EXETER UNIVERSITY

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A GENDER-SPECIFIC PERSPECTIVE ON ATTITUDES AND BEHAVIOURS TOWARDS DOMESTIC ENERGY

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MSc THESIS

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ACADEMIC YEAR 2008/2009

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September 2009

SUBMITTED BY NICOLA HOLE TO THE UNIVERSITY OF EXETER AS A DISSERTATION TOWARDS THE DEGREE OF MASTER OF SCIENCE BY ADVANCED STUDY IN ENERGY POLICY AND SUSTAINABILITY

I certify that all material in this dissertation which is not my own work has been identified with appropriate acknowledgement and referencing and I also certify that no material is included for which a degree has been previously conferred upon me.....

Abstract

This research aims to understand the relationship between gender and energy behaviour within the sphere of the household. The literature proposes that women have an active role to play in sustainably managing energy use within the home, although behaviours are usually related to situational, psychological and socio-environmental complexities. These findings informed the creation of a conceptual energy behaviour model which aided the collection of empirical data through self completion questionnaires and follow up interviews. Key trends were drawn out using bi-variate and multi-variate analysis and recurring themes investigated. Results showed that women play a critical role in managing energy use within the home. While there was a strong commitment to environmental actions, there is clearly still scope for targeted policy that considers men and women's different abilities, needs and opinions. Only through more gender-disaggregated research will gender responsive policies and programmes be formulated.

Acknowledgements

I would like to express particular thanks to Catherine and Bridget for inspiring this project and for their continued support throughout the year.

I am extremely grateful for the time and enthusiasm of all those that returned questionnaires and the valuable insights from those I interviewed.

Finally, thanks to Iain.

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1 Introduction

This chapter introduces the current study by setting the context, providing rationale and identifying the research objectives. A review of the current state of energy consumption and CO_2 emissions in the UK define the problem and justify the call for research. The main aims and objectives are then identified, defining the scope and boundary of the topic. Finally, the structure of the thesis is outlined.

1.1 Context

1.1.1 Energy trends

In 2008 there was a decrease in primary energy consumption of 1 percent in the UK compared with 2007. Figure 1.1 shows how energy consumption changed between 1970 and 2001 on both unadjusted and temperature corrected bases.

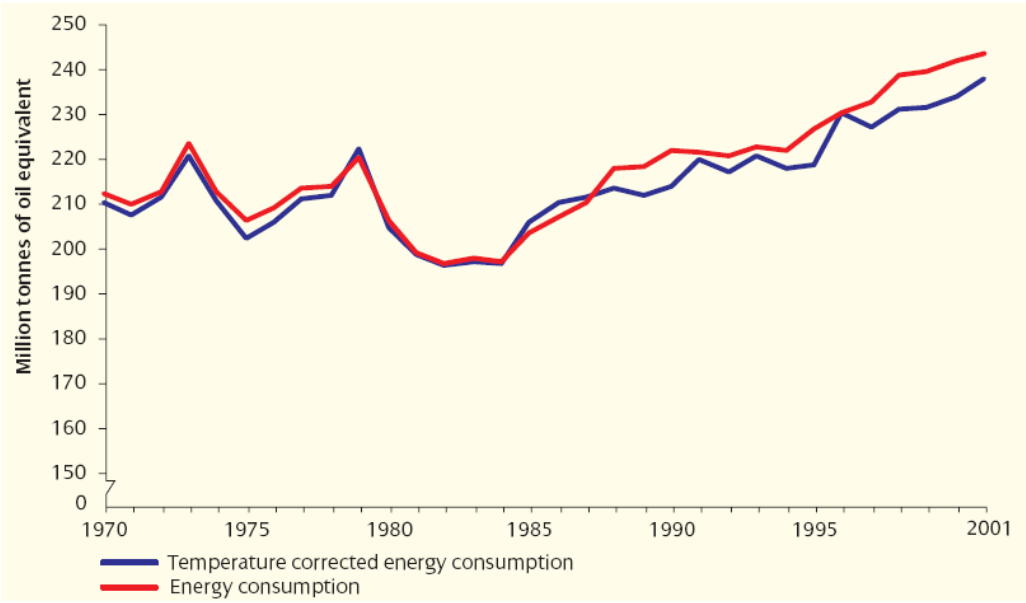


Figure 1.1 Total primary energy consumption (*DTI, 2001).*

In 2008, final end gas use in the UK stood at 607 TWh, an increase of 1.8% on the previous year. While this may sound like a conservative increase, a closer look reveals that the domestic sector alone was responsible for 60% of gas consumption and saw a 4.8% rise on the previous year. A similar trend can be seen in electricity use in the UK. In 2008 consumption stood at 340 TWh, an overall decrease of 0.6% from 2007 while the domestic sector saw a 2.7% increase on the previous year's usage (Energy Trends, 2009). In fact, domestic energy consumption increased by 12 percent between 1990 and 2008, although it has fallen from the high seen in 2004, when consumption was 19 percent higher than in 1990. Translated into CO_2 emissions uncovers an even more sombre picture. The period of 1990 to 2008 saw emissions reductions in the industrial, commercial and public service sectors, whereas emissions from the domestic and transport sectors both

increased. In the domestic sector emissions have increased by 2% since 1990 despite non electricity consumption in the domestic sector increasing by 9.5% over the same period. The reason for this is considered to be a combination of an increase in the number of households (around 10%) with reduced average energy consumption per household. This evidence suggests that changing household energy behaviours and reducing the use of resources by everyday practices will play a large part in reducing our national energy consumption and CO_2 emissions if the UK is to meet emissions reduction targets.

1.1.2 Tackling domestic emissions

Energy efficiency improvements, such as increased levels of insulation and the introduction of more efficient electrical appliances, have gone some way to reducing overall energy consumption from the levels that would have been experienced in their absence. However, achieving more significant cuts will require a more comprehensive understanding of the empirical links between lifestyles and the associated energy consumption and carbon emissions (Jackson, 2008) in order to tailor policy options to different segments of the population. The necessity of individual action and lifestyle change in dealing with local and global environmental problems was outlined extensively in 1992 in *Agenda 21* (UNDC, 1993) and reiterated more recently by the United Nations (UN, 2002). On the national scale, the British governments' last two sustainable development strategies have had a strong focus on individual 'environmental actions' (DETR 1999; Defra, 2005a). Urging people to contemplate their own lifestyles within the context of global environmental problems has become commonplace and the UK government is one of many actively promoting a wide range of personalised environmental actions, from recycling to sustainable travel, as a way of dealing with various local and global environmental issues.

1.1.3 Policy

Government forecasts published in 2006 anticipate an extra 6 million households by 2031 (there were 24.2 million in 2006), caused by both population growth and the continued segmentation of families. While policies aimed at encouraging more efficient use of household energy have been around since the oil crisis of the 1970's, more direct research into the makeup and mechanisms that distinguish different households would allow more targeted policy. Gender and domestic energy behaviour may be one such avenue that warrants exploration. Recent research has shed light on the possibility that at the household level, a distinct gender division of responsibilities influences the translation of environmental policies into practice (Roehr, 2002). If women have a central role within the household and are more commonly responsible for issues relating to health and the environment (Clark *et al.*,2003) then enabling them to behave in more sustainable ways may be one way in which domestic emissions can be tackled. Total domestic energy consumption will undoubtedly continue to rise in line with household numbers (Shorrock & Utley, 2003) unless the research, development and deployment of deliberate policies are put in place to avoid it.

1.2 Call for research

Understanding the relationship between demographic variables and energy related attitudes and behaviours will have valuable inputs for theory, social action and policy but current levels of research have been described as meagre and inconsistent (Van Liere & Dunlap,1980). Examinations of the gender dimensions of home energy use have both academic and applied interest in that findings will contribute to;

1) gender dimensions of energy use generally;
2) potential understandings of the socialisation effect upon energy interactions;
3) a better understanding of who is and who is not engaging in pro-environmental energy behaviours.

The scarcity of research into the environmental activity of women and factors related to it (Mohai, 1992) has resulted in few clear conclusions on the effects of gender on varying types of environmentalism. This study will address this knowledge gap by presenting and analysing results from a study of how women relate to, manage and conserve energy in the home. It will first of all establish the role of women play in managing household energy and, using a conceptual model of environmental action, develop a gender specific understanding of the socio-psychological factors that instigate domestic environmental actions.

1.3 Aims and objectives

The main aim of this research project is, using the sphere of the household as a geographical limiting boundary, to explore the relationship between gender and energy consumption and behaviour. The primary objectives are:

1. To undertake a critical review of the recent and historical literature on household energy behaviour and the role of gender within this;

2. To develop a conceptual model able to pull apart the determinants that influence certain environmental and energy behaviours by women within the household (situational, psychological and environmental);

3. To explore the current position of women in managing energy use in the home and their involvement in everyday energy saving behaviours ;

4. To highlight some policy implications based on the assumptions drawn from the research.

The paper starts off with an overview of the theoretical perspectives on addressing energy efficiency and demand reduction in the domestic sphere, followed by an exploration of more gender specific research. Chapter three defines the study site and develops a conceptual model through which data collection and analytical techniques are described. Results are presented and analysed in chapter four in the six subsections that were developed in the conceptual model; gender analysis; situational, psychological and environmental

variables; attitudes and behaviours and the role of feedback. The end of this section explores policy implications drawn from the research and the final section will conclude the study and discuss findings as they relate to future research.

2 Literature review

This chapter fits the current study into the context of previous research into aspects of gender, environmental behaviours and domestic energy use, providing a basis upon which the main objectives can be addressed.

2.1 Energy in the domestic sphere

Since the oil crisis of the 1970s and the threat of an imminent energy shortage, there has been extensive research into household energy conservation. The stimulus for investigation changed slightly in the 1980s when the negative environmental impacts of fossil fuel use became the principle motivating factor (Poortinga *et al.* 2003). It is in the last decade that we have seen domestic energy consumption rise to the top of the government's environmental agenda as a domain for potential energy savings and subsequent emissions reductions (European Commission, 2000). Residential energy use accounts for about one fifth of the total final energy consumption in OECD countries (IEA, 2003), with levels of electricity use steadily rising (IEA, 2001). In the UK, the period between 1990 and 2004 saw an 18% increase in energy use in the domestic sector, accounting for just over 30% of the country's final energy consumption (Faiers et.al 2007). UK policy makers have stressed the importance of energy efficiency in all sectors but have reiterated that energy use by households is one of the most pressing areas needing to be tackled (DETR, 1998). It is therefore well justified that policy measures aimed at reducing residential energy consumption are explored and implemented.

The two components that make up household energy use are primarily 'home' and 'transport' or what Van Diepen (2000) refers to as the difference between 'sojourning in space' and the 'bridging of space.' Home energy use describes activities such as home heating, lighting and the use of household appliances, while transport refers to the use of a private car. While they both fall under the scope of household activities, this study will primarily focus on home energy use, as research suggests that the two aspects are related to very different motivational variables (Poortinga, Steg, Vlek & Wiersma, 2003). Transport, in particular the use of a personal car, carries with it a connection to various quality of life aspects that are not found in the relationship with home energy appliances, according to Gatersleben (2000), and so values, beliefs and actions will relate to them both very differently. Barr *et al.* (2005) also make clear the divide between actions outside the home (consumption) and behaviours within the home (habitual). This first factor relates to overtly conscious decisions which may involve a significant cost implication, in contrast to 'everyday' household behaviours that people are likely to make little or no conscious decision about.

2.2 Technological improvements and behavioural change

The possibilities of improving end use efficiencies in the domestic sector can be divided into two separate areas, those relating to technological and efficiency improvements and those measures that are associated with behavioural change. The former has thus far received a far larger share of attention (Carlsson-Kanyama & Linden, 2007), with regulatory instruments influencing building efficiency standards and the introduction of

efficiency labels on appliances becoming common practice in many countries (IEA, 2000; IEA, 2002). With evermore manufacturers being required to improve the energy efficiency of their goods, governments have turned their attention to the actions and behaviours of the end user. Only incremental improvements have been achieved in this domain, attesting to the difficult nature of behavioural change. Despite the challenges, evidence suggests that the gains from improving domestic energy behaviour will be significant. Studies from the United States and the Netherlands have suggested that wasted household energy could be somewhere between 26 and 33 percent (Sonderegger 1978; Verhallen & Van Raaij 1981). It has been put forward that behaviour effects residential energy use to at least the same extent as more efficient equipment and appliances, with the possibility of household behaviour varying to such an extent that residential energy use differs to a factor of two, even when the equipment and appliances are identical (Palmborg, 1986). More recent estimates are scarce but studies by Carlsson-Kanyama et.al (2005) and Linden et.al (2006) have shown possible energy savings of up to 20 percent by changing behaviour in everyday life.

There are numerous strategies available for changing environmentally significant behaviour in the home, from utilising material incentives, to changing behaviour with education, to modifying institutional structures at a community or neighbourhood level (Stern 1999). Both with regard to mitigation and adaption policies for climate change, scientific and technical measures are preferred to 'soft' policies addressing behaviour and social differences (Lambrou & Paina, 2006) although with regard to energy use, changes in direct use of energy appear to be more manageable to the public than those requiring shifts in consumption (Defra, 2005). This could be due to a lack of knowledge people hold around indirect energy use and the significance of energy embedded in commodities. Likewise, it could be that shifts in consumption are not always economical and are associated with a considerable change in lifestyle (Poortinga, 2003). There will be no simple answer and strategies will surely have to be adapted and refined along the way but with the continued increase in the number of households and the demand for energy in the UK expected to keep rising, the need to establish effective policy in this area is evident.

2.3 Environmental concern and pro-environmental behaviour

There have been numerous studies investigating the factors that influence an individual's level of engagement with the environment. Social scientists have tried to conceptualise and measure public environmental concern but there will always be difficulties in gauging a concept so fundamentally complex (Hunter et.al, 2004). Despite these difficulties, it is generally accepted to refer to "the degree to which people are aware of problems regarding the environment and support efforts to solve them" (Dunlap and Jones, 2002:484). Several studies have investigated the factors that trigger environmental concern and three different scenarios have been identified; when environmental problems are seen to have (1) egotistical threatening or harmful consequences (concern for the self in relation to the environment), (2) social-altruistic costs (concern for other people in relation to the environment) or (3) biospheric effects (concern for the biosphere). Similarly, objects of environmental concern are generally classified into specific issues, such as CO_2 emissions, or more vague phenomena such as global warming. This tri-factor model originates from the Value Belief Norm theory (VBN) of pro environmental behaviour created by Stern and colleagues (Stern et.al (1999); Stern, 2000) which itself is a development of Schwartz' (1977) norm activation theory of altruistic behaviour. In the VBN

theory, awareness-of-consequences beliefs - whether related to the self, humankind or the biosphere - and environmental concern are often treated as interchangeable (Stern et.al, 1993), yet the former is an awareness of potential states of the world and the other as attitude towards environmental issues (Fransson & Garling, 1999).

2.3.1 A gendered perspective on environmental behaviour

In most developed countries, energy policy is formed on the back of differences in energy use by sectors of society, be it agriculture, industry or transport. As yet, gender has no place in policy formation under any of these subsections and there is very little in terms of gender disaggregation of UK energy research. A preliminary metastudy by Zelezny (2000) into gender differences in environmental attitudes and behaviours suggests that, contrary to past inconsistencies, a clearer picture has emerged that women do report stronger environmental attitudes and behaviours than men (Zelezny, 2000). A gender perspective recognises that some issues and constraints related to projects are gender specific and stem from the fact that men and women play different roles, have different needs and face different constraints on a number of different levels (Cecelski, 2000). A methodology that includes gender analysis will look at the socio-cultural defined roles and tasks that women and men assume in the family, household or community.

The three value orientations from VBN theory (self, humankind, biosphere) have been examined using individual difference correlates, gender being one of them, and evidence exists to support the suggestion that women have higher scores for all three value orientations (Stern et.al, 1993; Schultz, 2001) although most studies have focussed on individual difference correlates other than socio-demographics.

Current opinion is that pro-environmental behaviour is in large part a function of environmental concerns, which are in some ways related to awareness, not just of consequences, but a more social and personal awareness (Hackett, 1993). Although there is insufficient research to make bold claims, there appear to be modest distinctions between men and women, with women typically displaying higher levels of environmental concern than men (Mohai 1997; Bord & Connor, 1997) and appearing more likely to make behavioural adjustments in their day to day activities (Zelezny, Chua & Aldrich, 2000; Hunter *et al.* 2004). The authors explain this as a function of women's greater social responsibility and empathy towards others, while it has also been put forward that women's 'traditional' domain of the home may evoke more environmentally-orientated behaviours than the 'public sphere' of society and the marketplace, where men are socialised to be more dominant (Mohai, 1992).

Evidence also suggests that for the population as a whole, people are more likely to engage in pro-environmental behaviours if they do not involve substantial time, discomfort or monetary costs (Diekmann & Preisendorfer, 1998). For women, alterations to activities in the domestic sphere may rarely induce these barriers and Tindall et.al (2003) found from a Canadian case study that women are generally receptive to behavioural changes that can be undertaken in the course of daily routines such as conserving energy and recycling waste.

2.3.2 Gender and energy – a developing issue?

A gender perspective on energy has so far only been explored in developing countries, or the 'south', where it has been acknowledged that the relationship one has with energy is not gender neutral (Parikh, 2005:746). Energy use in these countries is associated with long hours of physical work, a disproportionate burden of which falls on women, in terms of supplying their families with food, fuel and water, often without the benefit of basic modern infrastructure. Women have to spend large amounts of time and energy obtaining traditional fuels to heat water and cook meals and also have to grow and process their own food, usually all by hand. Drivers are of course very different, with exploration into gender and energy coming from a desire for gender equality, as identified by the Millennium Development Goals (MDG) and followed up by the Commission on Sustainable Development (CSD). While connecting gender and energy has proved highly useful in helping women overcome the in equalities they face in conforming to their gender roles, climate change may be the driving force for establishing such a link in the developed world.

Whilst small advances have been made in developed countries around the complexity of the relationships among women, energy and the environment, the bulk of policy research is yet to reflect these advances (Cecelski, 1995). The modest exploration into the connection between gender and energy in the north is centred around the relocation of responsibilities for energy savings to private households and the effect this has had on women as the main contributor to household chores. Carlsson-Kanyama & Linden (2007) explored how the extra workload induced by energy savings may at times be significant and fall disproportionately upon women. A gender based analysis in energy challenges gender neutral policy making and the assumption that everyone is affected equally by government initiatives. Establishing more disaggregated data can ensure that perspectives of both genders are factored into the design and implementation of effective policy (Budhu, 2002) but until more time is spent examining the relationship women have with energy use in developed countries then the question will remain as to whether there is in fact any gender perspective to energy in the north (Clancy & Roehr, 2003).

2.3.3 Gender as a division of household energy

Until recently, most policy analyses implicitly viewed the household as a homogeneous entity, with only one set of preferences and a single decision maker. While this assumption has allowed us to gain an understanding of general household behaviour, it has led to a failure in understanding the long reach of some public interventions (Alderman *et al.* 1995). Analysing the processes by which households balance the diverse interests of their members and understanding the inner workings of the household can strengthen policy design and result in more effective policy instruments.

Energy use in households deserves an equal amount of disaggregation. Poortinga *et al.*. (2004) define household energy use as somewhere where individual and collective interests collide, a complex structure with which to analyse energy use. It is important to understand how and when households use energy in order to influence behaviour and tailor more appropriate policies. Intra-household differences are no doubt significant, yet remain only partially investigated due to the perception that they are private matters, deemed

too inaccessible to research. Parikh (2005) argues that when these differences persist across societies, in a predictable direction, for decades at a time, it would be folly not to take notice.

Despite the number of women employed full time in the paid labour work force growing significantly over the past few decades, the domestic division of labour in Britain and organisation of everyday life still leaves women with the majority of the domestic responsibilities (Breen & Cooke, 2005; European Commission, 2000). If domestic work does still lie mainly in the female domain then policies and campaigns calling for more sustainable lifestyles and more specifically efficient energy use in the home are primarily addressing women, without them having a specific gender aspect. If women are only making these behavioural changes because they are statistically undertaking more energy-related actions then such actions could be considered a by-product of their domestic duties. Tindell *et al.*. (2003:927) question this assumption and instead suggest that pro-environmental energy behaviour is something purposeful, a reflection of their commitment to environmentalism, with attitudes and beliefs motivating behaviour as much, if not more than their domestic responsibilities. Either way, a change in domestic energy use and more general conservation measures does often require an increased effort and extra workload whether this be through finding reliable, comprehensible information, integrating contradictory lifestyle demands or making the time to adjust behaviour in an already tight schedule. Regardless of these hurdles, it seems women are currently showing themselves as willing to include these requirements into their way of life (Roehr, 2002). The task now is to learn more about how they can be supported and nurtured in this role before their existing motivation is overused and they no longer act as initiators of pro-environmental behaviour.

2.4 Policies to change behaviour

Despite the difficulty in trying to transform household energy behaviours, various policy instruments have been implemented by the government with the intention of influencing processes in a way that leads to a more careful use of resources and results in more environmentally conscious decisions. Policies usually involve a relationship between two actors, a dispatcher and receiver of information and it is this relationship and particularly the way information is received that needs to be understood to a greater extent (Linden et.al, 2005). Several studies have looked into the impact of various intervention measures, from information to economic rewards, social norms and user-friendly technologies (Biel, 2003; Linden et.al, 2006) and the subsequent transition in behaviour change and the long and short term energy savings that have resulted from them (Stern et.al, 1986; Biel, 2003). Attempts to achieve behavioural change that will lessen CO_2 emissions are internationally widespread as the evidence for human induced climate change becomes more grave and compelling. However, without sufficient background research, well intentioned efforts run the risk of being naively executed and producing disappointing results.

2.4.1 Information campaigns

Programmes driven by information have always been popular with those who believe more knowledge will equal a greater ‘understanding’ of an issue and impel a particular behaviour. In the UK there have been attempts to influence household energy behaviour through various information campaigns, predominantly

highlighting different energy saving measures that can be adopted in the home. These have been delivered by organisations such as the Energy Saving Trust (EST), with pamphlets, adverts, product labelling and environmental awards all methods aimed at changing or strengthening attitudes. The Norwegian Centre for International Climate and Environmental Research outlined the role education can play and its implications in terms of gender. Erikson & Naess (2003), recognise that education may increase an individual's ability to access relevant information and, importantly, get their voices through to decision makers. Conflicting with this view is the literature supporting the 'education fallacy' which is an idea highlighting the 'weak link' that has been identified between knowledge about climate change and actual behaviour (Anable, 2006). Not only is the relationship unclear, but it can carry with it the risk of creating a mismatch between the main problem (e.g. climate change) and the personal solution (e.g. reducing energy use) or similarly miss the motivational step of the sequence altogether.

2.4.2 Social marketing

A more recent development in the pursuit for policies that will effectively incite long term behavioural change has been the advent of a social marketing approach. It is thought to develop a more sensitive and targeted package of measures to bring about the shift to a low carbon lifestyle and is seen as a way to bridge the gap between what we know about individual behaviour and implementing more effective policies to deal with what we know. Social marketing has been defined as 'the systematic application of marketing concepts and techniques, to achieve specific behavioural goals, to achieve a social or public good' (NSMC, 2009). It is heavily focussed on the consumer and understanding their knowledge, attitudes and beliefs and the social context under which they have to operate. Behaviours, both where they are and where they need to be, are often divided into actionable steps and a form of audience segmentation is usually employed.

There is much work already done in the area of environmental segmentation, by Defra, the Sustainable Consumption Roundtable and Green Engage Communications to name but a few, and it is becomingly an increasingly important tool in the fight for effective communication. In general, segmentation is the division of a population into groups or clusters with common characteristics, with the aim of understanding their needs, purchasing motivations and desires and then targeting them with the most appropriate message. Elements of models which are common across research findings include the role of personal norms (feelings of what *should* be done), personal values (sense of personal responsibility), habits (acting without thinking) and social norms (expectations from others in the community). They usually relate to internal and external motivations and barriers and are used to model or map current and potential behaviour.

Defra published their own framework for pro-environmental behaviours (Defra, 2008) designed to support policy development and implementation within the government and externally. Their environmental segmentation model splits the population up into seven clusters, each sharing a distinct set of attitudes and beliefs towards the environment which are based on people's responses to a broad range of attitudinal questions. While the model has been widely adopted and praised for the possibilities it creates in tailoring policy solutions, it has been criticised by some because it explains reported environmental behaviour by reference to attitudes about environmental behaviour, rather than in relation to independent variables. It has

also been criticised for its 'weak' attitudinal statements which have been found to transcend traditional demographic boundaries such as gender and income and so are therefore unhelpful in discriminating between individuals (Dr Jillian Anable, *pers. comm.*).

The social marketing framework appears to have the versatility to sell policy ideas as well as products and lifestyles. It offers a more sophisticated approach than information alone and could be especially useful in the context of this study, where so little is currently known. Creating a model is beyond the realm of this project, due to its size and the infancy of the topic. It is also clear that having a model is by no means a solution in itself. As a first step, together with a wider package of interventions, legislative shifts and bold political leadership, it may be useful in engaging and enabling the public to do their bit in the shift to a more sustainable energy system.

2.4.3 Modelling pro-environmental behaviour

Social marketing and information campaigns are just two examples of policy tools. Every type of intervention is derived from some basic conceptualisation. Conceptual models are based on various underlying assumptions about the nature of human development and learning. All the components of a model help to explain the way individuals act and generally advance awareness around implicit assumptions regarding human behaviour. In an environmental sense they aid understanding of why people act environmentally and highlight barriers in adopting pro-environmental behaviours. Many influential and commonly used theoretical frameworks have been developed to help ascertain the factors, both positive and negative, that have an influence on pro-environmental behaviour. The effective implementation of policies to alter behaviours relies explicitly or implicitly, on these 'models' of what behaviour is, how it is influenced, shaped and modified. These models are generally built from a set of conceptual premises, and some form of causal relationship between dependent and independent variables (Jackson, 2004).

Models are sometimes criticised for their level of complexity, the negative effect this can have on their practical application and the subsequent lack of openings for policy intervention (Barr *et al.*, 2001). For this reason, new models often emerge that are hybrid or outgrowth versions of earlier models. A brief overview of some advances in environmental models will help with the development of a conceptual model on which a survey can be developed for this project.

Simple models of pro-environmental behaviour were developed in the 1970s around the notion that environmental knowledge led to and increased environmental awareness, which was thought to lead to an increase in pro-environmental behaviour. This early model of pro-environmental behaviour (Fig 2.1), taken from Kolmuss and Agyeman (2002) shows an increase in awareness leading to eventual behavioural change.

Figure 2.1 An early linear behavioural model

Rationalist models such as these assumed that educating people on environmental issues would lead to more pro-environmental behaviours and that unconscious environmental behaviours could be easily be altered to a more sustainable pattern because, as such, they were not based on solid values. The model soon lost support as people came to recognise that in order to change long term behaviour, there is no simple solution to be found in merely raising the knowledge of an individual. Burgess *et al.* (1998:1447) have termed these models '(information) deficit models of public understanding and action' because of their overly simplistic nature.

Prominent psychologists Icek Ajzen and Martin Fishbein advanced knowledge on the relationship between attitudes and behaviours in their *Theory of reasoned action* (1975) (Fig.2.2) and *Theory of planned behaviour* (1980) (Kollmuss & Agyeman, 2002).

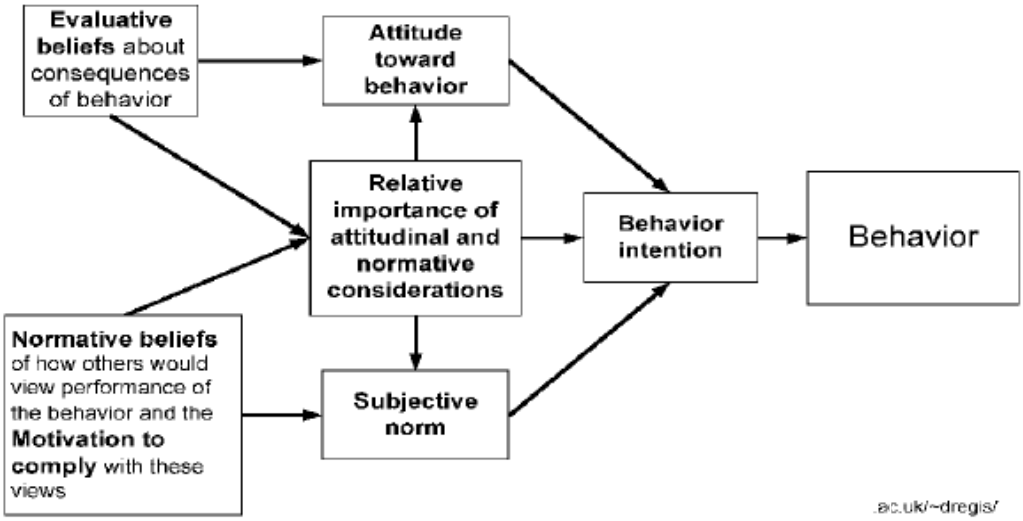


Figure 2.2 Theory of reasoned action (Ajzen & Fishbein, 1980).

When published, it was praised for its simplicity and clarity (Regis, 1990) and over time the structure was modified by various sociologists and psychologists (Hines *et al.* 1986, *Model of Responsible Environmental Behaviour*).

Psychological and sociological factors became increasingly common in models during the 1980s, as demonstrated by Fietkau and Kessel (1981) and seen in figure 2.3, where they consider attitudes, values and situational factors as key behaviour shaping influences. They also factor in the idea that feedback about environmental behaviours will influence future attitudes and actions, be it through feelings of making a difference (intrinsic) or from an economic or social reward (extrinsic). Whilst the model includes knowledge as a variable, it is more a modifier of attitudes than a key stimulus;

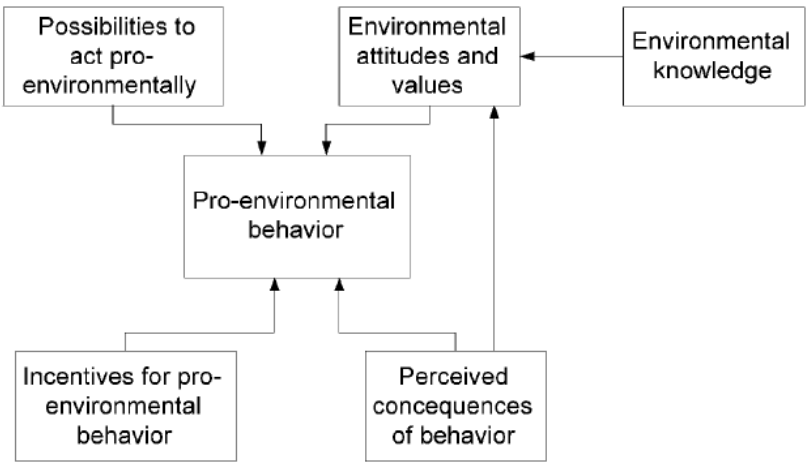


Figure 2.3 Model of ecological behaviour (Fietkau & Kessel, 1981).

More recently, a new category of research has developed, undertaken mainly by sociologists as opposed to psychologists. It aims to address the failings of previous models by taking into consideration individual, social and institutional constraints as well as rational human behaviour. Blake's (1999) model of barriers between environmental concern and action (Fig.2.4) address three main areas; individuality, responsibility and practicality;

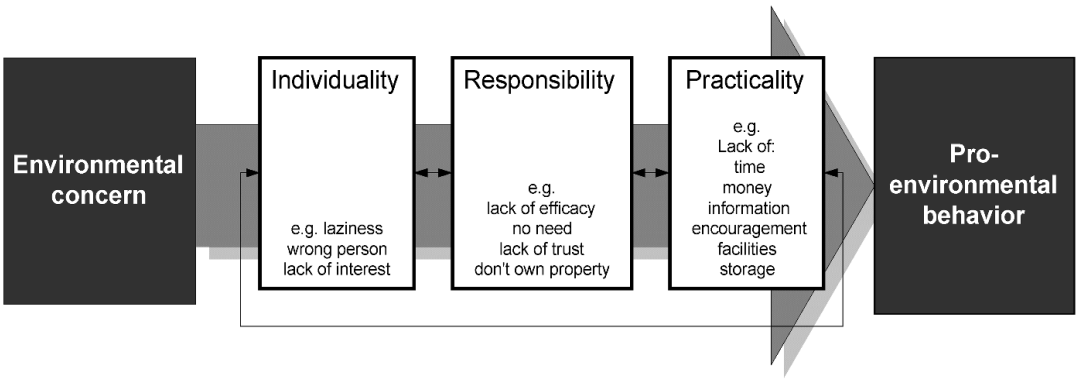


Figure 2.4 Barriers between environmental concern and action (Blake, 1999)

He believes that the way these factors interact with one another is especially important for people with no strong social and ecological concerns. Although including internal and external factors, Blake's model failed to deal with social, cultural and psychological variables.

It is clear to see that all models have aspects to them that go some way in explaining the value-action gap in pro-environmental behaviours, although clearly no model could encapsulate all the factors influential in shaping and determining behaviour - a model this complex would lose all practicality and could have no bearing upon effective policy making. Understanding and narrowing such a gap will be crucial in supporting pro-environmental behaviours, especially in the private sphere of the home, where actions are usually habitual and often hidden. Using a handful of reoccurring features, it has been possible to develop a model (Fig 3.1, *methodology)* on which a questionnaire can be designed which can then go some way in extracting the determinants of pro-environmental energy behaviours, or lack thereof, in the home.

2.5 Call for research

If we are to develop an energy system that is sustainable over the long term, energy efficiency in the domestic sector will continue to be a vital area of energy research and the more that is known about individuals as energy users, the more likely it is that the policies implemented are acceptable and effective. Creating a society where individuals are asked to make various choices and decisions in order to ensure households run efficiently and economically is a complex ideal that requires insight into attitudes, behaviours and habits (Gyborg & Palmer, 2009:2808). Without these insights, visible results are likely to be nominal and any significant changes in behaviour, short-lived. To truly help individuals make the connections between their behaviours and the impacts on the planet and to help them change their behaviour and reduce their emissions, we need to explore the household for the complex space that it is and undertake research that gives us insights into which measures individuals, both male and female are most receptive to.

Establishing an overview of how women in the UK relate to energy would be too costly and ambitious for the scope of this study, but a case study of a small town in Cornwall should be able to provide an insight into gender specific issues that may have a part to play in energy policy. Energy is one of the most quantified sectors and the lack of gender specific data available is testament to the current lack of concern and appreciation about gender issues by energy policy makers and analysts. Until we have more disaggregated energy data, gender cannot be appropriately mainstreamed into mitigation policies and instruments. As it stands, the energy policies that are put in place in the next decade or so will either make or break our success in reducing CO_2 emissions and ultimately in preventing the catastrophic warming of the planet. It therefore makes sense to follow all options available and to reopen the debate on the role of women in energy research and policy.

Examinations of the gender dimensions of pro-environmental behaviours in the home, particularly in relation to energy conservation, combined with information on attitudes and beliefs of women on the same topic are likely to have both academic and applied interest in that the findings contribute to: (1) gender dimensions of environmental concern; (2) gender disaggregation of energy related pro-environmental behaviour in the UK; (3) a better understanding of intra-household workings and how these impact upon energy saving behaviours. Results could include recommendations to policy makers, research councils and communication/marketing specialists.

2.6 Summary of key findings

While many studies have explored domestic energy behaviours under the premise that the household is a single entity, this study will consider whether or not gender is an important variable in understanding energy attitudes and behaviours in the home.

A review of the literature suggests that energy policy in the last two decades has moved from a purely technical, supply chain focus to one that embraces a broad range of issues. Attention has turned to the role of energy consumers, social and economic factors affecting behaviours and the roots of environmental concern.

The literature also proposes that women have an active role to play in sustainably managing energy use within the home, although sustainable energy behaviour is likely to be borne out of a complex web of situational, psychological and socio-environmental factors. These findings will inform the creation of a conceptual model in the following chapter, which in turn will aid the creation of a questionnaire aiming to develop these lines of thought further.

There is clearly need for improved research on the gender differences in energy behaviours. This study will highlight the scope of this and explore the different possible policy options.

3 Methodology

This chapter covers the methods of study. In the main it deals with data collection and covers how this is derived from primary and secondary sources. It also clarifies the link between the methods employed and the research aim and objectives.

3.1 Literature review

A review of relevant national and international research previously undertaken on the relationship between gender and energy enabled shortfalls in energy research to be identified and gave an overview of the subject area. The range of academic disciplines identified as contributing insights relevant to this topic was wide and included sociology, environmental studies, human geography, social and environmental psychology, social marketing studies and anthropology. Once completed, study aims and objectives were refined, a survey was decided as an appropriate empirical research method and a suitable questionnaire was formulated. This scoping review also ensured appropriate analysis of survey data on environmental and energy attitudes and behaviours was employed.

3.2 Conceptual energy model

A key objective of the study was to develop a conceptual framework in order to examine the influences of different variables on attitudes and behaviours. The illustrative model, figure 3.1, is a modified version of a model created by Barr *et al.* (2001). It was given a gender perspective but retained its original social and environmental values, situational factors and psychological variables. This interdisciplinary perspective is shown to provide a more complete framework for analysing behaviours. Choosing not to rely too heavily on neo-classical economic theory or internal psychological variables, the model pays attention to cognitive variables and demographic determinants. In doing so, policy solutions can be highlighted that are derived from individual psychological processes and from situational/external factors. Unless science and policy include a socio-economic theory of behaviour that incorporates both external conditions and internal processes, there is the risk of creating narrowly defined policies that fall short of objectives (Guagnano, Stern & Dietz, 1995:700).

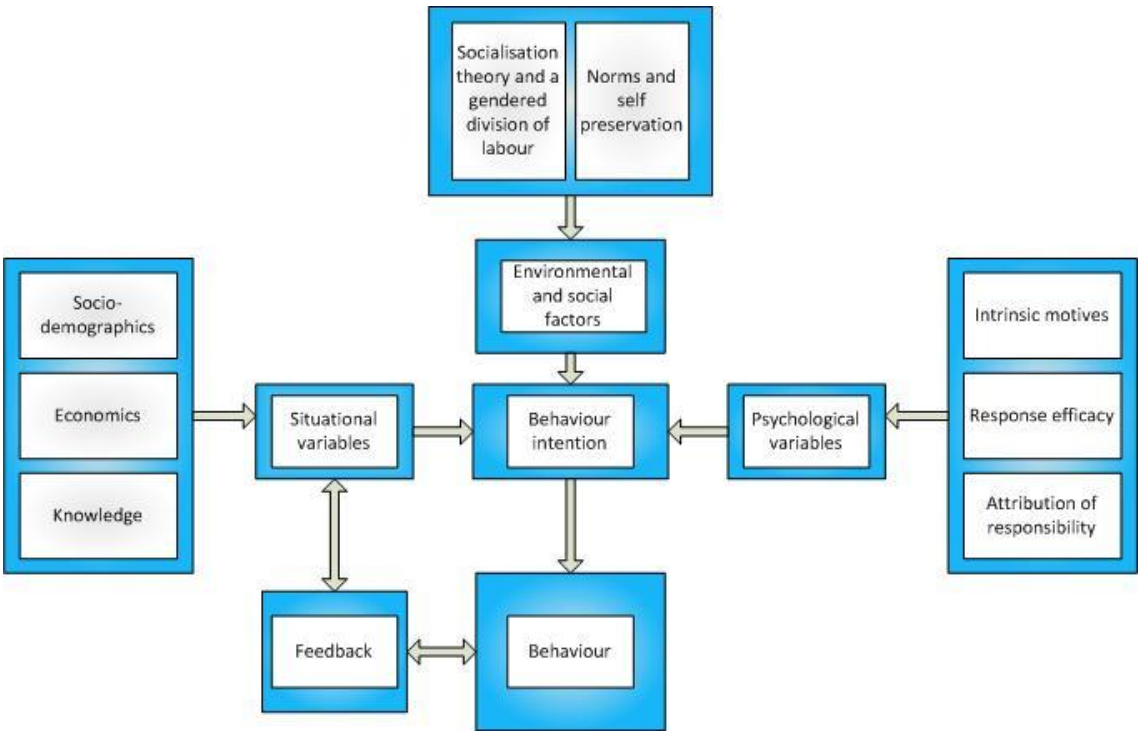


Figure 3.1 An illustrative model of hypothesized factors influencing household energy consumption

The following paragraphs explain the main components of the model, the situational, psychological, social and environmental areas and how feedback may play a role.

3.2.1 Situational variables

These relate to the behavioural context specific to each individual;

- *Socio demographic factors*; with the project already directed at the female demographic, a core objective is to discover if there is any key differences in age and levels of engagement, concern and willingness to change. Also whether the length of education will affect the level of knowledge regarding environmental issues and the effect this has on behaviour.
- *Economic factors*; clearly very important when formulating policy but these variables are more often tied up with social and psychological factors.
- *Knowledge*; a variable that so far, has attracted most attention in the field of behavioural change for its power in affecting levels of environmental action (Kallgren and Wood 1986). According to Schahn and Holzer (1990), two definitions of knowledge need to be taken into consideration, *abstract knowledge* (an awareness of general environmental issues) and *concrete knowledge* (more practical understandings). Clearly a basic knowledge of environmental issues and action strategies to deal with them is necessary in order to behave in environmental sustainable ways but research has found that a very detailed technical knowledge does not always foster pro-environmental behaviour (Diekmann & Preisendoerfer 1992). From their research, Fliegenschnee & Schelakovsky (1998) discovered that men are likely to have this more extensive, technical environmental knowledge.
- *Structural*; basic, fairly unchangeable factors such as provision for recycling, makeup of the house (cavity walls, garden, extensive water/heating management systems). Although simple, important in their ability to support or impede different environmental behaviours.

3.2.2 Psychological variables

These variables relate to a person's attitudinal construct of energy saving behaviours. In particular, the survey will explore;

- *Intrinsic motives*; according to Bord and Connor (1997)**,** the possibility of gaining significant elf satisfaction from helping the environment is far more likely to be found in women than men.
- *Response efficacy/locus of control*; this will represent an individual's perception of whether she has the ability to bring about change through her own behaviour. Those with a strong internal locus of control and high individual response efficacy will believe that their actions can bring about change, whereas those with strong external locus of control will believe it is only powerful others who have the ability to take actions that can help in the fight against climate change (Hines et al, 1986).
- *Individual sense of responsibility*; the greater this is for a person; the more likely they are to engage in environmentally responsible behaviour. It will be affected by trust, in both the government and the international community (Siegrist, 2000).

3.2.3 Social and environmental variables

- Socialisation theory and the new environmental paradigm (NEP); The NEP has been formulated in an attempt to express the shift in societal values away from the dominant social paradigm to a new value system (Evans, 2007). It is often employed to look at the way values are linked to behaviour. Operational environmental values have been measured using ecocentric and technocentric values (O'Riordan, 1985) with the former tending to have a stronger commitment to the environment. If women are more likely to be classed as ecocentrics and are socialised to show more concern for the biosphere then they may be well placed to develop habitual pro-environmental behaviours in the home.
- Social influence, norms and self presentation; it is likely that family, friends and community members will have some bearing upon the respondents, be it positive or negative.

3.2.4 Feedback about environmental behaviour

In order to persist with a pro-environmental behaviour, it can be beneficial for an individual to receive some form of positive reinforcement, be it an intrinsic satisfaction or external acknowledgment. The study will look into the ability of smart meters to provide a form of feedback, which will on some occasions be linked to an economic incentive. The study will assess the behaviour intention of women to use smart meters and their perceived willingness to change habits.

3.3 Primary data collection

Primary data was collected through a postal survey. It was decided that this would enable a large amount of data to be collected and would be within the cost and time constraints of the study. Although a national study

would have provided a richer, more valid data set, it was decided that for an innovative piece of research such as this, a study in Falmouth, Cornwall would provide a useful foundation upon which further studies could be based.

3.3.1 Questionnaire design

A four page questionnaire was designed to achieve the aims and objectives as set out at the beginning of the study and, particularly, to assess;

- General environmental attitudes (measured by separate items and assessed using a scale adapted from Defra's 'framework for pro-environmental behaviours' (2008)), self reported knowledge about the environment and feelings of self and response efficacy;
- Specific attitudes towards energy, including behaviour intentions and opinions on future UK energy policy;
- Situational and demographic variables (e.g. age, education, socio-economic status, household characteristics), measured using a combination of response scales;
- Specific energy saving actions (measured on a 5 point Likert type response scale ranging from 1 (always) to 5 (never)) and the factors affecting levels of energy conservation within the home.

The survey included both closed-ended questions (N=14) and open ended questions **(**N=2) (see appendix 1).

3.3.2 Pilot

The draft questionnaire was initially pre-tested to try and improve on the wording and format of the questions. This test was undertaken using respondents in the groups of interest, which in this case was females aged 20+ living in Falmouth. This form of protocol analysis (Ericsson & Simon 1993) allows you to gauge the reaction of a respondent and to follow through the process of questionnaire completion. It ensured the clarity, identified ambiguity and measured the effectiveness of responses. For example, there was a lack of understanding over the meaning of 'compact fluorescent light bulbs' and so the sentence was revised to 'energy saving light bulbs' avoiding confusion.

The questionnaire was refined and validated for content and a field test was run to assess the validity and reliability of the questionnaire. It was mailed to a street in Falmouth but only achieved a three in twenty rate of response. In order to address this problem it was decided that the questionnaires should be delivered in person which would allow confirmation that a suitable female resided in the property and also provide an opportunity for possible opt out from the survey. While this latter option negatively impacted on how representative the survey would be, it decreased the level of non response, commonly associated with postal self-completion surveys.

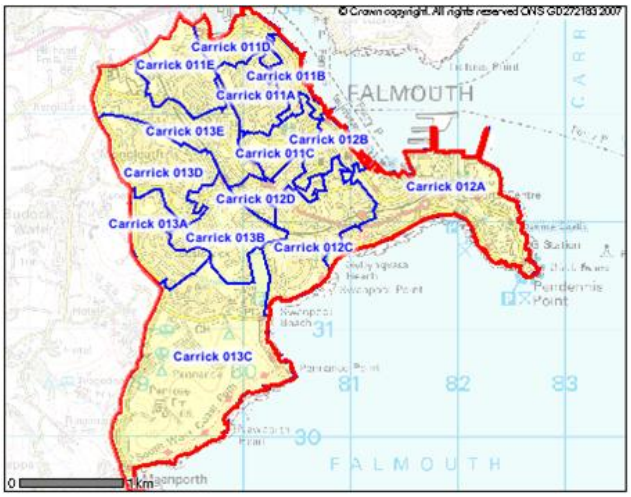
3.3.3 Sampling

Cost and time constraints required the study to use a form of sampling but in order to maintain validity it needed to be as near to representative of the adult female population in the UK as possible. Due to project constraints, the survey needed to be administered in Cornwall (Fig 3.1) and from all possible locations in the county, Falmouth was logistically practical and had a suitable socio-demographic mix. Falmouth is situated in Cornwall in the South West of England on the Fal estuary. It has a population of around 20,000 and while maritime activity has declined from its heyday, the docks are still a main contributor to the town's economy. It has become a popular holiday destination and is now primarily a tourist resort.

Figure 3.2 Map of survey site - Famouth, Cornwall

Initially, a form of stratified sampling was to be employed. This is a where the sample frame (Falmouth) is divided into strata and then a sample is taken from each stratum. This would have been done using the postcode address file (PAF), but the list, compiled by the Post Office, proved too costly for the scale of this project and instead, a stratified, two stage sampling design was used to recruit participants using lower layer super output areas (SOA). These represent a new statistical geography published by the Office of National Statistics (ONS). They are made up of three hierarchical layers - lower, middle and upper - whose key aspects are stability and uniformity of size. They have been introduced initially by the Office for National Statistics (ONS) for use on its Neighbourhood Statistics website (NeSS) with the long-intention of the areas becoming the standard geography across National Statistics. In Falmouth 14 lower layer SOAs were identified as can be seen in figure 3.2;

Figure 3.3 Lower layer super output areas



From the 14 lower layer SOAs, streets were randomly drawn (without replacement) from a list of residential roads. Within each stratum, three streets were drawn with each house on that street targeted with a questionnaire. Eligible respondents were female adults, able to take part in surveys in English and residing in private dwellings such as houses or flats. In houses with more than one eligible participant, the person with the most recent birthday was asked to take part in the study. Participant recruitment was in person and data collection was by mail. Participants were asked to complete the survey and post it back to an address with a lottery based incentive offered to encourage return of the completed questionnaire. With the survey being carried out on a residential basis, there was always the possibility of non response errors affecting the collected results but as stated earlier, the personal delivery was designed to diminish the likelihood of this. During the week of July 20th 2009, questionnaires were hand-delivered to 400 households in Falmouth.

In total, 241 respondents returned a completed questionnaire, a response rate of 60%. In comparing survey respondents to the actual population of the Falmouth CP area (Office of National Statistics, 2001) the sample was revealed to be wealthier, older and the average household size slightly larger (2.5 people as opposed to 2.2). High income groups were overrepresented with as were those who reached a higher level of education. In general, the number of returns was excellent and analysis of the sample demonstrated that the female population was demographically reasonably well represented.

3.3.4 Interviews

In undertaking any form of progressive research, there is every chance that initial results may not provide definitive and clear cut answers. With this in mind, including interviews as an added methodology tool was important if any firm and genuine conclusions were to be drawn. As a technique for collecting data, they excel in their potential to elicit specific kinds of information (Berg, 1998) and are central as a means of gathering data about people's motives and attitudes. Interviewees were selected from those who responded positively to a request in the questionnaire for a follow up telephone conversation to discuss in more depth experiences and attitudes towards domestic energy use. Blee (2001) describes interviews as especially useful in obtaining rich, detailed information about people's everyday lives without having to commit to prolonged involvement in the

lives and activities of individuals. Based on the fact that the people interviewed had already filled out a questionnaire, the open ended nature of a follow up interview allowed respondents to generate, challenge, clarify, or re-contextualise understandings of domestic energy savings. These were informal in nature and also anonymous so that interviewees could potentially speak more freely.

3.4 Primary and secondary data analyses

Data collected through the postal questionnaire and informal interviews were coded and entered into an excel spreadsheet. This was then analysed alongside the secondary data with the purpose of understanding the link between women and domestic energy use. Key trends were drawn out in responses, probabilities of answering in certain ways investigated and key statements extracted. Responses from interviews were clustered in order to establish reoccurring themes and allow key issues to be drawn out. To try and unearth deeper trends and relationships, bivariate and multi-variate analysis was undertaken, where responses were analysed by reference to particular groups, for example age, or level of education. This process is simplified in figure 3.3; blue boxes show the methods and the black bold boxes the aim and objectives.

3.5 Summary

This chapter covered the methods of study. It explained the development of a conceptual energy model that was used to aid the formulation of a questionnaire, the design of which was then described along with the process of carrying out a pilot study. Sampling techniques and the choice of Falmouth as a case study were substantiated and expanded upon. Interviews were explained with reference to the issues of validity and reliability and the chapter concluded with an explanation of the methods of analysis adopted. The following chapter summarises the results of the survey.

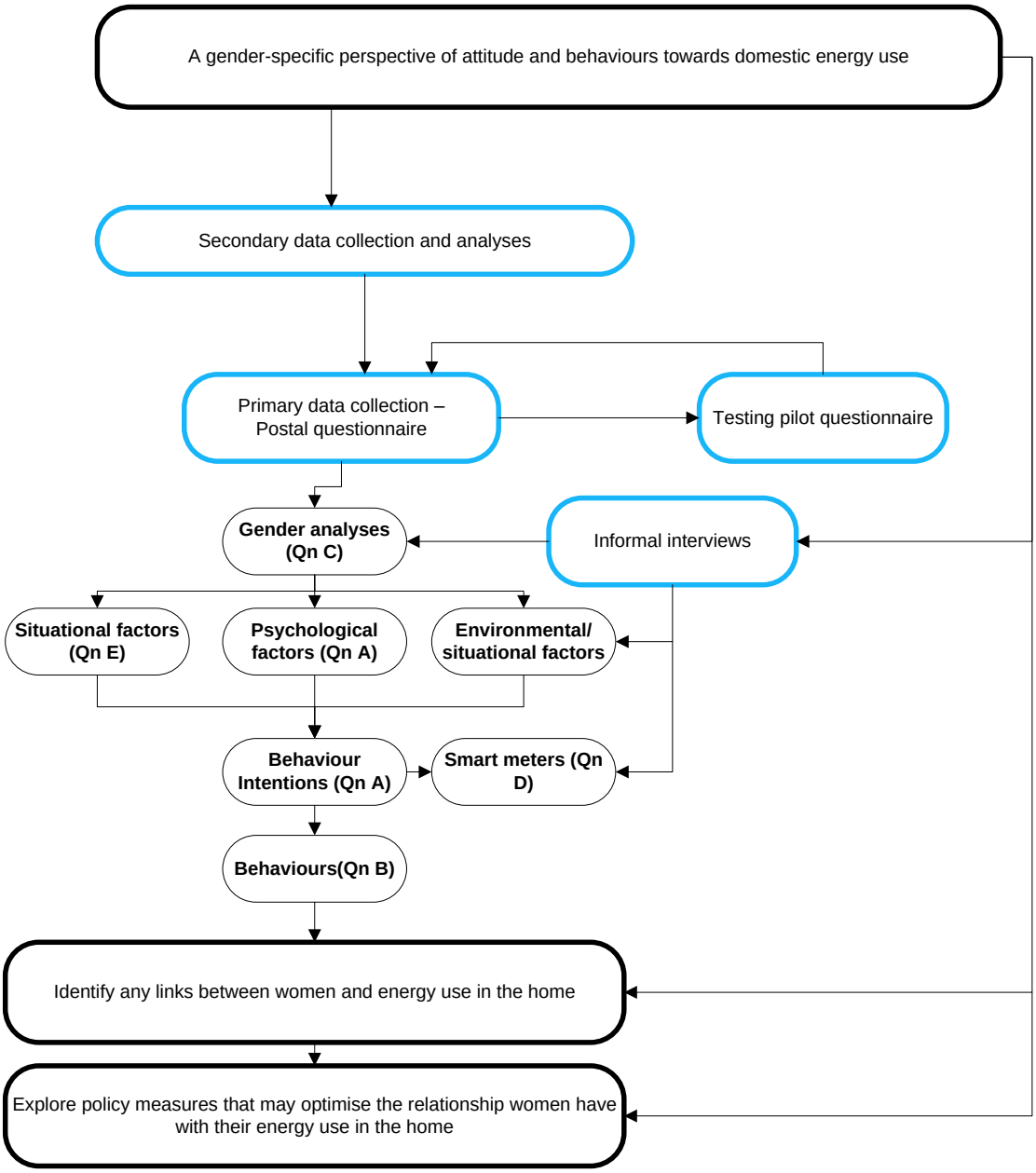


Figure 3.4 Methodology diagram

4 Results

Results of the questionnaires and informal interviews are presented in this chapter. A gender analysis is followed by more thorough investigation into the different variables highlighted in the conceptual model. Each section includes an analysis of the findings and the chapter concludes with a consideration of policy implications.

Table 4.1. Characteristics of the survey

Respondent characteristics			Household characteristics		
			Tenure (N=241)		%
Age (N=241)		%	Owner occupier: own it outright	88	36.5
20-29	47	19.5	Owner occupier: with mortgage/loan	99	41.1
30-39	38	15.8	Live with parents	9	3.7
40-49	43	17.8	Rented from private landlord/agency	39	16.2
50-59	45	18.7	Rented from council/housing association	6	2.5
60-65	35	14.5	**Number of permanent occupants (N=241)**		%
66+	33	13.7	1	22	9.1
			2	132	54.8
Highest level of education (N=241)		%	3	53	22.0
No formal	17	7.1	4	22	9.1
Vocational/NVQ	23	9.5	5+	12	5.0
GCSE	113	46.9	**Household income (N=214)**		%
A-level	54	22.4	0-19,999	44	20.6
Bachelor degree	33	13.7	20,000-39,999	74	34.6
Postgraduate	1	0.4	40,000+	96	44.9
			Level of heating management (N=235)		%
			room thermostat/radiator valves	207	88.1
			On/off or no central heating system	28	11.9

4.1 Gender analysis

One of the key objectives of the study was to establish whether or not there are gender differences with regards to the relationships individuals have with energy use in the home. The term gender refers to socially constructed roles of men and women, which come attached with different responsibilities, constraints, opportunities and expectations, defined by the society in which they exist. Gender relations influence how communities, households and institutions are organised, how decisions are made and how resources are used (PRB, 2001). Gender roles are not permanent but change over time and across cultures. To fully understand

how gender has an impact upon activities that affect the environment, it is necessary to examine the different roles and responsibilities men and women both have in making decisions about energy use.

4.1.1 Heating control

Space heating dominates consumption in the domestic sector and current accounts for 58% of domestic energy use. This is an increase of around 19 percent on the 1970 level, with the average internal home temperature 5.7°C warmer than in the same year. Another quarter of energy use in the home is accounted for in the heating of water, with space and water heating combined, totalling 82% of overall domestic energy use (Berr, 2007). Table 4.2 reveals the responses to a question enquiring into who took responsibility for controlling space and water heating within a household. Of all the women surveyed, 88% claimed to have some degree of control over these decisions with almost 50 percent stating that they were solely responsible;

Table 4.2 Responsibilities for space and water heating

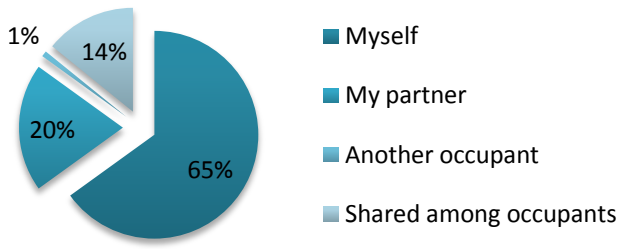
Responsible	***Percentage of respondents***
Myself	**48%**
Shared	**40%**
Partner	**11%**
Another occupant	**1%**

This supports evidence in literature that suggests women still continue to hold primary responsibility for household tasks in many northern countries (Blossfeld & Drobnic, 2001). Although appearing as fairly minor tasks, space and water heating carry with them significant energy saving potentials, and acknowledging who the key actor is in decision-making and action-taking will go some way in enabling more targeted campaigns for energy conservation.

4.1.2 Home energy savings

It has been suggested that men are more likely to be responsible for technical and structural alterations in the home, such as installing new boilers and insulation, whilst women are more likely to be expected to save energy through changes to their everyday behaviour (Roehr, 2001). As this survey concentrated on everyday behaviours and the majority of women who responded to the questionnaire (65%) considered themselves responsible for energy savings in the home, Roehr's assumption is supported. Significantly, 79% were either solely responsible or shared it with another occupant. Figure 4.1 explains in more detail how people responded to the question asking who has taken primary responsibility for any reductions in home energy use;

Figure 4.1 Responsibilities for energy saving behaviours



These findings are concurrent with a study assessing research into environmental behaviours published between 1988 and 1998. Zelezny, Chua and Aldrich (2000) found that the majority of studies proposed that, compared to men, women report greater participation in pro-environmental behaviour, and display the effects of traditional gender socialisation (where individual behaviours are shaped by gender expectations within the context of cultural norms). Furthermore, they are specifically more likely to engage in private behaviours within the household (Tindall, Davies & Mauboules, 2003; Blocker & Eckberg, 1997). It may be that women's 'traditional' domain of the home is somewhere where women are comfortable to engage in private-sphere environmentally orientated behaviours (Mohai, 1992).

Hunter, Hatch & Johnson (2004) also find that the number of women engaging in private sphere environmentally-orientated behaviours compared to men is also significantly higher in 14 of the 22 countries they investigated. Alongside this, a pattern emerged with regard to the gross national income (GNI) per capita of a country. Women appeared to partake in more environmentally orientated behaviours in the home relative to men in nations at the upper end of the wealth distribution.. On the back of this research, it is not surprising that in the UK a preference for private pro-environmental energy behaviours appears to be significantly feminised. It is also worth noting the figures in Table 4.2;

Table 4.3 Responsibilities for dealing with utility companies

Responsible	***Percentage of respondents***
Myself	**47%**
Shared	**18%**
Partner	**31%**
Another occupant	**4%**

Of the women questioned, 47% were mainly responsible for dealing with utility companies and taking care of the energy bills, while 31% said it was their partner's responsibility.

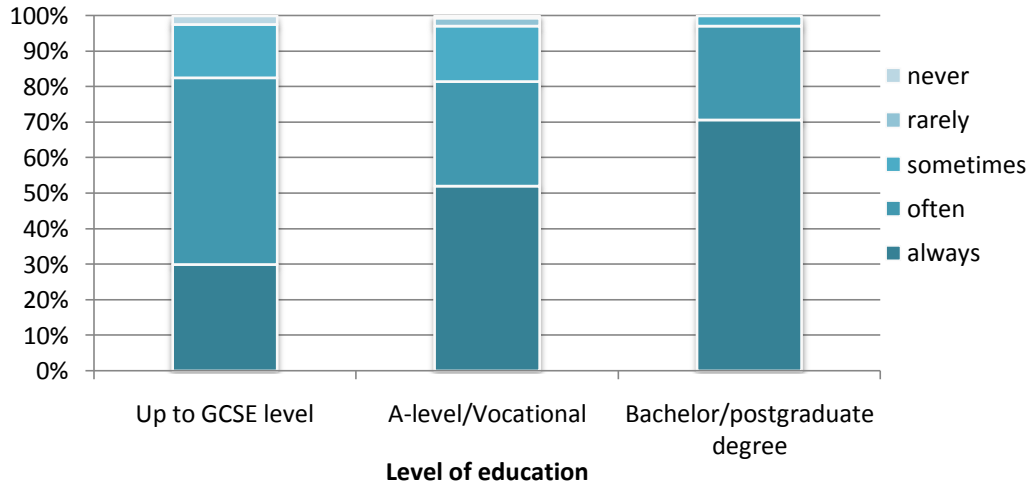
4.2 Situational variables

The topics covered in this section of the questionnaire relate to the behavioural context in which each individual exists. In particular it covers the socio-demographic, economic situation, and knowledge of each respondent.

4.2.1 Socio-demographics of the study sample

Out of the sample, there were clearly women who had decided to make pro-environmental changes to their everyday energy habits. Using a bi-variate analysis of frequency and education reveals a relationship between the level of education achieved and the consistency with which the habit has been developed. One such variable investigated was laundry and the extent to which education may have an effect on the habit of washing clothes at a lower temperature. Figure 4.2 shows this in more detail;

Figure 4.2 The affect of education on laundering at a lower temperature

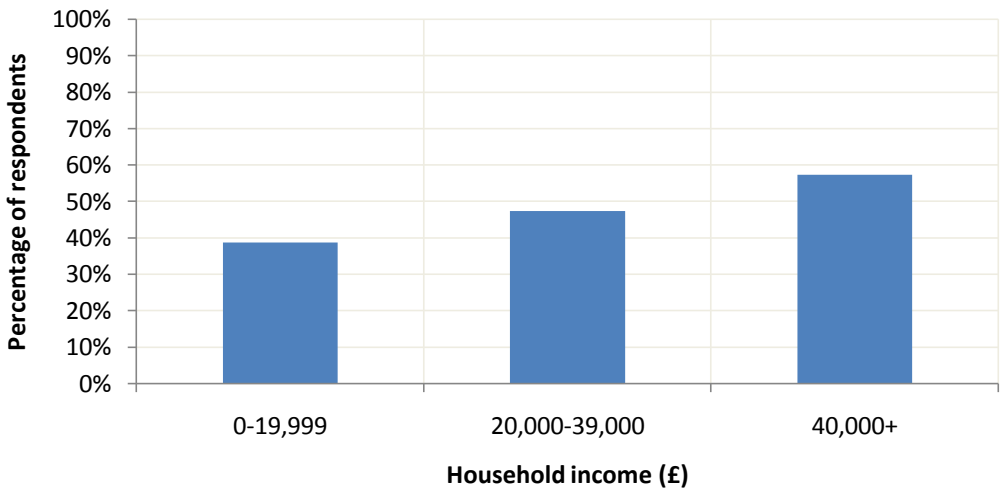


Overall, a sizeable proportion of the women, (84%) purported to *always* or *often* lowering the temperature of their wash. It is a change in habit that is not associated with significant financial savings and possibly a lower quality performance yet something has motivated 84% of these women to change. One answer for this could be in advertising campaigns from brands such as Persil where, rather than flaunting eco credentials and trying to gain green brand image points, there has been a form of engagement with consumers in helping them to make lifestyle choices that will both make a difference to their pockets and also to the environment. Be it advertising campaigns, or mass media campaigns, they have the power to infiltrate into everyday routines. 'Flex your power' was one such scheme run by Californian policymakers in 2001 as part of a state-wide multi-layered social marketing effort to deliberately shape public attitudes, values and behaviours towards taking energy-saving actions (Komanoff, 2002). Their success is usually attributed to the repetition of specific, vivid, workable energy conservation messages and Stern (2000) has long argued that the most success behavioural change initiatives involve combinations of carefully orchestrated intervention strategies that foster greater synergy. A review of the literature has already revealed that creating awareness alone is a poor predictor of action, but a wide variety of social processing and cognitive theories offer strategies largely

untapped. Indeed, surprisingly little research has been conducted on mass communication campaigns for energy related topics.

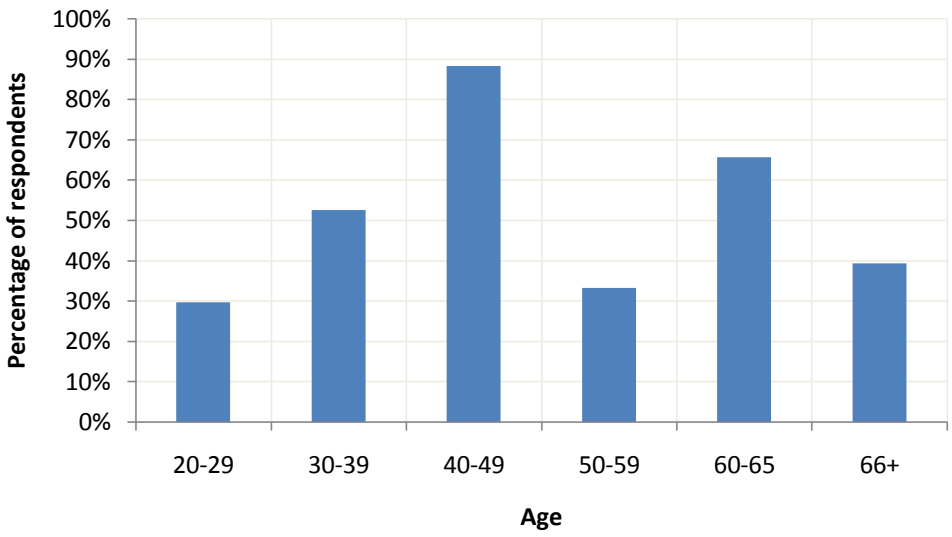
Figure 4.3 suggests that with an increase in household income, there may be a link with the proportion of women who have already reduced their home energy use because of concerns about the environment. Although this link between income and participation in energy saving behaviours around the home provides an insight on external variables, the distribution of respondents was not normal and the sample is too small to draw any firm conclusions. Economic theory on private provision of public goods expects an individual's willingness to pay to increase with income (Andreoni, 2001). As many respondents cited behaviours such as installing insulation, double glazing windows and replacing inefficient appliances as their behaviours to reduce energy use, this prediction is verified here. Dillman *et al.* (1983) provided more in-depth analysis on the effect of income on domestic energy saving behaviours and found that there was a differential effect for income on energy saving according to the measures being examined. Those on a lower income were more likely to take up direct energy saving measures, while technological measures could only be taken up by those with sufficient capital. The presence of increased occupants did not have a substantial effect upon the extent of behaviours undertaken, emphasising that although discretionary income may decrease with more occupants, there exists an ability to decrease energy use through everyday behaviours.

Figure 4.3 Income as a variable in women who report pro-environmental energy behaviours



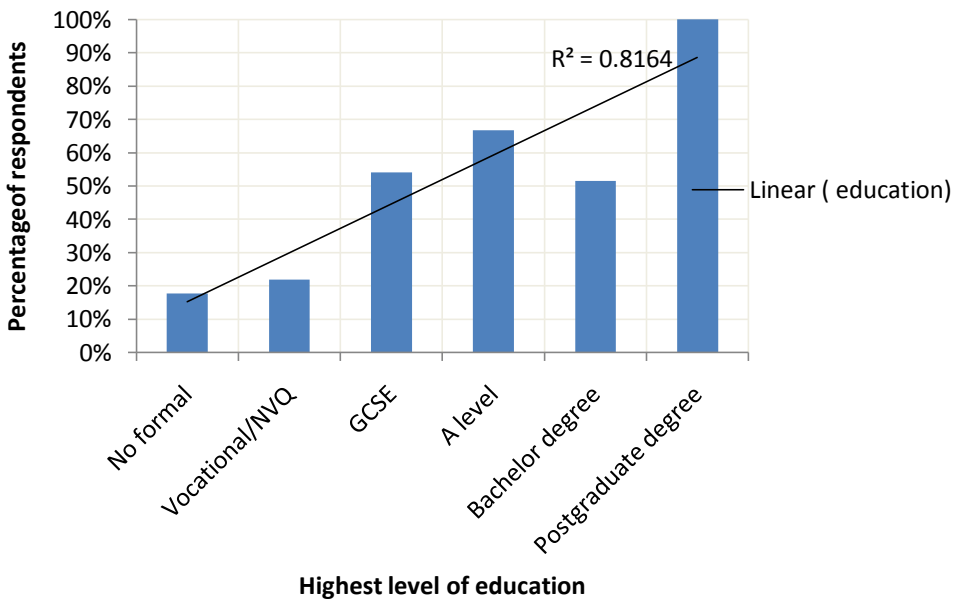
While past research has suggested that environmental concern is negatively associated with age (Kanagy *et al.* 1994), the results from the survey suggest that there is no clear relationship between age and actual positive energy behaviour in women (Fig 4.4). Demographic characteristics like motherhood may affect a women's ability to partake in energy saving behaviours in different ways – it would be obvious to assume that the time constraints of becoming a mother may limit the amount of time available for participation in such activities but environmental sociologists pay particular attention to the ability becoming a parent has to increase environmental awareness (Davidson & Freudenberg, 1996). Previous research has suggested that elderly women consume less energy than younger ones (Carlsson-Kanyama & Lindén, 1999) and the graph below suggests that they are also more accepting of extensive changes to their routine to conserve energy in the home.

Figure 4.4 Age as a variable in women who report pro-environmental energy behaviours



Whether or not education gained at the early stage of a woman's life will directly affect her participation in energy saving behaviours is doubtful. What is more certain is that it will increased her ability to access relevant information that may make it possible to become more engaged and empowered as an energy citizen. Figure 4.5 shows that there is a slow and fluctuating rise in the amount of pro-energy behaviours undertaken as education level rises. That is not to say that information and empowerment cannot come at a later date, but it is doubtful that is can be done without the availability of gender-disaggregated data on households. If this data can be obtained then women's coping strategies and adaption capabilities can be assessed and they can be better targeted in the communication of information related to climate change (Eriksen & Naess, 2003).

Figure 4.5 Education as a variable in women who report pro-environmental energy behaviours



Black *et al.* (1985) found that home ownership was a distinct factor in household energy adaptations and Barr *et al.* (2001) concluded that committed environmentalists were more likely to own their own home, while those with less energy saving intentions were more likely to rent from a local authority. In this study, home ownership was not a significant factor in undertaking energy saving behaviours (see appendix 3). Had the survey been more representative in regard to tenure, this trend may have been witnessed but as it was, only one respondent spoken to referred to the limitations of renting and her intentions to do more when she owned her own house. While home ownership may engender a sense of belonging and instil a duty of care, the behaviours that were covered in this survey were focussed more strongly on habitual actions rather than those which involved time heavy and possibly cost related decisions.

4.2.2 Economics

While it is common knowledge that financial incentives are successful in their ability to motivate individuals to behaving in desired ways, they are rarely long term solutions to permanent behavioural change. Noticeable in this research was the unprompted interest in micro-generation and community renewables in the follow-up interviews. Of those interviewed, over half mentioned an interest in knowing more about being able to generate their own energy. Studies have already shown that women consistently show less support for nuclear power than men and would rather we took a softer, renewable orientated path to a sustainable energy system (Longstreath *et al.* 1989), but there has been less recognition of women's desire to be involved in the solution on such a practical level. There are a disproportionately small number of women involved in the technical side of energy generation yet on the open ended questions; seven women out of the 10 interviewed claimed to want more information on small scale renewables. A typical statement was:

> *I don't know a lot about it (small scale renewables) to be honest but if I did and there was some financial help then I would certainly look into it (50-59)*

Interest was greatest from the more mature respondents. The combination of a higher disposable income and fewer time constraints may explain this. One lady, aged (40-49) spoke of her own mother who lived in a large property with land who was an active member of the community, had been president of the WI and who had previously tried to get solar panels installed on her roof. After some effort, 'the headache of trying to get the ball rolling' deterred her from following this through. This highlights the importance of maintaining motivation and engagement and also the need for a simplification of processes associated with renewable installation. In this example, engaging a key individual could have had a subsidiary effect in the local community. This may be particularly relevant in rural communities, where micro generation may be more feasible, cost effective and face fewer obstacles. With regard to domestic energy savings, targeted incentive schemes could go a long way in strengthening community based marketing schemes aimed at engaging particular groups.

Energy efficiency and small scale renewables represent the harder end of the market in terms of stimulating individuals to act, yet there is potential for great savings to be made. Evidenced here is the public willingness, among women, to become involved in either personal or community action, yet the subsidies and incentive

schemes to encourage people to make their homes more energy efficient have been insufficient, sometimes complicated, short-lived and over-subscribed.

4.2.3 Knowledge

It is apparent that there is a fairly high level of awareness around the need to shift the way energy is supplied and consumed in the UK. With 52% of respondents maintaining that for them the priority in the UK's future energy policy is in moving towards cleaner sources, there is clearly a basic knowledge of issues relating to climate change and energy use (Table 4.3);

Table 4.4 Priorities for future UK energy policy

Priorities	*Percentage of respondents*
Moving towards cleaner energy	**52%**
Keeping costs low	**26%**
Ensuring secure/reliable sources	**21%**

What was not so clear was whether or not these same women had the more concrete knowledge of how to apply what they knew and believed in to their everyday lives;

> *'More environmental awareness and commitment in the workplace would surely increase motivation levels at home and help make energy savings a habit for people (20-29)*
> *'I did try to compost our waste, but a neighbour told me that it would attract rats if we composted cooked food waste but I'm not sure if that is true' (30-39)*

The next step is finding the best place to educate women on the concrete everyday energy behaviours that make a difference in the home. Hargreaves et al (2007) looked at pro-environmental behaviours in the workplace and suggested that viewing actions outside of a domestic setting could enable a greater understanding of the specific dynamics of various actions. Transfer of knowledge into the home can then be made.

Through schools, WIs, church and sports groups there will be ways to reach the majority of female occupants in a household. For example, educating children at school about composting and helping them construct their own composting kit would be one way of bringing an issue homes. Similarly, if women are given an opening to bring an energy saving action into their lifestyle, evidence suggests that they would be willing to embrace it (Carlsson-Kanyama & Lindén, 2001). A successful scheme aimed at changing behaviours can be seen in composting food waste. What began as a pilot scheme to cut down on the amount of food waste going to landfill in Milton Keynes proved so successful that it has been adopted throughout Buckinghamshire. A crucial aspect of its success has been the accessibility and simplicity of the system. Specific recycling bins are

provided to every household, along with bio-degradable bags and a weekly collection empties the bins from outside every house. Alongside this scheme, Milton Keynes Council, recognised as a leading authority for recycling, has also run a home composting campaign, making it a viable and effortless behaviour. With over 40% of the women surveyed admitting that they never compost food waste and out of the same women, almost 80% claiming to always recycle other waste, in Cornwall it seems as though the local authorities are overlooking a receptive audience.

Gendered knowledge also varies by class, age and ethnicity, underscoring its complexity. While more educated women appeared to have a more complex understanding of the relationship between their energy use and climate change, relationships aren't all this simple and understanding the different knowledge of women in different socio-economic circumstances helps to determine the appropriate and sustainable interventions.

4.3 Psychological factors

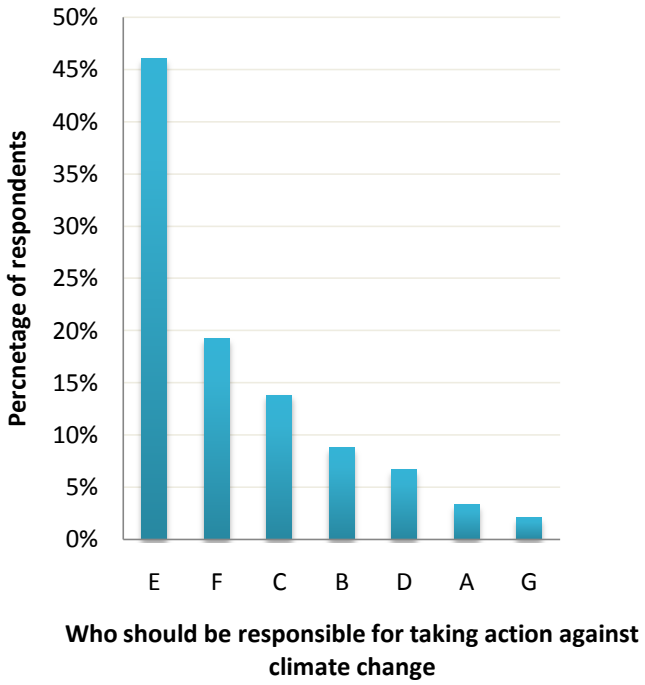
4.3.1 Intrinsic motives

Undertaking pro-environmental energy behaviours in the home, for the sake of the public good, or because of the self satisfaction of doing so is a difficult variable to quantify, especially from a survey. Those people who do undertake sustainable behaviours do so for a variety of reasons, relating to values, responsibility, costs, and attitudes. Andreoni & Vesterlund (2001) found that more than males, females have a heightened interest in equality and justice and are more likely to be equalitarian. The gender differences in altruism that they uncovered only serves to reiterate the importance of taking a gender perspective upon domestic energy. Observable gender differences such as these, that have predictable effects upon behaviour, present important opportunities for effective, targeted policy making.

4.3.2 Response efficacy and attribution of responsibility

Barr and Shaw (2004) revealed that the more individuals ascribe responsibility to external agents, the less likely they are to take action themselves. This hypothesis is not supported here as less than 10% of respondents believe 'individuals' are primarily responsible (Figure 4.6) yet as will be explored later in the chapter, many are taking personal action in the home. The figures relating to pro-environmental energy behaviours reported above also tell a different story; 37% alleged to have reduced their home energy use by *a lot* or *a large extent* because of concerns about the environment and 47% claimed to have done so *somewhat*. So it would appear that although many women believe that the government shoulder most responsibility, they are prepared to make incremental adjustments to their lifestyle regardless.

Figure 4.6 Attribution of responsibility



A	**Environmental groups**
B	Individuals
C	Industry/companies
D	Local authorities
E	National governments
F	The international community
G	Don't know

The general opinion was that our national government should be taking the lead in the fight against climate change. In follow-up interviews this feeling was reiterated, although it became clear that respondents felt individuals did have a role to play but this needed to be more clearly defined by the state, as demonstrated by the following respondent;

> *'The government need to take further steps to raise awareness among the population so that people are then able to do their bit' (50-59)*

One response demonstrated a strong external locus of control and she said that she felt any effort on her behalf was a drop in the ocean compared to the level of action that was actually needed;

> *'I would certainly be more motivated by collective action - if the USA, India and China cooperated in reducing their CO_2 emissions then efforts in the UK would not be in vain'*

Highlighted in different ways by different women, the attachment of responsibility for reducing emissions was shaped in varying ways. For the more engaged respondents, there was general acknowledgement of the necessity of individual action;

> *'Personally think it is up to the individual to act and decide on the future, not the government' (60-65)*

The policy implications of these varying levels of ascribed responsibility is that different women need different messages in order to stimulate or reinforce personal action

Literature on risk perception suggests that women view risks as larger and more problematic than men (Slovic, 1997) and that environmental concerns are generally greater than in men (Burger *et al.*, 2000). Although the attitudes women hold towards the attribution of responsibility was directed towards the governmental and large institutions, they report far reduced levels of trust in formal institutions, particularly science, technology and government (Siegrist, 2000). This stresses the value, and also difficulty, in building public awareness and understanding around the importance of energy saving behaviours within the home, in particular in conveying messages. One lady spoke of the deceit she felt came from her energy provider and it would be clear that if they were the source of future advice/information, past experiences would hinder her receptivity;

> *'...legislate against some of the practices that the energy providers employ - like when the objectives seem purely to make a profit from the consumer! We were advised to sign up to a 3 year contract to hold prices at a certain level as they had apparently purchased gas at a particular price - then we learnt that they were offering new customers a cheaper rate which was not applicable to those who had already signed up to a contract' (40-49)*

Whilst public engagement programmes have recently been more widely adopted and research into the role of citizens in the policy process better documented (Involve, 2007), the approach is still an area in its infancy. Within the context of participation, there are also difficulties in ensuring broad based public engagement (Few *et al.*, 2006). The notion needs to extend beyond specialist actors to help widen perspectives and guide research priorities (Turnpenny *et al.*, 2004). Participation can also ensure decisions are better geared towards their objectives (Few *et al.*, 2006) and can act as an empowering tool, giving communities greater access to the decisions that affect their lives (Parkins & Mitchell, 2005). Certainly, expert knowledge is indispensable in energy policy, but it is by no means self sufficient. If women are to believe and act upon information, the role of the expert may be more useful when it is "available within a larger discursive field, as an active participant in the community's production of meaning, rather than as a unitary source of meaning" (Depoe *et al.*, 2004:88). Haphazard and meaningless engagement can be perceived as a lack of honesty and will only serve to enhance public mistrust of policy makers. As women already seem wary of conventional sources of knowledge and advice, rethinking the flow of information could prove vital in getting women involved.

Miller *et al.* (2007) found in an energy-related study that local authorities, the industry and the national government were distrusted by both genders but interestingly, scientists and researchers working for government are trusted significantly more by men than women, whilst women trust environmental organisations more. If this trust is to be regained, then the government need to prevent sending any mixed messages on the environment which only serve to leave people confused and unsure of who to trust and how to behave. Not to underestimate this task – it will never be easy for the government to balance economic objectives with an environmental agenda - but for many, the case of a new runway at Heathrow is a step too far in a direction opposing environmentalism;

'if the government really want us to change then they should be setting an example..not as in the case of Heathrow' (30-39)

'...we need some coherency in government policy' (20-29)

Whether or not the environmental cost of expansion is mitigated by the inclusion of aviation in the EU emissions trading scheme (meaning substantial cuts elsewhere) has no significance for many people. It sends out the signal that the government are not as serious as they claim to be about carbon emissions and instead more interested in profit and economics. Such findings demonstrate the importance of joined-up thinking and consistency in policy making. It also highlights the importance of identifying the most appropriate communication channels and strategies to educate and engage women. For example, partnerships between researchers working for universities and environmental organisations may be a way of reaching this group.

It would appear that women have the greatest concerns about the environment, including the move to a low carbon economy, yet traditionally men are more involved in scientific matters (Roehr, 2001). If trustful partnerships among expert and lay groups can be established then women may be able to engage in informed debate and assess for themselves the appropriateness of proposed solutions. This very notion was suggested by a number of respondents;

'There needs to be more awareness around local issues and how we can influence and support them' (30-39)
'I would like to do more, but I don't know enough about it all to get involved' (40-49)

4.4 Environmental and social surroundings

4.4.1 Socialisation theory and a gendered division of labour

Although the UK is within the top 20 of the world league table on gender equality (WEF 2007), there is still an obvious gendered division of labour in the UK. An association still exists between women and caring professions, with men supposedly more suited to competitive, rational and dominant positions (Chafetz, 1988). More often than not, these are the high resource generating roles and leave many women assuming primary responsibility for domestic labour and family obligations. Participating in more nurturing and caring work, both in the home and in the workplace is believed to make women implicitly more socialised to value cooperation and concern for others (Davidson & Freudenberg, 1996). If at the same time women are undertaking a larger proportion of the domestic work (Jackson, 1996) then practically speaking, women will generally find more opportunities in their day to day lives to participate in pro-environmental energy behaviours. In contrast, men may be concentrating on providing financially and therefore hold a more consumerist attitude towards the environment (MacDermid & Stevenson, 1991).

4.4.2 Norms and self presentation

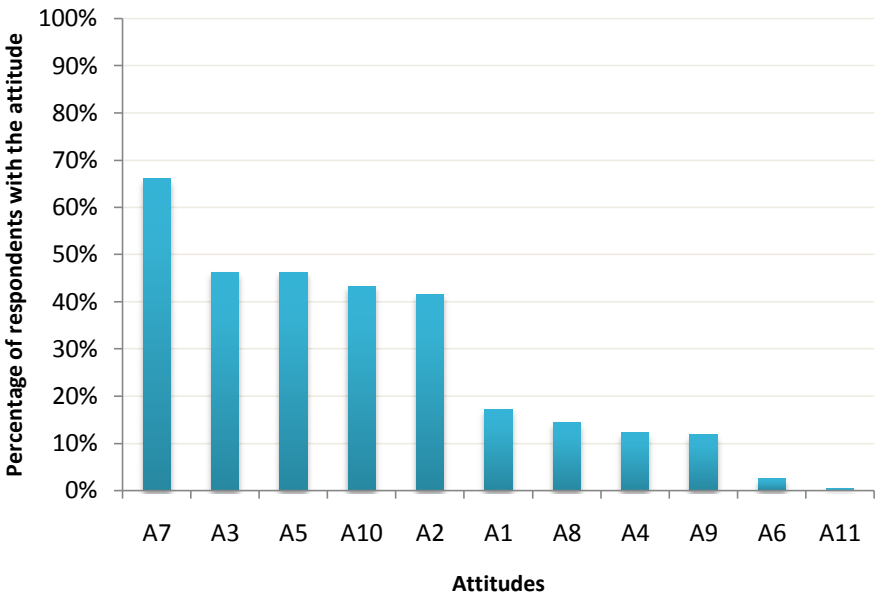
There have been decades of research investigating the influence of social factors in determining energy behaviours (Leonard-Barton, 1981; Costanzo, 1986). For example, Warren & Warren (1977) investigated the neighbourhood and the transition of shared norms and attitudes as a mediating institution between a household and larger society. They concluded that the importance of social norms in determining energy conserving behaviour was equal to or even outweighed the influence of individual socio-economic factors. Employing social norms as a way of influencing behaviour is particularly useful when there is limited time for changing beliefs or values (as with the urgency of climate change). Recycling is a classic example - over 85% of the women surveyed said they regularly recycled household waste, whereas it is clear that the same amount do not possess high levels of environmental concern. Behaviours are likely to become consistent with public norms providing individuals identify themselves with that group.

Midden & Ritsema (1983) consider two types of social influence, 'normative' (an influence to conform to the positive expectations of others) and 'informational' (an influence to accept information obtained from another as *evidence* about reality). Bordens & Horowitz (2001) found that women are more likely to conform than men under conditions of normative social influence than under informational social influence conditions. This being the case, then adopting strategies in which energy conservation in the home becomes a social norm may help motivate women who have strong motivations to comply but weak social norms in relation to energy. Conversely, if women have strong norms but weak motivations to comply then normative influence may be raised by enhancing the cohesion of the group/neighbourhood in which the individual exists. Overall there was a high level of activity surrounding the self reported behaviours that benefit the environment. Specifically, in all nine energy actions, there were few in any category that reported to never undertake any act. Part of this may be related to the theory of self preservation and the extent to which individuals perform behaviours, or in this case report them, in ways that they believe significant others will be impressed with (Sadalla & Krull, 1995). You would assume that a confidential questionnaire with an option of including personal details would help to remove this bias so either the surveyed women are undertaking a lot of positive energy behaviours in their homes, or they are aware of the social expectance to do so.

4.5 Behaviour intention

Efficiency was the overriding intention of the women involved in the survey and this desire to accomplish tasks with minimum expenditure of time, effort and cost and to optimise useful work per quantity of energy typifies what has so far been established regarding women and energy use in the home (Fig 4.7). Three of the four next most common attitudes relate to concern for the environment, which substantiates Mohai (1997) and others who discovered high levels of environmental concern among women. 46% of women also cited cost as a common factor influencing most of their decisions around the home, highlighting the need for responses that not only remedy environmental concerns but are also economically sound.

Figure 4.7 Environmental attitudes of the survey sample



A1	Environmental issues are a day to day concern for me
A2	I want to save energy to reduce my climate change impact
A3	I am concerned about the environment and think about it fairly regularly
A4	I'd like to save energy but I need more information to do so
A5	Cost is something I think about in nearly everything I do
A6	Although maybe I should, I don't really think about the environment – I've got too many other things to worry about
A7	I try to do things as efficiently as possible
A8	I feel like there are so many big global issues at the moment for anything I do to make much difference – the answer lies with big business and government
A9	I'd like to be able to think about things like saving energy but I'm constrained by my circumstances at the moment
A10	I think climate change is important
A11	I'm not really interested in energy saving

As revealed in table 4.3 (page 33), over half of the questioned women stated cleaner energy sources were most important to them in the future of UK energy policy. Just over 20% also had concerns about energy security and the reliability of the UK's energy sources as was also evident in the follow up interviews;

'More money needs to be invested by the government into making UK energy supplies secure' (50-59)

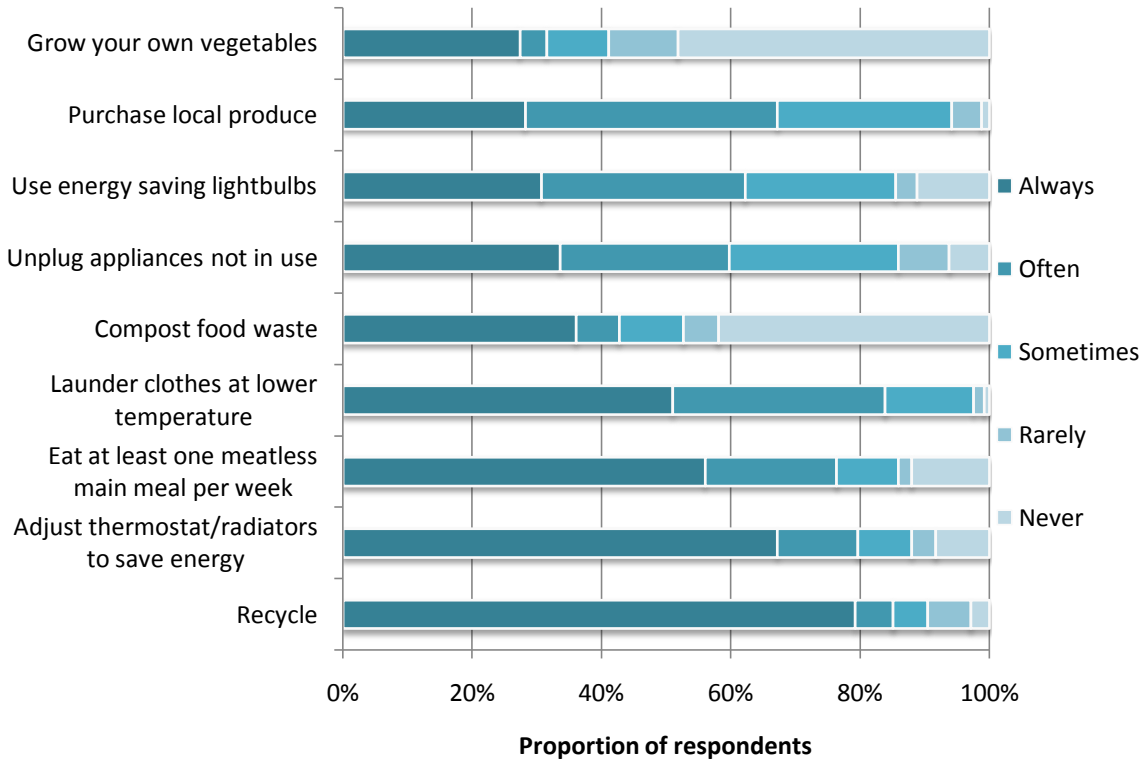
'We need to rely less on other countries for our sources of energy' (40-49)

4.6 Behaviour

The fairly high levels of commitment to environmentalism among women relative to men found by Tindall, Davies and Mauboules (2003) is further evidenced by the level of environmentally-friendly behaviours that women claim to undertake in the course of regular daily routines in this survey (Figure 4.8). Diekmann & Preisendorfer (1998) concluded from their research that people will generally only comply with their pro-environmental attitudes and engage in the behaviours in situations that do not involve substantial costs, such as time, discomfort and money and this low-cost hypothesis rings true.

For the most part, energy saving within the home was a fairly common activity, at least half of the sampled women always or usually undertaking the majority of activities. The least common related to those activities that required some sort of time commitment, such as composting food waste and growing your own vegetables. Conversely, washing clothes at a lower temperature requires little effort or discomfort. The frequency, with which women seem willing to undertaken relatively effortless habitual lifestyle adjustments, is where policy makers have had greatest success. Behaviours that relate to more effort and involve more personal sacrifice could prove to be more difficult to instil.

Figure 4.8 Participation levels in various pro-environmental behaviours

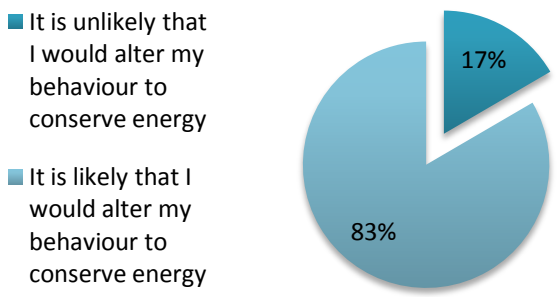


4.7 Feedback

The majority of women in the sample could see the benefits of having a smart meter in their home (in terms of accurate bills, real time information and possible reduced rates). Only a small proportion claimed they would not alter their routine for cheaper tariffs. 17% said they sometimes might with 59% saying they would be prepared to make significant alterations for cost savings (see appendix 4). Figure 4.9 reveals that a significant

proportion of the women believe that knowing when and how they were using energy would make them more conservative with energy use. Consumer research often classifies individuals into segments based on their values, attitudes and these results emphasise the importance in doing so for new solutions to energy conservation in the home. Leppänen & Jokinen (2003) classified individuals according to their attitude towards smart home solutions and found that while some are more interested in entertainment and pleasure, others lean towards information and security, concluding that different people need communication, devices and arguments of their own. The roll-out of smart meter technology offers an opportunity to communicate environmental messages in a new way, with more practical and detailed advice on energy saving measures. there are only a few situations where people can communicate or need to confront energy issues and the subject of energy saving and smart meters may provide the opportunity to give energy saving the social aspect that it has so far been missing.

Figure 4.9 The perceived effect of feedback upon household energy consumption



4.8 Policy Implications

While there are no-clear cut answers as to how women can be motivated to behave more efficiently and resourcefully in the domestic sphere, the results here have highlighted the variety of possible forces that may create barriers to behavioural change. Whether it is a lack of concrete knowledge, time or motivation, these forces likely interact to present different barriers, critical for different women, circumstances and behaviours. The most effective avenue would surely be to tackle situational, psychological and social factors and involve a combination of information, social incentives and institutional support. If women were involved in the process of policy formation then insights from their perspective could be more easily seen. Along with this, if women either able to have meaningful participation in the policy process, or can see others like them have, they are surely far more likely to trust the outcomes and be more strongly motivated to work for the goals. While the focus of this project has centred around the opportunities for pro-environmental energy behaviours, it is important to remember that there are conditions beyond the individual that constrain opportunities for the individual to act and as such, policies to promote behavioural change may fall on deaf ears. Although this study did not address it, many women spoke of their desire to make more sustainable transport choices but issues of cost and reliability and service provision stood in the way of these choices. So while such limitations exist, it is important not to set unreasonable targets for any policy directed at changing behaviour and to look

for policy opportunities in other areas that may be effective in removing barriers to personal action that lie outside of individual control.

4.9 Summary of results

The results from the survey and follow up interviews suggest women play a critical role in managing energy use within the home. Although the actions of many women suggest a high level of involvement in pro-environmental energy behaviours, more gender-disaggregated research will be needed in order to establish any firm conclusions on the factors that influence and motivate different individuals.

5 Conclusion

This chapter concludes the study. Delivery of the main aim and objectives is demonstrated and key results are presented.

The aim of this study was to pull together evidence on understanding attitudes and behaviour, identifying influences and drawing conclusions on the potential role women can play in transforming domestic energy use within the UK. The first objective was concerned with critically reviewing the literature on household energy behaviours and extracting any links that have been made to gender. The limited literature on the topic proposes that women do have a role to play in sustainably managing energy use within the home although it is clear that behaviours are bound up in a complex web of situational, psychological and socio-environmental factors.

These findings informed and supported the execution of the next objective, namely the development of a conceptual model that would enable the main determinants that influence pro-environmental energy behaviours by women to be extracted. The need to improve facilitating conditions for women to behave in the desired way was covered by the inclusion of situational and psychological variables, while the vital influence of social and cultural contexts was also included.

The third objective, namely exploring the current position of women in the developed world in managing energy day energy use in the home, was addressed by conducting a thorough survey throughout Falmouth, in Cornwall. While it would be an oversimplification of the plurality of lifestyles in the 21st century to make generalised statements about the energy attitudes and behaviours of women, high levels of environmental concern were evident, along with substantial pro-environmental energy alterations to everyday behaviours. With a large majority of women appearing concerned about efficiency and environmental issues, the current economic climate may present an opportunity to encourage behavioural change, as long as environmental messages can strike with and reinforce economic ones. There is the potential to move towards a much more structured and evidence-based approach to domestic energy behaviours and public engagement using up to date research, consumer insight and segmentation models. A greater understanding of gender roles and identities will play a crucial part in transforming household energy behaviours into ones that are pro-sustainable. A more transparent picture has emerged with regard to gender and energy in the domestic arena. Women are not unreceptive and indifferent about their energy use but are in fact instrumental in creating more efficient and sustainable homes.

Finally, the fourth objective was to highlight some policy implications based on the assumptions drawn from the research. In terms of domestic energy use, women clearly have a role to play. Gendered responsibilities, experiences and knowledge in the field of energy use and climate change impact on individual perceptions, acceptance and preference regarding environmental policies and strategies. Only through collecting more gender disaggregated data will gender-responsive policies and programmes be formulated. Information on energy use, conservation and participation in pro-environmental energy behaviours will contribute to gender responsive environmental strategies and policies that achieve outcomes that benefit the environment yet explicitly consider men and women's different abilities, needs and opinions in doing so.

While there are obvious difficulties inherent in gauging such a complex concept, the political will to change everyday patterns of consumption will surely facilitate a more thorough exploration of the topic. These findings have implications for theory, social action and policy. If gender is already considered to be a significant predictor of environmentalism, and it also appears to be influential in energy, it is surely worth investigating the implications of gender on other specific pressing areas of environmental policy. Gender-disaggregated data on attitudes towards a key range of policy issues including energy can only serve to create policy that more closely reflects the actuality of people's everyday lives.

With plans to cut carbon emission by 80 percent by 2050 from 1990 levels (Defra, 2008), the UK government's action on climate change appears ambitious, far reaching and internationally significant. Whilst renewables and energy efficiency will go some way in helping us reach these targets, in order to deliver absolute reductions in primary energy consumption there needs to be a more socio-technical, multi-disciplinary approach. This study went some way in highlighting that doing so provides you with a richer conception of individual utility functions that incorporates the power of ideas and emotions in motivating behaviour (Rose-Ackerman, 1996).

Certainly, environmental improvement will require the combined efforts of men, women and children globally; this study simply supports the application of more gender-disaggregated research. Without this, the contradictory effects of gender may relegate many highly concerned females to playing supporting roles in the fight for a sustainable future.

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Appendices

Appendix 1

A. Environmental attitudes

1. Which of the following statements most reflect your own beliefs? Please pick your top three with 1 being the one you agree with most strongly.

[A1]	Environmental issues are a day to day concern for me	...
[A2]	I want to save energy to reduce my climate change impact	...
[A3]	I am concerned about the environment and think about it fairly regularly	...
[A4]	I'd like to save energy but I need more information to do so	...
[A5]	Cost is something I think about in nearly everything I do	...
[A6]	Although maybe I should, I don't really think about the environment – I've got too many other things to worry about	...
[A7]	I try to do things as efficiently as possible	...
[A8]	I feel like there are so many big global issues at the moment for anything I do to make much difference – the answer lies with big business and government	...
[A9]	I'd like to be able to think about things like saving energy but I'm constrained by my circumstances at the moment	...
[A10]	I think climate change is important	...
[A11]	I'm not really interested in energy saving	...

2. Which one, if any, of these do you think should be mainly responsible for taking action against climate change?

[A] Environmental groups

[B] Individuals and their families

[C] Industry/ Companies

[D] Local authorities

[E] National Governments

[F] The international community

None of these

Don't know

3. Thinking specifically about energy policy, which of the following is most important to you in the UK's future energy policy?

Moving towards cleaner energy sources	☐	Making sure our energy sources are reliable/secure	☐
Keeping energy costs as low as possible	☐	Creating jobs in energy related industries	☐

<u>B. Energy actions</u>

1. Considering aspects of your personal life, please indicate how often you currently participate in these actions or activities that benefit the environment?

	Always [1]	Often [2]	Sometimes [3]	Rarely [4]	Never [5]
Lower thermostat during hot months/raise in cool	☐	☐	☐	☐	☐
Buying local wherever possible	☐	☐	☐	☐	☐
Use energy saving light bulbs	☐	☐	☐	☐	☐
Kerb-side recycling	☐	☐	☐	☐	☐
Unplugging appliances when not in use	☐	☐	☐	☐	☐
Eat at least one meatless meal per week	☐	☐	☐	☐	☐
Washing clothes at a lower temperature	☐	☐	☐	☐	☐
Composting waste	☐	☐	☐	☐	☐
Growing a vegetable garden at home/allotment	☐	☐	☐	☐	☐

C. Household

1. What heating controls does your main heating system have?

Thermostatic radiator valves	☐	Programmer/time clock	☐
Room thermostat	☐	On/Off only/no control	☐

2. Who is mainly responsible for controlling room and water heating in your household?

Myself	☐	My partner	☐
Another occupant	☐	It's shared equally	☐

3. To what extent have you *already* reduced your home energy use (i.e. electricity and gas) because of concerns about the environment?

(Select a number from 1 to 5, where 1 is 'not at all' and 5 is 'a large extent'.)

Not at all		Somewhat		A large extent
1	2	3	4	5
☐	☐	☐	☐	☐

a) Can you give any examples of these? .....

b) Who takes primary responsibility in doing this? .....

5. Who deals with utility companies and takes care of energy bills in the household?

Myself	☐	My partner	☐
Another occupant	☐	It's shared among the household	☐

D. Smart meters

By 2020 the government plans to cut emissions from homes to 29% below 2008 levels. Part of the strategy for better energy management and usage within the home will include the roll out of smart meters that let customers know exactly how much energy they are using and what they are spending on it.

1. How do you think knowing more about daily energy consumption in your home will affect your energy use?

It will likely result in the household using less energy	☐
I don't think it will affect energy in my household	☐

2. If cheaper tariffs are offered at different times of the day, how will this affect your energy use?

It will not affect the way I use energy	☐
It could sometimes affect energy use	☐
I will be prepared to significantly alter my routine to save money	☐

<u>E. Personal</u>

1. Which of the following best describes your household?

Owner occupier: own it outright	☐
Owner occupier: with mortgage/loan	☐
Live with parents/shared accommodation	☐
Rented from private landlord/letting agency/other	☐
Rented from council/Local Authority/Housing Association/Registered Social Landlord	☐

2. How many permanent occupants are there in your household?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5+ ☐

3. How old were you on your last birthday?

Under 20 ☐
20-29 years ☐
30-39 years ☐
40-49 years ☐
50-59 years ☐
60-65 years ☐
65+ ☐

4. Please mark your approximate annual household income before tax and other deductions

Below 20k a year ☐
Between 20k and 40k ☐
Above 40k ☐

Appendix 2

Main interview themes

The interviews were coded according to themes that co-incided with the major areas of questions. The broad theres that emerged out of the interviews are listed below.

1. Government inertia
2. Time limitations
3. Recycling
4. Role of business
5. Trust
6. Transport
7. Incentives

	Always/often	Sometimes/rarely never
Owner occupier: own it outright	43.2	56.8
Owner occupier: with mortgage/loan	38.4	61.6

Live with parents	0.0	100
Rented from private landlord/letting agency	43.6	56.4
Rented from council/housing association	100	0.0

Appendix 3

Table The effect of home ownership on frequency that individuals compost their food waste

Table The effect of home ownership on frequency that individuals install energy saving light bulbs

	Always/often	Sometimes/rarely never
Owner occupier: own it outright	69%	31%
Owner occupier: with mortgage/loan	59%	41%
Live with parents	44%	56%
Rented from private landlord/letting agency	56%	44%
Rented from council/housing association	83%	16%