Fuel Poverty in New Zealand — Implications for Policy

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Nahau te rourou
Naku te rourou
Ka ora ai te manuhiri

With your basket of knowledge
And my basket of knowledge
The people will prosper
Whakatauki (Maori proverb)

Abstract

Fuel poverty, or the inability to access or afford energy, impacts on the capabilities of households to attain a socially and materially needed level of energy services to participate in society. Fuel poverty is a significant social, economic, environmental and public health problem in New Zealand, affecting an estimated one in four households. The impacts of fuel poverty on the quality of life of households are manifested through people suffering from poor health due to inadequately heated housing, and people suffering deprivation in other areas of their lives. Several factors contribute to the relatively high levels of fuel poverty among New Zealand households — energy inefficient housing stock, rising residential fuel prices, low income, and social and behavioural factors. Despite this, the New Zealand government has been slow to respond to fuel poverty, with policies advocating for market led mechanisms over state interventions. Current policies are reactive, failing to find long-term solutions to this phenomenon. Current interventions have not factored in the voices of the fuel poor - what it actually means to live in fuel poverty in New Zealand.

There are four original contributions to knowledge made by this thesis. Firstly, this thesis offers a nuanced understanding of fuel poverty in Dunedin, New Zealand, using the energy cultures framework as a holistic outlook for looking at the drivers of energy behaviour and consumption choices. Secondly, it presents one of the first in-depth analysis of lived experiences of fuel
poverty in New Zealand, exploring the motivation, norms and practices that shape energy use. The current measures used in New Zealand for targeting fuel poverty are critically analysed, and new indicators are proposed based on the findings from this study. Third, taking into account the limitations of the Energy Cultures Framework, an expanded conceptual framework is presented which incorporates elements of the energy cultures, as well as adding family contexts and circumstance variables which may impact on fuel poverty. This new framework, called the Life-cycle based energy cultures framework, would allow the wider elements of fuel poverty, such as the social process and family needs, to be captured more comprehensively. The final contribution is a policy analysis of fuel poverty in New Zealand, with a critical review of existing measures, followed by proposing three policy scenarios for tackling fuel poverty in New Zealand.

A diverse methodological approach is taken in this thesis; synthesising existing literature, conducting a detailed qualitative analysis, incorporating policy evaluation, and a comprehensive stakeholder engagement to inform policy recommendations for mitigating fuel poverty. The findings of this thesis will provide useful insights and evidence to broaden the existing focus on insulation as a solution to fuel poverty, to looking at energy as an equitable service for all households and devising targeted interventions. Increased government investment and involvement, along with stronger political commitment and partnership with community and businesses are required if policies are to effectively decrease fuel poverty in New Zealand.

**Keywords:** fuel poverty, energy poverty, energy policy, policy analysis
Acknowledgements

The past five years of my life have revolved around this thesis, and there are many people who have supported and guided my path. I would like to start by paying my gratitude to Allah the Almighty, for guiding me and never leaving my side. I would also like to acknowledge the ancestors of this land. E ngā mana, e ngā reo e ngā karangarangatanga maha, tēnā koutou. Greetings.

This thesis would not have been possible without the participants of my study. Talking about their experiences of fuel poverty is not easy as they are letting me into a very vulnerable part of their lives. Thank you for selflessly sharing your stories and letting me into your lives briefly so I can help your stories to be heard.

I am grateful for the Todd Foundation for generously funding this thesis through the Energy Research Scholarship. I would also like to thank the University of Otago Doctoral Scholarship for contributing towards the PhD fees.

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I have been fortunate to have a very supportive research group at the Centre for Sustainability during my thesis tenure. Dr. Janet Stephenson has been a constant source of support, particularly in the early stages of my research. Her expertise, guidance and wisdom, and the ability to see the big picture never ceases to amaze me. Nicki Topliss not only provided
administrative support, she was also a mentor, encouraging me at every stage of this journey. I appreciate the helpful discussions from my colleagues at the Centre for Sustainability, and the opportunity to present my research. A big shout out to the supportive team at Otago Energy Research Centre for always finding an avenue to share my research, and for their financial assistance to attend conferences during my PhD.

I am also very fortunate to have the guidance from local experts in this field - Ian McChensey, Emeritus Professor Bob Lloyd, Rev. Dennis Povey and Scott Willis - the fuel poverty pioneer researchers in this field, whose opinions and contributions I value a lot. Thank you for paving the way for the next generation of researchers and for always being supportive of new ideas.

The time I spent in Dunedin was one of the best times of my lives. We have so many good memories of this beautiful and untouched place. Dunedin is very special, and it was made all the more special by 'my village' - thank you: Aana, Shahyr, Kai; Vishal and family; Nelu and family; Afroza and family; Sant Aunty; Brenda and family; Ana and Barb, my wonderful neighbours; and the North East Valley community family for all the wonderful memories, the meals shared and the laughter that helped me to keep going.

Last, by not the least, I could not have come this far without the help from my supportive dad and my amazing husband, Matt. My dad, Ibrahim Daud, has always believed in me, and one of the biggest gifts he gave me was to instil in me that my gender will not limit what I can achieve. My dad hung there with me until the end, never faltering in his encouragement. My handsome husband Matt - you have been with me every step of the way and have shared this difficult and amazing journey with me. We have supported each other through challenging phases - rearing a family, multiple job changes, moving countries, medical scares, and this thesis on top of it. Many times it has been stressful but you never let go, and you always, always believed in me.
Thank you to my beautiful kids, Sophie and Adam, for being my source of inspiration to keep going. Sophie told me, "Never give up" and Adam said "I hope you get good marks". Thank you to my supportive in-laws Liz and Art for always asking about how my work is going. Art always says "do good things" and I hope I can finally show that I did good. Finally, my crazy and wonderful family at Bigfish, especially Ozale my brother, for grounding me and keeping me going. Aroha i a koutou katoa tino nui. Varah loabivey. I love you all very much.

Fathimath McKague, June 2019
Personal Preface

I come from a warm and tropical country where exorbitant power bills and cold, damp houses are mostly not an issue. Then I moved to Dunedin, New Zealand! Ironically, we moved into a cold, old house in Brockville, a hilly suburb in Dunedin. My family was constantly cold, and we could not keep the house warm enough, nor keep up with the power bills. We soon realised that this was not an isolated case and all around us were families in similar circumstances to us. I became involved in a rental housing and health research conducted by Presbyterian Support Otago, and had the opportunity to see first-hand the impacts of fuel poverty on people’s lives. I was also fortunate to do a review of ‘Warm Dunedin - targeted rates trial’ for the Dunedin City Council, and hear from the residents about the benefits of a warm and healthy home. I was a part of the Dunedin-wide Cosy Homes initiative, later helping drive the North East Valley arm of it, which allowed me to see the difference collective, community-led effort had on reducing fuel poverty. Three meetings, one with Dr. Janet Stephenson and another with Professor Bob Lloyd and later with Ian McChesney, also changed how I thought about energy in New Zealand. These experiences and encounters influenced my perspective and passion for contributing to fuel poverty research. I was more determined to deepen my understanding of this field and contribute to fuel poverty policy and literature. New Zealand is a country I love as much as my birth country, the Maldives, and I hope to make a significant contribution to improving the lives of it’s people through my research.
Statement of Attribution


Chapter 7 is under review at Energy Research and Social Sciences as McKague, F., Wooliscroft, B. & Scott, M. Variations in fuel poverty across households in New Zealand.

Chapter 8 is under review at Journal of International and Comparative Social Policy as McKague, F., Wooliscroft, B. & Scott, M. Planning for future policy scenarios for mitigating fuel poverty in New Zealand.

For all the above papers, I was the lead investigator, responsible for concept formation, data collection and analysis, and manuscript composition. For Chapter 4, I received critical feedback from Dr. Scott, Assoc. Professor Wooliscroft, and Professor Lawson. For Chapter 3 and 5, helpful comments were received from both Dr. Scott and Assoc. Professor Wooliscroft. Dr. Matthew McKague provided invaluable guidance with \LaTeX{tex}troubleshooting.
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Chapter 1

Introduction

1.1 Overview

Fuel poverty, or the inability to access or afford energy, impacts on the capabilities of households to attain a socially and materially needed level of energy services to participate in society (Sovacool, Jansen, and Welle, 2017; Day, Walker, and Simoncock, 2016; Bouzarovski and Petrova, 2015). One in four households in New Zealand were estimated to be fuel poor in 2012 (Howden-Chapman, Viggers, Chapman, O’Sullivan, Telfar Barnard, and Lloyd, 2012). New Zealand has one of the highest winter mortality rates compared to other OECD (Organization of Economic Cooperation and Development) countries (Healy, 2003a). Low indoor temperatures has been linked to higher hospitalization rates (Telfar, 2010; Liddel, 2010), and 16% of cold-related deaths in winter (Davis, McLeod, Ransom, Ongley, Pearce, and Howden-Chapman, 1999). Despite these numbers, the current state of research only has a limited understanding of this phenomenon and its broader impacts in New Zealand.

Fuel poverty leads to two important effects: people suffering from poor health due to inadequately heated housing, and people suffering deprivation in other areas of their lives (Liddell and Guiney, 2015; Howden-Chapman, Viggers, Chapman, O’Dea, Free, and O’Sullivan, 2009). Household energy costs represent a significant portion of total household expenditure, and for many households, paying energy bills means going without other essentials such as nutritious food, or adopting economising behaviour in order to reduce household energy consumption (Harrington, Heyman, Merleau-
Recent research has shown the wider effects of energy poverty, including social impacts and effects on households’ quality of life (McKague, Lawson, Scott, and Wooliscroft 2016, 2017).

Several factors contribute to the relatively high levels of fuel poverty among New Zealand households — energy inefficient housing stock, rising residential fuel prices, low income, and social and behavioural factors all contribute to increasing fuel poverty rates (Lloyd 2006; McKague et al. 2016). Minimum insulation standards for housing in New Zealand were not introduced until 1978, and many houses lack sufficient insulation or efficient heating (Isaac 2004). Residential energy prices have risen sharply in the past ten years, intensifying the problem of fuel poverty for many households (MBIE 2016). The cost of living has increased in the past thirty years, however the average income has not risen significantly for the low income groups (O’Dea, 2000), leaving an increasing number of people struggling to pay their utility bills (Ministry of Social Development 2016). Lastly, New Zealanders have a strong cultural norm of putting up with cold homes, making behavioural and social factors one of the issues in this multifaceted phenomena (Cupples, Guyatt, and Pearce 2007; Cogan, Camilleri, Isaacs, and French 2006).

Efforts to date to curtail fuel poverty in New Zealand have been led by health impacts of living in a cold house, and have not resulted in decreasing fuel poverty levels across the nation (McChesney 2012). The responses to fuel poverty has been dominated by technical and economic approaches, which poses the threat of missing out on the human and social context of energy demand (Cooper 2017). Initial government responses have included changes to the physical structures of dwellings and providing a winter fuel payment for those in fuel poverty (Lloyd and Callau 2009). This is a good starting point for tackling fuel poverty, yet it does not capture the wider disadvantages faced by many people who live in fuel poverty (Scarpellini, Hernández, Llera-Sastresa, Aranda, and Rodríguez 2017). In particular, approaches used in New Zealand to measure and target fuel poverty tend to mask the diversity that exists within an increasingly heterogeneous population, and often fail to convey adequately what it means to be living in fuel poverty in New Zealand (McKague et al. 2016).

The contribution of this thesis comes from the integration of a broad
range of issues that impact on fuel poverty in New Zealand. The specific gap in literature that this thesis aims to fill is the limitations in how fuel poverty is framed and thus, how the policy responses to fuel poverty in New Zealand are limited in addressing the underlying causes and finding long-term solutions to this problem. This is particularly important as previous research in New Zealand has not considered the wider impact on the households, nor included their energy needs in devising measures and policies. This thesis provides important insights into the socio-technical energy interface in New Zealand and adds to the existing literature, and forms an original contribution by enhancing the development and understanding of fuel poverty in New Zealand. This thesis further identifies where gaps in literature still exist and provides recommendations to guide future research, policy and practice.

This research has four contributions; a) it applies the ‘energy cultures framework’ (Stephenson, Barton, Carrington, Gnoth, Lawson, and Thorsnes, 2010a) as a nuanced framework for understanding the broader drivers of fuel poverty, and proposes a multidimensional set of fuel poverty indicators for New Zealand; b) it explicitly focuses on the experiences of people in fuel poverty, and ultimately reflects the need to acknowledge the diversity and energy heterogeneity of households in finding solutions to decreasing fuel poverty; c) taking into account the limitations of the Energy Cultures Framework, an expanded conceptual framework, the Life-cycle based energy cultures framework, is presented which incorporates elements of the energy cultures, as well as adding family contexts and circumstance variables which impact on fuel poverty, allowing the wider elements of fuel poverty, such as the social process and family needs, to be captured more comprehensively and d) it critically reviews the current policy responses to fuel poverty in New Zealand, and offer fresh policy recommendations for mitigating fuel poverty.

1.2 Thesis Aim

The aim of this thesis is to significantly contribute to the understanding of fuel poverty in New Zealand, critically analyse the current policy measures to address fuel poverty, and to provide robust evidence-based policy recommendations for mitigating fuel poverty in New Zealand.
1.3 Rationale for this study

The rationale for this study arises from the need to recognise the extensive impacts of fuel poverty and aligning policies that support these, which are central to fuel poverty eradication. A comprehensive understanding of the drivers and impacts of fuel poverty will help target the limited resources and streamline services to provide fuel poverty assistance to a broader spectrum of households.

Understanding the full context of fuel poverty in New Zealand is important for a number of reasons as there are several factors which makes the situation in New Zealand unique. In New Zealand, housing is still lagging behind in building code with the majority of houses in some parts of the country lacking proper insulation or any forms of double glazing, central heating or efficient heating (Lloyd and Callau, 2009). New Zealand experiences relatively severe winter temperatures, especially in the colder parts of the South Island, emphasising that region-specific policies need to be formulated (McKague et al., 2017). There are socio-cultural factors associated with fuel poverty that are still not fully understood. A detailed understanding of the fuel poverty situation in New Zealand, and wider, impact-based measures are needed to better target policies and programmes.

To achieve these objectives this thesis will focus on three key areas: First, this thesis will explore the broader influences of fuel poverty on households, with the aim of better understanding the behavioural, social and context specific factors that drive fuel poverty. Secondly, building on from the findings of the qualitative study, this thesis will present a nuanced framework for looking at fuel poverty. A comprehensive set of fuel poverty indicators will be proposed that could be used to target interventions and widen the scope and breadth of fuel poor households reached. Third, this thesis will also examine the limitations of current fuel poverty policy measures in New Zealand and propose future policy scenarios as long-term solutions to decreasing fuel poverty in New Zealand.
Overall thesis aim: A comprehensive understanding of fuel poverty in New Zealand and implications for policy

<table>
<thead>
<tr>
<th>Study</th>
<th>Aim</th>
<th>Objectives</th>
</tr>
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<tbody>
<tr>
<td><strong>Chapter 5</strong> Theoretical analysis of fuel poverty</td>
<td>To propose a comprehensive framework for conceptualising fuel poverty</td>
<td>Moving beyond income and technical measures to focus on wider social factors that influence energy poverty, explore the interactions between these factors and from the external environment, investigate how energy poverty can be better understood and thus have targeted policy measures by using the energy cultures framework</td>
</tr>
<tr>
<td><strong>Chapter 6</strong> Empirical study on the lived experiences of fuel poverty</td>
<td>A detailed qualitative study to investigate the lived experiences of households in fuel poverty</td>
<td>To explore the energy consumption habits and coping mechanisms of fuel poor households, to capture the lived-in experiences of fuel poverty, to compile a multi-dimensional set of fuel poverty indicators for New Zealand</td>
</tr>
<tr>
<td><strong>Chapter 7</strong> Variations in fuel poverty across households</td>
<td>A second qualitative study which looks at the wide variations amongst households in how they prioritise energy</td>
<td>To use the family life cycle to frame fuel poverty in terms of family contexts and circumstances which may impact on energy usage, in addition to bridging the gaps in Energy Cultures Frameworks, as well as the family life cycle, this study also proposes a new conceptual frameworks for looking at fuel poverty - the Lifecycle based energy cultures framework.</td>
</tr>
<tr>
<td><strong>Chapter 8</strong> Policy scenario planning and recommendations</td>
<td>To critically analyse existing policy responses to fuel poverty, and to propose policy scenarios for mitigating fuel poverty</td>
<td>To form a detailed analysis of current measures and responses to fuel poverty in New Zealand, to propose three scenarios as future measures to tackle fuel poverty, to call for a strong policy commitment from the government to tackle fuel poverty in New Zealand</td>
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Overall thesis objectives:
- To better understand New Zealand households' experiences of fuel poverty, and their understanding of what energy hardship means
- To critically analyse how fuel poverty is conceptualised and measured in New Zealand
- To look at the broader variables that impact on households in fuel poverty
- To formulate a comprehensive set of fuel poverty indicators for New Zealand
- To critically evaluate the impact of current fuel poverty policy measures
- To explore and recommend future policy scenarios for alleviating fuel poverty in New Zealand

Figure 1.1: Outline of the aims, objectives and the three main studies of this thesis
1.4 Contributions of this thesis

The contributions of this thesis are formed by three areas of work:

- a holistic understanding of how fuel poverty is framed in New Zealand, and using an integrative framework for understanding the drivers of energy poverty
- a detailed qualitative analysis capturing the lived experiences of New Zealand households in fuel poverty, and the choices and trade-offs they make for thermal comfort
- a new conceptual framework that encapsulates energy cultures framework and the family life cycle which offers a comprehensive outlook of fuel poverty, taking into consideration family contexts and circumstances
- a critical policy analysis of existing responses to fuel poverty in New Zealand, and proposing three policy scenarios as future measures to tackle fuel poverty

The specific and novel contributions of this thesis include developing a new conceptual framework for looking at fuel poverty. Previous research on fuel poverty had looked at this condition in isolation from the context within which it occurs, and were removed from the person engaging in the energy behaviour. By using the lens of the Energy Cultures Framework (ECF) to look at fuel poverty, this thesis will bring in the wider variables and nuances around energy decisions, focusing on how different elements of the framework link together and influence fuel poverty. Applying ECF highlights the varying impacts of fuel poverty, bringing energy behaviour, decisions and environmental influences to see how they interact with energy services. Factors previously not associated with fuel poverty such as stress, time spent on sourcing firewood and distinct coping mechanisms of households will be novel contributions. In addition, this thesis will also expand the theoretical framework ECF. The research will provide a rich continuum of energy decisions as families progresses through the different family life cycles, and explore how their energy consumption patterns change and evolve as they move in and out of the various family stages. The findings will also address some of the limitations of ECF by factoring in categories of
households needs at different stages. More details into how different energy behaviour and preferences manifest from the same core values, but as family circumstances change how different aspects of these values are salient will be examined. The focus on these details including the social, cultural and context specific needs in understanding fuel poverty will add to the theoretical understanding of knowledge and will make a significant contribution to fuel poverty literature. Finally, this thesis will bring different theoretical models to create a comprehensive one that is built on the strengths of each, at the same time trying to eliminate the gaps the individual models bring. This is the first time such level of detailed lens will be cast on fuel poverty to critically analyse the behaviour patterns and choices of households. This new framework that links ECF with Family Life Cycle will provide nuanced details into fuel poverty looking at the different values, tensions, coping mechanisms and social aspects of energy in households. This is also the first time household circumstances and family contexts will be used in framing energy behaviour to design more streamlined interventions to the different household needs to lift people out of fuel poverty.

1.5 Thesis objectives

The specific aims and objectives of this thesis are to;

1. To better understand New Zealand households’ experiences of fuel poverty, and their understanding of what energy hardship means
2. Critically analyse how fuel poverty is understood and measured in New Zealand
3. Look at the broader variables that impact on households in fuel poverty
4. Formulate a comprehensive set of fuel poverty indicators for New Zealand, as well as a new conceptual framework for capturing fuel poverty
5. Critically evaluate the impact of current fuel poverty policy measures
6. Explore and recommend future policy scenarios for alleviating fuel poverty in New Zealand
1.6 Thesis positioning

To inform the theoretical and empirical grounding of this research, this thesis is positioned in the energy services literature. The energy services literature is embedded in energy studies, towards understanding energy as a service and system, something that people interact with and make decisions about concerning their energy usage (Buzar, 2007; Petrova, Gentile, Makinen, and Bouzarovski, 2013). Most of the existing research on energy behaviour has been focused on the residential sector (Anne, 2007; Bell, Lowe, and Roberts, 2010; Becker, Seligman, Fazio, and Darley, 1981), with the majority of these studies stemming from environmental psychology fields (Wang, B, and Zhang, 2011; Steg and Vlek, 2009; Abrahamse and Steg, 2009). These studies have been dominated by the technical and economical aspects of energy usage, while limiting focus on the human and social elements of it. Some studies recognise that social factors are important determinants of energy behaviour (Roberts, White, Preston, and Thumim, 2007), but our understanding of the variables linked with household energy consumption still remains largely embedded in the technical and expenditure based viewpoints (Lloyd and Callau, 2009).

Out of the energy literature, the dominant work on fuel poverty have focused on the physical structure of dwellings and appliances, the economics of household expenses of energy, and the epidemiological aspects of cold housing on health (Clinch and Healy, 1999, 2000; Harrington et al., 2005). However, one of the challenges of addressing fuel poverty is that energy consumption has multiple drivers of behaviour which are not easily captured using a single indicator based on economic or technical measures (Stern, 2014; Sovacool, Cooper, Bazilian, Johnson, Zoppo, Clarke, and Raza, 2012b). The social, cultural and behavioural underpinnings of energy poverty, and how these interact with the material culture and technical dimensions could provide new insights into how energy hardship is formed and changes over time. And to comprehensively address fuel poverty there is also a need to understand how energy decisions are made, and how these decisions form part of a larger energy service for households (Sovacool et al., 2017). This has prompted a call for multi-disciplinary approaches to fuel poverty (Sovacool et al., 2017; Stern, 2014), one that extends beyond just the technology used or income spent on fuel, and encompasses the social and psychological...
concepts of fuel poverty.

One such approach, the ‘Energy Cultures’ conceptual framework assists in understanding the factors that influence energy consumption behaviour, and helps identify opportunities for behaviour change (Stephenson et al., 2010a). The Energy Cultures Framework (ECF) proposes a model of energy consumption that is built up from three core elements: material culture, cognitive norms and energy practices, and suggests that energy behaviour is influenced by the interaction between the three elements of the framework and the external factors influencing them. The ECF brings together the dwelling and appliance specifications along with the social elements of norms, beliefs and daily practices of how people use this energy. These rich insights will add to our understanding of fuel poverty by providing knowledge of how energy decisions are formed, the way people engage with energy services and expectations they have around energy usage. This information is critical in designing interventions that provide a deeper understanding of the cycle of fuel poverty and help people out of this condition.

This thesis recognises the limitations of the ECF as well. The ECF, while it encompasses a much broader level of variables than existing fuel poverty literature, the framework is limited in capturing the various circumstances and situational contexts that might also impact a household’s energy consumption level. Therefore, only using the ECF may lead to missing out on the wider disadvantages and varying needs faced by many families. For this reason, this research has also used the Family Life Cycle (Murphy and Staples, 1979) (FLC) to add further insights and help our understanding of how fuel poverty levels are influenced by family circumstances and life stages. By using the broad theoretical and empirical lenses of ECF and FLC, this thesis aims to capture a wider range of variables that impact on fuel poverty and highlight the heterogeneity of consumers which could require distinct interventions. It is for this reasoning that the work in this thesis is positioned in the energy field. A detailed reasoning of why this positioning is taken is also explained in Chapter 3.

1.7 Terms and definitions used in this thesis

‘Energy poverty’ is commonly used to describe problems of energy deprivation in the homes (Bouzarovski, 2014), including a host of economic, in-
Infrastructure, social equity, education and health concerns from inadequate energy access in both the developed and developing world (Pachauri and Spreng, 2011; Sovacool, Sidortsov, and Jones, 2014). Energy poverty is widely used to describe issues of domestic energy deprivation in UK (Liddell, Morris, McKenzie, and Rae, 2012), Europe (Bouzarovski, Petroval, and Sarlamanov, 2012). Fuel poverty has also been used to mean the same concept. I used energy poverty because it is widely recognised in this field to mean ‘domestic energy deprivation resulting from inadequate income, housing and energy appliances’. This terminology has been expanded by Bouzarki and Patrova (Bouzarovski and Petrova, 2015) to focus on the material and social aspects of the relationship between energy services, which has been considered by researchers in this field to be a more accurate representation of fuel poverty terminology (Sovacool et al., 2012b).

The term ‘fuel poverty’ was originally coined in the UK to address problems of cold and energy-inefficient homes and their association with health and well-being (Boardman, 1991). Fuel poverty encompasses a more technical term and is defined as the need to spend more than 10% of a household’s income on energy needs. This is a narrow way of thinking of fuel poverty and focuses only on the income aspects of being fuel poor when there are many dimensions to energy deprivation (Hills, 2012). A detailed presentation of the different definitions and measures of energy poverty are provided in Chapter 2.

The term energy vulnerability lacks a clear definition and is therefore not preferred in this study (Middlemiss and Gillard, 2015). Much of the work on energy vulnerability is focused on who is vulnerable and who is not, often based on top-down demographic or geographic characteristics (Yohe and Tol, 2002). Other qualitative work focus on why people are vulnerable looking at their life situations (Brown and Walker, 2008). The limitation of this approach is that households interpretation of their own vulnerability could be dependent on their understanding of what is socially acceptable (Middlemiss and Gillard, 2015), and such an approach does not address the structural challenges facing households.

In this thesis, ‘energy poverty’ and ‘fuel poverty’ are used interchangeably. ‘Energy deprivation’, ‘energy hardship’ and ‘energy affordability’ are also used to explain the general concept. This thesis focuses on all household fuels, including electricity, wood, coal, gas and any other fuels that
contribute to household energy use in New Zealand. Transport has impacts on poverty and fuel poverty, however transport is not included in this particular research as it is very broad and was outside the immediate objectives of this thesis.

Other studies have also used fuel poverty synonymously with energy poverty (Buzar, 2007; Heffner and Campbell, 2011; Lloyd, 2006). A study comparing energy poverty and fuel poverty notes that although they are considered separate problems, in some instances there are overlaps with people being both energy poor and fuel poor (Li, Lloyd, Liang, and Wei, 2014). For a detailed understanding of the differences between energy poverty and fuel poverty please refer to Li, 2004 (Li et al., 2014).

The definition of energy poverty used in this thesis is:

*the inability to access or afford energy, impacts on the capabilities of households to attain a socially and materially needed level of energy services to participate in society* (Bouzarovski and Petrova, 2015)

This outlook is adapted from classic theories of justice (Rawls, 2009; Sen, 2011; Nussbaum, 2003), which applies principles of energy justice to ensure that the marginalised or vulnerable have equal access to energy (Nussbaumer, Bazilian, and Moeli, 2012). Energy justice theory argues that energy decisions should be guided by consideration of fair share of resources among all living beings, where basic welfare interests outweigh non-basic welfare interests (Sovacool et al., 2017).

1.8 Fuel poverty in the context of general poverty

Most researchers in this field stress that fuel poverty is a phenomenon in its own right and not simply a manifestation of poverty in general (Boardman, 2010; Hills, 2012; Lloyd, 2006), while others note that a high degree of correlation between poverty and fuel poverty can be expected (Pachauri and Spreng, 2004; Li et al., 2014). Historically, income has been the main focus of poverty, reflected in the macro-economic indicators like Gross National Product per head (Maxwell, 2009). Later, this concept was broadened to include not just failure to meet a certain income level, but rather as a failure to keep up with the standards prevalent in a given society (Maxwell, 2009; Stern, 1984).
There is a close relationship between poverty and lack of access to adequate and affordable energy services (Sen, 1976; Bouzarovski et al., 2012). Many households on low income have fewer means to improve their energy sources, and at the same time have to pay more of their income on expensive and inefficient sources of energy (Karekeze and McDade, 2012; Thomas, 2008). Thus, poverty includes both lack of access to income, as well as inability to access affordable services, such as clean and safe energy options. Fuel poverty, and general poverty, act as barriers for opportunities and social inclusion, and are linked with low social mobility and widening inequality (Rashbrooke, 2013; Wilkinson and Pickett, 2009). Fuel poverty has certain characteristics that makes it distinct from general poverty. Poverty can be eradicated through income support, whereas fuel poverty takes into account the contributions of inadequate income, energy inefficient housing and heating sources, with fuel prices and electricity prices being important contributing factors (Boardman, 2012a).

1.9 Theoretical foundation and methodological perspective

Ontology and epistemology guide the research paradigm of this thesis. The first is ontology or ‘the reality or the study of being’, meaning things that exists in the world which researchers can acquire knowledge about (Moon and Blackman, 2014). This research has used subjectivism ontology to guide and structure the research. Subjectivism ontology perceives that social phenomena is created from perceptions and actions of those social actors concerned with their existence (Hudson and Ozanne, 1988).

Embracing this ontology, this thesis is based on the view that reality is socially constructed and is subjective to change. Social constructivism involves instances where humans understand their world through the experiences and interactions they have with the outside world, producing and reproducing the societal systems they are in (Piaget, 1951; Jaramillo, 1996). Social constructivism perspective believes that individuals constructs these world views through their interactions, therefore no two people share the exact same views of the same phenomena. These distinct ideologies form unique values, norms and outlooks that at times can differ and clash with those around (Bates and Sangra, 2011). And this clash between world views
is important to learning new concepts and behaviour \cite{Bates2011}. More details of social constructivism and how it relates to fuel poverty are covered in Chapter 4.

Epistemology guides this research through the relationship between the researcher and this reality \cite{Patton2002}. This thesis has taken a strong interpretivist epistemological viewpoint, recognising that reality is interpreted differently by different people based on their social context and subjective perception of reality \cite{Crotty1998}. A strong epistemological stance was important for the validity and reliability of this research, and how the findings were framed to discover knowledge. Using an interpretivist epistemological view, this research is based on the outlook that humans construct knowledge as they engage with and interpret the world around them \cite{Crotty1998}. The researcher believes that individuals construct meaning of the same phenomenon in different ways, and how they interact with and understand the world are based on their cultural, historical and social perspectives \cite{Creswell2012}. Using this viewpoint, this thesis is guided by a flexible research structure which is receptive to capturing the different meaning in participants’ experiences of fuel poverty. The researcher remained open to new knowledge throughout the study and let it develop with the help of informants.

The third principle guiding this research is the philosophical perspective of the researcher in shaping the interpretation, communication and application of results \cite{Guba1994}. My philosophical perspective structures the approach I have taken to research, through ontology and epistemology. Phenomenology underpins this philosophical perceptive, where I separated my own experiences to understand the essence of the human phenomena, which is fuel poverty, under study \cite{Cunliffe2011}.

This thesis uses the Energy Cultures Framework \cite{Stephenson2010a} (ECF) as a conceptual framework to guide the methodology and analysis. This framework offers a nuanced way to study and capture fuel poverty that shows how the different elements of the framework interact and influence one another. The energy cultures framework has elements similar to Gidden’s (1984) ‘social practice’ theory \cite{Giddens1984}. Social practice theory is also often used to understand the dynamics between agency, structure and context \cite{Brown2001, Reckwitz2002, Hargreaves2011}. In practice theory, a practice is formed by a routinised behaviour
which involves elements of individual activities, materials, and shared competencies (Giddens, 1984). As Giddens (1984) argues, these practices are interconnected with other practices (e.g., practices of heating the house and practices of closing the windows) and are shaped by the wider political, economic, legal, and cultural structures. Practice theory could have been used in this study, however the Energy Cultures Framework was preferred as it brings together energy specific elements, such as barriers and facilitators to fuel poverty, which would offer a rich depiction of fuel poverty over what social practice theory might have provided. Similarly, social constructivism theory could have been also applied in this context. Social constructivism approach puts forward the notion that human beings "construct" understanding of their world through the experiences and interactions they have with the outside world and comparing these with existing beliefs (Piaget, 1951; Jaramillo, 1996). Under this paradigm, the process of social interactions individuals receive on a daily basis from their peers and social circles forms to strengthen their understanding of the world, and learning and behaviour change is thus considered to be “largely situation-specific and context-bound” (Eggen and Kauchak, 1999). Again, by choosing to focus on the elements of ECF this thesis brings in elements of social and external influences as one of the elements of ECF is external impacts. The energy cultures framework has been used in other studies focusing on energy (Lawson, Robertson, and Wooliscroft, 2016; Hopkins and McCarthy, 2016; Bell et al., 2010; Stephenson et al., 2016a; Sweeney, Kresling, Webb, Soutar, and Mazzarol, 2013), demonstrating that this is a useful tool for understanding energy behaviour. More details of how the ECF draws parallels to practice theory is covered in Chapter 3.

1.10 Thesis organisation

This thesis comprises of nine chapters. Chapter 1 gives the overall overview and layout of the thesis. This is followed by Chapter 2, which is a literature review of fuel poverty, focusing on the local background and relevant work related to the main theories and work covered in this thesis. Chapters 3, 4 and 5 provide details of the conceptual models and theoretical backbone of this thesis, outlining the methodology used.

To fulfil the aims and objectives of this thesis, three investigations were
undertaken, in order to find answers to the following three research questions:

- How is fuel poverty looked at in New Zealand?
- What are the broader impacts of fuel poverty in New Zealand?
- What are the policy measures needed to reduce fuel poverty from New Zealand?

The reminder of this thesis is structured around these three studies which address the above research questions. Figure 1.1 illustrates the aims of each study and how it contributes to the overall objectives of this thesis.

Finally, Chapter 9 offers a synthesis of the findings of this research, comprising of a broad conclusion and implications of this research. This is where the work completed is reflected upon and suggestions for future work are given. The key contributions of this thesis are summarised, and it concludes by restating the need to provide warm, dry homes and affordable, accessible and sustainable energy for all New Zealanders.
Chapter 2

Fuel poverty in New Zealand
— Background

This chapter will introduce the key concepts around fuel poverty, including the current theoretical frameworks, and gaps in existing literature. First, the broader concept of energy and its impacts on everyday lives are presented, stressing the important role energy plays in sustaining households and societies. Highlighting the gaps in current literature on energy behaviour, the positioning of this thesis will also be evident. The literature specific to fuel poverty will be presented as well, exploring how fuel poverty is distinct from general poverty. More specifically, this chapter looks at how the current measures of fuel poverty have been conceptualised, what the measures capture, and the shortcomings of existing measures. Next, the fuel poverty situation in New Zealand is examined, focusing on the drivers and impacts of prevalence of fuel poverty here. A review of the existing fuel poverty policy responses in New Zealand follows. Finally, this chapter will conclude with calling for a better understanding of the wider impacts of fuel poverty, and stronger policy responses to mitigating fuel poverty in New Zealand.

2.1 Energy as a fundamental need

Energy is an integral part of our lives. Energy is not only used to fulfil our basic needs, but it plays a vital role in the development and prosperity of a healthy society (Lutzenhiser, 1993). Affordable and accessible energy is a necessity for households and communities (Stern, 1984). To be able to be
warm, to be free from intense worry about paying fuel bills, to be able to afford adequate hot water and light – these are part of the human rights as outlined in the United Nation’s Declaration \cite{United Nations, 2013}. Global efforts to improve access and efficiency of household energy form a major part of alleviating poverty, and are considered fundamental to meeting the United Nation’s Sustainable Development Goals \cite{United Nations, 2016}. For some people, energy is becoming increasingly less affordable and accessible, leading to fuel poverty \cite{Boardman, 1991}.

In today’s society, energy is not an optional purchase. As Boardman reasons:

\textit{everyone needs to purchase fuel to provide essential energy services such as; warmth, hot water and lighting…these are not discretionary purchases but absolute necessities} \cite{Boardman, 2010} (pg 26)

Beder also notes:

\textit{electricity is not a commodity that consumers can choose to take or leave depending on price and supply; it is an essential service central to the maintenance of modern lifestyle} \cite{Beder, 2003} (pg 19)

Although energy is a necessity for many aspects of life, it is becoming increasingly harder for some segments of the population to access and consume energy as readily \cite{Healy and Clinch, 2004a, International Energy Agency, 2001, United Nations, 2013}. Rising energy costs are most deeply felt at the household and individual level. Some households often pay a sizeable portion of their income on energy, yet live in cold, damp homes and often their energy sources, and appliances that use energy sources such as heaters, are energy inefficient \cite{Geller, 2003}, leading to a condition known as energy poverty.

2.2 The shortcomings of the existing literature on energy poverty

Access to energy services is considered fundamental to basic human needs, and impacts on the well-being, health and safety of households in many
positive ways (IEA, 2006). Yet, energy hardship is a reality for more than one-third of the world’s population who have limited access to modern energy services and thus suffer the negative consequences associated with lack of energy. Several researchers across the world have been focusing on studying this area in order to improve our understanding of household energy use patterns, eradicate energy poverty, address environmental concerns and mitigate greenhouse gas emissions (National Energy Action, 1999). However, despite more than three decades of effort our understanding of the variables linked with household energy consumption remains limited (Pachauri, 2007; Laitner, 2007). Engineering, economics, psychology, sociology, and anthropology have been the main contributors to the field of household energy use and each approach has its own biases, frameworks, and techniques (Keirstead, 2006). To tackle energy problems researchers need to understand how people make energy decisions, and how energy forms part of a wider system and service for households (Stern, 1986, Sovacool, 2017).

Energy studies have been dominated by the physical-technical-economic models of energy consumption (Hart and de Dear, 2004; Stokes, Rylatt, and Lomas, 2004; Leach, 1992). The missing elements of this research angle is people as active users of energy systems (Wilhite, 2000). As Stern described in his 1986 work, heavy reliance on technical and economic theories has misinformed policies by focusing attention on such concepts and away from the social and psychological concepts which are also vital to include in fuel poverty discussions (Stern, 1986). Energy consumption routines involve complex cognitive, social and behavioural processes which when applied have improved the accuracy of the technical and economic models by factoring in individual motivation and information levels (Rogers, 2003). Behavioural models such as the theory of planned behaviour (Ajzen, 1991), have also added to the mix how energy attitudes are formed from individual beliefs which results in behavioural outcomes. These individual values and beliefs do no occur in a vacuum, but exist within broader social transformations and contexts (Shove, 2003; Guagnano, Stern, and Dietz, 1995).

Thus, an integrated approach to energy use, which incorporates social and behavioural determinants, as well as economic and technological aspects of energy consumption is important to provide a comprehensive understanding of fuel poverty (Keirstead, 2006). The energy snapshot of a household is not only dependent on how members use appliances or how much they spend
on energy. It encompasses household decisions based on complex interactions between technical (whether to use a heat pump or fireplace), economic factors (fuel prices), social factors (gender role in energy practices), cultural factors (cooking preferences) and environmental factors (number of sunshine hours) (Leach, 1992; Masera, Saatkamp, and Kammen, 2000). Thus, there are a number of inter-related factors that affect household energy choices that must be addressed in understanding the problems around and solutions to fuel poverty.

Energy should be considered as a service, and not only as a quantity of energy demand (Kowsari and Zerriffi, 2011). Energy services is used to describe the benefits one receives from energy, such as light, warmth or cooked meals (Pachauri and Spreng, 2004). While some studies acknowledge energy as a service (Sovacool, Cooper, and Bzailian, 2012a; Petrova et al., 2013), it is assumed that energy service requirements are constant and base estimates on fuel prices and income, and fail to factor in the variations in energy use behaviour. This gap in literature provides a basis for using an alternative conceptual model for studying energy consumption that provides a more comprehensive outlook of household energy. The Energy Cultures Framework (Stephenson et al., 2010a) used in this thesis acts as a basis for building new theoretical and empirical insights into energy patterns. At the centre of this framework is the interaction between, and the relationship amongst the different variables of technology, environment, behaviour, values and practices which influence the energy profile of households. One of the advantages of the framework is that it incorporates energy services and the human side of energy use to create a more nuanced look at fuel poverty.

2.3 Various measures of fuel poverty

Fuel poverty has always existed, but understanding the drivers and causes arising from it are relatively new (Lewis, 1982). Fuel poverty first gained the attention of researchers and policy makers around the 1970s, coinciding with the oil price hikes of 1973, which lead to increase in residential energy prices (Bradshaw and Hutton, 1983). Fuel poverty was first defined as the inability to pay for adequate warmth due to energy inefficient housing and high energy prices (Lewis, 1982; Hutton, 1984; Osbaldeston, 1984). Boardman (1991) refined this to a measurable definition, standardizing the condition
to an income-based measure. Boardman’s definition of fuel poverty states:

*A fuel poor household is one which needs to spend more than 10% of its income on all fuel use and to heat its home to an adequate standard of warmth. This is generally defined as 21 degrees in the living room and 18 degrees in the other occupied rooms – the temperatures recommended by the World Health Organisation.*

(Boardman 1991) (pg 36)

Early definitions of fuel poverty, such as Boardman’s 10% measure, were adapted from classic definitions of poverty and they reflect an absolute, rather than a relative condition of fuel poverty (Townsend 1979). The 10% definition is based on what people would need to spend on energy, rather than their actual energy expenditure (Isaac 2004). This attracted criticism from researchers on how the 10% measure is limited in capturing segments of households who are voluntarily cutting back on energy (Liddell, Morris, McKenzie, and Rae 2011; Moore 2011; Hills 2012). Households routinely underspend on household energy, for example, by self-rationing or not heating their homes due to financial constraints, a practice common among low income households (Lawson and Williams 2012a; Liddell and Guiney 2015; O’Sullivan et al. 2011). This was supported in Lloyd’s (2006) findings, showing New Zealanders use much less residential energy per capita than most other developed countries, and that much of this discrepancy is attributed to low levels of space heating used by households (Lloyd 2006). A 2011 review of low income households by the Energy Efficiency and Conservation Authority (EECA) noted that for many of these households, energy hardship often translates into cutting back on space heating as the first method of coping with high power bills (EECA 2011). Furthermore, Isaac et al (2006) found that during winter months, half of all New Zealand homes do not meet the WHO’s recommended indoor heating temperature of 18 degrees in the living room (Isaacs, Camilleri, French, Pollard, Saville-Smith, and R 2006).

Critics also noted that the 10% measure failed to capture the deprivation and social exclusion element of fuel poverty, focusing heavily on income indicators (Thomson and Suell 2013; Buzar 2007; Middlemiss and Gillard 2015). Research has shown that vulnerability to fuel poverty does not bear a simple relation to income, even when using the expenditure approach to estimate it (Li et al. 2014; Healy and Clinch 2004b). An analysis of fuel
poor households in Ireland in 2008 showed the share of each income group in fuel poverty according to the expenditure-based definition, highlighting that in contrast to Boardman’s measure that fuel poverty mainly affects those in the low income groups, significant proportions of second and third income groups were also within this threshold (Scott, Lyons, Keane, McCarthy, and Richard, 2008). This shows that simply comparing average energy consumption with income conceals the wide variations in energy use within households that may seem demographically similar but have different energy needs (Scott et al., 2008).

In 2011, stemming from the criticisms of the 10% measure, and following on from an in-depth review of fuel poverty in the United Kingdom, a new measure of fuel poverty was proposed (DECC, 2013). Called the Hill’s measure, this new measure classified households to be in fuel poverty by a dual attribute of ‘low income, high cost’ (LIHC) indicator, where households were fuel poor if their household income were below the official poverty line, and their energy costs were higher than the median amount (Hills, 2012).

Hill’s measure is a relative measure of fuel poverty, as opposed to Boardman’s absolute measure, and will be less affected by fluctuating energy
prices (Moore, 2011). Hill’s measure has also encountered its fair share of criticism (Boardman, 2012b; Moore, 2011). The criticism cover being complex and non-transparent as a result of its equivalisation of fuel costs, and its focus on larger under-occupied properties, while excluding many low-income households living in smaller homes with poor energy efficiency (Liddell et al., 2011).

While Hill’s measure addresses some of the limitations of the 10% measure, both the measures fail to address the wider concepts of fuel poverty that extends beyond income limits (Pereira, Freitas, and de Silva, 2011). Both of these measures have been driven by the energy benefits of tackling fuel poverty (Lloyd and Callau, 2009), but the non-energy benefits — for instance: less stress, greater comfort, the full use of the home and improved quality of life, can be greater than the energy-related benefits, but are rarely included in any measure (Heffner and Campbell, 2011; McKague et al., 2016). Energy has multiple drivers of behaviour, and it is a combination of these — economic, social, environmental and behavioural factors that needs to come together to adequately capture fuel poverty (Nader and Becker, 1980; Pachauri and Spreng, 2011; Shove, 2003; Stephenson, Barton, Carrington, Doering, Ford, Hopkins, Lawson, McCarthy, Rees, Scott, and Thorsnes, 2015a; Cooper, 2017).

2.4 A multidimensional measure of fuel poverty

While it is important to take a broader look at energy, the main challenge of identifying and measuring fuel poverty is that energy behaviour is not easily captured in one indicator. While previous research has focused on technical and economic measures (Hills, 2012; Clinch and Healy, 2001), others (Buzar, 2007; Harrington et al., 2005) stress energy consumption as subjective and context specific. Leading energy researchers have called for a multidimensional view of energy behaviour research — one that includes the context of actions and sees attitudes-behaviour processes as embedded in the larger systems of beliefs, events, institutions and background (Stephenson et al., 2010a; Stern, 2014). This view is encompassed in the energy cultures framework, which proposes that the variance in energy use across individuals can be linked to a combination of norms, material culture and energy practices that interact with each other to create self-reinforcing habitual patterns of
energy behaviour \cite{Stephenson2010}. The energy cultures framework will be presented in more detail in Chapter 3.

Leading on from this need to capture multiple variables, a more recent definition of fuel poverty was proposed in 2014, where fuel poverty was defined in the context of energy as a service, one that interacts and influences occupants’ behaviour \cite{Bouzarovski2015}. Fuel poverty was argued to be more than just an economic restraint, but one which impacts on the capabilities of households to attain a socially and materially needed level of energy services to participate in society \cite{Day2016, Sovacool2017}. This thesis adopts the ‘lack of access to energy services to participate in society’ to conceptualise fuel poverty. The reason for choosing ‘access to energy service’ \cite{Bouzarovski2015} to view fuel poverty is that it stresses on the interaction between the individual and energy services, and the way households respond to and choose different aspects of energy services. This viewpoint offers the advantage of capturing the wider indicators of energy services that are important in a measure of fuel poverty. A limitation of using ‘access to energy services’ definition to look at fuel poverty could be that the broader variables, such as quality of life indicators, will be harder to measure compared to previously used measures of economic or technical impacts of energy. Despite this limitation, using this definition to look at fuel poverty captures different aspects of energy usage and interactions which have not been factored in fuel poverty research before.

Table \ref{table:1} outlines the four leading ways fuel poverty have been framed, along with the strengths and limitations of each.

### 2.5 Fuel Poverty in New Zealand

While the terminology ‘fuel poverty’ was not widely used in New Zealand until 2006 \cite{Lloyd2006}, signs of energy hardship was evident from early on \cite{Rennie1989, King2003, Miller2005}. However, it was only in the early 1990s that researchers in New Zealand started taking an active interest in this topic. In the 1990s, economic reforms saw electricity prices increase to market rates, income fell for low-income households and market rentals introduced for state housing tenants \cite{Kelsey2015, McChesney, Smith2006}. Urbanisation and low income were linked
<table>
<thead>
<tr>
<th>Measure</th>
<th>Strength</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inability to pay for adequate warmth (Lewis, 1982)</td>
<td>Early definition captured the broad concept of fuel poverty which first linked energy to housing and income</td>
<td>Inability to pay for adequate warmth could be for any reason</td>
</tr>
<tr>
<td>Spending more than 10% of income on energy (Boardman, 1991)</td>
<td>Easy to measure and administer</td>
<td>Reflects an absolute rather than a relative condition of fuel poverty</td>
</tr>
<tr>
<td>Low income/high cost ratio (Hills, 2012)</td>
<td>Relative measure less affected by fluctuating energy prices</td>
<td>Complex and non-transparent as a result of its equivalisation of fuel costs, and focus on larger under-occupied properties</td>
</tr>
<tr>
<td>Affecting the capability of households’ to participate in society (Bouzarovski and Petrova, 2015)</td>
<td>Social indicators not only focused on income</td>
<td>Conditions may differ depending on society and context, and quality of life indicators may be difficult to quantify</td>
</tr>
</tbody>
</table>

Table 2.1: Fuel poverty measures and their limitations
with the increased dependence on electricity in New Zealand. By 2010, 86% of energy costs were driven from electricity (EECA, 2011). The 2006 New Zealand Living Standards Survey, which measures the individual deprivation index, found that 36% of households put up with feeling cold in order to save costs on energy, and 7% lacked the ability to keep the main rooms of the house adequately warm to the WHO standards (Salmond, Crampton, King, and Waldergrave, 2006). Furthermore, 10% reporting cutting back on heating in order to afford other basics such as food.

Using the 10% definition, fuel poverty rates in New Zealand were estimated in 2001 to be between 10% and 14% (Lloyd, 2006). More recent figures estimated that one in four New Zealand households were experiencing fuel poverty in 2012 (Howden-Chapman et al., 2012). Table 2.2 shows the varying rates of fuel poverty across New Zealand. Some researchers fear that the actual level of fuel poverty in New Zealand could be even higher than what is recognised, and this difference could partially be attributed to the limitations of the measure used (McChesney, 2012; McKague et al., 2016).

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<tbody>
<tr>
<td>Auckland</td>
<td>6%–8%</td>
<td>14%</td>
</tr>
<tr>
<td>Wellington</td>
<td>9%–14%</td>
<td>24%</td>
</tr>
<tr>
<td>Christchurch</td>
<td>18%–25%</td>
<td>40%</td>
</tr>
<tr>
<td>Dunedin</td>
<td>26%–32%</td>
<td>47%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>10%–14%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Table 2.2: Estimated rates of fuel poverty in New Zealand (Lloyd, 2006; Howden-Chapman et al., 2012)

Fuel poverty in New Zealand is exacerbated by a combination of factors: cooler climate, especially in the South Island; the changing population demographics across the country; rising residential energy prices; older housing stock; widening income inequality; and, behavioural and social factors.

There are great variations in average temperature between the South and North Island of New Zealand. Mean annual temperature ranges from approximately 10 degrees Celsius in the south to 16 degrees Celsius in the north of the country (Shen, 2004). This difference is reflected in the number of heating days and energy expenditure between the two islands. The
Household Energy End-use Project (HEEP) found that on average, heating made up around 25 percent of household energy expenses in Auckland in the North Island, while households in the South Island in Dunedin spent 50 percent of their total household expenses on energy related expenditure (Isaacs et al. 2006). Fuel poverty levels were higher for the South Island, with figures for Dunedin City at 32% compared to 14% in Auckland in 2006 (Lloyd 2006). This thesis is based on studies conducted in Dunedin. Dunedin (Māori name Ōtepoti) is the second-largest city in the South Island of New Zealand. Dunedin was chosen because of its high concentration of older housing, efforts into fuel poverty awareness and reduction, and strong connections to the community.

The demographics of New Zealand households have been transforming, contributing to changing habitual patterns of energy use and fuel poverty levels. Statistics New Zealand’s population projections indicate that the number of one person households, and the number of households living in rental housing is projected to increase by 2020 (Statistics New Zealand 2010). In 2013, half of the New Zealand population were renters (Howden-Chapman 2015). The changing nature of household size and composition in New Zealand could have implications for fuel poverty as older people, sole parents and single people households have been found to be more vulnerable to energy hardship (New Zealand Government 2011; Barton 2010). In rental properties, there are no legal obligations or requirements on landlords to provide sufficient heating appliances for tenants (Isaacs et al. 2006), and research has found that tenanted households have far higher rates of fuel poverty than owner occupied housing (Ministry of Environment 2005; Howden-Chapman et al. 2012). Tenants are less likely to invest in someone else’s property, and may not have permission to make such changes (Barton 2010). Pre-payment meters have also been found to be common amongst renters, and these have higher tariff rates and are easier to ‘self-disconnect’ (O’Sullivan, Howden-Chapman, and Fougere 2015). The solutions to fuel poverty in New Zealand must factor in geographical variations in heating days and demographic changes that are occurring in the country.

In New Zealand, electricity is the predominantly used household energy, making electricity access and affordability a main driver of energy poverty (Howden-Chapman et al. 2009). Amongst the OECD countries,
New Zealand’s electricity market is one of the least regulated (Shorrock 2000; Bertram and Twaddle 2005; Waddams-Price 2005). In the last two decades, electricity prices have increased 6.8 times, compared to the 4.1 increase in Consumer Price Index (Viggers, O’Sullivan, and Howden-Chapman 2013). Since the deregulation of the electricity market in the 1990s, real residential electricity price has risen 77% in the last ten years, compared to industrial price increase of 3.1% and commercial price, a decrease of 19% (Elliot, Moore, Field, Hunt, Lawrence, and Thornton 2012).

This price hike is particularly stressful for low income households, with household energy expenditure for this group rising from 7.6% to 13% in the past decade, compared to expenditure in the high income decile which showed a 0.5% increase from 1.1% for the same period (Viggers et al. 2013). Data from the Ministry of Economic Development showed that for 2008, on average, energy costs were a larger percentage of total household income in low income households than high income households (Ministry of Economic Development 2011). This might appear that low income households have increased warmth, while in reality some households in dwellings with a very cold indoor temperature during winter appear to spend a greater proportion of their income on energy than other households, yet fail to achieve the adequate warmth needed for healthy living (Isaacs, Saville-Smith, Camilleri, and Burrough 2010). The 2008 New Zealand Living Standards Survey found that 11% of people could not pay electricity bills on time, and 3% of households were disconnected from power (Ministry of Social Development 2008).

Housing is a key factor in the consideration of fuel poverty in New Zealand (Howden-Chapman et al. 2009; Lloyd and Callau 2009). The building and housing regulations, and the quality of housing stock in New Zealand have been historically weaker compared to other OECD countries (Isaac 2004; French, Camilleri, Isaac, and Pillard 2006). Minimum insulation standards for housing in New Zealand did not become mandatory until 1978, and as a result, houses built prior to this have no or poor insulation (Shen 2004). A housing report from 2005 found that about half a million homes did not have adequate insulation (Ministry of Environment 2005). The Residential Tenancies Act 1986 requires landlords to keep their premises in a reasonable state of repair, but this does not require them to undertake any energy improvements (Povey and Harris 2004). A 2004 survey, carried out among
100 low income households living in rental accommodation in Dunedin found that half of the houses surveyed failed to achieve the minimum standards set for healthy living conditions based on weather tightness and energy efficiency (Povey, 2004). A 2014 follow-up study showed little improvements on the same indicators (McKague, Povey, and Liebergreen 2014). This is an important point to note as rental housing stock is generally less regulated and is in poorer quality compared to owner occupied ones (Phillips, 2012).

In addition to the housing, the energy efficiency of household appliances is an important factor in household energy use. The Household Energy End-use Project (HEEP) found that the type of heating appliance used in the house had a huge impact on average indoor temperatures achieved (Isaacs et al., 2006). Houses heated by open fires were coolest and least energy efficient with an average indoor temperature of 16 degrees Celsius. A 2004 survey found national averages of 52% for wood and 7% for coal as main source of heating in New Zealand (Ministry of Environment 2004).

The Housing, Insulation, and Health Study showed that insulating houses increased the indoor temperature, reduced humidity and self-reported measures of dampness and mould (Howden-Chapman, Matheson, Crane, Viggers, Cunningham, and Blakey 2007). Furthermore, reduced visits to a doctor, and reduced days off school and work were also found among those living in well insulated houses. Another study, the Housing, Heating and Health Study, showed that replacing existing inefficient heating with more efficient heating sources resulted in improved asthmatic symptoms of children (Howden-Chapman et al. 2009).

New Zealand has a strong historic cultural preference for under-heating their homes (Cupples et al. 2007). Many houses surveyed in a nation-wide study had indoor temperatures well below the recommended WHO standards (Isaac 2004; McCchesney et al. 2006). This strong cultural belief about heating has been attributed to the pioneer attitude of New Zealanders, thrift behaviour and need for personal sacrifice, especially amongst the elderly (Cupples et al. 2007). Heating practices and norms also contribute to exacerbating the problems of energy poverty. The WHO recommends a healthy indoor living room temperature of 21 degrees Celsius in the living area, but the New Zealand national average is often under 18 degrees (Isaacs et al. 2006). The Household Energy End-use Project (HEEP) study found that many households only heated the living room, and bedrooms were
Energy consumption habits and choices are important factors to address in designing interventions for fuel poverty. A recent study found that 77% of residents who received upgraded heating systems were not using them efficiently (McManus, Gaterell, and Coates 2010). Furthermore, there are growing challenges related to the reluctance of some households, often the most vulnerable, to apply for assistance through subsidized programmes to help with the burdens of fuel poverty (Boardman 2010; McKague et al. 2016). Issues of stigma, and concerns about the disruptions associated with heating and insulation being installed, are both key factors in this challenge. There is a gap in knowledge at how energy consumption priorities and values influence energy behaviour. This thesis will address this gap by exploring the norms and values of households through lived experiences of fuel poverty, covered in more detail in Chapter 4.

2.6 Inequality in New Zealand

Inequality is rapidly increasing in New Zealand, and there are increasing inequalities amongst those who suffer from fuel poverty (O’Sullivan and Howden-Chapman 2017; Howden-Chapman et al. 2012). The most recent data showed that the gap between low income and higher income households has widened further in New Zealand than in any other developed countries in the past 25 years (OECD 2011). As a result of the recession and the squeeze on benefit levels, low-income households have incomes that are stagnating or dropping (Childrens’ Commissioner’s report 2013). The average disposable income of someone in the richest 10% doubled, from just under $200,000 to nearly $400,000 in the past two decades (adjusting for inflation). In contrast, the average disposable income for someone in the poorest 10% was only slightly higher than it was in the 1980s (O’Dea 2000). Over the last decade the cost of living for the lowest income households has increased by 50% compared to an increase of 43% among better off households (O’Dea 2000; Adams, Hood, and Levell 2014). This slow growth in income, coupled with increased electricity prices and low-quality housing could be contributing to increased prevalence of fuel poverty rates (Rashbrooke 2013). In a qualitative study carried out in New Zealand, low income was often given as a reason for living in cold, damp houses (O’Sullivan 2012). A study...
looking at deprivation in New Zealand found that households who scored high on deprivation score, also rated higher on scales such as lacking in ability to keep the main rooms adequately warm and putting up with feeling cold in order to save on heating costs (Perry 2009) (see Figure 2.2). Fuel poverty researchers have stressed that energy poverty should not be interpreted in isolation from this inequality that is deeply embedded in the process (Scarpellini et al. 2017).

In summary, it is not a single factor that drives household fuel poverty levels in New Zealand, but rather a combination and interaction between several factors exacerbating the situation for many households.

### 2.7 Impacts of fuel poverty

There is now a substantial body of evidence linking cold, damp homes to adverse health, social and environmental outcomes (Clark, Peel, Balakrishnan, Breyssse, Chillrud, Naehler, and Balbus 2013; Howden-Chapman 2004; Critchley, Gilbertson, Grimsley, and Green 2007). The health consequences of belonging to a fuel poor household are wide ranging, with both physiological and psychological impacts evident from exposure to cold indoor temperatures (Hills 2012; Liddel 2010). Fuel poverty increases the
likelihood of suffering from illnesses such as influenza, heart diseases, and strokes; and it increases the risk of suffering from asthma due to the growth of fungi and dust mites that cold homes promote (DECC 2013). Research has also found an increase in the use of health services by people living in cold homes, with those who find difficulty keeping their home warm enough most of the time were nearly twice as likely to visit the surgery four or more times, and twice as likely to use outpatient departments as those who never experienced this problem (Shortt and Rugkasa 2007). A study of the impact of fuel poverty on children found that for infants, living in fuel poor homes is associated with a 30% greater risk of admission to hospital (Liddell 2008; Howden-Chapman et al. 2012). In another study looking at children with asthma living in cold, damp housing found that children who received heating and insulation upgrades had 15% fewer days off school (Howden-Chapman, Bennet, and Siebers 2010).

The most extreme impact of fuel poverty is the excess seasonal mortality rate, described as the surplus number of deaths occurring during the winter season compared with the average for the non-winter seasons (Healy 2003a). Excess winter mortality in the winter months has long been linked to cold indoor temperatures; rates of excess winter mortality has been found to be higher in countries where building standards do not provide adequate protection for occupants against the winter cold (Wilkinson, Landon, Armstrong, Stevenson, Pattenden, and McKee 2001). These deaths are largely caused by the effects of exposure to cold on circulatory and respiratory diseases, resulting from the inadequately protected, thermally inefficient housing stock (Curwen 1991; Clinch and Healy 2000). A study by University of Otago researchers found that 1600 more people died in New Zealand during the four winter months than in other seasons, making New Zealand’s rates of excess winter mortality among the highest in the developed nations that measured it (Baker, Milosevic, and Blakely 2004). In New Zealand, like most countries with relatively mild winters, the need for homes to be thermally efficient during winter has long been disregarded (Lloyd 2006). As a result, inhabitants are exposed to short, but acute periods of cold during winter, which in turn impacts on health and mortality risks (Liddell et al. 2011).

The wider impacts of fuel poverty on the quality of life of inhabitants have still not been fully explored in the current literature. This thesis will
attempt to fill this gap in literature by providing a comprehensive understanding of the consequences of fuel poverty on the quality of life of inhabitants, which is detailed in Chapter 4.

2.8 Policy responses to fuel poverty in New Zealand

While there is evidence of fuel poverty in New Zealand, and recently, some acknowledgement of this, there is still no official definition, measurement, or government policies specifically targeting fuel poverty beyond the insulation scheme (McChesney 2012). In 1992, the New Zealand government acknowledged the vital service energy provides to households by specifying in the energy strategy “basic energy services remain accessible to all members of New Zealand society” (New Zealand Government 1992) (pg. 34). Yet, programmes were not rolled out until 2008 when the first attempt by the government to scope energy affordability and accessibility issues at a national scale were carried out (EECA 2011).

Fuel poverty research in New Zealand has been largely driven by a health focus (Howden-Chapman and Bierre 2008; Howden-Chapman 2005; Howden-Chapman, Signal, and Crane 1999). The heavy focus on quantitative measures and health aspects of fuel poverty fails to account for the variations, and wider impacts of energy in different situations (Lomax and Wedderburn 2009; McKague et al. 2016). As a result, government interventions designed to reduce fuel poverty have also predominantly focused on improving health outcomes of inhabitants, through retrofits and insulation schemes. Other interventions have focused on increasing the income of households through grants such as the winter fuel bill subsidy (Ministy of Environment 2005). Although such interventions respond to the short-term requirements of fuel poverty, they do not address the needs of households who fall outside of the income parameter. Some households might not be officially defined as being fuel poor, but maybe experiencing wider deprivation and insufficiencies associated with living in cold, damp houses. It is timely to assess the current policies and programmes in place to mitigate fuel poverty in New Zealand. In particular, interventions to address fuel poverty need to be targeted regionally, and must encompass the wider behavioural and social issues associated with this condition. A detailed policy analysis will be covered in Chapter 5, followed by recommendations for future policy
to reduce fuel poverty.

2.9 Conclusion

There is a significant gap in the energy literature regarding the behavioural and social aspects of energy use. While some recent work has explored the behavioural angles of energy consumption, very few research has looked at the wider variables and the dynamics between them. The growing prevalence and health consequences of fuel poverty requires a more comprehensive understanding of energy deprivation. An in-depth study of the different dimensions of fuel poverty is a vital step in improving our understanding of the condition, and designing interventions to decrease it.

The theoretical and conceptual framework used in this thesis provides a basis for addressing the gaps identified in the literature by focusing on the multiple variables, their similarities as well as differences between the various elements. By including a range of behavioural, personal, social and contextual factors, this thesis moves away from research which have overemphasized the technical and economic determinants of fuel poverty, and moves towards energy as a service which provides a more realistic view of household energy.

2.10 Chapter Summary

This chapter began by capturing the important role energy plays in our everyday lives. It then moved onto introducing the readers to the work of this thesis. The different approaches to defining and measuring fuel poverty were outlined, critically analysing the flaws in current measures. The causes and consequences behind fuel poverty in New Zealand have also been looked into. Missing from the literature was a comprehensive understanding of the lived experiences of fuel poor households which would inform the development of new indicator sets for New Zealand. The work in Chapters 3 and 4 will fill this gap by proposing a new framework for viewing fuel poverty, and through a detailed qualitative analysis, lead to proposing a multi-dimensional measure for fuel poverty.

The next section of this chapter was focused on the current fuel poverty policy in New Zealand, criticising the existing measures as being reactive and
providing short-term solutions to the problem. The existing policy responses are lacking in an integrated understanding of fuel poverty to inform policy, and fails in finding long-term solutions to minimise households experiencing fuel poverty. This gap in knowledge is addressed in the work completed for Chapter 5, which presents three policy scenarios for reducing fuel poverty in New Zealand.

This chapter provided the following information:

- Critical review of different measures of fuel poverty, and the reasons for choosing the ‘access to energy services’ measure for this thesis
- The prevalence, causes and effects of fuel poverty in New Zealand
- Brief overview of current policy responses
- Gaps in literature that this thesis will address

To summarise, the main points raised in this chapter were:

- Energy studies have been dominated by the physical-technical-economic models of energy consumption, and the missing elements of this research angle is people as active users of energy systems
- The energy use of a household encompasses household decisions based on complex interactions between technical, economic, social, cultural and environmental factors, indicating that a number of inter-related factors affect household energy choices that must be addressed in understanding the problems around and solutions to fuel poverty
- Energy behaviour is not easily captured in one indicator, prompting calls from researchers to move towards a multidimensional view of energy behaviour – one that includes the variance in energy use across individuals that are influenced by their norms, beliefs, practices and circumstances
- Fuel poverty in New Zealand is exacerbated by a combination of factors: energy prices, geographical variations, older housing stock and behavioural and social factors among others, yet interventions have focused mainly on a technical and economic angles
• Fuel poverty research in New Zealand has been largely driven by a health focus, with an emphasis on quantitative measures and health aspects of fuel poverty which fails to account for the variations, and wider impacts of energy in different situations and amongst different households.

• The way individuals interact with and respond to energy services are wide ranging, therefore the way energy behaviour is studied need to reflect this to include wider indicators of energy services that are important in a measure of fuel poverty.

The evidence presented in this chapter shows that fuel poverty is widespread and increasing in New Zealand, and alternative methods of conceptualising and measuring, and fresh policy perspectives are needed to reduce the prevalence of fuel poverty. The next chapter will present a critical review of conceptual frameworks for understanding energy behaviour.
Chapter 3

A critical review of conceptual frameworks for understanding energy behaviour

This chapter considers the leading conceptual frameworks from social and behavioural disciplinary perspectives that have been used for understanding energy behaviour in households, particularly with a focus on fuel poverty. This chapter will take a closer look at how previous work have framed this energy behaviour, as well as the strengths and limitations of these. Next, the Energy Cultures Framework (ECF) will be introduced, which provides an inter-disciplinary understanding of energy consumption and transitions. This chapter will also critically analyse ECF to explore the key themes, issues, gaps and problems in the way it has been applied across research. The chapter concludes by highlighting how the ECF will add to understanding fuel poverty, as well as how energy poverty will expand ECF research.

3.1 Conceptual frameworks for understanding energy behaviour

Energy usage operates within a myriad of factors including but not limited to infrastructure and technology, energy markets, changes in personal be-
haviour and expectations of energy uptake (Simcock, Thomson, Petrova, and Bouzarovski, 2017). Despite this, the dominant energy literature has largely focused on one or two dimensions of energy, predominantly infrastructure and technology, with little research done until recently on the social and behavioural aspects, and even little attention on the interactions between these elements (Stephenson et al., 2015a; Sovacool et al., 2017). As an example, in the United States, for every dollar spent on understanding the demand side of energy, $35 was put towards supply and infrastructure (US Department of Energy, 2011). A comprehensive review of energy related literature by Sovacool shows the extent of this omission (Sovacool, 2014b). Sovacool’s review of 4,444 full-length articles spanning 15 years between 1999 to 2013 in three leading energy journals found an under-representation of research on the influences of social and behavioural factors that contribute to energy, and a bias towards sciences such as engineering and economics. Engineers, economists, technology experts focus on the technical fixes instead of incorporating lifestyle and social norms in energy decisions (Sovacool, 2014a). Sovacool found that the intricacies of energy decision making process and the human dimensions of energy were rarely researched, with behaviour and energy demand appearing in only 2.2% of the articles over this time period.

Energy behaviour research, particularly fuel poverty research, has stemmed mostly from work done in the UK, which has historically been focused on three main areas: elderly populations (Ofgem, 2008), increase in seasonal mortality rates (Healy, 2003a,b; Chard and Walker, 2016; Ambrose, McCarthy, and Pinder, 2016) and financial burdens on low income groups such as pensioners (Ofgem, 2008). Sub-groups of people like student groups, single parents or people with disabilities were not as widely included in research. A study carried out in the UK in 2015 found that such special sub-groups of households have a particularly interesting relationship with fuel poverty (Li, Boom, and Davis, 2015). The way students use energy is interesting as this group mostly reside in relatively old housing stock which are energy inefficient and requires infrastructure changes to improve their thermal comfort, at the same time this group also has a high turnover of tenants (Li et al., 2015). Landlords are less incentivised to invest in improvements and with the frequent turnover of students they are less likely to demand changes as well (Li et al., 2015). A fuel poverty study done in Dunedin, New Zealand found that 61% of students in the study did not think their house was ther-
mally comfortable in winter and 90% of houses surveyed had indoor temperatures below the recommended WHO levels (Howden-Chapman et al., 2012). The problem of ‘under heating’ was also noted in this group. Moore (2012) pointed out that students prioritised spending on leisurely activities and entertainment over keeping a warm house. In order to understand distinct energy patterns of these groups, researchers needed a good theoretical framework which captures such behaviour.

A critical review of energy poverty research revealed two important limitations in existing literature. First, fuel poverty research does not have the backing of a solid theoretical foundation, and there is no empirical consensus on how best to identify fuel poor households (Fizaine and Kahouli, 2018). Second, fuel poor households are not homogeneous and one size fits all policies may not work for certain types of households (Simcock et al., 2017; Sovacool et al., 2017). Recent research have highlighted the difficulties of identifying a ‘typical household in fuel poverty’ as each household brings in multitude of factors which impacts on their energy use (Fizaine and Kahouli, 2018). Thus, using single indicators may miss out on capturing certain household as some households that are fuel poor on one indicator is not necessarily fuel poor according to another (Fizaine and Kahouli, 2018). These limitations could lead to the danger of some households being not represented in policy measures targeted at finding solutions to the problem.

The literature is rich and varied in research on energy, and is conducted across a variety of disciplines explaining consumer behaviour (Stern, 1984; Kollmuss and Agyeman, 2002; Druckman and Jackson, 2008), yet integrated theoretical and conceptual models have not been historically used in this space. Most of the dominant behavioural research suggest that people make rational energy consumption choices when information and choice is provided, with the more awareness and knowledge leading to rational choices (Druckman and Jackson, 2008). Other researchers criticise this way of thinking pointing to the failure in this method of considering the broader social and cultural factors that influence people’s energy use and shape their habits (Hargreaves, Nye, and Burgess, 2010; Shove, Chappells, Lutzenhiser, and Hackett, 2008; Shove and Walker, 2010). Sovacool also calls for bringing in more social sciences views and to accommodate data from a variety of sources including lay persons, which would provide greater feedback and incorporate diverse viewpoints. For complex phenomena like energy, inte-
Grating models are particularly useful as it addresses issues that may not be solved by single-discipline solutions (Sovacool, Ryan, Stern, Janda, Rochlin, Spreng, and Lutzenhiser 2015). To incorporate these multitude of factors it is essential to identify the key interactions and opportunities for change within this complex structure. Therefore, conceptual models are useful tools in understanding energy usage, as they decipher the complexities by focusing on the interactions and opportunities for change within such systems (Stephenson, Hopkins, and Doering 2015). The next section will take a look at a few of these conceptual frameworks next.

3.2 Practice theory

Some conceptual models have tried to incorporate the role of personal and social norms, and practices (Giddens 1979a). Within energy, consumer choice and decisions are seen to be influenced by the interplay between cultural norms, personal experiences and social interactions (Shove and Walker 2010, Smith and Stirling 2007). One such theory that bring these elements together is practice theory that emphasises the role and importance of everyday routines (Giddens 1979b). A practice is viewed as being a "routinized way in which bodies are moved, objects handled, subjects treated, things are described and the world is understood" (Shove 2003, p.250). Applied to the energy context, individuals ‘consume’ energy in order to identify with society, confirm to dominant norms and reproduce social practices (Sweeney et al. 2013). Practice theory would view energy transitions as changes in behaviour patterns which is brought about by shifting the daily routines, conventions and orders (Shove 2003).

Energy behaviour literature, stemming from research grounded in practice theory calls to recognise the important of social contexts, including people’s social and cultural practices (Shove 2010, Hargreaves et al. 2010, Stephenson et al. 2010a). Shove (2010) points out that understanding social change requires an understanding of how practices form and evolve over time. The practice-based view sees people’s energy behaviour occurring within social systems and people have the choice to adapt and change based on their perceptions of socially constructed world (Reckwitz 2002). Schatzki (2001) argues that practice are organised around shared habitus, with energy behaviour moving beyond the individual to society as a whole.
Habitus is a group of dispositions, skills and ways of acting that are socially learnt and shaped by the activities and experiences of everyday life (Bourdieu, 1986; Osborn, 1917). This habitus makes behaviour, thoughts and feelings to be interconnected and the ‘habit’ is only broken by a deviation from the norm (Bourdieu, 2003). Practice theory has been widely applied to energy use research (Geels, 2004; Pierce, Schiano, and Paulos, 2010; Sweeney et al., 2013; Stephenson et al., 2010a), and is used to identify levers for enabling change in practice, at the same time reinforcing those practices that are working to achieve a particular goal (Orlikowski, 2010).

Critics of practice theory point out that practice theories encourage attention to publicly available and accessible behaviour rather than inner mental states (Rouse, 2007). Researchers such as Fieldman and Orlikowski note that practice theory focuses too much on the actual habits instead of how knowledge have been acquired (Fieldman and Orlikowski, 2011; Orlikowski, 2010), while some find the notion that the material characteristics of technology and infrastructure are relevant only in relation to specific situated practices hard to grasp (Orlikowski and Scott, 2008). This isolated focus on practices is seen by the critics as “bracketing of entities” at the expense of understanding the dynamics that forms each entity (Fieldman and Orlikowski, 2011, p.1249). Lastly, some researchers comment that collecting and analysing data through a practice lens is time consuming and challenging due to the complexities and multiplicities of everyday habitus (Fieldman and Orlikowski, 2011). One example of was the work from Lave (1988) who found that even though people scored poorly on standardized math test they still displayed considerable mathematics skills in their daily situated practices, which were not captured by the study (Lave, 1988).

### 3.3 Agency theory

Another conceptual framework used to understand energy consumption is agency theory perspective of energy behaviour. Agency theory revolves around issues of agency (Jensen and Meckling, 1976, p.29), where agency is defined as “a process of interest where rational actors conduct intentionally an effective plan and management to achieve a specified goal”. In addition, agency theory focuses on problems when there is a discrepancy
between the interests and goals of individuals (Kumalasari and Sudarma, 2014). Agency has two roles as principal and agent, where principal gives certain instructions to gain more profit and the agent performs accordingly. Agency becomes a problem when there is a conflict between the interests and goals of one individual with that of the other.

Ross (1973) regarded the agency problem as the problem of incentives. Under agency theory different people have conflicting incentives to issues, leading to split incentives (Morris and Genovese, 2018). For example, a landlord and tenant may have different views on what would be important outcomes for a rental house. The landlord would want to minimise costs and increase the revenue, but for the tenant improving the comfort of their dwelling and decreasing housing costs would be more important (Ambrose et al., 2016). Multiple research from New Zealand highlighted that the benefits of energy efficiency improvements go beyond financial gains and impact significantly on the health of those who live in the dwelling (Ambrose, 2015; Millar, Baker, Howden-Chapman, Wilson, and Dickson, 2009). Despite this, the tenants had little incentive to make any high cost changes to improve energy efficiency (Bradbrook, 1991), as they occupy the property for a shorter time frame.

Perrow (1986) criticised the agency theory as concentrating only on the agent side of problem and is unconcerned about the principals who may exploit the agents. Others, such as Wiseman and Gomez-Mejia (1998), Sanders and Carpenter (2003) and Pepper and Gore (2012) have emphasised the limitations of agency theory in addressing how the agent’s motivation, risk averseness, time preference and compensation influence the incentives. More researchers, such as Eisenhardt (1989), Shleifer and Vishny (1997) and Daily, Dalton, and Rajagopalan (2003) also point to the fact that agency theory is based on a contractual agreement between principal and the agent which may face disturbances from information asymmetry, rationality and transaction cost. Roe (1991) and Van Essen (2011) have questioned the separation of ownership and control from actions and called to take into account the varying formal and informal ownership found in different contexts.
3.4 Social constructivism

Social constructivism approach puts forward the notion that human beings “construct” understanding of their world through the experiences and interactions they have with the outside world and comparing these with existing beliefs (Piaget, 1951; Jaramillo, 1996). Under this paradigm, the process of aligning or discarding world-views constitutes a fundamental part of learning and sense making (Jonassen, 1999). The bits of social interactions individuals receive on a daily basis from their peers and social circles forms to strengthen their understanding of the world, and learning and behaviour change is thus considered to be “largely situation-specific and context-bound” (Eggen and Kauchak, 1999).

Social constructivism perspective believes that individuals constructs these world views through their interactions, therefore no two people share the exact same views of the same phenomena. These distinct ideologies form unique values, norms and outlooks that at times can differ and clash with those around (Bates and Sangra, 2011). And this clash between world views is important to learning new concepts and behaviour (Bates and Sangra, 2011). According to Bates and Sangra, learning occurs when competing views challenges the individual’s current views to such an extent that encourages the person to adopt new world-views (Bates and Sangra, 2011).

Valentine and Sovacool (2017) highlighted how energy changes over time and identified opportunities for changing habitual behaviour. Sovacool proposed a new conceptual framework for thinking about energy, called the SBV (Sovacool Brown and Valentine) framework, which stems from the constructivist theory by Valentine and Sovacool (2017). The SBV framework encompasses the view that different world views exists due to varying social influences and stimuli. Sovacool also stressed that to change the pattern of energy use an in-depth knowledge is required of how energy consumers — not experts — conceive of energy challenges.

Critics of social constructivism such as Fox (2001), and Liu and Matthews (2005) observed that because of the emphasis on direct societal influences in social constructivism, it is easy to dismiss the role of passive behaviour change. Others researchers argue that social constructivism does not give equal consideration of the biological influence on cultural and social behaviour patterns, and stress that they are important to understanding be-
haviour and should be seen alongside societal influences (Sokal and Bric-
mont, 2000; Francis and Kaufer, 2011; Ridly, 2004). Table 3.1 outlines the
three main conceptual frameworks from social and behavioural disciplinary
perspectives that have been used for understanding energy behaviour in
households Table 3.1.

3.5 The energy cultures framework as a guiding
model to look at energy poverty

The energy cultures framework (ECF) was was borne out of calls by re-
searchers to shift energy behaviour research from focusing on technological
or economic elements to the wider social and material contexts (Wilson and
Dowlatabadi, 2007; Urry, 2012; Forrester, 1973). The ECF draws elements
from lifestyle literature (Chaney, 1996; Giddens, 1991) and socio-technical
systems (Geels, 2004; Smith and Stirling, 2005). At the core of the frame-
work are three elements that the individual has some degree of control over,
and these are framed by ‘external influences’ over which they have little or
no control (Stephenson et al., 2015a). The framework proposes that ‘energy
culture’ is defined by the interactions among theses three elements – mate-
rials (such as technology and physical infrastructure), energy practices, and
norms.

Applied to energy usage, materials may be the dwelling people live in,
availability of heat sources or financial means to make upgrades to the house.
Practices would include regular and irregular actions such as closing the cur-
tains to retain heat or turning the heat pump down at night. Norms are
personal and social expectations about daily life, including expectations of
how warm a house should be or how much money to spend on improving
the thermal comfort of a house (Stephenson et al., 2015a). Each of the ele-
ments provides a different view of energy behaviour, and they highlight the
complex and distinctive factors that influence energy usage. These include
interplay between technology, infrastructure, market forces and policy, as
well as individual and societal norms and expectations. The framework pro-
poses that the three core elements of material culture, practices and norms
are strongly interactive and frequently self-reinforcing, which make it harder
to change these behaviour patterns. In addition, these patterns of behaviour
are influenced by the external forces such as the price of electricity or avail-
<table>
<thead>
<tr>
<th>Conceptual framework</th>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice theory: emphasises the role and importance of everyday routines</td>
<td>Contributes to understanding how social changes form, identifies the levers for enabling change in practices and daily routines which are required to make changes in behaviour</td>
<td>Focuses too much on the actual routines and ways of doing things instead of how knowledge has been acquired or the inner mental states, may be time consuming to collect and analyse data through a practice lens</td>
</tr>
<tr>
<td>Agency: revolves around the issues of agency or the interest and goals of individuals</td>
<td>Focuses on the individuals involved, their motives, interests and goals, and how they relate to energy services</td>
<td>Individuals bring in several factors such as personality, motivation, time preferences and risk averseness which influence on incentives they expect from the energy services, formal and informal ownership issues may also influence on control of incentives. Over emphasis on direct societal influences may not factor in the role of individual behaviour change, or give equal consideration to biological influences to social and cultural patterns of behaviour</td>
</tr>
<tr>
<td>Social constructivism: Social interactions and situation specific experiences shape how individuals engage with energy</td>
<td>Factors in the different world views that exists within energy users based on their social experiences and context specific requirements, links norms and beliefs as being reinforced by social cues</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.1: Conceptual frameworks used to understand energy behaviour in households
ability of government grants towards insulation, which limits the individual’s capacity to change.

This framework was developed to understand the drivers and interactions that generate multitude of patterns in energy behaviour at a household level (Stephenson, Lawson, Carrington, Barton, Thorsnes, and Mirosa, 2010b). Subsequent research have applied it to the analysis of energy behaviour at community level (Stephenson et al., 2010a), identifying distinct clusters of household energy cultures (Stephenson et al., 2010a), framing policy to support energy behaviour (Barton, Blackwell, Carrington, Ford, Lawson, Stephenson, Thorsnes, and Williams, 2013), analysing energy cultures in the industry level (Bell, Carrington, Lawson, and Stephenson, 2013), and exploring the mobility preference within different generations (Hopkins and Stephenson, 2014). It has also been applied to understand energy saving behaviour (Klinger, Kenworthy, and Lanzendorf, 2013), student energy consumption (Morris and Genovese, 2018), behaviour in transport sector (Bell et al., 2013) and pro-environmental behaviour (Sweeney et al., 2013).

The ECF was influenced by different disciplinary thinking such as systems thinking, structuration and practice theory. Systems approaches have been used to understand complex problems in biological, physical and social systems (Leaver and Gillingham, 2010; BenDor and Ford, 2006; Hasson, Keeney, and McKenna, 2000). Drawing from the systems approach, ECF encompasses that the properties of any one part of the system is dependent upon and influence by the other parts within the system (Stephenson et al., 2015b). A systems thinking is behind ECF in highlighting the interrelationships between norms, practices and material culture, as well as the external influences surrounding these.

A second key influence on ECF was structuration theory (Giddens, 1984). In the ECF, structuration theory is used to capture peoples ability to act as free agents when faced with social, financial and political influences. Structuration theory focuses on how social systems develop and evolve, within the constrains of elements that people are able to control, as well as constrain influences of social, financial and political forces (Giddens, 1984; Rip and Kemp, 1998).

In the same way, the ECF is also influenced by practice theory, taking elements of how everyday activities are influenced by the wider society and highlighting how infrastructure and surroundings are reflected in the daily
practices (Shove, 2003). The norms and expectations people bring to their practices and material cultures are entwined in their everyday practices. The ECF distinguishes itself from practice theory by defining ‘practices’ as not only routinised activities but also as actions that may occur infrequently in the individual’s life but are common across their social circles (Stephenson et al., 2015b). An example the researchers give is the daily habitual activities around energy usage as well as the less frequent process of acquiring material objects. Another way ECF differentiates from practice theory is that practice theory puts interactions within the material or technology elements within practice, but the ECF recognises that social practices and material culture shape and are shaped by one another (Hard and Knie, 2001). Similarly, in practice theory the ‘practice’ is at the core of the model, while EC frames the ‘person’ at the centre of all interactions.

3.5.1 Strengths of the ECF

The main strength of the ECF is that it is a tool that was readily understood across disciplines and is general enough to be applied to different domains (Stephenson et al., 2015b). The framework is also a conceptually simple model that represents all these key elements in energy consumption while helping understand the interactions and heterogeneity of energy systems. A third key advantage of the ECF is that it brings together the technical, social and behavioural factors which impact on energy usage in one space, highlighting the social interactions which were not a main focus of previous research.

This is the first research which has applied the ECF to understand fuel poverty. The framework is ideal in examining the theoretical influences of ECF within the context of fuel poverty. The framework captures the key factors which impact on fuel poverty such as the physical and structural elements, as well as the behavioural and social influences. To demonstrate how ECF enriches the understanding of fuel poverty first consider the behaviour of students in fuel poverty as an example. For students, the expectations and norms stem from the need to live in cheaper housing close to university (Morris and Genovese, 2018), and that it is even socially acceptable for students to live in poor quality housing (Hubbard, 2008). For students, the energy costs are smaller proportion of overall household costs and it is easy to be incorporated into other household practices. External influences,
like the type of heating and physical structure of the dwelling is outside the control of the student, putting this group more at risk of fuel poverty (Bouzarovski and Cauvain 2016; Petrova 2017). At the same time, a recent study found that this group does not consider themselves to be in fuel poverty (Morris and Genovese 2018), the respondents under-reported themselves for fuel poverty issues. Such findings highlight the conflict within the system and show how norms and societal expectations may influence actual energy usage.

3.5.2 Limitations of the ECF

Researchers who have used ECF commend the conceptual model of Stephenson et al. (2010a) of using ECF to understand the different ways elements interacts within the socio-technical-cultural sphere in a simplistic manner which is useful in complex systems (Sweeney et al. 2013; McKague et al. 2016). However, they criticise the over-simplicity of the model and note how the framework does not address key elements in behaviour change such as motivation, barriers or distinct household needs and circumstances (McKague et al. 2017; Sweeney et al. 2013; Morris and Genovese 2018).

A key limitation of the framework is that energy cultures is not a one-model fits all. At the individual level, the energy cultures of a teenager will be very different from the materials, norms and practices of his elderly grandparents. At the household level, different household circumstances will also influence their distinctive norms, practices and material culture related to energy consumption. Previous research have identified that at the household level the energy cultures seem to be more shared (Lawson and Williams 2012b). In the same way, it is anticipated that there will be different energy cultures amongst different areas such as urban versus rural, or between different cities based on climate and topography (McKague et al. 2017).

A second weakness of the framework is its simplicity. The ECF was developed as a simple tool to be shared amongst researchers from different disciplinary backgrounds who had a range of perspectives and experiences (Stephenson et al. 2015a). The developers of ECF now acknowledge this stating that ECF was put together as a simple set of concepts for use as a common language and an integrating model for researchers from different disciplines without losing sight of the whole picture (Stephenson et al.)
When the original framework came out in 2010 (Stephenson et al., 2010a), the emphasis was on this simplicity and only through repeated subsequent research has it recently evolved into “reflecting the behaviour of all parts of the energy systems” (Stephenson et al., 2015b) (pg. 118). Later research also puts more emphasis on the interactions between norms, practices, material culture and the external influences that impact on the core elements. The research team also acknowledged that the individuals or households would bring distinctive beliefs, norms and aspirations for material culture which forms the basis of their energy cultures (Stephenson et al., 2015b). Such overarching influences at the household level were not considered in the original model.

From an energy cultures perspective the three dominant elements of materials, norms and practices are self-reinforcing and self-replicating, and thus extremely difficult to alter. Furthermore, these elements are resistant to change as they are also subject to external influences which locks the behaviour patterns. However, the current research identified that the core elements could be altered by households by shifting their norms or expectations irrespective of external influences (see Chapter 7 and 8 for details). Later research has also revealed that under certain circumstances the framework is not useful (Morris and Genovese, 2018; McKague et al., 2017). An example is when behaviour is not significantly shaped by material cultures, like those of policy makers where norms and practices precede the importance of material culture (Morris and Genovese, 2018).

Other researchers criticises the ECF as providing elements which act in isolation, and suggests bringing in additional factors of motivation, support and barriers which may impact behaviour change (Sweeney et al., 2013; Vallerand and Ratelle, 2002; Abrahamse, Steg, Vlek, and Rothengatter, 2007; McKague et al., 2016, 2017). They argue that mechanisms which surround an individual has to be categorised within these additional components which brings in the broader social and cultural influences on individual energy behaviour. Sweeney gives an example of a misalignment in the system that may prevent behaviour change from occurring. The introduction of energy saving compact fluorescent light bulbs (CFL) in Australia is such an example. Despite CFL’s being more energy efficient and affordable, consumers initially reacted with scepticisms over fears that CFL release harmful amounts of mercury when broken (Boughey and Webb, 2008) and
avoided them (Winton, 2005). This is an example of how barriers to energy uptake manifested through cognitive norms and material culture may be misaligned. Sweeney suggests that to overcome this it is imperative to look at the support opportunities in each of the three components of ECF along with barriers. Support mechanisms such as targeted and personalised information and education campaigns were found by researchers to be more effective in behaviour change (Abrahamse et al., 2007). This was echoed by Vallaerand and Ratelle (2002) (Vallerand and Ratelle, 2002) who found that giving consumers the information to make the decision to voluntarily change had a more desirable effect in encouraging behaviour which is sustained over time compared to enforcing energy related behaviour on consumers. This focus on targeted outlook to energy behaviour supports the notion that different strategies are required for households with different circumstances such as different levels of income, housing type or family needs like disability (Martinsson, Lundqvist, and Sundström, 2011; Thegersen and Grunhaj, 2010; McKague et al., 2016, 2017).

3.6 Conclusion

This chapter looked at the leading social and behavioural conceptual frameworks that have been used for understanding energy behaviour. Theoretical and conceptual frameworks such as agency theory, practice theory and social constructivism were investigated as possible avenues for looking at energy behaviour, outlining their limitations in capturing the nuances of fuel poverty. This chapter also looked in detail at how ECF could provide an inter-disciplinary understanding of energy consumption and transitions. Despite the limitation, the ECF offers a non-linear conceptual outlook on energy behaviour, which incorporates the interactions between material culture, practices and norms, as well as the interactions with external factors that support or hinder the internal elements. The framework also distinguishes between the internal elements which the individual has control over, and external influences outside of their agency. Applied to energy poverty, ECF will be helpful in capturing these interactions, interdependencies, in addition to identifying the barriers and drivers of change. The ECF could easily be compatible with other models of energy behaviour, and offers further room for exploration through the integrative approach. One of the
The greatest strengths of ECF is that it provides a simplistic heuristic tool for capturing energy behaviour within a multidisciplinary space. By addressing the limitations in the ECF, and addressing the gaps in fuel poverty research, this current research will expand how fuel poverty is viewed and add to understanding and reducing fuel poverty rates across all households.

The next chapter will look at the methodology utilised to carry out this research.
Chapter 4

Methodology

4.1 Introduction

While fuel poverty in New Zealand can be classified as a condition heavily influenced by the poor material conditions of the housing and energy appliances, it is a culturally embedded phenomenon that encompasses wider social and motivational implications. The primary objective of this thesis is to understand the broader impacts of fuel poverty in New Zealand. Two main studies were conducted to achieve this. The first study set out to explore how fuel poverty is understood by households, how it affects their day to day lives and the coping mechanisms households adopt to deal with energy hardship. The second study was carried out to understand the barriers to mitigating fuel poverty in New Zealand, and included interviews with experts in the fuel poverty space for recommendations on policy measures to adopt in order to alleviate fuel poverty.

This chapter outlines the methodological approach used to answer the key research questions in this thesis. This chapter is divided into several sections addressing the choice of research paradigm, including the ontological and epistemological grounding of the research. This will be followed by introducing the theoretical frameworks that support the backbone of this study, the Energy Cultures Framework and the Family Life Cycle. Next, details of the research design, study area and participants will be provided. After this, the workings of how the analysis has been performed will be presented. The chapter will conclude by highlighting issues with validity and limitations of the research design.
4.2 Research paradigm

The research paradigm used in this thesis focuses on the ontology, epistemology, methodology and methods which forms the basis of this study. These positioning and their shortcomings are discussed in detail below.

4.2.1 Ontology

Ontology is the study of being, and is concerned with what constitutes reality (Crotty, 1998). Ontological assumptions are concerned with the nature of social reality, claims about what exists, what this reality is made of and how the different elements of this reality interact with each other (Balaikie, 2000). In other words, ontology is associated with a central question of whether social entities need to be perceived as being objective or subjective. The ontological positioning of objectivism asserts that social phenomena and their meaning have an existence that is removed from social actors (Scotland, 2012). The researcher believes that reality can be fully understood within the social elements that constitutes the nature of reality. For this reason, for the current research, the researcher’s ontological positioning is subjectivism. Subjectivism is the ontological positioning that asserts that social phenomena and their meanings are continuously being accomplished by social actors through social interactions (Bryman, 2001). This viewpoint believes that reality is socially constructed through the interaction between language and aspects of an independent world, where the social phenomena and their meanings are continuously being accomplished by social actors (Scotland, 2012).

4.2.2 Epistemology

Epistemology is the nature and form of knowledge, and how this knowledge can be created and communicated (Cohen, Manion, and Morrison, 2007). Epistemology can be viewed as providing a philosophical grounding for deciding what kinds of knowledge can be possible, and how to then ensure it is adequate (Maynard, 1994). An interpretivist epistemological perspective is taken for this research. This interpretivist view stems from subjectivism which is based on real world phenomena (Scotland, 2012). The belief is that knowledge and meaning are constructed in and out of interactions between humans and their world, which is developed and communicated in a social
context (Crotty, 1998). This leads to the social world being understood from the viewpoints of those who are participating in it, and the role of the researcher is to construct an impression of the world as these people see it (Ratner, 2008). The epistemological and ontological stance taken by a subjective interpretivist research thus differs from a more realist ontology and objective epistemology which underlines elements of ‘Grounded Theory’ (Glaser and Strauss, 1967), where the researcher’s role is to discover truth that lies within the object of investigation, and where reality exists independently of any consciousness (Bryant and Charmaz, 2010).

The work carried out in this thesis draws heavily from constructivism as well. Constructivism takes the view that truth and meaning are created through the subject’s interactions with the world (Gray, 2013). This notion holds onto the perspective that subjects construct their own meaning in different ways, even with the same phenomena, bringing forth multiple accounts of the world. Interpretivist theoretical perspective arises from constructivism, and believes that reality is multiple and relative (Hudson and Ozanne, 1988). These multiple realities makes it difficult to interpret in fixed terms as highlighted by Lincoln and Guba (Guba and Lincoln, 1994). Proponents of this discipline believe that the knowledge acquired through interpretivism is socially constructed as opposed to being objectively derived (Carson, Gilmore, Perry, and Gronhaug, 2001; Hudson and Ozanne, 1988; Hirschman, 1985). The approach taken to research through interpretivism is more flexible and is receptive to capturing meaning in human interaction (Black, 2006). With interpretivist grounding, the researcher comes into the research with some prior insights into the research area but acknowledges that this foresight is not enough to develop a rich understanding of the phenomena under study due to the complex and multiple nature of realities constructed (Hudson and Ozanne, 1988). The researcher was receptive to receiving new knowledge and let her understanding develop with the help of the new research. Therefore, the goal of taking an interpretivist approach was to understand fuel poverty and interpret the different ways people give meaning to this phenomena. In this regard, careful attention was given to understanding the motives, meaning, reasoning and subjective experiences of fuel poverty as described by the participants (Neuman, 2000).

Both the ontological and epistemological positioning taken in this research are important for understanding how households view fuel poverty
and to convey the reality of their situations in their own words. First, this viewpoint produces multiple constructed realities that can be studied. Second, it allows the researcher to be the primary data collection instrument, engaging with households in fuel poverty. Third, the research occurs in the natural setting of participants, where the realities of their stories are whole that is understood within the context in which they occur. While these are all positive reasons for taking this ontological and epistemological positioning, it also brings forth some limitations. While every act of observation influences what is seen (Guba and Lincoln 1994), the researcher being the primary data collecting instrument to fully understand and describe the complex interactions, it also mixes the researchers own biases with the meaning that is being constructed. These biases is addressed in the limitations part below.

4.2.3 Methodology — Qualitative Research and the ‘lived experiences of fuel poverty’

The methodology selected for this research is deeply underpinned by the ontological and epistemological beliefs that the researcher brings to this study. An interpretive methodology has been taken in this study, which is directed at understanding fuel poverty from individual perspectives, investigating interactions among households, as well as looking at the broader social and cultural contexts behind these interactions (Scotland 2012). For this reason a qualitative methodology was selected for this research. Unlike quantitative methodology which accepts that the primary goal of research is to discover the truth that exists in the world by using scientific methods to build an understanding of this reality, qualitative methods rely on the subjective experiences and social contexts to understand this reality (Liamputtong 2009). Qualitative research puts the focus more on uncovering the knowledge about how people think and feel about particular circumstances rather than making judgements about whether these thoughts and feelings are valid (Patton 2005).

Most earlier studies on fuel poverty have taken a quantitative approach (Barnes, Butt, and Tomaszewski 2008; Bell et al. 2010; Buzar 2007; Collins and Curtis 2016) with few researchers delving into the more qualitative approaches to understand energy consumption choices (Brandon and Lewis 1999; Dear and McMichael 2011; DETR 1999). Qualitative research is
ontologically and epistemologically grounded in the interpretive and critical paradigm, guiding explorations that acknowledge multiple truths and realities (Dickson-Swift, James, and Liamputtong 2008). Previous studies utilising qualitative methods have shown that individual experiences are very powerful in capturing the voices that might otherwise be excluded from research (Hay 2010). Qualitative studies are also exploratory in nature, thereby enabling researchers to gain information about areas in which little is known (Liamputtong 2009). In addition, it also provides compelling evidence for social policy research and can be used to explore subjective experiences that cannot be investigated further through quantitative methods (Davidson, Ridgway, Kidd, Topor, and Borg 2007). While there is literature to quantify the number of people affected by fuel poverty (Boardman 1991; Howden-Chapman et al. 2009; Lloyd 2006), there is little to describe their every day experiences (Harrington et al. 2005; Middlenniss and Gillard 2015). Qualitative methodology provides a framework that is descriptive, exploratory, and explanatory when seeking to find perspectives and experiences, which aligns perfectly with the aims of this study.

Recent studies, particularly focusing on qualitative research tools to measure fuel poverty, are increasingly turning to subjective indicators of fuel poverty (Healy and Clinch 2007; Ormandy and Ezratty 2012). Subjective measures of thermal comfort: such as self-reported problems with indoor living conditions, or responses to cold such as shivering, have been used to infer prevalence of fuel poverty (Collins 1986). While Harrington (Harrington et al. 2005) and others (Brown and Walker 2008; Hutchinson and Day 2011) have carried out qualitative analyses of fuel poverty, the lived experiences of the condition is under researched (Willand, Maller, and Ridley 2017).

The lived experience is a representation and an understanding of a participant’s experiences and choices, and how these influence one’s perception of knowledge. ‘Behaviour’ is seen as an observable practice which is repeated over time, and which is formed by the interaction of materials, meaning and competences (Russel 2011). To enable the interpretation of fuel poverty for households, research is needed on how such energy practices and behaviour are shaped and form part of daily life. This thesis therefore need to capture the deeply held values, motives, norms and practices behind energy hardship. And, these needed to be captured in a relatively unstructured way
allowing participants to contribute their own ideas and categories to the research (Marshall and Rossman, 2011).

Lived experience studies have been used in areas such as health (Edwards, Irving, and A, 2011; Frias, 2005.) and climate change (Abbott and Wilson, 2015) to provide a greater understanding of different conditions, and in turn design interventions which are more aligned with impacts on the households. One of the earlier studies of lived experiences of fuel poor households were carried out in 2015 and conducted interviews with households in the UK (Middlemiss and Gillard, 2015). The authors found several challenges to addressing energy hardship identified by the fuel poor households, including the quality of the dwellings and stability of household income. In a 2017 study using lived experiences, Butler and Sherriff looked at energy hardship among young adults in the UK (Butler and Sherriff, 2017). The study found several themes, such as threats to home comfort and coping behaviour as typical conditions of fuel poverty manifested on this demographic group. Both of these studies stressed that attempts to address energy security and equity in the future must engage with and provide the accounts of households directly affected by fuel poverty.

The research objective of this thesis - ‘understanding fuel poverty’ can be best answered by applying qualitative methods, especially through the lived experiences of fuel poor households. This is because the detailed insights available in qualitative work have not been highlighted in debates on the nature of fuel poverty (Middlemiss and Gillard, 2015). The strength of the qualitative methods in this study is that it allows for an in-depth examination of the phenomenon through interviews with households directly affected by energy hardship, as well as with experts working in the fuel poverty field. This method was also chosen because the focus of the study is more to describe and explain rather than predict and generalise (Ulin, 2005), and it allows for an empirical inquiry of fuel poverty within its real-life context (Flyvberg, 2001).

While this research is focused on capturing the live-in experiences of people in energy hardship, energy hardship is seen as being socially and culturally contextualised, with multiple realities or stories constructed by those experiencing it. This captures the diversity of lived experiences and social constructions of energy hardship. This exploration is therefore carried out by focusing on the participants’ descriptions of what it means for
them to live in energy hardship. This approach emphasises the complexities of human life, and accepts that energy values and views differ between individuals (Rubin, 1995).

One of the goals of this thesis is to include a policy dimension to understanding fuel poverty. There has been one previous policy perspective of fuel poverty in New Zealand (McChesney, 2012), therefore one of the qualitative studies carried out for this research included interviews with experts in the fuel poverty space. The aim of these interviews was to understand, through the perspectives of the fuel poverty policy stakeholders, the barriers to alleviating fuel poverty and suggestions for measures to reduce fuel poverty in New Zealand. A policy analysis is a systematic assessment of a policy, it’s causes and consequences, and developing propositions to check whether the policy is effective (Dye, 1995). The reason why a policy perspective was included in this study is to complement the findings from household participants by providing deep insights from various stakeholders actively working to alleviate fuel poverty in New Zealand. In addition, this thesis also carried out an analysis of existing fuel poverty policy measures in New Zealand, and backed by expert viewpoints of these, critically analysed the usefulness of existing and proposed approaches.

4.2.4 Limitations of the methodological positioning

Interpretivists acknowledge that value free knowledge is difficult to achieve (Scotland, 2012). For example, researchers bring their beliefs and knowledge when they choose what to research, and how to research and interpret their data (Edge and Richards, 1998). In the sociological and psychological sphere of the current enquiry into fuel poverty, it is difficult to decipher and to remove the researcher’s own subjective interpretation of living in cold, damp houses and struggling with energy hardship. There is no question that the researcher went into the investigation with an understanding of theory underlying household behaviour before beginning data collection. The researcher therefore tried to use that understanding to initially frame research questions and structure the findings (Gumnesson, 2003). However, as the research unfolded, the methodology evolved as the researcher accommodated new understandings from participants and theory to support it. Because it is impossible to remove the researcher’s perspectives completely, this thesis also incorporates elements of the humanistic approach that shifts further
towards the subjective. In this perspective, what distinguishes human science from natural science is that human behaviour is always filtered by the subjective understandings of external reality on the part of the people being studied and the researcher herself (Smith 1996).

4.3 Theoretical framework — The Energy Cultures Framework

The model used for understanding fuel poverty needed to encompass the material, social, normative and behavioural dimensions of energy consumption. The current methodology was designed to capture and analyse the effects of these dimensions within the context of energy hardship. It used the pre-defined theoretical propositions that built on the energy cultures framework. The Energy Cultures Framework (ECF) provides an integrative approach that bridges the gap between theories of energy consumption focused on the individual and those centred on structural factors such as the conditions of the house and the energy efficiency of the appliances used. The ECF offers a holistic outlook that factors in the broad range of variables that could influence energy poverty - the material conditions of the house; values, beliefs and knowledge of consumers; day to day energy practices and preferences households adopt; and the wider social, cultural, political and environmental systems that impact on a household’s energy decisions. This framework has been applied in several other studies on energy usage (Lawson and Williams 2012b; Stephenson et al. 2015a; McKague et al. 2014) and offers a rich description of fuel poverty, allowing the wider elements of energy consumption to be captured.

This thesis also used elements of the practice-based energy-cultures framework (PBECF) which extends Stephenson et al.’s Energy Cultures Framework. In addition to the factors proposed by Stephenson and colleagues, Sweeney et al. (Sweeney et al. 2013) proposed that energy uptake is also shaped by the level of motivation, barriers and support occupants face. The model used in this study is illustrated in the following figure.

In Figure 6.1 the individual in the middle is driven by motivation to change, whereas the outer level is comprised of material culture, norms and practices that influence the broader social and cultural interplay in energy
usage. The model identifies barriers that may prevent particular energy behaviour. It also bring together the support systems which may overcome such barriers, and help inhabitants achieve the desired energy practices, for example, the level of thermal comfort of a house is connected to the norms and aspirations around heating that households place on them. The material cultures could also be limited by the external environment, for example, the level of insulation in a house may depend on the government subsidies available for retrofits. Barriers such as limited capital towards home retrofits may worsen fuel poverty while support systems like help from family and friends could ease the energy hardship experienced by inhabitants.

The Energy Cultures Framework has been used as a theoretical framework to guide this research. The reason why this framework was used is because it provides the key behavioural and technical elements of energy hardship which has been studied in isolation before. The framework also allows different categories and dimensions of fuel poverty to be captured through the interaction between its core elements and external factors such as market structure, policies and the environment. One of the biggest advantages of using the ECF is that it allows a triad of factors which influences energy consumption but this could also be one of the framework’s limitations. The framework assumes that the energy culture of individuals fits in perfectly within the fragments of material culture, norms and practices. But there could be elements of fuel poverty which may be difficult to categorise and fit into the fragments outlined by the framework. The framework does
not factor in individual and household differences such as increased need for energy due to changes in personal circumstances.

The ECF is also lacking in the motivation for engaging in certain energy behaviour, and does not factor in the support systems in place which may help someone in fuel poverty. For this reason, study 1 which is based on households, have used the Practice-based Energy Cultures Framework (PBECF) by Sweeney and colleagues (Sweeney et al., 2013) to bring in these elements which were lacking in the energy cultures framework. The PBECF expands the ECF by factoring in how people are motivated to adopt certain energy decisions, and the barriers and support systems in place which help them in reaching these decisions.

One of the limitations of the ECF is not probing deeply into the life circumstances and household contexts of people living in fuel poverty. To address this gap, this thesis will also use the Family Life Cycle (FLC) (Murphy and Staples, 1979). The FLC framework has been used widely in other areas to distinguish consumption habits and decisions based on the different stages of the family life cycle (Loomis, 1936; Clark, 1955). As the family moves through the different stages, such as single member to family with children and onwards to elderly occupants, their energy needs, spending patterns and the way they prioritise energy will change. It is anticipated that this progression through the family life cycle to impact on how fuel poverty affects their lives. For this reason, along with the ECF this thesis will use elements of FLC to provide a more comprehensive outlook of fuel poverty, and will be covered more deeply in Chapter 7.

4.4 Data Collection

4.4.1 Ethical approval

The study adhered to the comprehensive guidance laid out by the University of Otago Ethics Committee. While no obvious risks to participants were noted, appropriate support mechanisms were put in place to ensure that the participants were not subject to any harm. The researcher prepared comprehensive information sheets outlining the aims and objectives of the study (see Appendix A), including confidentiality, storage and use of data, and the right to withdraw at any point during the study. Informed consent was also acquired prior to any research activity. Given the specific nature
of the study, the researcher was concerned about the potential harm that might be caused to participants by reference to ‘poverty’, ‘fuel poverty’ or ‘disadvantaged’. In the interview schedules, the researcher minimised the use of such terms and instead used approaches that were appropriate and sensitive to the participants’ potentially difficult circumstances. Throughout this thesis, pseudonyms have been used in order to protect the identities of the respondents. At the end of each interview, the researcher left information leaflets about various community and health services available in Dunedin that participants could access if they wish.

4.4.2 Data collection Procedure

This study was based in Dunedin, New Zealand. Dunedin (Māori name Ōtepoti) is the second-largest city in the South Island of New Zealand. Dunedin was selected because of its older housing stock and cooler climate. Mean annual temperatures in the South Island ranges from 10 degree Celsius to 16 degree Celsius in the North Island (Shannon, Llyod, Roos, and Kohlmeyer, 2003). This difference is reflected in the number of heating days and energy expenditure between the South and North island. For cooler regions, such as Dunedin, more household energy is spent on space heating and makes up to 50% of the total energy in winter (Isaacs et al., 2010). The quality of housing stock in Dunedin is one of the poorest in the country, with a large number of poorly insulated dwellings (Lloyd and Callau, 2009). Most households use electricity for heating, and around 10% use wood burners for space heating (Shannon et al., 2003). Dunedin has a very hilly geography, and many of the houses within the inner city receive only a few hours of direct sunlight during the winter months. The low sunlight hours, colder climate and poor heating and insulation have shown to be detrimental to health and lead to higher rates of mortality during winter months (Shannon et al., 2003). Dunedin has also the highest rate of fuel poverty across New Zealand (Lloyd, 2006). Lloyd’s work indicated that in 2008 over 47% of residents in Dunedin were spending more than 10% of their income on their energy bills, and showed the change in fuel poverty rates across different New Zealand cities over the years. While these statistics are important and impressive, qualitative research is needed to understand what happens to these households, how they were coping and what it actually means for these households to be in fuel poverty.
A purposive sampling method was well suited for understanding fuel poverty as it increased the scope of information collection and helped to uncover a wide range of perspectives (Guba and Lincoln 1994; Delanty 1999). The rationale for choosing this approach was that the researcher was seeking to understand the wider impacts of fuel poverty among Dunedin households, which the participants will provide by virtue of their experience. Due to this reason, criterion sampling was chosen, selecting participants that match the criteria under study – in this case, inclusionary criteria was participants who have experienced or are experiencing living in cold, damp houses. The exclusionary criteria was anyone under the age of 18 and those who reported that energy hardship was not an issue for them. Even though criterion sampling was chosen to recruit participants, participants were chosen on experiential relevance and how they can contribute to evolving theory (Strauss and Corbin 1998). For this reason, at the onset of the study, open sampling was chosen, by leaving the inclusionary criteria fairly broad (those experiencing cold, damp houses) and choosing participants without any prejudice to the condition that allowed the researcher to be open and flexible to discovering new theoretical developments (Creswell 1998).

Before commencing actual data collection, a pilot study was conducted with three households and three policy experts. The interviews were audio-recorded to ensure correct use of the device. During the exercises, attention was given to body language, non-verbal responses and the manner of asking questions. As the researcher was the main data collection instrument, the pilot-study provided an insight into the phenomenon being studied, increased experience in interviewing and enhanced interpersonal skills of the researcher (Guba and Lincoln 1994). Any errors in interviewing skills were rectified and not repeated in the main study. The researcher also conducted several interviews for her work outside of academia prior to undertaking her thesis work and was familiar with the nuances of qualitative interviews, including listening patiently and being sensitive about how the questions are framed, and letting the participants tell their stories in their own way (Rubin and Rubin 2011).

The households were primarily recruited through health and social services agencies, mainly through advertising, presentations and letter drops. Respondents were also recruited through community groups, organisations working with students, older people, people with disabilities and migrant
groups. Utilising a range of different recruitment methods ensured that selection-bias was reduced as much as possible. Although respondents were not specifically recruited by ethnicity or socio-economic criteria, the aim was to concentrate recruitment in local areas with relatively high levels of income distribution using Statistics New Zealand 2014 census as a guide (Salmond et al., 2006). Past research has shown that certain households (primarily those with elderly people, people with special needs, families, migrants and long-term unemployed) are more vulnerable to fuel poverty (Boardman, 2010). However, the selection for this study was not based on any pre-existing definitions of fuel poverty, for example the need to spend more than 10% of a household’s income on fuel bills (Boardman, 1991).

In order to fully explore fuel poverty, it was important to capture a broad range of perspectives from different participants. For this reason, a variety of household types were interviewed for this study such as students, single parents, elderly occupants and working families. A range of experts were also sought for the policy interviews including academics, politicians and members of the community and business sector. Although a wide variety of households and experts were interviewed for this research, there were commonalities in their shared experiences and beliefs around fuel poverty, which emerged as the interviews unfolded and reached saturation.

Table 4.1 provides an overview of the sample’s demographic details for Study 1.

Face-to-face interviews were considered the most appropriate qualitative research method given the sensitivities of this study (Maccoby and Maccoby, 1954). The interviews were conducted and voice recorded in participant’s homes or a neutral agreed place. Thirty two participants were interviewed for study one, and 18 experts were interviewed for the policy perspectives. Data was collected using semi-structured interviews aided by a topic guide. This was complemented by a short questionnaire for eliciting socio-demographic data, and information on household income and fuel bills. The interview guide covered household characteristics and energy consumption habits, and probed into issues around how energy habits affected the quality of life of respondents, including: family life and social relations, well-being of household members and coping strategies used for living in energy hardship. The type of questioning adopted for this study lets the participants describe as freely as possible how they live through the phenomenon.
<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>16</td>
</tr>
<tr>
<td>Females</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Household type</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single occupant/Student</td>
<td>4</td>
</tr>
<tr>
<td>Single parent</td>
<td>13</td>
</tr>
<tr>
<td>Two parent household</td>
<td>7</td>
</tr>
<tr>
<td>Retired</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employment type</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working full-time</td>
<td>2</td>
</tr>
<tr>
<td>Working part-time</td>
<td>13</td>
</tr>
<tr>
<td>Unemployed on benefit</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tenure type</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner occupied</td>
<td>7</td>
</tr>
<tr>
<td>Private rental</td>
<td>17</td>
</tr>
<tr>
<td>Housing New Zealand</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main method of heating</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat pump</td>
<td>8</td>
</tr>
<tr>
<td>Portable electric heater</td>
<td>15</td>
</tr>
<tr>
<td>Wood/Fireplace</td>
<td>9</td>
</tr>
</tbody>
</table>

| Suburbs represented | 10  |
| Decile rating of suburbs | 2–7 |
| Age Range            | 23–71 (mean age 43) |

Table 4.1: Description of study participants (n=32)
Therefore, as few questions as possible were asked to avoid the researcher’s influence on their own experiences of the phenomenon (Robertson, 2007). An example of the topics and prompts used in the interviews are presented in table 4.2.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Prompts</th>
</tr>
</thead>
<tbody>
<tr>
<td>The house you live in</td>
<td>Heating, insulation, dampness and mould</td>
</tr>
<tr>
<td>Heating home in winter</td>
<td>How important is it to keep your house warm?</td>
</tr>
<tr>
<td></td>
<td>What difference, if any, do you notice about how you feel when you are using heating in your house, compared to when your house feels cold? Do you find it difficult to heat the house in winter? How does the cost of power bills affect you?</td>
</tr>
<tr>
<td>Energy and well-being</td>
<td>What does well-being mean to you? How does energy or lack of it impact on your everyday life?</td>
</tr>
<tr>
<td>Trade-offs</td>
<td>Have there been times when you had to choose between paying for power and paying for other things? Can you explain?</td>
</tr>
<tr>
<td>Coping mechanisms</td>
<td>What are some coping mechanisms you use to deal with energy hardship? Do you think energy hardship is a problem amongst people that you know? Can you explain?</td>
</tr>
</tbody>
</table>

Table 4.2: An example of the items and prompts used in interview

The interviewer did not raise topics in any particular order and had the flexibility to explore respondents’ perceptions and views. As the objective of interviews in phenomenology is to elicit participants stories, the researcher was the listener and asked participants for accounts of their experiences of fuel poverty. She asked probing questions to encourage the participants to elaborate on the details to achieve clarity and to stay close to the lived experiences. Even though the interviews were based on questions framed by an interview guide, participants were allowed the freedom to talk about their experiences in a way which they were comfortable. Open-ended questions were utilised, and the answer categories used by participants are not predetermined (Patton, 2005). The advantage of such a loosely structured interview guide is that it stimulates discussion rather than dictates it. It also allows for more understanding to develop and for the interviewee’s complex
viewpoints to be heard without the constraints of scripted questions (Tracy 2013). However, the less structure an interview has, the more skills and knowledge are required of the interviewer to be able to probe effectively (Tracy 2013). To account for this, the researcher spent several months prior to field work familiarising with the topic and carried out a pilot study to improve the interview skills necessary for fieldwork.

The sensitivity and subjectivity of this research area, especially discussing deprivation and hardship might prove to be challenging for some respondents. In addition, some households may be uncomfortable admitting to the extent of their fuel poverty problems, while others may overstate them. To overcome such barriers, respondents were assured of anonymity and reassured that they did not have to discuss any topics that they did not feel comfortable doing so. In addition, subjective answers were probed further to gain insight into the magnitude of the fuel poverty problem. The flexibility of the interviews, resulting in a conversational structure rather than a structured format, also helped put participants at ease.

Interviews concluded when saturation was reached (Patton 2002). This was done by gathering data until the core variables emerged as important to the theoretical understanding of fuel poverty and no new data were discovered regarding a category (Strauss and Corbin 1998). While Josselson and Lieblich (2003) (Josselson, E., Lieblich, and McAdams 2003) stress that saturation is one of the key determinants of sample size, they cautioned that true saturation will never occur as each new participants may have something unique to contribute regarding the condition under study. This has been noted as a limitation and effort has been made to include participants across a broad spectrum of household types that would represent the breadth and depth of fuel poverty. At the completion of the interview each participant received a supermarket voucher of $20 for their participation.

4.5 Analysis

The analysis used for qualitative research uses a number of tools with which researchers design their studies, and collect and analyse their data (Given 2008). For the purposes of the current study, in the absence of detailed qualitative research on fuel poverty in New Zealand, it was more crucial to first fully understand what fuel poverty means to the people experiencing
it. For this reason, thematic analysis (Given, 2008) was used in this study. The rationale for choosing this analysis method is presented below.

4.5.1 Thematic Analysis

The phenomenological approach used in this study yields statements of meanings and as a result thematic analysis was used to analyse the data (Patton, 2002; Braun and Clarke, 2006). Thematic analysis, an instrument of qualitative data reduction and categorisation, serves to identify the most important meaning units, referred to as themes or patterns (Creswell, 1998; Delgado, Ojeda-Benítez, and Márquez-Benavides, 2007). Crewel (1997) (Creswell, 2012) proposed a systematic process for coding data for thematic analysis where specific statements were analyzed and categorised into clusters of meaning that represent the phenomenon under study, paying close attention to what was experienced and how it was experienced. This approach is very common in qualitative analysis, and is one of the foundational tools in understanding of qualitative data (Braun and Clarke, 2006; Guest, MacQueen, and Namey, 2012).

There are some key advantages to using thematic analysis in this study. In comparison to other qualitative tools, such as discourse analysis or grounded theory, thematic analysis is very flexible and not embedded in any pre-existing framework, allowing it to be used with different theoretical frameworks (Braun and Clarke, 2006). Thematic analysis examines whole sequences of narratives within cases, while grounded theory uses coding to isolate portions of the transcripts that have areas of common focus across cases (Riessman, 2008). Furthermore, thematic analysis allows it to be used as a realist method, which reports experiences of participants, and allows participants stories to remain whole in its representation (Braun and Clarke, 2006).

However, there are some limitations to using thematic analysis. While thematic analysis is a very flexible method, which could be an advantage, it could also pose as a disadvantage to the researcher wanting to focus on specific aspects of the data. In addition, while this approach is excellent in capturing the experiences of participants, it has limited interpretive power if not used within a theoretical framework (Braun and Clarke, 2006). Despite these limitations, thematic analysis is the preferred choice in this study due to the in-depth knowledge it would provide into fuel poverty. Furthermore,
this study would be using the Energy Cultures framework (Stephenson et al., 2010a) to structure the findings and to provide interpretive basis for the outcomes as well.

The interviews were thematically analysed using Braun & Clarke’s six-phase framework for purposeful, systematic and rigorous analysis (Braun and Clarke, 2006). As the first stage of analysis, the transcribed interviews were manually coded by the researcher, read and re-read several times to ensure that all variables were captured. This initial step of reading and re-reading is crucial in enhancing the audit trail of the data, and to generate initial codes (Liamputtong, 2009).

Next, each interview was then analysed for thematic categories, following a revision of the procedure outlined by Colaizzi (1978), and Braun & Clarke (2006) (Braun and Clarke, 2006; Saunders, 2003). Data were assigned themes, based on pre-determined categories aided by previous literature and the theoretical framework of energy cultures. Data were also compared and contrasted within and between categories, a process similar to the constant comparative method used by Glaser and Strauss (1967) (Glaser and Strauss, 1967; Sapsford, 1996), to clarify themes and re-assign data if necessary.

The next step was to identify corresponding quotes from the interviews. Segments of texts were coded to capture full thoughts or experiences (Guest et al., 2012). Themes obtained early in the analysis were progressively collapsed into a smaller number of sub-themes in subsequent steps of the data analysis. Through a process of continually checking back and comparing themes between (and within) interviews, redundancies were eliminated and higher-order relations between themes formulated. Themes obtained during the early phase of data analysis were specific in content and were stated in sentence form; later themes were increasingly more concise and conceptually inclusive. For example, the early themes, “Avoid turning on heating” and “Decrease spending on energy” were reduced to a single statement “Limit energy use” in subsequent steps of the data analysis. At each level of analysis, the themes obtained were referred back to the original data to determine if they were still able to account for the experiences described. For example, the original data was scanned to determine if the concept “limit energy use” adequately represented all statements referring to limiting energy usage, including not turning on heater until it was very cold and avoiding being in the house so as not to turn the heating on. The emerging themes are supported
by quotes from the interviews to provide context to them.

Differences and similarities were explored within the thematic framework, examining gender, household type and employment status. However, due to the small number in each group, extensive sub-group analysis was limited.

A limitation of the coding process is the fragmentation of qualitative data as highlighted by Hollaway and Jefferson (2000). They argue that while a systematic break down of data is easy to manage, it reduces the data to segments and de-contextualises the narratives. The principles proposed by Gestalt, that the understanding of the whole is greater than the sum of its parts, support this claim where the meaning can be better understood in relation to the whole picture. Taking this limitation into account, the data was analysed using a structured summary for each household to aid in the holistic understanding of the narratives. These summaries assisted in the analysis process by providing links that connects elements of the data in the interpretation. An example of the coding process is presented in Figure 4.2.

4.6 Ensuring Rigour

As noted by Hay:

> It is no frivolous matter to share, interpret, and represent others’ experiences. We need to take seriously the privilege and responsibility of interpretation.

Rigour is a way of evaluating qualitative research and refers to the quality of data produced. Ensuring rigour is essential in qualitative research for establishing that a study is trustworthy, and that the findings are credible, while making a meaningful contribution to the literature.

There are certain steps taken to ensure the rigour of this qualitative research, using strategies suggested by Guba and Lincoln (1981). Firstly, meticulous checking has gone into the early stages of research design and at various points in the research process. In addition, each stage of research has been properly documented for reporting and interpretation.
Experiences of living with energy hardship

Coping mechanisms

House and appliances
- Absence of heat pump
- Absence of thermal curtains
- Open fireplace

Support and help from family
- Going over to friends’ place for meals
- Asking for help
- Use of food banks

Decreased spending on food
Cutting back on transportation
Limiting hot water use
Asking for help
Open fireplace
Use of food banks
Absence of heat pump
Absence of thermal curtains
Figure 4.2: Initial thematic map showing three main categories for Study 1.
In this regard, triangulation methods (Denzin, 1978), such as checking the sources against others, verifying processes and interpretations with supervisors and colleagues have been utilised to enhance the credibility of this research.

The concept of reliability, in other words replicability of the findings are viewed differently in qualitative studies as well. Reliability relates to the need for a study to be consistent across time, researchers, and analysis techniques (Morrow, 2005). In qualitative data, individual responses largely depend on the context and experiences of each participant and their circumstances surrounding the phenomenon under study (Russel, 2011). Replicability was achieved in this study by keeping a detailed analytical record of the research process, along with frequent checking and re-checking of the findings.

Similarly, transferability refers to the degree to which the findings can be generalized to the wider population. Qualitative data is not generalisable in the same way as quantitative data, given the small sample size and lack of significant statistical analyses (Morrow, 2005). Transferability in this study was enhanced by steps proposed by Trochim (2006) as outlined by Liamputtong (2009), such as providing detailed descriptions of the research setting, participants, methods and processes (Liamputtong, 2009).

As this is a qualitative analysis using a relatively smaller number of participants from a single case study based in Dunedin, the strength of the findings lies in the richness of the data. And given the exploratory nature of this study, the findings may not seem to be generalised to be representative of the whole population. However, the present findings are still very relevant and would provide a basis for future representative studies of larger segments of the general population. Maximum effort has been put into ensuring that the participant pool contained households with a diverse range of demographic backgrounds and characteristics, adding to the validity of the study.

Lastly, confirmability, or the degree to which data can be confirmed by others is also ensured in this study. This is demonstrated through documentation of the data analysis process, which creates an audit trail that other researchers can potentially follow (Liamputtong, 2009).

Qualitative research is subjective as the researcher is the instrument for analysis, making judgements about coding and categorising the data. To
ensure rigour and trustworthiness of the data, the researcher was honest and vigilant about her own experiences, and pre-existing thoughts and beliefs about fuel poverty. The researcher engaged in a self reflective process of ‘bracketing’ where she recognised and set aside, as much as possible, her a priori knowledge and assumptions, with the analytical goal of attending to the participants accounts with an open mind. Additional reflexive processes were also carried out such as consulting with supervisors and colleagues, and writing notes throughout the analysis to examine how the researcher’s thoughts evolved as she engaged deeply with the data.

4.7 Limitations

Some limitations of the current research should be noted. A limitation of qualitative research in fuel poverty could be the hesitation of participants to share their experiences [Boardman (2010)]. This has been a key obstacle to properly identifying the fuel poor [Heffner and Campbell (2011)]. People often say they are warm enough, even when they are cold, suggesting that the fear of social stigma may be preventing them admitting their situation [Boardman (2010)]. Methods that rely on self-identification through telephone or mail surveys may face the risk of not obtaining accurate answers [Heffner and Campbell (2011)]. Detailed, face-to-face assessments, carried out in a place where the participant feels comfortable, using open-ended questions, is still a much more reliable way to determine the condition of fuel-poverty [Heffner and Campbell (2011)].

Having only one primary investigator available for all data gathering, analysis and interpretation also creates opportunities for interpreter bias [Liamput tong (2009)]. The interviewer took measures to reduce subjectivity and give room for participants to answer questions in their own words. The interviewer rephrased the comments to clarify concepts and to make sure she understood the participants’ perspectives. Resource constraints do not allow for multiple data coders. Many steps have been taken, including member checking, to improve inter-subject validity. The ontology of the researcher and the methods of investigation were specifically chosen to address interviewer subjectivity.

In qualitative research it is difficult to be totally removed from the participants you interact with, and there is always the chance that this may
impact on the methodology of the study. For this reason careful attention was paid to reflexivity or self-awareness of the relationship between the researcher and the participants (Braun and Clarke 2006). This involved a continuous process of self-analysis in which the researcher reflected on the experiences, and was mindful of her own interests and experiences of the phenomena when interviewing the participants. Continuous consultation and reflections were carried out with supervisors and colleagues throughout the data collection and analysis process.

The limitation of the sampling strategy used in this research is such that the study does not give a representative sample of what fuel poverty means to households across New Zealand, and thus cannot claim validity in other parts of the country.

4.8 Summary

This chapter has outlined the methodological perspectives and analytical methods used in this study. The methodology has been shaped by the principles and assumptions derived from the interpretive and critical paradigm. Phenomenology and in-depth qualitative interviews have been utilised in this study to better understand the lived experiences of households in energy hardship that provide valuable insights into this topic. The next chapter will explore the Energy Cultures Framework in detail, especially applied to understanding fuel poverty.
Chapter 5

Understanding energy poverty through the energy cultures framework

This chapter introduces the energy cultures framework as an integrated lens to conceptualise fuel poverty. The work in this chapter contributes to meeting the first, second and third overall objectives of this thesis identified in Chapter 1 (see section 1.2), with the aim of taking an in-depth look at how fuel poverty is viewed in New Zealand.

The chapter begins by introducing the leading theories behind the drivers of fuel poverty. It then outlines the limitations of the existing theories in capturing the multidimensionality of fuel poverty. Next, the energy cultures framework is introduced. The different components of the framework are explained, focusing on how the elements interact and influence each other. The chapter moves on to demonstrate why the energy cultures framework would be a more comprehensive conceptual lens for fuel poverty. Two case-studies are introduced at this point which supports the argument. Finally, the chapter ends by summarising how the framework contributes to policy and research.

5.1 Introduction

Energy poverty occurs in many parts of the world (DECC, 2013; AGECC, 2010). Energy poverty, or the inability to access or afford energy, impacts on the capability of households to attain the level of energy services necessary to participate in society (Day et al., 2016; Sovacool et al., 2017; Bouzarovski and Petrova, 2015; Sovacool, 2014c). One in five people lacks access to modern electricity, and three billion people rely on biomass and other ‘traditional’ fuels for cooking and heating (United Nations, 2016). Over 10% of households in the United Kingdom, 14% in Europe and 25% in New Zealand cannot afford to keep their houses adequately warm in winter (DECC, 2013; Howden-Chapman et al., 2012; EPEE, 2009).

Energy poverty can trigger a number of health and social effects. For example, exposure to indoor air pollution leads to respiratory infections, asthma and other diseases (WHO, 2007; Bruce, R., and R., 2000), whilst the inability to afford adequate warmth in winter has been associated with adverse effects on physical health and mental well-being and with excess winter mortality (Liddel, 2010). Recent research has shown the wider effects of energy poverty, including social impacts and effects on households’ quality of life (McKague et al., 2016).

Energy poverty is exacerbated by widening income and wealth inequality, making it harder for those with low income to have access to clean, affordable energy (Wilkinson, Smith, Beevers, Tonne, and Oreszczyn, 2007). These households may pay a significant percentage of their income on energy, yet still live in cold, damp homes as a result of energy inefficient appliances or lack of insulation (Goldthau and Sovacool, 2012; Lloyd, 2006; Geller, 2003). Reports from New Zealand show that the average percentage of household income spent on energy in the home has increased across all income groups in New Zealand between 1988 and 2013; however, the biggest increase was for the lowest income group, with rates rising from 6% in 2007 to 13% in 2013. In contrast, the highest income group spent just 3 percent of household income on energy in the home in 2013, an increase from 1.6% in 2007 (Ministry of Social Development, 2016). While energy poverty is closely related to wider poverty and inequality, it is a distinct phenomenon that requires urgent attention (Heffner and Campbell, 2011; Hills, 2012; Lawson and Williams, 2012a; Stephenson et al., 2010a).
Understanding the drivers and underlying causes of energy poverty is important for designing measures to eradicate it. Yet, many existing ways of conceptualising such causes do not capture their full complexity (Cooper 2017; Walker and Day 2012; Petrova et al. 2013). The dominant literature on energy poverty has focused on the physical structure of dwellings and appliances, the economics of household expenses on energy, and the epidemiological aspects of cold housing on health (Clinch and Healy 2001; Harrington et al. 2005). While economic and technical approaches are useful, they do not adequately depict the wide ranging variables implicated in the emergence of the condition in space and time (Sovacool et al. 2017; Stern 2014; Pachauri and Spreng 2011). In particular, we would argue that the social, cultural and behavioural underpinnings of energy poverty, and how these interact with material and technical dimensions, could provide new insights into how energy vulnerability is formed and changes over time.

The aim of this chapter is to demonstrate the value of the energy cultures framework (Lawson et al. 2016; Hopkins and McCarthy 2016; Bell et al. 2010; Stephenson et al. 2010a; Sweeney et al. 2013) in offering a nuanced and holistic framework through which to understand the drivers of energy poverty. The framework brings together multiple elements to conceptualise how the technical, behavioural and social components interact to structure energy consumption. The framework also captures the barriers and support systems in place that must be identified for effective policy targeting. Such a comprehensive understanding of energy poor households will provide insights that aid in designing targeted policy measures to alleviate energy poverty.

5.2 Understanding the drivers of energy poverty

One of the challenges of adequately addressing energy poverty is that it has multiple causes which are not easily captured in one indicator (Stephenson et al. 2010a; Verhallen 1981; Wilson and Dowlatabadi 2007; Nussbaumer et al. 2012). This is evident in the number of theories attributed to energy poverty (Bell et al. 2010). Income, housing conditions and fuel prices, have all been factored in as contributing causes of energy poverty (Bouzarovski and Petrova 2015), yet they are limited in capturing the severity of the condition.

The classic theory from Boardman implies a ‘triad’ of low income, high
energy prices and poor household energy efficiency as causes of energy poverty (Boardman, 1991). Energy poverty could also be aggravated by the absence of savings and living in rental accommodation which limits the ability of households to improve their homes (Boardman, 2010). Recent years have seen more complex and nuanced aspects begin to emerge. Energy poverty has been linked to having high energy needs caused by disability or health condition which requires additional energy (Snell, Bevan, and Thomson, 2014). Bouzarovski and Petrova (2015) also highlight the degree of built environment flexibility and the extent to which households are able to access alternative energy carriers as additional factors that can influence vulnerability to energy poverty (Bouzarovski and Petrova, 2015). Vulnerability theory stresses that different households will have different degrees of vulnerability to energy poverty, depending on their exposure and sensitivity to the condition and their capacity to adapt (Middlemiss and Gillard, 2015). Research has found that there are growing challenges related to the reluctance of some households, often the most vulnerable, to apply for assistance through subsidized programmes to help with burdens of energy poverty (Boardman, 2010). Issues of stigma, concerns about the disruptions associated with heating and insulation being installed, and distrust of authorities are key factors in this challenge (Boardman, 2010; Lawson and Williams, 2012a). Despite these advances, in many policy discourses the dominant understanding of the causes of energy poverty remains limited to the triad of incomes, efficiency and energy prices.

It is difficult to target interventions for energy poor households by focusing on one aspect of the problem (Heffner and Campbell, 2011; Isaac, 2004). An example is the Winter Fuel Payment Programme in the UK, where the solutions of energy poverty are based on one of the causes – low income. A winter fuel payment was given to all pensioner households regardless of circumstances, and it has been estimated that as a result about three-quarters of these fuel assistance payments went to households that weren’t energy poor (Boardman, 2012b). While blanket interventions such as these are often cheaper to administer than a targeted approach, the downside is that some affected households miss out. Moreover, focusing only on income support can be a short-term measure that does little to improve the living conditions of households (McKague et al., 2017). Another example is from New Zealand, where interventions were framed solely around
technical causes of energy poverty. An evaluation of a national-wide government insulation project in New Zealand showed that 77% of residents in New Zealand who received upgraded heating systems were not using them efficiently, showing the importance of interventions also considering factors such as the behavior and practices of householders (Isaacs et al., 2010).

These various challenges point to the need for a comprehensive understanding of energy poverty, one that moves beyond the narrow ‘triad’ of income, housing and energy appliances. It is here that we argue the energy cultures framework, which conceptualises energy poverty through the interplay between technical factors, social norms and household practices can be of value.

5.3 Energy Cultures Framework

Leading researchers in the energy field have called for a multidimensional view that encompasses the larger systems that influences energy consumption (Osbaldeston, 1984; Stern, 1986; Hards, 2013; Lutzenhiser, 1993; Sovacool et al., 2017). A combination of economic, built environment, social and behavioural factors should be amalgamated, it is argued, to adequately understand the dynamics of household consumption (Shove, 2003; Pachauri and Spreng, 2004).

The energy cultures framework provides an integrative approach that bridges the gap between theories of energy consumption focused on the individual and those centred on structural factors (Stephenson et al., 2010a), supporting existing theories of energy poverty while strengthening what they each offer. The term ‘culture’ here refers to a cluster of similar ‘knowledge, beliefs, behaviour and material objects’ which affect energy consumption, both at an individual and household level (Stephenson et al., 2010a) (pp. 6123). The framework offers a holistic outlook that factors in the broad range of variables that influence energy poverty – the material conditions of the house, values, beliefs and knowledge of consumers, and the wider social and cultural systems that impact on energy decisions – and importantly the way these variables interact (Stephenson et al., 2010a). Figure 5.1 illustrates the energy cultures framework.

At the core of the framework are three key components that impact on energy consumption, or the level of energy services that a household is able
to attain – norms, practices and material culture (see figure 1). Norms are householders’ expectations and knowledge regarding their energy use; practices are what they actually do in terms of energy usage; and material culture is their surrounding house and appliances that impact on how much energy is consumed. The framework’s underlying principle is that these different components interact with and influence one another. A change in one of these elements impacts on another, while the interactions between these elements reinforces certain energy consumption patterns, resulting in a distinct ‘energy culture’. To understand energy poverty through the energy cultures lens, energy consumption is seen as an interaction between norms, practices and material cultures, as well as the external influences that form the context in which these interactions occur. A household’s ability to change their energy culture is affected by the particular ‘barriers’ and ‘support’ available to occupants, both internally within the household and from external factors outside of it ([Sweeney et al., 2013](#)). The different elements of the framework are presented in more detail below:
5.3.1 Norms

Norms are shared beliefs about how individuals behave in a given context (Giddens, 1991). In the energy cultures framework, norms are a household’s expectations and aspirations in relation to energy consumption in a given context, with ‘expectations’ their beliefs and assessments about their current practices and material culture, and ‘aspirations’ the practices and material culture that they consider desirable but have not yet been achieved (Stephenson et al., 2015a). A household’s expectations and aspirations shape how they consume energy and how they perceive the situation that they live in, and so are useful in understanding energy poverty. For example, norms shape how warm people expect their living space to be, their perceptions of different methods of keeping warm, and the value that they place on having energy efficient technologies – which can all affect how an energy poor household experiences their situation and whether they feel it is worthwhile attempting to make changes.

5.3.2 Material cultures

Material culture is a household’s physical assets, includes the surrounding infrastructures, appliances, and technologies that play a role in how energy is used. Material culture acts as a significant driver of energy poverty. A low-level of insulation in a house and energy inefficient appliances increase energy consumption and make it harder to warm the house or retain the warmth inside. Material culture should be one of the first components to tackle in measures to address energy poverty as it has one of the most direct impacts on the level of thermal comfort in the house. The energy cultures framework also recognizes the interaction between material culture and norms – householders have expectations and aspirations regarding the material of their home, and these play a role in how they interact with their physical environment culture and how willing they are to make alterations to their home.

5.3.3 Practices

Practices refer to the actions of households – both their routinized, everyday activities and their relatively infrequent actions (Stephenson et al., 2015a). Householder practices are strongly influenced by their norms, as these shape
how people react to situations and what they consider appropriate activities. For example, the practice of putting the lid on pots when cooking to decrease moisture in the house, or closing the curtains to retain heat, may come from norms about preventing mould growth and retaining heat. Practices are also influenced by a household’s material culture. For instance, the availability of an open fire, coupled with a preference for ambient warmth from fires, could see a household adopt very different heating methods compared to a household with only gas central heating.

5.3.4 External Influences

External influences are those factors that are largely beyond the immediate agency or scope of control of an actor or household, but which shape their norms, practices and material culture. The boundary of what constitutes an ‘external’ influence can vary between households. For example, whilst a homeowner has certain legal rights over the physical aspects of a house (and thus could decide to make changes to make the house warmer or more efficient), a renter often has limited agency to make such changes (these issues being controlled by a landlord instead) and so much of the infrastructure of the home form part of their external influences. External forces shared by both groups include market mechanisms, energy prices, subsidies, wider social norms, information campaigns, and policies or regulations that impact on energy usage. External influence are important because they can lock-in current energy cultures and so act as ‘barriers to change’ (see below), or they can facilitate new energy cultures. For example, subsidies available for low-income renters towards insulation could motivate landlords to alter the material culture of their rental properties by installing insulation, thus aiding the situation of energy poor households living in such homes. The level of insulation installed in a house may also depend on other external influences, such as government building codes.

5.3.5 Motivation, Barriers and Support

In addition to the core elements and the external influences of the energy cultures framework, three additional factors are important to consider in relation to energy poverty – motivation, barriers and support available to the households.
Motivation plays an important role in changing habitual patterns; for example, if a grant is available for new insulation that will improve the energy efficiency of the home and lift a household out of energy poverty, a household must still be motivated to take-up this offer. Motivation to change consumption habits may be influenced by norms, such as awareness about the health impacts of living in a cold, damp house or the high cost of electricity. At the same time, whilst a household might be motivated to change their energy culture, factors such as material culture (e.g. a difficult to insulate home) or external influences (e.g. a lack of adequate information or funding) might prevent such changes. This stresses the point that energy cultures framework highlights – energy poverty is influenced by not one element, but the interaction of different factors, and so solutions to energy poverty must consider the broader variables.

Barriers are limitations on deviations from current energy cultures. The different elements of an energy culture (material culture, norms, practices and external elements) can all act as barriers. For example, norms such as limited awareness about efficient energy appliances could prevent households adopting energy efficiency. External influences could also act as barriers, for example a lack of subsidies for home retrofits, low wages, or inadequate regulation of the private rented sector can prevent households making changes to the material culture of their home. While barriers are a limiting factor, support systems available to the household could aid them in changing their energy culture. Financial support from family or friends, or providing new information to a household, may help overcome the barriers that prevent a shift in energy culture. For example, an effective awareness campaign about energy poverty might provide households information about government subsidies or low-cost options that can change their material culture. Likewise, a well-informed friend might provide advice needed to change the norms of households.

5.4 Energy poverty through the energy cultures lens

This section presents two case studies to illustrate how the energy cultures framework can be applied to better understand the causes of energy poverty. These cases studies are drawn from an energy consumption study conducted
in New Zealand, in which the framework was used to guide the research
design and analyse the findings. Full details of the methodology of this
study can be found in McKague et al. (2016) \cite{McKague2016}. In
both case studies the names of respondents have been changed in order to
protect identity.

5.4.1 Case study 1

Norma is a 39 year old mother of two who lives in Dunedin, New Zealand.
She lives in a rental house in the north side of the city with her partner and
two children. During winter she finds it really cold in her house.

‘I’ve lived here for a year and a half. During the winter it’s not that
great, because the sun’s gone by two or three o’clock in the afternoon…
When we first shifted in it was so cold… you can smell the cold, you can
smell the mildew… I had to actually ask to get some ceiling insulation and
also seals around the windows which they (landlord) didn’t do… I didn’t
qualify for the government grants… I just went and did it myself… because
there was a lot of draught… it was very cold… but that is not enough, I
need more insulation to make it weather-tight’

Norma uses portable heaters in her bedroom and living room. She is
very aware about retaining heat, and about the level of moisture inside her
house.

‘Heating is very important cos you know you don’t want your kids to get
sick… and you know when we cook and what not lots of steam builds up
and even that produces mould and mildew… we move around a lot less in
winter… we pull out blankets and just hunker down’

Norma is conscious about saving energy but ensures she keeps the house
comfortable for her children.

‘I try to turn the heater on just before 4 o’clock … just before the kids
get home so you know it’s starting to warm up and I keep it that way… I
turn the heater off at night before we go to bed… The power bill it’s not
unmanageable but it’s sort of getting up there… You’ve got to conserve
power at the end of the day, unless you want to either have your power
disconnected or have a massive power bill at the end of the month which
you just can’t afford… At the end of the day I think if we don’t conserve
our power we are going to end up with nothing… Power is becoming too
expensive and unaffordable’
Using the energy cultures framework to analyse Norma’s energy poverty outlines the circumstances underpin her situation. In Norma’s case, the material culture is the main cause of her energy poverty. The position of her house that does not capture adequate passive heat from the sun in winter, the lack of thermal insulation in the walls and loft leading to the heat escaping quickly, and the inefficiency of heating systems which means using the heating is expensive. Her material culture is further inhabited by the external influences, such as an inability to access subsidies for insulation and the high electricity prices. The material culture and external influences acts as barriers for Norma to move out of energy poverty.

Norma’s practices of moving around less inside the house during winter, putting on extra clothes, and putting lids on pots when cooking to reduce moisture all indicate that she is very energy aware. Her practices are driven by the material culture around her and the strong norms and awareness around energy. Norma is energy conscious and is careful about her energy spending. She confines heating to one space to conserve power, and prefers extra clothing to stay warm over turning the heating up. When practices and material culture are aligned with norms it embeds the behaviour forming habits.

For a change in energy culture to occur, one of the elements must change. In Norma’s case, it is clear that the change must originate from the material culture. As Norma is already energy conscious, has aspirations for her home to be warmer and better insulated, and carries out a lot of activities to prevent moisture, contain heat and warm her house, it is the level of insulation in her house and the energy efficiency of her appliances that needs to be changed for her to move out of energy poverty. External factors such as regulations impacting on building standards, or subsidies for low income families towards energy efficient appliances and insulation, could lift her out of energy poverty. However, while this may be the case for Norma, other situations might demand interventions driven by practices or focused on norms.

5.4.2 Case study 2

Eric is a single father of a four year old son, living in his own property in South Dunedin, New Zealand. Eric has made some changes to the house, including installing insulation.
‘The original part of this house is very thin and has no cavity available for insulation . . . It’s weatherboard on the outside . . . The cold air just rushes up the floor . . . There’s a lot of springs in the area which makes it very cold . . . I have insulated everything I can, with the assistance of grants . . . It’s a two story house, and I can’t put any insulation on [the ceiling] because of the way the house is built . . . The only way I can do that is to re-roof the house and I can’t afford to do that’

Eric relies on a wood burner to keep warm in winter. He spends a lot of time acquiring wood to keep the burner going.

‘Winter here is very cold . . . This house is kept warm by a fire . . . I don’t use heaters . . . I just go out and cut firewood . . . Anytime I go anywhere outside of the city I have trailer, I have some saws and I bring the wood . . . [My wife and I] have recently separated . . . [My ex-wife] had the fire going all year, that’s why we go through so much wood . . . I’m out chopping firewood all the time so she can keep it warm to her standards’

Eric has expectations in which he accepts living in a cold home, and these expectations then shape how he deals with the cold and his aspirations to change his situation:

‘I’ve always lived in cold flats as a student so I’m used to piling on clothes instead of turning on the heater. When I was flatting many of my flat-mates came from hot climates and they had the heaters up all the time . . . You don’t need to have the house that warm, just put some clothes on for god’s sake . . . My son has gotten used to being in this cold house, [but] my ex-wife and I had arguments about heating . . . it caused a lot of stress in our relationship . . . Electricity bills and trying to rationalise why I don’t want to spend so much on it . . . Is it really necessary to have a hot shower every day? From a male point of view, no it’s not!’

‘In Dunedin, in winter it’s very hard for people to stay psychologically well . . . it’s a cold, depressing place and the climate is very cold . . . but that’s just the way it is . . . it’s the situation . . . it’s the geography of this place . . . you’ve just got to adjust your attitude . . . Ana found it very hard and that’s one of the reasons why we separated’

Using the energy cultures framework to help understand Eric’s situation unveils his norms – encompassing expectations and aspirations – that drive his practices and act as barriers to change. As Eric grew up in a cold house, cooler indoor climate is the norm for him and he sees little value in warm-
ing up the house, instead preferring to put on extra clothing. A conflict in attitudes to warmth might lead to disagreements amongst household members – as Eric pointed out, the mis-match of energy consumption values and priority was one of the reasons for his separation from his ex-wife. Eric’s norms and values could be acting as a barrier to him making the necessary changes to move out of energy poverty.

In order to tackle Eric’s energy poverty, his norms and practices need to be targeted. Deep set belief systems are hard to change instantly. An intervention based on explaining the health impacts of living in cold houses, how the cooler indoor temperatures may be affecting his son, or showing how other households live and keep warm, might help drive change in Eric’s energy habits.

5.5 An integrated energy poverty framework: implications for policy and research

The energy cultures framework provides a holistic understanding of the causes of energy poverty by bringing together the internal and external elements that influence the energy consumption decisions and patterns of households. Using the ECF, the findings from the case studies clearly articulate the distinct norms, beliefs and practices that lead occupants to their choice of material culture and aligns them with the respective energy services that fits in with these values. Case study 1 and 2 show different variants of this behaviour: one where material culture is the dominant factor in fuel poverty and in the second example norms and beliefs are most prevalent in determining energy consumption habits. This is in line with previous research that show energy consumption is influenced by larger systems that influence individuals behaviour (Stephenson et al., 2010a; Verhallen, 1981; Wilson and Dowlatabadi, 2007; Nussbaumer et al., 2012), and that a combination of economic, built environment, social and behavioural factors should be brought together to adequately understand the dynamics of household energy consumption (Shove, 2003; Pachauri and Spreng, 2004). While the ECF helps in capturing key indicators of fuel poverty, it does not factor in some important elements such as household needs or circumstances (McKague et al., 2016), or what motivates, hinders or supports someone to move in and out of fuel poverty (Lawson et al., 2016; Sweeney et al., 2013).
The energy cultures framework provides an integrative approach that bridges the gap between theories of energy consumption focused on the individual and those centred on structural factors \cite{stephenson2010a}, supporting existing theories of energy poverty while strengthening what they each offer. A household’s energy culture shape their vulnerability to energy poverty, and the barriers and support systems available to them determine their potential pathways out of the condition. For effective policy development it is important to have an integrated system of understanding the complex drivers of energy poverty, which the energy cultures framework provides.

The main strengths of applying the ECF to understand fuel poverty is that it helps to identify different categories of energy poor households that require distinct policy interventions. The framework uses conceptually simple set of indicators to bring together the key elements which influence fuel poverty. Indicators such as perceived energy needs, conditions of the house or coping mechanisms occupants adopt to deal with energy poverty could be used to efficiently target households. Better understanding of the different norms, behaviours and material settings of households helps in capturing segments of users who may be demographically similar but have very different energy cultures \cite{stephenson2016, lawson2012b, bouzarovski2012}. The inspirations people have for energy, their need for material changes and daily practices shed in-depth light into their energy behaviour patterns. It is important to understand the reasoning behind these practices and daily consumption habits if interventions are to be devised to lift people out of fuel poverty.

This is the first time ECF has been applied in fuel poverty research, and while it provides a good understanding of the key elements in energy interaction, there are still some key limitations that have to be addressed. Firstly, the model is simplistic in its use which is an advantage as well as a disadvantage. For example, people who spend extended amounts of time in the home, such as elderly people and families with young children, would require extra energy for their day to day needs. These particular needs and circumstances of different households have not been factored into the model. At the individual level, the energy cultures of a teenager will be very different from the materials, norms and practices of his elderly grandparents.
At the household level, different household circumstances will also influence their distinctive norms, practices and material culture related to energy consumption. Such differences need to be more clearly integrated into how these requirements will affect the material needs, practices and norms of different households types. Addressing specific needs will also help customise policies and programs. For example, the elderly group may benefit from direct interventions focused on the material cultures, such as continuing subsidies for heating and insulation. Those who do not use energy as efficiently as they could may benefit from programs to help alter their energy practices, such as customised home energy advice. It would also be useful to link this group up with services in the community which may help them cope with the financial hardship of increased power bills.

Energy poverty is complex and has wide ranging consequences for family and society. Looking at energy poverty through the energy cultures lens provides a useful analytical structure to understand the complex drivers of energy poverty, how habits are formed and what external influences impact on energy consumption or non-consumption. The framework will enable better informed policy-making and add significant value to expanding energy poverty research. The energy cultures framework is transferable to different contexts and agents as well. For example, future studies could compare the drivers of energy poverty between two contrasting geographical contexts, such as a cooler country and a warmer one, or between households and businesses. By better understanding the complex energy consumption patterns of the energy poor, and using this understanding to help drive change will help the transition towards a sustainable and secure energy future for all.

5.6 Summary of findings

This chapter has proposed and supported the case for using the energy cultures framework as a nuanced theoretical lens for viewing fuel poverty. This chapter contributed the following:

- identified the gaps in existing theories
- provided support and examples through case-studies that showed how the energy cultures framework would address these gap
• supported how the energy cultures framework is a useful conceptual tool for viewing energy poverty

A comprehensive understanding of the drivers of fuel poverty will facilitate better targeting, implementation and evaluation of future fuel poverty policy measures.

The next chapter extends the objectives of this thesis in trying to understanding the lived experiences of fuel poor households.
Chapter 6

Understanding the energy consumption choices and coping mechanisms of fuel poor households in New Zealand

This chapter captures an in-depth study of the broader experiences of fuel poverty. No research has been conducted so far that exclusively investigates the lived experiences of fuel poor households in New Zealand. One of the aims of this thesis was to better understand the different dimensions of fuel poverty in New Zealand and to propose a multidimensional set of indicators that would capture this variability. The work in this chapter contributes to meeting the first and third overall objectives of this thesis identified in Chapter 1 (see section 1.2).

The chapter begins with an in-sight into fuel poverty prevalence in New Zealand. The main drivers of fuel poverty and the way it is measured and captured are outlined. Energy cultures framework is then proposed as a conceptual tool for studying fuel poverty, and a qualitative study is under-
taken using this framework as a theoretical back-drop. The study is based in Dunedin, with the aim of capturing the lived experiences of households in fuel poverty. The findings from the study are presented as key themes. A set of multi-dimensional indicators of fuel poverty are derived from this data. The chapter concludes with the rationale for this study and why insights into households fuel poverty can aid in designing effective interventions.

6.1 Introduction

Energy is a vital part of our lives (Lutzenhiser, 1993; Shove, 2003). Affordable and accessible energy is a necessity for households and communities (Lutzenhiser, 2014), but it is becoming increasingly hard for some people to afford or access energy as easily (Lloyd, 2006). One in four households in New Zealand were assessed to be in fuel poverty in 2012 (Howden-Chapman et al., 2012). Fuel poverty is a public health issue that has been associated with adverse effects on physical health and mental well-being (Liddel, 2010).

Literature on fuel poverty has concentrated on the physical aspects of buildings and appliances, the economics of household expenses on energy, and the epidemiological aspects of health and energy use (Clinch and Healy, 2001; Sovacool et al., 2012b). The behavioural side of energy consumption is under-studied (Cooper, 2017; Wilhite, Nakagami, Masuda, Yamaga, and Haneda, 1996; Patterson, 1996). While economic measures are useful to portray the extent of fuel poverty, they do not adequately capture the wide ranging social impacts of fuel poverty (Harrington et al., 2005; Liddell, 2008). By focusing on the perspectives of the households in fuel poverty this study will provide an opportunity to better understand the broader aspects of fuel poverty (Sovacool, 2014c; Stern, 2014).

This study will use the energy cultures framework (Stephenson et al., 2010a), and the practice-based energy-cultures framework (PBECF) (Sweeney et al., 2013) as theoretical lenses to explore the energy consumption habits and coping mechanisms of people living in fuel poverty. We explore the potential of these frameworks in the fuel poverty context by applying it to in-depth interviews carried out with households in energy hardship in New Zealand. The research will offer a range of experiences of fuel poverty to be captured, and will add a rich body of evidence to the fuel poverty literature by highlighting the wider social impacts of fuel poverty.
6.2 Fuel poverty in New Zealand

In New Zealand, residential energy prices are rising faster than income levels, intensifying the problems of fuel poverty for many households (Lloyd and Callau, 2009; Rashbrooke, 2013; Eaqub and Eaqub, 2015; Ministry of Social Development, 2008). This is exacerbated by a widening gap in income and wealth inequality, making it harder for some households to have access to affordable energy (Wilkinson and Pickett, 2009; Rashbrooke, 2013). For these households energy bills take up a high portion of their household income, yet their energy sources are inefficient and they live in cold, damp homes (Geller, 2003; Barton, 2010).

Fuel poverty leads to two important effects. People suffering from poor health due to inadequately heated housing, or having to sacrifice other basic needs in order to afford thermal comfort (Howden-Chapman, 2005). The current dominant measures of fuel poverty have not adequately captured this variation in choices and practices households adopt to cope with energy hardship (Sovacool et al., 2017).

Lewis (Lewis, 1982) originally defined the concept of fuel poverty as the inability to afford adequate warmth in the house. The most commonly used definition of fuel poverty classifies households that need to spend more than 10% of their household income on energy bills to be in fuel poverty (Broadman, 1991). Using this definition, an estimated one in four households in New Zealand were in fuel poverty in 2012 (Howden-Chapman et al., 2012). This approach has been criticized for focusing on what households would need to do spend in order to achieve acceptable warmth levels instead of what households are actually spending on keeping their dwellings warm (Hirst and Brown, 1990; Heffner and Campbell, 2011; Hills, 2012; Fahmy, Gordon, and Patsios, 2011). A more recent definition for fuel poverty has been adopted (DEFRA, 2001). Hill’s measure of fuel poverty, which classifies low income households with high energy needs as being fuel poor, if spending on their fuel needs puts them below the poverty line (Hills, 2012). While Hill’s measure takes into account household needs, both the Hill’s measure and the 10% measure, based on economic terms, fail to adequately capture the broader experiences of fuel poverty (Royston, 2014; Middlemiss and Gillard, 2015).

Several factors contribute to the relatively high levels of fuel poverty in
New Zealand. The poorly insulated housing stock in many parts of New Zealand adds to the hardship faced by their inhabitants (Shen, 2004). Minimum insulation standards for housing in New Zealand were not introduced until 1978 (EECA, 2007). Many houses built prior to 1978 – the bulk of existing housing stock in some parts of the country – lack sufficient insulation (Lloyd and Callau, 2009). New Zealand has a small population dispersed over the two main islands. There are significant variations in temperature in the North and South of the country, leading to discrepancies in fuel poverty levels between the North and South island (Lloyd, 2006). Natural gas is not reticulated in the South Island and central heating is rare in New Zealand houses (Isaacs et al., 2010). These factors contribute to the prevalence of fuel poverty in New Zealand.

The demographics of New Zealand households have changed as well, contributing to changing habitual patterns of energy use and fuel poverty levels (EECA, 2016; Ministry of Social Development, 2010). Projections in 2016 by Statistics New Zealand forecasted that an increasing number of households, including families and older people, would shift to living in rental housing in the coming years (Statistics New Zealand, 2016). Rental properties in New Zealand have on average lower standards than owner occupied properties (Isaac, 2004). As a consequence some households in rental housing are more vulnerable to suffering from fuel poverty (Barton, 2010).

The changing demographics of consumers and habits of energy usage, along with the need to capture the wider impacts of fuel poverty present opportunities and challenges for fuel poverty research in New Zealand (Heffner and Campbell, 2011; Howden-Chapman et al., 2009). This creates a need to focus on the underlying choices and behaviour patterns which affect the way households use energy, and also paves the way to critically analyse how fuel poverty has been conceptualized.

### 6.3 Contextualizing fuel poverty

Since the 1980’s, researchers have recognized the need to address the behavioural and social elements of energy (Lutzenhiser, 1993; Patterson, 1996; Sovacool et al., 2017). A growing body of researchers have taken a particular interest in how energy consumers act in their environment and how their
behaviour interacts with the environment to shape energy use (Stern, 1977; Lutzenhiser, 2014; Cooper, 2017). Research on energy conservation first started to look at the link between attitudes and energy behaviour (Heberlein and Warriner, 1982; Seligman, Kriss, Darley, Fazio, Becker, and Pryor, 1979; Stern, 1977). Early studies focused on changing energy behaviour by motivating people based on monetary savings or environmental concerns (Moezzi and Janda, 2014). These perspectives do not consider the culture that shapes the habits and practices behind energy use (Sovacool, 2014c). To fill this gap researchers have looked for a social link to examine the relationship between the user and the built environment (Wilhite and Lutzenhiser, 1998; Stern, 2014; Pereira et al., 2011). Researchers, such as Shove, call for a socio-technical approach that is engrained in the daily routines around energy and their interactions with technology (Shove, 2003).

These different perspectives highlight the main challenge of identifying and measuring fuel poverty. Energy has multiple drivers of behaviour which are not easily captured in one indicator (Stephenson et al., 2010a; Wilson and Dowlatabadi, 2007; Verhallen, 1981; Black, Stern, and Elworth, 1985). While there is extensive literature on energy end user behaviour, there is relatively limited research on exploring the values and decisions that drive this behaviour (Sovacool, 2014c). Shove (Shove, 2003) and Bell et al. (Bell et al., 2010) stress that the wider beliefs about energy usage should be considered alongside the technical aspects. This was echoed by Hedges (Hedges, 1996) who noted that the perspectives of people in fuel poverty were missing from the discourse, and that there is a need to tap into the understanding of households in energy hardship.

Several leading researchers in this field have called for a multidimensional view of energy behaviour research that is embedded in the larger systems that influence energy consumption (Osbaldeston, 1984; Stern, 1986; P.C. and Oskamp, 1987; Sovacool et al., 2017). It is a combination of these issues – income, built environments, social and behavioural factors – which has to be combined to adequately conceptualize fuel poverty (Pachauri and Spreng, 2004). While previous research has looked at the social and behavioural impacts of energy consumption (Stern, 1984, 2014), there is a need to better understand the factors that influence these variables and the interactions between them.

This study is an in-depth qualitative analysis, aided by the Practice-
based Energy Cultures Framework (Sweeney et al., 2013), to conceptualize the experiences of fuel poverty in New Zealand. The practice-based energy-cultures framework (PBECF) extends Stephenson et al.'s (Stephenson et al., 2010a) Energy Cultures Framework. The Energy Cultures Framework was developed to factor in the broad range of variables that influence energy behaviour – from the material conditions of the house, values, beliefs and knowledge of consumers, to the wider social and cultural systems that impact on energy decisions (Stephenson et al., 2010a). Sweeney et al. (Sweeney et al., 2013) proposed that energy uptake is also shaped by the level of motivation, barriers and support occupants face.

In Figure 6.1, the individual in the middle is driven by motivation to change, whereas the outer level is comprised of material culture, norms and practices that influence the broader social and cultural interplay in energy usage. The PBECF identifies barriers that may prevent particular energy behaviour. It also bring together the support systems which may overcome such barriers, and help inhabitants achieve the desired energy practices (Sweeney et al., 2013), for example, the level of thermal comfort of a house is connected to the norms and aspirations around heating that households place on them. The material cultures could also be limited by the external environment, for example, the level of insulation in a house may depend on the government subsidies available for retrofits. Barriers such as limited capital towards home retrofits may worsen fuel poverty while support systems like help from family and friends could ease the energy hardship experienced by inhabitants.

Sweeney et al.’s framework brings together the interactions between technology, social structures and behaviour. To see how well this framework could be applied to fuel poverty it was used in this study as a conceptual tool to study energy hardship in New Zealand. We used the different elements of the framework to design the methodology and identify any barriers or support systems in place which might influence the fuel poverty levels of inhabitants.

6.4 Methodology

This study was based in Dunedin, New Zealand. Dunedin (Māori name Ōtepoti) is the second-largest city in the South Island of New Zealand.
Dunedin was chosen because of its older housing stock and cooler climate. Mean annual temperature ranges from 10°C Celsius in the South to 16°C Celsius in the North of the country (Shen, 2004). This difference is reflected in the number of heating days and energy expenditure between the South and North island. In cooler regions such as Dunedin, space heating makes up about 50% of the total energy use in winter (Isaacs et al., 2010). Eighty-six percent of houses in Dunedin were built prior to 1977, and few legal requirements for insulation or efficient heating exist for these old housing stock (Povey and Harris, 2004). Fuel poverty levels were higher for the South Island, with figures for Dunedin City at 32% in 2009 (Lloyd, 2006). This is quite high compared to Auckland in the North Island that has fuel poverty levels of 14% in 2009 (Lloyd, 2006; Ministry of Education, 2007). Participants were identified with the help of community, religious and health organizations. A total of 32 semi-structured interviews were completed for this study. Semi-structured interviews were chosen as they captured the participants perspectives and views (Silverman, 2000). The primary goal of this study was to understand how households perceived and coped with energy hardship. The interview was framed by the question: ‘Can you describe your experience of living in energy hardship? The interview transcripts were analysed for emergent themes (Braun and Clarke, 2006) based on the Energy Cultures Framework (Stephenson et al., 2010a), as well as the practice-based energy cultures framework (Sweeney et al., 2013), and organized into common themes across participants’ narratives (Glaser and
6.4.1 The informants

Most of the participants in this study were of New Zealand European (15) and Māori ethnicity (11). The ages of the participants ranged from 23 to 71 years, with half (16) of the participants in the 25 to 44 age group. Seventeen occupants interviewed in this survey lived in private rental properties while there were eight participants living in Housing New Zealand properties (6). The main method of heating amongst the participants interviewed were portable electric heater (15), followed by open fires (9). For most participants the power bill in winter ranged between $100-$150 (18). The demographics of the participants are outlined in Table 6.1.

A limitation of the study was the small number of participants which did not allow for any sub-group comparative analysis. In line with qualitative research methodology, the study was confined to a small number of participants, which will facilitate transference of knowledge, but not generalisation. A second limitation is the recruitment of participants from one city, which misses opportunities to compare participants from other locales across New Zealand. The experiences of people from different parts of the country may highlight region specific concerns of fuel poverty which were not captured by this study.

6.5 Findings

The themes were categorized into material culture, norms, practices, barriers and support systems aided by the ECF (Stephenson et al., 2010a) and PBECF (Sweeney et al., 2013). Three main themes emerged from the experiences of living with energy hardship. The themes were the strong association of the material conditions of the house and heating structure with energy hardship (which acted as barriers to overcome fuel poverty); direct and indirect effects of energy hardship on quality of life; and the various coping strategies, and support systems used by participants to deal with energy hardship. The narratives portrayed the connections between the different values and norms inhabitants placed on energy usage, and how these interacted with the practices and coping mechanisms to influence their energy cultures. The themes are explained in more detail below.
<table>
<thead>
<tr>
<th>Gender</th>
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<tbody>
<tr>
<td>Males</td>
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<tr>
<td>Females</td>
<td>16</td>
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<table>
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<th>Household type</th>
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</tr>
<tr>
<td>Single parent</td>
<td>13</td>
</tr>
<tr>
<td>Two parent household</td>
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<tr>
<td>Retired</td>
<td>8</td>
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<table>
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<tr>
<th>Employment type</th>
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<tbody>
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</tr>
<tr>
<td>Working part-time</td>
<td>13</td>
</tr>
<tr>
<td>Unemployed on benefit</td>
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<tr>
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<tr>
<td>Private rental</td>
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<tr>
<td>Housing New Zealand</td>
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<table>
<thead>
<tr>
<th>Main method of heating</th>
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<td>Heat pump</td>
<td>8</td>
</tr>
<tr>
<td>Portable electric heater</td>
<td>15</td>
</tr>
<tr>
<td>Wood/Fireplace</td>
<td>9</td>
</tr>
</tbody>
</table>

| Suburbs represented | 10 |
| Decile rating of suburbs | 2–7 |
| Age Range           | 23–71 (mean age 43) |

Table 6.1: Description of study participants (n=32)
6.5.1 Material culture and barriers

The findings suggest that energy hardship was closely associated with the material culture of the dwellings. The material conditions of the house and the energy efficiency of the appliances used in the household had a strong influence on the way inhabitants used energy, and often magnified the experiences of fuel poverty. Thirty of the 32 participants reported how the lack of proper insulation and energy efficient heating in their house added to their energy hardship. The participants who lived in rental properties (17) and Housing New Zealand properties (8) described their indoor environments as cold. Many of these properties did not have adequate insulation and the positioning of their house did not allow for much sun in winter. Participants also described presence of mould and the constant feeling of dampness inside the house (24). One of the main methods of heating used by the participants were open fireplaces (9), which was a feature of many of the houses built in the early 1900s [EECA, 2007], and portable electric heaters or oil heaters (15), which are on average not as energy efficient as heat pumps [Shen, 2004]. Participants described how it felt like to live in these cold houses;

\[
\text{It's a battle to stay warm... this house is badly positioned, we get maybe 2 hours of sun a day... there's very little insulation... this house is always way colder inside than the outside... so if it's cold outside, it's bloody cold inside.} \\
\text{Elderly couple}
\]

\[
\text{It's very cold and damp in this house... the window frames are old and draughty... you can actually feel the draught coming in through the windows... it takes a lot of heat to warm up this house... even then sometimes it feels like an icebox inside the house... recently I took the old open fire place out and put a wood burner in by going to the bank and begging for an extension on my mortgage.} \\
\text{Single father with three children}
\]

\[
\text{We have a fireplace in the house, but we don't use it because of the cost... we have a little electric heater that we move from room to room as it's needed... when my son goes to bed I usually put it (heater) in there for a little while to warm up his room... we have no insulation so as soon as you turn the heating off, the heat just disappears.} \\
\text{Single mother with one child}
\]
As many participants noted, the material culture of houses contributed to experiences of fuel poverty. The difference between being warm or not was strongly linked to the appliances used for generating warmth, and how well the dwelling retained this heat. Indoor thermal temperatures were affected by whether occupants had an energy efficient heater in the house or an adequate fire place. This was coupled with whether participants had proper insulation, thermally backed curtains and draught proofing around the windows. Energy consumption choices are not as clear cut as having a heat pump in the house, the way participants make decisions to use these appliances are inter-related with their beliefs and expectations of thermal comfort as we will see later in the findings.

6.5.2 Impact on quality of life

Living in energy hardship affected the participant’s quality of life in many ways. It limited their ability to continue with day to day activities and their capacity to participate in society. Spatial confinement, where participants indicated that they had to confine themselves to one room, heating just one room of the house to minimise energy usage, was a recurring narrative in the interviews (28). Participants also shared how they were staying in bed for extended amounts of time to keep warm (21), and instances of children and parents co-sharing a bed to keep warm (10).

There was no quality of life... isolation, staying in bed, confining myself to one room... my life shrank to one room... I don’t think people realise how important it is... just to have a little bit (of money left) over to make you feel that you are still human.

Retired, elderly woman

My son doesn’t spend any time in his room in winter because it’s too cold there... when it gets really cold, we’d get dressed in layers... pile clothes on... stay in bed reading... trying not to think about the cold... trying to escape to another world.

Single mother with one child

As mentioned above, fuel poverty was not only influenced by the material culture of the dwelling, although it was a significant factor in determining whether a household is in fuel poverty or not. The way households consumed
energy was also related to the deeply held norms and values they placed on thermal comfort. This was clearly evident when different household members brought in conflicting aspirations for how much energy they should use. For example, households with students from warmer countries may find it very cold in Dunedin weather and crank up the heating, whereas someone who is acclimatised to this environment may put on a sweater first before turning the heat up. At the same time families with young children may prioritise keeping the house warm over other household expenses to keep their children comfortable in winter. These differences in energy behaviour patterns are entwined with previous experiences, beliefs and expectations around energy use occupants have.

You’ve got to conserve power... unless you want either have your power disconnected or have a massive power bill at the end of the month which you can’t afford... so yeah, I would reduce the power I use... sometimes.

Single occupant in shared accommodation

My wife and I are from different cultures... we have different ideas on how warm we wanted to keep the house... she wanted to have the house warm all the time, while I was raised to put a jersey on before turning the heating on... so yeah we were always fighting over the heat pump... eventually we separated because of that.

Single father with two children

The energy choices households made put a constraint on spending for other basic necessities (Sweeney et al., 2013). Participants reported that during the winter months they were cutting back on spending on food (27), especially cutting back on fruit and vegetable consumption. This practice of prioritising energy bills over other necessity household expenditure is coupled with the beliefs they have that having a warm house is important.

You feel deprived and you can’t do anything... you are constantly going without... either it’s without power or without food... and you are always cold... there was a time when I only had six dollars a week for food... I was too ashamed to tell anyone... I did it because I went without food to pay the power bills... I had to
prioritise, and power was a priority over food.

Elderly man living alone

Food was not the only thing affected by the energy choices households made. Prioritizing energy bills hindered participants’ ability to seek medical attention, with some participants stating that they delayed going to the doctor even for urgent health matters (12), delayed or avoided getting prescriptions (24), and stopped using non-emergency procedures such as getting eye and dental check-ups in winter (24).

In winter I’m trying to survive from week to week... I’m always thinking about how much money is left and where I can spend it... we try hard not to get sick so we don’t have to go to the doctor... if you have to constantly calculate how much (money) you have left, that’s a very stressful way to live.

Two-parent household with grown-up children

All of the participants highlighted that social relationships are important for a good quality of life, and shared instances of how living in energy hardship limited their ability to create and maintain social relations. Indirect effects of fuel poverty such as emotional distress and constant worry over power bills were evident among the participants interviewed (9). Arguments over power bills and energy usage changed the dynamics of the household, with participants sharing that this resulted in strained relationships with other members of the household (13).

We changed to GloBug (pre-payment meter)... we went on it because it was the only option available for us... the first two weeks were fine... but after that we were constantly topping it (meter) up... we couldn’t keep up with it... it kept turning orange (indicating that power was about to be disconnected)... it was very stressful and I was constantly worrying about when we’ll get disconnected.

Single mother with one child

Living with energy hardship was hardest on households with young children. Participants with families highlighted that children often felt left out of the social connections at school as they were not able to participate in extra-curricular activities their peers were engaged in (12).
Little things like taking my son out for a meal or a movie... I couldn’t do that... I couldn’t even afford to buy him a birthday present... he’s not involved in any school activities because of the cost... it’s quite embarrassing for him... sometimes he gets bullied or alienated because he can’t do the things other kids are doing.

Single father with young child

For some participants social isolation was self-imposed. They described the shame and hesitation they felt in inviting people over to their cold house (14), and the extent they would go to, to hide the cold living environment from their friends and family (18). This is linked with the beliefs and values households associate with thermal comfort, preferring, perhaps due to circumstances, to live in isolation instead of adjusting how they use energy.

I was ashamed of the way I was living... hiding in the cold... I rarely have people over because it’s just too cold in the house... when my daughter came over to visit I made sure that I turned the heating on before she came... she didn’t have a clue about how I was living... I was too ashamed to tell her.

Elderly woman with grown-up children

The “time poverty” issue raised by some participants compounded the difficulties associated with fuel poverty. These participants (5) spent a significant amount of their time searching for, cutting, and tending to firewood or other sources of heat. Participants shared how this impacted on the amount of time available to spend with family or pursue social activities. This is an example of the practices and daily behaviour participants adopt to respond to fuel poverty, which are again linked with how they value energy. Because this occupant thinks it’s important to heat his home, he is sacrificing his time in order to obtain firewood to keep his family warm.

The first winter I was here, I was paranoid about using the heat pump and avoided turning it on... I used the fireplace a lot and I had to cut firewood all the time... the fire goes on 24 hours in this house... all the routines were around the fire... I didn’t have time to spend with my kids... I am out all weekend scavenging for free wood.

Single father with two kids
Many participants highlighted living in fuel poverty impacted on their quality of life in a wide array of ways, including social isolation and ability to participate in what other members of the society are engaged in. This often resulted in participants resorting to numerous coping mechanisms to adapt to living in energy hardship.

6.5.3 Barriers and support systems to coping with energy hardship

The participants described a variety of strategies they utilized to cope with living in energy hardship. A range of techniques were used to deal with maintaining their everyday life and restoring a level of normality to the quality of their lives. This included managing the various barriers and support systems that influenced their energy consumption choices. The poor conditions of the house and energy inefficient appliances were noted by many participants as their biggest barriers to a warm and dry house.

*This is a big, old house . . . even if we heated it the heat goes out so fast through these draughty windows . . . in the past I’ve had to ask my daughter for help in paying the bills . . . it’s a terrible way to live asking your children for help.*

Elderly couple with grown-up children

*This is a badly positioned house . . . we get maybe three to four hours of sun a day in winter . . . there’s nothing I can do to warm up this house . . . it’s freezing inside . . . on top of that the heat pump is in a silly place.*

Single father with one child

One of the coping mechanisms to energy hardship was to tap into the support systems available for these households (Sweeney et al., 2013). Asking for help from family and friends (6), or pursuing external funding for paying electricity bills (11) were highlighted as temporary solutions to coping with energy hardship. Increased use of food banks (24) were also noted as a way of managing the household budget during winter.

*This week I spent on a second-hand winter jacket . . . and now I don’t have money for food . . . I’ve got to get to the Food bank and ask if I can get a food parcel this Friday . . . the Food bank has been*
great. . . I don’t know what I would have done without them this winter. . . I’ve been so nervous about losing power that I’ve been topping up the card (for the pre-payment meter) and not having money left over for anything else. Retired, elderly woman

While participants shared the barriers in place that were hindering their ability to minimize being in fuel poverty, they also shared the support system in place that helped them. Support such as help from family and friends, and external agencies were particularly noted.

Once the gas bottle runs out, it runs out. . . it had run out in the past and I’ve just survived with extra clothes on. . . sometimes my mum helps to fill up the gas bottle which is a big help. Single male, living alone

6.6 Discussion

This study focused on the wide ranging impacts of living with energy hardship. Previous studies on fuel poverty have looked at this phenomenon mostly through a technical and expenditure based outlook (Clinch and Healy, 2001; Sovacool et al., 2012b). This research takes a more holistic view of fuel poverty to include not only the technical and material conditions, but also the wide-ranging social and behavioural aspects of fuel poverty. Our findings contribute to the literature by showing that the experiences of fuel poverty influenced broad aspects of participants lives and were closely related to their overall quality of life (Harrington et al., 2005; Liddell, 2008). The social disadvantages households face on a daily basis, and the sustained challenges that fuel poverty imposes on their capacity for participation and inclusion in society, which have not been properly covered by previous studies, have also been highlighted (Rashbrooke, 2013; Eaqub and Eaqub, 2015).

Building on the PBECF (Sweeney et al., 2013), our study reveals that fuel poverty is affected by the material conditions of the house (whether dwellings have insulation, energy efficient heaters or the type of electricity scheme used); norms and beliefs held by the inhabitants (if the householders believe it is important to keep the house warm, and expectations around energy usage amongst inhabitants); and the daily practices householders
perform (such as coping mechanisms of putting on more layers instead of turning the heating on). In addition to these, participants focused on the barriers they faced such as energy inefficient appliances, and the support mechanisms like help from family that eased the energy hardship experienced by them. The interesting point to note is that fuel poverty is not only influenced by the presence of one of these factors, but it is a combination of all these factors and how they interact together that leads to sustained fuel poverty in households. A household may have a heat pump in the house but if they choose not to use it, whether it is due to limited income or their beliefs about the level of indoor thermal temperature tolerable, is associated with the way energy services is perceived by the household. Similarly, the practice of ‘sacrificing’ time to obtain firewood was seen an example of coping behaviour to fuel poverty that values keeping a warm house over other factors. The findings also reveal the indirect effects of fuel poverty, such as the constant worry and stress over balancing power bills and other expenses, which has not been covered in previous literature. The wider disadvantages that fuel poverty places on people, such as families missing out on participating in extra school activities or birthday parties further emphasises that fuel poverty is much more broader than previous literature states.

Table 6.2 summarizes these different variables identified through the narratives. Figure 6.2 presents a schematic diagram that captures these diverse choices and coping behaviours of households in fuel poverty, which could be used as a multi-dimensional set of indicators to measure fuel poverty. It also emphasizes the barriers and support systems which influence the energy choice of inhabitants, and shows the interlinked relationship of the themes identified in this study.

Stephenson et al. (Stephenson et al., 2010a) and Sweeney et al. (Sweeney et al., 2013) concluded that energy consumption is influenced by the internal and external physical, cultural and social components around individuals. Similar to Sweeney’s findings, participants in our study reported that the conditions of their material culture and the cost of electricity limited their energy choices. While Sweeney found reducing the impact on the environment to be an important motive for reducing energy consumption, for the participants in our study, limited income largely restrained how they chose to use energy.
### Conditions of house and appliances

- Lack of proper insulation (30)
- Living in rental properties (17)
- Positioning of the house/lack of sun (8)
- Heat pump not in the most effective place (6)
- Single paneled windows (30)
- Absence of thermal curtains (28)
- Draughty doors and windows (24)
- Presence of mould and condensation (24)
- Open fireplaces (9), Portable electric heaters (15)

### Altering everyday life

- Decreased spending on food (27), doctor’s visits (24) and prescriptions during winter (24)
- Confining activities to one room (28) or staying in bed to stay warm (21)
- Limiting energy use such as not turning on the heater until it is very cold (26), heating one room (25) or limiting hot water use (17)
- Decreased socializing (14), going out for meals (20) or having people over for meals during winter (17)
- Going to extreme lengths to hide the cold house from others (18)
- Cut back on transportation to allocate money for energy bills (8)

### Impact on social relationships

- Social isolation, ashamed to invite people over to cold house (14)
- Changed social relationships, not being able to participate in activities others are doing (20)
- Increased amounts of time spent sourcing for wood/ways to pay power bills, resulting in less time with family (8)

### Seeking support from others

- Increased use of foodbanks during winter (24)
- Asking for help from family members or friends (6)
- Tapping into external funding sources to pay power bills (11)
- Being aware of the various electricity and insulation schemes (6)

### Impact on mental well-being

- Constant worry and distress over power bills, budgeting for other expenses, and not being able to save money (23)
- Sense of inadequateness and isolation, and arguments over power usage and bills (13)
- Sense of frustration and anger over lack of control of thermal comfort of the house (9)

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Table 6.2: Multi-dimensional indicators influencing the experiences of living with energy hardship. Numbers in parenthesis indicates the number of participants who identified with the experience.
Figure 6.2: Multi-dimensional indicators of energy hardship experiences
Barriers such as the poor condition of the dwelling and energy inefficient appliances, limited income, and the high costs associated with upgrades were preventing participants from making the necessary changes to make their house warmer and drier. For example, several participants reported that the heat pump was not located in the most ideal place. Instead of the heat pump being in a place where occupants spend most of their time, it could be in a hallway or in a bedroom which was not as effective. Many participants also noted that being in a rental property acted as a barrier to the changes they can make to improve the energy efficiency of the house. Barton (2010) supported this by concluding that renting could be a barrier for many tenants as some landlords had little incentive for investing in extra insulation or energy efficient appliances.

Participants shared how the social and economic factors linked to energy hardship exacerbated the hardship and exclusion they felt. Energy restrictions deprived people from access to many resources and opportunities that other households were engaged in. For example, prioritizing energy bills may restrict the financial means for upskilling, which in turn restricts the prospects for advances in employment. Without access to these resources and opportunities, climbing up the social ladder is even more challenging, a notion echoed by research in inequality (Wilkinson and Pickett, 2009). The consequences for the low income households are made worse with limited income being used on low quality energy appliances used at low efficiency, reducing their ability to accumulate the resources they need to upgrade to energy efficient appliances or dwellings.

Differences in values and norms amongst household members were also identified as a barrier to energy usage. This was most prominent amongst students flatting together or amidst families where household members brought in conflicting expectations and goals. The importance values play in relationships have been highlighted by Schwartz (2012), stressing how different values are interconnected and influence each other. The beliefs participants held around the importance of a warm home impacted on how they used energy, as well as how they interacted with other household members. Similar findings were reported by Harrington (2005) showing how experiences and expectations influence tolerance to living in cold homes. Research by Poortinga (2004) found that values around energy are strongly linked.
White et al. (1996). An example noted by them was the Japanese bathing routine, which is very important to the Japanese lifestyle, and at the same time very energy intensive. As Stephenson et al. (2010) and Sweeney et al. (2013) observed in their findings, the role of values and expectations were clearly evident in the current study as well (Sweeney et al., 2013; Stephenson et al., 2010a). Participants recalled how differences in beliefs around energy consumption resulted in stress and conflict in relationships with household members.

The findings further highlight how practices are formed and embedded by society and those around individuals. As practice theory and social constructivism states, and evident from the findings, individuals consume energy in order to identify with society, confirm to dominant norms and reproduce social practices (Sweeney et al., 2013; Shove, 2003; Piaget, 1951; Jaramillo, 1996). The way individuals heat the house and warm the living area before children come home from school, or the practice of putting lids on pots while cooking or closing curtains to retain heat are all practices that are learnt and reinforced by society. Practice theory would view energy transitions as changes in behaviour patterns which is brought about by shifting the daily routines, conventions and orders (Shove, 2003). This was evident from our findings when participants shifted their daily routines to spend time collecting firewood in order to enjoy the benefits of having a warm fire and the social aspects it provided. It was also clear from our findings that the norms and practices around energy consumption were closely related to the household situation. For example, families shared how they prioritised keeping the house warm for their children, and would only turn the heating on before the children came home from school. This is consistent with findings from Harrington (2005) (Harrington et al., 2005) and others (Anderson, White, and Finney, 2010; National Energy Action, 1999) who found similar results showing that household circumstances drove energy consumption patterns in families.

Participants also highlighted the various means of support that were available to them. Help provided by family and friends, as well as social institutions were acknowledged. The food bank and the curtain bank offered significant help for the participants during the winter months when power bills were prioritized over food. Participants noted the benefits of being aware of the various insulation schemes and electricity supplier schemes
which helped them cope better with energy hardship. For example, some participants were on the ‘smooth pay’ electricity scheme which allowed them to pay a smaller fixed amount towards energy bills every week instead of a bulk monthly bill, making it easier to budget household expenses. It is also important to note that several participants were not aware of the insulation schemes, especially help available for those living in rental properties. This finding complements similar research showing that information limitations act as a constraint for households in fuel poverty, and often the advice given to such households does not take into account the wider lives of those in fuel poverty (Hedges 1996; Harrington et al. 2005; Sadler 2002). The results of this study conclude that a cold home cannot be evaluated in isolation from its social factors, and a better understanding of the wider socio-technical systems that influence fuel poverty need to be incorporated in future measures.

Using the energy cultures framework to look at energy consumption patterns and coping mechanisms of households in fuel poverty reveal in-depth insights into household behaviour and preferences. The findings highlight the wider impacts of fuel poverty that has not been previously noted, bringing out the complexities and nuances of the relationship between fuel poor household members and their environment. The complex coping mechanisms of sacrificing time for sourcing free wood, self imposed social isolation from trying to hide their conditions from others, constant worry and stress over energy, coupled with how households members have conflicting energy decisions based on their situations were all significant findings highlighted by this study.

Through this research some novel findings of fuel poverty were revealed. The findings indicate that fuel poverty widely impacts on the quality of life of people, including their capacity to participate in society. Material culture was an important element of whether someone was in fuel poverty but it was closely embedded in the values, beliefs and daily practices people brought in which determined fuel poverty levels. Another novel finding was the constant stress and worry that conflicting views and arguments over power bills had on household. For example, students from different countries flatting together may argue over how warm to keep the house or what material changes to be used to improve the thermal comfort. In addition, the findings also showed how prioratising energy over other needs
impacted on the capacity for people to enjoy a good quality of life and have access to other needs such as seeking medical attention when sick or buying medicine. This is consistent with previous research that show the importance of looking at the wider social impacts of energy, which has previously not been looked into in the fuel poverty space (Osbaldeston, 1984; Stern, 1986; P.C. and Oskamp, 1987; Sovacool et al., 2017).

In this chapter we have shown how our findings demonstrate the strengths of the ECF framework applied in the fuel poverty context. To date, most research on fuel poverty have looked at this condition in isolation from the context within which it occurs, and removed from the person in the middle engaging in energy behaviour. Instead, previous research tended to look at the economic and technical factors contributing to fuel poverty. By using the Energy Cultures Framework, this research brings in the wider variables such as social conditions, beliefs and norms, in addition to the material conditions of the house, which impacts on fuel poverty. ECF was applied to better understand the nuances around energy consumption, values and beliefs on how household energy decisions were made and the social variables influencing these decisions. More importantly, the findings point to how the different elements of ECF link together and influence each other which impacts on the fuel poverty of households. This research enriches the ECF by clearly demonstrating how the material culture, norms and practices of energy behaviour are embedded in influencing fuel poverty. The ECF provides a simplistic way for looking at fuel poverty which has not been researched before. By concentrating on few elements that influence energy behaviour it is easy to see how behaviour patterns are formed and normalised over time. In addition, by dissecting fuel poverty into these three or four components outlined in the ECF it is also easy to see where and how interventions can be based.

The energy cultures framework provides direction to focus the findings on, yet it is limited in capturing the diversity amongst fuel poor households. For example, the ECF factors in the values and norms anchored on certain energy practices, but it is not detailed enough to probe deeply into the household situations that lead to such beliefs. A findings from this research was how different household circumstances, like having children or elderly people in the house, trigger certain patterns in energy usage, such as turning the heater on before the kids come home from school. The findings of
this study also draw out the need to understand how people make energy
decisions and how these decisions are connected to the wider systems that
influence the energy service around them. While the ECF recognises this,
the details of such processes are lost within the simplistic model. By using
the ECF it is evident that the person is an active user of this energy service,
bringing in their own preferences, norms and biases to the overall energy
consumption model. The complexities of energy decisions and the social
effects of fuel poverty have not been fully addressed in any of the variables
provided by the model. The findings from this research will expand the way
ECF is used to not only look at the variables identified by the framework,
but to put it in context within the household situation and circumstances
that surround energy consumption. At the same time, we stress the need
to link these individual behaviour and beliefs to the wider systems around
the household that influences fuel poverty levels. Specifically, we call for
factoring in how the family circumstances and situations impact on this
overall model. In addition, by incorporating research from other researchers
that address the limitations identified in ECF, we are able to overcome some
of these gaps by integrating household needs, circumstances and looking
more closely at how these influence the elements identified by the ECF.

In summary, based on the findings of this study, using the ECF to frame
fuel poverty does not factor in the following:

- diversity amongst different households, especially their family circum-
  stances and contexts
- social processes around energy usage, and how the decisions on energy
  are linked to the wider systems around the individual
- stress and conflicts occupants face in prioritising energy
- linking all the above together in one framework to present a more
detailed and nuanced outlook of fuel poverty

6.7 Conclusion

The findings of this study signifies that fuel poverty has wider implications
than previous literature indicate, affecting many aspects of participants’
daily lives, their participation in society and quality of life. This in-depth
understanding of fuel poverty and the different mechanisms of coping with it would aid in designing interventions to tackle fuel poverty. Policy makers could consider the variability of energy usage in relation to family type, health needs, cultural and social contexts of households. Respondents identified the indirect effects of living in energy hardship, such as worry, social isolation and impact on relationship. Policy makers need to recognize these equally damaging broader consequences of fuel poverty. As a result of this study, detailed knowledge of the experiences of energy hardship has emerged. While the theoretical framework provided a rich set of data by bringing together the wider aspects of fuel poverty, future research could focus on how the various elements of the framework are embedded in the broader systems, such as policy and environmental stimuli that influence energy consumption.

This findings contributes to the field of fuel poverty research by providing an in-depth look at the wider social implications of fuel poverty through the voices of fuel poor households. This was demonstrated by showing how the energy cultures of inhabitants shape and influence their energy choices, and how the barriers and support systems impact on fuel poverty levels. Policy makers may benefit from understanding the interaction between the behavioural, social and environmental factors to devise programmes and policies to alleviate fuel poverty in New Zealand. Energy hardship is complex and has wide ranging consequences for family and society. Providing a voice for fuel poor households will enable better informed policy-making and add significant value to expanding the fuel poverty research.

6.8 Summary of findings

Little has previously been investigated in the literature about the lived experiences of fuel poverty in New Zealand. This study contributes to fill this gap in knowledge by providing a detailed qualitative analysis involving fuel poor households. This chapter made the following contributions:

- identified the broader perspectives and experiences of fuel poor households, in particular their energy consumption choices and priorities
- proposed a comprehensive set of fuel poverty indicators for New Zealand

The findings in this chapter will contribute to policy and future research through designing inclusive interventions that captures the voices of the fuel
The next chapter will look at the variations in fuel poverty across different household types.
Chapter 7

The variations in fuel poverty across households

This chapter captures the variations in fuel poverty across households, their energy consumption needs and behaviour patterns, and the wider social aspects of energy. This chapter adds to the work carried out in the previous chapter by expanding on the lived experiences of fuel poverty to look at the nuances of this phenomena through the different family contexts. The differences in motivations, social behaviour and coping mechanisms of different family types will be viewed through the family life cycle, paying particular attention to context specific factors that impact on fuel poverty.

The chapter begins with an overview of the family life cycle and how it adds to getting insights into fuel poverty. The conceptual framework used in this thesis, the energy cultures framework, is recapped here as well to guide the readers. In-depth interviews with households across Dunedin, New Zealand were analysed and presented as key themes across variations in fuel poverty. The chapter concludes by stressing the importance of understanding not only the commonalities amongst households, but it is imperative to look at the differences in order to fully understand and design interventions to reduce fuel poverty.

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CHAPTER 7. THE VARIATIONS IN FUEL POVERTY ACROSS HOUSEHOLDS

7.1 Introduction

Fuel poverty, or the inability to access or afford energy, impacts on the capabilities of households to attain a socially and materially needed level of energy services to participate in society (Sovacool, Jansen, and Welle 2017; Day, Walker, and Simcock 2016; Bouzarovski and Petrova 2015). One in four households in New Zealand were estimated to be fuel poor in 2012 (Howden-Chapman, Viggers, Chapman, O’Sullivan, Telfar Barnard, and Lloyd 2012). New Zealand has one of the highest winter mortality rates compared to other OECD (Organization of Economic Cooperation and Development) countries (Healy 2003a). Low indoor temperatures has been linked to higher hospitalization rates (Telfar 2010; Liddel 2010), and 16% of cold-related deaths in winter (Davis et al. 1999). Despite these numbers, the current state of research only has a limited understanding of this phenomenon and its broader impacts in New Zealand.

Fuel poverty leads to two important effects: people suffering from poor health due to inadequately heated housing, and people suffering deprivation in other areas of their lives (Liddell and Guiney 2015; Howden-Chapman et al. 2009). Household energy costs represent a significant portion of total household expenditure, and for many households, paying energy bills means going without other essentials such as nutritious food, or adopting economising behaviour in order to reduce household energy consumption (Harrington et al. 2005; O’Sullivan et al. 2011). Recent research has shown the wider effects of energy poverty, including social impacts and effects on households’ quality of life (McKague et al. 2016 2017).

Several factors contribute to the relatively high levels of fuel poverty among New Zealand households — energy inefficient housing stock, rising residential fuel prices, low income, and social and behavioural factors all contribute to increasing fuel poverty rates (Lloyd 2006; McKague et al. 2016). Minimum insulation standards for housing in New Zealand were not introduced until 1978, and many houses lack sufficient insulation or efficient heating (Isaac 2004). Residential energy prices have risen sharply in the past ten years, intensifying the problem of fuel poverty for many households (MBIE 2016). The cost of living has increased in the past thirty years, however the average income has not risen significantly for the low income groups (O’Dea, 2000), leaving an increasing number of people
struggling to pay their utility bills (Ministry of Social Development 2016). Lastly, New Zealanders have a strong cultural norm of putting up with cold homes, making behavioural and social factors one of the issues in this multi-faceted phenomena (Cuppes et al. 2007; Cogan et al. 2006).

Efforts to date to curtail fuel poverty in New Zealand have been dominated by technical and economic approaches, which poses the threat of missing out on the human and social context of energy demand (McChesney 2012; Cooper 2017). Initial government responses have included changes to the physical structures of dwellings and providing a winter fuel payment for those in fuel poverty (Lloyd and Callau 2009). This is a good starting point for tackling fuel poverty, yet it does not capture the wider disadvantages faced by many people who live in fuel poverty (Scarpellini et al. 2017). In particular, approaches used in New Zealand to measure and target fuel poverty tend to mask the diversity that exists within an increasingly heterogeneous population, and often fail to convey adequately what it means to be living in fuel poverty in New Zealand (McKague et al. 2016). Previous research on fuel poverty have also relied on income-based measures to understand how households are affected by this condition (Boardman 1991), by looking at the energy prices or the energy efficiency of appliances used (Lewis 1982; Hutton 1984; Osbaldeston 1984). The limitations of using such lenses to look at fuel poverty is that they are restricted in capturing the variations amongst households, and their different circumstances and needs for energy services. For example, past measures of fuel poverty based on income and expenditure do not factor in the households who are cutting back on energy voluntarily to balance their budgets, or households comprising of people with special needs requiring higher energy needs (Lawson and Williams 2012a; Liddell and Guiney 2015; O’Sullivan et al. 2011).

The current research aims to expand the existing body of knowledge on fuel poverty by exploring the relationship between energy consumption, stages of family life cycle (Loomis 1936; Clark 1955), socio-demographic and psychological variables. The study will examine whether different stages of the family life cycle determine energy use patterns, and whether they are related to various behavioural antecedents, socio-demographic, cultural, situational and psychological factors which influences energy consumption and fuel poverty rates. This research uses two theoretical frameworks to better understand the nuances around household energy use and ultimately fuel
poverty. First, the Energy Cultures Framework (ECF) (Stephenson et al., 2010a), is used to explore the energy consumption habits and coping mechanisms of people living in fuel poverty. The ECF was developed to factor in the broad range of variables that influence energy behaviour — the material conditions of the house, norms and values of consumers, and the daily practices which evolve around households energy usage (Stephenson et al., 2010a). While the ECF is useful in gathering details on the material culture, norms and practices of households, it is limited in considering the particular circumstances and contexts within households which may influence their link with energy services. As a result, a second theoretical concept is used to overcome this limitations of ECF. The family life cycle (Murphy and Staples, 1979) is used in this paper to explore how the different stages of the family, their energy needs and life situations may also impact on how people respond to and make decisions around energy. We explore the potential of these frameworks in the fuel poverty context by applying it to in-depth interviews carried out with households in energy hardship in New Zealand. The research will offer a range of experiences of fuel poverty to be captured, and will add a rich body of evidence to the fuel poverty literature by highlighting how different family circumstances and stages influence the norms, beliefs and practices of energy usage. A comprehensive understanding of fuel poverty is needed before targeted measures could be implemented.

7.1.1 The Family Life Cycle

The family life cycle (FLC) is a well accepted concept used in sociology and marketing as a useful basis for segmentation and as a predictor of various types of consumption behaviour (Loomis, 1936; Clark, 1955). The concept of family life cycle is based on the notion of progression of stages through which the majority of families pass. There will be exceptions, and the exact timing of each stage will vary across individuals. A family’s needs, spending patterns and lifestyles are affected by such factors as the number of people in the family unit, the age and employment status of its members and their economic, social, emotional and lifestyle needs. The focus of this study was on the relationship between FLC and fuel poverty. Because of the expenditure nature of energy consumption, this is an area where behaviour could be strongly linked to the stages of FLC. Segmentation, for example based on the basis of age, marital status, age of children or employment status,
could provide a rich addition the elements identified by the Energy Cultures Framework (Stephenson et al., 2010a), by linking how the family situations are connected to energy practices and attitudes among households. There has been no study conducted so far in the fuel poverty literature that links this phenomena specifically with the family life cycle.

The family life cycle (FLC) classification by Murphy and Staples (1979) (Murphy and Staples, 1979) was adapted and used in this study. Murphy and Staples’s classification is an updated version of the original one proposed by Wells and Gubar (1966) (Wells and Gubar, 1966), and was amended to accommodate changing household patterns such as including households containing single parents or never married single people. Households are defined as those we regularly reside with, interact and make consumption decisions with (Wells and Gubar, 1966). Households at each stage of the family life cycle can be grouped into market segments with distinct needs, attitudes, and desires. A person begins as a dependent and then moves through a sequence of household arrangements over their life span. Household types vary with the age of their members and with the presence or absence of children. The frequency and sequence of stages varies across cultures and societies (Gilly and Enis, 1982). Hisrich and Peters (1974) (Hisrich and Peters, 1974) examined the family life cycle and segmentation variables based on income, social class and age, and found that these variables showed strong association with purchasing behaviour of families. Family life cycle was also found by Cox (1975) (Cox, 1975) as a powerful variable in family purchase decision-making. Wells and Gubar’s (Wells and Gubar, 1966) as well as Murphy and Staples (Murphy and Staples, 1979) stages of the family life cycle are outlined in Table 7.1 and Figure 7.1.

Previous studies have focused on various characteristics of the household in an attempt to explain energy consumption. A study by DeFranzo and Workov (1979) (DeFronzo and Workov, 1979) found that the gender of the household members had no significant difference on the level of electricity consumption. Meanwhile, Klausner (1979) (Klausner, 1979) found that energy usage increased with the increased number of ties families had to outside activities. Energy use has been linked to socio-demographic factors (such as income and household size) and psychological variables (such as attitudes) (Biesiot and Noorman, 1999; Moll, Noorman, Kok, Engstrom, Throne-Holst, and Clark, 2005; Becker et al., 1981). A Dutch study looking
### Chapter 7. The Variations in Fuel Poverty Across Households

<table>
<thead>
<tr>
<th>Stage of family life cycle</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor Young (less than 40) single.</td>
<td></td>
</tr>
<tr>
<td>Newly married Young couples without children. Two income earners. High income.</td>
<td></td>
</tr>
<tr>
<td>Full Nest 1 Young couple with children. Lower income than former group because more likely to have one income earner.</td>
<td></td>
</tr>
<tr>
<td>Full Nest 11 Older couples with children. Higher income than former group. Members of this group are more likely to be further in career and have two incomes.</td>
<td></td>
</tr>
<tr>
<td>Empty Nest Older couple without dependant children (less than 16). High income.</td>
<td></td>
</tr>
<tr>
<td>Solitary Survivor Older single person with relatively low income. High proportion of retired and also lower education persons.</td>
<td></td>
</tr>
</tbody>
</table>

Table 7.1: Wells and Guba's classifications of the different stages of the life cycle ([Wells and Gubar](1966))
<table>
<thead>
<tr>
<th>Young</th>
<th>Middle-Aged</th>
<th>Older</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>Single</td>
<td>Older married</td>
</tr>
<tr>
<td>Married without</td>
<td>Same-sex couples</td>
<td>Older unmarried</td>
</tr>
<tr>
<td>children</td>
<td>with children</td>
<td></td>
</tr>
<tr>
<td>Married with</td>
<td>Same-sex couples with children</td>
<td>Older with children again</td>
</tr>
<tr>
<td>children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced with</td>
<td>Married without children</td>
<td></td>
</tr>
<tr>
<td>children</td>
<td>Married with children</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Married without dependent children</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Divorced without children</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Divorced with children</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Divorced without dependent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>children</td>
<td></td>
</tr>
</tbody>
</table>

Figure 7.1: Murphy and Stapes adapted family life cycle (Murphy and Staples, 1979)

at direct and indirect energy use in households found socio-demographic and psychological variables determine changes in energy behaviour patterns (Abrahamse and Steg, 2009).

The traditional FLC model was once typical of many families, which tend to progress uniformly through the stages discussed. Today, while the traditional FLC stages are still the most common type of family progression, some researchers have attempted to expand the FLC to give a better picture of the diversity of family and lifestyle arrangements (Shaninger and Danko, 1993). The underlying socio-demographic forces that drive the modified FLC model include divorce and later marriage, with or without the presence of children. This modified FLC only recognises families that started in marriage, ignoring such single-parent households as unmarried mothers
CHAPTER 7. THE VARIATIONS IN FUEL POVERTY ACROSS HOUSEHOLDS

or fathers, and families formed when one or more single people adopt a child. When households undergo status changes (divorce, temporary retirement, a new person moving into the household, the death of a spouse), they go through changes in consumption and decision making. This in turn influences how the family interact and influence each other when making consumption decisions. There could be decisions formed by the whole family unit, or one member of the family who may be the major decision maker. Research has also shown that different family members take on different roles and perform different tasks in the decision making process related to consumption (Gupta, Hagerty, and Myers 1983).

A number of demographic trends have emerged in the last decade in New Zealand, which has important implications for domestic unit structure and energy consumer behaviour (Gilly and Enis 1982). One such trend is the move towards smaller households, another being an increasing number of single-parent households. A third trend is the overall ageing of households, while the later age at marriage and high divorce rates are also resulting in a diversification of household forms. A big increase in the category of ‘other households’ including blended and non-family arrangements also affect household dynamics (Andreasen 1993).

Putting the FLC in the context of fuel poverty is important for including these variations in the family unit. Previous research on fuel poverty has assumed that all families and households respond in similar ways to this condition (Liddell et al. 2011; Moore 2011; Hills 2012). This assumption limits inclusion of families that do not adhere to the energy norms set by society, that by spending more than 10% of income a household is in fuel poverty (Boardman 1991). Energy services have to be looked at more broadly and holistically by observing how the household members make decisions about and interact with their energy services. At the same time, their energy services need to be linked with the wider family circumstances and situations which impact on their energy needs. For example, household needs across FLC stages vary as a family progresses through the different stages over their lifespan. For example, households with children may have increased spending on energy as they spend more time at home, where as single younger people may give preference to technological purchases, and empty nesters may have more spending on health related products over energy expenditure (Russel 1999). Using the FLC along with ECF facilitates
better matched interventions to overcome fuel poverty by probing into the
energy decisions people make which are closely linked to their circumstances.

7.1.2 Family Life cycle, Energy Cultures Framework and the
link with energy

For the purposes of this study, a modified family life cycle based on four
stages will be used: Bachelor, Young family with children, Single parents
and Elderly occupants. These four stages are described in Table 7.2.

<table>
<thead>
<tr>
<th>FLC stage</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor (no children)</td>
<td>Young, single people. Employed part or full time, or studying. Low-income one-person household in shared accommodation with people in similar characteristics.</td>
</tr>
<tr>
<td>Young family with one or more children</td>
<td>Young couple with children, low to medium income. One or both members in employment.</td>
</tr>
<tr>
<td>Separated, divorced or widowed person with dependent children.</td>
<td>Low income, mostly on benefits or part-time employment.</td>
</tr>
<tr>
<td>Elderly couple or older occupant living alone</td>
<td>Relatively low-income. Retired, mostly living in own dwelling.</td>
</tr>
</tbody>
</table>

Table 7.2: Stages of the family life cycle used for this study (adapted from Murphy and Stapes adapted family life cycle [Murphy and Staples, 1979])

Across the family life cycle stages, it is expected that there would be an increasing demand for energy during the early stages of the cycle as the family unit grows. Energy demand is predicted to taper off as the children grow and move out. This pattern may increase again in the later years of life as elderly people prefer different thermal comfort to younger members. External factors such as the conditions of the house and tenure type impacts on energy consumption as well. For example, families in early stages of the life cycle may live in rental housing, and as they secure financial security may move into owner occupied ones. Owner occupied properties may be more energy efficient compared to rental properties. The size of the family unit also explains some differences in household energy consumption patterns. For example, larger families could be heavier users of energy than smaller

families, as larger families tend to use more hot water and live in bigger properties. The ages and activities of the family members also offer some explanation to variations in energy consumption. For example, younger children may spend more hours in the home and may have greater energy needs than older kids who tend to spend more time outside.

The family life cycle is used as a conceptual framework in this paper to look more clearly at the energy consumption patterns of the family unit. There are several reasons why this framework could provide additional insights into fuel poverty. First, family size changes over the stages of the life cycle, and with this change the demand for energy changes over the cycle. Second, as the family unit moves through its life cycle, the preferences, behaviour patterns and relationships members have with energy changes as members form ties outside of the home unit. Thus, the family life cycle could be a useful tool for examining the differences in energy consumption behaviour as the family moves through the different stages.

Within the FLC, the energy cultures framework is used to take an in-depth look at the variations in household energy use. The Energy Cultures Framework adds the wider variables that impact on energy decisions (Stephen-son et al., 2010a), such as the material conditions of the house; values, beliefs and knowledge of consumers; and the day to day energy practices and preferences households adopt. Sweeney et al. (Sweeney et al., 2013) proposed that energy uptake is also shaped by the level of motivation, barriers and support occupants face. The extent of fuel poverty may depend on factors that serve as barriers or opportunities to move out of energy deprivation (such as an increase in income).

Using the family life cycle and the energy cultures framework as conceptual tools, this study looks at the variation in fuel poverty among households. This paper aims to bridge the limitations of only using the ECF by factoring in the household contexts and circumstances into the fuel poverty equation. The nuances and differences in energy consumption patterns, preferences and needs will be explored in relation to what stage of the family life cycle a household is in, their particular circumstances and needs for energy, to the cultural and social aspects of energy behaviour which are not as well captured by the ECF.
7.2 Present Study

This study was based in Dunedin, New Zealand. Dunedin (Māori name Ōtepoti) is the second-largest city in the South Island of New Zealand. Dunedin was chosen because of its older housing stock and cooler climate. Mean annual temperature ranges from 10°Celsius in the South to 16°Celsius in the North of the country (Shen, 2004). Eighty six percent of houses in Dunedin were built prior to 1977, and few legal requirements for insulation or efficient heating exist for these old housing stock (Povey and Harris, 2004). Fuel poverty levels were higher for the South Island, with figures for Dunedin City at 32% in 2009 (Lloyd, 2006).

Participants were identified with the help of community, religious and health organisations. A total of 32 semi-structured interviews were completed for this study. Semi-structured interviews were chosen as they captured the participants perspectives and views (Silverman, 2000). The primary goal of this study was to understand the variations in fuel poverty and energy consumption among households in Dunedin, based on their family circumstances and stages in the family life cycle. A qualitative investigation was carried out using in-depth interviews to get this information. The interview transcripts were analysed for emergent themes (Braun and Clarke, 2006) based on the family life cycle and the energy cultures framework, and organised into coherent themes across participants narratives (Glaser and Strauss, 1967).

The results were framed around the family life cycle embedded within the energy cultures framework, as it was apparent from the data that families in different stages of the life cycle had different values and practices when it came to engaging with energy services. For example, the way households with older occupants viewed heating the house was different from the way a household with younger occupants preferred to heat the house. As families move through the different stages, along with evolving family circumstances and needs, the members bring in past experiences and changing living situations, addition of jobs, moving dwellings, or expanding their family. So at each stage of the life cycle, their consumption patterns, needs and preferences changes, impacting on how families engage with energy. For example, several households with elderly occupants placed a higher value on having a fireplace over heat pumps. Even though the heat pumps will be more energy
efficient, the older occupants preferred the ambiance of fires and the social practices that form around having a fireplace. This also shows the deeply held social and cultural elements around energy which are more deeply en-grained as households move from one stage of the life cycle to another. Detail of how the data translate into the new model can be found in Table A.1 in the appendix.

A limitation of this study is the recruitment of participants from one city, which misses opportunities to compare participants from other places across New Zealand. The experiences of people from different parts of the country may highlight region specific variations in fuel poverty which were not captured by this study.

7.3 Results

The themes were categorised around the stages of the family life cycle, and within that the elements of the energy cultures framework. For example, the energy consumption patterns (their material culture, norms and behaviour) of elderly people living alone were compared that of families with young children. The results show that total energy consumption increases with each stage of the life cycle through the child rearing years. When children leave home, the energy consumption of households declines and this level increases again at the later stages of the cycle. The main findings across the four stages are summarised in Table 7.3.

The themes that emerged, framed around the four stages of the family life cycle and linked with the energy cultures framework are discussed in detail below.

7.3.1 Bachelor stage

The bachelor stage is characteristic of young people, either living alone or in shared accommodation. These people could be in early employment, studying or on a student loan.

The first theme that emerged focused on the households beliefs about energy use and thermal comfort. This corresponds to the norms and beliefs segment of the energy cultures framework. Looking at these views through the family life cycle show interesting trends across the different stages. The young people interviewed for this study had a very different view towards
<table>
<thead>
<tr>
<th>Stage</th>
<th>Energy consumption patterns and preferences over the family life cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor</td>
<td>Young occupant, living mostly in rental accommodation. They do not consider heating to be a vital part of everyday life. Their energy needs are low and prefer low-cost options such as portable heaters over fireplace or heat pump. The coping mechanisms towards energy hardship include spending increasing time out of the house and at the university or public places to keep warm. This group is very comfortable with the use of technology to track and manage their energy usage.</td>
</tr>
<tr>
<td>Young couple with dependent children</td>
<td>Young families with children value energy and prioritise keeping the house warm. This group preferred heat pumps and fireplaces, and preferred to heat the bedrooms for their kids. The families valued the social rituals around firewood, time spent with children collecting wood, and enjoyed the ambiance they get from the fireplace. But the families also highlighted the 'time poor' element of engaging in collecting firewood. While families prioritised energy, they adapted by adjusting their other household needs.</td>
</tr>
<tr>
<td>Separated, divorced or widowed person with dependent children</td>
<td>The energy needs of the single parent households were severely constrained by their limited income. These households warmed the house, but only some parts of the house, for the children, and only when needed (for example, right before kids come home from school or go to bed). They preferred low-cost heating option such as portable heaters or fire-places (with wood sourced from friends and community centres). Living in rental properties limit the retrofit changes these households can bring to the property. However, this group is very resourceful in tapping into the services available in the community for their needs.</td>
</tr>
<tr>
<td>Elderly couple or older occupant living alone</td>
<td>The elderly group has higher energy needs and require more energy to keep warm. This group holds a sense of frugality and limit turning the heat on, preferring instead to put on a jersey. The elderly occupants valued the practical elements of the fireplace and used it for other purposes such as drying laundry. They also enjoyed the social elements around the fire places, having visitors over when the fire is on and collecting firewood. However, as the occupants age, or one partner passes away, this limits the time they can spend on collecting wood and tending to fire. This group copes with energy hardship by restricting themselves to bed or to heating one small area of the house, limit spending on food and limiting having visitors over.</td>
</tr>
</tbody>
</table>

Table 7.3: Energy consumption patterns and preferences over the family life cycle
energy, with some expressing that while energy is important, heating is not a vital part of their lives. Young people preferred to spend most of the day outside in public heated places such as libraries or malls to avoid heating the house. The material culture used by younger occupants differed among other stages of the family as well. Participants in the bachelor stage of the cycle lived mostly in rented dwellings, with low insulation and energy inefficient appliances. Their practices differed from those of other family stages as the younger occupants choose to spend more time outside the dwelling or preferred to limit heating when in the house.

I always lived in cold flats as a student . . . so I’m used to piling on clothes to stay warm . . . we have a heat pump that gets used maybe once a month in winter . . . being a student you kinda get accustomed to all the little tricks of how not to be cold in Dunedin . . . we don’t need a very warm house

Student flatting with others

There were significant variations in the choice of material culture preferred by the different households based on the family life cycle. The younger cohorts used interesting choices of material culture and heating methods such as hot water bottles or drinking hot beverages to keep warm over the use of heaters.

when you are student you don’t worry about heating . . . we have a heat pump in the lounge but there’s a rule that we won’t turn it on unless it’s below freezing . . . we don’t heat our bedrooms as the small heater uses a lot of energy . . . we just use hot water bottles and take it to bed . . . the kitchen is freezing and we don’t cook often

Students flatting together

Considering the social aspects of energy, younger participants such as students and people who did not have access to free firewood, did not consider the rituals around collecting firewood and having a warm fire to be important and preferred other sources of heating (such as low-cost portable heaters). This group did not equate having a fire place as impacting on their social interactions and instead opted to socialise outside the home.

I like to enjoy fire places when I visit my parent’s place . . . I don’t understand what the fuss is about . . . it’s too much work for me
it’ll take too long for me to get it going in the morning and
I don’t have that kind of time ... I’m rushing for classes in the
morning

Younger participants shared that they prioritised other needs over energy, focusing more on material needs and socialising. This group had an interesting relationship with their energy services, it was something that was there when they needed to warm the house, but this group did not base their time or resources to constantly worrying about energy bills. This may be because of the values they have towards their energy usage and not prioritising energy over their other needs.

I made some foolish mistakes ... I got a PS3, TV, laptop on HP (hire purchase) ... I got into heavy debt with the interest they charged ... I couldn’t afford to keep up with the payments ... those things were more important for me than cranking up the heat

Younger occupants also had different coping mechanisms to cold compared to other groups, spending time in their rooms or outside the house in public places to keep warm. Such practices were also seen in the older members of the family cohort, confining themselves to one single space to keep warm or spending time in publically heated places to stay warm.

We rarely spend time in the common area ... it’s just too cold in the living room ... I use the tiny heater in my bedroom to take the edge off ... I also have a hot water bottle that I take to bed ... the kitchen is freezing so I try to make instant meals so I don’t have to spend time in there ... I’m not home during the day ... any chance I get to go out I go because I don’t like being stuck here in the cold ... I try to spend most of my time at the university or library where it’s warm

Student sharing flat

An interesting difference that emerged was how energy conscious and aware most of the younger participants were. They were apt at technology, utilising these for keeping track of power usage.

we are very careful about the appliances we use... we keep track of our daily power use and it’s easy to see where it goes... it’s
helped us a lot now if we are not in the room we make sure to
turn lights off, stuff like that... I’ll be more willing to have the
heating on for longer if the heat actually stayed around ... but if
the heat is not staying around you are just throwing money out
the window - literally! ... I’m keen to move to a place next year
where it’s a little bit easier to heat

Student flatting with others

7.3.2 Young family with one or more children

Young families with one or more children live in either rental properties or
first homes. Both the parents may be working, in which case it may be a
comfortable income household. Or one parent may stay back to care for the
children, which impacts on the level of disposable income the family may
have. Young families have higher energy needs due to placing priority on the
comforts of children, and value keeping the house warm. They bring strong
beliefs that sees their energy practices centred around turning the heat up,
or spending on proper insulation and draught-proofing the house.

Oh, it’s very important to heat the house... cos you know you
don’t want the kids to get sick. I don’t want my kids going to
an icebox at night so I put the heat pump on low and heat their
bedrooms before bed

Family with small children

The material culture preferences of families were towards heat pumps,
night heaters and fireplaces which kept the house warmer. Most families
believed that it was important to heat the house, and sometimes even heated
the bedrooms to keep the house warm for their children. Some young families
with two incomes lived in owner-occupied dwelling with better insulation and
energy efficient appliances, making it easier to keep up the thermal comfort
of their homes compared to other groups living in rental properties.

I always try to turn the heatpump on before my kids come home
from school ... I like to have the house warm for them ... I would
even turn on their night heaters before they go to bed just so the
kids are cosy

Married couple with children

The social aspects of energy use was evident from the narratives. The
relationship different groups of the family life cycle had with energy, and
how this impacted on their social life were highlighted by many participants. Families had a very positive attitude towards firewood, the rituals around collecting them and the enjoyment they get from sitting in front of a fire. Collecting firewood for some of the participants was seen as spending time outdoors, bonding time with their children, and being active and ‘living off the land’. This was an interesting findings, as this particular phase of the family life cycle, having children as well as the time and energy to collect firewood, changed the value the participants placed on this ritual. For these participants, their family circumstance of having children keen to participate in collecting firewood influenced their energy practices and habits.

*I’m a landscaper, I just go out and collect firewood ... that’s what I do ... everywhere I go I have a trailer and when I see free wood it’s very satisfying to get free wood ... sometimes I bring my son along and just love spending time with him in the woods*

Family with young children

*Keeping warm is very important in our family, we make other sacrifices to save money for wood ... we do this because we enjoy the fire ... just being around the fire makes you feel good ... I believe a fire makes the air in your house fresher too*

Family with children

One interesting social aspect around energy is the ‘time poor’ element highlighted by some participants who spent lots of time sourcing free firewood. These families expressed that the increased time spent looking for wood impacted on their relationships with spouse and effected the time they had to spend with family, and hindered the time to pursue their interests. This shows the interaction between the different elements of the energy cultures framework, even though their time with family were cut, these participants still chose to spend that time collecting firewood. The values and preference they placed on having a warm fire over-rode their concerns of time.

*Wood hunting takes a lot of hours ... we have to hunt around for free pallets and bring them home ... then we spend time cutting and stacking them ... there’s a lot of other people hunting for*
CHAPTER 7. THE VARIATIONS IN FUEL POVERTY ACROSS HOUSEHOLDS

free firewood too . . . so it’s a game of who gets there first

Married couple

The way households coped with mounting energy bills, prioritising energy or picking other households needs over energy varied across the family life cycle as well. Most families put energy first before anything else and ensured that adequate heating was on in winter for their children. This is an important distinction from just using the energy cultures framework to look at energy consumption. Looking at how different family circumstances influence fuel poverty, such as having children in the house who require additional warmth, provides more detailed information on the energy preferences and choices of different families.

I tried to keep up with the power bills . . . it impacts on our transport options . . . we have to be careful on how we spend . . . mostly around petrol and eating out . . . sometimes even in winter instead of driving we bike or walk to save petrol money . . . we try to do savings in other ways . . . like making a lot of our own things or preserving

Family with small children

7.3.3 Single parent household

This group includes households who are either divorced, separated or widowed who have dependent children to take care of. This group lived mostly in rental accommodation, have part-time employment or live on benefit. With the presence of children this group also has high energy needs but their level of thermal comfort is constrained by their low income. This is where the different elements of the energy cultures conflicts with each other. While the occupants may place high value on keeping the house warm, they are largely restrained by the quality of insulation and energy efficiency of the dwelling they are in.

I know it’s important to keep the house warm for the baby . . . and I do try, I mean I’ll turn the heat pump on in the kitchen or use the small heater in the bedroom . . . but it’s been very hard, especially with the GloBug method of paying

Single mother with baby
Even though these participants may value keeping the house warm, their energy practices may be driven by the material culture available to them, opting to use low-cost options such as portable heaters or turning the heat pump on for a short time. Most of the single families lived in poor quality rental properties, which were hard to heat and had limiting choices when it came to retrofits. This is an example of how one element of the energy cultures has a stronger hold on their decisions over others. The energy choices these families make again emphasises how family circumstances, such as having a single income or single parents raising children, influences the way people interact with their energy services, and facilitates fuel poverty.

We turn the small heater on during the day...my son plays in the sitting room so I put the little heater on for him there
Single dad with one child

It’s hard when you are single mom...renting is the only option available for us...this house is so cold but we can’t do anything about it because it’s a rental
Single mom with one child

The coping mechanisms this group adopts are based around the support systems available to them. With their limited income and resources, single families had to be creative in sourcing their energy needs. For example, accessing firewood through the local church, or getting a food parcel from the food bank helps these families make connections to the community. These connections are vital in helping ease the burdens of fuel poverty for families in such circumstances. Identifying the barriers households in different situations face towards achieving optimal thermal comfort and recognising the support mechanisms such as the community support and resources available to these households are important for understanding how different elements of fuel poverty are inter-related.

We are lucky that we get the firewood from church...fire wood is something that connects me to the people around me...I feel someone cares enough about my situation to help us
Single mother with children

Since this group has limited income, free firewood is beneficial to them, but this requires additional time commitments. The practice of firewood
collection and the value placed on enjoying a fire perhaps for this group is
driven less by the social factors associated with it, but more with the need
to source free resources that can help them cope better with fuel poverty.

*I was out collecting firewood all the time . . . wherever I went, I
was in search of where to get free wood from . . . I wish I had more
time to spend doing what I love instead of spending all my time
doing this*  
Single dad with children

Like other groups, fuel poverty also impacted on the social capabilities
of single households by limiting how they can spend their income on other
needs or having people over for a meal.

*I rarely have people over because it’s just too cold in the house
. . . and when I do have people over I don’t have much money left
over after paying bills to put up a nice spread*  
Single dad with one child

Single parents have similar coping mechanisms to families and elderly
occupants - moving around less in winter, putting more clothes on to keep
warm and restricting spending on other needs.

*I move around a lot less in winter . . . I pull out blankets and
just hunker down for winter . . . I try to save in other ways like
cutting back on meat or vegetables during winter*  
Single mom with one child

### 7.3.4 Elderly occupants or single survivor

This group of the family life cycle consists of retired elderly people, either
living as a couple or as a single survivor. These households live in mostly
owner occupied larger properties, or sometimes in smaller rental units. They
live mostly on retirement benefits and have limited income as well. Com-
pared to the other groups in the family life cycle, the elderly groups have
higher energy needs as they grow older, with the tendency to keep warmer.

In contrast to the other groups, elderly people brought deeply held values
of frugality and growing up in cold homes where they only put the fire or
heating on when absolutely necessary, and only in the living room. The
occupants in this group opted not to heat the bedrooms and only heated just the sitting room or a small part of the house where they spend most of their time in winter. For this group, perhaps due to the generation in which they grew up in had different values and practices around the expectations of a warm house. Their energy needs were higher as they grew older, but their values conflicted with this need, and their practices reflected their values more deeply.

I can tolerate cold to the point where it’s unbearable... I suppose, I grew up with the appreciation that when the warmth is gone it’s gone... my mom always used to say if you are cold put more clothes on... we grew up in cold houses and that was the norm

Elderly woman living alone

The elderly groups had a strong association and preference for fireplaces. Most of the people in this group grew up in houses with a fireplace and it was the primary and sometimes only source of heating for them growing up. As a result there were fond memories and beliefs attached to the notion of having a fireplace and gathering around it as a family. Most of the elderly occupants lived in larger properties which were harder to heat, perhaps this was another reason why some preferred not to heat more space than necessary. The people in this group are very resourceful at managing on limited means and were very efficient at fixing things around the house or making things from scratch.

This house is too much for one person... it’s huge and very difficult to heat... I mean no one heats the whole house... everyone used the fireplace so I suppose it has stuck with me... to this day we prefer the fire over electric heat

Elderly widow

I try to keep the fire going all the time, especially when my kids come over... it’s an old fire place but I love it... We are lucky to live in a big property with mature trees... so we get some fire wood from that... sometimes when I can’t get firewood I would save the walnut shells from the trees... the fire place is also our laundry for the winter

Elderly couple living alone

Most retired elderly people had time on their hands and some enjoyed the time spent collecting their own firewood. Collecting firewood was also
associated with being outdoors and active in winter. At the same time some occupants expressed that the older they get the harder it becomes to go out and collect firewood.

*I think you either have to sacrifice time or money for energy...* if you are retired and have time on your hands then that’s fine...then you have the time to collect fire wood if you have a fire...you can even find wood at the beach in the summer...bring the drift wood home and dry it for winter...I cut down a tree in my yard last year and used that for fire wood...so it’s a process that you have to invest time in

Elderly man living alone

Among this generation, there was a gender segregation to some rituals around fire. In most cases, males will go out and source firewood while some women tended to stay home and keep the fire going.

*When my husband was alive we used to use the fire place...* when he was alive he would go and drag up wood from the woods behind our house...he’s passed away now and I don’t feel like putting the fire on because that was his job

Elderly woman living alone

This group was also very ‘house-proud’ and one of the impacts of being fuel poor and not having a warm house was the inability of some households to have friends or grandchildren over as they were ashamed to invite people into their cold homes. Sometimes this group went to lengths to hide their cold homes from family and friends, and would heat the house or living area before the family came over.

*I started to lose touch with people and there would be several days when I wouldn’t talk to someone...* when I spent money on energy bills I didn’t have money for food...it made it very hard to have people over for meals...I didn’t have food to offer to people

Elderly woman living alone

As coping mechanisms towards cold houses, elderly people tended to heat just one small space, such as the sitting room or kitchen and use this
space. They were also more likely to stay in bed to keep warm, or go to the malls or libraries to seek warmth. This practice was intertwined with the deeply held values they have towards putting up with the cold and limiting wastage. For this group their values and beliefs over-rove the other elements such as material cultures or practices towards fuel poverty.

Sometimes it feels like that the inside of the house is much colder than the outside . . . I try to go to the malls or library to hang out just so I can have some heating . . . I’ll even go for walks when I can just to get warm . . . better than sitting here in the cold

Elderly woman living alone

The different cohorts of the family life cycle differed in how they prioritised energy. Some younger members preferred to spend on entertainment or social media over power bills, while families and elderly people have a different set of sacrifices.

I used to be able to go to the doctor and have my prescription filled . . . I want a proper winter jacket . . . you know things like that . . . in winter when the power bills come these things go last . . . sometimes I go without food to pay for power bills . . . or I go without buying clothes or anything for myself . . . I had to budget very carefully to not get into power debt . . . I had to have priorities . . . and power was a priority over other things

Elderly man living alone

7.4 Discussion

The family life cycle and the energy cultures framework are meaningful constructs for examining energy consumption patterns and fuel poverty (Stephenson et al., 2010a; Loomis, 1936; Clark, 1955). This study has shown the inter-relation between energy values, practices and material culture that are embedded in and changes with the different stages of the family life cycle. As people grow older the changes in their attitude and behaviour influence their energy consumption choices and priorities, impacting on how they adopt and utilise energy services (DeFronzo and Workov, 1979; Klausner, 1979). This includes decisions such as the purchase of energy efficient
appliances, and the frequency of heat pump use. Home characteristics also influence energy usage (Hard and Knie, 2001). The number of rooms in a house, how this space is used, the degree of insulation and sun exposure impact on the thermal comfort of the home. There is an interaction between home characteristics and household behaviour which again reduces or increases fuel poverty levels. Energy-related attitudes play a part in fuel poverty as well (Bouzarovski and Cauvain, 2016; Petrova, 2017). Concerns over the environment, energy price or attitudes towards personal thermal comfort may influence energy decisions at home (Shaninger and Danko, 1993; Gilly and Enis, 1982). Lack of knowledge on the energy costs of certain consumption habits may also be a determining factor in fuel poverty (Gupta et al., 1983). For some stages of the family cycle, their material culture restricted how they used energy, while for others the deeply held values and expectations on thermal comfort determined the level of energy service these households engaged with (Russel, 1999). For example, young cohorts who lived in poorly insulated rental property and who did not prioritise keeping their house warm had a different outlook to energy compared to older generations who grew up in cold homes and thus brought strong beliefs about putting an extra jersey on before turning the heat up. This is an example of how different groups in the family life stages had similar beliefs (of putting up with the cold) but for different reasons and stemming from opposing beliefs - the elderly as a frugal measure and the younger ones as a 'right of passage' influenced their energy decisions.

This study has shown that day to day energy conscious behaviour, which are intrinsically linked to the person’s habits, norms and socio-cultural background influences their energy decisions. A study by Verhallen and Van Raaij (1981) (Van Raaij and Verhallen, 1983) found these behavioural factors accounted for 26% of the energy use for home heating and was a significant determinant of energy use. The social elements of fuel poverty and energy consumption was clearly evident from the narratives. For example, the preference of older households for firewood, the social routines of families around collecting firewood are all linked to the wider social aspects of energy consumption which has not been considered before. Studies have found that household energy use is strongly related to the wider social nudges (factors that provide opportunities and constraints for energy use) (Brandon and Lewis, 1999). Others such as Harland and colleagues (1999) (Harland,
Staats, and Wilke, 1999] stressed that environmental concerns and subjective norms can also be motivators of energy use. This was supported by our findings as well as some families were very environmentally conscious in their use of energy.

We can also see from the findings that daily practices are deeply linked with the household contexts and family life cycles. As Shove (2010) pointed out, people's energy behaviour occur within social systems and people have the choice to adapt and change based on their perceptions of socially constructed world [Shove, 2010]. Our findings show this distinction between family types and how social pressures and socially learnt behaviour influence energy patterns. For example, the practices of students were centred around seeking external sources of heat like hanging out at the mall or public places. This group did not value collecting free firewood or keeping the house warm all the time like the other groups. In contrast, families with young children put more focus on keeping the house warm and prioritised thermal comfort first and foremost over other living expenses. These findings highlight that practices are not only driven by social expectations, but are distinct to different household types and individual circumstances.

Based on such assumptions it is predicted that people will make decisions that yield optimal results given budget constraints, and these behavioural choice can be improved by giving people more information or increasing their knowledge [Coleman and Fararo, 1992; Goode, 1997]. In contrast, a growing body of scientific research demonstrates that people are rarely the rational decision makers envisaged by these models of human behaviour [Samuelson and Zeckhauser, 1988; Stern, 1984; 1986]. There could be cognitive biases and behavioural anomalies (such as status quo bias and availability bias) which influence decision making as well [Kahneman, Slovic, and Tversky, 1982; Stern, 1992; Samuelson and Zeckhauser, 1988]. A comprehensive review of cognitive biases are beyond the scope of this paper, but policy makers are encouraged to consider the impact of such cognitive biases when determining how best to shift energy behaviour. For example, the effectiveness of behavioural interventions can be enhanced by targeting energy related practices that can be easily modified, such as encouraging households to set their washing machine default program to 'short and cold cycle'. Another example is making electricity bills easy to read and simple to understand for households, avoiding unnecessary complexity and sensory
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overload.

The decision making power of household members are influenced by background conditions, including culture, social norms and ethnicity (Van Raaij and Verhallen, 1983). These conditions tend to determine individual’s attitudes concerning lifestyle values and choices. The norms interact with specific situational factors at given points of time to determine consumption patterns. Family decision making is affected by variables from the family life cycle and situational factors such as time pressure or the value place on a purchase (Hempel, 1985). When household members perceptions and attitudes are not aligned, conflict arises. Families may resort to conflict avoidance or conflict resolution techniques that may affect decision making (Park, 1982). This was evident from the study as household members brought in conflicting views and preferences over thermal comfort, and reported arguments over power bills as a source of constant worry and stress.

As the findings suggest and similar to previous research, the family life cycle is a powerful determinant of family purchase decision-making, where different household members brought distinct beliefs and consumption patterns (Cox, 1975; Gilly and Enis, 1982). For example, mothers with young children were careful to warm the house before the children came home from school and elderly occupants preferred to use warmer clothes and in addition to keeping the house warm. This was contrary to the findings by DeFranzo and Workov (1979) (DeFronzo and Workov, 1979) who found that gender had no significant relationship with energy consumption. Our findings point that females occupants had a stronger association with keeping the house warmer compared to preferences of male occupants. We also did not find anything consistent with findings from Klausner (1979) (Klausner, 1979) who found that energy usage increased with the increased number of ties families had to outside activities. But as our findings also indicate, energy use is closely linked to socio-demographic factors (such as income and household size) and psychological variables (such as attitudes) (Biesiot and Noorman, 1999; Moll et al., 2005; Becker et al., 1981), as seen through the way households with different income and household size use energy.

One of the limitations of the family life cycle model is that it fails to recognise the changing family dynamics of contemporary society and the impact of such changes on the type and composition of families (Gilly and Enis, 1982). Some researchers have called on FLC to be expanded to give
a better picture of the diversity of family and lifestyle arrangements that you find in modern society (Shaninger and Danko, 1993). For example, the increasing number of single-person households, co-habitation by non-legally married adults, delayed parenting and rising divorce rates are not factored in this model. Using the simplistic FLC model therefore fails to capture such variations in family dynamics. As Wells and Gubar (1966) (Wells and Gubar, 1966) and Fischer (1955) (Fischer, 1955) note, defining the different stages of the family life cycle is difficult and the deviations from the traditional patterns are hard to capture. However, much of energy consumption behaviour is household-oriented, making it a necessary part to define family life stages so that all households in society are included.

In addition, a limitations of the energy cultures framework is that it does not factor in household type or person variables which may influence energy-related needs within a given context. Personality values are linked to a person’s interests and choices which determine the activities he or she may engage in. Household life styles are influenced by these personal variables and socio-cultural factors. A more personalised outlook to energy consumption is needed to provide a holistic understanding of how people view and base their energy services choices.

As this study was based on findings from a case study carried out in one city with a small sample size, detailed comparisons were hard to establish. For example, this was the case when looking at variations in energy use between males and females. Future studies could look at a larger sample size and do comparative studies across different cities or sub-groups of households to look at variants in energy use.

This study was carried out to address and overcome the limitations of the energy cultures framework by looking beyond the variables identified by the framework. In order to understand how household circumstances and family stages influence fuel poverty, the family life cycle has been used to look at the differences in motivation, social behaviour and coping mechanisms to fuel poverty of the different family types. Higher demand for energy is required during the early stages of the cycle as the family grows, and again during the later stages of old age when occupants require more energy to stay warm. This change is also linked to the material conditions of the dwelling, in that during the early stages most families may live in rental properties which are not as energy efficient compared to owner occupied ones. As
people move through the different stages of the family life cycle their energy consumption preferences, needs and material culture changes, impacting on how they utilise energy. The social values placed around energy services, such as preference for fire places over other heat sources were also factored in. For example, how older occupants prefer firewood over heat pumps, and how they value the social routines around the fires were evident from the narratives. This also emphasises the importance of cultural preferences in energy practices which have not been factored in the broader debates on fuel poverty.

The findings also expand the Energy Cultures Framework by providing a rich continuum as the family progresses through the different stages of the family life cycle, how their energy consumption patterns change and evolve as they move in and out of the various stages. The findings point to the need to include social and cultural preferences of households in interventions for fuel poverty. This is important as one of the drawbacks of the ECF is that it is limited in factoring in the household contexts and circumstances that impacts on fuel poverty. This research shows that the energy service of a household is not only dependent on how members engage with the material cultures, or what their motivations for using certain appliances are, but also on complex decisions based around the needs of the household at any given stage of the family life cycle. As members move through the stages of the family cycle, different energy behaviours and preferences will manifest from the same core values they hold, but as their family circumstances change, different aspects of these values become more prevalent in a given context.

Using the family life cycle along with the ECF further highlights this detailed energy consumption patterns and decisions as the family grows. Therefore, an integrated approach to fuel poverty which brings together motivation, social triggers, cultural preferences and family circumstances at different stages will enrich fuel poverty interventions which are designed for different household contexts. This link between the ECF and the family life cycle has significant policy implications to really understand how fuel poverty impacts on different households. Interventions need to target people whose position in the family life cycle makes them most vulnerable to fuel poverty. As household members go through the different stages of the family life cycle their energy needs changes, encountering different barriers and requiring a different set of support systems to get through fuel poverty.
The overall findings of this research propose embedding the ECF within FLC, to design better measures aimed at targeting different household circumstances and situations. Based on the findings, we are proposing the ‘Lifecycle based Energy Cultures Framework’ (figure 7.2) which we argue would provide a better contextual model for understanding fuel poverty. Previous research on fuel poverty has looked at this condition from silos of economic or technical viewpoints, later on with the social scientists contributing how household norms and behaviour are linked to this phenomena. The energy cultures framework is limited in capturing the tensions between family needs, context and their energy services.

The Lifecycle based energy cultures framework brings together the elements of the Energy Cultures Framework (Stephenson et al., 2015b), the Practice-based Energy Cultures framework (Sweeney et al., 2013), as well as the Family Life Cycle (Murphy and Staples, 1979) to form a holistic fuel poverty outlook which brings in multiple layers. The first layer (in black) is the basic flow of resources. This is where the income and time of a household is split into spending on energy services or their other needs, which is similar to the ‘heat or eat’ condition highlighted by previous researchers (Harrington et al., 2005). Time is an important element of this framework, as highlighted throughout the findings how households invest time to collect firewood and tend to heating their homes. The way these resources are allocated determines the energy outcomes such as providing a warm house, or the social outcomes of being able to invite people over to a warm house. In addition, there is the decision maker who control that flow of resources (in blue). Their decisions are influenced by the norms, values, beliefs, and the engrained practices of how they engage with the energy services.

Surrounding these two layers of resources and decision maker are the family needs and circumstances which can impact on resources and decisions on energy usage (in red). For example, a household with small kids may have higher energy needs and spend more on food, while elderly occupants may have higher medical costs coupled with high energy needs. The family circumstances are linked with the energy norms and practices households adopt, for example having a warm house may be more important for people with kids compared to other family groups. In addition to the norms and beliefs of the energy decision maker, the beliefs of those around the families
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Figure 7.2: The Lifecycle based Energy Cultures Framework.
that influence their energy decisions also changes how households engage with energy services.

The next layer of this framework is the support mechanisms and barriers (in green) which affect the amount of resources that are available and directly targets the energy services, such as availability of insulation schemes in the area or having a food bank. The final element is the negative consequences of this resource tension between heat or eat, or spending on other needs. Negative effects of fuel poverty may include the constant worry over bills, not being able to participate in society, or the social stigma and shame of living in a cold house.

This expanded framework brings all the elements of fuel poverty together to link them in a holistic way for fuel poverty to be really understood. The values people bring at any given point in life towards their energy services, the way they choose to interact and base their practices on, and how they make their decisions around the material culture should be seen through the family circumstances and contexts which impacts on these decisions. Equally as important as income and the technical elements are the time and resources available to a household which hinders or supports their energy practices. The wider social elements of fuel poverty are also vital to be considered in a comprehensive model of trying to understand why households are in this condition.

The theoretical contribution of this paper is bringing the family life cycle as a lens for looking at energy poverty. This is the first time such a perspective has been adopted to critically analyse the behaviour patterns and choices of fuel poor households. The new Lifecycle based framework which links the family life cycle with the energy cultures framework, provide further nuanced details into the differences in values, tensions, coping mechanisms and social aspects of energy in households. In addition, this viewpoint factors in the different family contexts and circumstances, and ultimately helps design better matched interventions to the different household needs to lift people out of fuel poverty.

7.5 Conclusion

This paper has shown that the energy consumption patterns, variations in coping behaviour and attitudes towards energy services changes across
the stages of family life cycle. These strong social drivers of fuel poverty and segmentation among households through the family life cycle help in capturing the variations in energy use. For a comprehensive understanding of fuel poverty in New Zealand, it is important to understand such differences in energy attitudes and behaviour among households which will help in devising more inclusive interventions for fuel poverty.

The next chapter will form a critical overview of fuel poverty policies in New Zealand, and propose fresh policy measures for targeting fuel poverty.
Chapter 8

Planning for future policy scenarios for mitigating fuel poverty in New Zealand

Having considered the aggregated lived experiences of fuel poor households in chapter 7, and after analysing the variance amongst the data by looking at differences in energy practices and norms in chapter 8, this thesis will now add to the fuel poverty literature by taking a policy perspective. A policy perspective is important because it provides a systematic assessment of a policy, its causes and consequences, and criticised the effectiveness of policy (Dye 1995). There has been one previous policy analysis of fuel poverty in New Zealand carried out in 2010 by McChesney (2012) (McChesney 2012), therefore insights from people directly working in this space were vital for a comprehensive understanding of fuel poverty. The aim of these interviews was to understand, through the perspectives of the fuel poverty policy stakeholders, the barriers to fuel poverty alleviation in New Zealand, and to capture recommendations provided by the experts on the best way to move forward if New Zealand is to reduce fuel poverty in future. This chapter complements the work carried out in the previous two chapters by providing a holistic understanding of issues affecting fuel poverty, both from the households’ perspectives and expert opinions. The barriers to alleviating

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fuel poverty and suggestions for measures for moving forward are captured in this current study. The work in this chapter contributes to meeting the fifth and sixth overall objectives of this thesis identified in Chapter 1 (see section 1.2).

The chapter begins by reinstating the prevalence and drivers of fuel poverty in New Zealand. It then focuses on the current policy responses to fuel poverty, with a critique of existing measures in addressing the wider dimensions of fuel poverty, and finding long-term solutions to it. To inform the development of future policies, expert stakeholders were interviewed for this study. Based on the recommendations from these interviews, three policy scenarios are then proposed to alleviate fuel poverty in New Zealand.

8.1 Introduction

Affordable and accessible energy is essential for a good quality of life (Townsend, 1979; Boardman, 1991; Clinch and Healy, 1999; Palmer, Maclnnes, and Kenway, 2008). Fuel poverty, or the inability to access or afford energy, affects a broad spectrum of households, and impacts on their ability to attain a socially and materially appropriate norm of energy services required to participate in society (Sovacool et al., 2017; Day et al., 2016; Bouzarovski and Petrova, 2015). In New Zealand, one in four households are estimated to be in fuel poverty (Lloyd, 2006; Howden-Chapman et al., 2012). There is a plethora of information on the impacts of fuel poverty, highlighting a real need to tackle this problem (Harrington et al., 2005; Liddell, 2010; Marmot, Geddes, Bloomer, Allen, and Goldblatt, 2011; Chester and Morris, 2011; McKague et al., 2016). So far, the New Zealand government has been slow to respond to fuel poverty and there has been few political commitments to mitigating it (O’Sullivan and Howden-Chapman, 2017).

The existing responses to fuel poverty in New Zealand are minimal, concentrating on the physical aspects of the dwellings. The government favours market interventions, such as promoting power supplier switching among consumers, over state led interventions (Isaacs et al., 2010). While there are many different dimensions to fuel poverty — being cold, heat or eat, social exclusion, debt, disconnections — the government has taken a very narrow approach to addressing this problem. The New Zealand Energy Strategy (2011–2021) set out six goals, one of which was to provide warm,
dry and energy efficient homes (Ministry of Economic Development, 2011), however, no specific policy targets for tackling fuel poverty were outlined beyond a nation-wide insulation scheme. Solving the complex problem of energy vulnerability requires inter-sectoral policy commitments from multiple stakeholders, moving on from the siloed approach New Zealand currently favours (O’Sullivan and Howden-Chapman, 2017).

This chapter explores three different policy scenarios as possible pathways for mitigating fuel poverty in New Zealand. Informed by interviews with experts in this field, we present policy alternatives that requires different levels of commitment from the government. The government can continue business as usual, explore a medium cost policy stance or shift to a high cost policy pathway which encompasses a holistic and integrated policy plan for alleviating fuel poverty. Reducing fuel poverty needs targeted and tailored policy interventions that should be supported by intergovernmental agencies, adopted by communities and easily accessible to all households.

The first section of this chapter gives an overview of fuel poverty in New Zealand, highlighting the leading drivers behind this phenomena. We discuss the attempts made by the government to address this problem and present the limitations of these measures. The second section outlines the study design and analysis. In the third section, three scenarios are presented with a discussion on implications and policy guidelines for future action. The final section draws a conclusion calling for a stronger policy commitment from the government to tackle fuel poverty in New Zealand. This study makes a unique contribution to fuel poverty in New Zealand by factoring in expert viewpoints in finding long-term solutions to it.

8.2 Background

8.2.1 Drivers of fuel poverty in New Zealand

Identifying the fuel poor is complex (Moore, 2011). This is complicated in New Zealand where there are no official definitions or measures of fuel poverty (McChesney et al., 2006). Government attempts to capture fuel poverty gave a bleak outlook of the situation (Salmond et al., 2006; New Zealand Government, 2013). The 2006 New Zealand Living Standards Survey found that 36% of households put up with feeling cold in order to save on energy, 7% lacked the ability to keep the main rooms of the house
warm to the WHO recommended standards of 18 degree Celsius, and 10% reported cutting back on heating in order to afford other basics such as food (Salmond et al., 2006). The 2015 New Zealand General Social Survey found that 35% of households in rental properties reported their homes were colder than the WHO recommended temperatures compared to 15% in owner-occupied ones (Statistics New Zealand, 2016). Using the 10% definition (Boardman, 1991), the estimated number of households living in fuel poverty in New Zealand increased from 10–14 percent in 2006 to 23 percent in 2008 (Howden-Chapman et al., 2012). New Zealand has one of the highest winter mortality rates compared to other OECD (Organization of Economic Cooperation and Development) countries (Healy, 2003a). Low indoor temperatures has been linked to higher hospitalization rates (Telfar, 2010; Liddel, 2010), and 16% of cold-related deaths in winter (Davie, Baker, Hales, and Carlin, 2007).

Several factors contributes to the relatively high levels of fuel poverty in New Zealand, including reforms to the electricity market, older housing stock, growing income inequality and social factors key among them (O’Sullivan and Howden-Chapman, 2017). In the early 1990s, the state owned energy company was privatized with the goal of improving efficiency through competition and choice to consumers (Beder, 2003; Poletti, 2009). Free market advocates claimed that consumers who had access to information would act rationally to get the best possible price (Lah, 2009). In reality, the electricity pricing schemes were not transparent, and did not lead to a downward pressure on consumer prices (Chester and Morris, 2011; Bertram and Twaddle, 2005). Residential electricity prices increased by 71% between 1990 and 2008, whereas industry prices increased by only 18%, while commercial rates decreased by 21% during this period (Ministry of Economic Development, 2008). Over the past few years, New Zealand’s average annual power prices increased from 9.2c (NZ dollar) per kWh in 1990 to 25.5c per kWh at the end of 2010. Over the same period, the increase in Australia was less than 2c per kWh and about 3c per kWh in the United States (MBIE, 2013). During this time the average incomes of those in the top tenth of households have risen significantly in real terms, while average real incomes of those in the lower and middle-income groups remained stagnant (Statistics New Zealand, 2016; Ministry of Economic Development, 2011). The high residential electricity prices led to a Ministerial Review of the Electricity
Market Performance in 2009, which did not lead to direct state intervention and continued to favour voluntary market mechanisms (Layton, Dean, Russell, Evans, Franks, and Stevenson, 2009).

The market reform affected those in low-income households the most. State housing tenants were moved to market rentals with supplementary grants, and income fell for low-income households (Kelsey, 2015). Low-income households were spending a substantially higher portion of their income on energy needs in winter compared to higher income groups (Chester, 2014; Jamasb and Meier, 2010). The Household Energy Expenditure Study showed that the percentage of household income spent on energy in the home has increased across all income groups in New Zealand between 1988 and 2013, however the biggest increase was for the lowest income group up from 6% in 2007 to 13% in 2013. In contrast, the highest income group spent just 3 percent of household income on energy in the home in 2013, an increase from 1.6% in 2007 (Statistics New Zealand, 2016). Thirty-five percent of New Zealand families were not able to keep up with electricity, gas or water bills (Jensen, Krishnan, Hodgson, Sathiyandra, Templeton, and Jones, 2006), and over 40,000 households were disconnected from electricity in 2014 (Ministry of Social Development, 2016).

The low quality of rental housing in New Zealand contributes to the high levels of fuel poverty. New Zealand has a history of poor housing, especially the rental stock, which is often badly insulated, cold and damp (Isaacs et al., 2010). The private rental market in New Zealand is lightly regulated and there has been no obligation on landlords to provide insulation or efficient heating for their tenants (Bertram and Twaddle, 2005). Minimum insulation standards for housing in New Zealand were not introduced until 1978 and many houses built prior to this — which is about a third of existing housing stock in New Zealand — lack sufficient insulation (Shen, 2004; Statistics New Zealand, 2016; EECA, 2007). The increasing cost of housing means that there is a declining rate of home ownership in New Zealand and a move towards renting (O’Sullivan and Howden-Chapman, 2017; Eaqub and Eaqub, 2015). Low income households are more likely to live in rental properties, and these rental properties are on average a poorer standard than owner occupied ones (New Zealand Government, 2011; Telfar, 2010). Landlords have little incentive to provide any retrofits as benefits of energy savings and thermal comfort will be enjoyed by the tenants and not the
landlords (Howden-Chapman et al., 2009; Barton, 2010). The increasing income and wealth inequality in New Zealand intensifies fuel poverty by making it harder for households on low incomes to meet their daily needs. New Zealand’s level of income inequality has risen substantially since the 1980s and 1990s relative to the levels in other OECD countries (O’Dea, 2000; Wilkinson and Pickett, 2009; Davis et al., 1999). During this period taxes were cut for top earners, while benefits were reduced by up to 30 per cent. The average income of someone in the richest 1% doubled, from just under $200,000 to nearly $400,000 (adjusting for inflation). In contrast, the average disposable income for someone in the poorest 10% was only slightly higher than it was in the 1980s (O’Dea, 2000). Over the last decade the cost of living for the lowest income households has increased by 50 percent compared to an increase of 43 per cent among high income households (Adams et al., 2014).

The problems for low-income households are further magnified by the poverty premium — whereby the poor pay more for the same goods and services (Caplovitz, 1967). This is especially hard on some population groups, such as the elderly or people with disabilities, who not only have low income but incur additional costs based on their needs — such as high energy bills due to spending more time at home. People on low income are more likely to live in energy inefficient rental dwellings (Sherwood Burge, 2006; Barton, Lucas, Barrera-Hernandez, and Ronne, 2006; Walker and Day, 2012), and tend to pay more for their energy as they are more likely to be on premium energy plans such as pre-payment metering methods (O’Sullivan et al., 2011). A study exploring the energy service deprivation between ‘energy deprived’ and ‘energy healthy’ households in New Zealand found that deprived households, such as those on low income, were getting only about 40% of the energy service per dollar spent on energy compared with the ‘energy healthy’ households or the higher income groups (McChesney, 2012).

Recent research has explored the influences of behavioural and social factors linked to energy consumption in New Zealand (McKague et al., 2017, 2016). New Zealanders have a strong cultural norm of putting up with cold houses. Many houses surveyed in a nation-wide study had indoor temperatures well below the recommended WHO standards (O’Sullivan and Howden-Chapman, 2017; Isaac, 2004). There is a need to better understand
energy decision making behaviours by considering the wider variables that impact on them.

The benefits of identifying the fuel poor through targeting households needs have also not been fully explored in New Zealand. As a result, an evaluation of a nation-wide government insulation project in New Zealand showed that the benefits did not flow to the households most in energy poverty (Lloyd and Callau 2009). A similar study found that 77% of residents in New Zealand who received upgraded heating systems were not using them efficiently (McManus et al. 2010). This could be attributed to the growing challenges related to the reluctance of some households, often the most vulnerable, to apply for assistance through subsidized programmes to help with energy hardship (Boardman 2010). It could also be due to a lack of "working capital" to pay for reimbursement based schemes.

Given the multitude of forces driving fuel poverty levels in New Zealand: such as, low quality rental accommodation, the electricity market reform, rising inequality and social factors, the current policies are reactive and addresses only a few symptoms of the problem. The policies fail to consider the wider causes or provide long-term solution to fixing fuel poverty. In addition, the continued focus on economic measures and a lack of political will have prevented adequate progress in eradicating fuel poverty in New Zealand.

8.3 The limitations of current measures to address fuel poverty in New Zealand

In 1992, the government recognized the importance of energy accessibility by specifying in the New Zealand Energy Strategy that "basic energy services remain accessible to all members of New Zealand society" (New Zealand Government 1992 pp. 28). Under the Energy Efficiency and Conservation Authority (EECA), strategies were designed to add insulation and improve the energy efficiency of New Zealand homes (EECA 2011). This was reinforced in the 2011 Energy Strategy by acknowledging that "many New Zealand homes are inadequately insulated and have inefficient space and water heating systems" (New Zealand Government 2011 pp.32).

In 2011, in response to high residential electricity prices, the govern-
ment launched the “What’s my number?” campaign to promote switching by urging consumers to switch to the cheapest electricity plan (Electricity Authority 2011). This shifted the onus for market price trends away from suppliers and onto customers (McChesney 2012). In a country where 69% of the total national residential energy use came from electricity (Isaacs et al. 2010), it was up to consumers to reduce their electricity bills by actively bargaining and switching suppliers. The government anticipated that power switching would save consumers at least $100 a year, however the government failed to consider the barriers consumers were facing. People with power debts, mostly low income families, were encouraged to switch to pre-payment metering. Compared to other payment options, pre-payment metering was more expensive for the households (O’Sullivan et al. 2011). Nor did the switching result in improved thermal comfort for these households, but it was easier to self-disconnect and allocate the budget to other needs (O’Sullivan and Howden-Chapman 2012). Electricity Authority commissioned research showed that only 35 per cent of those surveyed would approach a power company to switch (Electricity Commission 2015). Further, some of the cheapest tariff offers required transactions to be on-line, making this option harder for those without the skills or access to such services, and the benefits flow to literate, computer savvy citizens (McChesney 2012). Some customers were also unable to switch because of debt or other issues (Electricity Authority 2012).

The government acknowledged that the deregulated electricity market was not providing the benefits of true competition to residential consumers as envisioned, and more direct state interventions were slowly introduced (EECA 2011). New legislations required electricity suppliers to provide low fixed daily tariffs for low income electricity consumers (New Zealand Government 2011). The limitation of this tariff is that it is only beneficial to consumers who use less than 8000 kWh per annum, which is too low for families living in the (colder) South Island. While 25% of consumers in the North Island use low-usage plans, only 9% of consumers in the South Island do (Hansard 2004). After two high profile fuel poverty related deaths, guidelines were also put in place to protect medically dependent and vulnerable customers from disconnection (Electricity Commission 2015). Following a nation-wide study on household energy end use, mandatory insulation levels

http://www.whatsmynumber.org.nz/
were revised, and the focus was shifted from energy savings to improving the indoor conditions by phasing out open fires and promoting electricity based heating (Isaacs et al. 2010).

By 2009, ‘Warm up New Zealand’, the government’s flagship program was launched to address the lack of insulation and improve the energy efficiency of homes. The program provided subsidies for retrofitting insulation, targeted first at general households and later offered only to low income groups. Under this program, 15 percent of the housing stock has been insulated, while 30 percent of homes still remain uninsulated, many of which are rental properties (OECD 2017). Studies found a direct health benefit of this insulation programme largely from reduced hospitalisation, pharmaceutical costs and reduced premature mortality (Howden-Chapman et al. 2009; Grimes, Denne, Howden-Chapman, Arnold, Telfar Barnard, and N. 2012). Lloyd and Callau (Lloyd and Callau 2009) criticized the minimal insulation standards set out by the government as not achieving the required minimum indoor temperatures, especially in the cooler South Island. Lloyd suggested increasing subsidies for wall insulation and double glazing especially in these regions. Isaacs (Isaacs et al. 2010) called for increasing the mandatory minimum insulation levels and putting more focus on space heating. The government is currently reviewing plans to phase out the insulation policy.

In 2016, the government introduced a law that required landlords to declare, on tenancy agreements, how much insulation a rental property had. Enforcement was a challenge and an inspection revealed that many landlords have not complied with the new law (MBIE 2016). By 2019, all rental properties in New Zealand would be required to have minimal insulation, but enforcement has been left to the tenants. Critics have challenged that some tenants might feel hesitant to report landlords because of fear of eviction, and have criticized the government of leaving the solutions of fuel poverty up to market forces (Barton 2010; Howden-Chapman et al. 2010; McChesney 2012). A 2016 submission to introduce a warrant of fitness for all rental properties was rejected by the government on the basis that the proposed indicators were exhaustive and it would be costly to administer (Ministry of Health 2016).

Current policy responses to fuel poverty in New Zealand do not take a holistic view of fuel poverty and fail to incorporate the wider variables
that impact on how people use energy. For example, the government’s insu-
lational program only addresses one aspect of the energy culture — the ma-
terial side (Stephenson et al., 2016). There is little consideration of the
behavioural responses or the values placed around household energy in New
Zealand (Hirst and Brown, 1990; McKague et al., 2017). Understanding
the complex issues surrounding the difficult choices and trade-offs house-
holds’ make about energy consumption will help better align policies to
those most in need (Sovacool et al., 2017). Households in fuel poverty have
to make choices between eating and heating (Battacharya, DeLeire, Haider,
and Currie, 2003), and it inhibits some households from satisfying their so-
cial needs (McKague et al., 2016). The response to fuel poverty in New
Zealand is narrow and fails to acknowledge the causes — rising energy prices,
low income, energy inefficient housing and unhealthy energy consumption
norms and practices of households. Policy needs to be based on a com-
prehensive range of indicators, one which extends beyond cold housing into
broader energy service needs (Bouzarovski and Petrova, 2015; Cooper, 2017;
Sovacool et al., 2017).

This study focuses on policy interventions for tackling fuel poverty in
New Zealand. Key experts and stakeholders in this field were interviewed to
identify the policy challenges and what is needed to alleviate fuel poverty.
Based on these interviews, three scenarios for future fuel poverty policy
development are proposed.

8.4 Present study

Dunedin City was selected as a case study to gather expert views on policy
recommendations for reducing fuel poverty in New Zealand. Dunedin (Māori
name Ōtepoti) is the second-largest city in the South Island of New Zealand.
Dunedin was chosen because of its older housing stock and cooler climate.
Mean annual temperatures range from 10 degree Celsius in the South Island
to 16 degree Celsius in the North (NIWA, 2015). Dunedin was also one of
first places to trial the housing rental warrant of fitness, and houses a wide
range of stakeholders involved in the fuel poverty space. Face-to-face inter-
views were conducted with 18 stakeholders from a broad range of fields and
expertise. Participants included researchers, government representatives,
council members, community groups and non-governmental organizations.
Stakeholder (in alphabetical order by last name) | Organisation
--- | ---
Hon. Dr. David Clark | Labour Party, Minister of Health
Mayor Dave Cull | Dunedin City Council
Michael Gaffney | Otago Polytechnic / Cosy Homes Project
Debbie George | Age Concern Otago
Margaret Hill | Grey Power
Michael Laufiso | Community and Housing Dunedin
Marie Laufiso | Brockville Community Development
Jinty McTavish | Dunedin City Councillor
Rev. Dennis Povey | Presbyterian Support Otago
Tammy Prescott | Curtain Bank
Dr. Janet Stephenson | Centre for Sustainability, University of Otago
Nicola Taylor | Anglican Family Care
Dr. David Tombs | University of Otago
Meteria Turei | Green Party
Jordana Whyte | Cosy Homes Project
Scott Willis | Blueskin Resilient Community Trust
Leteisha Nicholas | Generation Zero
(wishes to remain anonymous) | Health Sector

Table 8.1: List of experts interviewed for this study

Participants were chosen because they were involved with research, policy or programmes related to fuel poverty. While this small number of participants do not reflect a representative sample of policy experts across the country, the strength of this study is in the breadth and depth of experience of participants which would contribute to wider policy formation. Table 8.1 shows the names and organisations of experts interviewed for this study.

The transcribed interviews were analysed using framework analysis (King 1998). Initial coding was carried out using a coding frame based on the energy cultures framework as a conceptual framework (Stephenson et al. 2010a). The energy cultures framework provides an integrative framework that supports existing theories of energy poverty while strengthening what the individual theories offer. The framework offers a holistic outlook that factors in the broad range of variables that influence energy poverty – the material conditions of the house, values, beliefs and knowledge of con-
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sumers, and the wider social and cultural systems that impact on energy decisions (Stephenson et al., 2015a).

A second stage of coding was performed with constant comparison until all emergent themes were coded (Ritchie, Lewis, Nicholls, and Ormston 2013). Interviews were analysed for key themes, points of agreements and disagreements as well as specific policy issues raised by informants. Analysis of themes revealed several similarities in the views of the different stakeholders. Three key policy scenarios emerged from the interviews after analysing the data - business as usual, and medium and high cost options for tackling fuel poverty. The key themes and the implications of these findings are presented in the next section.

8.5 Results and Discussion

The findings were broadly categorised under two key themes important for fuel poverty policy development in New Zealand — barriers to fuel poverty alleviation and opportunities for future interventions. The main recommendations are collated in the table below.

8.5.1 Barriers to fuel poverty alleviation in New Zealand

Interviewees described four major barriers to fuel poverty alleviation in New Zealand.

The economic priority

The short term economic focus taken by the government when addressing fuel poverty was noted by experts as a barrier to finding long-term solutions.

*alleviating fuel poverty is a macro-economic objective for the government...policies are aimed at prioritising economic growth and are market driven...it can momentarily get people in fuel poverty through a difficult situation...but it doesn’t address the cause of the problem*  
Mayor Dave Cull

This narrow stance taken by the government masked the social and environmental concerns of fuel poverty. The experts (9/18) noted that focus on economic outcomes could be a result of having a lack of comprehensive
### Scenario Recommendations

**Barriers to fuel poverty alleviation in New Zealand**
- Economic priority over social good
- Lack of stakeholder involvement
- Failure to address regional fuel poverty variations
- Absence of policy integration across sectors

**Business as usual policy scenario**
- Continue with the current insulation program

**Medium cost policy scenario**
- Nation-wide awareness campaign
- Modified warrant of fitness
- Expanding government insulation subsidy program
- Energy rebates and discounts

**High cost policy scenario**
- Integrated policy plan across sectors
- ‘Whole’ house approach
- Energy supplier obligation
- Reducing electricity prices for residential consumers
- Increasing income for households

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**Table 8.2**: Scenarios and recommendations from experts for mitigating fuel poverty in New Zealand
understanding of fuel poverty to inform policy, and called for a broader conceptualisation of fuel poverty.

there are people amongst the fuel poor who are fuel poor because of their physical environment... there’ll be others who actually don’t use much power because of their practices... and there are many reasons why people may use more or less than 10% of their income on electricity... if you are going to address fuel poverty you have to address each of these aspects

Dr. Janet Stephenson

Twelve respondents called for a review of the current measures of fuel poverty used in New Zealand, and urged towards a wider measure that includes social indicators alongside economic ones.

Lack of stakeholder involvement

The solutions to fuel poverty in New Zealand have not included those that are most impacted by it – the fuel poor households. The current policy measures were criticised by some respondents (11/18) as being top-down, with limited involvement from the wide range of people affected by fuel poverty.

I think there’s a direct link between lack of dialogue and understanding of the issue, and the prevalence of fuel poverty in New Zealand... we need to ensure the voices and direct representation of fuel poor households are heard by the government

Rev. Dennis Povey

Lack of stakeholder engagements in policy were noted as a barrier to devising inclusive interventions. Experts recommended ensuring that the voices of fuel poor were included in future policy discussions.

there’s a lack of diversity in our fuel poverty policies... we must directly speak to these missing voices of households and communities... and ensure that we include their diverse needs and contexts in future policies

Dr. David Tombs
As interviewees noted (8/18), community engagement is a big part of addressing fuel poverty in Dunedin. A city-wide fuel poverty action group, comprising of all leading stakeholders have been formed to look at the challenges fuel poverty pose to the city. Other cities should follow this initiative in involving communities in finding solutions to fuel poverty.

**Failure to address regional variations**

Even though there are great regional variations in temperature, heating days and fuel poverty rates across the nation, the government has a blanket solution for addressing the symptoms of fuel poverty. Respondents (12/18) stressed that failure to address this variation was a significant barrier to devising targeted interventions.

> there are large discrepancies in fuel poverty levels across this country... in the North we have warmer climate and shorter heating period compared to the South... yet, our policies are driven by the North... how is that going to solve the problem for what is happening in the South? 

Debbie George

Due to this regional variations in temperature and heating days, it was recommended by some interviewees (12/18) that fuel poverty policies must be regionally based.

**Absence of policy integration**

The existing fuel poverty policy is driven by the technical elements of fuel poverty, and policy response arising from the housing and energy sector. This shows that current polices have only looked at one element of the energy cultures framework, the material cultures, in finding solutions to this problem. The deeply held values New Zealanders bring towards thermal comfort and their daily practices and habits are not factored into policy measures.

> fuel poverty is not only an energy issue or even a housing issue alone... believing it is will produce inefficient and ineffective solutions... fuel poverty cuts across socio-environmental and socio-economic issues... sustainable solutions to fuel poverty must be woven across all these 

Dr. Janet Stephenson
Experts (16/18) called for a strong policy commitment from the government and integration of fuel poverty policies across sectors including health, education, housing, energy and climate change.

### 8.5.2 Opportunities for future policy interventions

The interviews also captured a range of policy measures which were proposed to address the difficult challenges posed by fuel poverty. Three main themes emerged from the findings as plausible scenarios to guide future fuel poverty policy formation in New Zealand: business as usual where the government continues with the current insulation program, as well as medium and high cost interventions requiring significant financial and policy commitment from the government. Each of these themes/scenarios will be discussed in detail below:

#### Business-as-usual policy scenario

The first scenario identified through the analysis for mitigating fuel poverty is where the government just continues with the current insulation scheme in place. New Zealand has a high percentage of low quality housing and this initial effort by the government should be acknowledged as an important first step in tackling the cold, damp houses in the country. Since the program rolled out in 2009, 294,600 homes have been insulated at a cost of $447 million, with a benefit cost ratio estimated to be 3.9:1, through reduced hospitalisation and pharmaceutical costs (EECA, 2016; Howden-Chapman et al., 2012). This amounts to a total benefit of $1,265 per year per household for low-income households and $547 for high income households (EECA, 2016).

The government has committed a further $18 million to extend the Warm up New Zealand programme until 2018 (EECA, 2016). This will support improving insulation for 20,000 more rental properties. This grant from the government qualifies the landlord for a 50% subsidy for ceiling and under-floor insulation to the latest 2008 minimum building standards. The net benefit of this program is expected to be $2.10 for each dollar spent. In addition, the recent changes to the Residential Tenancies Act would require that all residential rental properties be insulated within three years. This does not apply to over 100,000 properties that will be exempt from this
law because it is too hard to retrofit insulation in these properties. The total combined efforts are expected to improve the thermal comfort of more than 310,000 homes. This still leaves over 600,000 homes without adequate insulation in New Zealand.

Experts (15/18) highlighted that minimum insulation alone is not enough to achieve the WHO recommended indoor temperatures for health and thermal comfort. While the government offered grants to install efficient heating appliances, these were discontinued in 2013. This emphasises that trying to fix fuel poverty by only addressing one aspect of the material culture will not be successful in completely tackling this problem.

> energy is accessible in this country, just not affordable...the government’s insulation scheme is a step in the right direction, but they have only scratched the tip of the ice-berg...they need to focus on long-term solutions to fuel poverty...we can’t have a party that relies on solutions to fuel poverty being driven by the market

Meteria Turei

Another criticism from experts (7/18) was that as enforcement of insulation is left up to the tenants, this may act as a barrier for tenants reporting on landlords due to fear of eviction; or limited uptake of the scheme due to lack of knowledge of tenants regarding the schemes. This is an example of where the practices and norms of the energy cultures framework will help in understanding the beliefs householders have about different schemes and the barriers to accessing them. Without understanding their motives and barriers the schemes may not be adopted by the households it is intended for.

> the insulation policies have been confusing...the criteria have been confusing...the government has a stop-start approach to this scheme...so people have been left confused as to what the policies have been at any one time

Health sector

Given the key concerns from experts, the business-as-usual scenario will not be sufficient to find long-term solutions to fuel poverty. The experts believe that while material culture needs to change to shift fuel poverty levels, that alone will not be adequate in sustaining the reduction in fuel
poverty rates. Understanding the energy values and practices, and taking a whole house approach to the material culture is further needed.

Medium-cost policy scenario

The second policy scenario is a medium cost position where the government considers additional measures to reduce fuel poverty. Drawing from recommendations made by experts, the following themes were identified:

a) A nation-wide awareness campaign

Experts (13/18) stressed that New Zealand needs an effective household energy literacy and awareness campaign. This is targeted at changing the knowledge and values of the energy cultures of households. Perhaps this could be the hardest element to change out of the three core energy cultures framework variables: material culture, practices and beliefs.

*education is a big part of alleviating fuel poverty... people understanding the schemes and help available... even though some services are free, some people still don't access it because they are simply not aware of what's out there*  

Tammy Prescott

The experts stressed that the awareness campaign could factor in household needs and address issues that are specific to different regions which have varying climate and energy needs. An energy awareness program must acknowledge the heterogeneity in energy consumption, motivation level of households, and address the norm and practices that drive energy usage. Information provision should facilitate easier price comparison, transparent billing and be readily available to newcomers such as migrants and international students. Strong partnership with community groups would make such a campaign successful in personalising advice to households. Changes to material culture to address fuel poverty should occur in conjunction with targeting measures to understand and align with the beliefs, values and preferences for energy services households bring.

*It’s not only about giving people information or education... it’s how you engage with and potentially change people’s attitudes and that’s a bigger process... I think very few people are going to change their behaviour on the basis of what WHO says... what do*
they know? ...they are in Geneva!...what do they know about Dunedin?...we need sustained engagement with communities on issues that are real to them

Dr. David Tombs

b) Modified warrant of fitness

In the past, attempts to pass a rental warrant of fitness (WoF) for residential properties have not been successful. In a pilot of the WoF, 96% of properties failed to meet the criteria set out for insulation, safety and security (Bosch, 2014; Bennett et al., 2014). The government did not support the submission citing that the proposed indicators were exhaustive and complicated to monitor. This is perhaps reflective of the government’s rush to find solutions to fuel poverty without factoring in the voices from the people directly impacted by this condition and what indicators were most important for them.

the proposed WoF was an over-kill...it's complicated with too many factors which is making it expensive and difficult to implement...if you are talking about cosy homes there's a much more limited number of things such as insulation, heating, weather tightness...and we should be focusing on these first

Rev. Dennis Povey

Respondents (15/18) proposed that as an initial phase, a warrant of fitness for rental housing should focus exclusively on aspects of the house that are linked to fuel poverty – insulation, dampness, draught and heating. With fewer and more specific indicators, the WoF would be cost-effective and easier to administer. Enforcement of the rental warrant of fitness would not be left up to the tenant. The local councils have a greater role to play in compliance, similar to how the local councils oversee food safety bylaws in restaurants.

the government has made a start on WoF and that’s very positive...but I’m not sure if it’s enough...we have power at the local government level to enforce hygiene standards for cafes that sell food, but we don’t have power to enforce standards for rental accommodation

Mayor Dave Cull
c) Expanding the government subsidy program

Suggestions were made by some interviewed (9/18) that further measures to tackle fuel poverty could include efficient heating in government interventions. A comprehensive targeting of material culture is needed if fuel poverty is to be properly tackled, moving beyond the focus on only insulation to include draught proofing, thermally backed curtains and efficient heating in the package.

right now the only requirement in rental properties is that there’s minimum insulation... but heating is a big issue... a lot of times rental properties don’t have a good source of heating... so heating needs to come into the subsidy program

Jordana Whyte

An additional 50% subsidy could be offered to all low income households under an extended Warm Up New Zealand scheme towards installing energy efficient heating. A government survey showed that 11% of New Zealand households were using open fires in 2005 [MBIE 2013]. A subsidy for efficient heating, coupled with insulation, could increase the thermal comfort of the house, and help in reducing energy bills. Adding a 50% subsidy for efficient heating is expected to cost $165 million, at the rate of $1000 per household, benefiting 165,000 number of households across the nation (1000 × 165,000 = 165,000,000). This cost could be spread over several years, costing, for example, $33 million per year over five years. Past experience show that focusing only on insulation will not yield the desired results in reducing fuel poverty, it has to be coupled with providing efficient heating as well.

d) Energy rebates and discounts

Several points were noted by experts in this theme. Some respondents (9/18) suggested providing electricity concessions to medically dependent consumers with conditions that are aggravated by changes in temperature. This could be supplemented by a home energy assistance scheme for people facing financial hardship in paying energy bills. The current deprivation scores (Ministry of Social Development, 2014) could be modified to include broader variables [McKague et al. 2016] to identify households in need, with Housing New Zealand taking an active role in administering this scheme. This was a great example of why it is important to understand and
acknowledge the different household circumstances which may have varying energy needs and need different interventions. Individuals that make up a family have different energy needs which change depending on the stage of the family cycle they are in, understanding these energy demands and needs will form inclusive policies that are better matched for the different households.

_The price of electricity is a huge issue in this country...the government can help by providing a winter payment...and not see it as a cost, but as an investment in people’s health_

Debbie George

Experts (14/18) noted that financial measures are crucial for addressing short-term affordability for vulnerable consumers. Indicators for targeting fuel poor households should move beyond an income measure, which the government favours now, to include indicators based on the conditions of the house, household type and their energy needs. Households with elderly occupants, families with young children, people with disabilities, and medically dependent consumers could receive, for example, an additional $300 annually, towards their power bills. The average New Zealand household spent about $160 per month, per household, on power bills in 2015 [Statistics New Zealand 2016]. In 2015, 18% of the population had a disposable households income of below $60,000 a year, which is the definition of low-income families in New Zealand [Statistics New Zealand 2016]. A concession of $300 a year to eligible applicants could help 270,000 eligible families at a cost of $81 million per year to the government (300 × 270,000 = 81,000,000). The benefits of this concession will be reaped through health benefits, added warmth or by having extra funds to allocate to other necessities such as food. Again, this emphasises that it is important to factor in the households contexts and energy needs particular to different households which may impact on the level of support system they need to lift them out of fuel poverty.

Adopting policy commitments towards a moderate scenario could greatly improve the thermal comfort, health and well-being of fuel poor households, and contribute to decreasing air pollution from inefficient burners. Providing subsidies to install efficient heating could reduce emissions and improve energy efficiency, whilst making it cheaper to heat the home. Financial assistance and energy rebates for eligible consumers could ease the burdens
of fuel poverty by making it easier to allocate their budgets to household needs. At a total cost of $114 million per year for heat pumps subsidies and a $300 rebate per year to eligible households, it will benefit 270,000 households \( (33,000,000 + 81,000,000 = 114,000,000) \). Assumes 50% subsidy for heat pumps is spread out over 5 years).

**High cost policy scenario**

The third scenario proposed by experts focuses on addressing the root causes of fuel poverty and working towards finding long-term solutions to addressing these. This requires stronger policy commitment and investment from the government. The government needs to address the causes of fuel poverty – low income, high fuel prices, energy inefficient homes, and behavioural and social circumstances. This scenario factors in all the elements of the energy cultures in finding solutions to fuel poverty as experts note that to fully address this condition and lift people out of fuel poverty a comprehensive outlook is needed. The following themes were identified:

**a) Integrated policy plan**

In the high cost scenario, experts (9/18) stressed that an inter-governmental advisory group on fuel poverty is essential for ensuring effective coordination of policies and programmes across all government sectors.

> at a policy level we need to create a high level policy commitment through government that crosses the current fragmentation between government departments...for example EECA partnering with Housing New Zealand, MBIE and Health Boards...so everybody is on board with the fact that fuel poverty is a serious issue and that they need to actually address it in a multifaceted way with some really strong targets     

Dr. Janet Stephenson

The advisory group would be working with a multi-agency model with the health, social and community sector to identify and target households. This group will focus on specific interventions that can potentially reduce fuel poverty in New Zealand. Fuel poverty policies could be aligned with, and integrated into policies on housing, health, social welfare, energy and climate change. These policies will ensure that the voices of fuel poor households are acknowledged within the energy strategy, recognizing that their needs
are diverse. Policies on mitigating climate change and improving energy efficiency could be tied in with providing clean and affordable energy for all households.

b) A ‘whole house’ approach

Respondents (11/18) believed that future policy measures to tackling fuel poverty in New Zealand need a ‘whole house’ approach to the way housing is conceptualised. Experts suggested learning from best practices from other countries, such as Better Energy Homes Schemes from Ireland and Norway’s ‘Million homes’ program which have taken a similar approach to sustainable housing. This view takes a comprehensive check of all the material culture requirements of households that impact on their thermal comfort and energy services.

*if you really want to make a difference in fuel poverty you need to tackle the housing in this country... you have to include wall insulation, double glazing, efficient heaters... if you look at Scandinavian countries where they have gone all out to try and improve their housing stock there is a ‘whole’ house approach... for New Zealand this is the only way forward* Dr. Janet Stephenson

Better Homes Energy Scheme, funded by the state run Sustainable Energy Authority Ireland, provides grant aids for low income home owners towards energy efficient retrofits for their homes. This includes grants for retrofitting roof insulation, wall insulation, boiler with heating control upgrades and solar collector installations. A cost-benefit analysis showed that greater benefits were achieved when wall insulation, and boiler and heating upgrades were included (Collins and Curtis 2016). Experts suggested that New Zealand government could consider a broader grant scheme such as this one, which covers additional energy efficient upgrades, not just insulation.

In Norway, a campaign was launched taking a whole house approach, to improve the energy efficiency of the social housing stock. Norway’s ambitious housing policy is based on the principle that everyone should have affordable and good quality housing in a good environment. Partnering with housing co-operatives, the government provides financial mechanisms such as low cost building sites, subsidised loans and grants. The houses are then sold on the principles of ‘selling at cost’ with no profits taken, ensuring the public
can afford energy efficient homes (Kurz, 2004; Tranøy, 2009).

It was noted by experts (11/18) that New Zealand needs a similar whole house approach to housing, which will include subsidies for wall insulation, window glazing and efficient heating. As an initial first phase, subsidies could be provided to improve the social housing sector, then rolling onto general low income households. Funding for this could be allocated from the health and housing budget. It is estimated that about 270,000 rental properties are still inadequately insulated (EECA, 2016). Even on a conservative sum of $4000 towards additional retrofits including wall insulation, window glazing and efficient heating, a budget of over $1 billion will be required ($270,000 \times 4,000 = 1,080,000,000$). A more feasible option could be to partner with businesses and energy suppliers for funding towards the costs, with the government providing 50% of the subsidies. The United Kingdom (UK) has trialled a similar partnership with energy companies, with a goal of providing additional retrofits for low income families.

c) Energy supplier obligation

Nine respondents recommended that New Zealand could consider placing obligations on large energy suppliers to reduce emissions and to help fuel poor households, similar to the scheme in the UK.

*I think a public policy around carbon tax and energy supplier obligation like what they are doing in the UK would help provide a fairer way of distributing income*  
Scott Willis

The Energy Company Obligation (ECO) from the UK specifically targets fuel poor households by providing added support for energy efficiency measures (Rosenow and Eyre, 2013). The larger energy suppliers have three main legal obligations under ECO: Carbon Emission Reduction Obligation (CERO), Carbon Saving Community Obligation (CSCO), and the Home Heating Cost Reduction Obligation (HHCRO). Energy suppliers are required to work with households to identify and treat hard to heat homes, ensuring rural consumers are included in energy assistance programs, and improving the ability of low income households to affordably heat their homes, such as replacing or repairing boilers (Ofgem, 2015). While the ECO has run into some challenges in the UK with some companies imposing levies on energy bills that have disproportionate impact on low-income
households (Mallaburn and Eyre, 2014). A better model could be the government working in partnership with the suppliers to ensure government supported subsidies are in place to prevent additional levies being passed onto vulnerable consumers.

d) Reducing electricity prices for all residential consumers

In the high cost scenario experts advocate for a decrease in electricity prices for residential consumers. In the past, efforts to alleviate fuel poverty have concentrated on low income groups, while a broad range of households, including those on two incomes, are affected by fuel poverty (Boardman, 2012b; Lawson et al., 2016). While markets must operate in a way that does not disadvantage vulnerable consumers, they must also ensure that all consumer have access to affordable energy. The biggest impact of rising fuel prices has been seen in residential energy costs which have increased significantly compared to industrial and commercial rates. Even with houses being retrofitted with minimum insulation, and subsidies in place to provide winter fuel assistance, the high energy costs makes it harder for many households to afford adequate energy services (Jamash and Meier., 2010).

\[\text{we need a major re-haul of the electricity market... we are proposing progressive pricing in electricity... this policy would certainly work to improve low income families access to electricity now and work to improve affordability of electricity in future... we can have a uniform pricing to start with but as consumption gets progressively higher prices need to change}  \]

Meteria Turei

Experts (8/18) proposed that a uniform electricity tariff, subsidised by the government and through network charges, could be introduced to all residential consumers. Average electricity expenditure per household per annum in 2016 was $2,043, at 7265 kWh consumption per household per year at a unit cost of 29.25c per kWh (MBIE, 2016). Reducing the cost of electricity across all residential consumers by 10% will cost about $365 million per year, which amounts to $200 per household per year (10% of 2043 is about 200. 200 \times 1,824,000 = 364,800,000 assumes 1.824 million households (2018)). However, the government needs to take into account ‘rebound effect’ from increased usage, as well as additional infrastructure changes to support the potential increase in consumption.
e) Increasing the income supplement for households

As a last recommendation, experts (7/18) put forward that subsidies for electricity could be supplemented by the introduction of a universal income benefit.

\textit{the government has been very slow to increase the minimum wage... many people don't have adequate income to meet the daily costs they face... the government should take a lead on this and introduce a living wage and a universal income benefit... there's a strong argument for raising income supplements so people can afford a better quality of living}  
Dr. David Clark

New Zealand’s primary income assistance package, Working for Families, is targeted at those in employment. The government needs to review its policies on income assistance, increase the family tax credit and consider a universal basic payment not contingent on work. This would be funded by introducing a capital gains tax, as well as through corporate and land taxes. Finland and Holland are testing out a universal basic income under a social experiment \cite{Murphy2016}, and New Zealand should pay close attention to the results of this experiment to see if it is feasible there.

Moving towards the high-cost scenario could bring significant changes to housing, income and electricity market structure. Adopting the policy measures from this scenario could reap long-term benefit to the health and quality of life of households, as well as contribute to reducing emissions by cutting unhealthy sources of heating. In this scenario 270,000 rental properties could be adequately heated and insulated at cost of $500 million (this is high cost plan, assuming 50% funding by the government). Furthermore, the average cost of electricity could potentially decrease by $200 per household per year at a cost of $365 million (this scenario is for the high cost plan). Measures from this scenario are moving beyond just addressing the three core factors identified in the energy cultures framework, to making the connections of fuel poverty with the broader systems that impacts on this condition.
8.6 Policy Implications and theoretical developments

Fuel poverty is a complex issue, and the implementation and delivery of policies in New Zealand to date have been challenging. Despite a nationwide initiative to tackle this problem, fuel poverty still remains a reality for one in four households across New Zealand where many households live in cold, damp houses and are unable to afford adequate warmth.

This policy analysis used the energy cultures framework (and its extension the practice based energy cultures framework) as theoretical tools to look at barriers to fuel poverty and future measures for alleviating fuel poverty. The energy cultures framework provided a holistic look at fuel poverty which has not been previously factored in fuel poverty policy measures in New Zealand before. By carefully examining the various barriers and potential areas for change in material cultures, consumption patterns and norms of households, stronger policies can be formulated which tackle the long-term effects and root causes of fuel poverty. The barriers highlighted by experts such as the economic priority stance taken by the government and lack of wider stakeholder involvement are vital obstacles to cross to fully understand and address fuel poverty. The different scenarios proposed by the experts interviewed are also framed around the categories of energy cultures. For example, the modified warrant of fitness and addressing the whole house approach is taken from a material cultures viewpoint. In contrast, running a nation wide awareness program is aimed at tackling the deeply held cultural values of putting up with the cold in New Zealand. By using the framework to think of barriers, and anchoring it to device interventions for tackling fuel poverty show various potentials for interventions that has not been addressed before. Using the energy cultures reveal the heterogeneity in household types and region specific needs and variations which must be factored in for comprehensive policy measures. An important distinction provided by using the ECF to look at fuel poverty policies is the segmentation in households, categorised by household needs, how they prioritise energy and different family circumstances which determine their energy consumption patterns. It is vital from a policy perspective to move away from ‘one size fits all’ policies to really focus on how policies can be better targeted to the needs of the households.
The findings in this chapter demonstrate the value added by looking at policies through a holistic viewpoint of the energy cultures framework. Previous policies which are based only on technical or expenditure based elements fail to achieve sustainable solutions to fuel poverty. Through the energy cultures lens of looking at the strongly held energy beliefs applied in a policy context, and how factoring in the households contexts and needs enrich the policy insights into fuel poverty. The current fuel poverty policies in New Zealand are reactive and only addresses certain aspects of the problem. There was a need to move beyond these narrow policy measures factored on material or economic impacts, to incorporate the wider social elements of fuel poverty, and understanding how it is embedded in the external systems, in designing measures to eradicate this condition. For example, the government’s flagship insulation program only addresses the material cultures of energy use, at the expense of behavioural responses or cultural norms placed by households on energy preferences. By framing energy behaviour through the ECF lens the findings of this study bring in a holistic outlook to fuel poverty policy. Understanding the different choices and trade-offs households make in their energy consumption decisions will yield better informed policies. This is the first time fuel poverty policy has been looked at through a comprehensive range of indicators that moves beyond just economic and material cultures. The findings of this study identifies the barriers to fuel poverty alleviation and highlights potential areas to target in policy measures. This research stresses the importance of including the wider social, behavioural and cultural factors, such as the deeply held norms of households and their cultural preferences for certain energy decisions. The findings also highlight the need to consider the different household circumstances, life stages and household needs in interventions to alleviate fuel poverty.

The theoretical contributions of this paper is that it expands the ECF theory by applying it in a policy context for the first time, and bringing together multiple elements of energy consumption to base policy on. By using the ECF as an alternative conceptual model for thinking about fuel poverty policy has many benefits such as linking how the material culture of households are linked to household’s energy preferences and daily energy habits. The framework brings forward the human side of fuel poverty to policy interventions, urging policy makers to include the voices of the fuel poor and implement policy based on household circumstances, not only on
energy costs and income levels.

This is one of the first qualitative studies to be carried out with experts in fuel poverty research and policy in New Zealand. This study identified future policy pathways to tackle fuel poverty in New Zealand by presenting three different scenarios, which requires varying levels of commitment from the government. We highlighted the challenges to efforts to address fuel poverty and outlined recommendations for future policy development, calling for a comprehensive and multi-agency approach for decreasing fuel poverty. A policy section was vital for this thesis as it complements the experiences from households to bring in views from experts in this field. A policy perspective also sets directions for future and provides different pathways that can be considered in measures to tackle fuel poverty.

If the government continues with the business-as-usual scenario it will only benefit a small number of households, and would only tackle one part of the problem. Adopting recommendations from the medium cost scenario could be a move towards improving heating and insulation standards, but fall short on finding long-term solutions. The high cost policy scenario calls for a significant shift in policy and investment from the government, and while it would tackle the root causes of fuel poverty, it is a costly option requiring major discussions and decisions at multi-party levels. Future studies could carry out an in-depth feasibility study of some of the recommendations suggested in this paper, and explore the complexities of actually implementing these.

In addition to outlining the three scenarios, a number of steps were proposed by the experts: it is fundamental that a long-term vision for reducing fuel poverty is developed and supported by multiple parties; it is imperative to engage the households, especially those affected by fuel poverty, in the policy process; fuel poverty must be recognized as a significant social, economic and environmental contributor to a low quality of life, and must be integrated within broader policy frameworks in housing, health, energy and climate change. New Zealand needs to tackle the root causes of fuel poverty by taking a ‘whole house’ approach in future policy measures, finding ways of reducing residential energy prices for all consumers and increasing income benefits across all households.

The findings demonstrate the need to move beyond the current focus on insulation in New Zealand, towards a more integrated holistic viewpoint
that addresses the causes of fuel poverty in finding long-term solutions to it. Fuel poverty should be recognised as a specific policy issue, with improved targeting of policy and programmes to reach not only those most in need, but to provide energy security for all households. Fuel poverty remains a significant policy shortfall in New Zealand. Fuel poverty has many causes and impacts, and it requires innovative policies and practical solutions that brings the government, businesses and the community sector working together to find long-term solutions to achieve warm, dry and well-insulated housing for all New Zealanders.

8.7 Summary of findings

This chapter was a critical analysis of current responses to fuel poverty in New Zealand. By evaluating the short-comings of existing measures, and through interviews with key stakeholders, this chapter provided further support for strengthening policy to reduce fuel poverty. This chapter provided the following contributions:

- a critical analysis of current policy responses to fuel poverty in New Zealand
- proposed three scenarios as future mitigation measures for fuel poverty

The findings supports the conclusion that strong political commitment, a drive to address the barriers to fuel poverty policy and stronger consumer protection of fuel poor households are needed in future policy measures.

The next chapter synthesises the previous chapters of this thesis, with a detailed discussion on the implications of this study for policy and research.
Fuel poverty occurs when people have difficulty accessing or affording the energy services to participate in society (Day et al., 2016; Bouzarovski and Petrova, 2015; Sovacool et al., 2017). One in four households in New Zealand were estimated to be fuel poor, or unable to afford adequate warmth at home in 2012 (Howden-Chapman et al., 2012). Fuel poverty has wide ranging impacts on the health and quality of life of households (Hills, 2012; Clinch and Healy, 2001; Harrington et al., 2005; McKague et al., 2016), yet it has not received adequate attention from the government.

There are several factors unique to New Zealand that exacerbates fuel poverty rates. Minimum insulation standards for housing in New Zealand were not introduced until 1978 (EECA, 2007; Shen, 2004), as a result, this poorly insulated housing stock in many parts of the country poses difficulties with heating and retaining heat. The increasing domestic energy prices are intensifying the problems of fuel poverty for many households (Eaqub and Eaqub, 2015; EECA, 2016), with the widening gap in income and wealth inequality making it even harder for some households to have access to affordable energy (Rashbrooke, 2013; Wilkinson and Pickett, 2009). For these households, energy bills take up a higher portion of their household income, their energy sources are inefficient and they live in cold, damp homes (Bar- ton, 2010; Geller, 2003).

The New Zealand government has been slow to respond to fuel poverty, and have taken simple solutions to fix this complex problem. The existing
responses to fuel poverty in New Zealand are reactive, concentrating on the physical aspects of the dwellings ([Isaacs et al., 2010] [McChesney 2012]). The few policy responses that exist are based on the health impacts of living in a cold, damp house ([Howden-Chapman et al., 2009]), yet fuel poverty has many dimensions that need to be factored in measures and interventions ([McKague et al. 2017, 2016, Cooper 2017, Sovacool et al. 2017]).

This thesis has outlined an investigation into fuel poverty in New Zealand, and the implications for policy going forward. There were six key objectives of this research:

• to better understand New Zealand households’ experiences of fuel poverty
• critically analyse how fuel poverty is understood and measured in New Zealand
• look at the broader variables that impact on fuel poverty
• formulate a comprehensive set of fuel poverty indicators for New Zealand
• critically evaluate the impact of current fuel poverty policy measures
• explore and recommend future policy scenarios for alleviating fuel poverty in New Zealand

The objectives of this thesis were achieved through three main studies: a conceptual research looking at how fuel poverty is framed, a detailed qualitative analysis to better understand the perspectives of fuel poor households as well as variations in fuel poverty amongst households, and a policy analysis reviewing current responses with recommendations for future interventions.

The multi-faceted nature of fuel poverty makes it particularly challenging to capture the various dimensions of energy consumption. Understanding the underlying causes of fuel poverty are important first steps in designing measures to eradicate it. One of the biggest challenge has been the limitations of current theories on fuel poverty which do not fully address the different variable that impact on energy behaviour ([Walker and Day 2012, Petrova et al. 2013, Lawson et al. 2016, Jensen et al. 2006, Barton et al. 2006]). The dominant literature on fuel poverty prioritises focus on the technical structure of dwellings and appliances, the economics of household expenses on energy, and the physiological aspects of cold housing on
health (Hills, 2012; Clinch and Healy, 2001; Harrington et al., 2005). However, these measures do not adequately depict the wide ranging variables implicated in the emergence of fuel poverty (Stern, 2014; Pachauri and Spreng, 2011; Sovacool et al., 2017). In particular, a fresh focus on fuel poverty needs a social and cultural lens that would provide insights into how energy behaviour is formed and changes over time (Cooper, 2017; Stephenson et al., 2015a; Sovacool, 2014c), as well as how families in different circumstances are affected by this condition.

A critical review of energy poverty research revealed two important limitations in existing literature. First, fuel poverty research does not have the backing of a solid theoretical foundation, and there is no empirical consensus on how best to identify fuel poor households (Fizaine and Kahouli, 2018). Second, fuel poor households are not homogeneous and one size fits all policies may not work for certain types of households (Simcock et al., 2017; Sovacool et al., 2017). Recent research have highlighted the difficulties of identifying a ‘typical household in fuel poverty’ as each household brings in multitude of factors which impacts on their energy use (Fizaine and Kahouli, 2018). Thus, using single indicators may miss out on capturing certain household as some households that are fuel poor on one indicator is not necessarily fuel poor according to another (Fizaine and Kahouli, 2018). These limitations could lead to the danger of some households being not represented in policy measures targeted at finding solutions to the problem. Leading researchers have called for fuel poverty to be framed within the broader social and cultural factors that influence people’s energy use and shape their habits (Hargreaves et al., 2010; Shove et al., 2008; Shove and Walker, 2010). Sovacool, who have done a lot of research in energy behaviour, particularly focusing on fuel poverty, also calls for bringing in more social sciences views and to accommodate data from a variety of sources including lay persons, which would provide greater feedback and incorporate diverse viewpoints. He stresses that for complex phenomena like energy, integrating models are particularly useful as it addresses issues that may not be solved by single-discipline solutions (Sovacool et al., 2015). To incorporate these multitude of factors it is essential to identify the key interactions and opportunities for change within this complex structure (Stephenson et al., 2015b).

This thesis added to the body of evidence of the fuel poverty literature
by highlighting the wider social impacts of fuel poverty. Although 25% of all households in New Zealand are estimated to be in fuel poverty, no research has been conducted so far that exclusively investigates the lived experiences of these households. The behavioural and social elements of energy consumption are under-studied in the fuel poverty literature (Wilhite et al., 1996; Patterson, 1996; Sovacool, 2014c; Stern, 2014; Sovacool et al., 2017; Cooper, 2017). By focusing on the perspectives of the households in fuel poverty this thesis captured the realities of living in energy hardship, and the impact on their day to day lives. The findings contribute to the literature by showing that the experiences of fuel poverty influenced broad aspects of participants’ lives and were closely related to their overall quality of life. The social disadvantages households face on a daily basis, and the sustained challenges that fuel poverty imposes on their capacity for participation and inclusion in society were highlighted by this research.

To better understand energy behaviour, an integrated model, the energy cultures framework (Stephenson et al., 2010a; Sweeney et al., 2013) was used as a conceptual framework to understand the drivers of fuel poverty. The framework brought together multiple elements to conceptualise how the technical, behavioural and social components interact to structure energy consumption and impact on fuel poverty. Using the framework allowed a rich set of data to be captured, especially focusing on the barriers and support systems that may help or hinder someone being in fuel poverty. The energy cultures framework filled the gap between theories focused on the individual and those centred around social and technological factors.

Using the energy cultures framework has provided deeper insights into fuel poverty in New Zealand which were not uncovered before. The framework brought in a cultural perspective of how energy behaviour is formed and habits are embedded over time. This was particularly important for New Zealand as there was a strong cultural component to fuel poverty which was not explored before or factored in interventions (McKague et al., 2017, 2016). Previous studies on fuel poverty have taken a technical (Lloyd, 2006), economical (Healy and Clinch, 2002) and epistemological (BRE (Building and Research Establishment), 2006; Clinch and Healy, 2000) stance understanding this condition. By taking a single perspective it misses opportunities to look holistically at fuel poverty and understand the wider dimensions impacting on fuel poor household. The energy cultures framework captured
the material culture of households, such as poor insulation and lack of efficient heating which could be the first measures that should be taken to address in alleviating fuel poverty. The framework also identified the deeply held norms and behaviour patterns which need to be understood in order to decrease fuel poverty. The cultural norm of putting up with the cold or lack of information perhaps feeding into energy inefficient practices such as not using thermal curtains are consumption patterns that can be altered to decrease fuel poverty. The framework also made it possible to see the connections between material culture, norms and practices which impact on each other to form a consistent pattern of energy consumption, and this habit is hard to break. The strength of applying the ECF to understand fuel poverty is that for the first time the framework brings together the core elements which impact on fuel poverty. By looking at how the material elements intertwine with norms and practices to influence energy decisions and behaviour sheds light into how fuel poverty may be formed or could be changed.

At the same time the ECF has some limitations which were also addressed in this thesis. The ECF is simplistic in its nature and tries to bring a 'one size fits all' model to address energy behaviour as uniform across all household. In addition, the model does not factor in important aspects which may influence energy behaviour such as distinct household needs, circumstances and situations that impact fuel poverty. This thesis has tried to address this gap by linking ECF with the Family Life Cycle (Murphy and Staples, 1979) to bring in how the different family contexts and stages would impact on the way households engaged with their energy services. Similarly, in previous chapters this thesis has utilised other research addressing the gaps in ECF, such as the practice based ECF (Sweeney et al., 2013) that tries to fulfil some of the limitations of ECF by linking the barriers, motivations and support systems which influence fuel poverty. By incorporating the Family life cycle and Sweeney’s model onto the ECF, this thesis has build a new model called the Life Cycle based energy cultures framework that would provide a better platform for exploring energy behaviour and understanding fuel poverty. This new model not only has the core elements of the ECF, but also brings together the household circumstances and needs, barriers, support systems and motivation for change in one space. Such detail are important in order to produce a holistic understanding and address
ways of reducing fuel poverty.

Through this research it has been shown how our findings expands the ECF framework applied in the fuel poverty context. This research enriches the ECF by clearly demonstrating how the material culture, norms and practices of energy behaviour are embedded in influencing fuel poverty. The ECF provides a simplistic way for looking at fuel poverty which has not been researched before. By concentrating on few elements that influence energy behaviour it is easy to see how behaviour patterns are formed and normalised over time. In addition, by dissecting fuel poverty into these three or four components outlined in the ECF it is also easy to see where and how interventions can be based. Using the energy cultures framework to look at energy consumption patterns and coping mechanisms of households in fuel poverty reveal in-depth insights into household behaviour and preferences. The findings from this research highlight the wider impacts of fuel poverty that has not been previously noted, bringing out the complexities and nuances of the relationship between fuel poor household members and their environment. The complex coping mechanisms of sacrificing time for sourcing free wood, self imposed social isolation from trying to hide their conditions from other family members, constant worry and stress over energy, coupled with how households members have conflicting energy decisions based on their situations were all novel attributes highlighted in this study.

The primary aim of this work has been to better understand how fuel poverty impacts on households. The lived experiences of fuel poor households gives insights into the coping mechanisms they adopt such as isolating themselves in just a small space during winter and heating only that space, not heating the bedrooms, sacrificing food to pay for heating bills, constantly worrying over power bills and having disagreements with household members over the thermal comfort levels of the home. Further analysis from households point to the significant differences in energy consumption patterns between the different household types. For example, elderly people have higher energy consumption needs as they stay at home for longer periods. These groups also adopt different coping mechanisms like staying in bed for extended periods of time to keep warm. In contrast, single households like students, spend a higher portion of their time outside the house, and therefore have different energy needs. This group resort to interesting coping mechanisms such as, frequently drinking hot drinks to stay warm to
prioritising playing with entertainment devices over having the heating on.

One of the biggest drawbacks of the ECF is that it is limited in capturing the diversity amongst fuel poor households, which this thesis had tried to address. For example, the ECF factors in the values and norms anchored on certain energy practices, but it is not detailed enough to probe deeply into the household situations that lead to such beliefs. A findings from this research was how different household circumstances, like having children or elderly people in the house, trigger certain patterns in energy usage, such as turning the heater on before the kids come home from school. A further limitation of the energy cultures framework is that it does not factor in household type or person variables which may influence energy-related needs within a given context. Personality values are linked to a person’s interests and choices which determine the activities he or she may engage in. Household life styles are influenced by these personal variables and socio-cultural factors. A more personalised outlook to energy consumption is needed to provide a holistic understanding of how people view and base their energy services choices contingent on their needs and circumstances.

The findings of this study draw out the need to understand how people make energy decisions and how these decisions are connected to the wider systems that influence the energy service around them. Even though the ECF recognises this, the details of such processes are lost within the simplistic model. By using the ECF it is evident that the person is an active user of this energy service, bringing in their own preferences, norms and biases to the overall energy consumption model. However, the complexities of energy decisions and the social effects of fuel poverty have not been fully addressed in any of the variables provided by the model. The findings from this research will expand the way ECF is used to not only look at the variables identified by the framework, but to put it in context of the household situation and circumstances that surround energy consumption behaviour. At the same time, the research outcomes stress the need to link these individual behaviour and beliefs to the wider systems around the household that influences fuel poverty levels. Specifically the findings call for factoring in how the family circumstances and situations impact on this overall model. In addition, by incorporating research from other researchers that address the limitations identified in ECF, the expanded framework introduced here is able to overcome some of these gaps by integrating household needs, cir-
cumstances and looking more closely at how these influence the elements identified by the ECF.

Taking into account these limitations of the ECF, this research looked beyond the variables identified by the framework, to see how different households react to fuel poverty. In order to understand how household circumstances and family stages influence fuel poverty, the family life cycle (FLC) has been used to look at the differences in motivation, social behaviour and coping mechanisms to fuel poverty of the different family types. Higher demand for energy is required during the early stages of the cycle as the family grows, and again during the later stages of old age when occupants require more energy to stay warm. This change is also linked to the material conditions of the dwelling, in that during the early stages most families may live in rental properties which are not as energy efficient compared to owner occupied ones. As people move through the different stages of the family life cycle their energy consumption preferences, needs and material culture changes, impacting on how they utilise energy. The social values placed around energy services, such as preference for fire places over other heat sources, were also factored in. For example, how older occupants prefer firewood over heat pumps, and how they value the social routines around the fires were evident from the narratives. This also emphasises the importance of cultural preferences in energy practices which have not been factored in the broader debates on fuel poverty.

The Family life cycle was used to enrich the ECF, still one of the limitations of the family life cycle model is that it fails to recognise the changing family dynamics of contemporary society and the impact of such changes on the type and composition of families (Gilly and Enis [1982]). Some researchers have called on FLC to be expanded to give a better representation of the diversity of family and lifestyle arrangements that you find in contemporary society (Shaninger and Danko [1993]). For example, the increasing number of single-person households, co-habitation by non-legally married adults, delayed parenting and rising divorce rates are not factored in this model. Using the simplistic FLC model therefore fails to capture such variations in family dynamics. As Wells and Gubar (1966) (Wells and Gubar [1966]) and Fischer (1955) (Fischer [1955]) note, defining the different stages of the family life cycle is difficult and the deviations from the traditional patterns are hard to capture. However, much of energy consumption be-
haviour is household-oriented, making it a necessary part to define family life stages so that all households in society are included.

Embedding the FLC within ECF provides a rich continuum as the family progresses through the different stages of the family life cycle, how their energy consumption patterns change and evolve as they move in and out of the various stages. The findings point to the need to include social and cultural preferences of households in interventions for fuel poverty. This is important as one of the drawbacks of the ECF is that it is limited in factoring in the household contexts and circumstances that impacts on fuel poverty. This research shows that the energy service of a household is not only dependent on how members engage with the material cultures, or what their motivations for using certain appliances are, but also on complex decisions based around the needs of the household at any given stage of the family life cycle. As members move through the stages of the family cycle, different energy behaviours and preferences will manifest from the same core values they hold, but as their family circumstances change, different aspects of these values become more relevant in a given context.

Using the family life cycle along with the ECF further highlights the detailed energy consumption patterns and decisions as the family grows. Putting the FLC in the context of fuel poverty is important for including these variations in the family unit. Previous research on fuel poverty has assumed that all families and households respond in similar ways to this condition ([Liddell et al. 2011] [Moore 2011] [Hills 2012]). This assumption limits inclusion of families that do not adhere to the energy norms set by society, that by spending more than 10% of income a household is in fuel poverty. Energy services have to be looked at more broadly and holistically by observing how the household members make decisions about and interact with their energy services. At the same time, their energy services need to be linked with the wider family circumstances and situations which impact on their energy needs. For example, household needs across FLC stages vary as a families progresses through the different stages over their lifespan. Households with children may have increased spending on energy as they spend more time at home, where as single younger people may give preference to technological purchases, and empty nesters may have more spending on health related products over energy expenditure ([Russel 1999]). Using the FLC along with ECF allows an opportunity to look at fuel poverty more
closely, and better understand the energy decisions people make which are linked to their circumstances, in order to devise well-matched interventions to overcome fuel poverty.

Leading on from the findings of this work, a new conceptual framework was introduced. The new conceptual framework, called the Lifecycle based energy cultures framework, brings together elements of the Energy Cultures Framework, the Practice-based Energy Cultures framework as well as the Family Life Cycle to form a comprehensive outlook into fuel poverty. This expanded framework brings all the elements of fuel poverty together to link them in a holistic way for fuel poverty to be really understood. The values people bring at any given point in life towards their energy services, the way they choose to interact and base their practices on, and how they make their decisions around the material culture should be seen through the family circumstances and contexts which impacts on these decisions. Equally as important as income and the technical elements are the time and resources available to a household which hinders or supports their energy practices. The wider social elements of fuel poverty are also vital to be considered in a comprehensive model of trying to understand why households are in this condition. The strengths, limitations, and theoretical contributions of the different models are summarised in Table 9.1.
<table>
<thead>
<tr>
<th>Theoretical Frameworks</th>
<th>ECF</th>
<th>FLC</th>
<th>Life-cycle based ECF</th>
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<tr>
<td><strong>Summary of findings</strong></td>
<td>Incorporates social and behavioural impacts of energy usage along with technical and economic influences. Help understand drivers of energy decisions at a household level. Identifies the norms, practices and built environment, as well as how these interplay with external influences to shape energy behaviour.</td>
<td>Captures the variations in fuel poverty across households, their energy consumption needs, behaviour and daily patterns. Expands the living experiences of fuel poverty by looking at it through the different family life stages. Looks at the differences in motivation, social and behavioural patterns and coping mechanisms through family life stages to see distinctions across households.</td>
<td>A comprehensive and holistic framework that brings together elements of ECF, PBECF, FLC to understand the many layers and intricacies of fuel poverty. Under this one model, it brings together the time, income and resources spent on energy preferences, decisions and consumption habits. Factors in the family needs which impacts on these resources and needs, in addition to bringing together the support mechanisms and barriers that influence preferences.</td>
</tr>
<tr>
<td><strong>Strengths</strong></td>
<td>Simple model readily understood across disciplines. Brings in interactions of energy systems, emphasising social and behavioural factors</td>
<td>Addresses the limitations of ECF by capturing the wide variations across household circumstances and stages which may influence energy decisions. Easy to monitor the particular group needs and how households in same life stages such as elderly or young parents make energy consumption choices.</td>
<td>Brings all the elements of fuel poverty together to link them in a holistic way for fuel poverty to be really understood. Helps in drilling down into the details of how fuel poverty impacts on different households through values, how people choose to interact and form decisions about material culture, income, technical elements, time, resources, wider social elements, all framed by the family context and needs. Identifies vulnerabilities, distinct physical conditions and rich detail which aid in tailoring programs and interventions.</td>
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<tr>
<td>Theoretical Frameworks</td>
<td>ECF</td>
<td>FLC</td>
<td>Life-cycle based ECF</td>
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<tr>
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<tr>
<td>Limitations</td>
<td>Simplistic model where key elements are missing such as health, vulnerability, physical needs. Energy cultures of households and individuals in these dwellings will differ, which are not factored in. Important aspects of energy behaviour such as motivation, support systems and barriers are not addressed.</td>
<td>The model is not useful in itself and while it provides a categorical distinction between households, it does not add much value beyond that. Energy decision making power of households maybe influenced by background conditions such as culture or individual needs. It also fails to recognise the changing dynamics of contemporary society and impacts of such changes on the type and composition of families, and on their energy needs.</td>
<td>The many variables identified in the new model could be hard to encapsulate from research into practice, and such levels of detail may be difficult to translate to policy.</td>
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</table>
Theoretical Frameworks

ECF

Previous research on fuel poverty looks at this condition in isolation from the context within which it occurs, and were removed from the person engaging in the energy behaviour. ECF brings in the wider variables and nuances around energy decisions, focusing on how different elements of the framework link together and influence fuel poverty. Applying ECF highlights the wider impacts of fuel poverty bringing elements of energy behaviour, decisions and environmental influences. Factors previously not associated with fuel poverty such as constant worry and stress, time spent on sourcing firewood and distinct coping mechanisms of households are contributions that enrich the understanding of this phenomena.

FLC

Expands the ECF by providing a rich continuum of energy decisions as family progresses through the different family life cycles, and how their energy consumption patterns change and evolve as they move in and out of the various stages. Addresses some of the limitations of ECF by factoring in categories of households needs at different stages. More details into how different energy behaviour and preferences manifest from the same core values but as family circumstances change different aspects of these values are salient. The focus on these details including the social, cultural and context specific needs in understanding fuel poverty adds to the theoretical understanding of knowledge.

Life-cycle based ECF

Bringing different theoretical models to create a comprehensive one that is built on the strengths of each, at the same time trying to eliminate the gaps the individual models bring. This is the first time such level of detail has been cast on fuel poverty to critically analyse the behaviour patterns and choices of households. This new framework that links ECF with FLC provides nuanced understanding into fuel poverty looking at the different values, tensions, coping mechanisms and social aspects of energy in households. This is also the first time household circumstances and family contexts has been used to design more streamlined interventions to the different household needs to lift people out of fuel poverty.

Table 9.1: Strengths, limitations and contributions of the different models
Throughout this research it was found that the challenges of fuel poverty and the solutions to it have not received sufficient policy attention in New Zealand. In New Zealand, the government did not consider fuel poverty a policy priority, and there has been no formal political commitment to mitigating it beyond the insulation scheme which is being reviewed and may or may not continue beyond the current funding round (Cooper, 2017; EPEE, 2009; McChesney, 2012). Current policy responses have taken a reactive approach rather than addressing the causes or finding long-term solutions to the problem. This thesis explored the barriers and opportunities for mitigating fuel poverty in New Zealand by drawing on viewpoints of key stakeholders in this field. Next, three policy scenarios were proposed reflecting different levels of commitment from the government.

The policy scenarios highlighted by this thesis point to the need for a long-term vision for reducing fuel poverty, one which is supported by multiple parties. Backed by findings from the qualitative study and feedback from stakeholders it was found that it is imperative to engage the households, especially those affected by fuel poverty in the policy process. Fuel poverty must be recognised as a significant social, economic and environmental contributor to a low quality of life, and must be integrated within broader policy frameworks in housing, health, energy and climate change. New Zealand needs to tackle the root causes of fuel poverty by taking a ‘whole house’ approach in future policy measures, finding ways of reducing residential energy prices for all consumers and increasing income benefits across all households.

The policy perspective adds to the households views by bringing in the viewpoints of experts working in this field. The fuel poverty stakeholders interviewed for this study noted the material barriers as well as the cultural and normative barriers that need to be addressed in fuel poverty. They also stress on not focusing on one or two dimensions of fuel poverty as has been the case so far, but to adopt a ‘whole house’ approach that comprehensively factors in multiple factors of fuel poverty for long-term solutions. The findings of this thesis helped provide better insights to why people are in fuel poverty, and helped identify the wider issues that impact on this phenomenon. For effective policy integration it is important to understand the dynamics of the socio-technical barriers to moving people out of energy poverty (Bell et al., 2010). This thesis emphasised that to effectively tackle
fuel poverty, the norms, practices and material culture of the surrounding must be factored in. In addition, it helped identify different categories of energy poor households that require distinct interventions (Lawson and Williams, 2012a; Lawson et al., 2016). Policy makers should consider the variability in energy consumption amongst these distinct segments, and use indicators based on energy needs, conditions of the house or coping mechanisms to target households. The energy cultures of inhabitant’s shape and influence their energy choices, and the barriers and support systems available to them impact on how they move in and out of energy poverty. Understanding this would provide opportunities to explore the broader systems in place which would aid in designing targeted policies and programmes.

Therefore, an integrated approach to fuel poverty which brings together motivation, social triggers, cultural preferences and family circumstances at different stages will enrich fuel poverty interventions which are designed for different household contexts. The link between the ECF and the family life cycle has significant policy implications to really understand how fuel poverty impacts on different households. Interventions need to target people whose position in the family life cycle makes them most vulnerable to fuel poverty. As household members go through the different stages of the family life cycle their energy needs changes, encountering different barriers and requiring a different set of support systems to get through fuel poverty. By having a deeper understanding of the energy decisions people make, the motivations and support systems behind these, as well as the different circumstances that lead to certain choices are imperative for reducing fuel poverty.

9.1 Contributions to theoretical development

This particular research has contributed to the theoretical development of fuel poverty by advancing our understanding of this phenomena. Using the energy cultures as a theoretical framework to ground this research has provided a holistic understanding of energy poverty by bringing together the norms, practices and material culture of households. The novel contributions of this research highlighted the intriguing patterns of energy consumption and relationship with energy households have amongst themselves and with their environment. Although the study was based in Dunedin as a case
study, it has provided a rich description of the lived experiences of fuel poverty in New Zealand which has unique features that makes it challenging for households. The high residential electricity prices, the older housing stock and the deeply held cultural norms of putting up with the cold stresses the importance of devising region specific interventions.

The findings also explored the wider impacts of fuel poverty which has not been previously researched. Despite early qualitative studies having looked at coping strategies such as the ‘heat or eat’ behaviour (Harrington et al., 2005), the findings of this thesis offered a nuanced look at the barriers households face, such as social isolation of fuel poverty, and the support systems that could be tapped into, like the food banks. The findings further point out the complexities of the relationship between energy users and their environment. Households having to constantly worry over power bills, having conflicting expectations of thermal comfort amongst household members, and being stuck in a feedback loop - continuously consuming their time, resources and social capital around energy and keeping warm.

The results of the study reveal the diversity amongst fuel poor households, while highlighting the material conditions, norms and behaviour patterns that should be identified to alleviate fuel poverty. The findings point out that fuel poverty involves complex behaviours linked to households members which are not necessarily categorised into fragments as initially defined by the energy cultures framework. Such outcomes extend the understanding of the energy cultures framework by inviting a more in-depth look at fuel poverty, that not only looks at the triad of factors proposed by the framework but brings in the variance within the framework, such as the wide ranging needs of households and thermal preferences of members.

The findings show how the different theoretical frameworks are supported. For example, elements of practice theory and social constructivism are evident in the data. The way households carry out particular routines of behaviour, such as heating the house before their children came home from school or collected firewood to enjoy the social aspects of the fire, are examples of such practices that are reinforced by society. In the fuel poverty space, people make particular energy decisions or engage in distinct energy behaviours in order to identify with society, confirm to dominant norms and reproduce social practices (Sweeney et al., 2013; Shove, 2003). Similarly, the findings showcase elements of social constructivism by portraying how
households rely on social cues or instructions from their peers and social circles to form and strengthen their consumption patterns (Piaget, 1951; Jaramillo, 1996; Eggen and Kauchak, 1999). For example, in the case of students they are mostly replicating the behaviour of their peers by choosing not to heat the home, instead seeking that social interaction and thermal comfort outside.

This thesis tried to bridge the existing gap in fuel poverty research by using the family life cycle to link how the different stages of the cycle could impact on the variables identified by the energy cultures framework which influence how people use energy. It was evident from the findings that depending on circumstances and family needs at each stage of the cycle, the energy consumption needs, preferences and values of households changes. A new theoretical framework was proposed that embeds all the elements of the energy cultures framework with the family life cycle, the LifeCycle Based Energy Cultures Framework. This new framework could provide more detailed information on how family circumstances are linked to the overall energy consumption decisions, which are again entwined with the wider variables of income and material culture. By bringing all these factors together in one framework and seeing how the different elements interact and influence each other would help in uncovering some of the energy decisions households in fuel poverty make.

Overall, while previous qualitative studies on fuel poverty have noted issues with income and energy efficiency of dwellings, as well as coping behaviours of ‘eating or heating’, the findings of this research reveal intriguing patterns in energy consumption and deprivation. The findings highlight the wider impacts of fuel poverty that have not been previously noted. The findings advance the energy cultures theoretical framework used in this study by pointing out the complexities and nuances of the relationship between fuel poor household members and their environment. The complex coping mechanisms of sacrificing time for sourcing free wood, self imposed social isolation from trying to hide their conditions from other family members, constant worry and stress over energy, coupled with how households members have conflicting energy decisions were all novel attributes highlighted in this study that broadens the understanding of fuel poverty.

The study advances the energy cultures theoretical framework used in this study by also applying it to fuel poverty and policy which reveal im-
important findings for designing interventions. The barriers highlighted by experts such as the economic priority stance taken by the government and lack of wider stakeholder involvement are vital obstacles to cross to fully understand and address fuel poverty. The different scenarios proposed by the experts interviewed are also framed around the categories of energy cultures. For example, the modified warrant of fitness and adopting the whole house approach is taken from a material cultures viewpoint. In contrast, running a nation wide awareness program is aimed at tackling the deeply held cultural values of putting up with the cold in New Zealand. By using the framework to think of barriers, and anchoring it to device interventions for tackling fuel poverty show various potentials for interventions that has not been addressed before. Using the energy cultures reveal the heterogeneity in household types and region specific needs and variations which must be factored in for comprehensive policy measures.

The theoretical contribution of this paper is bringing the family life cycle as a lens for looking at energy poverty. This is the first time such a perspective has been adopted to critically analyse the behaviour patterns and choices of fuel poor households. The new Lifecycle based framework which links the family life cycle with the energy cultures framework, provide further nuanced details into the differences in values, tensions, coping mechanisms and social aspects of energy in households. In addition, this viewpoint factors in the different family contexts and circumstances, and ultimately helps design better targeted interventions to the different household needs to lift people out of fuel poverty.

9.2 Limitations and future directions

The most significant limitation of this study was that it was concentrated on Dunedin City as a case study. By focusing on one city, this misses out on capturing the variability and region specific issues that might not have been picked up by this research. The experiences of people from different parts of the country may highlight region specific concerns of fuel poverty which were not captured by this study. Furthermore, the small number of participants used in this study did not allow for any sub-group comparative analysis. As Dunedin was used as a case study, it will be difficult to apply the results of the study to the wider population and it cannot be assumed that the findings
will be the same for every other member of the population if the study were replicated elsewhere. For example, if the same study was carried out asking people about their experiences with fuel poverty, the responses will vary depending on the climate of the place the respondents are in; the culture, norms and attitudes people have towards thermal comfort and putting up with cold; their upbringing and past experiences with cold housing; level of income or gender and many other factors will influence their answers. However, the researcher felt that Dunedin City was an ideal case study to look at fuel poverty – Dunedin not only had the highest rate of fuel poverty measured (Lloyd 2006), it also has a high number of older housing stock, cooler climate, and higher percentage of heating days (NIWA 2015). The researcher had established strong connections with the community and fuel poverty researchers in the city, which facilitated access to participants and data collection. However, future studies could look at a more representative sample across the nation, taking into consideration culture, geography and social context to carry out comparative studies across different cities or sub-groups of households to look at variants in energy use. Therefore, despite the advantages of having a rich source of data, the disadvantage is that by choosing to concentrate this research in one area it will be hard to generalise the findings to other places (Patton 2002; Braun and Clarke 2006).

Another limitation of this research was that the information collected could be susceptible to biases, such as social desirability (King and Bruner 2000), especially during interviews conducted with households and stakeholders. A further limitation could be the hesitation of participants to share their experiences (Boardman 2010). This has been a key obstacle to properly identifying the fuel poor (Heffner and Campbell 2011). People often say they are warm enough, even when they are cold, suggesting that the fear of social stigma may be preventing them admitting their situation (Boardman 2010). Methods that rely on self-identification through telephone or mail surveys may face the risk of not obtaining accurate answers (Heffner and Campbell 2011). Detailed, face-to-face assessments, carried out in a place where the participant feels comfortable, using open-ended questions, is still a much more reliable way to determine the condition of fuel-poverty (Heffner and Campbell 2011).

Having only one primary investigator available for all data gathering, analysis and interpretation also creates opportunities for interpreter bias...
The interviewer took measures to reduce subjectivity and give room for participants to answer questions in their own words. The interviewer rephrased the comments to clarify concepts and to make sure she understood the participants’ perspectives. Resource constraints do not allow for multiple data coders. Many steps have been taken, including member checking, to improve inter-subject validity. The ontology of the researcher and the methods of investigation were specifically chosen to address interviewer subjectivity.

In qualitative research it is difficult to be totally removed from the participants you interact with, and there is always the chance that this may impact on the methodology of the study. For this reason careful attention was paid to reflexivity or self-awareness of the relationship between the researcher and the participants (Braun and Clarke, 2006). This involved a continuous process of self-analysis in which the researcher reflected on the experiences, and was mindful of her own interests and experiences of the phenomena when interviewing the participants. Continuous consultation and reflections were carried out with supervisors and colleagues throughout the data collection and analysis process. It is recommended that future studies use a mixed method data collection, using objective measures, such as housing and energy data, to strengthen the qualitative data.

9.3 Conclusion

Fuel poverty is a significant social, economic, environmental and public health problem in New Zealand. The existing literature and policy responses to fuel poverty in New Zealand has taken a limited approach to understanding this phenomenon. Housing and electricity prices are strong drivers of fuel poverty in New Zealand, yet there is a need to better understand the wider social and context-specific variables that impact on energy consumption.

This research was an investigation into fuel poverty in New Zealand, with the aim of better understanding the wider impacts and the policy implications of it. The following three contributions to literature were made in this thesis:

- a holistic understanding of how fuel poverty is framed in New Zealand, and using an integrative framework for understanding the drivers of energy poverty
• a detailed qualitative analysis capturing the lived experiences of New Zealand households in fuel poverty, the choices and trade-offs they make for thermal comfort, leading to proposing a new set of indicators for measuring fuel poverty

• a critical policy analysis of existing responses to fuel poverty in New Zealand, and proposing three policy scenarios as future measures to tackle fuel poverty

To summarise, the key evidence-based recommendations made in this thesis call for:

• a strong policy commitment from the government to views energy as a ‘basic right to energy service’

• better identification and targeting of fuel poor households by using a broader measure and wider set of variables that factors in deprivation and quality of life indicators

• a formal review of current fuel poverty polices, and an advisory board to advise and guide the government’s fuel poverty policy development

• a nation-wide in-depth study of fuel poverty in New Zealand, looking at how fuel poverty impacts on different regions, demographics, culture, family and age groups

• adopting a ‘whole house’ approach to tackling fuel poverty, taking into consideration family type, household energy needs, social and context-specific factors that influence on energy consumption

The New Zealand government continues to see energy problems as merely technical or economic problems. Fuel poverty is an interconnected socio-technical issue which is embedded in deeper social, political, and cultural factors. Future measures to tackle fuel poverty must look at energy as more than a cost-benefit analysis, but as a ethical and moral concern over equity and justice. The set of indicators proposed in this thesis addresses the shortcomings of treating energy systems as a purely technical system, moving towards multidimensional and socio-technical systems that reflects the integrated nature of energy. For effective and long-term policy solutions
to fuel poverty, research and policy must start with understanding the broad role energy plays in society and in the lives of the households.

Fuel poverty is a challenging and complex phenomena, and solutions to it will not be found short-term. The key policy solutions to fuel poverty must encompass a strong political commitment, and stronger regulatory framework for housing, energy efficient appliances and electricity pricing schemes. New Zealand can no longer afford to let fuel poverty levels rise. The clear health, economic and quality of life benefits to New Zealanders far outweighs the costs of doing the minimal required to address the symptoms of this problem. Fuel poverty impacts on many aspects of people’s lives and continues to affect households across New Zealand. The findings of this thesis will provide useful insights and evidence to broaden the existing focus on insulation as a solution to fuel poverty, to looking at energy as an equitable service for all households.
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Appendix A

Additional tables
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<th>Theme</th>
<th>Sub-theme</th>
<th>Code</th>
<th>Example</th>
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<tbody>
<tr>
<td>Material condition</td>
<td>energy efficiency, appliances</td>
<td>material condition, energy efficiency, appliances</td>
<td>This is a big, old house... even if we heated it the heat goes out so fast through these draughty windows... in the past I've had to ask my daughter for help in paying the bills... it's a terrible way to live asking your children for help... we get maybe three to four hours of sun a day in winter... there's nothing I can do to warm up this house... it's freezing inside... on top of that the heat pump is in a silly place. we are very careful about the appliances we use... we keep track of our daily power use and it's easy to see where it goes... it's helped us a lot now if we are not in the room we make sure to turn lights off, stuff like that... I'll be more willing to have the heating on for longer if the heat actually stayed around... but if the heat is not staying around you are just throwing money out the window — literally!... I'm keen to move to a place next year where it's a little bit easier to heat - Single mother with 2 children (Respondent 1)</td>
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<tr>
<td>Heating structure, orientation of the house, appliances used</td>
<td></td>
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<td>This house is too much for one person... it's huge and very difficult to heat... I mean no one heats the whole house... everyone used the fireplace so I suppose it has stuck with me... to this day we prefer the fire over electric heat... I try to keep the fire going all the time, especially when my kids come over... it's an old fire place but I love it... We are lucky to live in a big property with mature trees... so we get some fire wood from that... sometimes when I can't get firewood I would save the walnut shells from the trees... the fire place is also our laundry for the winter - elderly widow living alone (Respondent 5)</td>
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<td>we turn the small heater on during the day... my son plays in the sitting room so I put the little heater on for him there... It's hard when you are single mom... renting is the only option available for us... this house is so cold but we can't do anything about it because it's a rental... it's a battle to stay warm... this house is badly positioned, we get maybe 2 hours of sun a day... there's very little insulation... this house is always way colder inside than the outside... so if it's cold outside, it's bloody cold inside - single mom with one child (Respondent 6)</td>
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<td>It's very cold and damp in this house... the window frames are old and draughty... you can actually feel the draught coming in through the windows... it takes a lot of heat to warm up this house... even then sometimes it feels like an icebox inside the house... recently I took the old open fire place out and put a wood burner in by going to the bank and begging for an extension on my mortgage... we have a fireplace in the house, but we don't use it because of the cost... we have a little electric heater that we move from room to room as it's needed... when my son goes to bed I usually put it (heater) in there for a little while to warm up his room... we have no insulation so as soon as you turn the heating off, the heat just disappears - single father with 2 children (Respondent 8)</td>
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I've lived here for a year and a half... I'm renting. My partner and two kids live here also. During the summer it's not so bad because you get sun streaming all around... the winter it's not that great... because the sun's here and gone basically by two or three o'clock... but um... when we first shifted in I had to actually ask to get some ceiling insulation and also seals around the windows and what not which they didn't do... I just went and done it myself... yeah... because there was a lot of draughts... so it was very cold... it's the sun and you know its just cold... you get the sea breeze and what not as I said we had a lot of draught in that first winter because there was no draught stops or anything like that around the house... heater's not going and if the heatpump is, it only heats up the living room... no heating in the bedrooms all the heats just sort of goes around... just you know winter...and the house was bigger so you know... just having to heat the whole house and I had to keep on switching power companies... but I finally have it sussed and paid off now - family with 2 children (Respondent 2)

Right um... well, it's a big improvement on the house I used to have which was over a 100 years old and built in the English fashion... so that the warmest room was the laundry and the bedroom got hardly any sun (laughs)... but I loved it... but it was on the hill and the section was too big for me... and I stuck it out thinking I was going to get well for years... yeah, I was determined to get well... didn't happen... I don't think being cold and not having enough money for food really helped my recovery. Plus I didn't have help with housework or things like that when I was really bad... I think all that stress made it worse... but um... I looked for years and overtime I looked the effort would make me ill and I'll look and I'll relapse and I didn't have quite enough money and I was worried I was going to end up in another cold, old house needing a lot of maintenance... and I wanted to be on the flat close to supermarkets... close to a bus so I can get to town... finally found it after years of looking... and this house is so nice - elderly woman living alone (Respondent 11)

when the sun's out its wonderful... when its cloudy I notice such a difference... I really do... and when I moved here I spent the last of the bit of money over from the other house putting in insulation and the second year I was here I put in a heat pump because the first year was really unpleasant... I just heated the bedroom then... and that's how I used to live up the hill... so my plans of doing more like window film or double glazing got sidelined when I had plumbing issues and that was out of the question... I can't lift my arms you see... and I can't put the window films up... well, I can... but its very hard to do it for a prolonged time - single male living alone (Respondent 4)

When I had the plumbing problems... one of the plumbing problems... when I had to replace the hot water cylinder... and I discovered it was quite easy to manage not having hot water... in the summer it was warm enough to have a shower... and in the winter I manage... although washing your hair in cold water is not much fun and it makes me feel even cold... but it gives me a bit more money... when I'm not well and I have to think can I buy this on my budget or I can't... I've got just a little bit of extra give in the budget and if I go over it I don't have to be so stressed when I'm shopping which allows me some money to buy second hand clothes and books because before I had nothing... all I was doing was worrying about power bills... it's been a great pleasure to have that tiny bit of income... something just for me... - single father with 2 children (Respondent 14)
### APPENDIX A. ADDITIONAL TABLES

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<thead>
<tr>
<th>Theme</th>
<th>Sub-theme</th>
<th>Example</th>
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<tbody>
<tr>
<td>Emotional State</td>
<td>People's daily experience of illness and health</td>
<td>&quot;It was hard... it was really really hard. People don't see... people see when you're out and you're dressed and if you look healthy... it was an old doer upper that I bought just before I became ill... when you say you live in Maori Hill and you don't have money... there are lot of people in Maori Hill in little old places... some elderly... and some people are living in little old cottages... families homes... and some are living in little old places... but some people are living in little old cottages... and not working... and living well... and people ask... but why aren't you getting better... and you can't justify and you can't explain... elderly woman living alone (Respondent 3)&quot;</td>
</tr>
<tr>
<td></td>
<td>Physical health</td>
<td>&quot;And then my roof started leaking... the water was everywhere... we had a very wet year and all the roofers were busy and I had to wait... I had to keep the water out and the water was everywhere... I had buckets, pots and vases everywhere... and I was having to get up through the night to empty them... its like having a baby having to get up and attend to a child... I couldn't afford the insurance to replace it... I had to keep the water out... but the insurance refused to replace it... and the insulation was never right even after that... and I couldn't afford to replace it... and I never came up with the money... I didn't replace it... I didn't have the strength or the money... I didn't have the energy... I couldn't afford to manage it... it was a very hard, retired man living alone (Respondent 18)&quot;</td>
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<tr>
<td></td>
<td>Heating</td>
<td>&quot;I had a night store heater but that only heated part of the house and so I live in the area where that was... and then shortly after that they stopped the assistance for the night store heater... so after that it was no longer cheap to run it... so it was a very cold house... I couldn't afford to heat it... it was 6 degrees in the house in the winter... I used to heat just my bedroom and live in the bedroom because that was the warmest place... elderly couple (Respondent 24)&quot;</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
<td>&quot;Absolutely... it's just as cold first thing in the morning... oddly enough first thing in the morning and late at night once the sun goes down... I was startled when I first moved here... and I think it's because I was up not the hill and not as cold there in winter... but down here you get much more intense winters.&quot;</td>
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Winter here is very cold . . . this house is kept warm by a fire . . . a wood burner . . . I don't use heaters . . . . when I first bought the house we had an open fire . . . which was really not useful at all . . . we lost all the heat and the house was really cold first thing in the morning . . . power bills were between 300 and 700 dollars in the winter . . . and that's ridiculous . . . I'm on the income of 24,000 dollars a year . . . that means I just go out and cut firewood . . . because I'm a landscaper . . . that's what I do . . . any time I go anywhere outside of the city I have trailer on and I have some saws and I bring the wood. To put that in context the average house will burn somewhere between 20 and 30 cubic metres of wood in a year . . . we burn anywhere around 60-75 cubic metres a year . . . so that's a lot of wood - young person living alone (Respondent 10)

No . . . the open fire was useless . . . very aesthetically pleasing but it was useless . . . Recently I took the open fire out and put a proper burner in by going to the bank and begging for an extension of the mortgage . . . I also put some carpeting in . . . the rooms were bare wood floor before . . . ran out of money after that so couldn't do much else. One of my boys has allergies . . . and its still very cold for him . . . his allergies are worse in winters. The fire goes 24 hours a day in this house . . . we have recently separated (his wife and him) . . . Hannah had the fire going all year . . . and with the baby around she had to . . . that's why we go through so much wood . . . and that leads to issues of where's your partner? well . . your partner's out chopping firewood all the time . . . it's a very cold house and a very cold location. There's a nasty wind here which makes it very cold - single father with one child (Respondent 31)

So we've been here a year and a half now . . . yes, it's a three bedroom house, it's got a basement and a room underneath . . . and got the old wooden windows which have quite a lot of rot . . . our landlord quite good, so he's sealed and varnished these front windows for me because there were starting to get water seeping through . . . but doesn't want to replace them . . . although they are a lot better now. Although the last year, the first winter we had here was pretty cold . . . not as cold as other houses I've been in . . . but still pretty cold . . . the landlord was nice enough to do the free home energy insulation scheme . . . so we had the ceiling and the underfloor all done . . . which probably helped a little bit but not as much as I expected. And the main problem is none of the walls are insulated and yeah there's a lot of draught . . . and things like that - young couple living alone (Respondent 28)

It's probably a little better since the insulation was put in. But I do tend to ventilate . . . and I leave the windows open a tiny little bit at nights which does help . . . of course there's a little bit of cold air as well. I do have a dehumidifier but its so expensive to use and I don't use it - family with children (Respondent 19)

We have one heat pump, which is in a really silly place (laughs) . . . just because it's only enough to heat these two rooms . . . so most of the time we're here and then we have a little electric heater that we move from room to room as its needed. So like when my son goes to bed I usually put it in there for a little while to warm up his room . . . and we've got the fire there but it doesn't do anything . . . it's an open fire . . . looks nice . . . but it hardly produce any heat . . . so yeah . . that's the only heating we have - single father with one child (Respondent 26)
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<td>The house is very cold... and the only room we can heat with the heat pump is just the sitting room and this little dining area... and in winter we just tend to spend most of our time in here... my son will play in here... the only other time we use the house is when we use the bathroom or go to bed really... I have a little study room at the back which in that part of the doesn't get much sun at all so I tend to just work at the dining room table now... so it's a bit of a pain... my son probably doesn't spend any time in his room because it's cold in winter. And it's gets draughty as well... I've put some draught stops on some windows but they are kind of worn off. Because the windows are really old it doesn't work properly - single father with one child (Respondent 26)</td>
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<td>This house is also very badly positioned... this side of the house is against the hill and lots of trees here... which prevents the sun from coming in as well. And the thing is when you have kids and if you can heat only one room of the house they feel very confined. I use the heat pump for a little bit in the morning warming up the room before my son goes to school... then I'll usually have it off during the day as much as I can, until after school or dinner time when my son comes home and it's really cold - family with 2 children (Respondent 24)</td>
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<td>It was really hard to keep up with the power bills... especially last year I was finishing up my studies and I was really busy on a student stipend, looking after my son... money was pretty tough. I tried to have all the power points off and I had lights off. I would limit my hot water a lot... limit showers and train my son to have baths rather than showers which I think is better... or else he'll be in the shower for ages. The average power bill last winter for us was like $200 and anything over $120 was too much... budget wise $120 was our affordable power limit. But I had to turn the heater on when my son was home... especially with kids around it's important otherwise they get sick and all. I would try to avoid being in the house during the day time so I didn't have to heat the house... I would go to the library or to uni or some place where I can be warm - male student flatting (Respondent 17)</td>
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<td>Yes definitely... the biggest thing is older, uninsulated houses... the majority, probably all the properties that I've lived in and all the properties my friends' have lived in are all built around sort of that 1940s and 1960s and the walls aren't insulated... and they're often run down... they've got wooden window frames which also is a problem because over time they deteriorate... and the fact that you are in the Valley where you know the cold just seems to get trapped... during winter when we get ice there are lots of parts in the Valley that doesn't even thaw out. And the cost of power has definitely increased... it definitely costs more than it used to. I think all those combination of things... I mean the biggest thing is the house itself... if this house had the walls insulated this would make a huge difference - female student flatting (Respondent 10)</td>
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<td>It's a Housing NZ house... and it's cold (laughs)... the sun comes in really good... I remember one house that I lived on, we lived on one side of the road that got no sun and we could see the sun shining on the other side... it was so frustrating - retired couple living alone (Respondent 23)</td>
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<td>It's very expensive to keep warm... I've got quite a bit of wood... in the morning we turn on the heater and throughout winter I have the night store heating going on in the hallway all the time... it's just like warmer... I pay for it once a month... but it's just warmer for the girls... because there's no carpet out there and so... yeah, they don't want to get up and it's too cold and I can't blame them... it's me lying in bed saying get up (laughs)... They don't have heaters in the room but the night store heater warms up the rooms and takes the edge off... and the girls have their own electric blanket... but it can be quite costly... I'm still paying for power even though I use the fire most of the time... the night store heater is very dear... when the night store heater is not going I use about $3.50 a day but when that's going it jumps right up to $12 - single mother with 2 children (Respondent 32)</td>
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I've been living here since July last year. It's a 2 bedroom Housing NZ house... it's $98 a week... and it's me and my 8 year old son. Before I moved in here I was living in a student flat for $240 a week... and before that I lived in St. Clair for $150 for an insulated house, fire with wetback... I was up to date with my power bills and I was getting about $120 power bills because it was so warm... it was a good house... and then we moved to North East Valley and in the two months I was there on the waiting list for this Housing NZ house, I incurred $98 worth of power off a healthump... in two months - single mother with one child (Respondent 22)

That house was an old house with big gaps in the windows and it put me in strife now because I'm stuck with this $1200 power bill which is the lump of it from that property that I was in for 2 months... 4 weeks ago I had the power company tell me that if I couldn't pay $76 a week that they wouldn't be able to continue my power consumption... and I said all I can give you is $40, I don't have anything more... and they said we'll allow you to pay off the debt at $46 a week but not to consume any more power... and I said that's not helping me at all and to just cancel my account - family with 2 children (Respondent 21)

I'm paying off the debt now but I switched companies. Unfortunately I'm stuck with a $1200 bill that WINZ wouldn't pay... I've asked the loan company and they said I've been in debt before and they can't lend me any more. I've worked really hard in the last five years to make things better. So we just connected with Glowbug (pre-payment metering). It was supposed to be connected last week... and I sat there looking at this blinking light, hoping that I wasn't gonna have no power... so I put $40 on the thing last week and then another $40 on it this week. I don't know how it works, but I'm not good with internet so I've still got a wee bit to learn - single mother with one child (Respondent 20)

I worked out that my normal consumption would be about $230 a month so I sort of split that down so that's why I'm putting $40 on it cause with the glowbug when you run out of power it blinks and tells you and it can disconnect you as well. So I'm a little bit nervous about that happening. It hasn't blinked at me yet... we've got all green at the moment... so green is good (laughs). I use the heater sometimes... if I come home and it's still damp and cold, and it's still an hour and half till bed then I'll flick the heater on for a wee while... but as soon as bed, heater off... do you know what I mean... I don't bother leaving it on... you know. I'm a solo mom with an injury (a workplace accident left her with two missing fingers on her left hand). So now I struggle to do some work, like the lawns - single mother with one child (Respondent 25)

Well, to be quite honest my power consumption from July till February... I left the old property with a $890 bill and I have now $1200 bill... but that's me paying $20 a week. I've been trying to tell this to the power company... if you take the $890 off, really I'm doing well... it's still under $500... a manageable amount... so I was trying to keep up with my current bills at the same time as paying for the debt. I've asked the power company if they can take the $890 aside and leave me with the current and they said no... they wouldn't do that... and in my eyes that would have helped me a lot... we could set that aside... chip away at that at $10 a week and pay the $30 current - elderly man living alone (Respondent 27)
Theme | Sub-theme | Code | Example
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I’ve been with Genesis for four years . . . I’ve been a reliable customer and I was like come on Genesis you can see that I’m really trying . . . .
my wee fella (son) has his birthday next weekend and I have no money for a gift or to have his birthday unless I can magically come up with some money . . . maybe I can get some loan but the interests are so high! We’ve talked about how mom’s not going to have money for a present and I think he understand it . . . we’ve never been financially secure . . . . I’ve been a single mom from even before my son was born . . . . I’ve got an older daughter . . . she lives with her dad now . . . she’s that age . . . 14 . . . I don’t get to see her . . . . she’s relocated with her dad to the North Island - single mom with one child (Respondent 29)

Well, with the glowbug I’ve been really careful and turning the electric blankets during the day and that sorts of things . . . things that I wouldn’t naturally normally do like making sure the lights are off . . . constantly going ‘if you are not in that room turn the lights off’! whereas normally I wouldn’t even be doing that . . . so you can see that being on this Glowbug has made me a bit more aware of what my power consumption is . . . so I’m not quite prepared to sit there and run a heater . . . like I was earlier on . . . it’s a good thing maybe . . . I mean not just the worry of being disconnected . . . it’s quite handy to know what we are using our power on every week - family with 2 children (Respondent 30)

The Glowbug keeps me in a wee bit of a panic and more aware of what my power consumption is because I’m not someone who has a spare $20 on a Sunday if the power goes out . . . so I suppose you can say that it has affected my budget in a way not only having to pay for power but having to pay for my medical bills as well. My son is always sick with coughs and colds and I’ve been to the doctor a few times . . . . I have a $120 bill at the doctors that I’m still paying. And I’ve been to the food bank a few times this month actually . . . due to this power . . . because I’ve been so nervous about losing power so I’ve been topping up the card in fear of disconnection . . . because with my son around I can’t afford the power to be disconnected. I’m always worried and thinking oh no, I’m going to lose power any minute - family with 2 children (Respondent 30)

I board with Merilyn . . . she’s my landlord . . . it’s a two bedroom statehouse . . . since I’ve been here it’s gone from being a cold house to being a little bit warmer because Housing NZ put a heatpump in the lounge . . . but my room is the coldest room and I can’t put a heater on in there because I’ve got so much stuff on there it would be dangerous to have a heater . . . so I don’t know how I can warm my room up. I have blankets and it’s warm under lots of blankets once you get in . . . but I don’t have an electric blanket. The room itself is very cold. It’s always been the coldest room of the house. There’s insulation in the house . . . there’s bats up on the ceiling and there’s also insulation down in the cellar as well. The curtains are really old and not insulated. We can’t afford to get new curtains - elderly couple living together (Respondent 23)

The lounge is pretty cold as well . . . even with the heatpump on it’s still cold . . . I have the heat pump to low but its still very cold in the lounge. I don’t know why . . . maybe the curtains are getting too old in there. It’s also very draughty . . . maybe because sometimes we leave the door open for the cat because the cat goes outside and we leave the door open for the cat to come back in. The Housing NZ wouldn’t let me put a cat door in . . . I don’t know why . . . they said they don’t do that any more . . . I’ve tried but they won’t let me - elderly couple living together (Respondent 23)
Just this little electric heater in the kitchen... I've got an electric blanket in my room... and there's a heatpump in the lounge. We don't go into the lounge very often though... about a couple of times a week... Coronation Street is on twice a week so I usually go in there and watch that twice a week and that's the only time I turn the heatpump on. And if I've got visitors, I'll turn it on when I get visitors. There's no heating in the bedrooms - elderly couple living together (Respondent 27)

We basically just heat this tiny kitchen and live in here. We spend almost all our time in here. The electricity bill in winter can go onto a couple of hundred at times... it can, yes. I've go the smooth pay... it's really easy. I put the same amount every week and if the bills too high they just let it go and adjust it later on. It's been really good to be on that plan... I pay $28 a week... it's really good... it's affordable. And they review it every now and then and say if we gotta pay more. You can end up paying more. But I'm on credit now - retired elderly couple (Respondent 27)

To the best of my knowledge there are some minor insulation around the major living areas of the house... and nothing around the utility areas... no insulation in the back section which is the kitchen, bathroom and laundry... no there's a hole in the wall in the laundry... it is somewhat covered... it's a damn hole in the wall... the landlord didn't do anything about it... I didn't bring it up with my landlord... we were a bit late in looking for a flat and rather desperate and time was running out and finding somewhere affordable was proving to be a problem. We used to live about 8 houses up the road last year so we know what this area was like when we moved here we knew what it was going to be... we slightly under estimated the lack of insulation... that was probably the biggest thing that we didn't get a grasp on... it's just that you can heat the room up but as soon as you turn that heater off the heat just disappears like not even half an hour ago this room was at 28 degrees and its already cold - male student flatting (Respondent 7)

Yes, and I'll be getting a big rack of bubble wrap at some point for the windows... we have the curtains closed all the time to keep the heat in as much as we can. This is a very dismal area just because it is in the shade of the motorway right there... like we get maybe 2 or 3 hours of sun a day... and the way the sun hits us... it just hits these front bedrooms that's about it... that's about all the natural warming that comes in... in the deepest darkest winter which we are not even there yet - male student flatting (Respondent 4)

Colder than outside on some days... so the house itself is really bad... the windows are all wooden frame windows there's gaps in them... I got some newspaper in there and tried to close some of those gaps... so the heat just leaves very quickly and yeah it's... we haven't got a thermometer in here... but on a lot of cold days it's a lot colder inside the house than it is outside. And another issues is we have a cold part of the house... half of the house doesn't retain any heat that we generate here... it's blown out that way every time we try to go to the kitchen or bathroom... just letting the heat out... there's a small tiny heater in the bathroom that has just stopped working recently... we used that heater occasionally - young couple (Respondent 24)

We have a heatpump that gets used once a month maybe... trying to be careful about what sort of energy expenditure we actually have... the way we do it is that the power bill is in my name... I just collect money from the flatmates on a weekly basis and that goes to cover all expenses... rent, power, food... the easiest way I found to run a flat if we all pay one lump sum a week and just make sure that that lump sum is more than enough to cover all expenses including food... and then if there's money left over you just divvy it up evenly or if there's not enough money to cover a particular bill you just let everyone know and everyone pitches in and share that bill - female student flatting (Respondent 10)
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<td>This house is very cold, especially during the cold days because the fire doesn’t work ... so we have to use the oil heater ... so my husband and my daughter and I have to squeeze into one room ... and we would only stay in one room at any one time ... like in the kitchen ... so when I am cooking it is a bit warmer so we all stay in the kitchen ... then we put on the little oil heater only in the room we are in ... so if I’m cooking we have it on in the kitchen just to keep the kitchen warm and the outside is like freezing. After we finish eating we just all move upstairs to our bedroom and heat up the bedroom with the same oil heater which we keep on moving. We live in one bedroom now because it is too cold for her (daughter) to sleep alone. The owner has not fixed the chimney ... and said it won’t be fixed for a while so we have to live in one room. The sitting room is not used at all - young family with one child (Respondent 30)</td>
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<td>it’s too cold and too big to heat. The oil heater keeps the room we are in fairly warm ... so that ok ... but when I come to university and Sisi (daughter) goes to school my husband’s really cold at home because he doesn’t want to use the heater too much ... it’s really too expensive ... it consumes a lot of electricity and very expensive. My husband stays at home and he’s so cold in the house that he’s sometimes at home with jackets and multiple layers of clothes on. The house is very old ... not well insulated ... you can feel the draught coming in through the window ... and because it’s Pine Hill the wind is stronger than downhill ... because when we used to live on the flats it wasn’t’ that windy at all ... so you can feel the window shaking on cold days in this house. When you put the heater beside the window you can feel the breeze and see how much air is coming through - young family with one child (Respondent 21)</td>
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<td>The former tenants put some draught proofing around the windows ... but they are old and fell off ... but we haven’t done anything yet. The curtains are ok curtains but not well adjusted to the window ... they are short and the draught still comes in. The owner said that the ceiling and floor is insulated but the walls are not done. It’s the old wooden windows and it’s very cold. We have the electric blankets on bed ... and its nice once you get in ... but we cannot stay in bed all the time ... and its really cold once you try to get out of bed to go use the toilets or something - family with 2 children (Respondent 28)</td>
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<td>We are a really low energy consuming household. We are very careful about the lights and switches ... and we are careful about which appliance we use ... and we save energy a lot ... we just think it’s the heaters ... the heaters cost us a lot to run. The big appliances (fridge, washing machine, microwave) are big energy using appliances ... we don’t use a TV and we only use the computers so not very many appliances. It’s a pain sometimes to dry clothes ... we never use a dryer ... because it’s very cold and damp these days so we have to put all the clothes inside and it takes many days to dry it out. We have a wood burner but it’s broken right now ... that landlord hasn’t fixed it yet - elderly retired couple (Respondent 11)</td>
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<td>we don’t want a heatpump ... heatpumps are not very efficient ... especially for the big house ... it may just warm a little bit for the living room and the other parts of the house will be very cold ... because we used the heat pump in our previous house and the heat pump just heated a little part of the house ... and it was really expensive ... when we used the heat pump it cost us over $200 a month. We have three bedrooms now and I can’t imagine heating that much space - male student flatting (Respondent 17)</td>
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It's a big house... we had the free insulation done... we got the EECA ceiling and underfloor insulation... it is a lot warmer than it used to be... before you couldn't keep the heat in... not even in the part of the house (the living area)... now it is warmer because of the core. But now you can see a bit of a difference. It's actually improved a bit, how we move about living in this room and enjoy it.

The kids find it very cold and they spend a lot of time in the bedroom... they have no heating in the room but they have an electric blanket on there... again it's expensive to heat. I struggle to put my bills... I actually changed my electricity provider last week... I used to be with PowerShop but I've switched to Genesis and got on their fixed rate for twelve months. That comes up to about 26 cents per kWh... where as power shop was about 30 cents per kWh. Our energy usage is not high... we dry clothes on the ceiling rack... with the fire going it dries real fast. We have the high ceiling... this house is from the 1880s so it's very old style - elderly retired couple (Respondent 27)

It's about a 130 years old... it was originally a very old cottage... it's been extended about a 100 years ago... nothing as fancy... it has beautiful fireplaces. It didn't have any insulation when we arrived... it had batts in the room but it had squished down... we put polyester insulation in the roof... and also in the walls... and the floor... and the foundation was really rotten... it was sitting on the ground... we had the builders to look at it... we replaced all the barriers and lifted the house up... putting in concrete with a new foundation... we put in insulation on the floor... now it's fully insulated... but no double glazing. The house is in a very cold area... so it won't warm naturally - retired elderly couple (Respondent 25)

It's a big house... we had the free insulation done... we got the EECA ceiling and underfloor insulation... it is a lot warmer than it used to be... before you couldn't keep the heat in... not even in the part of the house (the living area)... now it is warmer because of the core.
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<td>I live here on my own</td>
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<td>I've lived here for about 3 years. It's partly insulated. When all the doors and windows are shut this room can get very warm. I have a cat that's why I keep the window open. I use the gas heater. I don't heat my bedrooms it's cold as I just chuck on extra jerseys and go to bed. Today I have the bedroom window open to dry the place out... I go around and wipe out the windows... there's so much water on the windows... condensation and mould. This is classified is a 2 bedroom but it's not. It's practically one bedroom. The landlord has been good about mending... I have to get on their case but they do repairs and stuff. I had a kitchen door that was broke and it took them months to fix it up... eventually I took the door off and had a blanket hanging on the doorway for months until it got fixed - young male student flatting (Respondent 7)</td>
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<td>Gas</td>
<td>22 dollars</td>
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<td>A bottle and that lasts me about a week in winter. Electricity bill jumps in winter from 120-130 a month. I use the TV, and hot water... although I don't use hot water much - young male living alone (Respondent 17)</td>
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<td>We lived here from</td>
<td>2008</td>
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<td>We bought this house. This house like many NZ houses is actually very cold in winter. We are doing our best... we put insulation on ceiling but it also requires a lot more work. We don't have underfloor... the position of the house is very low so we cant do it. We have this fireplace going in the living area it is great. We had an open fire before we changed that now it's a closed fire. We did it five years ago and now we are very happy. This room is our favourite place to spend time in. My husband lives here. Our daughter is grown up and she's now in America and got a job there. I'm taking care of her dog. Now we have 2 dogs. Initially we moved from Auckland... we moved because my daughter decided to study at Otago... we love Dunedin now. We decided to live here. It's nice here although houses are cold here. We also have a heatpump in another room... it's the computer room office. I turn that in the morning when it's very cold. Heatpump is good but requires money. And heatpumps are only good for heating one small room. We have electric blanket and a small heater in the bedroom... we don't use the heater much. We spend the evening here in the living room so it doesn't really matter. There's no heating in the kitchen so it's very quick cooking - family with young children (Respondent 28)</td>
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<td>It's a 2 bedroom house</td>
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<td>It's not a warm house. I'm using two heater... one oil heater and one convention heater. I used it in my room. I spend all my time in my room. There's no heating in the living room or kitchen. We don't get the morning sun... there's big glass doors we lose a lot of heat. I bake a lot so that warms up the kitchen... I warm up the area with cooking otherwise it will be freezing. I spend a lot of time here in the kitchen. My friends when they come over say its cold in here so I try to have people over right after I bake so it's still warm. Sometimes the outside is actually warmer than the inside - female student living alone (Respondent 10)</td>
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<td>Since last year...</td>
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<td>I've noticed in winter it's freezing in this house... especially in winter when it's cold. I've had the heater on for two days but it only keeps it comfortable not warm when I turn it off half an hour later it's freezing. As soon as I put my heater on my usage jumps to 10$ an hour and if I don't turn it on it's 2$ an hour. I'm on the glowing and I'm wondering if this smart meter and there's no problems with it. I lived in a council flat in Christchurch and I had a wall heater and I was charged half that... here it's too expensive. I try to shut off the living area and this area here is the only bit I heat. So it shouldn't be that expensive to heat this small area - elderly man living alone (Respondent 11)</td>
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I find it easier to keep a track of where my money is going. There's no one to help me if I get into a pickle. I have a limited amount of money and what I allocate that's my power for the week, I don't have money from anywhere else. I'm on benefit... that's why I'm renting a computer (from HP). I have the internet on. I want to design websites and work from home. I take medication for depression, they call it a mood stabiliser... that's just a fancy name for an antidepressant. The first weeks were hard but once your body gets used to it its not bad. I found that I needed the pills to function - elderly woman living alone (Respondent 3)

I have been here 26 years... I've always found it very cold and draughty... they've got insulation in the floor and basement... but it's so draughty it's like a wind tunnel... it's such a big long house that it's so hard to keep warm... Housing NZ is not very helpful in getting the draughts or cold... it's up to you to do it... there's so many windows in this house it's hard for me to do anything I can't buy insulation to cover the windows. I'm sitting here at night and I'm freezing... I've got a little heater but I'm still shivering... I'm sitting here and I'm freezing... what I find that I'm sitting in my bed with my electric blanket on... when my son left I'm just alone and I've found it easy to save my power - elderly woman living alone (Respondent 3)

I have a wood burner but my hand is partly numb because of my stroke so I don't use it often... but it's so cold and draughty here... I go to someone else's house and just stay there when it's warm. I would like to have a heatpump... I'm not home during the day... any chance I get to go out I go because I don't like being stuck up here... we've had a very cold winter and we've had snow... I don't have a car so when I have to go I have to take the bus and it's a long wait for the bus. Some days are really cold. Because I've been by myself I don't put the fire on... I come home and put the little heater on... it's just easier to put the heater on... but you have to sit right in front of it... the rest of the house is freezing... so I have to really put that fire on and I have to put the doors open - elderly man living alone (Respondent 11)

Just the little heater and electric blanket... I've got nothing and it's cold... so in the winter I have my hat on and my scarf and my coat and put the heater on and gloves as well (fingerless gloves)... and get around the house like that but it's so cold it's too be in your own house like that... but housing NZ is not very helpful... there's so many draughts in this house. Doors and windows are always banging somewhere in this house. I like to have the windows open a little bit for a bit of fresh air. I try to have the fire on if I know someone is coming in to visit. If I come home by 5 it's so cold and it takes a while to get the fire going and warm up. I don't have any kindling to start the fire. I got some firewood from the church... because I do a lot of community work they let me have some wood for cheap. That lasts me the whole winter because I'm on my own. 2 cubic meter lasts me a winter. I think I can get away with it (not heating the house) because the suns out. I don't put the heater on... you don't need to... but it's very cold inside... but if I put the heater on... I don't want to waste the power - elderly man living alone (Respondent 11)
the power bill goes way up… I just get up and get moving and put the extra clothes on… so I don’t put the heater on very often… but if its someone elderly or with children that must be very hard… but if its just me it doesn’t bother me that much. But when my daughter and grand children come to visit I put the fire on for them. I notice my power bill is so much less if I don’t put the heater on… if I put the heater on it goes up to double the bill. I’m on the smooth pay for power so it’s manageable. I pay about 36 dollars a week. I have a credit in summer which is carried over to winter. That is manageable… all my expenses comes out from Housing NZ budget and they give me the rest back. The rest is just enough for food. The money that’s left could be for a doctors visit or something… but if I want to get any extras I don’t have money for that… but if I’m very careful and manage my money better I can save it up for going to the pictures… I do volunteer work but don’t get paid. I enjoy doing that. I’m saving up for dentures… I’ve got to get the rest of my teeth done. I have to go to the dental school. I don’t know what happened to my teeth. It just rotten and started falling out. I have to have them all taken out and get dentures. I don’t think I looked after them… I didn’t have money to go to the dentist and there’s a long waiting list for the dental school. I let it slip off and now its too late. I’ll be quite glad to get dentures. It will get my confidence back - retired elderly couple (Respondent 27)

it’s an old 1908 villa… we’ve been here for 10 years… its fairly run down… we built in this living area. It was very cold when we moved in… that first couple of winters were very hard… we had very thin curtains… we got the Warm Up NZ insulation on ceiling and underfloor… and suddenly it was amazing… you could walk into the hall and it wasn’t colder than the outside in the middle of winter… it has been a gradual process replacing curtains and putting in more insulation. There’s 3 bedrooms in this house. In winter we spend a lot of time in the living room… we shut the room down and keep the heat in… we use the fireplace… it an old wood combined one with coal… but it doesn’t heat very well… we’ve used coal but don’t like it much… three winters ago we got a heat pump and that’s made a huge difference… the fire tops it up. when we cant’ get firewood we save walnut shells from the tree and use that - family with young children (Respondent 24)

The power has been easier once we have been on the smooth pay which evens it right out… I always pay just a little bit more so I know that in winter I can manage… and that it would be comfortable… that helps hugely. I’ve noticed that when family comes to visit the power bill goes up. Our saving grace is that there’s is a wetback… our power bill in winter is manageable because the water is hot from the fire - single mother with one child (Respondent 29)

Because this house is really cold and damp… I have gotten this house insulated on ceiling but I cant’ get underneath the house the insulate it… so I have pretty dense carpets… I’ve also got a wood burner. I added a sun room to allow more light and natural heating… Being in Ravensbourne… you don’t get much sun especially in winter… I did what I could like closing gaps in the windows. When I have the fire going I keep doors closed and rooms doors closed… I want to change the lights to more efficient lights but I haven’t been able to do that yet. This area in particular double glazing is not feasible because of the fluoride output from the Ravensbourne fertilizer plant… which means that the glass in these windows have to be replaced every 3-5 years… the plant have to do it. Its a their reprehensibility. they have to… it’s part of their mission - family with young children (Respondent 19)
I'm sharing a flat with two others in this house. There's 3 bedrooms but we use one of them as a study room. The couple in the big bedroom and I have ours. It's really cold having that door open to my room will make the heat escape. If open that door to my room it would make the whole house cooler. I find it freezing in my room. It's the same temperature as outside. I don't have any heating in my room just a hot water bottle that I cuddle up to. I don't want to get a heater for my bedroom because I want to save and don't have the money for that. Young male student flatting (Respondent 4)

We are renting this 2 bedroom. It's cold but not bad. we are arguing with them at the moment. the heat pump is not working. We have a little baby in the house. big gaps in the windows... that needs fixing. Rent is 230 a week. There's no heating in the other part of the house and the only heating is in the sitting room. We turn the small heater on in the day and put a little heater in the bedroom as the baby sleeps with us. Young family with a baby (Respondent 2)

The house is definitely cold. It's quite cold on the floor and the feet are freezing. The baby is always sick and has coughs and runny nose. we try to keep it warm as much as we can but he's constantly sick. We had to take him to A&E recently and he had to take an asthma inhaler. It gets very cold at night so he ends up getting in between me and my partner in the bed. The doctor at the hospital said he is sick because of the cold air at night breathing that in. We got a hot water bottle for his bed and put some extra blankets on his bed but it's still cold. Young family with baby (Respondent 2)

We had a automatic payment set up every week which was 25$ a month but Jackson (my son) missed out on bits and pieces. He needs new stuff but we haven't been able to buy it because it (Glowbug) just chewed up our money. We went from 20$ to 30$ to 50$ and then unto 100$. We couldn't keep up with it. One time we had only 10$ left and we rang them up to top up but they disconnected us day. We asked if we could just top up with the 10$ and then top up the next day when we get paid. They said no. you need to find the other 10$. I was home alone with the baby... and I had to wait in the cold house until my partner got home from work at 5:30. I couldn't make the baby's bottles without hot water. It was just horrible. Young family with 2 children (Respondent 30)

I think we are a good example of a low income family. This house has only been insulated September last year... which was good. Jackson (my son) missed out on bits and pieces. He needs new stuff but we haven't been able to buy it because it (Glowbug) just chewed up our money. We went from 20$ to 30$ to 50$ and then unto 100$. We couldn't keep up with it. One time we had only 10$ left and we rang them up to top up but they disconnected us day. We asked if we could just top up with the 10$ and then top up the next day when we get paid. They said no. you need to find the other 10$. I was home alone with the baby... and I had to wait in the cold house until my partner got home from work at 5:30. I couldn't make the baby's bottles without hot water. It was just horrible. Young family with 2 children (Respondent 24)
### Theme Sub-theme Code Example

The opportunity was good and this house we are renting is obviously is not fantastic . . . it was good over the summer but over the winter . . . it's ok . . . it takes a long time to warm up . . . we don't get a lot of sun . . . this area is terrible . . . we don't get any sun in winter . . . it sort of touches the front windows in a day . . . but that's about it. Me and my wife lived here since a year . . . we have lived in another couple of houses around Dunedin but this house is the worst. This house is early 1900s . . . very early 1900s . . . insulated some . . . the landlord says they put underfloor . . . but who knows . . . it certainly doesn't retain the heat . . . the old window frames are old and draughty - young couple with no children (Respondent 21)

The electric fan heater in here. And depending on how cold it is the heatpump in the hallway . . . it really doesn't heat this room (living room) but it keeps the hallway warmer and keeps the other rooms drier. We normally just heat this room and live in here. Maybe this is the reason our powerbill has gone up . . . this electric heater takes a lot of energy . . . we don't heat our bedrooms . . . just hot water bottles . . . the kitchen is freezing . . . often it is warmer outside than inside . . . there's no heating in the kitchen either and none of the bedrooms have heating . . . its kind of relying on the heatpump if we want to heat them or a separate heater if we want to - young couple with no children (Respondent 21)

<table>
<thead>
<tr>
<th>Practices</th>
<th>Daily activities</th>
<th>energy usage, capacity to participate, spatial confinement, heating one room, minimise energy usage, staying in bed to keep warm, co-sharing bed to keep warm, prioritising heating, maintaining social relationships, hiding cold indoor conditions, time spent sourcing for wood, sacrificing food</th>
</tr>
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<td>There was no quality of life . . . isolation, staying in bed, confining myself to one room . . . my life shrank to one room . . . I don't think people realise how important it is . . . just to have a little bit (of money left) over to make you feel that you are still human. I move around a lot less in winter . . . I pull out blankets and just hunker down for winter . . . I try to save in other ways like cutting back on meat or vegetables during winter. We rarely spend time in the common area . . . it's just too cold in the living room . . . I use the tiny heater in my bedroom to take the edge off . . . I also have a hot water bottle that I take to bed . . . the kitchen is freezing so I try to make instant meals so I don't have to spend time in there . . . I'm not home during the day . . . any chance I get to go out I go because I don't like being stuck here in the cold . . . I try to spend most of my time at the uni. or library where it's warm - elderly woman living alone (Respondent 5)</td>
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<td>I was out collecting firewood all the time . . . wherever I went, I was in search of where to get free wood from . . . I wish I had more time to spend doing what I love instead of spending all my time doing this I rarely have people over because it's just too cold in the house . . . and when I do have people over I don't have much money left over after paying bills to put up a nice spread - single father with 2 children (Respondent 8)</td>
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<td>My son doesn't spend any time in his room in winter because it's too cold there . . . when it gets really cold, we'd get dressed in layers . . . pile clothes on . . . stay in bed reading . . . trying not to think about the cold . . . trying to escape to another world. In winter I'm trying to survive from week to week . . . I'm always thinking about how much money is left and where I can spend it . . . try hard not to get sick so we don't have to go to the doctor . . . if you have to constantly calculate how much (money) you have left, that's a very stressful way to live - single mother with one child (Respondent 32)</td>
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I like to enjoy fire places when I visit my parents place . . . I don't understand what the fuss is about . . . it's too much work for me . . . it'll take too long for me to get it going in the morning and I don't have that kind of time . . . I'm rushing for work in the morning . . . I always lived in cold flats as a student . . . so I'm used to piling on clothes to stay warm . . . we have a heat pump that gets used maybe once a month in winter . . . being a student you kinda get accustomed to all the little tricks of how not to be cold in Dunedin . . . we don't need a very warm house - male student flatting (Respondent 17)

This week I spent on a second-hand winter jacket . . . and now I don't have money for food . . . I've got to get to the Food bank and ask if I can get a food parcel this Friday . . . the Food bank has been great . . . I don't know what I would have done without them this winter . . . I've been so nervous about losing power that I've been topping up the card for the pre-payment meter and not having money left over for anything else . . . Once the gas bottle runs out, it runs out . . . it had run out in the past and I've just survived with extra clothes on . . . sometimes my mum helps to fill up the gas bottle which is a big help - elderly woman living alone (Respondent 27)

The first winter I was here, I was paranoid about using the heat pump and avoided turning it on . . . I used the fireplace a lot and I had to cut firewood all the time . . . the fire goes on 24 hours in this house . . . all the routines were around the fire . . . I didn't have time to spend with my kids . . . I am out all weekend scavenging for free wood . . . I always try to turn the heat pump on before my kids come home from school . . . I like to have the house warm for them . . . I would even turn on their night heaters before they go to bed just so the kids are cozy - family with young children (Respondent 30)

Little things like taking my son out for a meal or a movie . . . I couldn't do that . . . I couldn't even afford to buy him a birthday present . . . he's not involved in any school activities because of the cost . . . it's quite embarrassing for him . . . sometimes he gets bullied or alienated because he can't do the things other kids are doing . . . We changed to GloBug (pre-payment meter) . . . we went on it because it was the only option available for us . . . the first two weeks were fine . . . but after that we were constantly topping it (meter) up . . . we couldn't keep up with it . . . it kept turning orange (indicating that power was about to be disconnected) . . . it was very stressful and I was constantly worrying about when we'll get disconnected - single mother with one child (Respondent 6)
APPENDIX A. ADDITIONAL TABLES

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sub-theme</th>
<th>Code</th>
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<td>I've got to have it all the way unto 30 and I still find I'm sort of with four five layers on . . . I actually have a heater in the hallways that I use to heat that end . . . I air out the house every day and when I cook I keep those windows and door on that side just a little bit open yeah . . . I move around a lot less in winter we pull out blankets and health wise the kids end up with a lot more colds . . . a bit more sick days off and I've noticed that their asthma flares up a bit more as well . . . well I try not to turn everything on just before 4 o'clock . . . just before the kids get home so you know its starting to warm up and I keep it that way . . . I turn that heater off at night before we go to bed but we leave the heat pump going on cold nights so its warm in the morning when we get up . . . the power bill is not too bad in summer but when winter comes we sort of hit the 500 dollar a month mark so its getting a bit its not unmanageable but its sort of getting up there . . . In winter we adjust our food intake we go for more like stews and urn soups . . . I've got a great big crackpot there that I can do a couple of days meals in and what not . . . so just way the food budget goes down as the power bill goes up . . . we are able to manage like that . . . yeah I buy less clothing in winter as well you know sort of I go to the winter sales at the end of every year and stock up for the next winter - family with young children (Respondent 24)</td>
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<td>I've got a couple of mates that do . . . one mate she's got three kids and two boys under 8 . . . so you know its more important for her . . . . so I've noticed that she does . . . she's the same as me . . . food bill goes down . . . as power bill goes up . . . sort of makes it work from other areas. It is cold . . . yeah . . . there is . . . you can smell the cold . . . you can smell the mildew . . . yeah . . . urn but she heats only one room . . . the room that they are in whereas the bedrooms are freezing . . . where as my kids they go in and out of rooms and likes spending most of their time in their rooms you know . . . Hendrick's got a lot of toys in his room . . . he likes to play there . . . so I find it easier to keep the whole house open - female student flatting (Respondent 10)</td>
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<td>I was disconnected for about a week. I moved frozen to my friends freezers . . . I had a wee gas portable . . . cooked on that (laughs) . . . urn and basically we hunkered down with blankets . . . yeah. So I lived in one room . . . and when it was very cold . . . snow, hard frost . . . I'd get dressed in layers . . . pile clothes on . . . sit up in bed . . . try to read . . . to escape to another world . . . try to watch TV . . . . . . . . . but if I was warm it definitely helped me to think more easily . . . its just less stress - elderly retired man (Respondent 18)</td>
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<td>It was really hard . . . I had friends who sometimes offered me meals . . . oh those were wonderful days (laughs) . . . there was an elderly friend when his wife died . . . he would shout me out for lunch . . . we'd have a full meal and that was my only meal for the day . . . and I finally plucked up courage one day . . . I used to go to a bible study group . . . my church . . . I told a lady there and they started giving me tins of baked beans . . . and I developed a hoarding habit . . . hoarding dried food . . . to show myself that I had food - elderly retired female (Respondent 5)</td>
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<td>Well . . . it made it very hard to have people over for meals . . . and I used to be able to cook . . . but I didn't have food to offer to people. So I didn't see any friends. Sometimes friends would ask me for a meal but either I couldn't afford or couldn't cook for them back. And if they had a family and they ask me I was one person . . . but to have them back for a meal I would have a number of people to feed which was hard . . . it was expensive. I used to know people . . . not anymore . . . I've become increasingly isolated . . . they often have family help . . . family to assist with meals when they are short . . . sometimes give them money . . . yeah . . . I didn't have that . . . so no . . . I don't really know . . . students . . . I often wonder about them . . . but they live better than I do - elderly retired woman (Respondent 3)</td>
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I had to cut firewood all the time... that means we have to keep the fire going over night... all the routines are around the fire... hot water is through electricity and that's a drain as well... with a baby around there's a lot of washing to do. The kids had got used to being in a cold house to some extent. I've always lived in cold flats as a student so I used to pile on clothes... but it's a battle to stay warm... this house is always way colder in the inside than it is on the outside... so if its cold outside it's bloody cold in the inside - family with young children (Respondent 28)

We minimize the showers... the boys are getting into teen years now... Hannah was a lady... you've got to have your home comforts... we are a sporty family... I won't have a shower and only shower after few a days... but that's hot water! I'm saving by not wasting it. There were arguments about heating... it causes stress in the relationship... money causes stresses... electricity bills and trying to rationalise out... ok is it really necessary to do five hot washes in a day, every day? And from a male point of view no it's not... you have to change your lifestyle to your budget... and if the money isn't there... I think between us (wife and him) earn 36,000 dollars a year... and the last year maybe 24-28,000 dollars a year. You've got to live in your budget - single father with 2 children (Respondent 20)

Well if you are spending money on heating and electricity you haven't got money to spend on food. And as far as I'm concerned food is a priority... you don't have to have flash food... just nice food and I've always eaten well... it's important to eat well because if you are healthy that's a positive... in Dunedin in winter it's very hard for people to stay psychologically well... it's a cold, depressing place and the climate is very cold. And that's just the way it is... it's the situation... it's the geography of this place. It's a horrible place to build a city. But then you've got to adjust your attitude... in Dunedin as far as your know your warmth is one thing - family with young children (Respondent 21)

in places like Dunedin if you are active... if you didn't do things when it's raining you'll never do anything... so you've just to adjust your attitude... dress warm and get out there and do it and you'll find that you have a good time and get used to rain. Cold is cold... you can get trapped in front of a tv or infront of a heater but that's another part of this strategy and the way we get through... Hannah has found it very hard and that's one of the reasons why we separated... it's this depressing weather... stuck with a child... new experience for a single woman who's used to getting out and doing whatever she wants, when she wants, when she likes... instant family, lots of washing, cold climate... sitting infront of a fire... having to feed the fire all the time and no money to go and do things... that's destroyed our relationship - single father with 2 children (Respondent 20)

Yes, the high power bills means there's less money for other things basically that's what it comes down to. So just little things like taking my son for a movie or a meal out went on the way side in winter. And yeah, food will be one of the things to go... one thing I have to do is to cut back on the food we eat. I'm lucky that I'm pretty good with budgeting and money and there are certainly people who are worse off than me. I've always been good with money so I could always manage my bills. I was lucky that I've never had my power disconnected or anything like that... I probably have missed the payments a few times and had to forego the early discount payment... just because I had to wait an extra week or two until I had enough money to pay the bills... and if we are paying that we will be slightly late with another bill... that's how I manage in winter... I try to shuffle bills around... try to decide where I can spend the money that week... $20 less food that week or $20 towards the power or something else. And I found that in winter my son gets sick more often... just getting more colds and getting a bit run down... and coughs... coughs probably the biggest one - single father with one child (Respondent 25)
My mom would be one for sure... she just returned from having her hip done and spent home after a few weeks in the hospital... and yeah she definitely struggles... she's quite good with her power... she'll turn the heat pump on for an hour and would turn it off again for an hour... she's very aware of how much power costs and she definitely struggles with that. She spends her whole time in the lounge with all the doors shut. I've got some friends, working families who struggle to pay the bills... I think energy is one of the biggest issues... some of my friends have had power bills around 300-400 dollars which absolutely blows my mind - single mother with one child (Respondent 8)

It's very expensive to keep the house warm but it's also very important for me to do that. I find it's easier to keep my girls warmer, they don't get sick... rather than being cold and we'll get sick and have time off school and work... we can't afford time off work because we've got to pay for the power... preventions easier than anything else... and it just makes it nicer... it makes it easier to get up when it's warm... it's just more comfortable... there's nothing worse than walking around shivering... we've had our days of doing that. I'd like to have cheaper power bills... I'd like to not have to run the night store heater and such but you just have to. Sometimes I can say to the girls, especially now that they are a wee bit older... I can say chuck on another jersey but when they were young they wouldn't feel the cold until they got sick and then I'd have to deal with it... and I really just can't deal with it - family with young children (Respondent 21)

Well, the money's got to come from somewhere so we used to have Sky (television package) and then I got us a van... so I was like sky money or petrol money... and so we chose the car... and over winter... I normally put $70 a week in the van... over winter I'll put in $50 and put an extra $20 on our power each week... you know it limits us... but you know it's just cosier... if you are going to be stuck at home you might as well be warm. There's nothing better than being warm... having the slow cooker cooking and just being cozy. I like that when my grandchildren come over it's warm... I just love it... makes life easier - young male living alone (Respondent 17)

That means maybe we tend to go out in the weekends so maybe that's off or maybe we’d have to walk to school the last couple of days before our payday. And it’s hard when you are used to having a car (having to walk). We go to church and after church we go to the museum or the gardens, whatever the weather we like to do something but you know there’s been sometimes when we had to park up the car and just come straight home - family with young children (Respondent 30)

I thought that since it was a state house it would have good insulation... it does look like it has silver stuff under there... but it is cold... really cold... as you can see I have blankets and sheets hanging on all doorways... that's for when it's shut... it keeps the draughts out so I pull these curtains and I jam the couch up against the curtains because as much as Housing NZ supplies curtains if you have a look... see how short they are and the draught just comes rushing in. My kitchen and the bathroom they are probably the coldest. The worst thing about getting cold is showering... when you are showing the kid... he's very asthmatic... he's very easy to get cold and so we are at the moment experience a bad cold and cough... we've been off school for five days now - single mother with 2 children (Respondent 29)
It's sort of like you can't constantly keep it warm... I've had the fire going a few times but you've got to have the wood to be able to feed it you know. Someone gave me half a bag of coal but it's not a coal burner so I can't use it. So I've got a few bits of wood there but that's not enough to keep us warm. When the fire's going it's nice and warm but we don't have it going that often because I can't afford to buy wood. I also have a this wee little electric heater which work and income funded me and that pretty much stays there... yeah, the lounge is the warmest room... I normally shut off my room because it's too cold. It's actually really cold in this house... it's freezing at times that we can't even sit still. The whole house feels very cold... and that's sort of what it's like - elderly retired man living alone (Respondent 23)

Well, we pretty much live in our lounge or in my bedroom with the electric blanket... in daytime I refuse to have the heater going... so that's when you crawl under the blanket, shove a blanket over lap and I was taught as a young girl to use blankets because you don't have money for electricity all the time you know... so it has affected us quite a bit. And my son often sleeps in the lounge in winter because it's been too cold in his room to sleep. I suppose you just try to keep warm you know... having asthma doesn't help because you sort of feel bad - family with 2 children (Respondent 19)

I've tried to have the heater going and leave that door open and the rest of the doors shut, just his room open and that's wasting the heat... like some nights when it's really cold, even if you turn the heater on you won't notice it making a difference in here... do you know what I mean... because you can feel the draughts from under the windows... it's not a warm house at all. Before I got this house I looked at another house, but it had a heat pump you know and I was like no way I'll want another heat pump after the big power bill I cranked up with the heat pump with my other house - elderly couple living together (Respondent 18)

I'm not in my room very often for one thing... if it was warmer I'd be in there more often and I'd tidy up more and I'll be working on my computer and stuff and doing some stories and stuff... and if I had my room tidier then I could have the heater... so it revolves around me getting my room tidier and then I can get a heater in there... Not very much, I'm very good with budgeting and I have enough every week for food. But once my phone broke down and I didn't have any extras aside for things like that you know... so yes, in a way energy is an issue in circumstances like that... I had to save for months to be able to buy a new phone - male student flatting (Respondent 7)

there though... even with the fire going it was very cold. They just sit in the lounge and have the open fire going. Our fireplace is closed off... it would have been nice to have a fire here. When my husband was alive we used to use the fireplace... when he was alive he would go and drag up wood from the woods behind our house... and we used to get coal delivered. He passed away over five years ago now. I have a son but I don't get to see him. I just found out that his wife is having another baby and I've asked if I could see my grandson Max - elderly retired woman (Respondent 5)
Well, generally I'm at uni between 5 and 8 hours a day ... and when I come home I either relax in this room (living room), where I close off the room, grab my blanket ... maybe run the heatpump for 5 or 10 minutes ... or I go into my room where I have a small fan heater and I run that for 5-10 minutes ... same deal, close up the room, close the windows, grab blankets, jackets or whatever ... wrap up and all that ... by wrapping up I'm keeping the insulation and retaining my own body heat ... it's easier and cheaper than heating the whole room ... and when there's only one person living in the house at any one time it only makes sense to heat the one room and because of how intermittently we use the heating oil heaters are not particularly viable because of the amount of energy taken up to warm the oil in the first place so cos I only need about 5-10 minutes of heat every 3-4 hours ... it's enough to take the chill off ... so means I can turn the heater on for 5-10 minutes, get my hands warmed up enough to function for me to type with or whatever ... and then when I wrap up I'll hopefully retain enough heat to keep me going without the heater for another couple of hours - female student flatting (Respondent 10)

I'm one of those people who naturally gives off a lot of heat so I've always been able to handle the cold very well.. but I wear thick insulative flannel clothes ... jackets around the house ... while I recognize it's cold ... cold itself isn't a problem for me ... whereas my flatmate will wear 4 or 5 layers and will still be freezing ... so she'll try to wrap up ... she wants to use the heater but she also wants to not have to spend money on power .... our latest power bill was a $118 ... over last winter's power bills were over $200 - male student flatting (Respondent 4)

Yes, like I said I tend to not turn the heater on or only turn it on for a few minutes every couple of hours ... I'll spend most of the time in my room under blankets ... I'll be more willing to have the heater on for longer if the heat stayed around ... but when the heat is not sticking you are just throwing money out the window ... literally! So yeah ... I prefer to keep the place warmer ... it'll certainly keep my other flatmate happy ... but it's difficult. My flatmate occasionally borrow my fan heater because we don't sleep at the same time either ... once I'm done warming up my room for the night I'll leave my fan heater outside the door and she'll collect it if she needs it ... it works for us now because she works nights shifts but it wouldn't work if we were here at the same time ... it's not what I call the ideal situation ... the way we heat the house or don't heat ... but we get by ... we drink a lot of warm drinks ... so yeah ... you find ways to get around it ... I've been flatting in Dunedin for 4 years now so you sort of get accustomed to all the little tricks of how not to be cold in Dunedin - male student flatting (Respondent 7)

It's not so difficult at the moment ... we are careful with how much electricity we use and really control how much we use ... we are ok at the moment but we don't want big electricity bills ... we haven't had to reduce our spending on food or anything ... we can still meet our budget thankfully. I think the way we manage is by controlling the way we use electricity and how much we use. We try to control it by not setting the heater too high and only heating the room we are in. We set the heater on low to take the chill off ... if we don't feel like we are freezing it is fine ... that's enough heat. We heat the room and then turn off the heater sometimes. We had a bad experience with the flat that we lived in before - young couple with no children (Respondent 2)
we had the pre-payment system and it is really expensive on that . . . we used to put $100 or $200 inside the meter and it would use it so quickly and it would glow at us when it got low . . . so we had to fill it up again. It had a indicator that shows that if it's at $20 we have to top it up again . . . we used to put $100 in summer and at least $200 or more a winter . . . that would just heat up the sitting room and the bedrooms will be still cold. That would last us only about 3 weeks . . . that system really costs more . . . and I didn't like it at all . . . the highest bill we pay now on a regular system is about $100 . . . and for the lower bill about $60 and that is much lower than the pre-payment system. It was really stressful to see on the pre-payment metre the bar going down and I have to panic and think I have to put money in quickly . . . we used to top up at the Post office . . . and the post office might be closed during the weekend so we have to be very cautious and not use too much electricity otherwise they will cut off. Thankfully we were never cut off . . . we could always somehow manage to put enough money in the meter before hand - young family with 2 children (Respondent 9)

Well, I'm living from week to week . . . I work part-time and I'm a single mom. The bill last month was 220 a month . . . and I can't really afford that . . . . that's money I could have been spending on food and other things. You would think that with the $200 dollar bill would allow you to keep the house relatively warm, but it's not. It's still cold. We are lucky that we get our firewood free from around the house and from family. We don't have any costs involved in that. I mean I don't really use the heater and we can't really afford to run the heater - single mom with one child (Respondent 14)

Well I have to pay that power bill next week and I'm not quite sure how I'm going to pay that. Since I've switched companies they can't disconnect me (laughs). So if I have to pay it basically we'll have to starve for a week if we have to pay that. I have no money put away or anything. My mom has helped me out before with food a lot too when I couldn't afford to buy it. We can't afford to go out and we don't have people over here either. Just living week to week there's not much money on a part-time job. I'm a kitchen help at a retirement home. It's not easy to get part-time work around kids school schedule. I have a Bachelor's in Art majoring in education but I can't get any jobs. Not quite sure what I want to do at the moment - elderly couple living alone (Respondent 3)

If I can get organised and start a weekly payment for power that might be a bit more manageable rather than a one big payment. I'm living week to week but I know the power bill is coming each month and it's always on my mind . . . you try to put it at the back of your mind but its such a worry. We'll often go without food to afford power. We cut meat use and buy cheaper cuts of meat. I spend a lot of time going through catalogues and looking for specials on super markets. I go to Countdown, pack and save is cheaper but then that's petrol to go there and that adds up. The kids are not really involved in any activities because of the costs involved . . . it's quite embarrassing for my kids . . . they sometimes get bullied at school or alienated because she can't do the things other kids are doing - family with 2 children (Respondent 9)

My son, a teenager can now spend more time in his bedroom because his room is not so cold now . . . we put in another a window in his room . . . so he gets a lot of sun in the afternoon and makes is a lot warmer . . . it made a big difference to his life . . . we can now be in different parts of the house . . . we don't all cram around the fire trying to keep warm . . . it has improved our relationship now that he has his own space . . . now that we have insulation everywhere . . . the fire makes the room too warm at times . . . that's a good problem to have. Now we just have to light the fire only twice while before we had to keep it going all day because we didn't have the insulation then. My son was really good he don't complain about the cold in his room - family with 2 children (Respondent 30)
We spend a lot of money on wood and we really struggle to afford it. If we run out before we get a new load and the wood shop is wet if it's raining, we make other sacrifices to save money for food. Our wood is very expensive, and we use electricity for hot water and a little bit for heating at night. When we use heating at night we set it for very low, and when you wake up it's 15 degrees; it may not be very warm but it's more than cold. (Respondent 21)

I don't put the heater on much. I just try to manage, unless it's very cold. If it's freezing cold I just put the little heater on and stay in bed watching movies all day. I've never been able to afford a heat pump. It's either heat pump or fires. When I need the heater I use it. And I have the TV on almost all day. I'm on disability benefit now and I don't have much to do but watch TV. My bills are pre-paid by WINZ on budget wise. (Respondent 17)

I can tolerate to the point where it gets unbearable not to have the cold. If I was doing it myself I would find it hard. I have problems with paying power bills. I had help from the Money Foundation to pay my power debt. I made some foolish mistakes. I got PS3, TV, laptop on HP (Hire Purchase) and I got into heavy debt with the interest they charged. I couldn't afford to keep up with the payments. I had to finally go to a budget advisor and get help. (Respondent 4)

We spend a lot of money on wood and we really struggle to afford it. My wife has arthritis and she really feels the cold a lot and so we make other sacrifices. (Respondent 21)
I manage... I don't 'drink or eat out. I have a very tight budget on benefit and that doesn't leave much money for other things. I just stay at home and chill and listen to music. It can be if I let it... I've been cut off once... I couldn't pay my power bill... and I had to switch companies. You have so many bills at the same time and I just couldn't cope. Usually it's my mom who pays for my gas which is such a big help. My parents always help me out. I only use the living room... especially when friends come over we just put heating here and stay here. The kitchen and my bedroom is the coldest. I rarely go in there. It's easier to heat this room and keep it warm - male student flatting (Respondent 17).

At the moment because I don't have a job it's very difficult financially, so we can't spend money on firewood. So my husband tries to get as the wood was not dry. This is called wood hunting... we can do this because my husband is very strong. He goes into different shops and tries to collect the free wood. Sometimes it's not dry and we didn't have heat that time. This is called wood hunting... we have a trailer... we can do this because my husband is very strong. We need to be able to buy the wood and this takes a lot of time. We only use the wood pump for the first couple of months. Then we run out of money and have to find another way to heat the room. We have to hunt around for free pellets and then bring it home and cut it. When we use the heat pump our energy bills have increased. I have discount if I pay on time with my power company. I get 10 $ off. I get a discount if I sign up with the power company for 3 years - young couple with no children (Respondent 21).

I thought that if I want to get the house warmer I have to turn the heat on. I spend money a little bit that way. My flatmate doesn't heat his heater in the room... he has an electric blanket and he says it's fine for him - female student flatting (Respondent 10).

There's a lot of other people hunting for free firewood too, so it could be a problem too. We always try and to keep up and try to pile up. During these months we try to survive these couple of months. We have to hunt around for free pellets and then bring it home and cut it. When we use the heat pump our energy bills have increased. I have discount if I pay on time with my power company. I get 10 $ off. I get a discount if I sign up with the power company for 3 years - young couple with no children (Respondent 21).

I don't turn the heater on... I try to go somewhere else where it's warm. And we have to turn the heating on... I spend money a little bit that way. My flatmate doesn't heat his heater in the room... he has an electric blanket and he says it's fine for him - female student flatting (Respondent 10).
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<td>I was disconnected for a day. I spent the day calling the power company and I had no power. I went to WINZ but they declined to help in that case because I had two previous times where they helped me with power. But they did eventually help me out. I wasn’t disconnected for long but it was annoying. I’m working with WINZ now and every week WINZ will pay my power company directly. They also pay my rent. SO I have the basics covered. That doesn’t leave enough left over for food... and sometimes I have to go to the church or food bank or Salvation Army for help. I’ve been noticing that I’ve been going a lot more to the food banks in winter. I want to continue the smooth pay with WINZ and have a credit with power so I don’t get disconnected again - single mother with one child (Respondent 1)</td>
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<td>I’ve had times when I couldn’t afford food or top up my GloBug... WINZ had helped in the past. If I’ve got no electricity there’s no friends who wants to come over... this is not the 1800 with candle light on especially if there’s another guy sitting there. I’ve been disconnected once or twice. When I turn the heater on I keep it on in the lowest setting. But the windows are so draughty the heat never stays in. It’s going to cost me a fortune to do the draught stopper tape but if I get one tape and do something that will be better than nothing - elderly woman living alone (Respondent 11)</td>
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<td>We used to go to the doctors and get prescription filled... but there are some months when I can’t afford to do that... or top up my phone... I want to get a proper winter jacket... you know things like that. This week I spent on a second hand winter jacket with a proper hood so I don’t have money for food... I’ve got to get to the food bank and ask if I can get a food parcel this Friday... I don’t ask all the time... just on weeks when it’s hard for me. It’s hard for me to get to town... I don’t have a car and if I take the bus that’s one way bus ride each way... the other day when I went to town the bus broke down and that was an extra three quarters of an hour on top of that. I recently had a stroke and my right hand is numb now... it’s really frightening... it sort of gives you a fright and you lose your confidence and that it’s horrible if you feel your hands are going numb - elderly couple living alone (Respondent 27)</td>
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<td>In the evenings we shut the big curtains that separates the kitchen and the living room and we only heat that living room. The heatpump can take the cold off in the daytime... and we don’t heat our bedrooms at all... unless we have someone is visiting... we have electric blankets to keep it dry... it can be very cold in the bedrooms... we used to climb into bed with hats and scarf... I don’t know how anyone can afford to heat their bedrooms... people should be heating... but we can’t afford it. It’s so expensive... when we were kids we used to cuddle everyone into the same bed and keep warm that way - elderly couple living alone (Respondent 23)</td>
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<td>I have a sickness that makes me prone to pneumonia... and my son has croup growing up. I live and work in this space so I try to keep it from being freezing cold. I know when my room is getting cold because I’ll start coughing... it’s a terrible way to live... we got a dehumidifier... I run it at times. I warm up the room and run the dehumidifier next to my wardrobe to dry it out. In winter in Dunedin you can’t run the dehumidifier unless it’s dry so you have to heat the room up at the same time as well. It gets really damp in the bedroom. When friends come I try to keep the heating up more. When the kids were little we used to just heat one bedroom for us and the baby and the rest of rooms we used at shut off in winter. It’s damp and dark in winter in this parts of the Valley - elderly retired woman (Respondent 5)</td>
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It's freezing ... I have a good heating source ... I have the wood burner and a small oil heater in the bedroom on timer especially if people are coming over. The wood is expensive ... I am on a big slope and I have to pay extra to have it brought up. I only heat the living area ... and I don't heat other areas and keep it closed off. I heat the sitting room first and then at night open the door and it takes the chill off the bedroom and hallway a bit. We get very little sun in winter ... there are a number of things I could do to change to improve things slightly not greatly but the reality is I'm getting old and changes are expensive. I can just afford firewood for winter - single mother with one child (Respondent 22)

I go through about 600 $ of firewood per winter. I stay home a lot now. I've fallen a couple of times in the path while trying to climb up so I don't go out much in winter. I'm hoping to walk somewhere where I can drive into the garage open the door and get into the house. I would still stay in this area with the view. I've been in situations where I've just heated the bedroom and stayed in my bedroom and would just only come out to make a meal and go back to the bed. I'm fortunate now that I don't have a mortgage and things are a bit more manageable now. I don't turn the heater in the room on ... I used to when the fire was going. I'm pretty well acclimatised now. I remember growing up it was cold ... it was so cold we didn't want to get out of bed - elderly retired man (Respondent 3)

Mostly I'm at the library because its nice and warm ... when I'm home I'd rather be in the living room than my room as it's freezing in my room and its warmer here. I sit here with the heatpump on low and a blanket on. In the winter I try to spend most of the time at uni. or library. Although it's freezing in my room sometimes I want to give the couple their space so I go to my room and suffer a little bit. I try to keep warm by snuggling in bed with the hot water bottle ... I wear a lot of layers even in bed - male student flatting (Respondent 4)

I have a car but I can't afford to drive it ... I try to wake up earlier and walk to uni. And with shopping I only buy the necessary items and limit the food I buy ... I never pamper myself or indulge in anything. It's mostly my groceries ... I only buy things that last for a longer time and rarely would I buy meat and only cheaper cuts. Especially fruits and vegetables I try to limit it although its one of things you need. But its very expensive. I have to say that power bills does impact on my social abilities ... I want to go out more but I can't afford it ... and even with studies I find that I have to go to the library because I wouldn't want to be in my room ... I'll be shaking and shivering if I stay in the room ... so I have to go to the library ... so it does limit the things I can do. Actually when I spend time with friends I don't spend any money ... just time with them ... I haven't really gone to a movie or anything like that. I don't have family here or a lot of friends. We were really poor growing up I have this deep desire to save and not spend money - young couple living alone (Respondent 21)

We try to get some heat out there ... into the hallway but it doesn't succeed. The heatpump is in the wrong place ... our powerbills haven't been too bad ... our highest was 150-170 in winter. We were on GloBug but not any more. We went onto it because it was cheaper power ... it would work very well for us and things like that ... we went on it and the first two weeks were very good ... after the first two weeks we were constantly topping it up ... but it still kept changing to orange. We couldn't keep up with it ... 50 $ top ups would last a couple of days. They disconnected us and we were disconnected in June for a week. We couldn't afford to top it up until payday ... so after two days of disconnection we went to top it up on payday but the device showed that it was negative ... we couldn't afford it - young family with 2 children (Respondent 30)
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<td>you top up and it takes off $5 off the bill and we had the previous bill from $70. So we contacted Genesis and they connected us in two days. It was so hard during the disconnection period. It was cold and middle of winter. We stayed at a friends house... she has 6 already there... and it was extra commuting for my partner... he had to walk from Waverly to S. Dunedin to get picked up from work... he was getting home later... we had to try to juggle everything at the same time on the same trip. It was quite hard. We only had $30 left for top up after food... and when we went to top it up it had a negative $8... and $5 for surcharge so that didn't leave us much... young couple with 2 children (Respondent 9)</td>
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<td>I have the heat pump to come in at 6:30am... I have covered the gaps around the house and have put some draught stoppers... the windows are rotten and old... but in the sitting room I have patched them up as much as I can... we don't have a fan in the bathroom so we need to keep the door open after showers... i try to air the house out when I can... I want the heat to be in the room... I don't want my kids going to ice boxes in night time... so at night I put the heat pump on low and try to get the heat in the kids rooms... It's not icy cold down there... its not tooasty but its manageable... there's no heating in the bedrooms... there's some old fireplaces in the room but I've stuffed them with some old batts... that should stop a fair bit of wind coming down. I turn the heat pump off at night... at odd occasions when we had snow days and its like I'll turn it down to about 16 and leave it on at night... young couple with 2 children (Respondent 9)</td>
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<td>It impacts on my other budget and areas... I usually try and pay a little bit through out the month but it doesn't always work out like that... I'm with contact... and I just have a 22% discount if I pay before the due date and I try to always pay it off before then... it works out good... but I just have to make sure I would have paid it last fortnight but there was too many other things... and I had to pay it this week... but paying it all at once is a lot... it's really hard... because I'm also paying for a car and there's rent... you know it's tight. It's been hard and I had to take money from somewhere else... and I had to borrow from friends. I had to go back to Rotorua when my sister died and I had to borrow money to get the ticket. I found that in Dunedin its very damp and things go mouldy very fast... single mom with one child (Respondent 14)</td>
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<td>It's the cold... i've even got thermal on now inside the house... i found even with the heat pump on I'm a lot colder... i'll even go for a walk just to get warm... better than sitting here in the cold. But with the heat pump on it takes the chill off... but when I come home and the heat pump has not been on all day its freezing in here... colder than the outside... its like a ice box. I have an electric blanket and my kids have hot water bottles. It's a necessity here I think. I remember waiting for the school bus in Palmerston North... it was always freezing... but we wore jandals all winter... bare feet... when we were kids... and we didn't feel the cold... i cant remember being cold when i was a kid... elderly woman living alone (Respondent 5)</td>
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<td>It impacts on the way we move around the house... this room is where we live really... and bedrooms are not used... the kitchen we got to be in there... but we try to minimise the time we spend in there. We rented this house because we know the landlord and we needed a space for our dog... but at this stage we are pretty keen to move... we are looking at buying as well in a few years. But I'm keen to move for next year to a place where it's a little bit easier to heat... young couple with no kids (Respondent 21)</td>
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It just means that we have to be a little bit more careful and it makes saving harder. My wife's not working; she's studying. In terms of income, it means that we are saving significantly less over the winter than in the summer, and if we are looking to buy it doesn't look good. It also impacts on transport options—we probably spend less on petrol—so we prioritise instead of driving, we bike to work. So yeah, it does impact how we budget. We have to be careful on how we spend—mostly around on petrol and eating out—a young couple with no kids (Respondent 21).

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<td>Norms, Values, beliefs and norms participants place on energy usage, interactions with practices and coping mechanisms that influence energy cultures conflicting aspirations for warmth, values place importance on heating, constant stress and worry over power bills, strained relationships, shame and hesitation, values heating bedroom</td>
<td>You've got to conserve power... unless you want either have your power disconnected or have a massive power bill at the end of the month which you can't afford... so yeah, I would reduce the power I use... sometimes. My wife and I are from different cultures... we have different ideas on how warm we wanted to keep the house... she wanted to have the house warm all the time, while I was raised to put a jersey on before turning the heating on... so yeah, we were always fighting over the heat pump... eventually we separated because of that. You feel deprived and you can't do anything... you are constantly going without... either it's without power or without food... and you are always cold... there was a time when I only had six dollars a week for food... I was too ashamed to tell anyone... I did it because I went without food to pay the power bills... I had to prioritise, and power was a priority over food - single father with 2 children (Respondent 31)</td>
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<td>when you are student you don't worry about heating... we have a heat pump in the lounge but there's a rule that we won't turn it on unless it's below freezing... we don't heat our bedrooms the small heater uses a lot of energy... we just use hot water bottles and take it to bed... the kitchen is freezing and we don't cook often - male student flatting (Respondent 17)</td>
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<td>Oh, it's very important to heat the house... cos you know you don't want the kids to get sick. I don't want my kids going to an icebox at night so I put the heat pump on low and heat their bedrooms before bed. Keeping warm is very important in our family, we make other sacrifices to save money for wood... we do this because we enjoy the fire... just being around the fire makes you feel good... I believe a fire makes the air in your house fresher too I know it's important to keep the house warm for the baby... and I do try, I mean I'll turn the heat pump on in the kitchen or use the small heater in the bedroom... but it's been very hard, especially with the GloBug method of paying - young family with 2 children (Respondent 9)</td>
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<td>I was ashamed of the way I was living... hiding in the cold... I rarely have people over because it's just too cold in the house... when my daughter came over to visit I made sure that I turned the heating on before she came... she didn't have a clue about how I was living... I was too ashamed to tell her. Oh it is very important cos you know you don't want your kids to get sick... but then again being warm also comes ventilation and you know when we cook and what not lots of steam builds up and even that produces mould and mildew because of the warm you know - elderly woman living alone (Respondent 3)</td>
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when my kids were little I had to have the house heated basically all the time ... for them not for me (laughs) ... but now that they are
getting older and that ... it's easier to manage rather than having a power bill that's so high ... you've got to conserve power at the end of
the day ... unless you want to either your power disconnected or have a massive power bill at the end of the month which you just can't
afford ... yeah. So I would reduce the power I use and not switch on the heater until the kids came. At the end of the day I think energy
is important ... because you know it runs your everyday appliances ... appliance you need ... like your washing machine and fridge ... we
do have a dishwasher but I refuse to use it ... nothing wrong with doing it by hand ... I've never owned a dryer ... cos I think that you
know you've got wind and sun for that ... yeah ... at the end of the day I think if we don't conserve our power we are going to end up with
nothing - family with 2 children (Respondent 24)

It really is important ... well, I notice as I'm getting older that I feel the cold lot more ... I've got so many layers on today and urm ... I
try to put more layers on rather than increase the heat of the heatpump ... but I'm also on medication that makes me feel the cold a lot
more ... so when I was up the hill I used to get dreadful chills and I ... one year here I got them as well ... and then the doctor changed
my medication which helped a lot but I notice that as soon as it starts getting cold it starts coming back again ... I don't know what
could be done but I'm sure it must make my health better if I'm warm ... for one thing its less stress on the body ... and to feel more
comfortable its easier to do things ... otherwise when it gets really cold I go to bed ... I just stay in bed ... its the warmest place - elderly
retired man (Respondent 23)

It was a lot harder when I was younger and I had a mortgage to pay ... I was young and I wanted to go out and do what my friends
were doing but I didn't have the money and I didn't have the strength ... and I was stuck at home ... I used to long to get out ... go to
certificates ... go to films ... do all the things that everybody likes to do from time to time ... even just going out and having a cup of coffee
... couldn't afford to do that. In the early days, before I was using credit cards and such ... I was frightened that I would go over the
edge ... I would get cash out for what I was allowed for food and that's very stressful going around working out how much I could spend
when I wasn't well ... my brain wasn't working very well ... I was so tired ... but if I had a dollar over I would gamble and I would buy an
instant Kiwi and quite often I would double my money and get two dollars. So I spent one and get two back and that was my social life ... going out and having a cup of coffee ... I don't think people realise how
important it is ... certainly WINZ don't ... they don't see that as necessary ... you can't work and I was very grateful to have money to
eat ... to pay my bills ... but just to have a little bit over to make you feel that you are still human ... (sobs ... crying ...) ... but as I've got older it's still important but not quite as important at least as it used to be - elderly retired woman (Respondent 11)

I'm positive these are all connected ... when you feel so deprived that you can't do anything ... and you are constantly going without ... and
you are always cold ... and there was a time when I only had six dollars a week for food and I went to WINZ three times with all my
receipts proving that because the interest rate on my mortgage has gone to 9% ... but I did get some assistance for the mortgage but 26$ week
didn't go very far towards paying the mortgage and a lot of it went towards the mortgage and it left me 68 for food and I was hungry ... I was really hungry and I was too ashamed to tell anyone (sobs ... crying ...) ... and they didn't give me any emergency money for
that ... they didn't have food banks in those days ... I think people now get a lot of assistance but that wasn't available then. And I was
young ... I think it's easier to get assistance if you are older ... so it is now I look and always have looked healthy but I can't do what I
want to and I can't take care of myself ... I just craved to go out there and do things - elderly retired woman (Respondent 5)
It affects my daily life in every way... I'm in constant pain... my muscles and joints... everywhere... but the greatest difficulty is in thinking... I get a brain fog... I've never known exhaustion like this... you eat but you wake up no better the next day... I generally wake up feeling worse than I did the next day. So over the years I've learnt that it's a matter of managing it... its like having a budget for your money, a budget for your energy... only its harder to budget because... you are not sure exactly how much you've got and when it will suddenly be depleted - elderly couple living alone (Respondent 24)

There wasn't a great deal of quality of life... and it was hard even making conversations with people because I was out of what they were doing. I wanted to talk about how I was feeling but those kind of conversations scare a lot of people... that's what I've found (laughs). And there was no quality of life... isolation, couldn't get out... staying in bed all day... confining myself to just one room. My life shrank to a room... it shrank to a bed... my life was reduced to a room. I started losing touch with people and there would be days that I wouldn't get out of bed... out of the house. It was just dreadful in the winter... it would have been nicer if I could afford to heat the house - elderly retired man living alone (Respondent 23)

Very hard... but I did... and I did it because I went without food to pay the power bills and I went without buying clothes or anything for myself... I had to budget... I had to budget very carefully to not get into power debt. And I had to have priorities... and power was a priority over food... but it all has consequences... I developed gum disease... I couldn't afford to see a doctor or a dentist... people don't generally come across it these days but I think that might have been it (lack of proper food) that caused it (gum disease)... so it was either go without food or go without power - single mom with one child (Respondent 25)

I'm sure if I had a warm house and I had enough money for food... I'm sure my health would have been better... I may well have recovered... I may have been able to get back to work - single mother with one child (Respondent 25)

When I was first here I had flatmates and it was great... but many of those flatmates came from hot climates and they had the heaters up all the time... the winter bills were around 700... to keep the rooms warm in winter when the house wasn't properly insulated was a major battle... we had fan heaters and stuff... all the time - single father with 2 children (Respondent 31)

We keep heaters for guests... old panel heaters and oil heaters... we keep the house warm when people come over and never let on that we have issues with heating. Also, there's a lot of moisture underneath which seeps through the floors... and so with my sons allergies as soon as he walks into this place he starts sneezing... gets the gummy eyes and all those sorts of things which is a real bummer. I'll sell the place when I can and in the mean time I'm trying to maintain things as much as I can and try not to notice things. I also thought about putting heat pumps in but it wasn't economical to do that... we'll need too many units to heat upstairs and downstairs and we'll be pumping heat all the time... and I just couldn't afford to do it (put heat pumps in) - single father with 2 children (Respondent 31)

Definitely... I think keeping warm is important... and even things like the fridge we have here is a pretty old fridge and I'm sure it cranks up the power quite a lot... so living in a rental house with energy inefficient appliances doesn't help at all. You often take what you're given and quite often they are old appliances but you don't have a choice - female student flatting (Respondent 10)
Table: Theme Sub-theme Code Example

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<td>The thing people don't realize is that this is an issue not just for the kids but for the adults as well... power bills and things like that cause stress for the adults and parents as well... it has these flow-on effects that people don't see... the power bill goes up there's less money and more stress and so that's quite an important thing to note - young family with 2 children (Respondent 19)</td>
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<td>It hasn't impacted on other things much. We've had our first touch of snow and it's been a bit cold and that but we haven't even hit winter yet and it's only going to get worse... it probably impacts on things in winter time and right now it's impacting on the fuel for the car. We have a $120 limit for our food shopping and that's the basic food. I can't afford to lose any money from the food budget, I'd rather take it from somewhere else like the petrol money but if I had to I would probably have to take it from the food bills next. My main priority is rent first, power, food, petrol and everything else after that. Power is pretty high up there... keeping warm is a must. I don't like being cold... I imagine the girls doesn't like being cold either. We leave my friends' houses before and the girls are like 'man, that's a cold house!' and then we come in here it's nice and cozy. You know if I can provide warmth for my girls it's one thing I can do as a mom - single mom with 2 kids (Respondent 32)</td>
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<td>Yes, it is an issue... you know, I'd like to be able to able to jump on the (power company website) daily to check my usage... or I feel that if I had double glazing I could switch off the night store heating during the day when it's sunny. I would like to not worry about where the money is going to come from to pay the power bills... not having to worry about whether I would have enough to fill the car - elderly woman living alone (Respondent 5)</td>
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<td>I work at the (community) food bank... and working there I see lots of people in this situation. 7 times out of 10 they are coming in to get food because they've had a high power bill to pay - elderly woman living alone (Respondent 5)</td>
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<td>That it's cold and you just gotta leave and come home and be warm... you feel a bit rude asking 'do you have a blanket?' or you know... they are obviously cold and you are trying your best to hide the fact that you are cold so not to make them feel uncomfortable but it's cold and you just wanna go... and they also know it's cold and they might be thinking 'oh I hope they don't feel it's cold'... it's very awkward... I've gone into some people's houses that it's so cold that there's steam coming out of your mouth... during winter... me and the girls just love coming home, chucking on our onesies and have the slow cooker going all day... light the fire and just relaxing... it's just homely and cozy. So when I go into someones home and its not like that you just wanna leave. I remember years ago I was going around on supervision for the Department of Corrections and we went to one persons home and he was that cold that he had moved into the kitchen and his heat was coming from the light bulb... it was just heart breaking and it was horrible. He had a heater and that but he just couldn't afford to turn it on - family with 2 children (Respondent 9)</td>
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<td>We think about our foot print that we are leaving to the environment... we know we're not doing a good job but when you wanna keep warm you know your family comes first... it comes first before the environment. My kids come first... it's a horrible way to think and for some people the environment comes first and I'm not trying to little them or anything because it's (the environment) is important... but as important as it is to them my family is to me. No mom wants to see their kids sick from lack of keeping them warm - single mom with 2 children (Respondent 20)</td>
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There was a time when we didn't have the means to get firewood and we just had a silly wee heater and it wasn't keeping us warm and we would have to pile clothes and sit in one room. We would drag the heater into the sitting room and close everything up and just live there. Even sometimes it was warmer in the car with the heater going... just drive around... I never wanna go back to that life again. There was a time when I couldn't turn on the night store heater and it was really cold... even during the night.

I have to say that going back to when I was a young child and looking at how things are now, I would say that poverty has gotten worse... I think that charity is rarer than what it was... I do remember my mom getting lots of support, but amongst the people I know I'm realizing that there are so many people in the same situation that we are in... the likes of not wanting to turn their heaters on because they are worried that they won't be able to pay the bills... there are people like that everywhere... it's a sad thing really... if I could trade everything I could for a warm house, I would... but guess what? as a solo parent can you imagine the dream of owning a house is a very long way away... and that's probably never gonna happen... single father with one child (Respondent 8)

The kitchen and partly our living room and bed I would say that it's pretty cold... we heat the kitchen and mostly live here. I try to have a shower in the morning... I don't like to go to bed with wet hair... I wear warm clothes, pile up clothes even in the house. I try to have short showers... and I don't shower daily... I would sometimes take a bath to save on hot water. I don't take a bath often... I find it hard to get out of the bath (laughs)... and I use hot water for dishes... and we use the heat pump on low just to take the chill off. So we try to keep the rooms we live in warm. Housing NZ gave us carpets... right through the whole house... it's been really nice to have the carpets... they even put a rangehood for us. Not most of the time... I find the smooth pay very affordable and manageable... but then sometimes I wonder... it's not even winter yet and yet I'm paying 50 a week on it... just to keep up with payments... young, single living alone (Respondent 17)

I wonder if we need to put a TV in here (in the kitchen where they do heat with a small heater) and just heat one room instead of having the heat pump going, it would save power wouldn't it... but I don't know where we'd put the TV in here... there's no space and it's a very small room... I find it very cold, especially in my room. We heat the kitchen and mostly live in this room. I try to have a shower in the morning... and I don't like to go to bed with wet hair... I wear warm clothes, pile up clothes even in the house. I try to have short showers... and I don't shower daily... I would sometimes take a bath to save on hot water. I don't take a bath often... I find it hard to get out of the bath (laughs)... and I use hot water for dishes... and we use the heat pump on low just to take the chill off. So we try to keep the rooms we live in warm. Housing NZ gave us carpets... right through the whole house... it's been really nice to have the carpets... they even put a rangehood for us. Not most of the time... I find the smooth pay very affordable and manageable... but then sometimes I wonder... it's not even winter yet and yet I'm paying 50 a week on it... just to keep up with payments... young, single living alone (Respondent 17)

I certainly try to limit myself to one room a lot more often than I would otherwise... I like... for recreational activities I'm a gamer... I play PlayStation and rather than playing 20 minutes on that and going doing something else in my room and then coming back... I'm more likely to stay in one spot wrapped up and just committed to that activity for a few hours because I've vested that energy in it... so I'm more likely to limit my exposure... too much of a hassle... I don't enjoy getting dressed... so I don't like going out... and I don't like spending time with people... and I don't like getting ready to put on clothes... young, single living alone... (Respondent 20)
I suppose on sunny days I try to make sure I’m here to open up some of the house, let some fresh air in to try to eliminate the dampness. I can’t just be at uni 9-5, M-F because if I don’t take the time to air it out this house will get really really damp and because the windows are so insecure I can’t leave it open and leave. Washing is an issue in the sense that I would prefer to use the line, but in Dunedin you are lucky enough to get a sunny day at all ... and the washing line catches even less sun than the rest of the house. Washing line is in the back yard ... the backyard is even less sheltered from the sun. I pick when I do my washing very specifically and I would try to get my washing out on the line to get the vast majority of it dried that way and maybe give half an hour in the dryer if I need to ... my flatmate on the other hand because she’s at work or asleep just uses the dryer for all her washing which is a major contributor to our powerbill and it is also a huge problem with humidity - female student flatting (Respondent 10)

Being warm is not super important ... maybe a little bit ... we can stand to be a little bit cold ... we can always put more clothes on and we can sleep in a not very warm bedroom and have the blankets on ... so we can just heat up a little bit ... just keep ourselves warm that’s enough. We don’t need a very warm house ... no! My daughter sometimes thinks it’s cold, especially in the morning when she tries to get out of bed but the other times she’s fine because we heat up the relatively small area and she will feel comfortable and we just stay in the small area. So every time we go into the bathroom and go into the toilet and it’s really cold for her - single mom with one child (Respondent 1)

Yes, energy is an issue ... especially for electricity ... other parts we think it’s ok ... we think all the trouble come from heating problems ... our chimney is broken ... but we recently got some firewood thinking the chimney might be fixed ... but to our horror our firewood was stolen ... and then we found the chimney’s blocked ... so all these problems are a heating problem - young couple with no kids (Respondent 21)

Because of the theft my husband really feels sad and also Sisi’s getting sad ... she’s constantly asking us ‘are there any thief outside? are they trying to steal our wood again’ ... we live in constant worry and fear and we have no sense of security in our homes. My husband is very cold in the house during the day ... he just wears a lot of clothes ... and maybe goes to the kitchen ... but sometimes when it’s really cold on the rare occasion he would turn on the heater. We rarely have people over because it’s just too cold in the house. And even if we do heat one room then we would have to just crowd around in one room - young family with one child (Respondent 19)

We found that being in a rental we couldn’t change much of the house ... we could just change ourselves ... put more clothes on and put a heater on ... that’s all we could do ... if we put some new curtains or put insulation on it will cost a lot ... and we don’t intend to do this as we don’t intend to stay there - young couple with one child (Respondent 19)

I mean if power was cheaper we would have money to do other things. It’s very stressful when the powerbill comes in. It would be nice to turn the heaters on in winter and keep the house warm, especially for my kids but I can’t justify spending that on power because I can’t afford it - single mom with 2 children (Respondent 25)
When my son was young he had asthma... he doesn't have it any more and I believe that's because we are very careful about moisture and any fungus or mould in the house... its a terrible problem for asthma... he doesn't want a heater in his room now... thats fine.

When my wife was getting her PhD scholarship money we used that for insulation and gib boards and moisture controls... now the money has run out and we are in trouble... she has no money. She's almost finished her PhD... so we are hoping that she would get a publishing grant...

You often hear people talking in the news that New Zealand needs affordable houses... in Dunedin, the houses are affordable but they are not habitable. They are simply not liveable. The houses in Dunedin are killing people... you can argue about the poor insulation or heating problem... it's not solved by just having proper insulation... we don't have an affordable housing problem in Dunedin. Everybody can fix it... but you must be the owner of the house to make these changes... if you rent the house you can't change the house... wall insulation should be included... It's a very good idea... family with 2 children (Respondent 9)

It's very important for me... I get sick very often... so it's important for me turn the heater on and keep the house warm... so I do turn the heaters on when I can. If I didn't have this debt with the HP I could manage my budget better. It's good... I am able to manage my rent and power and get a hold of my finances. This is a small nice apartment and it's a good place. I volunteer and work at Regent Theatre so it's nice to have something to do sometimes - young male living alone (Respondent 7)

I don't thing it's been easy. The last place I lived had only a log burner... no matter what you did the place was bitterly cold... there was nothing you could do... as soon as you walked in to the flat you were cold... we just wrapped ourselves in blankets and tried to just manage. I was always sick just because it's always been cold. I have friends who live in cold houses with coughs, asthma and wheezing. No wonder they get sick... their houses are freezing. They can't turn the heater on... there's a lot of financial stuff. Once that gas bottle runs out it runs out... if it runs out in the weekend I don't have a place to fill it up. It had run out in the past and I just survived with extra clothes on - retired elderly man (Respondent 23)

I think it is important for everyone... I love to be warm. I grew up in Ukraine so we have different climate here... it is cold but during winter we have central heating... it is different... I have to wear the double glazing sometimes... I open the windows and air it out... but it's very draughty during the times it's closed as well. We have really had to combine the gas. If it was just gas we couldn't... young couple with no children (Respondent 21)

When we were young my flatmates... we didn't have any money and I believe that's because we were very careful about moisture and any fungus or mould in the house... its a terrible problem for asthma... we didn't have a heater in our room ever... hate having the heater on... there's a lot of financial stuff. Once that gas bottle runs out it runs out... if it runs out in the weekend I don't have a place to fill it up. It had run out in the past and I just survived with extra clothes on - retired elderly man (Respondent 23)

So pretty much I spend all my time at home as I don't have a job. Int he morning I'm hiding in the office as it has the heatpump and any way we can get some money open on wood - young couple with no kids (Respondent 23)
I am comfortable when I heatpump going. Some cold morning when it was 2 degrees outside it was 2 degrees inside as well, especially in our bedroom with condensation. With the heatpump we can barely survive the morning. We don't get much sun in winter. Although this side is better than the otters side of road where they don't have any sun - young couple with no children (Respondent 21)

It's not so bad ... we found our way to survive ... we try to be optimistic ... it can be very cold in your house ... if you go outside it could be warmer outside ... winter is not so bad just another season. We always need to count how much money is available after paying rent ... we try to do home baking and make our own jams and try to survive from week to week. I am always thinking about how much money is left and where I can spend it. We try to cook a lot of soups during winter and have less meat. In winter we don't go out to eat at all ... or we don't have anyone over ... if you had to think and calculate how much you have left then even a bottle of wine becomes expensive - retired elderly couple (Respondent 27)

I want to save ... I don't want to spend too much money on power ... I want to save too. I know it's winter and I don't want to get sick ... and if I get sick who's going to bring in the money. So you just got to be creative. I manage by using less hot water. My power company increases the kw per unit in winter ... it goes up in winter and its more expensive ... so I use less hot water and really limit the hot water I use. I do quick showers ... as quick as possible - female student flatting (Respondent 10)

Very important ... I refuse to freeze my arse off ... but that damn glowbug is so expensive. A month before winter we had snow on the ground. If it's really cold I'll turn the heater on low and leave it on. But unless it's snowing and really cold I don't turn the heater on. I don't use hot water much. I don't heat my bedroom. I'm very power conscious ... I got that from my mom. I'm very aware what power costs. I'm tracking my power uses online and I know how much I consume. I lost my Globug swipe card a month back ... they charge for the cards ... you need $25 for the swipe card ... I didn't have that money to spare for cards. If you run out of power on a Monday and you don't get paid until Thursday ... they can actually extend your power ... and they can even transfer your negative balance to a debt balance. The debt balance takes of 25$ for what you put on a card. The negative balance is taken off straight away from your top up and that doesn't leave much balance on it - single mom with one child (Respondent 1)

I grew a very deep fear of the first couple of winters I was here. I would be downstairs pulling boards off the bottom of the house and sawing them up to trying to keep my kids warm enough. I wasn't well enough to chop wood or didn't have wood and going out and just ... and persevering for food and trying to be warm enough and trying everything ... being bundled up ... we didn't have curtains ... the curtains we had were very thin ... it was just ... and you don't want to be sick ... I hated it ... I hated it because your health suffered and it was really hard work and one winter someone at the Marae gave us wood ... it was always a struggle ... (cries) we don't even run a car now ... because we can't afford to put in gas ... this year I didn't end up getting a lot of wood because my husbands' away ... the church gave us some wood but I know it's not going to last ... because its always colder onto solstice ... and one of the good bits about having the big trees in the yard is if it dies then that winter we'll have firewood ... yay we'll have wood next year from it ... but then we have to cut it and it might be a big bill to have it cut down - elderly couple living alone (Respondent 24)
We don’t go out for meals at all . . . it’s terrible .. I’m 51 and we still juggle . . . we have no savings . . . it’s a big house . . . we can’t afford to heat the house . . . we want to sell this house eventually and move to a smaller place . . . it’s such a beautiful house and we are so attached to it. It needs a lot of maintenance and have deferred maintenance year by year and that’s not good. One day it’s going to be past a point when we can’t afford to keep on deferring repairs anymore . . . our kids had to support themselves from a young age for a large extent . . . they know that mom and dad can’t pay for everything . . . when they were really broke they came and lived at home. I come from a large family - elderly couple living alone (Respondent 27)

there was 7 of us . . . in a state house in Perirua . . . we grew up in poverty but we had skills and know how to get by. I make a lot of my own things, cook and preserve. Growing up I was a state house . . . the fireplace was cracked . . . there were no heaters . . . if you were cold you put a jacket on, more clothes on . . . we had huge piles of clothes on and got into our sleeping bags . . . It was really cold growing up too. I still carry that mentality with me . . . we still have jumpers and blankets and get used to it . . . I’m comfortable in 8 or 10 degrees - retired elderly man (Respondent 11)

I think my mindset has changed gradually to trying to search out cold from suffering . . . but I’m still . . . things like going and looking for wood, taking boards out of your own house to because you can’t afford wood. It has made me really think and search out ways to manage and cope with the cold - single father with 2 children (Respondent 8)

The government should take over some of the social services agencies are doing . . . it’s not fair on the social services agencies . . . RSA provides people with a connection with a history, a grandfather who served in the services . . . we provide them with firewood and coal for free. Even now grandchildren of those people can get the free firewood and or coal if they require. It’s provided free and based upon need in the department . . . if you don’t live in a healthy environment you do get illness associated with that . . . and that gets up costing the government . . . in doctors or hospital bills. So it’s the advantage a government to do it too . . . but they don’t consider putting the ambulance at the top of the cliff instead of the bottom . . . they are very good at insulation . . . but there’s no sense of providing the heating if there’s no heating . . . but insulation alone is not enough . . . heating should be the next step. And as need presents government can help with heating. Something as simple as a wet back which provides heating and hot water. Or solar panels in areas acceptable to solar could be another option. This area could be alright for wind generation - couple with 2 children (Respondent 2)

Actually the cold does get to you . . . I constantly have runny nose and coughs . . . in winter it’s really hard. It is important . . . but I prefer to save to be honest. I’m a student and it’s hard because I’m on a very small student stipend and trying to manage with that is very hard. We used to divide the heat bill evenly . . . but that wasn’t really fair since I wasn’t getting any heating in my room . . . the other flatmates get most of the heating . . . so it caused a lot of stress and arguments over that - young male flatting (Respondent 4)
Very important . . . but if it's cold and it's a fine day . . . I turn off the heat and open up the windows . . . because it's important to air the house out I believe. And of course you get condensation on the windows . . . especially in my room I get condensation. I wipe the windows down - elderly woman living alone (Respondent 3)

We didn't feel cold . . . we had a fire and it was sufficient . . . it's hard now because I know that every month I'll have a bill over 200 . . . I have to keep an eye on the expenses. The first winter I was here I was so paranoid about using the heatpump and I had no idea the effect it will have on our power bill . . . we've never had a bill like that . . . but with the heat pump it's big bills. I'm very reluctant to use the dryer because it just increases our bills . . . but there are days you have to with four kids - young family with children (Respondent 9)

Yes definitely . . . I suppose the big thing I notice is the difference in power bill in summer and winter . . . the room in summer gets reasonable sun and is comfortable . . . and our power bill was about 40 and now its winter and we have to heat this room . . . especially since the heatpump is in the hallway and we have to heat this room . . . its 3-4 times higher. It's not a significant hardship . . . but it is a large chunk of monthly expenses - elderly couple living alone (Respondent 27)

It's probably more important for my wife than me . . . for me it's important to heat the living area but if my wife had her way she would heat the whole house and wouldn't care about the costs . . . but we can't afford that - young family with kids (Respondent 30)

When you are a student you don't worry about heating . . . we had a heatpump in the lounge but there was a rule that we won't turn it on unless it's below freezing - female student flatting (Respondent 10)

I'm positive those are all connected . . . when you feel so deprived that you can't do anything . . . and you are constantly going without . . . and you are always cold . . . and there was a time when I only had six dollars a week for food and I went to WINZ three times with all my receipts proving that because the interest rate on my mortgage has gone to 9% . . . but I did get some assistance for the mortgage but 20$ week didn't go very far towards paying the mortgage and a lot of it went towards the mortgage and it left me 68 for food and I was hungry . . . I was really hungry and I was too ashamed to tell anyone (sobs . . . crying . . . .) . . . and they didn't give me any emergency money for that . . . they didn't have food banks in those days . . . I think people now get a lot of assistance but that wasn't available then. And I was young . . . I think it's easier to get assistance if you are older . . . as it is now I look and always have looked healthy but I can't do what I want to and I can't take care of myself - elderly woman living alone (Respondent 18)
I just craved to go out there and do things. I’m positive these are all connected... when you feel so deprived that you can’t do anything...and you are constantly going without... and you are always cold... and there was a time when I only had six dollars a week for food and I went to WINZ three times with all my receipts proving that because the interest rate on my mortgage has gone to 9%... but I did get some assistance for the mortgage but 26$ week didn’t go very far towards paying the mortgage and a lot of it went towards the mortgage and it left me 6$ for food and I was hungry...I was really hungry and I was too ashamed to tell anyone (sobs... crying...) ... and they didn’t give me any emergency money for that... they didn’t have food banks in those days... I think people now get a lot of assistance but that wasn’t available then. And I was young... I think its easier to get assistance if you are older... as it is now I look and always have looked healthy but I can’t do what I want to and I can’t take care of myself... I just craved to go out there and do things - elderly woman living alone (Respondent 5)

Table A.1: Thematic analysis sub-themes and coding examples.
<table>
<thead>
<tr>
<th>Main theme</th>
<th>Sub-theme</th>
<th>Verbatim data</th>
<th>Missing elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beliefs and norms</td>
<td>Warm house not a priority</td>
<td>“I always lived in cold houses growing up so I’m used to piling on clothes to stay warm”</td>
<td>• Energy needs and requirements</td>
</tr>
<tr>
<td></td>
<td>Prioritise keeping house warm</td>
<td>“We don’t need a very warm house”</td>
<td>• individual preferences</td>
</tr>
<tr>
<td></td>
<td>Prefers heat pumps</td>
<td>“I like to enjoy the fireplace when I visit my parents house”</td>
<td>• household circumstances</td>
</tr>
<tr>
<td></td>
<td>prefers fireplaces</td>
<td>“as a student we have a rule that we don’t turn on the heat pump unless it’s below freezing outside”</td>
<td>• effect of income restrictions</td>
</tr>
<tr>
<td></td>
<td>sense of frugality</td>
<td>“I don’t heat the bedrooms”</td>
<td>• time spent on sourcing energy services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“I don’t think it’s necessary”</td>
<td>• support mechanisms available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“I’ll be more willing to have the heat on if it stayed around for longer”</td>
<td>• motivation to make change</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“heating is important for my children, I don’t want them to get sick”</td>
<td>• motivation to tap into insulation and heating subsidies</td>
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<tr>
<td></td>
<td></td>
<td>“Heating is more important for me than food, I can adjust and manage the food, but a warm house is above that”</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>“I spend a lot of time collecting free firewood, I try to even take the kids out with me”</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>“When I see free firewood it’s a very satisfying feeling to collect them”</td>
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<td></td>
<td></td>
<td>“This is a rental house, I don’t want to put too much effort into changing the heating structure”</td>
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<td></td>
<td></td>
<td>“Keeping warm is very important for our family as we have a disabled child, we make other sacrifices to be able to do that”</td>
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<td></td>
<td></td>
<td>“I believe the fire makes the air in the house fresher too”</td>
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<tr>
<td></td>
<td></td>
<td>“I know it’s very important to keep the house warm for the baby”</td>
<td></td>
</tr>
<tr>
<td>Main theme</td>
<td>Sub-theme</td>
<td>Verbatim data</td>
<td>Missing elements</td>
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</tr>
<tr>
<td>Daily practices and social rituals</td>
<td>• Enjoys frequent fires</td>
<td>• “We use the hot water bottles and take it to bed to stay warm”</td>
<td>• Coping mechanisms of different family groups</td>
</tr>
<tr>
<td></td>
<td>• Spends time collecting firewood</td>
<td>• “We rarely spend time in the common area, it’s just too cold”</td>
<td>• energy usage patterns and preferences of different cohorts</td>
</tr>
<tr>
<td></td>
<td>• Spends time with family sourcing wood</td>
<td>• “I try to make instant meals so I don’t have to spend time in the freezing kitchen”</td>
<td>• behavioural patterns of energy aware groups vs non-aware groups</td>
</tr>
<tr>
<td></td>
<td>• Adjusting other households needs for heat</td>
<td>• “any chance I get, I go outside and spend it in public places that are heated”</td>
<td>• impact of energy on wider quality of life</td>
</tr>
<tr>
<td></td>
<td>• Taps in services such as foodbanks</td>
<td>• “we are very careful about the appliance we use and we keep track of how we use power”</td>
<td>• how norms and beliefs are linked to energy decisions and every day behaviour</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• “I always try to turn the heat pump on before the kids come home from school”</td>
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<td></td>
<td></td>
<td>• “I like to turn the night heater on before going to bed”</td>
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<td></td>
<td></td>
<td>• “I go out and collect firewood, I love spending time with my son in the woods”</td>
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<td></td>
<td></td>
<td>• “Sometimes in winter, to save money for power bills we walk and not spend as much on petrol, putting that money towards power”,</td>
<td></td>
</tr>
<tr>
<td>Main theme</td>
<td>Sub-theme</td>
<td>Verbatim data</td>
<td>Missing elements</td>
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<tr>
<td>Material Culture</td>
<td>• Constrained by income heating and insulation is a barrier limited sun portable heaters or fireplace living in rental property</td>
<td>• “The heat pump is in a weird place, we hardly get any heat out of it to the living room, it’s in the hallway” • “There’s an old fireplace in this house, the heat just goes out no matter what we do” • “We hardly get any sun in this house, we lose the sun by 3pm in winter and don’t get any afternoon sun at all” • “Having a GloBug is an expensive way to manage your energy, they charge higher for everything” • “We are lucky we get free firewood from the church” • “This house is too big and difficult to heat and it’s hard to manage for one person” • “This is an old fireplace, but I really enjoy it, the fire connects me to other people around me” • “This is a rental house, there’s no insulation or proper heating and the landlord just doesn’t care”</td>
<td>• Significance of living condition • whether it is a rental property or owner occupied • arrangement and availability of heating appliances • orientation of the house to the sun • availability of support mechanisms like free firewood • connection of material culture with social aspects of energy</td>
</tr>
</tbody>
</table>

Table A.2: Flow of data from narratives to new model (refer to Chapter 7)
Appendix B

Data collection documents
Assoc. Prof. B Wooliscroft  
Department of Marketing  
Division of Commerce  
School of Business

Dear Assoc. Prof. Wooliscroft,

I am again writing to you concerning your proposal entitled “Energy and quality of life in New Zealand”, Ethics Committee reference number 15/020.

Thank you for your letter of 9th March 2015 addressing the issues raised by the Committee.

On the basis of this response, I am pleased to confirm that the proposal now has full ethical approval to proceed.

Approval is for up to three years from the date of this letter. If this project has not been completed within three years from the date of this letter, re-approval must be requested. If the nature, consent, location, procedures or personnel of your approved application change, please advise me in writing.

Yours sincerely,

Mr Gary Witte  
Manager, Academic Committees  
Tel: 479 8256  
Email: gary.witte@otago.ac.nz

c.c. Assoc. Prof. R W Aitken    Department of Marketing
Energy and quality of life in New Zealand

INFORMATION SHEET FOR PARTICIPANTS

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. If you decide not to take part there will be no disadvantage to you and we thank you for considering our request.

What is the aim of the project?

This project is being undertaken as part of the requirements for a Doctor of Philosophy at the University of Otago, Dunedin, New Zealand. The aim of this research project is to explore the impacts of energy hardship on the quality of life of households in Dunedin, New Zealand.

What types of participants are being sought?

Participants who are experiencing some signs of energy hardship are sought: signs such as difficulty keeping the house warm, difficulty paying power bills and experiencing fuel debt among others. All participants should be above 18 years of age and only one participant from each household is required.

What will participants be asked to do?

Should you agree to take part in this project, you will be asked to participate in an interview with me about your experiences and views with regard to what energy consumption means to you and your household. This interview will be held at your house or a place of your choice. Your interview would be no more than an hour.

What data or information will be collected and what use will be made of it?

This project involves the use of interviews which will be recorded on a digital voice recorder with your permission.
Every effort will be made to maintain the anonymity of the respondents. In the event that the line of questioning does develop in such a way that you feel hesitant or uncomfortable:

- You may decline to answer any particular question(s)
- And/or you may withdraw from the project, at any stage, without any disadvantage to yourself of any kind.

The results of the project will be submitted as a PhD thesis, and may be published as academic articles. The thesis will be available in the University of Otago Library (Dunedin, New Zealand). You are most welcome to request a summary of results of the project.

**Can participants change their mind and withdraw from the project?**

You may withdraw from participation in the project at any time and without any disadvantage to yourself of any kind.

**Is there a reward for participating in this study?**

Yes. Each participant will receive a sum of $20 grocery voucher for participation.

**What if participants have any questions?**

If you have any questions about this project, either now or in the future, please feel free to contact either:

Fatima McKague  
PhD Candidate  
Department of Marketing  
University of Otago  
PO Box 56  
Dunedin  
New Zealand  
Email: fatima.mckague@otago.ac.nz  
Tel: 03 479 3928

or  
Assoc. Prof Ben Wooliscroft  
Department of Marketing  
University of Otago  
PO Box 56  
Dunedin  
New Zealand  
Email: ben.wooliscroft@otago.ac.nz  
Tel: 03 479 8445
This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph. +64 3 479 8256). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.
Energy and quality of life in New Zealand

PARTICIPANT INTERVIEW GUIDE (for interviewer only)

☐ Introduction by interviewer: Thank you for agreeing to participate in this study about energy and quality of life in New Zealand. I am interested in the houses that we live in, and how we use energy in our homes. I will be asking you some questions about your home, and energy habits in your home. Everyone’s answers are different, and there are no right or wrong answers, you can talk about whatever you like. If there is anything you feel uncomfortable answering you can choose not to answer that question.

☐ Here is the consent form. Please read it and then sign it to indicate that you agree to the terms of this study and understand what it involves.

☐ These topics will be covered in the interview:

1. The house you live in (Tell me about the house you live in?)

2. Your energy consumption habits (Can you tell me about how you use energy in your house?)

3. How important is heating or a warm house for you? (probe into beliefs and values)

4. How energy impacts on your quality of life (In terms of energy, what does well-being and comfort mean to you? How is your quality of life?)

5. Energy experiences in your neighbourhood, or among people you know (Do you know of anyone experiencing energy hardship?)

6. Coping mechanisms for energy difficulties (can you tell me how this affects their daily lives?)
Suburb: _________________________
Age: _________________________
Gender: _________________________
Ethnic group: _________________________
Approximate annual household income: _________________________

Household type:
☐ Single person
☐ Retired
☐ Sole parent with children
☐ Two-parent with children
☐ Household with no children
☐ Other: _________________________

Tenure:
☐ Private landlord
☐ Owns with mortgage
☐ Owns mortgage free
☐ Housing New Zealand
☐ Other: _________________________

Age of house:
☐ Pre 1978
☐ Between 1978-1999
☐ After 2000

What are your main methods of heating the house? _________________________

What is your approximate total monthly energy bill in SUMMER? _________________________

What is your approximate total monthly energy bill in WINTER? _________________________
Energy hardship in New Zealand: implications for policy

INFORMATION SHEET FOR PARTICIPANTS

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. If you decide not to take part there will be no disadvantage to you and we thank you for considering our request.

What is the Aim of the Project?

This project is being undertaken as part of the requirements for a Doctor of Philosophy at the University of Otago, Dunedin, New Zealand.

The aim of this research project is get the viewpoints of various stakeholders regarding fuel poverty and policy implications for energy hardship in New Zealand.

What Types of Participants are being sought?

The study will be based in Dunedin, and participants will include heads of community organizations, local politicians, health professionals and academics with expertise and research interest in this area. About 20 people will be invited to take part in this project.

What will Participants be asked to do?

Should you agree to take part in this project, you will be asked to participate in an interview to share your views with regard to energy hardship in New Zealand, and what policies and practices needs to be implemented to alleviate fuel poverty from New Zealand. The interview will take approximately an hour. Please be aware that you may
decide not to take part in the project, at any point in time, without any disadvantage to yourself of any kind.

What Data or Information will be collected and what use will be made of it?

Data collection involves a face to face interview, which is expected to take about an hour. The general line of questioning includes asking interviewees’ views on energy hardship in New Zealand, and policies and practices that needs to be implemented to tackle this problem.

Although anonymity of participants is possible, it will be preferable to identify them by name and/or position. All participants will be informed of this option prior to the interview, and if they request not to be identified, their name will remain confidential and their views will be attributed to an anonymous source.

The results of the project will be submitted as a PhD thesis, and may be published as academic articles. The thesis will be available in the University of Otago Library (Dunedin, New Zealand). You are most welcome to request a summary of results of the project.

The data collected will be securely stored in such a way that only the researchers will be able to gain access to it. Any raw data on which the results of the project depend will be retained in secure storage for at least five years, after which it will be destroyed.

Can Participants change their mind and withdraw from the project?

You may withdraw from participation in the project at any time and without any disadvantage to yourself of any kind.

What if Participants have any Questions?

If you have any questions about our project, either now or in the future, please feel free to contact either:

Fatima McKague
PhD Candidate
Department of Marketing
University of Otago
PO Box 56

or Assoc. Prof Ben Wooliscroft
Department of Marketing
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