A DETERMINATION OF THE ATTITUDES TOWARDS ENERGY USE AND CONSERVATION OF USERS (HOMEOWNERS) AND PROVIDERS (HOUSEBUILDERS) OF DOMESTIC DWELLINGS AND THEIR INFLUENCE UPON CO_2 EMISSIONS.

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The Sun, Moon and Stars would have disappeared long ago had they been within the reach of predatory human hands...

Havelock Ellis.

Abstract

UK energy use in domestic housing forms an important part of the Government's programme to reduce CO_2 emissions, the sector contributing nearly one third of total CO_2 emissions.

The research established that within the parameters of legislation, market economy and high levels of homeownership, the attitude of users (homeowners) and providers (housebuilders) effectively determine the contribution that this sector will make to reducing CO_2 emissions.

The research aim was to determine whether the attitudes of users (homeowners) and providers (housebuilders) are conducive to a reduction in CO_2 emissions from domestic dwellings.

The study undertook a large-scale survey of users (homeowners) attitudes towards energy use and conservation. The research concluded that users (homeowners) attitudes are not conducive to a reduction in CO_2 emissions.

Results of the study established the existence of a link between the attitudes of users (homeowners) towards energy conservation and CO_2 emissions. The study identified that users (homeowners) attitudes towards energy use and conservation are not the homogeneous. A premise that the Government had always assumed. More specifically, three distinguishable groups of users were identified; the elderly, the income sensitive and the ambivalent. The study identified that the knowledge levels and awareness of users (homeowners) towards energy is low, despite two decades of cognitive information campaigns regarding energy conservation from the Government. The study also determined that previous government campaigns to reduce energy use have been largely ineffective, their effects at best, transitory. Finally, the study identified that maintenance of comfort is the most significant factor in the use of energy by users (homeowners).

The survey of providers (housebuilders) determined their attitude towards energy use and conservation. The study determined for the first time the attitudes of providers (housebuilders) to energy conservation and CO_2 emissions. It showed them to act unitarily and to be singularly driven by profit.

The research concluded that providers (housebuilders) attitudes are not conducive to a reduction in CO_2 emissions. The results show that providers are exceptionally attuned to their market and respond only to commercial demands and legislation. Providers do not consider energy efficiency to be an important issue in new homes. No market exists for energy efficiency in housing. Users will not pay a premium for energy measures in housing.

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Table of Contents

List of Figures

List of Tables

List of Abbreviations

AEA Atomic Energy Authority

BNOC British National Oil Corporation

BP –British Petroleum

BRECSU Building Research Energy Conservation Support Unit

CFC's – Chlorofluorocarbon

CHP – Combined Heat & Power

CO_2 Emissions - Carbon Dioxide

DIY – Do It Yourself

EEO – Energy Efficiency Office

HBF – Housebuilders Federation

HEES – Home Energy Efficiency Scheme

IEA – International Energy Agency

MPG – Miles Per Gallon

MPH – Miles Per Hour

NCB – National Coal Board

NHBC –The National House Building Council

NUM – National Union of Mineworkers

^{o}C – Degrees Centigrade

OECD – The Organisation for Economic Co-operation and Development

OPEC – Organisation of The Petroleum Exporting Countries

PR – Public Relations

RICS – Royal Institution of Chartered Surveyors

SAP- Standard Assessment Procedure

U Value – Thermal Transmittance

UN – United Nations

VAT – Value Added Tax

W/M^2K or $W/M^{2o}C$ – (U Value) The Expression of a U Value in Watts Per Square Metre Per Degree of Temperature Difference.

CHAPTER 1 INTRODUCTION

This research has its origins in the wider context of global warming and climate change, brought about by the burning of fossil fuels over the last three decades of industrialisation. It stems directly from the need to reduce CO_2 emissions and the commitment made by the British government at the Rio Earth Summit in 1992 to reduce the CO_2 emissions of the UK to the levels produced in 1990, with a further reduction of 15% by the year 2010. This commitment raised a number of questions as to how the government would achieve these substantial reductions in CO_2 emissions. Previous studies regarding the production of CO_2 emissions had shown these to be the result of three major sources, industry (including the electricity generators), transport and buildings. The use and occupancy of buildings accounts for 49% of CO_2 emissions, nearly 30% of which is attributable to domestic dwellings. It was clear that in order to achieve the targets to which it was committed, the government would have to significantly reduce the emissions from this source. The research recognised that energy conservation in this sector was technically and economically feasible, based upon the experiences of other countries with colder climates: It remained uncertain however, whether the will to implement the necessary energy conservation measures was present and/or sufficiently developed in the UK. The research question was set to determine whether the attitudes of the two main contributors, the users (homeowners) and the providers (housebuilders) were conducive to achieving these CO_2 emissions.

1.1 Background to the research

Climate change has been a gradual and ongoing process throughout the period of industrialisation, but only recently has its effects become sufficiently obvious and significant to prompt governments to address the issue. The issue now is one of global warming, with all its consequences, together with other changes to the global climate. The essence of any solution to the problem is to reduce these harmful emissions, especially CO_2, by reducing the amount of carbon based fossil fuels that are burnt. The need is for immediate energy conservation and/or fuel substitution later.

The oil crisis of the 1970's provided the first catalyst for the conservation of energy, but this declined as the crisis passed and energy consumption returned to pre-crisis levels as economic growth recovered. The resultant climate change continued unabated, eventually culminating in the Rio Earth Summit in 1992 held in Brazil under the auspices of the United Nations: At the Rio Earth Summit the UK government committed Britain to significantly reduce its CO_2 emissions. The government committed to reduce CO_2 emissions to the level recorded in 1990 by the year 2000 and to a further reduction of 15% by the year 2010.

The UK government faced with the problem of how to achieve the reductions to which it had committed, examined the use of fossil fuels in the UK with a view to identifying who the major producers and consumers were and where the greatest reductions could feasibly be made. The major users of fossil fuels, and thus the major producers of CO_2, were found to be industry, transport and buildings. Buildings account for nearly 49% of CO_2 emissions, while industry and transport account for the rest in roughly equal proportions, these proportions fluctuate slightly depending on economic activity, but remain fairly constant. Industry and transport are obvious major producers of CO_2 emissions; as a result both have received significant worldwide attention with some notable successes in reducing their emissions.

Vehicles have received a great deal of attention, particularly from governments in an attempt to reduce the pollution they produce and its effect upon the health of the population. Initiatives such as lead free petrol, catalytic converters, annual emission testing of vehicles (at MOT in the UK), together with the development of more energy efficient vehicles and others that operate on alternative fuel sources such as electricity or gas have all been introduced with significant success with respect to reduced CO_2 emissions. In addition, government policies have been actively promoting fewer cars on Britain's roads by encouraging the use of public transport, park and ride schemes in major cities and proposing taxes for cars to enter certain areas of major cities and car sharing. The results however have not been as successful as hoped for, the number of cars continues to grow as does the number of car journeys. Fiscal measures have also been invoked, through the penalisation of large engine cars that consume more fuel and as a result produce more emissions, together with a slow but significant increase in the cost of petrol. None of the measures has yet to affect the use of vehicles, but a slight reduction in CO_2 emissions has been noted.

Industry has also received significant government attention. Over the years the government has developed policies and schemes aimed at industry and commerce, such as assistance with energy surveys, demonstration projects, energy monitoring, research and development and the use of CHP or district heating. Regional energy efficiency officers were also made available at one time to provide support for firms. Energy labelling was also introduced to assist industry with the selection of large-scale plant or machinery. However these campaigns for industry halted in 1988 due to cuts in government spending on energy efficiency. The thrust of these government policies had been to show industry how to save money by being energy efficient but had not extended the message to include the concept of saving energy to reduce CO_2 emissions.

During the 1980's and 1990's the government policy of privatising electricity did encourage and help a number of organisations to achieve energy savings, however there was also a negative effect, in that many smaller firms sought to increase their electricity usage to qualify for the 10-25% discounts that were available to larger users, with consequential negative effect on CO_2 emissions.

With respect to buildings as a whole and their contribution to CO_2 emissions, the government has instigated a wide range of different schemes at different times. In commerce, schemes such as the promotion of energy labelling for office machinery and the introduction of movement activated lighting have helped to a limited extent to create an energy saving ethos among workers. Communicating messages such as 'switching off lights, and machines that are not being used` were widely promoted. A small number of demonstration projects for energy saving office buildings were also actively promoted and publicised by the government. All of these factors have been directed towards consumers as a means to reduce the amount of money that organisations spent on energy. None of the schemes attempted to promote a reduction in the use of fossil fuels to reduce CO_2 emissions.

With respect to domestic buildings, only in the last decade has the British government begun to actively address domestic dwellings as the cause of almost 30% of total CO_2 emissions. Government initiatives for domestic dwellings prior to this time have been aimed at energy conservation as a response to a crisis or as a way to save money. Because of the size of this sector it cannot be ignored in the government's efforts to successfully achieve a reduction of CO_2 emissions. In short the government must bring about a significant reduction in the energy used in the domestic housing sector if it is to succeed.

1.2 Focus of the research

The focus of this research centres on the use and conservation of energy in domestic dwellings as a primary contributor to CO_2 emissions in the UK and in particular how this sector can achieve significant reductions in its emissions. Two potential strategies emerge to achieve these reductions, the first is the installation of physical and technological measures into the fabric and systems of houses to reduce their energy use, the second option is to get the users to use less energy in their homes.

Housing in the UK can be categorised and viewed in a number of ways by ownership, existing and new, type, age, etc. The ownership mix of housing in Britain is varied but significant. Private house ownership accounts for some 70% of dwellings in the UK, social housing accounts for 23% and the remainder is privately rented. The proportions of these divisions have an impact on the strategies open to the government to save energy. It is probable that initial reductions in CO_2 emissions will come primarily from the social housing sector where the government, through Local Authorities, is able to exert control over the construction and improvement of these properties. The government, through the leverage of funding will oblige local authorities and housing associations to improve their housing stock to the desired energy efficiency levels. Social housing could therefore act as the catalyst for reduction measures across all housing sectors. However, social housing only accounts for 23% of the housing stock in Britain (EHCS 1991), consequently, on its own this sector is unlikely to be able to contribute a proportionally greater reduction in CO_2 emissions. Therefore, with home ownership in the UK accounting for approximately 70% of all domestic dwellings, it is inevitable that the Government will have to address energy usage in the private housing sector in order to meet its CO_2 emission targets.

The government is aware of the magnitude of the problems that exist in attempting to improve energy efficiency in the existing housing sector, having made some efforts towards this previously. Studies undertaken by the Department Of The Environment (DOE –English House Condition Survey 1971-1996, DOE 1990 a & b) and the Building Research Establishment (Shorrock *et al* 1993), regarding the standard of energy efficiency of the housing stock and the trends in energy use, showed that a need already existed to improve the energy efficiency of the existing housing. These studies demonstrated that there is a level of awareness of the problem of conserving energy on the part of the government, shown by the introduction of various policies, such as changes in thermal requirements for newly built housing, as well as campaigns directed towards homeowners in an attempt to raise awareness and conserve energy at a domestic level, (without significant success). Speculation as to the effectiveness of these policies and campaigns has been widely expressed, it is suggested that despite the public being aware of various energy conservation campaigns undertaken by the government there is little empirical evidence to suggest that the public have adopted the measures.

These attempts to encourage users (homeowners) to implement energy conservation measures, suggest that the attitude of users (homeowners) towards energy use could be the determining factor in the success of any government initiative to reduce CO_2 emissions. It is suspected that the only way, in which the government can achieve the reduction in emissions that it has committed itself to, is by getting users to adopt physical measures that save energy and improving the way in which they actually use energy. Achieving these aims may prove more difficult than it first appears. There is evidence to show that many users (homeowners) are unaware of the effect that energy saving measures can have. Many do not have the disposable income to afford the installation of some of the more expensive measures and research by Shorrock et al (1993) discovered that many people will only pay for improvements that directly affect their comfort level.

The government are facing a significant problem in their efforts to achieve CO_2 emission reductions from privately owned dwellings. The government has only a limited number of options available to it, each of which has a political and economic price. A radical measure could be to introduce retrospective legislation for the installation of energy conservation measures into existing homes, with the homeowner to pay for the measures. This option would be very unlikely, as it would amount to political suicide for any party or government that proposed them.

A second option would be to adjust or manipulate the cost of energy for homeowners upwards by tax or other fiscal means, that would make energy efficient measures appear a more attractive proposition. Although more gradual in effect this option would most likely have the same consequences for the government that recommended it. The example of the fuel accelerator provides a useful precedent for this type of measure.

A third strategy would be to combine retrospective legislation with government subsidies. The key factor would be the extent of government subsidy.
Studies show a reticence on the part of the public to pay significant sums for these sorts of schemes, it would therefore fall to the government to meet most of the cost, which runs contrary to current and recent political trends of both political parties. The trend towards lower taxation appears to be embedded in the UK electorate and it would not be politically feasible for one party or the other to adopt a contrary approach on an issue that to date has not attained prominence in the electorate's mind.

Therefore with regard to existing housing stock, in addition to the three strategies above, or any combination thereof, the government is left with limited options, all of which centre on influence rather than power:

- Induce users (homeowners) to change the way they use energy
- Persuade users (homeowners) to install energy conservation measures
- A combination(s) of all of the above.

There is another possible strategy that the government could adopt, which although risky is not implausible in political terms, this would be to wait for technological developments to provide the means to reduce CO_2 emissions from domestic dwellings, without the political and economic pains associated with the other strategies. Although attractive to government, it has not been considered in this study because of its indeterminate timeframe, whereas the timeframe for meeting the CO_2 targets have been set at Rio and later at Kyoto. It may occur but has been considered as a non-option in this study.

However, with these strategies in mind, together with the political philosophy of minimising public sector borrowing and spending, it appears very unlikely that the government will willingly finance or subsidise energy improvements in private housing. Therefore it is inevitable that the government will put the onus on users (homeowners) to install energy conservation measures and/or modifying the way that they use energy.

Significantly, this proposition leads to the conclusion that the success of achieving a reduction in CO_2 emissions will depend heavily on the attitude of users (homeowners) towards energy use and energy conservation. Specifically, whether a propensity for energy conservation exists and if so, to what extent does it exist. The existence and strength of a conducive attitude towards energy conservation on the part of homeowners (users) will be the major determinant of the success or failure of the government to meet its CO_2 emissions targets in the existing housing stock. It becomes therefore, the first research question.

With regard to new housing, the attitudes of two groups become the determining influence as to whether the CO_2 emissions will be met. New housing for the public sector, mainly social housing is produced to the requirements of the various housing associations and local authorities, funded through the Housing Corporation. The standards of energy conservation can be easily specified by government though this funding mechanism, thus achieving its targets relatively easily. The other and far larger sector of new housing is housing built for owner occupation. In the UK, the majority of new housing for sale comes from a relatively small number of larger housebuilders, consequently the attitudes of this group is an important factor in the achievement of reduced CO_2 emissions. It is the attitude of these providers (housebuilders) towards energy use and energy conservation in new dwellings that will determine whether new dwellings will meet the required standards for CO_2 emission reduction.

The government can influence CO_2 emissions from this sector by either forcing through improved thermal insulation standards (Building Regulations) for new buildings or by persuading providers (housebuilders) to adopt these measure voluntarily. Forcing increased standards of construction for new houses will, the housebuilders claim, increase the cost of new houses, which will have a potentially negative effect on the government's popularity. New and replacement housing will account for a progressively increasing proportion of the housing stock, with a correspondingly increased influence upon energy use and CO_2 emissions. The attitude of providers, particularly the large volume housebuilders will be especially important, partly because they account for a large proportion of new housing in the UK, but also because their attitude will determine the ease or difficulty with which the government achieves its CO_2 emission targets. Providers have the ability to make energy conservation a positive aspect of new houses and to create a market for these products, they also have the ability to do the opposite, so it is for these reasons that the attitude of these providers (housebuilders) towards energy conservation and Government initiatives to reduce CO_2 emissions will have such a significant effect on the overall success of the Government's initiatives.

Attitudes are central to energy use in the domestic sector and therefore to the CO_2 emissions produced by it, they will play a major part in the success or failure of the Government's initiatives to reduce CO_2 emissions, yet these attitudes are largely undetermined. It is to discover what these attitudes are that has become the research questions for this study. It is to determine the attitudes of users (homeowners) and providers (housebuilders) towards energy use that this research is directed.

1.3 Research question

The foregoing considerations lead to a simple research question, which can be stated as:

What contribution do the users and providers of domestic dwellings make towards reducing CO_2 emissions?

1.4 Objectives

The objectives for this research are derived from the research questions stated above, they deal with the need to determine what contribution the users and providers of domestic dwellings make towards achieving reduced CO_2 emissions. It seeks to determine the contribution the attitudes of users (homeowners) and providers (housebuilders) will have upon energy use and energy conservation in domestic dwellings. It also seeks to discover if these attitudes are conducive to the reduction of CO_2 emissions.

The objectives can be itemised as follows:

a) To determine the attitudes of users (homeowners) towards energy conservation and their use of energy.

b) To determine how conducive these attitudes are to reducing CO_2 emissions.

c) To determine the attitudes of providers (housebuilders) towards energy conservation.

d) To determine how conducive these attitudes are to reducing CO_2 emissions.

e) Evaluate the contribution these attitudes make towards reducing CO2 emissions in this sector.

1.5 Hypothesis

Based upon published accounts of previous initiatives and research concerning energy use and conservation, governmental policies and initiatives, together with the limited previous research studies undertaken in the area of attitude towards energy conservation in the home (Phillips & Nelson 1976, MORI 1990, Hedges 1991, Sadler & Ward 1992), the prevailing attitude towards the use and conservation of energy of both providers (housebuilders) and users (homeowners) is ambivalent.

The hypothesis for the research is therefore stated as:

'The prevailing attitudes of users (homeowners) are not conducive to the attainment of the CO_2 emissions reduction set by the Government'.

'The prevailing attitudes of providers (housebuilders) are not conducive to the attainment of the CO_2 emissions reduction set by the Government'.

1.6 Parameters of the study.

The study used a sample of 1,000 householders (users) in the south east of England, comprising a variety of house types. Field studies were carried out during 1996.

In a corresponding geographical area and time period, the study used a sample of providers of new homes in the form of 10 large major housebuilders. The selection criterion for the sample is fully discussed in the methodology of the thesis in chapter 3.

1.7 Format of the thesis

The thesis is divided into six chapters.

Chapter 2 of the thesis is an extensive review of literature pertaining to the issue of energy conservation. The review provides a contextual background by firstly examining the origins of energy conservation in a global context, and then more specifically investigating the contribution of housing to environmental problems and CO_2 emissions. The review examines the relevant energy policies and energy efficiency initiatives that the UK Government has implemented over the years. In addition it discusses the evidence that energy efficient buildings can be constructed in the UK and examines comparative energy efficient construction and practices in European countries. This study provides the history and context of energy efficiency in housing in Britain up to this time, particularly the lack of importance accorded to it by successive governments and volume housebuilders and the resultant significance that it now enjoys.

The literature study also reviews previous research relating to the attitudes and perceptions of homeowners towards energy efficiency and examines the attitudes of the providers of new housing (housebuilders). The purpose of the literature study is to cohesively determine the attitudes and behaviour of homeowners (users) and providers (housebuilders) towards energy conservation and discover whether a propensity exists to reduce CO_2 emissions. The literature study also has the purpose of examining the role that the Government has played to reduce CO_2 emissions over the years. This chapter also describes the conceptual factors that form the sub-hypothesis deduced from the literature.

Chapter 3 describes the conceptual factors deduced from the literature study and describes the explanatory model for the research. This section also discusses the methodology undertaken in the study. The factors identified in the literature study are primarily concerned with identifying attitudes and relationships of users and providers, and therefore the necessary data had to be collected as there was no previous research in either the homeowners group (users) or the providers (housebuilders) that could be comprehensively tested.

The users (homeowners) research was in the form of an extensive attitudinal and behavioural questionnaire for the homeowners. The providers (housebuilders) research was a series of in-depth attitudinal interviews with 10 volume housebuilders to elicit the necessary information.

Chapter 4 presents the results and analyses the users (homeowners) attitude survey.

Chapter 5 presents the results and analyses the providers (housebuilders) attitude survey.

Chapter 6 tests the hypothesis and draws conclusions from the findings and makes recommendations for further research in related areas.

1.8 Terminology and connotation

The terms 'CO_2 emissions' and 'energy conservation' have been found to be used synonymously in much of the published material and in government documents, consequently and by default, this practice is repeated in this research and thesis. The difference between the two is minimal in practice, the two having a cause and effect relationship emanating from the same measures. Originally energy conservation has been the term in common use, emerging first a it did in relation to the oil crisis of the 1970's, where energy conservation was used as the driver to reduce Britain's dependence on imported fuel. Only latterly has the issue of CO2 emissions and the connection with energy conservation been widely recognised and the term used more broadly, brought about by an increased awareness of global warming and climate change.

CHAPTER 2 LITERATURE STUDY

2.1 Introduction

The literature study explores the current history and contributory issues of CO_2 emissions and energy conservation.

The aim is to firstly establish the link between CO_2 emissions and energy conservation and how these are synonymous. The study also establishes how CO_2 emissions and energy conservation have prompted much discussion, government policy and immense propaganda over the last three decades.

The scale of influence of the impact of housing on CO_2 emissions is assessed. In addition, the condition of the housing stock is investigated, together with the trends for fuel sources for domestic heating.

The study considers government attitudes, policy and initiatives towards CO_2 emissions and energy conservation, with specific regard to housing and the overall success these initiatives achieved. The historical political and economic influences and tensions regarding energy are also assessed.

Studies and indicators of attitudes of homeowners and housebuilders towards CO_2 emissions and energy conservation in housing are identified and analysed to determine their existence, strength and focus.

2.2 Global warming and environmental change

It is widely accepted that the industrialisation of the world has been achieved through the consumption of fossil fuels, firstly coal and latterly oil and gas. The direct consequence of this has been the production and release of large amounts of carbon dioxide into the atmosphere over the past three hundred years. The issue of CO_2 emissions and as a result, energy conservation, is not a problem that is limited to the UK, it is world-wide. Consequently, energy use, efficiency and conservation in the UK form part of a global consideration, which although perceived from a national basis, this research is cognisant of the global context into which it belongs.

The people and governments of the earth are being forced to deal with the results of industrialisation which has taken place over the previous three centuries and has produced a variety of unwanted and unforeseen problems, amongst these global warming, the carbon crisis and the greenhouse effect. The major cause of these problems is the large scale burning of fossil fuels by the industrial economies, which has increased the quantity of carbon dioxide in the atmosphere, resulting in global warming. In effect, these industrial economies have taken natural resources and transposed them into pollutants (Anderson 1993).

Historically, the issue of CO_2 emissions has been burdened with controversy, vested interests and factional debate, which is evident throughout the literature. The effect or purpose of many debates and discussions regarding CO_2 emissions or environmental issues has been to shroud facts and slow or prevent concurrence and agreement. Both sides of the CO_2 emissions debate are guilty of clouding the issues for political or economic purposes, consequently, bias, exaggeration and misleading information are evident throughout the literature, this is recognised and considered at appropriate points in the study.

The global implications of the world-wide use of energy cannot be ignored. Government policies intended to counteract the problems of global warming will only be effective in the long term, if a global view is taken and liaison with world-wide counterparts occurs.

Energy use in the form of burning of fossil fuels for power generation to provide heat, light and power contributes significantly to the amount of greenhouse gases in the lower atmosphere. These have accumulated in the lower atmosphere with the protective blanket of gases becoming thicker and as a result absorbing a greater amount of infra-red radiation, therefore increasing temperatures on the earth's surface, widely known as global warming. The primary greenhouse gases are carbon dioxide (CO_2) and chlorofluorocarbons (CFC's). Carbon dioxide accounts for approximately half of all greenhouse gases produced. Significantly for this study is that the use of buildings produces nearly half of the carbon dioxide emissions recorded in the UK (Johnson 1993).

Long term environmental stability requires a significant reduction in CO_2 emissions per year. The world-wide solution to the problem of CO_2 emissions is to stop using fossil fuels, however, as much of the industrialised world relies on these fuels for their power generation, this simplistic approach is not immediately feasible. An alternative approach is to switch to alternate sources of power, such as nuclear. Nuclear power has been costly to develop and its evolution fraught with technological problems, accidents and risks with far reaching repercussions. In addition, the economic and environmental issues concerned with the generation of nuclear power are highly questionable and controversial.

Another approach is the use of renewable sources of energy, such as solar and wind power. While these sources have been developed to a limited extent in a number of industrialised countries, these sources of energy are still regarded as marginal contributors to the total energy needs of the world. The use of renewable energy appears to be the most judicious solution to the problem when compared with non-renewable energy (fossil fuels), however, the urgency of the energy crisis offsets these benefits. It would take significant time, effort and investment to move the industrialised world from traditional energy sources to renewable sources, as a result, short term more immediate measures have to be identified and implemented.

The reliance on fossil fuels and the CO_2 produced is compounded by wasteful and inefficient use of the energy produced. There is evidence that energy can be used more efficiently, thus reducing the amount produced, but for a variety of reasons more efficient use is not adopted The answer is to find a catalyst that will force or encourage the more efficient use of energy. This catalyst will probably come in the form of economic and/or political policy (Anderson 1993, Johnson 1993). The responsibility for energy conservation, hence reducing CO_2 emissions is a global one. Every country needs to take responsibility for their actions and use of fossil fuels, this can only come from agreeing and adhering to comprehensive global economic and political policies.

2.3 Policies on CO_2 emissions

Many policies concerning the promotion of energy conservation have arisen, not to address the problem of CO_2 emissions or global warming, but from a variety of different rationales mostly related to economic and/or political objectives. This is particularly true of early policy initiatives relating to energy, prior to global warming becoming a potent issue. However, these policies have the effect of reducing CO_2 emissions. Anderson (1993), puts forward the argument that there are four reasons for advocating energy conservation policies.

The most prevalent reason is that of saving money. Anderson (1993), states 'Government expenditure has been put into policies to promote energy efficiency, and a return has resulted from this 'investment' in terms of money saved on energy. Private and corporate customers have saved money, the public sector as a consumer of energy have saved money, and the producers of electricity have been able to satisfy consumer demand without having to spend so much on building additional generating capacity'.

In macroeconomic terms, lower corporate expenditure on energy reduces manufacturing costs, increasing competitiveness, which results in exports being less expensive to produce. As a result of these factors, the balance of payments improves and this eases constraints on macroeconomic policy. Where the country is a net importer of fuel a similar reduction in the balance of payments deficit occurs because of reduced imports.

The second reason is political and is to reduce the energy dependence of the country on potentially unreliable or unacceptable sources of supply. Using energy more efficiently reduces the consumption of energy. This in turn reduces the need for mining and extraction, but also reduces the need for the world to rely on other sources of energy that are more hazardous such as nuclear power. In addition, becoming more energy efficient will also reduce dependence on imported oil, this contributes to a more stable world economy reducing the potential for oil being used as a political weapon, as it has been so effectively demonstrated in the volatile relationship the world has with the Middle East. The benefit of reduced CO_2 emissions is a welcome by-product of this policy but the underlying reason is that of reducing political dependence on other countries for imported fuel.

The third reason for advocating energy efficiency is to control the deteriorating greenhouse effect i.e. reducing CO_2 emissions and CFC's into the atmosphere by reducing the use of materials that produce these gases. This has only become prevalent since the late 1980's. The only way to achieve this is to significantly reduce CO_2 emissions and for the world to adopt and enforce a comprehensive energy efficient regime.

The fourth reason is for the world to take a more sustainable standpoint. All resources (not just energy) need to be used more efficiently in order to make mans occupation of the planet tenable in the long term and to move towards a much greener economy. An example being the increased use of sustainable products for building and living, recycling waste more efficiently and using more efficient form of transport. Energy conservation is only a small, but essential part of this process.

Recognition of the need to reduce CO_2 emissions has increased the profile of energy use and has resulted in a serious problem for many governments. In response to these increasing problems, the heads of 106 governments, realising the seriousness of the situation, attended a UN Conference on Environment and Development (The Earth Summit) in Rio de Janeiro in June 1992 and signed a treaty designed to stabilise the earth's climate (Flavin & Lenssen 1995, DOE 1994 a, DOE 1994 b).

The main outcome of the Earth Summit with regard to energy use and conservation was the Climate Change Convention: an agreement between countries that established a framework for action to reduce the risks of global warming by limiting the emissions of greenhouse gases, primarily CO_2. The UK government's commitment to reduce CO_2 emissions made in Rio De Janeiro 1992, provides the impetus for the present focus on energy use and conservation.

Despite the UK government committing itself to these reductions in CO_2 emissions, it does appear that a degree of prevarication still exists. The whole basis of the commitment centres on reducing the 'risk' of global warming, yet as all the delegates were aware, global warming is fact, occurring as a result of CO_2 emissions; it is not a 'risk' that it may occur, it is occurring.

The summit also demonstrated the vast differences of opinion and interest between various countries which belied the political wrangling that occurred between countries over issues of CO_2 emissions. The United States wished to continue to pollute and promulgated the trading of pollution as an economic commodity, whilst developing countries did not want their industrial development to be hindered by pollution controls. The many varying national interests contributing to the Summit resulted in a highly complex and difficult situation that conspired against the attainment of a binding and effective agreement on the reduction of CO_2 emissions.

2.4 Introduction to energy conservation.

Energy conservation rather than CO_2 emissions only became an important issue as a result of the oil crisis of October 1973. At this time the world began to realise the real cost of energy resources and their volatile availability, but as yet, not the consequences these would have upon the environment by their use. Energy conservation was precipitated by Arab oil producers who raised the price of oil almost overnight by 70% and cut production by 5% per month. This resulted in a rapid and significant increase in the price of energy, accompanied by a perceived shortage. As a consequence, energy use and energy conservation became an issue for the first time. (Pickering & Owen 1994, The World Commission On Environment & Development 1987, Evans & Herring 1987, Marbo 1986). From this time onwards, domestic fuel bills for oil, gas and electricity rose sharply, as part of an inflationary spiral during the 1970's experienced throughout the developed world (Loraine 1979).

The UK government reaction to this energy crisis, like the government of every other industrialised nation, was to advocate energy conservation. The government embarked on a massive propaganda campaign, aimed at reducing all forms of energy use in the country, initially for the purpose of maintaining sufficient energy to meet immediate needs, but with an additional benefit of saving money for the nation. In the long term the real political reason was ultimately to reduce Britain's dependence on the Arab countries for oil. The campaign promoted measures that included fuel rationing, a three day working week, rotating power cuts and halving street lighting, together with a 50mph speed limit throughout the country. Reducing energy use was recognised by the government at this time as the key to the problem, in what appeared to be a time of national emergency. The government's campaign to reduce energy use was a success, it together with political developments avoided the worst consequences of the shortage, in the long run however, it had brought energy and energy conservation to the forefront of the national psyche for the first time, albeit not for environmental reasons. The concept of energy conservation to reduce CO_2 emissions, rather than to reduce the nations fuel use had still yet to occur.

Prior to the 1973 crisis, oil was considered as the major low cost fuel source and regarded as a long-term reliable energy resource upon which the countries of the industrialised world had built their post-war economic recovery. By this time coal seemed like a fuel of yesterday, expensive to mine and dirty to use. The 1973/74 crisis marked a sudden demise in the era of oil fuelled economic growth and led to soaring inflation as OPEC quadrupled the world oil price, economic growth slowed down, and the rate of unemployment rose. Those developing countries that had recently come to rely on oil suffered from the higher prices, which resulted in many massive foreign debts and declining incomes (Flavin & Lenssen 1995). The world consumption of oil began to decline and continued to do so for a number a years, this decline was not registered at first, as attention was drawn to the supply interruptions and price fluctuations caused by the Iranian Revolution in 1978. The rise in prices introduced by OPEC in 1979 1980 did not start this decline in demand, but contributed to its continuance in later years and provided new reasons for energy conservation and for the substitution of coal and gas for oil. (Stork 1975, Marbo 1988)

During this crisis period governments looked for sources of energy that could restore their economies to economic growth. Nuclear power was considered as a complete replacement for oil, but found not to be feasible. Despite vast subsidies, the building of nuclear reactors began to decline because of rising costs and growing public concern, intensified by the accidents at Three Mile Island in 1979 and later Chernobyl in 1986. By the early 1990's the majority of nuclear expansion programs had been halted (Flavin & Lenssen 1995). In 1996 nuclear power stations accounted for 27% of the UK total electricity generation, but renewable sources of energy still only accounted for only 2% (DOE 1996).

With the decline of nuclear power, many nations resorted to coal as an alternative to reduce their dependence on petroleum. The use of coal peaked in the 1980's with its use mainly confined to the generation of electric power. Since the 1970's oil crisis, UK oil and natural gas production has increased while the production of coal has declined. In the long term it is expected that existing energy reserves will become more scarce, as a result fuel prices will rise, encouraging greater fuel economy and increased incentive to develop alternative energy sources. Over the same period, final energy consumption by households has risen by 20% since the 1970's. (Shorrock *et al* 1993).

By the early 1990's, the market for energy began to be influenced by environmental issues rather than solely by the politics of oil. A number of high profile environmental disasters, such as the Waldsterben (forest death) in 1982, caused by acid rain from coal burning power plants, Chernobyl (1986) and the wreck of the Exxon Valdez in 1989 bought the issue of energy and the environment prominently into public awareness.

This time of energy crisis, from the initial origin of the 1970's through to the 1980's had sensitised the UK population to reduce their energy use to save money as the price of fuel continued upwards. While at the time, the governments appeal to the `hearts and minds` of Britain's population appeared highly effective in reducing the use of energy in a short term crisis, this mindset had never been transposed to reduce energy use to for the longer term purpose of reducing CO_2 emissions.

2.5 Contribution of housing to CO_2 emissions

Total energy consumption by different sectors of the UK energy market has varied over the past 25 years. The amount of energy consumed by industry has fallen, whilst energy consumed by transport has increased. There has been a decline in the use of coal, and a rise in energy from gas consumption, while this has ultimately reduced the amount of CO_2 emissions recorded over this period of time, the reduction has largely been due to a change in the type of fuel used. Solid fuels, produce at least twice the amount of CO_2 emissions than a comparable quantity of gas. A reduction in emissions has occurred, as a result of more modern fuels being introduced which consumers and producers prefer. The scale of this somewhat fortuitous reduction in CO_2 emissions is unlikely to be repeated.

Shorrock *et al* (1993) recorded that buildings were responsible for 49% of all UK CO_2 emissions, with the domestic sector being the greatest contributor, accounting for some 30% of the total emissions. The Association for the Conservation of Energy (1993) suggest that at least 20% of these emissions from domestic buildings are the result of waste and could be saved. This would result in 9 million tons of carbon being withheld from polluting the atmosphere and annual savings of up to £3 billion.

Only over the past decade has the recognition of the link between CO_2 emissions and domestic energy use, resulting in energy conservation in the domestic sector becoming a matter of both national and government concern. If no energy saving measures are taken, projections show that CO_2 emissions are likely to increase between 10% and 40% over the next fifteen years causing irrevocable damage to the earth's atmosphere (House Of Commons 1990, DOE 1990 a, DOE 1990 b, The World Commission On Environment & Development 1987).

The environmental impact of domestic energy use on the environment cannot be ignored. Domestic energy use equates to approximately 30% of the UK's output of carbon dioxide. Approximately 7.5 tons of carbon dioxide is produced to meet the average home's energy needs for a year. The Energy Efficiency Office (1992) claim that this can be reduced by 20%, and possibly 50%, by using energy more efficiently in the home. The breakdown of domestic energy use shows that 55% of the average household energy use is accounted for by space heating, a further 20% on heating hot water and the remaining 25% spent on lighting and cooking.

With this scale of domestic energy use, an obvious policy for the government to achieve a meaningful reduction in CO_2 emissions from this sector is to impose a regime of energy conservation on domestic dwellings.
The urgency of the need for reductions in energy use in housing has been widely recognised by a variety of organisations such as, The World Commission On Environment & Development (1987), Commission of the European Communities (1991), Official Journal of the European Communities (1993) and the DOE (1994 b).

2.6 Legislation

Legislation has been used on a periodic basis by successive governments to influence the energy efficiency of domestic dwellings. Energy conservation standards for new building construction have gradually become more stringent through the mechanism of the Building Regulations. Periodically, the government through the Department of the Environment has commissioned an assessment of the thermal standards of dwellings, and made changes to the thermal aspects of the Building Regulations as a result of these amendments and any current political or economic considerations regarding energy use and conservation.

The Building Regulations have included provision for thermal performance that has determined the insulation of dwellings constructed since 1945. The requirements of the Building Regulations for thermal insulation remained essentially unchanged until the 1965 revision. However the revised thermal performance requirements introduced in 1965 were not particularly rigorous and could be easily met by a standard brick/brick or brick/block cavity wall and 20mm of glass fibre quilt in the roof (BRE 1993). This reflected the continued low priority afforded to energy conservation by the government of the time and the population in general. The primary focus for building standards remained the eradication of damp and condensation, as part of the general improvement of accommodation standards. Consequently, energy conservation held little importance for either governments or households.

The oil crisis of the early 1970's initiated concern about the conservation of energy. However, the Building Regulations were not revised until 1976 and then primarily to deal with condensation rather than to address energy conservation, although the revisions did introduce improved U values and a provision for limiting the total area of windows.

More significant improvements in energy conservation, through increases in insulation were subsequently introduced in revisions to the Building Regulations in 1982 and 1990. The 1990 revisions introduced the concept of ground floor insulation for the first time in the UK. Appendix 1 illustrates changes in thermal insulation required by the Building Regulations over the years.

Construction methods inevitably have evolved, in some cases as a result of the Building Regulations. The 1976 revisions were largely met by adopting lightweight concrete blocks for the inner skin of cavity walls. The 1982 revision increased the use of insulation within the cavity itself, it also led to the development of high performance insulating blocks that allowed the cavity to be kept clear (BRE 1993).

All these changes were generally met by housebuilders with little if any conscious effort and only provided minimal recognition of the issue of reducing CO_2 emissions. Ultimately these changes in regulations did improve the thermal performance of newly constructed dwellings, however, they did not change the perceptions of homeowners (users) for the need to reduce CO_2 emissions and the need for energy conservation.

Subsequent to the amendments to the 1982 Regulations, the Department of the Environment proposed changes to upgrade the Regulations further. The reactions to the upgrading of the thermal regulations provide an interesting insight into the entrenched attitudes that existed amongst housebuilders. Reactions to the changes ranged from reserved approval to outright condemnation. The House Builders Federation stated that the proposals would add between £800 and £1,000 to the cost of an average house, as expensive changes would have to be made to current designs. In addition, it was also stated that the Housebuilders Federation felt, and always had, that there was no need to improve the insulation standards of new housing. The Federation considered that the government was attacking the wrong area and that instead of concentrating on the 150,000 new homes built each year, it should look towards improving the 1.1 million homes bought annually on the second hand housing market (Building 1987).

The statements and position adopted by the Housebuilders Federation provides one of the first insights into the attitude of housebuilders towards energy, which is substantially one of non-interest, if not outright opposition. However this may be interpreted as simply opposition to change, which happens in this instance to relate to higher energy conservation standards. The housebuilders attitude reflects their key interest, that of maintaining profits, in the case of increased thermal standards, by attempting to keep costs to a minimum.

With respect to the representativeness of these views, the Housebuilders Federation does represent a significant proportion of housebuilders in the UK including a number of the large housebuilders. It is therefore reasonable to accept that the attitude expressed by the House Builders Federation is the attitude held by the majority of its members, particularly in the absence of any dissenting or contrary views expressed by individual housebuilders at the time.

The statements made by the Housebuilders Federation did however, identify a salient and important point about the greater proportional influence of existing homeowners on energy conservation and CO_2 emissions. In order to make significant reductions in energy use and therefore CO_2 emissions existing housing must be included, focusing only on new housing will not produce the required magnitude of reductions quickly enough. This reflected the attitudes of the housebuilders at this time that energy conservation was not a significant factor in their operations, or the market for new homes.

It is suspected that the Housebuilders Federation (HBF) were reluctant to endorse any proposed changes to thermal requirements for a number of reasons. Firstly, at the time of the changes the housebuilding industry was in recession and the HBF saw the changes in thermal requirements as an additional building cost, one which was unlikely to be passed onto to purchasers in the prevailing economic climate and which would ultimately reduce profits.

There is also evidence to suggest that quality issues and the problems of achieving quality were also of concern to housebuilders. Housebuilders were at this time, already struggling to achieve the specified levels of quality in their dwellings. By adding further modifications required by the improved regulations would only add to the problem of attaining quality.

The housebuilders comments clearly demonstrate their position at this time and manifest the indifference and/or ignorance to the problem of energy conservation and CO_2 emissions held by these firms. Comments such as `felt no need to improve the insulation standards` typify their position and The National Housebuilders Federation are clearly established as a manufacturers association whose sole purpose is protecting the interests, particularly the financial interests, of its members. There is no evidence to show that the HBF have any other agenda or objectives with relation to the greater improvement of housing or environmental issues.

Changes to Part L of the Building Regulations, particularly those implemented in July 1995 created controversy over the next few years. In a similar warning to the one made by the HBF in 1982, The National House Building Council (NHBC) warned that the house building industry could be hampered by these forthcoming changes to the Building Regulations. The NHBC estimated that the changes proposed to the Part L of the Regulations would add between £500-£1000 to the cost of a new home. The implications being that new homebuyers were unlikely to bear these extra costs, instead they would result in reduced profits for the housebuilders. In essence, the NHBC considered that greater energy efficiency was a desirable objective for new housing, but not at the expense of the housing market, i.e. the housebuilders (Building 1993). The attitude of the NHBC does not differ at all from the attitudes expressed by the Housebuilders Federation, these two organisations between them represent the majority of housebuilders, (including the large housebuilders) in the U.K.

The NHBC are highly committed to their members, and has a close alliance to the House Builders Federation, it largely owes its existence to its members purchasing the '10 year' guarantee on new homes that it offers.

An opposite view, held by many environmentally aware individuals and organisations in the construction industry, regard the changes made to the Building Regulations as a missed opportunity to achieve the higher performance levels realised in a number of other countries. Possibly the most important development in the 1992 changes to the Building Regulations was the introduction of the Standard Assessment Procedure (SAP). This, although complex, provided a consistent comparable determination of the energy rating of a domestic building for the first time (Building Services 1994, New Builder 1994). All housing was required to have a SAP rating. Ratings range from 1 100, where 1 represents a poor energy performing building and 100 a very energy efficient one. The rating is based on the total annual cost for heating space and water, plus standing charges, pump and fan power, taking into account floor area (AJ 1995). The Regulations require buildings to achieve a SAP rating of over 80. The English House Condition Survey Energy Report of 1991, DOE (1991) found that the existing housing stock in Britain has an average SAP rating of only 35, and the majority of the housing stock fell well below the current Building Regulation standards for energy efficiency.

The philosophy of the amendments and revisions to the Building Regulations since 1990, has been to encourage greater energy efficiency whilst retaining flexibility in design and simplified implementation (Building Services 1994, New Builder 1994). They also proved more flexible than previous changes to the Building Regulations, as they allowed builders to compensate for reduced insulation in one element by increasing it in another: trade-off (BRE 1993, Building Regulations 1965 - 1991). The idea of trade-off was fundamentally flawed. In simple terms, one aspect of the building can be insulated while another aspect is not, in theory all the heat conserved in the insulated part can be escaping through the uninsulated part. Within two years further amendments were enacted, to correct the unpopular trade off theory (Building Regulations 1995).

The response from the construction industry to the compulsory energy rating scheme (SAP) has been mixed. Housebuilders remained implacably opposed to any measures that might impinge upon their profits. Housebuilders claimed that the scheme was unworkable, would confuse house buyers and give different ratings for identical buildings using differing heat sources (Building 1995). During the early implementation of SAP, some housebuilders found an alternative route to conforming to SAP by merely substituting energy efficient light bulbs throughout their dwellings rather than installing additional energy efficient measures intended by the legislation. This once again demonstrated the attitude of housebuilders as remaining primarily one of being concerned with profits and not surprisingly seeking to find the most commercially advantageous way of meeting the requirements. As yet housebuilders do not show a significant interest or commitment to the environmental problems that prompted measures such as SAP. The attitudes of housebuilders have a clear pattern, opposing any changes that require a change in construction resulting in additional cost, which is unfortunately perceived as negativity. Housebuilders concerns are solely concentrated on maximising profit, rather than any commitment to the environment.

2.7 Practices in Europe.

2.7.1 Thermal comparisons.

In comparison to other countries, the UK thermal regulations are well below the standards across economically and climatically comparable countries in Northern Europe, such as Germany, Netherlands, etc. Scandinavia, although having more severe climatic conditions than the UK is significantly ahead of the UK with regard to thermal insulation standards, but provides useful comparisons as to what can be achieved and the means by which it can be achieved. Scandinavia provides an excellent example of the energy use and conservation standards in domestic dwellings that it will be necessary to achieve in the UK in order to make the substantial CO_2 emission reductions required by the government. The insulation standards required in Sweden in comparison to those in the UK illustrate the scale of the problem. With regard to wall insulation, the National Cavity Association estimates that it would take 95 years to insulate all the non-insulated cavity walls in the UK, based on the 120,000 dwellings that were insulated in 1993 and accessible lofts would take 178 years to insulate fully (Building 1994). These installation rates have not increased significantly since 1993 and it reflects how far behind the UK is with regard to thermal insulation. There is also a difference in attitude towards energy use and conservation between the UK and Scandinavia. In Scandinavia, the Building Regulations are much more stringent but are often voluntarily surpassed, unlike the UK where the standard is regarded as the maximum rather than the minimum. This reflects the greater energy consciousness of the Scandinavians, which is probably the result of their more extreme climate which brings the issue to the fore, if only in respect of the greater difficulty of maintaining comfort levels. Indeed, Sweden implemented its energy conservation programme around 50 years ago precisely for this reason, the changes considered to have been driven by comfort considerations rather than any other factor.

Although more demanding, Swedish development of thermal standards made similar progress to those of the UK until the oil crisis of the 1970's. Sweden's response to the energy crisis was positive. The Swedish government legislated in 1975, with further changes introduced in 1984 which demanded thermal insulation requirements that specified U Values of for walls (0.17 W/M^2K), roofs (0.12 W/M^2K), floors (0.20 W/M^2K) and windows (2.0 W/M^2K), which meant triple glazing. The requirements were further upgraded in 1988 to cover all elements of the building.

The comparison in table 1 shows that even in 1984 the Swedish regulations still far exceeded those demanded in the UK in 1990.

Table 1 : Comparison of Swedish regulations in 1984 to British regulations in 1990

	ROOF	WALLS	FLOOR
1984 - Sweden	0.12	0.17	0.20
1990 - UK	0.25	0.45	0.45~

(U Values - W/M^2K)

~Applies to all floors including those in contact with the ground (Building Regulations 1965 1991, Olivier 1992).

At this time the difference in thermal standards and attitudes was highlighted in an article in the UK building press which drew attention to Scandinavian practices regarding energy efficiency and made comparisons with the practices in the UK surrounding energy efficiency and conservation. It stated *'The UK could learn a lot from Sweden's non-confrontational attitude, surely it is time we progressed from our antiquated adversarial approach to a responsible consensus method of doing business in the energy sector. If we don't, we'll simply continue to wallow in a tradition of cold and damp'* (New Builder 1994). The issue of attitudes as a part of the energy conservation debate within the construction industry was, for the first time openly raised. Until this time the generally negative attitude towards energy conservation of housebuilders, developers and possibly the government as well, had not been discussed openly as a contributory part of energy conservation.

Although it is probable that the Scandinavian success has been largely the result of improving energy conservation for reasons of comfort and cost rather than to reduce CO_2 emissions, there is a prevailing favourable attitude towards energy conservation in these countries. The Scandinavian climate is the main dictator of energy conservation, which engenders a positive attitude among homeowners and housebuilders to be as energy efficient as possible, however, it is uncertain the extent to which the cost of energy influences this attitude and to what extent social responsibility does.
The UK climate cannot be compared to Scandinavia's, which makes any comparison of their positive attitude towards energy conservation difficult to compare to the UK's. Simplistically, if the UK climate was similar would the UK have developed a similar attitude and be significantly more energy conscious? In reality there are too many social, cultural and other variations that contribute to the difference. However economically, it is suspected that homeowners in general would be more inclined to insulate their homes and be more energy conscious, as they would directly and significantly benefit from savings on what they would regard as substantial fuel bills. Equally, the sensitively market orientated housebuilding industry would be highly unlikely to advocate energy conservation unless there was a clear consumer demand and associated premium available. The housebuilding industry will not begin to produce energy efficient homes until

demand from potential purchasers exists. The housebuilding industry will not offer any additional features, including energy measures, without a clear commercial reason.

2.7.2 Government Intervention

The extent to which government action is involved in producing energy savings and thereby CO_2 emission reductions varies from country to country and in the form that the government action can take. The issue of balance between compulsion and voluntary commitment on the part of consumers is at the centre of deliberations by governments and is reflected in the action taken. Over the past 10 years Denmark has been one of the most successful countries in the western world in reducing its energy consumption. During the first oil crisis in 1973, Denmark's consumption of fuel for space heating was reduced by around 45% per square metre. The Danish parliament in 1981 passed an 'Act of Reduction of Energy Consumption in Buildings', whose main objective was to bring existing buildings up to the same required levels of energy efficiency as new dwellings. Within this act each recommendation intended to promote some increased investment in energy efficiency. The Danish government introduced a variety of measures to achieve these energy savings, many of which were quite novel and provided useful examples for other governments considering similar reductions in energy use. One of the most novel measures was a heat survey scheme. In practice this measure has had the most cost-effective impact of any scheme aimed at improving fuel usage in homes within any European Community state. The 1981 Act also placed this important imposition on existing house owners, it required that from 1985 onwards, before any home built prior to February 1979 could be sold, the vendor must provide the prospective purchaser with a Heat Survey Report outlining what has been done, or what is to be done, to bring the house up to the required energy standards of a new home (Association for the Conservation of Energy 1989). The Act softened the impact of this requirement with a subsidy, limited to around £590 per home however, this covered only a proportion of the total expenditure (including the cost of a consultant). As most energy recommendations for the average dwelling amounted to £1,210, and the subsidy was not paid until the complete recommendation had been carried out, many homeowners found this unappealing and in the early days the uptake of this scheme was very low. The scheme was subsequently modified allowing owners to complete the work in stages and then claim the subsidy, once the limit was reached. The revised scheme proved far more palatable to the vendors and generated a much greater uptake of the scheme, with consequently much more positive results on energy conservation.

The Danish government were very shrewd in the introduction of this Act. The Act did not 'force' people to install energy efficient measures, neither did it prosecute homeowners who did not have a Heat Survey Report done, instead the government relied upon social pressure rather than criminal pressure (Association for the Conservation of Energy 1989). Promotion of this scheme reflected this approach and took the format of an intensive information campaign. Advertisements appeared in newspapers and on television, reminding citizens of their 'legal' obligation to provide a Heat Survey Report or Energy Certificate at the point of sale.

The subsidy was removed in 1984, following which estate agents played a crucial part in the continuation of the scheme. The majority of estate agents were found to advise vendors without a heat survey to obtain one, and those few vendors that did not order a Heat Survey were invariably forced to obtain one by prospective purchasers. If the vendor was still not prepared to have a Heat Survey done then the purchase price of the dwelling was frequently negotiated to take this into account. It was concluded however, that the Heat Survey Report had little influence on the price of a home as long as the suggested amount of investment was less than £2,600. It was also found that for older properties, the existence of an energy report had little influence on homeowners to invest in energy measures, as they were more likely to be concerned with 'modernising' the property. However, in newer buildings the presence of an energy report appeared to induce energy saving investments that may not have been made, having gone unnoticed if the report had not identified and made the recommendations (Association for the Conservation of Energy 1989).

This scheme has clearly been a success in changing the attitude of homeowners to adopt a more positive perspective towards energy use and encourage greater energy efficiency. It is interesting to note, that homeowners attitudes are apparently changed by a method that can only be described as 'indirect penalisation' applied to the sale or purchase of a property. From a financial position, homeowners are highly unlikely to risk losing the sale of their home in favour of spending the £590 required to produce an energy report. The presence of social pressure as a force in this scheme cannot be ignored, it demonstrates how strongly some individuals are influenced by peer and market pressure. Whether this scheme could be applied to the UK, and still have the same success is debatable. In the present political climate it is unlikely that any government will pass a similar Act, mainly because of the electoral ramifications to their popularity as a result. While an admirable concept to improve the efficiency of the housing and reduce CO_2 emissions, the repercussions to the instigating political party are likely to be wide ranging and damaging. The general public is likely to see this as another tax, and are highly unlikely to accept such a cost while there is no general recognition of the global environmental crisis or some other energy crisis. Without considerable publicity and development of public opinion, it is highly unlikely that the public will make the link between this measure and a significant benefit to the environment from reduced CO_2 emissions.

In the Netherlands, the emphasis of government policy has been on the reduction of fossil fuel consumption and the increased use of renewable energy. The government has attempted to raise the profile of the environmental issue by classifying these policies not as energy policies, but as environmental policies. The government has also drafted a number of new energy efficient programmes for the domestic sector. Under the 'sustainable building programme', which was formally adopted in 1990, higher levels of energy efficiency are required in all new construction. The government is also considering the possibility that compulsory energy labelling and mandatory retrofitting of energy efficiency measures into dwellings by owner occupiers prior to sale, or with rented accommodation where the standard of energy efficiency is considered unsuitable or ineffective.

The Dutch government introduced a scheme in 1991 that allowed energy distribution companies to charge an environmental levy on the energy bills paid by customers. The proceeds are used to subsidise investment in selected energy measures, in conjunction with finance provided by the government under the

Energy Conservation Budget. This policy has given a crucial role to the gas and electricity utilities in the promotion of energy efficiency. Estimates of the level of investment into energy measures are significant. The Utility companies estimate that government and utility subsidies of £142m will contribute to customer investment of £264m, which represents 65% of the total costs. No other European government subsidy or campaign matches this level of investment for the general public and energy efficiency. The overall objective of the scheme is solely to provide enough financial incentive for energy consumers to undertake the investment themselves.

Despite this being a positive way of generating investment and action into energy efficiency, one major flaw exists. The initiative still rests with the consumer to undertake the investment and in those countries where the attitudes of homeowners clearly indicate that energy efficiency is not a major concern, no incentive to invest in energy measures exists and no investment will be made. This 'levy' relies upon the assumption that 'energy users' are concerned about the cost of fuel and will install these measures to reduce their bills. Indeed there would be sufficient willingness on the part of consumers to install the measures whether they are subsidised or not. The study omitted the effect of this 'levy' on the attitude of energy users or what propensity existed, with or without the levy, to install energy saving measures.

These energy practices demonstrate that there are a variety of initiatives being used in other countries to reduce the energy consumption of domestic dwellings. It is also evident that a number of European countries are ahead of the UK with regard to energy efficient building and more importantly the policies by which these can be successfully introduced. The progress in these countries is underpinned by significant and consistent research that has been undertaken over a number of years, which has spawned the development of energy efficient construction methods. Added to the successful implementation of these practices into everyday construction use, has made these countries significantly more advanced in energy conservation than the UK. Only now is the United Kingdom beginning to bring its construction methods into line with other countries proven efforts.

The difference between the UK and some European governments is the attitude towards and extent of research and development of low energy technology and housing. European countries have invested significant sums in these areas whilst the UK has spent considerably less by comparison. This shows that in European countries, energy is accorded much greater importance. Energy conservation and indeed environmental issues attain a greater political significance in many European countries than they do in the UK. These issues in the UK remain firmly anchored to issues of cost, tax and basic short term economic benefits, as such they will only become potent as a political issue in the event of an immediate crisis or economic loss. It is possible for energy conservation to become a major political motivator through the saving of money on fuel bills and benefits the population which may place the government in a positive light.

2.8 Condition of the UK housing stock

As an initial starting point the condition of the existing housing stock in Britain must be determined with specific regard to its condition and general state of energy efficiency. Over recent years, home ownership has risen significantly, particularly under the Conservative government of 1979-97. The UK housing stock currently contains a large number of dwellings that are poorly insulated and maintained.

Significantly, the type of fuel used has changed considerably over the years. For many years, energy consumed for domestic space heating, water heating and cooking was primarily from solid fuels. Originally wood was used, subsequently succeeded by coal, and by the start of this century, coal (in all its forms) accounted for approximately 95% of all domestic energy use in Britain. By the 1950's gas and to a lesser extent electricity had become the main fuel for cooking, however, coal (and coke) was still the main fuel used for space and water heating. Coal took third place behind gas and electricity in delivered energy; its decline being the result of intense competition from these other fuels, together with the Clean Air Act of 1956. New appliances that utilised gas and electricity were attractive to use in terms of cleanliness, flexibility and convenience; also the price of these fuels was decreasing rapidly (Evans & Herring 1989).

The use of oil for domestic use increased significantly from around 1955 onwards with the development of the Persian Gulf Oil fields, primarily in the form of premium grade kerosene (paraffin) for heating, using cheap and portable heaters. Evans & Herring (1989) estimate that by the 1960's, this was probably the second most popular fuel in British homes, although compared to the use of coal the contribution was small. Paraffin declined steadily after this time, with safety concerns and the steady adoption of central heating.

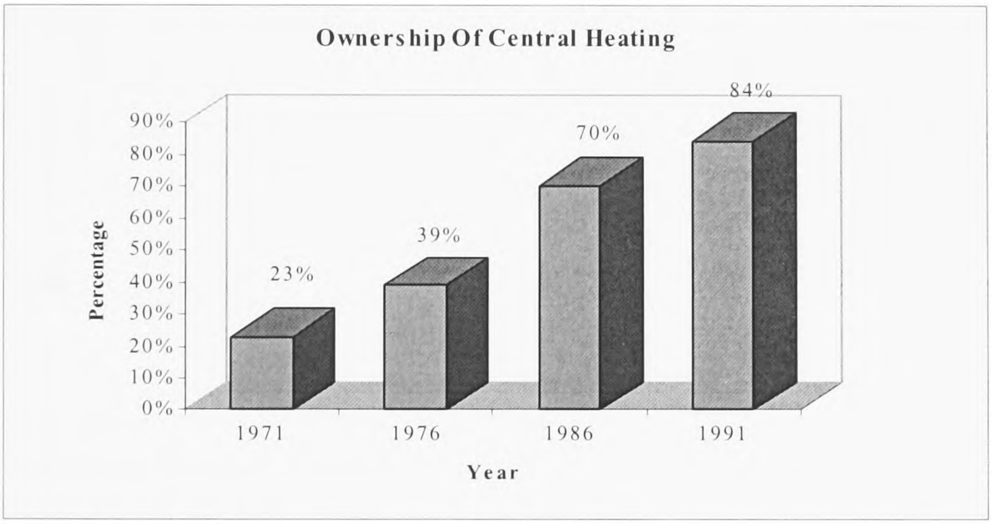
Coal had the attraction to lower income consumers that it was a fairly easily controlled expense, being purchased monthly or weekly. In this way, expenditure could be easily accounted and budgeted for.
With the advent of new 'invisible' fuels, these were more difficult to keep track of financially, the cost only being known when the bill arrived showing the amount spent over the previous quarter. This method of purchasing fuel is thought to have contributed to the greater use of energy as it makes greater fuel use 'easy', as the fuel cannot physically be monitored or tracked, unlike coal.

The English House Condition Survey (DOE) has recorded the condition of the dwellings in Britain over a number of years. The first English House Condition Survey was carried out in 1967, with subsequent surveys carried out in 1971, 1976, 1981, 1986 and 1991. Prior to 1967 the earliest record of the state of houses is a Housing Survey (Woolf, 1964) commissioned by the Ministry of Housing and Local Government to investigate the current housing situation at that time. The 1964 Survey found that only 17% of households who were owner/occupiers had central heating, with solid fuel being the most popular fuel used (Woolf 1964, DOE 1971). The majority of households had local heat sources, primarily open fires.

The English House Condition Survey is divided into two parts; a physical house condition survey designed to measure the environmental condition of the housing stock in Britain, and a social survey, designed to record occupants attitudes to housing, repairs, improvements and other matters. These provide important background information regarding heating, housing and energy use that underlie the attitudes currently expressed by homeowners. These changes provide the context in which these attitudes were formed, and in some instances remain, consequently an appreciation of these physical and social changes are useful for an understanding of the attitudes that now prevail.

A number of trends have been identified by these surveys, such as the increasing ownership of central heating, with gas and electricity as the predominant fuels. The change from local heating to central heating had been a major factor in the amount of energy used in domestic dwellings.

Figure 1 displays the increase in ownership of central heating over the period 1971 to 1991.



(Source:English House Condition Survey : 1971,1976,1986,1991).

Figure 1: Ownership of central heating.

The 1976 Survey ascertained that 39% of homes had full central heating, although the type of fuel used to operate the system was not ascertained, 11% had partial central heating and 51% had no central heating at all. Full central heating was found to be most common in the Southeast and least common in the Northern regions. Differences due to tenure were substantial; nearly 60% of owner/occupied dwellings possessed at least partial central heating, compared with 44% of local authority dwellings and 22% of privately rented dwellings (DOE 1976). By the 1981 survey, 57% of households lived in centrally heated dwellings, with the most common form of fuel being gas (38% of households) followed by solid fuel, electrical storage (6% each), oil-fired (5%) and other (2%).

With regard to usage of these systems, the most common control was achieved by room thermostats and double period timers. The issue of system usage grew in prominence and the 1981 survey included behavioural aspects of heating and energy use in the home for the first time. It revealed that a third of households heated all their rooms regularly in winter, whilst another third heated at least half of their rooms. Three-quarters of households used their systems regularly in winter and 9% used them all the year round, while 2% of households that had central heating did not use it at all (DOE 1981).

The 1986 survey also included information on the physical and social aspects of the housing stock, it also produced a Supplementary Energy Report that highlighted the following points: the increasing ownership of central heating, with over 70% of households having central heating with mains gas the fuel for heating in 75% of homes. Only 1% of homes now lacked any fixed heating at all. Solid fuel remained the second most common fuel.

With reference to heating patterns, the survey found these to vary between weekdays and weekends, patterns also altered with regard to the type of heating and household characteristics. It was found that on average, owner/occupiers consumed 60% more fuel than Local Authority tenants. High gas consumption was largely confined to owner/occupiers, higher income groups and households with central heating. It was also found that tenants, low-income groups and households lacking central heating were likely to be high electricity consumers (DOE 1986 & Supplement 1986). Average room temperatures were found to be 18^0C in most rooms and 16^0C for the hall. For the first time the homogeneous occupant, which had previously been the assumption with regard to the usage of heating and the consumption of energy in the domestic situation, was being shown to be not homogeneous. The distinct categorisation of the users of energy identified in the 1986 Survey showed that a unitarist approach to the issue of energy conservation and use would probably not be sustainable. Although the Survey produced fairly rudimentary categorisations and characterisations for these different groups, it did initiate recognition of their existence and stimulate further study. The significance of user behaviour and attitudes to energy conservation remained unexplored and unquantified at this time.

A contemporary study by Salvage (1993), supported the findings of the 1986 Survey, it too showed that people on low incomes, the elderly and unemployed households were also more likely to be found in colder housing than those on higher income or in work.

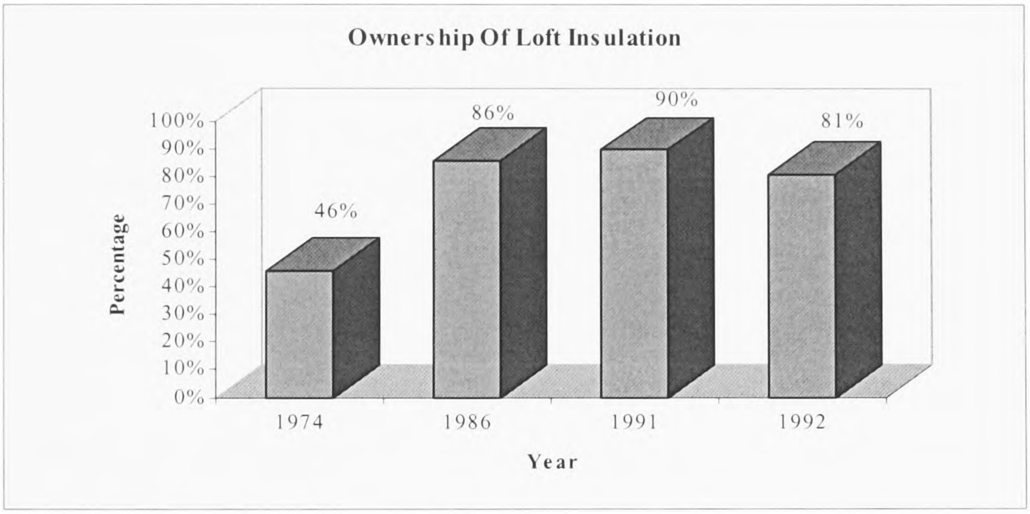
Prior to the findings of the 1986 survey, the 1981 survey showed high levels of satisfaction on the part of householders with heating facilities, that correlated with the fact that the cost of heating was not a primary concern to these households. This finding, in retrospect, is a significant indication that the attitudes of homeowners regarding energy use and conservation, although not recognised as being significant in 1981, existed as a contributory factor at this time. This supports the deduction that user behaviour cannot be ignored, as the use of energy in the home appears to be largely driven by attitude.

The 1991 English House Condition Survey showed that the ownership of central heating had risen to 84% of the dwellings surveyed. There is evidence that the installation of central heating was not confined to the most recent housing stock, but was becoming predominant in dwellings of all ages. The owner/occupied sector contained the greatest proportion of central heating (88%), while the private rented sector had the lowest (63%).

Later English House Condition Surveys included the determination of energy conservation measures, reflecting the growing significance of energy as an issue. However, it would appear that most of the energy conservation measures installed were installed primarily for comfort reasons rather than for environmental concern on the part of the homeowners.

The 1981 Survey also revealed another characteristic of householders, a lack of information and/or knowledge concerning energy conservation policies. The Survey found that almost a quarter of the sample lacked roof and loft insulation, and a third of these households without roof/loft insulation were unaware that grants were available to assist installation (DOE 1981). Whilst more than 80% of homes in the UK have loft insulation, it is estimated that more than 75% of accessible lofts have insulation that only meets the standard required by the 1974 Building Regulations (DOE 1996).

Figure 2 displays the increase in ownership of loft insulation until the year 1991.



(Source:English House Condition Survey : 1971,1976,1986,1991,1996).

Figure 2 :Ownership of loft insulation

In an apparent reversal of trends towards greater insulation standards, the Surveys charted a decline in the number of cavity walls that have been insulated by occupiers in the period up to 1992. In 1974, the number of owner occupied houses in Britain with cavity wall insulation was 20%, while in the year 1992 the number was 18%. This decline can be attributed to two factors, the first is the replacement of older housing stock without cavity insulation with new housing that has cavity wall insulation built-in during construction and hence would not require to have their cavities insulated. The second reason relates again to the importance that occupiers attitudes play in the achievement of energy reductions. During this period there were damaging reports on the quality of cavity wall insulation, together with associated health risks, plus the high capital outlay involved was also questioned with regard to pay back and value for money. All these factors led to a decline in the number of houses that had installed cavity wall insulation at a time when an increase would be expected. (DOE 1986 & Supplement 1986, Building 1994).

A positive finding shown by the English House Condition Surveys was the ownership of double-glazing, which has progressively increased over the period of the surveys, in 1974 the proportion of homes with double-glazing was 13%, this has since risen to 35% in 1986 and to 65% in 1992. There is evidence, Shorrock *et al* (1993), that this increase is primarily due to the improved maintenance and perceived increase in property values resulting from the installation of double glazing, rather than energy saving benefits. In the 1991 energy supplement of the English House Condition Survey, the proportion of households (owner/occupiers) that had full double glazing was 73%, nearly three times that of other sectors such as private rented or Local Authority dwellings.
It is suspected that reasons such as lower maintenance costs and increased property value, are reasons for some householders to install double glazing, however, the increase in the installation of double-glazing is also considered to be largely comfort related. It is highly likely that these three factors are the probable causes for installing double-glazing, rather than any desire to reduce CO_2 emissions.

The English House Condition Survey has also shown a corresponding trend for the installation of draught proofing. The 1986 survey shows the proportion of homes with draught proofing was 38%, however, by 1991 the proportion had fallen to 30%. The survey showed the proportion increasing in the years 1983 - 1986 but then a steady decline in the years to 1992. Shorrock *et al* (1993) attributed this to the fact that people do not feel the need to draught proof their home as they already had a satisfactory comfort level.

The 1991 Energy Report included a section termed Energy Related Work which comprised energy conservation measures carried out by householders. In 1991 the average expenditure on energy related work per household in the owner occupied sector was £298. Of this sum, 55% was attributable to the installation of double glazing, with the remainder being spent on measures such as the installation or upgrading of heating systems, servicing of boilers and installation of extractor fans. Only 5% was expended on insulation measures. Double glazing, along with the removal or replacement of old fireplaces were found to be the two most frequent jobs undertaken by the sample, although neither of these jobs were thought to have been undertaken for energy saving reasons, but purely for aesthetics. Installation and upgrading of central heating systems accounted for 23% of work in 1991, 10% being attributed to new installations and the remaining 13% to upgrading or repair of existing systems. The study also confirmed that owner occupiers on higher incomes undertook the greater monetary value of work. Couples and smaller families tended to do the most work, whilst the elderly (mainly lone pensioners) did the least.

The attitude that appears to be forming for homeowners is that the carrying out of energy related work is almost always for comfort reasons, to reduce maintenance or to add value to the property. There is no evidence to suggest that there is an attitude conducive to homeowners being concerned with energy use and therefore installing measures to reduce fuel use. Homeowners appear to remain unconcerned and/or uninformed of the need to reduce energy use and as a result, CO_2 emissions.

With regard to improvements in insulation in homes, around 9.8 million owner occupiers claimed to have improved insulation in their home, with many claiming to have installed more than one measure (DOE 1996). The study highlighted that the main reason for improving insulation tended to be an attempt to make the house warmer rather than reduce fuel bills, confirming the primary motive to be one of achieving or improving comfort levels.

The 1991 survey revealed that a certain amount of confusion existed amongst occupiers. A significant number of owner-occupiers (79%) saw no need for draught proofing and had never considered it, but favoured double-glazing. It became apparent that homeowners had not understood the link between draught proofing and that of double-glazing, notably that double-glazing is a form of draught proofing.

Over the period 1971 –1996, the survey charted a general trend of improvement of property energy measures. It showed that around 75% of owner occupiers had improved the insulation of their homes, starting with the installation of cheaper and simpler methods of insulation, such as loft and hot water cylinder insulation and later more costly measures such as double glazing. However, at the same time a group of owner-occupiers contradicted this general trend, their homes could be improved with the addition of insulation, but they claimed to have no intention of doing so, either because they felt there was no need to do so or they could not afford the measures (DOE 1996). In attitudinal terms, this supports the deduction that fragmentation exists in the attitudes of owner-occupiers and that a uniform attitude is unlikely.

It can be concluded from the English House Condition Surveys, that the public are insulating their homes mainly to improve comfort levels rather than to save energy, but this is however, largely dependent on the level of affordability of the measures in question. The studies also show the divergence of attitudes of owner occupiers towards energy use in the home. They have shown that many people do not see a need for insulation, and have no real concept of the type of energy measures or the benefits that these would provide. This can be partially attributed to a lack of knowledge of the various measures that are available.

The study also points out that there are a great many people that are living below their desired comfort level due to inefficient housing or fuel poverty, especially pensioners and very low income households who are prone to high levels of poverty (Salvage 1993). This has often resulted in hypothermia, particularly for the elderly, which claims around 600 lives every winter in the UK, with a 16% to 24% increase in deaths in the winter months. A typical UK winter bringing 30,000 to 60,000 more deaths than any other season. This is considered largely attributable to Britain's homes being colder than similar countries, including those with far colder climates (New Builder 1994, Salvage 1993).

Complimentary to the English House Condition Studies, is the Domestic Energy Fact File produced by the Building Research Establishment that provides assessments of trends in energy use, and expenditure on energy measures. These reports identify that domestic energy consumption tends to increase in proportion to increases in income and growth of population. The amount of energy that households consume is largely dependent on the level of comfort that the individual householder requires to achieve and the extent of the provision he/she wishes to achieve, i.e. whole house heating or partial heating. The consumption is also dependent on physical factors, particularly, insulation standard of the dwelling and the cost per unit of energy.

There are a number of householders who stated that they could not afford to reach their desired level of comfort, but stated a willingness to divert income, to achieve the desired comfort level. The proportion of income spent on light, fuel and power varies between less than 3% for the most well off households, up to 13% for households in the lowest income group. There are around 6 million low income households and many of them are likely to be achieving a much lower level of comfort than they require or need. As a consequence these people are more likely to be living in much colder houses and be more anxious about spending any money on improving the level of warmth. The decision to spend additional income on maintaining comfort levels or to install energy conservation measures is easily made. The report shows evidence of higher proportions of insulated homes where the householder is in a better position to pay for insulation, or where consumption levels are high and therefore the incentive to save is greater. There is proportionally more insulation in owner occupied houses, houses owned by high income groups and houses with central heating (Shorrock *et al* 1993).

The English House Condition Surveys have shown a gradual improvement in the installation of energy measures, however, the evidence shows that this has been primarily for comfort reasons. The evidence also suggests that along with homeowners prioritising comfort rather than energy conservation, property values and perceived property values also take priority over energy conservation. The habits and behaviour of the occupants, from the moderate information provided in the studies, suggest that they have not changed a great amount over the duration of the studies. Many homeowners still remain ambivalent towards energy conservation, which could explain the general inertia present in homeowners with respect to improving properties for energy reasons.

Emerging from the EHCS and the Energy Reports are a set of attitudes towards energy use and conservation held by homeowners. These can be summarised as;

- An ignorance towards energy conservation measures.
- An ignorance towards the need to conserve energy use in the home.
- A pre-disposition to use more fuel to achieve a comfort level rather than insulate their dwelling.
- A reluctance to spend money on energy measures that are perceived to add no value to the property or reduce maintenance.

2.9 UK Research into Energy Efficient Housing.

The UK government has carried out some research in the field of energy efficient housing, concentrating on the technological aspects of the development of low energy housing with reduced running costs for the occupier. This has been aimed at conventional types of dwelling rather than the more innovative types of dwelling that remain a minority in the housing market. This research has almost exclusively been aimed at affordable housing for the social housing sector rather than owner occupier homes market. However, the relevance of innovations in energy conservation in housing, which translate into reduced costs for the occupier and reduced fuel use and CO_2 emissions, cannot be ignored when considering how the government might achieve its CO_2 emission target with respect to domestic dwellings.

The majority of this research has been carried out by the Building Research Energy Conservation Support Unit (BRECSU), in conjunction with the Department of the Environment Energy Efficiency Office, the Milton Keynes Development Corporation and the Open University Energy Research Group.

2.9.1 BRECSU : Building Research Energy Conservation Support Unit.

The Building Research Energy Conservation Support Unit have been researching energy conservation in construction for the past two decades and have produced a large number of technical publications outlining good practice design guides for energy efficient buildings, which include housing, industry, commerce and commercial (BRE 1980 - 1994).

One of the first housing projects that the BRE implemented was undertaken jointly between Salford City Council and Salford University. The aim of the project was to provide housing that retained the comforts and convenience of traditionally designed homes, but had low energy consumption, maximum flexibility of energy source, minimum maintenance and eliminated serious condensation. The scheme was called the Salford Low Energy House (EEO 1987). The results obtained from the constant monitoring of the homes during occupation demonstrated that substantial energy savings were achievable in the domestic sector. The results indicated that a very high satisfaction rate was expressed by the occupiers, who achieved a superior level of thermal comfort at a fraction of the cost incurred by occupants of most other types of dwelling. (EEO 1987, EEO Demonstration Report 1987). The study is of note in that it is one of the first to include users and their usage of energy into the consideration of performance. Previous studies of the technical performance of houses has been limited to static testing of the fabric, ignoring the effects of users on the performance of the building.

In another project undertaken in conjunction with Manchester City Council, BRECSU managed a new build project for the council who required the new homes to be prototypes for further new social housing. One of the main points that was raised by the Council and agreed by BRECSU was that it might not be necessary for the whole house to be heated for it to meet acceptable comfort levels throughout by the use of greater insulation, the cost of which would be offset by the cheaper heating system needed. Ten new homes were built on the site of the Halliwell Lane Estate at Cheetham Hill, with the main features being high standards of insulation, draught proofing and controlled ventilation, no cold bridging and a central boiler with individual control. None of these features were particularly unusual, however when combined they achieved excellent results such as wall U values of $0.27W/m^2K$, roof value, $0.2W/m^2K$, and floors $0.36W/m^2K$. The heating used a simple system of gas fired wall hung boilers. The end result did not differ visually from other conventional new build so there would be no loss of "kerb appeal". The ten homes were compared with a set of houses that had a conventional whole house heating system with a low energy design. The comparison showed that not only did the ten new homes with the extra insulation save a further 13% in energy costs, but that the construction costs of these homes was also lower. The additional cost of insulation amounted to £80 per house whilst the cost of the heating system was £990 cheaper than the conventional system used in the other properties. This gave the ten new homes an overall saving of £910 per home, most importantly the level of comfort was unaffected by the differing construction (Building Today 1989). These houses showed that there was in fact no cost premium to build comfortable low energy houses, which has always been a concern to the commercial housebuilders who envisaged additional costs being met from profits. It does however, raise another issue, touched upon under 'kerb appeal'.

The concept of kerb appeal is extremely important in the commercial housebuilding market, as it will be a major determinant of the price paid for a new dwelling. Consumer behaviour in response to other optimisation aspects of house construction, such as timber cladding, show consumers to be very conservative and traditional in their attitudes and demands. Whether consumers would accept a partially heated dwelling, however comfortable, remains to be tested. It would only be accepted if the attitudes of consumers can be developed to appreciate energy conservation issues in general and the validity of the operation of the house specifically.

In the early 1990's BRECSU, using the data collected from reports such as the Salford low energy home, and other low energy test houses built in estate form, produced a set of initiatives that differed from previous energy saving ideas. These demonstrated that any building could be improved beyond the current Building Regulation standard and achieve savings of up to 30% in running costs by adopting simple and straightforward measures. (BRECSU 1990, Building 1990, Building 1986, Building Services 1988, Building Technical File 1987, Energy Policy 1986, EEO 1990, Everett *et al* 1985, Lowe *et al* 1985, Birtles 1993)

A study of four houses with differing standards of insulation and overall construction costs was made. *House 1* was the simplest of the four and conformed to the 1990 Building Regulations with extra insulation added to the walls, roof and floor. *House 2* used the 'trade off' option possible under the Building Regulations, double-glazing was used, but insulation remained at the

lower level required in the 1985 regulations. *House 3* used advanced energy controls and a boiler with lower running costs. *House 4* was the Building Research Establishment's idea of optimum balance of building cost and performance. The insulation was thicker than specified in the 1990 Regulations, walls had a U-value of $0.3W/m^2K$ instead of the required $0.45W/m^2K$. Double-glazing was used throughout and a thermal storage system was used. Results of the study showed that although *House 1* was the cheapest to construct, it was not the most economical to run over the year, with a total annual fuel cost of £421 (£35 per month). *House 2* had similar fuel costs, but the U value of the walls had been increased to $0.6W/m^2K$ and the overall extra construction costs were £300. Therefore the changes made to *House 2* had no effect on the overall fuel costs.
House 3 had total fuel cost of £351 per year, which, in comparison to *House 1* had an overall saving of £70 per year, (a saving of £5.80 per month). Although this property had a greater construction cost of £350, the amount saved on heating would 'pay back' the additional outlay over a five-year period.
House 4 had a total fuel cost of £192, which gave a saving of £229 per year, in comparison to *House 1.* This saving was substantial, although the additional constructional costs were an extra £1000, the actual initial additional outlay can be recouped in savings in a period of 5 years. (Building 1990).

These findings show that energy efficient homes can be built at a reasonably small additional cost to the housebuilder. However these methods have not been adopted in the market place by the housebuilders who remain sensitive to the market and the absence of a premium for energy efficient houses.

Many of the low energy purpose built housing estates have all worked on similar principles, the incorporation of additional insulation, double glazing, avoiding cold bridging, good site planning and design, solar panels and the inclusion of a highly efficient boiler. The results of these low energy estates can give the occupants substantial energy savings. The savings achieved from the low energy housing in the city of Manchester, another BRECSU & EEO project, offered occupiers a saving of £97 per year, with the 'payback' period being around 2 to 3 years as the additional cost of building the house above conventional standards was around £300 (EEO 1987).

Low energy houses built in South London (BRECSU & EEO), offered occupiers a saving in the region of £137 per year with a 'payback' period of 4.9 years from an additional construction cost of £674.37. (EEO 1990,BRECSU 1980 - 1996). From the body of data available in this field and the substantial amount of research being carried out in the areas of estate design and housing construction, it is evident that energy efficient houses can be produced with only a small increase in construction cost.

A report published in conjunction with BRECSU and the Energy Efficiency Office (EEO March 1996) provided a review of ten ultra-low-energy homes in the UK. This report was primarily targeted at architects, designers and house builders. The main conclusions from the report state that there is now a significant amount of activity in the area of ultra-low-energy homes in Britain. In the preamble to the report, many schemes were recognised; these schemes accounted for over 500 dwellings and showed that high levels of energy efficiency could be achieved using a wide range of construction methods and techniques. The UK schemes underwent monitoring, with the owners monitoring the electricity, gas and other fuel consumption. The performance was found to be not as good as was expected, as only four of the schemes reached the original target of the review. Generally the monitoring discovered that two major factors contributed to the poor performance, high air leakage rates and the poor design or commissioning of heating systems. (EEO 1996).

The research carried out on low energy dwellings has concluded that in the UK, there is a sufficient amount of research on low energy housing to aid energy conservation and provide lower running costs for occupiers. However, homes of this standard are not built en masse for homeowners. Housebuilders are not applying these principles in their new homes, as they feel the house buying public were not concerned with saving energy (Building 1992). Nor is the UK government legislating with sufficient strength to achieve these high energy standards, which is reflected in the amendments to the Building Regulations over the years. The only outcome is that to a certain degree, these types of homes have been adopted to a certain extent, with a slight increase in the area of new build social housing. Here many Local Authorities and Housing Associations look to dwellings such as these, not only for improved maintenance and energy efficiency reasons, but also for the benefits they provide to tenants in the form of reduced running costs, as the provision of affordable heating is an historic issue for both social landlords and tenants.

2.9.2 The Milton Keynes Development Corporation.

More research into energy efficient homes has been carried out by the energy research group of the Open University in collaboration with the Milton Keynes Development Corporation. Two of the most prominent projects undertaken have been the Pennyland project and Linford low energy houses all of which have been built at Milton Keynes. All the homes have been built to high thermal standards to reduce air infiltration, have good potential for solar gain, an extremely efficient space heating system, with the layout and orientation of the homes carefully considered to achieve the best results. (Lowe *et al* 1985, Everett *et al* 1985).

1986 was designated Energy Efficiency Year, the Milton Keynes Development Corporation in conjunction with 32 different housing developers, collaborated to demonstrate how effective modern energy saving measures could be incorporated into modern housing design. This culminated in Energy World, an exhibition of over 50 houses of differing designs using various forms of construction and materials.(Energy World Information Pack 1986).
The majority of the homes exhibited in Energy World were sponsored by large companies such as British Gas, Abbey National, Admiral Homes, Laing Homes, Wimpey Homes, Llewellyn Group and Pilkington Glass insulation. These homes demonstrated high insulation values and excellent potential energy saving for the occupants.

The designs were revolutionary at the time of construction, primarily conventional designs, these properties had high standards of insulation, draught proofing and an efficient space heating system. Site orientation was not extensively mentioned in the literature, however, solar gain was used comprehensively throughout all the designs to reduce heating bills in the winter months.

The buildability of the dwellings and overall construction costs were extremely reasonable, which made the dwellings very marketable. The Milton Keynes Development Corporation made valiant attempts to increase awareness and influence attitudes towards energy conservation using the results from Energy World and Future World, however, these efforts to disseminate information and increase knowledge of energy conservation were not successful. A post project assessment shows that since this development, a number of the large sponsors have not repeated the exercise. This may indicate that these organisations contributed to energy world purely for the immediate kudos and initial advertising value, some may well have used it to test if it would prove a successful business investment. The lack of continued interest or investment in energy efficient housing suggests that the attitude of these corporate investors was short term in this instance. It confirmed the general inertia towards energy conservation that existed and reflected the continued profit related ethos of business at this time. The conclusions and recommendations resulting from these two projects, together with a number of other publicised studies, have been incorporated and used in the development of better energy efficient construction for new domestic housing.

A reason for the general inertia towards energy conservation in new homes, may derive from a lack of public interest in energy efficient dwellings at that time. House builders are sensitive to consumer demand and their likes and dislikes to inform new designs or developments.

As part of the evaluation of these projects, users were surveyed in order to elicit their attitudes towards occupying these dwellings, a rare attempt to link the technological aspects of energy conservation to way in which they are used. A year after the Future World exhibition, a report covering the two sites highlighted the experiences of some of the occupants who lived in the "showcase homes". The report showed mixed results, with some occupants expressing contentment with their dwelling, while others were not as content. The comments reflected the diversity associated with people, such as, the upstairs of the house being too hot, the heat exchanger being noisy, others describe living in the dwelling as like living in an "air bubble" (AJ 1988). The report affirmed that the technological measures to achieve energy conservation were feasible and economically viable, but were not necessarily successful because of the interface with people, the users and how they live in the dwellings. The report recognises the significant influence that users have on the success of energy conservation.

The Futureworld exhibition was widely publicised throughout the building press, and was heralded as the very best in energy efficient homes. However, with the housing market at that time recovering from recession, the actual marketability of the homes could have been vastly improved by better publicity and dissemination of information, however this was not done. There was a lack of published facts and figures available for the general public that would have informed them of such basic information such as, how much money the house would save on fuel bills compared to less energy efficient homes in a comparable price range. In retrospect it appears that another opportunity was missed to improve the public's knowledge and awareness of energy conservation issues in housing, an area already recognised at this time as being deficient. The issue of changing consumer attitudes towards energy efficient houses had yet to be recognised as an issue at this time.

2.9.3 Commercial initiatives in energy efficient housing.

As the issue of energy efficiency has grown in importance, certain house builders have experimented with the production of energy efficient housing. Two notable examples being the Wimpey 'Superspec' house and Barratts 'Oracle' project.

Wimpey Homes worked in conjunction with BRECSU to produce their first low energy home situated in Colchester, which incorporated many energy saving ideas that BRECSU had already proven to be cost effective in housing. The 'Superspec' house achieved excellent U-values that exceeded the 1990 Building Regulations through the incorporation of additional insulation, proven building techniques, and high efficiency space heating. The selling price of the homes was 1.5% more than the same house built to the 1985 Building Regulations, and was expected to be less than 1% of the cost of constructing the house to the 1990 Building Regulations (BRECSU January 1990). Despite these favourable costs, Wimpey shelved their plans to build the homes en masse, because they have determined that the public will not pay the extra few thousand pounds for the energy conserving measures.

Since the launch of the Superspec home, Wimpey has never built the 25 it announced were to be built at the launch of the Superspec. The company state that they had have delayed plans to build the superinsulated houses because the house-buying public were more concerned with how to pay the mortgage than conserving the environment. The company felt that as energy was comparatively cheap, energy conservation could not be seen as a selling point in the immediate future. (Building 1992). This provides direct evidence of the attitude of house builders towards energy conservation in new housing, which is unsurprisingly commercially orientated but essentially correct in its evaluation of consumers' attitudes and purchasing decisions.

The Barratt 'Oracle' project was a joint venture between Seeboard, (a regional electricity supplier) and Barratt homes. The Oracle project was a low energy housing development in Epsom. It boasted excellent U-Values, achieved by the introduction of a comprehensive heat recovery system together with a new technique of constructing the inner blockwork wall. The technique involved using glue to bond the blocks together instead of mortar, as Barratt were aware of the potential heat loss through mortar joints (Heating & Air Conditioning Journal 1989, Building 1989). Following the Oracle project, Barratt went on to produce its first large scale development of low energy housing at Hendon in North London, which incorporated a number of energy saving features such as thick wall insulation, insulated ground floors and thick insulation in the roof space (Building Homes 1990).

Many of the large providers, such as Laing Homes, Crest Homes and Ideal Homes (now Persimmon homes), have all produced low energy designs over the past few years. However, the designs for conventional housing being built at the present time do not achieve a high standard of energy efficiency, but continue to be built to the current Building Regulations for financial reasons. These financial reasons relate to the additional cost of constructing energy efficient houses, which vary from £500 to £5,000 depending on the size and design of house. The additional would impinge directly upon profits. There is little evidence to show that house buyers are willing to pay a premium for energy conservation and that the dwellings could be sold at the higher price. Whilst housebuilders and homeowners may be aware of the issues regarding energy conservation, house buyers are not inclined to pay a premium for energy conservation measures and hence are not conducive to providers offering energy conservation in new homes.

From the review of this type of low energy construction, many aspects of design are covered although the emphasis is definitely on the actual construction of the dwelling rather than the site orientation and planning, although this is usually considered. Research has clearly established the buildability of these dwellings so they can offer good energy saving possibilities with no concern as to the building being difficult to construct (Davies & Pyle 1993). As noted previously, all these designs concentrate on conventional types of building, with little incorporation of any ecological measures (other than "green" materials, e.g. CFC free insulation). The review has also shown that low energy homes are technically possible, but at the present time they are not being built on a large scale in Britain.

The evidence from these studies suggest that despite low energy housing being achievable at a relatively low cost, most house builders are reluctant to build this type of housing on a large scale because of a lack of demand for energy efficient housing on the part of consumers. As a result, housebuilders consider energy efficiency to be a low priority, preferring to remain with more conventional dwelling types and features that meet current Building Regulations, but are marketable to prospective purchasers and more profitable to the housebuilders.

2.10 Government attitudes towards the environment.

The attitudes of various UK governments towards the environment and energy efficiency measures generally, have played an important part in the issue of energy use and conservation in the domestic dwelling sector. It is necessary to investigate and appreciate the development of environmental and energy policy in the UK, and the political considerations that underlie these decisions to place developments in these areas into context. Governments of both main political parties (Conservative and Labour) have held office during the period 1970 to 1996, yet for neither has energy conservation or the larger environmental issues formed a consistent part of their policies. It appears that energy conservation and environmental issues are cyclical, only to be acted upon when they become potent for one reason or another, they appear to sit in the 'can be left alone' category of issues. Governments during this period have undertaken initiatives to reduce energy conservation with varying measures of success.

2.10.1 Energy as a political consideration

Until the 1970's there was a lack of consistent definitive policies in the UK in respect of energy conservation specifically, policies that affected energy in general were usually subsequent to economic or foreign political considerations. Robinson (1993) states that until this time energy policies implemented by the government were largely instant responses to pressing problems that concerned the electorate and were instrumental in 'swaying votes'. Robinson (1993) goes on to suggest that the government of the day reacted to problems with short term political fixes. While governments did not and would never specifically state that their actions were to sway votes, the short term solutions would typically be gathered together to form a white paper or a ministerial speech that would give the appearance at the time to be 'coherent policy' in relation to energy. Energy as an economic factor of production and as a large scale employer was invariably the prime focus of any policies in this regard.

Throughout this period the government was subject to continuous powerful pressure from a variety of vested interest groups. These vested interests included the National Union of Mineworkers (NUM), the National Coal Board (NCB), the Atomic Energy Authority (AEA), the British National Oil Corporation (BNOC), together with pressure from the City of London, all were responsible for exerting pressure on the various governments in an effort to further their own agendas for energy through influencing government policy. In addition to these vested interests, the government of the day was always susceptible to electoral pressure via public opinion.

For the NUM and the NCB the pressure was for the government to continue investment into the 'home' grown coal industry and to effectively attempt to eliminate competition from other sources that were cheaper and bought from overseas. Many governments submitted to this pressure as the organised power of the miners was in some instances too strong to resist.

Government policy towards energy was also influenced by the nuclear power industry. The Atomic Energy Authority (AEA) successfully exerted pressure on the government to invest heavily in nuclear power. The government were receptive to such overtures as they sought an alternative energy source to oil to allay fears of being dependent on imported fuel sources.

The BNOC were also a fairly successful influence of the government for a time, and with the discovery of North Sea oil and gas, the City of London also exerted pressure along with the BNOC, as the potential revenue from parties involved with North Sea oil and gas was speculated to be highly profitable in the future. It was these pressure groups that formed the crux and origin of government activity in the energy markets, which resulted in increased government intervention and protectionist practices over the years (Robinson 1993, Bailey 1977, Toke 1990).

2.10.2 Producer group pressures on energy policy

The policy of protectionism towards the coal industry was a constant feature of the government's energy policy during the post war years. The newly nationalised British coal industry would receive, not surprisingly, strong support from the Labour government who had nationalised the industry. Apart from ideological factors, there were also political and social factors that led to the nationalisation. Economically the coal industry was unprofitable, lacked investment and faced an uncertain future in private hands. Nationalisation occurred at a time during the early post war years when the government embarked upon the reconstruction of the UK and its economy, coal appeared to be the major source of secure energy supplies for the British economy. Politically the Labour government was closely linked to the trade union movement of whom the miners formed an important part. The government was also faced with harsh economic realities, the country was effectively bankrupt following the war, having expended almost all its reserves and a lot beyond. Concerns regarding the balance of payments were very real. The country needed a plentiful source of cheap energy in order to rebuild, coal offered this without having to find foreign exchange to pay for it. For all these reasons, energy policy at this time was driven not by environmental concerns but those of pragmatic realism. Oil was comparatively cheaper than coal at this time and there was a trend from some consumers to move from coal to oil, this was exacerbated as the price of coal increased under intense protectionism. The National Coal Board (NCB) together with the National Union of Mineworkers (NUM) put intense pressure on the government to protect coal from competition from other fuels, which the government largely did.

The NCB and the NUM wanted the government to commit to massive production targets of 200 million tons of coal a year and lobbied hard for a number of years. Governments, both Labour and Conservative were reluctant to commit to a target that was uneconomic, not in the best interests of the country and probably not attainable due to production and geological constraints. Both Labour and Conservative governments provided protection for coal during the period 1945 to 1960's, despite this the production of coal was declining during this period and government found itself protecting the industry in another way through moderating the rate at which output declined and employment decreased. Historically, the miners held great political symbolism, if not significance, in British politics, the Labour party had traditional and very strong links with the miners. Even the Conservative government, who lacked such links to the miners still had to consider the attitudes of this group of workers once in government. Coal remained at the centre of all energy policy.

The continued production problems for coal and the progressive decline in output led to the government signalling the use of oil in power stations in 1954, as at the time the government believed a coal shortage was imminent. By the late 1950's the government reversed the policy because they believed that coal was now superfluous. Coal stocks increased forcing the government to demand a reduction in cheaper imported coal to protect the UK coal industry.

In 1965 and 1967 the government produced two white papers on fuel policy. These papers unintentionally exposed the way in which the government had protected coal from competition by imposing the fuel tax on oil in 1961, which effectively protected coal from oil competition. Similarly in 1968 when production of North

Sea natural gas began, the government once again protected the coal market from competition by not permitting electricity producers to burn more than token volumes of natural gas in power stations (Robinson 1993, Bailey 1977, Toke 1990).

Economic problems in the 1960's followed by high inflation culminated in January 1972, when the NUM voted for an all out strike for higher pay, by the end of January 1973 Britain was suffering power cuts. On the 8th October 1973, after months of power cuts and talks, the Conservative government announced a 7% increase in wages. The wage increase was a concession by the government in the light of the anticipated problems resulting from the crisis caused by the Middle East war and the first indications that Arab producer countries would use oil as a political weapon in the conflict with Israel. The crisis prompted fears over the security of oil supplies, together with a potentially damaging large increase in the price of oil. The coal dispute could not be allowed to continue by the government. Ultimately the dispute with the miners led to the downfall of the Conservative government in the 1974 election, the 'right to govern' election. A Labour government came to power and on the 6th March the NUM agreed terms offered by the government, a settlement of £100 million, twice what the Conservative government had offered (Whitelaw 1989). These events demonstrated the incredible power and influence that this particular group of workers and the coal industry as a whole, exerted on government policy relating to energy. It was only in the 1980's that this was broken.

Throughout the period 1945 to 1980, and to a certain extent the following years, energy, in whichever form, (coal, oil and gas) only came to the fore in government policies or in politics generally when used as a political weapon, as leverage for groups with vested interests or during a crisis. No government of either political party, considered the side effects of energy policy and the effects on the environment. CO_2 emissions from the use of fossil fuels was increasing, but were not at this time considered an important issue.

The Middle East war in the 1970's (the oil crisis) encouraged the more efficient use of energy, but served to emphasise the problem of the cost of fuel rather than environmental issues. This predilection with cost continued to rise steadily and after 1973 and acted as a distraction to the environmental issues that were becoming evident during this same period, but were going largely unnoticed by the general public. The cost of energy and its effect on living standards and industrial competitiveness remained the main consideration of government, rather than the consideration of CO_2 emissions. In short, energy conservation with regard to CO_2 emissions was yet to become a major political consideration.

Throughout the 1950's and 1960's the nuclear power industry had also been exerting pressure on successive governments to influence policy. The Atomic Energy Authority (AEA) relied on the scarcity of information surrounding nuclear power and adopted a policy of 'blinding the government with science' (Robinson 1993). The AEA claimed that Britain had found its new fuel, and would be able to produce fuel 'too cheap to meter' (Robinson 1993), provided the government invested. The case for nuclear power had not been proven on economic or, in some respects, technological grounds at this time, but the government were persuaded and in 1955 the first nuclear power station was announced. Within two years, the programme had tripled in size.

The use of nuclear fuel to generate electricity would reduce CO_2 emissions as it substituted for the coal and oil powered stations that would have been built to meet increased demand, this was a positive side effect. Nuclear power was also seen as a way for Britain to become less dependent on foreign countries for energy. By the late 1960's and early 1970's British energy policy had bifurcated and now had as its primarily objectives maintaining protection of the coal industry and promoting nuclear power. Both these aims it could be argued, were a direct result of the intensive lobbying undertaken by the respective industries both capitalising on the electoral hopes and fears of politicians. The political benefit offered by nuclear power was irresistible, it meant that Britain would no longer be as reliant on other countries for energy, and therefore avoid the position that it found itself in the 1970's oil crisis. The end result of these policies and circumstances was a market where competition between fuels was limited and energy prices were unnecessarily high.

The history of nuclear power has been problematic. The Labour government during the 1960's were keen to try and develop nuclear power using British built technology such as Magnox and the advanced gas cooled reactor (AGR). At a time of severe economic difficulties putting scarce investment into British technology that promised so much could be interpreted to be good for popularity or morale, the British public through its government was 'buying into' something that was British. However problems occurred, the development and application of British technology was causing the construction of the nuclear power programme to fall behind schedule. Difficulties in achieving safety standards were experienced which required greater investment, together with spiralling construction costs and delays in completion. As a solution the AEA sought to buy successful American pressurised water reactor (PWR) technology. Tony Benn, the then Energy Minister, was fervently opposed to this at the time and stated that he would "fight like a tiger against the American light water reactor" (Benn 1998). It is suspected that the rationale behind this, was that if they discarded the British technology and bought from overseas there would be a public outcry at the loss of the significant investment already made into the British technology and the damage it would do to British firms hoping to undertake nuclear business worldwide. As a result of Labour's early enthusiasm to use British nuclear technology, the period of 1974-1983 led to other countries developing their nuclear programmes with far greater success.

Nuclear generated power eventually accounted for about 11% of the total UK generating capacity, but its active development has been curtailed in response to the safety and environmental problems that emerged following the incidents at Three Mile Island and Chernobyl, together with the realisation of the huge costs associated with decommissioning nuclear power stations. As an environmental contributor, nuclear power has had mixed benefits, the reduced amount of CO_2 emissions that would otherwise have been produced, are countered by the on-going contamination problems.

The discovery of gas in the North Sea in 1965 brought a new dimension to the issues and policies of energy. Esso and Shell had found vast reserves of gas in north Holland, whilst drilling in Britain had revealed small amounts on the

Yorkshire coast and concluded that natural gas may be present under the Continental Shelf. Further exploration followed and the first discovery on a commercial scale by BP occurred in December 1965. When it was clear that vast quantities of gas were available the Gas Corporation, and the government, had to decide how it would be used. As an energy policy decision the influence of the environment is unknown, but the effect on the environment can be seen in retrospect. The government decided to use natural gas as a primary fuel available to domestic and industrial consumers rather than restrict its use or supply. This decision required the conversion of the whole distributive network and consumers appliances. In environmental terms, the decision to convert to gas reduced the consumption of coal in the forthcoming years with a consequential reduction in CO_2 emissions. The introduction of natural gas coincided, and probably contributed to the huge increase in the installation of central heating systems in homes, with a consequential greater consumption of fossil fuel and production of CO_2.

Fourteen million customers were converted to natural gas. By the end of 1975 it was in full supply to customers and rapidly became the largest supplier of energy to the domestic sector.

Despite the success, at the end of 1975 British Gas was losing money. In the financial year of 1974 the British Gas Corporation lost £44 million, because of the price contract negotiated in the 1960's, which had been overtaken by inflation. Price increases followed making gas more expensive, yet the losses were not recovered in the 1970's. Only in 1975 did gas move back into profit. In 1976 a further 10% price increase was introduced as a result of the criticism by the coal industry that gas was being sold too cheaply. Subsequent price increases later bought the price of gas into line with the price of coal (Baily 1977). The issue of price within the nationalised gas industry was still being driven by the need to protect coal, even as its use declined. The overall result of the pricing policy on energy, was higher than necessary charges to consumers, which affected living standards and the competitiveness of UK industry.

Perhaps the most significant influence on energy policy was the discovery of oil in the North Sea in the early 1970's. The discovery coincided with rising crude oil prices and increased public awareness of energy due to the oil 'shock' of 1973. Not surprisingly, the coal industry and nuclear power industries mounted a strong defence against the threat posed by domestic oil, demanding continued support from the government.

The lobbying was successful as in 1975 oil taxation was introduced which constituted selective taxation of oil producing companies, this together with two other taxes imposed on oil, meant that revenue from this particular fuel source was very large. Tony Benn, the Energy Minister, revealed royalties from North Sea gas and oil amounted to nearly £67 million, of which £44 million came from North Sea oil.

The timeliness of the discovery of North Sea oil, in the light of the oil crisis was viewed as putting Britain back in business, able to support itself rather than relying on imports. However, the difficulties of exploiting the oil fields together with the prospect that North Sea oil would probably be nationalised by BNOC, slowed down the production of oil which brought oil into perspective for the country (Baily 1977). The situation became clear - although supply was plentiful and may replace imports and leave some for export, it would be expensive, and would therefore not be the energy bonanza that it was once thought to be.

2.10.3 Energy Policy

Cheap energy had been taken for granted by the industrialised world, cheap energy, firstly coal and latterly oil had fuelled the industrial revolution and industrialisation. Only when the price of oil rose dramatically with the 1973 oil crisis did the UK and other industrialised countries realise the significance of these resources. The result was worldwide drive by governments for energy conservation (Pickering & Owen, 1994, Bradshaw & Harris 1983, Anderson 1993). For the first time energy policy was being driven by the need to conserve energy, albeit for political reasons. The UK in common with all other industrialised nations began to examine its use of energy and to seek ways to reduce it, thereby reducing their exposure to volatile suppliers.

In 1974, the government commissioned Central Policy [cc1]PReview produced the first study concerned with how energy conservation could be achieved nationally at that time and for the future. Some of the conclusions from this study still influence and underpin energy policies today.

The study made recommendations in respect of three areas, transport, electricity generation and most importantly the focus of this study, energy use in the home and industry.

Some of the recommendations for home and industry were;

- To regulate the pricing of coal, gas and electricity.
- To raise the standards of insulation in new homes and flats and to introduce other measures in the interests of energy conservation.
- Mechanisms to provide grants to insulate existing homes.
- Provide publicity regarding the financial advantages of building insulation, heating and ventilation control and the true cost of running domestic appliances. Also highlight the relationship between higher room temperatures and higher fuel bills.
- Promotion of more efficient types of lighting.
- The department of energy should bridge the gap between those who know about fuel efficiency and those that need to know. Means should be found to extend the work of consultancy organisations, giving advice on fuel efficiency. (Central Policy Review 1974).

On reflection this study emerged to be one of the most incisive documents addressing the problems of energy conservation and making recommendations to solve them. The study covered a wide range of issues, including the need to win the hearts and minds of the users in order to achieve the energy conservation. It did not however, identify the significance of the hearts and minds approach and little guidance is deducible from the implementation of the recommendations, which promoted energy efficiency under a money saving regime. However, as government policy over the following years demonstrated, these recommendations were not adopted in full, or as it turned out consistently.

No real comprehensive energy efficiency policies existed in the UK until the oil crisis of 1973, the UK then joined the OECD countries engaged in the government promotion of conservation. The government promotion of energy set out to achieve two purposes. Firstly the problems of oil and energy had raised the awareness of consumers (voters) and the government had to be seen to be doing something. Secondly, energy efficiency, particularly for industry, meant that awareness of the quantity of energy used was raised, incentivising users to reduce the amount of energy consumed and thereby reducing the amount of energy to be imported or produced.

Ultimately, the policy had economic objectives, with the price of energy rising, the crux of the scheme was to attempt to make fuel more affordable both for industry and domestic consumers. The 'government promotion of energy' did not make reference to energy efficiency as also contributing to reduced CO_2 emissions. Global warming was still not a political issue.

Tony Benn as Secretary of State for Energy (1975-1979) took the first steps, in 1977, towards the early development of comprehensive energy policy. The Labour government made extensive cuts in other areas of government expenditure and Tony Benn announced a £450 million programme of investment in energy conservation over four years. He suggested that 'energy policy should ensure that everyone can afford heat and light at home' (DOE 1977). He did not mention that this scheme would assist in the reduction of CO_2 emissions. The programme consisted of a massive home insulation scheme, a variety of smaller scale schemes, advice provision, grants and industry demonstration projects (Bradshaw & Harris 1983, Anderson 1993).

This approach ended and was replaced with a new set of agenda's when the Conservative government came to power in 1979. The Conservative government promised to 'uphold free market principles' (Anderson 1993), which in simple terms meant that if investment in energy efficiency was cost-effective then the public and industry would invest in it, a laissez faire approach. This was shrewd politics, as at the time energy prices were still increasing faster than inflation which meant that for industry the idea of 'buying into' energy conservation was immediately advantageous. The rise of fuel prices in 1979 was followed by the government significantly reducing expenditure on energy efficiency, but concurrently witnessing increasing expenditure on energy efficiency by the private sector (Anderson 1993). At this time, the principles of energy efficiency were centred around making energy more affordable, it ignored the global implications of the fuel used such as CO_2 emissions. It is suspected that if energy prices had been falling, the Conservative government may have considered energy efficiency to have even less importance.

The Department of Energy took the view in 1982, that the role of market price determined energy demand and negated the need for separate investment into energy conservation, in simple terms, a 'free market' approach. The simplistic assumption that prices would drive energy use and conservation is in retrospect somewhat naïve, with regard to the complexities of the situation. The free market approach was construed as the downfall for energy efficiency (DOE 1982).

Both David Howell and Nigel Lawson (both Conservative Energy Ministers 1979-1983) were in agreement with free market principles and fully supported the policy. However, when Nigel Lawson was replaced by Peter Walker in 1983, this heralded a new wave of energy efficiency policy and established the Energy Efficiency Office within the Department of Energy. The main goal for this new department was to take the UK to the top of the international energy efficiency league table within five years (Anderson 1983).

The Energy Efficiency Office believed 'that savings of up to 20% were achievable in each sector of the economy by 1995, saving around £1,960 million' (House of Commons 1990). However even at this time energy efficiency was still only seen as a means of saving money on fuel rather than counteracting the problem of global
warming.

To achieve the £1,960 million saving per year, Peter Walker launched a number of policies specifically aimed at industry and commerce, including the provision of grants for homeowners for loft and water tank insulation. These policies and

schemes were mainly aimed at industry and commerce, who were perceived to be the big users of energy and thus where the biggest gains might be made. The schemes included measures such as assistance with energy surveys, demonstration projects, monitoring, research and development and the use of CHP or district heating. Regional energy efficiency officers also provided support for firms.
For domestic consumers, a less comprehensive approach existed. The government organised an energy saver show, which visited around 400 locations in the UK such as shopping centres and home exhibitions, providing information and advice on energy efficiency in the home. Grants were also available to certain homeowners to install loft and hot water tank insulation.

The energy policies of the Thatcher administration (1979-1983) initially appeared to be aimed at a reducing coal production, partly a reflection of the on-going production difficulties and the decline in output, partly economic reflecting the unrealistically high cost of energy. There is also a hint of revenge for the downfall of the Conservative Government in 1974. A programme of pit closures was introduced which met fierce opposition from the coal industry, culminating in the miners strike March 1984 to March 1985. This would be seen as one of the most important influences to affect energy policy. After a violent and prolonged strike, which centred around pay, voluntary redundancies, early retirement and closure of inefficient pits, and which had significant social and political ramifications, the miners gave up and agreed terms with the government. Support for the much reduced coal industry was agreed and coal imports for the generation of electricity were again restricted. The end result of the strike was that the coal industry was no longer the powerful pressure group on government and energy policy that it had been in the past.

In conjunction with the decline in the power of the coal lobby, the nuclear industry was also losing its power as a lobby group. The promises of cheap electricity had not materialised, construction delays, cost overruns and technical problems in the construction of power stations were extensive, to a point where they were no longer regarded as acceptable. During this time, two serious nuclear power station accidents occurred that led to increased awareness of nuclear power and to opposition from the general public, both for the construction of new plants and continued operation of existing ones. In the years prior to these incidents the power these pressure groups exerted on the government and policy was marginal, which resulted in little incentive for government to take these views into consideration. What was emerging from these developments was an awareness of the environment and environmental issues and their relationship to energy.

Another policy shift took place in 1987, when Cecil Parkinson replaced Peter Walker as Secretary of State for Energy. Cecil Parkinson was significantly less concerned about the energy problems than his predecessor and returned to a 'market forces approach'. Government expenditure on energy efficiency initiatives was cut and the budget for the Energy Efficiency Office was almost halved. The government energy saving campaigns to promote energy saving were finally halted in 1988. Demonstration schemes were stopped and home insulation grants were massively reduced, together with much of the community insulation projects. This demonstrated a clear lack of commitment by the government with regard to energy conservation. The oil crisis was over, Britain's need for energy had stabilised and fuel prices had been balanced out. The government saw no obvious need to continue promoting the benefits of saving energy now that Britain was less dependent on other countries for energy and the issue of energy was no longer as potent with the electorate. Energy conservation could again be put on the 'no need to act' shelf of issues.

The privatisation of the electricity and gas industries by the Thatcher government promised to liberate producers and revolutionise the energy market. The protective policies towards home industries for so long the core of energy policy was to end and competition in the energy markets allowed to develop. Margaret Thatcher (1993) describes privatisation as 'one of the central means of reversing the corrosive and corrupting effects of socialism'. The move towards privatisation was undertaken mainly for political dogma, and for the development of healthy competition between fuels which would benefit consumers.

In reality, the privatisation of gas and electricity presented very little competition in the market, as the privatisation merely transferred ownership from the public sector to the private sector, effectively continuing the monopoly of supply that had always existed. It is apparent that government policy had not been directed to the welfare of the consumers initially i.e. the general public, or for the reduction of CO_2 emissions but towards investors. It is this fact that is crucial - if the general public had been a driving force in demanding cheap energy, then energy policy in Britain would have been considerably less protectionist and competition would have occurred in the market place decades earlier.

Cecil Parkinson's main concern was clearly the privatisation of the electricity industry, not the continuation of Peter Walkers commitment to energy conservation. Consideration of energy efficiency and the environmental issues were not a major concern in the formulation of the Electricity Bill to privatise the electricity industry. In 1989, the government attempted to introduce an amendment to the bill for the purpose of encouraging electricity suppliers to promote energy efficiency, (although it is suspected that the government were only paying lip service to this issue), the government were defeated in the House of Lords. When the Bill was finally passed two months later, it contained an insubstantial provision on energy efficiency, which allowed the Director General to promote energy efficiency through information and target setting. It is likely that privatisation would make the implementation of energy conservation even more difficult, getting nationalised industries to comply with any such requirements would be comparatively easier than trying to get a disparate number of private companies to do the same.

Ironically, as a result of a quirk of privatisation, many smaller firms were encouraged to use more electricity in order to qualify for the 10-25% discounts that applied to large users. Such anecdotes serve to confirm the absence of any significant consideration of environmental considerations in the privatisation policy, they also serve to demonstrate the increased need to consider CO_2 emissions.

Despite Cecil Parkinson's policies, which reduced investment into energy efficiency, part of the 'Thatcher Agenda' was touted as a 'green agenda', notable because it was the first time such issues emerged into mainstream politics. In 1988 Margaret Thatcher drew attention to the greenhouse effect and stated categorically that the UK could not afford to ignore the consequences of CO_2 emissions, and that energy efficiency was crucial. Only now, in 1988, was the problem of global warming and CO_2 emissions realised and acknowledged. The speech ignited the drive for energy efficiency, for the first time energy conservation was not only seen as a means of saving money, which had been the historical view, but as a means of 'saving the planet' (Anderson 1993).

This was perhaps, the crucial turning point for energy conservation and CO_2 emissions in government thinking and policy. The UK government had finally accepted the need to reduce energy to save the environment and not just as a mechanism to save money on fuel or reduce dependence on other countries.

In July 1989, Chris Patten became Secretary of State for the Environment with orders from Margaret Thatcher to pursue energy efficiency as part of the green agenda. Cecil Parkinson was replaced by John Wakehan who did not appear to have any specific personal agendas regarding energy efficiency, but instead demonstrated an unwavering competence in supporting government policy on energy efficiency, similar to Peter Walkers commitment earlier. Resulting from this, in 1990 the Building Regulations were amended, (discussed in earlier in this chapter) furthering the government's commitment to energy conservation. However, in comparison to other countries the UK remained a long way behind in the energy efficiency stakes. Friends of the Earth compared the changes to the Building Regulations to 'approximately the standard in Sweden in the 1930's (Friends of the Earth 1990).

In May 1990, the House of Commons Public Accounts Committee produced a report that mainly criticised Cecil Parkinson's policies with respect to energy. The report suggested that funding for the Energy Efficiency Office should be increased, rather than the reduction that was being proposed. The report also criticised the lack of communication between other government departments (outside the Department of Energy) and suggested that these departments had been setting a bad example for the nation in their policies affecting the consumption of energy.

In 1990, the first catalyst for energy efficiency in the UK appeared from the government in the form of a White Paper - This Common Inheritance. This was perhaps the most comprehensive government response to environmental problems since the oil crisis of the 1970's. The paper covered a variety of issues of environmental concern, but perhaps most importantly advocated that energy efficiency improvements were the cheapest and quickest way of combating the threat of global warming. (DOE 1990 b, DOE Summary Paper 1990 a). The paper also advocated that if more information was given to consumers of energy it would help them make better choices as consumers, investors and voters.

The paper covered many aspects of the environment, including specific information relating to the construction industry and consumers.

This effort by the government was primarily concerned with changing the attitudes of consumers in the hope that this would raise awareness of energy conservation. It recognised the contribution that the users of energy would make to its conservation, however, the strategy was largely 'passive', placing the emphasis on consumers to find out more and educate themselves, rather than the government educating the consumers.

The government attempted to make improved access to information an integral part of policies towards the environment. Britain's strategy for tackling global warming was dependent on the general public taking action to use energy more efficiently. The government wanted to influence attitudes to housing and energy conservation and proposed to do this by;

- Encouraging greater energy efficiency and step up the work of the Energy Efficiency Office; and cut the energy bill of the government estate;
- Promote combined heat and power schemes;
- Monitor the toughened energy efficiency standards for new buildings to see how they might be further strengthened;
- Encouraging energy labelling of houses and of appliances such as washing machines, boilers and fridge's;
- Promote the use of energy efficient lighting; and Press for new minimum efficiency standards across Europe ((DOE 1990 b, DOE Summary Paper 1990 a).

Despite this paper being the boldest move by the government since the oil crisis, it was still heavily criticised because of its timing, critics stated that they thought this paper should have come 5 years earlier, and not directly prior to a general election. (Financial Times 1990). Criticism also existed in the timing of the goals that the UK government had set out in the white paper, it had set the target for stabilising emissions in the UK to be achieved by 2005, five years later than the European Community (Daily Telegraph 1990). Subsequently, the target was reduced to the year 2000, but no policy changes were announced in conjunction with the change to facilitate the target to be met.

Developed from the Earth Summit, the document 'Sustainable Development - The UK Strategy', (DOE 1994 a) looks at the challenges the UK will face over the next 20 years.

There are some areas where considerable progress has already been made, others where the debate is only just beginning.

With regard to the construction of the built environment, there are many points that this document addresses, namely;

a sustainable framework, where the aims are to refurbish, adapt and reuse existing buildings; to design and build new buildings that can be adapted to different uses, (thereby extending their lifetime with multi-use) as much as possible. To use recycled components and materials, or those from sustainable sources and minimise energy needed to operate a building. With regard to trends, the UK strategy shows that there has been an improvement in the energy efficiency of buildings, driven by meeting the requirements of the Building Regulations, plus a basic recognition of the environmental and financial benefits of reduced energy use, and an improvement in the technology and techniques to achieve the energy savings.

Technology was also improving the ability of designers and constructors to use sustainable and recycled components, and to reuse and recycle construction waste. These aims may be attainable particularly for commercial buildings and dwellings at the high end of the market, however, this was not the case for the majority of housing. The opinion of the housebuilders showed no interest from potential purchasers in recycled components or low energy construction in general.

Practices such as energy efficiency, recycling and use of sustainable materials and products, needed to become inherent parts of the design and construction process and, in some cases, replacing existing traditional construction techniques and practices for significant energy savings to be made.

Current responses to the problems highlighted by the report were research and development activities that continued into energy efficiency techniques, technology and best practice. Research was also being undertaken into recycling opportunities. Training and career development programmes for building professionals were increasingly incorporating the principles and practice of environmental sustainability, although further progress in this area was considered desirable.

The way forward was considered to be improved standards of thermal performance of buildings planned under the Building Regulations. Further initiatives were needed between the government and the industry to bring forward ways of increasing recycling and minimising waste in the construction process.

The government also declared its intent to work with the other members of the European Union to set up systems for energy labelling of electrical appliances and boilers, fridges and heating equipment for industry (Anderson 1993, DOE 1990, DOE Summary Paper 1990 a).

In April 1992, the responsibility for the Energy Efficiency Office (EEO), was transferred to the Department of the Environment. The EEO was tasked with promoting energy efficiency generally and was intended to play a catalyst role in energy conservation, a point encapsulated in the mission statement for the EEO;

"Our mission is to protect the environment, and save money, by encouraging better management methods and by promoting the cost effective use of energy in all locations.

To achieve our mission, we use, publicity to raise awareness, strategic dialogue with industry and consumers, technical advice to overcome barriers to action, financial and other incentives where funds are available, simulation of innovation and new technology and legislation.

We are major contributors to the achievement of the government's CO_2 target" (DOE 1994 b, DOE 1994 a).

This provides a clear indication of the shift in attitude towards energy conservation by the government, where the primary aim now appears to be to influence attitudes towards energy conservation, rather than other measures and to do this through a series of campaigns. It can be postulated that this mission statement was in part a direct result of analysing the success of government energy saving campaigns since the 1970's. It is suspected that the government have concluded that the only way to achieve a reduction in CO_2 emissions is to educate the people who will have to pay for this reduction by improving the efficiency of their home - the householders (users). The budget for this campaign was set at £14.5 million over three years.

The EEO directed its efforts through a widespread advertising campaign consisting of advertisements on television and radio, as well as in the press, aimed at raising the awareness of the population and industry, towards energy efficiency measures and behaviour, especially the effect that these have upon environmental problems.

In 1993, the Environment Committee produced its fourth report on Energy Efficiency in Buildings, (DOE 1994 a), this contained a number of principal recommendations relevant to the construction industry. These recommendations were very influential with regard to the built environment and covered many areas such as; the imposition of VAT on fuel for domestic heating and power. Requiring the government to balance shorter-term compensation schemes with longer-term investment programmes to improve energy efficiency of low income groups.
Another recommendation was that the government should consider increasing and extending the Home Energy Efficiency Scheme (HEES) to include a wider range of insulation and other measures more appropriate to the individual needs of eligible properties and individuals. This has in practice worked, but only to a very small extent with some families claiming the funds available for the inclusion of energy measures, however there is still a large group of the population that are unaware of the initiatives under this scheme, which restricted its success. This point illustrates the importance of users in energy conservation and the need to educate their attitudes towards it.

The introduction of the energy labelling of buildings was considered by the Environment Committee, as a mandatory scheme for home energy labels introduced at the point of sale or at the point of major renovation. It was also recommended that the government discuss with the Council of Mortgage Lenders a means of taking into account the energy efficiency of dwellings in their lending policies. As yet neither of these schemes have been operationalised, they provide another indicator of the complexity and difficulty of implementing energy conservation measures other than by legislation, and at this time of the government's inertia towards imposing energy conservation.

It was recommended that the Building Regulations be revised in order to raise the standard of energy efficiency for new build properties. The rationale was that if opportunities are missed now to improve the energy efficiency of new buildings, then it will be more costly to retrofit them later. It would also leave a legacy of energy inefficient housing stock for the future, which in turn will lead to the government having to invest a greater amount in these properties to raise the standard when they eventually become problematic. To a certain extent, the Building Regulations were revised to improve energy efficiency, with the introduction of mandatory SAP rating for all dwellings, with effect from July 1995. The introduction of a statutory SAP rating did nothing to influence the attitudes of homeowners or housebuilders towards energy conservation measures in homes. Housebuilders viewed the changes negatively as they would ultimately affect profits and therefore continued to build dwellings that conformed to the very minimum energy standards allowed (Building Services 1994, New Builder 1994).

A significant Act with regard to energy conservation in domestic dwellings was the Home Energy Conservation Act 1996. This Act was an attempt by the government to recognise the inadequate information that existed regarding the energy efficiency of the entire housing stock. The Act would exceed the information collected and held by the Department of the Environment, which had traditionally used only a representative sample of the housing stock in the UK. The Act required every local authority to conduct an energy profile of the housing in its area, both public and privately owned. On the basis of the data collected, local energy conservation plans were to be drawn up and an estimate made of the cost of achieving energy savings of 10%, 20% and 30%. The Act also required Local Authorities to identify the measures required to achieve these reductions and the resultant CO_2 emission reduction and fuel bill savings these would produce (Inside Housing 1996, Energy In Buildings & Industry 1994, DOE 1996). In practice this worked well, with many Local Authorities now embarked on schemes of mass energy efficiency improvements to their housing stock to achieve the necessary emission reductions.

This Act and its subsequent implementation have produced clear evidence that meaningful reductions in energy use can be achieved by compulsion through legislation. The political implications of this for future governments attempting to achieve reduced CO_2 emissions are enormous. Governments will consider very carefully the effects on the electorate of compelling them to spend considerable sums of money on measures that, currently, they do not accept the value of.

Anderson (1993) in his assessment of energy strategies in the UK, concludes that energy efficiency has never played a key role in UK energy policies for a number of reasons. These reasons are firstly, that the UK has large energy reserves of its own, which as a result negates the need to import energy supplies compared with many other countries. Consequently the drive for energy efficiency to reduce dependence on imports is weaker in the UK. The other reasons which are essentially political, are the 'free market' concepts favoured through the Thatcher government which mitigated against political intervention in the market to promote energy efficiency. The only exception being the promotion of information on energy efficiency. The final reason that Anderson cites is the weakness of green politics in the UK. If the green political parties in the UK had been as influential and powerful as some of the producer groups have been over the years, UK energy policy would be radically different.

2.11 Effectiveness of government initiatives aimed at reducing energy use.

In conjunction with energy policies and changes in legislation, the government has also attempted to promote the voluntary saving of energy in the home using a variety of campaigns.

2.11.1 Government energy saving campaigns

The first such programme that the government implemented to promote reduced energy consumption, was called *'Save it'*, implemented in 1975. The scheme aimed to promote efficiency and economy in the use of energy, in an attempt to secure an immediate reduction in energy consumption. The scheme also sought to achieve longer-term changes in public attitudes and habits that would produce a continuing saving of energy. This was the first time that the government had attempted to influence attitudes to energy. The campaign set out to provide a range of information showing how energy use could be reduced in the home, to reinforce these advantages the scheme also included persuasive descriptions of the consequences of high-energy use. The information was provided through television, newspapers and other media. In the first year of the scheme £3 Million was spent on advertising, less in the second year when advertising was concentrated during the heating season.

An evaluation of the campaign by Phillips and Nelson (1976) using attitudinal research, found that generally amongst householders, the desire to save money was the prime motivator to save energy. However, almost no-one was prepared to sacrifice their standards of comfort to save money. The study drew three main conclusions, firstly that householders believed there was no apparent crisis with regard to energy, secondly that the government and industry wasted more energy than householders and finally, there was a general lack of public knowledge regarding how to save energy.

Phillips and Nelson (1976) also found that there had been a small but significant increase in the installation of various types of insulation. Interestingly, improvements had also been made in the behaviour of householders, with the main change in behaviour being householders switching off lights and rationalising their use of heating and hot water (Ellis and Gaskill, 1978, Phillips and Nelson, 1976).

Research by Williams (1983) concluded that although the campaign was effective in making people aware of energy measures, the message was not selfperpetuating or long-lasting, which was evidenced by a decline in the intent to install measures during the periods when the campaign was not in operation. Additionally, the campaign was also found to have the most effect on householders in the higher income brackets. William's (1983) also concluded that publicity alone was not sufficient to persuade the majority of householders to insulate their homes, and that to succeed, more positive action would be required (Williams 1983, Salvage 1993).

A subsequent scheme was implemented by the government in 1978 to specifically promote increased insulation, the *Home Insulation Scheme* was introduced under the Homes Insulation Act 1978. The Homes Insulation Act gave the Secretary of State for the Environment general powers to prepare schemes under which Local Authorities could make grants towards the cost of insulating homes in their area (Salvage 1993). The largest scheme, introduced in September 1978, covered loft insulation and tank lagging, grants were available, subject to meeting certain conditions, to cover up to 66% of the cost if installing these measures. The scheme was later re-assessed and two subsequent schemes were introduced, from 1980 pensioners could obtain grants to cover up to 90% of the cost of the required work, and subsequently in January 1982, disabled people on a Mobility or Attendance Allowance qualified for grants at the same level. These schemes failed to achieve their original objective, to insulate around half a million homes within a ten year period. An interim review of the campaign, released in 1980, discovered that a disproportionately high number of grants were issued to 'better-off' households, whilst large numbers of low income families, including pensioners and tenants, had not applied for them, either because they felt their landlords would not approve or that they were not entitled. Research undertaken by the National Consumer Council (1980), found that even with the major proportion of the costs met by a grant, low income householders were still unable to afford the work. This suggested that householders in low income brackets had very short term priorities and energy efficient measures were not considered a priority.

The same study also postulated reasons why the uptake of the grants were low. The reasons were primarily considered to be,

- Apathy on the part of the householder,
- Energy being a low priority for those on lower incomes as insulation does not result in cash savings,
- The administration of a grant being unappealing (paperwork and organisation of the work).
- Alack of incentives for landlords and private tenants,
- No visible improvement (unlike double glazing),
- Doubts about the benefits of insulation which can be attributed to a lack of knowledge (National Consumer Council, 1980).

These reasons provide an interesting insight into the attitude towards energy use and conservation held by householders at the time.

Following on from the Home Insulation Scheme, the *'monergy'* scheme was introduced by the government in 1986, with the stated aim to encourage consumers to be more energy efficient, with £14 million being spent on the campaign. The effectiveness of the campaign did suggest a small reduction in energy usage had been achieved, with a 5% increase in sales of energy efficient products being recorded after the completion of the campaign (Harkness 1995). It is difficult to postulate whether this campaign had any impact on changing the attitudes and behaviour of householders towards energy usage in the home, due to a lack of published information and the government's reticence to disclose any information relating to the success or failure of the scheme. It can be postulated though, that this scheme did appear to have a short term effect on the uptake of energy efficient products, but due to the a lack of published information regarding the long term effects of the campaign it is difficult to speculate on its success in increasing the awareness of energy efficiency of householders.

In 1988, the government relieved Local Authorities of the responsibility for home insulation grants, implementation being passed to HEES, (Home Energy Efficiency Scheme) operated by the Department of the Environment (Bradshaw & Harris 1983). Government expenditure on HEES, rose from £35 million per annum in 1993 to £70 million per annum in 1994. In the budget of November 1994, a further £10 million per annum were allocated to HEES, and a month later, a further £20 million per annum giving a total of £100 million per annum. These sums are significant with respect to energy efficiency measures and serve to demonstrate the commitment of the government to reduce energy use and CO_2 emissions. However, in November 1995 the Chancellor announced a cut of £31 million per annum to the budget with immediate effect. It was estimated that the implications of this cut would result in 200,000 fewer homes being insulated and/or draught proofed each year (Inside Housing 1996). In the budget of November 1996 the Chancellor stabilised the position, announcing a budget of £75 million for the HEES scheme, for each of the following years of 1997 and 1998 (Inside Housing 1996). Although the number of lofts, tanks and pipes insulated during this period increased, HEES can be attributed with having had only a minimal influence on the practices and little or no influence on changing attitudes of householders towards energy use. This is largely due to the restrictions preventing anyone other than pensioners and low income households benefiting from the scheme. Additionally the campaign appeared to be focused more on providing a financial incentive rather than changing the attitudes and awareness of householders.

The *'Helping the Earth Begins At Home'* campaign began in 1991 and ran for a period of three years, concluding at the end of March 1994 (Harkness 1995).
An interim review of the *'Helping the Earth Begins At Home'* campaign concluded that it was successful in increasing the importance of global warming and the environmental agenda to the public, promoting the concept as a priority. The review suggested that the campaign was successful in increasing the awareness of the link between global warming and home energy use. There was also a general acceptance by the public that energy efficiency improvements can help reduce global warming. The campaign was found to be communicating a greater acceptance of personal responsibility for the use of energy and the relevance of altering personal action with regard to energy use. (Criswick 1993). However, only very small 'improvements' in energy efficient *action* were noted and it was not clear whether or not this was attributable to the campaign. It was also recommended at this stage that there was a greater need to secure significant changes in householders' behaviour and attitudes and it was recommended that a greater set of motivators were needed in the campaign. Accepting that this report was produced by the campaign internally and the claims of the interim conclusions may be questionable, their general intentions remain valid.

A subsequent campaign began in 1994 entitled *'Wasting Energy Costs The Earth'* whose aim was to promote awareness of energy efficiency and the link with global problems. This was an attempt by the government to influence the public by making them realise the link between energy saving in the home and environmental problems. It is also likely that the government had now realised that its CO_2 targets, committed to in Rio, were unlikely to be met unless energy use in the domestic housing sector was addressed.

The *'Wasting Energy Costs The Earth'* campaign consisted mainly of free publications with advice on making homes more energy efficient, plus information on heating, insulation and saving energy in the home.
One initiative was the use of voucher booklets, which offered the recipient a percentage saving on insulation products or energy saving light bulbs. This, along with a questionnaire booklet for homeowners to complete the details of their properties and then return to the EEO, from whom they would receive a breakdown of the measures needed to improve the efficiency of their dwelling and general advice, were found to have the highest uptake figures from the public. (Harkness 1995, Criswick 1993).

Figures obtained from the EEO showed the uptake of these vouchers and questionnaires to be popular with the public. However, there was no evidence that actually confirmed whether the information or vouchers were used by the public, or whether they provided a catalyst for change in public attitude. In addition there was no available information either in a published form, or forthcoming from the EEO regarding the effectiveness and general performance of this campaign.

In general, government campaigns have been largely unsuccessful over the years. Initially the intention was to promote insulation in the home, it was only in later years that the government realised that to do this the attitudes of householders had to be changed to be more receptive, even proactive. Later campaigns included aims to change the attitudes and awareness of householders, but the true effectiveness of these campaigns were negligible. This was partly due to the lack of any published information on their success and partly because there are still a large number of householders in Britain that do not know how to save energy (Phillips and Nelson (1976).

2.11.2 Effectiveness of UK polices

Anderson (1993) categorically states that 'The promotion of energy efficiency has never played a central role in UK energy policy'. History has proved this to such an extent that the UK is still striving to commit to CO_2 reductions that are a result of problems first identified in the early 1970's.

The government have used publicity campaigns in an attempt to draw the attention of the public to energy conservation in general, but these have been largely concerned with saving money or more affordable fuel costs, rather than energy efficiency to reduce CO_2 emissions. Government's have also tried to make available more information regarding costs, technologies and standards, together with information on electrical appliances and cars, but once again these were tailored with saving money as the primary benefit rather than highlighting environmental issues.

In 1987, the OECD carried out a study of the effectiveness of publicity and information campaigns. The conclusions were favourable, but stressed the advantages of tailoring the information provided to particular industries and groups of consumers. Evidence to test this in the UK has been limited although there are examples of government publicity campaigns having been abandoned because of ineffectiveness such as the 'lift a finger campaign' in 1984.

With regard to energy standards for buildings, as these are regarded as minimum standards they fail to provide any incentive to exceed, something the housebuilders have been inclined to capitalise on, constructing to the minimum standard whilst at the same time convincing customers that they are exceeding regulations. These minimum standards are prone to become maximum standards unless there is a consistent policy of incremental improvement of the standards, especially as new technologies and products are developed.

Research and development have been taking place over the years, aimed towards producing best practice technologies for conservation. In addition, social science research has also been carried out regarding consumer behaviour and the factors affecting it, however, there is little evidence to demonstrate that this research has had any significant impact or influence of governmental energy policy.

The OECD/IEA (International Energy Agency) reviewed the effectiveness of energy policies. Generally, their conclusions are that on the whole the various energy policies reviewed have been 'worth while' when comparing the cost of the policy to the government with the benefits in terms of energy saved. However, Anderson (1993) states that these conclusions would be greatly reinforced if environmental impact were also taken into account.

Anderson (1993) also suggests that the effectiveness of a policy is dependent on that policy being combined with another policy, such as a publicity campaign, to inform people of the existence of the scheme. In the case of domestic consumers it is exactly this approach that should be pursued rather than the unitarist approach to date. An individual policy alone is not sufficient to influence everyone - a variety of approaches is necessary. A mix of policies has been shown to be best, energy is consumed in a variety of different ways by a variety of different consumers, therefore, one type of policy on its own will not sufficiently influence everyone concerned. Different policies in conjunction with one another will form a holistic approach that is likely to reach each type of consumer. The scale of policies is also of importance, perhaps as much as the actual policy itself, governments should not be debating which policy is the best, but which policies will be implemented on a larger continuing scale.

Considering the efficacy of the UK governments policies throughout the 1970's and 1980's, it becomes apparent that they were not designed or equipped to deal with the scale of the problem of energy conservation in the context that it moved to in the late 1980's and early 1990's. In the earlier years energy conservation was seen as a forum to use energy more efficiently to reduce Britain's dependence on the Middle East and then primarily as a means for industry, commerce and householders to save money, reduce the balance of payments and reduce the need for generating capacity. Climate change, especially the greenhouse effect introduced an urgency to energy conservation, taking on a grave significance in the event of the failure of government policy.

2.12 Attitudes and perceptions towards energy.

Initially, the emphasis of research into energy consumption in buildings has been almost exclusively based on models based on factors such as the physical parameters of floor area, insulation levels, ventilation rates and heating appliance efficiencies (Oseland & Humphreys 1994, Ellis & Gaskill 1978). These studies were used to try and collectively forecast the energy requirements for certain types of building and to highlight ways in which these requirements could be reduced, with the ultimate aim of stimulating the technology and/or products to achieve the reductions.

2.12.1 Emergence of user attitude as a factor.

Following the oil crisis of the 1970's, with its consequential increase in fuel prices and perceived shortage of primary energy, firmly established the focus of research on to the reduction of energy consumption. Particular emphasis was placed on assessing the effectiveness of insulation materials, which eventually led to extensive field testing of physical models on occupied buildings. One result emerging from many of these field tests, was that the majority of unexplained variances in energy use and general consumption between similar buildings were due to consumer behaviour. This was the first reported recognition of the importance that attitudes and behaviour by users have in energy conservation.

In a landmark study, Ellis and Gaskill (1978) concluded that there were three reasons why the significance of user behaviour had not been investigated previously. Firstly, before the mid 1970's, there was no urgency to improve the models used for formulating conservation policies, secondly, the testing of the models was invariably carried out on unoccupied prototype buildings where user influence could be eliminated as a factor, and finally, it was assumed that the effect of user behaviour would be minimal, or at least uniform.

The study highlighted research carried out in the field of social science relating to individual energy users, the evidence from these studies suggested that improving thermal insulation standards in dwellings had a varying effect on different categories of user. It was found that higher levels of insulation produced a disproportionally greater reduction in energy consumption for high-energy users than for low energy users. It was also suggested by Ellis and Gaskill (1978) that an interrelationship exists between buildings and their users, which is both interactive and complex.

Other research (Lipsey 1977) showed a clear relationship existed between the likelihood of a person adopting energy conservation measures and the level of education that they possessed. In essence, the more educated the person the more likely they would be to conserve. However the relationship with income level was less defined. A number of studies highlighted by Ellis and Gaskill (1978), concurred that lower income groupings were less likely to conserve, but a discrepancy existed as to whether higher income groups would actually be more inclined to save, in spite of the fact that they are more able to conserve. Ellis and Gaskill (1978), also showed younger age groups were more likely to accept conservation policies than older age groups.

2.12.2 Information Provision and Consumer Behaviour

The issue of persuading Users (homeowners) to adopt energy conservation measures is closely related, if not directly influenced by the psychology of consumer behaviour and the extensive literature and research associated with it, particularly with regard to influencing consumer decisions and attitudes relating to purchasers.

Studies of consumer behaviour concentrate on how individual's make decisions to spend their resources, which could be time, money or effort on consumption related items. This involves what they may buy, when they may buy it, where they might buy it and how often they buy it. (Shiffman & Kanuk 2000). For users (homeowners) to improve the energy efficiency of their home or change the way they use energy in the home, they must consciously choose to do it, which will involve a change in attitude, belief or decision making. Cognitive marketing strategies aim to change beliefs and attitudes to create a want or need for a product.

Peter, Olson & Grunert (1999) define consumer behaviour as `the dynamic interaction of affect and cognition, behaviour and environmental events by which human beings conduct the exchange aspects of their lives`. They further state that there are at least three important ideas in this definition: 1) consumer behaviour is dynamic 2) that it involves interaction between affect and cognition, behaviour and environmental events and 3) it involves exchange.

2.12.3 Consumer behaviour is dynamic

The implications that consumer behaviour is dynamic is that individuals, consumer groups and society itself change and evolve over time. This means, quite crucially that a particular marketing strategy implemented one year for example, would not be as effective the following year, mainly due to the evolving changes in the consumer group (Peter, Olson & Grunert, 1999). In practice, this means that particular attention needs to be paid to marketing strategies that operate over a long period of time, and how these strategies would consistently appeal to the public over this period. A powerful example of changing and evolving public information campaigns are the drink driving campaigns over the last decade. These campaigns have become significantly more 'hard hitting' and graphic over the years, driving the point home to the public, they have also kept in line with the changing composition of the driving population which has also evolved. In most recent years, many of the campaigns have shown younger people in the advertisements, reflecting a higher proportion of younger drivers on the road that are considered to be more prone to drink driving.

2.12.4 Interaction

Secondly consumer behaviour involves interaction between affect, cognition, behaviour and environmental events. Simply, in order to understand consumers it is essential to understand what consumers think, feel, what they do and the things and places that may influence (Peter, Olson & Grunert 1999). It is suggested by Peter, Olson & Grunert (1999) that these elements are crucial to developing a complete understanding of consumers and selecting strategies to influence them. These three elements are:

- Consumer affect and cognition
- Consumer overt behaviour
- Consumer environments

Consumer affect and cognition are two types of mental response that consumers have to stimuli and events in their environment. Affect is concerned with consumers feelings about stimuli and events, in simple terms, whether they like or dislike a product. Affect can vary in intensity as it is largely based on emotion and feelings. In practice marketers develop a positive effect for their products to increase the chances that consumers will buy them. Because people experience affect in their bodies, affect is part of the person at the time that they experience it. The implications of affect with regard to a product, shopping environment or a marketing campaign are straightforward. For example, a person could be in a crowded busy shop and experience frustration particularly if they are looking to specifically purchase a certain product and are unable to locate it. They may approach a sales person for help who is consequently rude to them. This person will then not only experience the emotion of frustration, but may also then be angry with the sales person. As a result of these factors the process of affect will then mean that the person becomes agitated and will most likely leave the shop, without purchasing the intended item.

Another example of the process of affect may be that an advertisement is seen on the television and the person in the advert is someone that irritates and annoys the viewer. In this instance it is most likely that the message of the campaign will not be fully recognised by the viewer as they are too pre-occupied with being annoyed at the person in the advert. The implications of dealing with emotions when attempting to implement a marketing strategy is to select material in the campaign that will create a positive 'affect' rather than a negative one.

Cognition refers to the process of thinking, understanding and interpreting stimuli and events. As a mental state, cognitions are not felt in the body. Cognition includes knowledge, meanings and beliefs that consumers have developed and stored in memories. While many aspects of cognition are a conscious thought process, others are sub conscious and automatic. The main components of cognition are;

1) Understanding – interpreting or determining the meanings of specific aspects of one's environment.
2) Evaluating – Judging whether an aspect of the environment, or one's own behaviour is good or bad, positive or negative, favourable or unfavourable.
3) Planning – Determining how to solve a problem or reach a goal.
4) Deciding – Comparing alternative solutions to a problem in terms of their relevant characteristics and seeking the best alternative.
5) Thinking – The cognitive activity that occurs during all of these processes.

One of the main functions of the cognitive system is to make sense of, and understand aspects of personal experience. The cognitive system creates symbolic, subjective meanings that represent our personal interpretations of the stimuli that are encountered. The second function of the cognitive system is to process (or think about) these interpretations or meanings when carrying out cognitive tasks such as identifying goals and objectives, developing and evaluating alternative courses of action to meet those goals, choosing the action and carrying out that behaviour. Generally, the amount and intensity of cognitive processes varies extensively across products, consumers and situations. However, consumers are not always engaged in extensive cognitive activity, in many instances behaviours and purchase decisions involve minimal cognitive processing (Peter, Olson & Grunert 1999).

Other aspects of cognition include personality, attitude and motivation (Christopher & McDonald 1995). Personality influences decision making and attitudes, the types of personality include compliants, aggressives and detacheds. Compliants being defined as those who like to be needed and appreciated; they seek to avoid conflict and are unlikely to upset others; they are loving and unselfish. Aggresives are defined as believing in survival of the fittest; they need to be the best and to achieve recognition even if they have to exploit others to do so. Detacheds tend to be self-sufficient and private; they want minimal interference from others and place high value on their independence. The extent to which purchasing behaviour is influenced by personality is still not clearly understood (Christopher & McDonald 1995). Work undertaken by Everett Rogers

(1962) investigated how personality type might influence a person's readiness to buy a new product or service. The study identified five types of personality; innovators, early adopters, early majority, late majority, late adopters. In simple terms, the innovators being the first to buy the product and the late adopters are those that are last to buy after the product has been tried and tested and spoken about by the other personality types.

Attitudes is not an easy concept to define, however there appears to be some agreement that this refers to three elements that are assumed to predetermine behaviour. These are defined as;

- Cognitive, which are beliefs and perceptions held by the individual about a specific product.
- Affective which is the consumer's overall evaluation of the item or product in question.
- Conative is a tendency to respond in a consistently positive or negative way with respect to the product.

Finally motivation, which is simply defined as 'a need is said to exist until action has been taken to satisfy it' (Christopher & McDonald 1995). Most significantly in this area is the work of Maslow, who derived a hierarchy of needs. All of these factors form the basis of consumer affect and cognition (Peter, Olson & Grunert, 1999).

The relationship between affect and cognition remains an issue in psychology. Several researchers (Tomkins, 1983, Zajonc, 1984) consider the affective and cognitive systems to be independent, while others (Lazarus, 1984) argue that affect is largely influenced by the cognitive system.

While these principles deal with 'personal influences' of consumer behaviour, these factors are also affected by influences external to the consumer such as the consumers overt behaviour and the environment of the consumer.

Consumer overt behaviour is the physical actions of consumers that can be directly observed and measured. Behaviour is critical, as it is the process by which sales are made and profits earned and is measured in terms of shops visited and products purchased. While many marketing strategies centre around affect and cognition for the consumer, behaviour cannot be ignored by marketers as it is critical for marketers to analyse understand and influence overt behaviour. This can be influenced by a number of factors such as greater quality, lower prices and greater convenience (Peter, Olson & Grunert, 1999).

Consumer environments are everything that is external to consumers that influences the way they think, feel and act. This includes social stimuli which have influences such as, others action, culture, sub cultures and social classes. It also includes social stimuli such as stores, products, advertisements, etc. The consumer environment is important as it is the medium where the stimuli is placed to influence all the aspects such as the culture, others actions, sub cultures of customers. Marketers tend to use environments such as Television to run adverts during programmes where they know a target audience will be watching, or shops are located close to highly populated areas to increase the proximity of the customers (Peter, Olson & Grunert, 1999).

2.12.5 Exchange

Finally, Peter, Olson & Grunert (1999) state that the important point when dealing with consumer behaviour is that it involves interaction and exchanges between humans. In simple terms the role of marketing is to create exchanges with consumers by formulating and implementing strategies. In simple terms the `marketers` want consumers to tell their friends, family, etc about the product. If a product is effective and performs well, this may encourage positive behaviour. Other tactics are also used to encourage this exchange, these can be group gatherings with a specific product, such as Tupperware for example, or the way in which new bars or restaurants might offer customers free drinks, to encourage people to return, but also encourage people to talk about the place, hence promote exchange between consumers in the form of word of mouth.

2.12.6 The decision making process

Despite a divergence of published views surrounding the exact definition of consumer behaviour, the basic principles of the consumer decision making process is crucial as it is these basic processes that culminate in eventual action, whether that be the purchase of goods and services or the adoption of energy conservation measures.

The decision making process can be viewed as three interrelated stages; a) the input stage, b) the process stage and c) the output stage.
The input stage is the consumers recognition of the product need, which is based on two main sources of information, the efforts of marketing (product, price etc) and the external sociological influences on the consumer (i.e.; the friends, family, social class, culture etc). This process is also known as the awareness phase, where the consumer gradually becomes aware of a product (Christopher & McDonald, 1995). The collective impact of the marketing efforts and the influence of friends, family etc are all likely to affect what consumers purchase and how they use what they buy.

The process stage focuses on how consumers actually make decisions. The psychological factors present in every individual (personality, learning, perception, motivation) that affect how the information from the input stage influences the consumer's recognition of a need, carry out pre-purchase search for information and an evaluation of alternatives (Shiffman & Kanuk 2000).

Finally, the output stage of consumer decision making consists of purchase behaviour and post purchase evaluation. The purchase behaviour of a low cost item could be influenced by a special offer for example, and the consumer embarks on a `trial' which is the exploratory phase, evaluating the product through direct use. If the consumer is pleased with the purchase the consumer may buy the product again. A repeat purchase usually signifies product adoption. For higher value items, initial purchase usually signifies adoption. (Christopher & McDonald 1995).

Peter, Olson & Grunert (1999) outline the basic principles of the behaviour of consumers, which form the core of defining consumer behaviour, however, there are some authors who state that there is nothing unusual or difficult about defining consumer behaviour. Fishbein and Ajzen (1980) simplify the principle by stating that it is human action involving a choice among various alternatives, and there is little reason to assume that novel and unique processes are invoked in order to account for the action. The authors postulate that many models and theories surrounding consumer behaviour tend to incorporate virtually every known social, psychological construct and process, and tend to generate confusion rather than understanding. There has also been criticism as these models and theories suffer from untestability and lack of specificity of variables (Fishbein & Ajzen 1980).

2.13 Energy conservation and consumer behaviour.

Public information campaigns are widely recognised as essential for an effective energy conservation policy and most Western governments run one (Williams 1983).
The attitudes of users (homeowners) have been 'appealed' to consistently over the last three decades with specific regard to saving energy in the home. This has primarily been through the medium of government information campaigns. The basic principles of these campaigns has been to attempt to inform and motivate users (homeowners) about energy conservation (Salvage, 1993).

The success of the government's public information campaigns over the years has been largely uncertain with regard to their large scale success in changing attitudes towards energy use in the home. There is little evidence that the attitudes of users (homeowners) have changed to any significant extent, evidenced through either an increase in the number of homes being insulated or in the public becoming more aware of the related environmental and energy issues. It has been postulated that these public information campaigns were not sufficient in respect of the information that they contained or in the way they were delivered, to effect action on the part of the homeowners or to change their attitude towards energy use. One reason for this could be that the influence of the basic principles of consumer behaviour have not been considered or addressed fully in these campaigns. The principles of consumer behaviour are used widely to shape and form attitudes and to coax consumers into wanting, needing or purchasing what organisations want them to buy. This is most effectively carried out through cognitive marketing strategies that are based on the very core principles of consumer behaviour.

Unlike many cognitive marketing campaigns in the market place, which attempt to influence consumers to purchase specific products, government energy saving campaigns are not dealing with a single homogeneous task (Ellis & Gaskill, 1978). The campaigns are not just attempting to influence the purchase of a specific product, they aim to change behaviour also. These campaigns are seeking to persuade people to undertake a number of actions, such as turning down thermostats, only heating rooms in use, draughtproofing, etc, the campaigns are also seeking to influence the purchase of energy saving devices. The communication may work at a number of levels in order to achieve different elements of behavioural and attitudinal change. Phillips and Nelson (1976) state that there are two points of relevance when dealing with campaigns such as these. First is the precept of Fishbein (1967) that in seeking to measure attitudes we must know what behaviour we are trying to predict, with the ultimate objective of the campaigns to 'save energy'. Second, is the conclusion of King (1975), who states that we should not try to produce advertisements or evaluate their effect without having some theory on how they are to work (Phillips and Nelson,1976).

From a psychological viewpoint the phenomenon of adaptation (Helson, 1958) is relevant. People adapt to a repeated stimulus and eventually ignore it unless the level of stimulation is outside their range of tolerance. In order to maintain an impact the level of stimulation must change in anticipation of these adjustments in the range of tolerance. In order to maintain conservation as a result of price alone it may be necessary to increase the price of energy to quite unacceptable levels (Ellis & Gaskill, 1978).

However, the link between energy conservation and a persons knowledge or attitude was claimed to be tenuous (Lopreato and Meriwether, 1976), examples in the US showed a general increase in awareness regarding energy conservation measures after specific cognitive information campaigns, but these were not reflected in an increased tendency to conserve energy. Ellis and Gaskill, (1978) suggested that people were predominantly motivated to do things by economic self-interest, however there is no definitive data to determine whether this relationship is long or short term, or whether people will be motivated to act in their long term interests even where they have a clear perception of what the interest is and how they can impact upon it.

Phillips and Nelson, (1976) emphasise that consumers must know how they can conserve energy before significant savings can be affected, an assumption that has been central to the planning of conservation strategy in the UK.

Where behavioural strategies aim to directly change behaviour, cognitive strategies are directed at changing individuals beliefs or attitudes in the expectation of a consequent change in behaviour. An important distinction in relation to considering cognitive strategies is concerned with the content of the information that is communicated to the individual and the method by which that information is communicated. In relation to energy use, the content of communications can be broadly divided into three areas; a) the consequences of energy consumption, i.e. depletion of resources, effect on the environment and wastage etc; b) information on how energy can be conserved, the actions which energy users can take to reduce their consumption and c) information given to the user on current rates of personal consumption i.e. feedback.

Ellis and Gaskill, (1978) investigated the use of cognitive strategies to inform users of certain kinds of information. A differentiation was made between the type of information given regarding the consequences of high or excessive energy use (generally aiming to stimulate long term interest) and, information on how energy could be conserved, which related to the individual and their personal interest. Public campaigns in the US have found that using the first type of information (stimulating long term interest) strategy to be fairly ineffectual in increasing energy conservation, but have been found it to increase awareness, of energy issues.

The government's *"Save it"* campaign in Britain, was designed to increase the level of energy awareness among householders and promote specific information that focused on a strategy for marketing insulation materials. The substance of the campaign was to inform and advise householders about how they could help themselves and the nation by using energy more efficiently. This campaign did produce a certain degree of success, but the initiatives were found to be adopted mainly by householders in higher income brackets (Salvage 1993). Ellis and Gaskill (1978), suggest that general information regarding energy issues will increase "energy literacy" but the evidence indicates that at present, the long term consequences of energy use holds little interest or importance for many people, compared to short term personal consequences (Phillips and Nelson 1976).

Ellis and Gaskill, (1978) investigated the effectiveness of giving the end user 'feedback' on their energy consumption. In the US, this method was found to be quite successful, where a 10 - 15 % reduction in domestic fuel consumption was achieved after feedback, however the studies were found to contain an essential lack of information to enable the end user to interpret the results of the monitoring. This information could have resulted in a greater reduction in domestic fuel consumption had the user fully understood the results of the monitoring and been able to act upon them (Ellis & Gaskill 1978).

Fishbein's (1975) analysis suggested that cognitive strategies should aim to change an individual's belief regarding the effects of specific acts of conservation or consumption in relation to their short-term interests. This research also suggested that communication through the mass media is not the most effective way of conveying this type of information. This occurs for a number of reasons; a) there is no indication that the message being sent is being understood by recipients, b) together with the fact that many campaigns directed through mass media make the assumption that the recipients are a homogeneous group and c) invariably, there is a lack of feedback regarding the effectiveness of the communications (Fishbein 1975).

Cognitive marketing strategies rely on appealing to the consumer, in the hope that the information provided through information campaigns will result in action on the part of the consumer. Therefore a complete understanding of the dynamics of consumer behaviour must be fully investigated and understood for any campaign to be effective. The fact that consumer behaviour is dynamic is also crucial (Peter, Olson & Grunert, 1999). As individuals, consumer groups and society itself are changing and evolving over time, information campaigns need to consistently appeal to these changing dynamics. Analysis of the government energy saving campaigns since the 1970's have shown that the information being promoted has not evolved over the years, and as a result have very limited affect on the uptake of energy measures in the home as the campaigns still largely promote the same message.

With regard to understanding attitudes to energy use in order to have a successful marketing strategy, there appears to be no consistent understanding by the government of users (homeowners) and the attitudes and way in which energy is used in the home. Previous studies surrounding the area of attitudes to energy have been biased to larger income groups, and have concentrated more around saving money than energy, therefore understanding the drivers of saving money, rather than identifying attitudes towards energy. Government campaigns have also ignored the influence of comfort in their strategies, informing people for example that turning down the heat by one degree will save them money. The attitudes that users hold towards comfort is one of overriding importance, they will take no measures that will have affect comfort level, therefore turning the heat down is very unlikely to occur as this attitude would be construed as being `a strongly held belief`. Government information campaigns have done little to try and influence this strongly held belief by attempting to change it through understanding attitudes.

Finally, the government have always made the assumption that the public are a homogeneous group, appealing to a single whole group through one message rather than tailoring or understanding that different groups require different messages.

This input stage of the decision making process is difficult to relate to the information campaigns of the government, as this stage relies mainly on a recognition of the product. In the case of energy saving, and creating a need for a product, unless consumers actively want to save energy, for example by improving the insulation of their home, then this stage would be effective is raising awareness of the need for insulation to save energy. However in the case of no perceived need for energy saving on the part of consumers then the probability of government information campaigns being effective and creating a need is likely to be unsuccessful. The government have attempted to create a need by promoting both energy saving and saving money to consumers, in the hope that this will create an awareness of the need to save energy.

How the principles of 'output' relate to the uptake of energy measures is also difficult to associate. A very simplified view could be that some consumers in colder homes may see an advert for energy efficiency and mentally take note (the input stage) that they could possibly make their home warmer through the adoption of energy measures. The consumer may then go on to purchase specific energy measures, with this decision being prompted by a special offer on these measures (the process and output stage). However, as discussed by Christopher & McDonald (1995) where purchase usually signifies adoption, this is unlikely to be the case for consumers with regard to energy measures because the principles of consumer behaviour in this instance are difficult to apply. As an example, in the case of a trial shampoo or washing powder, purchased through a special offer after an advertising campaign, consumers may then go on to purchase again as they like the product, hence signifying adoption. With energy measures, consumers cannot necessarily 'test' or 'trial' the product, as invariably these measures rarely show a visual or immediate comfort improvement. Consequently, when users purchase energy saving measures, this may mean that they are becoming 'attuned' to the concept of these measures, or alternatively they have purchased these measures to satisfy an immediate comfort level.

With particular regard to energy saving in the home, government campaigns have centered around providing information and knowledge about energy saving products and practices in an effort to change the attitudes of users (consumers). The limited effectiveness of previous government campaigns suggests that in relation to consumer cognition of energy in the home, only a few measures such as loft insulation, appear to have been stored in memories, as these have been the most advertised measures over the longest period of time, and have been subject to a higher level of familiarity.

While many marketing strategies centre around affect and cognition for the consumer, behaviour cannot be ignored as it is critical for marketers to analyse understand and influence overt behaviour. Very few government campaigns have actually been able to effectively measure this process. Many of the studies carried out have relied solely on establishing intent, rather than measuring overt behaviour. As an example, the 'wasting energy costs the earth' campaign noted a take up of information regarding energy saving in the home, but a similar increase in the take up of insulation measures was not necessarily noted. In addition, a change in the way in which energy was used in the home could not directly be measured as there were no processes in place to measure the effectiveness of these information campaigns.

As discussed previously, marketers tend to use environments such as television to run adverts during programmes where they know a target audience will be watching, or locate shops close to highly populated areas to increase the proximity to customers (Peter, Olson & Grunert, 1999). While there is no doubt that the environment in which the government information campaigns were promoted i.e.; through television, newspapers and radio, it would appear that the messages of the campaigns were not appealing to users (homeowners). A reason for this may be that when dealing with the three main elements (affect and cognition, overt behaviour and environment) is that a reciprocal system exists, where any of the elements could be a cause or an effect of a change at any given time. For example, behaviour could change consumers' affect, cognition and environments and affect or cognition could change consumers' behaviour and environment. In short, any comprehensive analysis of consumers must include and consider all three elements and the relationships between them. It would appear that on many levels the government Information campaigns have not considered these elements or any relationships that may be present between them.

In spite of the difficulties in separating the effects of price rises and other extraneous factors from the effects of the information itself, the evaluation of the 'Save It' campaign postulated that it did have a certain degree of success.
Phillips, Mills and Nelson (1978) stated:

> *"We have witnessed a variety of 'cognitive' changes in the period under review. We have also seen changes in claimed behaviour and some simple 'actions' like turning the heating or thermostat down. We have had some success in instigating more major 'behavioural' changes such as the installation of loft insulation"*

The perceived success of this campaign is largely attributed to the deliberate strategy of marketing energy-saving devices, with emphasis on providing information to the public on the potential effectiveness of various types of insulation, and on how they cut down on energy costs (Ellis & Gaskill, 1978). Whilst the evaluation of the campaign did notice a slight increase in the take up of measures such as loft insulation, the effect on the actual 'cognitive' changes discussed is largely negotiable, as the evaluation of the campaign concentrated on 'intent' rather than actual measured practices. McGuire (1968) states *"There is little clear evidence that attitudes can be predictably changed by cognitive appeals or even that if they are changed they will have any predictable influence on behaviour"* (Ellis & Gaskill, 1978). However later research by Fishbien and Ajzen (1975) demonstrated that attitudes can be predictive of behaviour if the former are specifically related to the latter. Their research showed that general attitudes about energy issues would not be expected to predict specific acts of energy conservation. The relevant attitudes which are likely to predict behaviour and which communication strategies should be aiming to change, are specific attitudes towards particular conserving behaviours. Such attitudes are made up from a set of beliefs held by the individual, and the task of an effective communicator must be to identify those beliefs which are relevant or 'salient', and to express communication in terms that are likely to change those beliefs (Ellis & Gaskill, 1978).

Ellis & Gaskill, (1978) state that Fishbein and others have shown in a number of case studies how effective a communications strategy based on these principles can be. They go on to state that Fishbein's work has far reaching implications for the design of effective communications. Although the planning of the 'Save It' campaign has contained certain elements of a Fishbein approach, a systematic application of his kind of analysis to the issue of energy conservation has not been attempted but would have been an important contribution to the formulation of energy policy (Ellis & Gaskill, 1978).

In it efforts to promote energy saving through cognitive marketing campaigns the government has assumed that a relatively high degree of cognition exists from users (homeowners). In some instances this is the case for well published energy saving measures such as loft insulation which has been highly promoted over the last few decades. However, the basic principles of the need to save energy have not been fully promoted and therefore there is a lack of cognisance on the part of users (homeowners). As a result of this, it is suspected that the part of the strategy dealing with the consumer environment and promotion of products via television have had little or no effect as there is a lack of basic cognisance together with the government not changing their strategies to meet the changing dynamics of the consumer population. As a result, the overall effectiveness of these energy saving campaigns is largely negotiable.

2.14 User (homeowner) attitudes towards energy conservation.

There have been a limited number of studies relating to the attitudes of domestic users (homeowners) towards energy efficiency in the home. An early study undertaken in 1974 1976 by Phillips and Nelson (1976) investigated energy savings in private households. The purposes of the study were fourfold;

A) to assess the awareness of householders of the need to use energy efficiently and economically;
B) to determine the awareness of how to accomplish this;
C) the extent that householders were taking action to save energy;
D) the extent that householders were intended to or were prepared to take positive action to save energy.

The study was implemented in five stages, firstly in 1974 to collect information on householders' current behaviour and attitudes to the use of energy and also to determine the level of interest in energy saving prior to a possible government campaign. The second stage of the research was undertaken in January 1975 immediately before the launch of the government *"Save It"* campaign, which followed a considerable amount of publicity on energy conservation. The third stage was undertaken eight weeks after the launch of the *"Save It"* campaign, with a fourth stage in July 1975, following the second phase of the campaign. The fifth survey was conducted in early 1976, one year after the launch of the campaign in order to allow a year-on-year comparison to be made.

The pre-campaign study made a number of illuminating findings concerning attitudes towards energy and energy conservation held at that time by householders. Firstly, the majority of householders believed that energy saving was important but felt that no immediate crisis existed. Secondly, the sample of householders considered the government to be guilty of wasting energy through the use of street lighting. Finally and perhaps the most important finding, was that householders had a minimal knowledge of how to save energy, which was limited to switching off lights, rather than more substantial measures such as the insulation of their homes.

The study identified an interest in good housekeeping, with regard to energy use, the level of which peaked during the fifth stage 1976 survey a year after the campaign. The study also indicated intentions on the part of householders to install energy saving measures, however, many could not see how insulating their homes would have an impact, this perception also rose throughout the study period.

The study concluded that householders needed to be made more aware of the seriousness of the energy problem and to be provided with information about how to save energy that would be within their means or capabilities, without lowering their standard of comfort. It is this area that later government campaigns would have been well placed to promote, ensuring a change in attitude by explaining and promoting methods of energy saving that the public could relate to. The study also concluded that although householders prime interest in energy saving was to save money, they were also unwilling to sacrifice their standards of comfort in order to achieve it (Phillips & Nelson 1976).

A later study undertaken to determine the general public's attitudes towards home insulation and the environment, was commissioned in August 1990, by the UK Mineral Wool Association, Eurisol. The study was carried out by MORI (1990), using a nationally representative sample of 1,340 homeowners. Interviews were conducted in-home, in 149 locations across Britain. The results showed that although three out of four homeowners were concerned about the greenhouse effect, they did not comprehend that the single and most effective way of reducing the carbon dioxide emissions which cause global warming, was to improve the insulation in their own homes. Therefore the attitude towards energy saving from homeowners in this instance would have to be considered one of apathy and not directly relevant to individuals.

Almost 50% of the respondents (wrongly) believed that catalytic converters would be the most effective means of reducing CO_2, whilst 20% believed that using lead free petrol would slow global warming. The lack of knowledge of householders regarding energy use and conservation was evident from suggestions made to reduce the green house effect, which included, eating less meat, dropping less litter, stopping smoking and purchasing organic products. Less than 4% of the sample correctly recognised that the major cause of CO_2 emissions in the UK was the generation of electricity and the use of fossil fuels for heat and power in homes. It was mistakenly thought that the biggest causes were car emissions (41% of respondents) or industrial and manufacturing processes (33%). These perceptions were later underpinned in the pilot study for this research, where the respondents considered cars to be the greatest producer of CO_2 emissions, with the second major cause being industry. This again confirms the need for a change in the attitudes of users (householders), which will only be achieved through greater knowledge of energy conservation issues.

The MORI (1990) study found that once people understood the environmental implications of home energy conservation measures, they claimed they were more prepared to improve home insulation. However, the intention and the resulting action was never measured. If offered an incentive of a grant scheme, householders were twice as likely to want to insulate their homes (MORI 1990, Chartered Surveyor Weekly 1990). MORI concluded that *'There is widespread concern about the greenhouse effect but little understanding of its causes and reparation. Moreover, energy conservation and, in particular, home insulation are not immediately associated with its reduction, though homeowners appear receptive to the environmental benefits of home insulation, once informed'* (MORI 1990). From an attitudinal viewpoint these findings show that once informed of the environmental implications of energy use, peoples' attitudes do appear to change. However, for how long this change in attitude occurs is still unknown.

Householders clearly understand after being informed how their personal energy use would affect the environment, but it is considered unlikely that this education alone would affect attitudes sufficiently to act as an impetus for change. It is considered that it is not just a change in attitude through education that will be the catalyst for change (i.e.: increased awareness and uptake of energy saving measures) but its use in tandem with either legislation or financial incentives.
Although the report identified the attitudes held by homeowners, it lacked information relating to energy practices and related lifestyles of users in the home.

Hedges (1991) undertook a study of householder attitudes to energy conservation in the home, in conjunction with the Department of the Environment in 1991. The purpose of which was to ascertain what people knew about:

A) Energy consumption and costs;
B) Environmental impact;
C) Energy saving measures taken and what motivated or inhibited these;
D) How far energy consumption is affected by considerations such as, reducing costs, limiting environmental damage;
E) Other factors like custom and habit;
F) Whether environmental impact would motivate users to reduce energy consumption
G) Reactions to the ideas of incentives.

The sample consisted of 103 people from 94 households within selected geographical areas and was deliberately biased towards larger houses and higher income families because of their tendency to use more energy.

Results of the study showed that householders' rarely thought of investing in energy efficiency measures. It was also shown that householders seemed reluctant to pay for something that they felt was not significant and energy efficiency does not compete well with more cosmetic or status-enhancing projects. There was also a strong indication of lack of knowledge regarding possibilities of energy saving in the home and an air of not being bothered by the homeowner, as it was not considered significant (Hedges 1991).

This again shows the government realised that a need existed for more information regarding the attitude of householders, together with an indication of the amount that householders would want as a financial incentive to improve their homes. However, the study was biased towards the more affluent and as previous research has shown (Ellis & Gaskill, 1978) it is the lower income groups that are less likely to conserve, due to energy not being a high priority with no cash incentives. Action by the government as a result of this study has yet to be witnessed.

In 1992, Sadler & Ward (1992) produced a report concerning owner / occupiers attitudes to house repairs and maintenance. This report included a section on attitudes to cost effective upgrading for energy efficiency. The study was based on in-depth interviews and discussions with a small and deliberately chosen sample of 48 owner/occupiers. With regard to attitudes to energy efficiency, the study showed that the majority of householders approach to energy efficiency was half hearted, in the sense of energy efficiency not being of any great or consistent importance. The idea of improving the insulation in their home had occurred to a few of the respondents but was not a high priority.

The study confirmed the findings of previous studies by showing that householders are unaware of the true savings or rapid payback on simple measures like draught proofing and loft insulation, there was also little concept of "payback". The majority of householders also believed that energy conservation measures are adopted purely for comfort and no other reason. There are however, some householders who are keen to learn more about how to save energy and help the environment, but felt that they needed much more encouragement and advice, through such things as energy audits and advisory services (Sadler & Ward 1992). Although the study was limited to a small group of householders, the main conclusions from the survey indicated that the majority of householders were largely unaware of the government energy campaigns current at that time and where to obtain information on energy efficiency. There also appeared to be a general ambivalence towards energy efficiency measures and the sample were found to have little idea of the financial savings that could be gained from installing energy conserving measures to their home.

A 1994 study by the University of Northumbria, (New Builder 1994) showed that consumers were unwilling to pay the price premium for using green products and components in new building. The conclusions were based on a comparison of cost of a `typical' house built by North Housing, and that of an equivalent house using green components such as, timber frame, recycled gutters, environmentally friendly paint, windows and patio doors. The `green' house was priced at £35,376, 7.7% above that of the £32,849 of the North House. House buyers were asked if they would be prepared to pay the difference in the interests of the environment. Of the 49 surveyed, 43 stated that they would not be willing to pay the additional cost, whilst the remaining 6 stated that they would consider purchasing a smaller more environmentally friendly house, instead of a larger conventional house, spending the same money on each. The researchers stressed that consumer resistance to the premium should be balanced with the maintenance and cost savings associated with the environmentally friendly house (New Builder 1994). This confirms the attitude that the general public are not prepared to pay for environmental protection, whether it is green components or energy conservation. It supports the deduction that economic and comfort considerations, override environmental considerations for the majority of house purchasers. In addition, initial conclusions from the research stated that there was no market for environmentally friendly homes and therefore these are not economically viable.

The Royal Institution Of Chartered Surveyors policy unit published a report in April 1994, entitled `Financial incentives for greener homes' (RICS 1995). The report dealt with the residential sector and reasons why the uptake of energy efficiency had remained low. The report identified that there were many reasons why householders have shown little interest in energy efficiency schemes. Significantly, it identified the most significant reason to be an unwillingness on the part of the householder to pay for such measures. The report identified that many householders were reluctant to consider investment in energy efficiency, even where the payback was as short as one year. The report conjected that with the imposition of VAT on domestic fuel being introduced at that time, the public would be more focused on the need to reduce energy consumption (RICS 1994). It is possible that at the time of the survey householders were unhappy with the proposal to include VAT on fuel and as a result expressed attitudes towards energy efficient measures that were largely negative.

The RICS report considered that an emphasis should be put on greater financial incentives for householders, if the government is to achieve its objective and stated commitment to reduce carbon dioxide emissions. The report explored a number of different financial incentives by which householders could be encouraged to take up energy efficiency schemes. The first of these proposed incentives was tax relief for energy efficient measures. It was proposed that householders investing in energy efficiency would be allowed to offset the cost against a taxable income. The RICS postulated that this would encourage certain individuals who would not otherwise have carried out the work, the more generous the tax relief, the more inclined individuals would be to carry out the work. The second incentive was the re-introduction of grants, as this has been the form most frequently used to promote energy efficiency in previous years. It was suggested that these grants would be more flexible in their approach and generally be aimed at householders who could not usually afford to do the work. The third incentive was the provision of `soft' loans, where it was considered that a low rate of interest would be likely to result in a greater take up, but would be predominantly among the individuals that could afford to do the work. It was estimated (RICS 1994) that the introduction and take up of these loans would only have a marginal impact on the promotion of energy efficient measures.

The fourth incentive considered by the report was the reduction in the rate of VAT on energy efficient improvements. However, the study then concluded that this would be unlikely to occur as this would not be fiscally neutral. The next incentive was the use of a housing allowance, which would replace the systems of mortgage interest tax relief and housing benefit. The study then concluded that this would not be feasible as it would require a major change in fiscal policy. The final incentive proposed by the study was the introduction of grants recoverable through energy bills and this was concluded to be the most effective method as unlike most of the previous incentives it did not involve additional government expenditure. It was considered to have the best potential to attract a wide uptake, make a significant contribution to energy efficiency and involve no cost to the Exchequer. The report demonstrated that although the unit costs per householder would be higher, the increase would be off-set by the reduced consumption of energy. Whoever bore the initial cost, whether it be the government, or the energy supply company, they could merely recover it by simply adding a premium to the amount payable by householders (RICS 1994). These incentives provide many possible opportunities for the improvement of householders homes, however, the majority of them would appear to rely on the government to either pay initially or make substantial changes to fiscal policy.

A preliminary study carried out at South Bank University by Bhatti and Sarno (1996) concerning the attitudes of homeowners towards energy efficiency when purchasing new homes addressed two specific attitudes :

A) What place energy efficiency had in relation to other factors in the decision to buy;

B) Whether consumers were willing to pay an additional premium for energy efficient housing;

The study in the from of a postal survey selected dwellings in England and Wales that had received an NHBC certificate in 1994, using a 1% random sample drawn from NHBC registrations with an achieved response rate of 25%.

The report showed the lack of importance attributed to energy efficiency by house buyers when buying a new home, as opposed to an existing home. Energy efficiency was shown to be only a minor consideration.

59% of the respondents did not want to do repairs or maintenance,

25% of the sample wanted 'up to date features',

12% wanting a 'high standard of energy efficiency'.

The study indicated that 37% of respondents claimed energy efficiency was their second priority when deciding to purchase. The survey also indicated that 48% of the sample claimed to have enquired about the energy efficiency of the dwelling they were intending to purchase.

With reference to the prevailing attitude of ambivalence to energy revealed in previous surveys, it is postulated that the sudden change in attitude could be the result of a sensitisation of the respondents towards energy efficiency and possibly that respondents felt 'obliged' to have mentioned energy efficiency when in actuality it was not one of their priorities during the purchasing process.

Bhatti and Sarno's study (1996) showed that 36% of households were unwilling to pay any additional money for an energy efficient house, the same percentage were however willing to pay up to 5% more provided they received the payback within two years. Very few were willing to pay more than 7.5% for an energy efficient house. This contributes to the evidence that householders are reluctant to pay more for energy efficiency in new or existing homes for energy conservation.

The study found however, that the need for energy efficiency was recognised by the homeowners. Fifty eight percent of the respondents considered that their present home could be made more energy efficient, which suggests that although consumers think more could be done to the existing housing stock, they are unwilling to pay to do it.

This evidence indicates that at this time there appears to be a begrudging recognition by householders of the need for energy conservation and possibly this reflects a greater concern for the environment generally. There is a preference for upgrading existing homes rather than the construction of new more energy efficient homes, which homeowners feel have a consequential greater impact on the environment.

With regard to the energy use practices of the sample, 85% of the sample were concerned with conserving fuel, 77% turned down heating and 40% switched off lights when not in use, but only 9% heated only one room. It may be significant that very few households did anything else to conserve energy.

The study concluded that there is not a great deal of 'green' demand in the housing market, and that the energy efficiency of the dwelling does not figure as a primary factor in the selection criteria of a new home. However, it was felt that there was public concern for the environment, increased fuel costs and the lack of demand could be attributed to 'inadequate responses from market institutions'. The study felt that the emphasis for information dissemination on energy efficiency rested with estate agents and building societies (Bhatti & Sarno 1996).

The results from these studies conclusively show that it is the attitude of householders that influence the take up of energy conservation measures. The key attitudes that repeatedly appear are those of the energy problem not being significant to householders, and householders being generally ambivalent about environmental problems and saving energy in the home. Many householders do not relate the problem of energy to themselves as individuals and their energy use, together with the fact that paying for energy measures is not a high priority compared to holidays or a new car. Also prevalent is a consistent indication of a lack of knowledge of the benefits of energy efficiency by householders. It can therefore be deduced that the attitudes of homeowners are not conducive to a reduction in CO_2 emissions.

2.15 Providers (housebuilders) and energy conservation

2.15.1 Overview of the housebuilding industry

The housebuilding industry is difficult to define as a distinct industry because of its make-up and ownership. Traditionally, house building was undertaken by a large number of small builders producing only a few houses at a time.

In March 1955, Mr Patrick Maitland asked the Minister for Housing and Local government what was his estimate for housebuilding and urban development over the next 20 years. Mr Duncan Sandys replied.... *'I have been most carefully considering what information I could give in reply to this question. I have reluctantly come to the conclusion that there are so many unknown or uncertain factors, that any estimate which I might give him...would be wholly unreliable and consequently misleading'* (Credit Lyonnais Securities Europe, 1999). This statement demonstrates the unpredictability of the housebuilding industry and its output, even in the 1950's, as the industry is reflective of, and driven by, the varying economic and political trends affecting the UK. The unpredictability and volatility caused by economic and political factors remains and was particularly evident in the 1980's and 1990's.

According to Bramley, Bartlett and Lambert (1995) much of the character of the housebuilding market and the supply of new build, stems from key characteristics that include durability, high cost and immobility. The long lead-times in producing new houses, together with the prevalence of existing second hand homes, means that short term economic factors and financial considerations affecting demand largely determine the state of the market. In the mid 1980's, rising incomes and low interest rates meant an increasing demand for new homes, but due to the slowness of supply, this demand was transposed into a rapid increase in house prices. This increase in house prices, together with increasing interest rates then depressed demand, leading to a fall in house prices in many regions from 1990 onwards. Since the 1970's, this cycle of boom and bust has been repeated three times and was accepted as the normal pattern of economics surrounding the construction of new homes.

Data (Housing and Construction Statistics), that track the fluctuations in the housebuilding industry through the period 1955 to 1997, show that significant booms and slumps have occurred during this period in the private housebuilding market. In comparison, public housing has been more stable, with a significant lack of booms and slumps. Private housebuilding experienced relatively significant slumps in the early 1970's recovered slightly and then slumped again in the mid 1970's, until the early 1980's. It is postulated that these slumps were largely attributable to the larger economic problems that stemmed from the oil crisis of the 1970's, which prompted a lack of demand by purchasers in the face of very high and fluctuating interest rates. The slump in the private housing market led to a restructuring of the housebuilding industry. Many of the smaller builders went out of business or were taken over by larger firms, thus effecting a consolidation of the industry towards larger firms. The decline in housebuilding activity in the 1980's was similar in some ways to the collapse of the 1970's with similar causes and effects, again many smaller firms did not survive and went bankrupt and another round of consolidation occurred. The low level of private housebuilding activity in the 1980's is considered to be a result of financial deregulation in Britain and other countries (Bramley, Bartlett & Lambert, 1995).

Private housebuilding tends to lead the cycle in the construction industry, in that recoveries and downturns start earlier in private housebuilding. The demand for private homes is heavily influenced by a number of factors, significant amongst these are interest rates, disposable income of households, expected incomes and price expectations of consumers. However, despite these factors influencing demand, the general economic performance of the country as a whole is also reflected in the booms and slumps of the housebuilding industry over these past decades. In the late 1980's and early 1990's, many housebuilders were only building homes once these had been sold rather than producing homes on a speculative basis, in times of economic prosperity more homes are built speculatively.

Another factor that is a major determinant of housebuilding activity and the housebuilding cycle is land, in terms of price and availability. Housebuilders seek to maximise profits but these are determined by a combination of land availability and prices, and as a preference will develop housing where profits are high, usually in areas of high demand but this is controlled by the supply of land made available for development by the planning system. These factors have been the subject of many studies (EIU 1975, JURUE 1977) which have shown the relationship between `land available in planning terms` and `land actually available` to be complex and indirect. One study found that more than half of the planning permissions granted for housing were not on the sites allocated in development plan. This land made up for the shortfall in land allocated through the planning system and was one of the means by which Local Authorities maintained the flow of land into development. Land release by Local Authorities has been the subject of considerable debate, particularly from the Housebuilders Federation, who have actively lobbied for Local Authorities to release greater amounts of land for housing development. However, theoretical studies carried out by Bramley, Bartlett and Lambert (1995) suggest that the effects of large scale releases of land would not be as great as expected, price effects would be fairly uniform geographically. The more land that is available and suitable for development the more construction that can take place, having regard to the factors involved in the profitability of developing the land. This is a largely simplified version of the theories put forward by Bramley, Bartlett and Lambert (1995) but nevertheless states the underlying consideration for housebuilders.

Housebuilders have difficulty accurately forecasting the cycle of demand, especially as typically the total planning and construction time for new housing developments can be up to two years (Bramley, Bartlett and Lambert, 1995). Speculative housebuilding carries a significant financial investment and risk with the large amount of capital involved with land and development prior to sales. These factors, together with the unpredictability of the market and variations in money supply makes housebuilding risky.

2.15.2 Structure of the industry.

Before considering the kind and types of firm involved in the house building industry, it is necessary to place the industry into context within the overall UK construction market. Ball (1983) stresses the difficulty of achieving this, as there is a lack of national data on speculative housebuilders published separately from data for the construction industry as a whole. Ball (1983) states that there are two main sources of data on the construction industry; the Private Contractors Construction Census and The Census of Production (CSO). Within these publications, little attempt is made to distinguish between the controllers of the production process, main contractors and speculative housebuilders, from the sub contractors employed by these groups. As a result, it is virtually impossible to determine the number of builders building at any one time, the number of builders, whether large or small, or the number of sub-contractors involved in the process.

As a proportion of the total construction work carried out in Britain, private housebuilding is comparatively small. The characteristics of firms in the housebuilding industry also varies significantly from the rest of the construction industry, in that less specialist firms or workers are employed and of the specialist trades used in private housebuilding, the less technically demanding appear to predominate such as plant hire, plumbers, plasterers and roofers. F[CC2]ew contractors or builders combine speculative housebuilding with other forms of general building activities[CC3], and even the largest contractors such as Wimpey and Laing created entirely separate housebuilding divisions (Ball 1983).

In the 1970's the housebuilding industry underwent substantial changes and restructuring. This followed the 1972/73 boom and slump in the housing market which became known as the crisis year of 1973. Authors such as Ball (1983) and Bramley, Bartlett and Lambert (1995) postulate that this slump was due to factors such as exceptionally bad winters, the introduction or repeal of legislation, a general election, material supply bottlenecks, labour shortages and labour strikes, together with crippling interest rates. However, the influence of the oil crisis on the market and the industry at this particular time cannot be ignored. It is suspected that problems with power, shortages of material supplies from overseas, together with the rapid increase in price of oil, which in turn raised the price of building materials and consumer insecurity in general, all exacerbated the housing slump of the 1970's.

During the course of this 1973, housing starts fell to half those of the previous year - a record drop. The market share increased for the larger housebuilders who were better able to sustain a slump such as this. Ball (1983) suggests that volume production of new homes allows the effects of market fluctuations to be minimised through a diversification of sites and housetypes. Other advantages that volume housebuilders have over the smaller firms operating in the same market, are that larger firms are able to achieve a higher turnover of capital and the ability to trim margins on individual schemes and make higher bids for land that smaller firms are unable to compete with, due to a lack of capital, and resources.

Ball (1993) suggests that the relationship of firms to capital accumulation is important to understand when considering the changes that occur in the housebuilding industry. As a result there are five types of builder that can be distinguished, with the division between them roughly relating to output. However, output levels are not the cause but the consequence of being a certain type of producer. The five types are; petty capitalist, small family capital, non-speculative housebuilding capital, large capital and long term land development capital. While this long term land development capital type are most of the largest producers of new housing, it has been at the expense of small family capital which has been the most significant shift of the industry's restructuring. Particularly in the 1970's where many smaller firms could not survive in the housing slump and were 'bought out' by the larger housebuilding firms, possibly because these smaller firms owned land banks ripe for development in the future.

While these five types of capital within the industry are important to gain a profile of firms and capital operating within the housebuilding industry, this study is concerned with the largest producers of housing; namely the long term land development capital. Firms that produce over 300 units a year are those considered to be the key players in the industry and it is this group that will build large volume housing and have significant marketing campaigns for the sale of these homes to the general public.

The top firms in the private housebuilding industry have remained relatively constant over the years. In 1995 the top 20 housebuilders builders (by unit completion) were; (Credit Lyonnais, 1995)

- Wimpey Homes
- Tarmac

- Barratt
- Beazer
- Wilcon
- Raine
- Bryant
- Persimmon
- Bellway
- Westbury
- Lovell
- Ideal
- Laing
- David Wilson
- Redrow
- Fairclough
- Bovis
- Crest
- Alfred McAlpine
- Bloor

It is the attitudes of this group of housebuilders towards energy efficiency that is pertinent to this study.

2.15.3 Providers (housebuilders) attitudes to energy

The private housebuilding industry's approach to CO_2 emissions is largely reactive, energy efficiency will only be implemented if forced by the government through legislation, or it is seen as a business opportunity. Conversely, the approach of the public housebuilding industry is much more identifiable and transparent. For years, Housing Associations and Local Authorities have been building homes to high levels of energy efficiency as it is in their interests to provide affordable homes and affordable heating to their occupants. Historically, private housebuilders involvement in matters concerning a reduction in CO_2 emissions has been sporadic and in some cases has tended to reflect whatever `trends` were occurring in the industry at that specific time. As an example, in the 1980's a few top housebuilders entered the market of energy efficiency and built show homes for exhibitions and trial homes in partnership with BRECSU and utility suppliers. However, since then the principles used as a marketing tool for these experiments to be sold, have not been applied in practice to housebuilders' conventional designs. It is suspected that these exercises were undertaken for PR purposes, more than anything else, as in many instances these housebuilders did not repeat the exercise, or continue to build highly energy efficient homes. Therefore, it can be seen that to some extent the attitudes of volume housebuilders towards energy efficiency, have reflected `trends` occurring in the industry. In fact, the general trend of innovative energy efficient homes which became prevalent in the 1980's, has now significantly diminished.

The main factors surrounding this lack of activity in the energy efficiency housing market can be postulated (fairly accurately) as the housebuilders perception of no market existing for this type of dwelling. This together with the influencing factor of profit margins being reduced by building these homes in the opinions of the housebuilders, are quite probably the main reason why the top housebuilders are still building to minimum standards rather than exceeding the thermal regulations.

There also appears to be a significant lack of information available regarding the views of housebuilders and the level of commitment they have to reducing CO_2 emissions. The leading organisations in the industry that act on behalf of the housebuilders rarely publish any type of information regarding environmental matters, or if so, do so only for their members. In addition, these groups have refused to comment on the housebuilding industry in general or agree to be interviewed for this research regarding the subject of housebuilders and energy conservation. There is reluctance on the part of volume housebuilders' to discuss current issues of environmental concern, together with a perception of secrecy regarding their standpoint on energy efficiency, which prompts conclusions based on their attitudes.

These are;

- that housebuilders main concerns are selling properties on a large scale for the maximum amount of profit regardless of energy efficiency;
- that housebuilders have either little perception or little inclination to provide levels of energy efficiency that is above requirements;
- if energy efficiency became a true issue that would begin to affect the overall profitability of each business and the marketability of their dwellings, then the likelihood would be that housebuilders would become more concerned and act accordingly.

The voice for the housebuilding industry is primarily the House Builders Federation. The House Builders Federation is the principal trade federation for private sector housebuilders in the UK. The members of the House Builders Federation account for 80% of all new homes built in the UK. As a result, the views of this particular body can be considered to be largely representative of the view of the housebuilders themselves. On many occasions when a change in Building Regulations has occurred and thermal standards have been increased the House Builders Federation have been vocal in their opposition to these changes. In essence the House Builders Federation over the years have refuted changes to the thermal regulations, claiming that housebuilders are being penalised and that the government should be concentrating on the second hand housing market rather than the new homes market. It appears from the press that the House Builders Federation are of the opinion that the thermal regulations are more than sufficient and should not be increased any further, despite the governments commitment to reducing CO_2 emissions.

This indicates that the private housebuilding industry appears relatively indifferent to external pressures such as environmental lobbying groups and in some cases government pressure. It is probable that if the private housebuilding industry had been influenced or pressured by groups with an interest in promoting energy efficiency, then their reaction or subsequent actions would have been highly publicised throughout the industry. This did occur in the 1980's for a very short time, as mentioned previously, but was short lived. Overall, it appears that the private housebuilding industry are narcissistic in their actions regarding the construction of new homes and the standards to which they build them. The only factor that has had a significant influence on an increase in the energy standards of new private homes has been implemented by the government in the form of building regulations. This suggests that housebuilder attitudes are not conducive to a reduction in CO_2 emissions and the only factor that will change the attitudes of housebuilders will be government legislation.

2.15.4 Environmental policy and new housing

During the 1980's environmental concerns became a major political issue and it was only then that these concerns were transposed into government policy. The most important concern was the use of fossil fuels in Britain and a need to reduce the risk of global warming as a result. Bramley, Bartlett and Lambert (1995) draw out energy efficiency and insulation standards for new homes as a point of discussion with regard to planning policy that affects new housing.
Quite correctly they highlight the problem of the inefficiency of the housing stock in Britain compared with other countries. They also mention improvements that homeowners undertake and briefly make reference to the publicity schemes and insulation grants that are available in the second hand housing market. With regard to new housing Bramley, Bartlett and Lambert (1995) suggest that Britain still lags behind other countries. However, UK Housing Associations have taken the principles of energy efficiency much more seriously than the private housebuilding market. This is mainly due to an awareness that affordability of fuel (heating, cooking and lighting) are crucial for low income tenants. Bramley, Bartlett and Lambert (1995) argue the point of the extent that government policy should intervene in this area and that the government should perhaps not impose prescriptive Building Regulations, on issues such as energy efficiency, but rely on market forces aided perhaps by better information. In addition, the authors suggest that if buyers were aware of the savings achieved by energy efficiency they would pay more for a house that offers them these savings, and this means that developers would then get their money back from including energy saving features in their dwellings. This theory is based upon the fact that good, impartial information would be made available to consumers together with the expectation that energy costs will rise progressively in the future.

While this is a reasonable concept to propose it appears that little consideration has been given to housebuilders perception of energy efficiency, together with the profitability issues for developers of including features like this in new dwellings. This theory also makes an automatic assumption that consumers want energy efficiency, understand the concept and are prepared to pay for it, which historically is generally not the case. Finally the theory regarding the provision of information to consumers is proposed. Over the years the government has made information available to consumers regarding energy efficiency, however, the success of this type of information has been largely questionable in the resultant lack of activity in the demand for energy efficiency from consumers in new homes.

However, Bramley, Bartlett and Lambert (1995) suggest that it may be cheaper to design and install energy features at the new build stage, rather than install them during the life of the dwelling. The authors then postulate that if in the future there exists a growing need to conserve energy then it may be prudent to consider regulating new dwellings to include energy efficient measures. This particular recommendation is considered to be naïve. In 1995, the drive for energy conservation was as strong as it has ever been with the government committing to CO_2 emission reductions in an attempt to reduce global warming. At the current rate of government activity in this particular area, it appears unlikely that these commitments will be met, which will then exacerbate the need to conserve energy to an even greater extent. Further regulations for new dwellings which make greater provision for energy efficiency needed to have been implemented in the late 1980's and not left for the next millennium.

2.16 Deductions from the literature study

2.17 Development of the research model – Users (homeowners)

The literature study provided a framework of possible user attitudes towards energy use and conservation, and these were used to structure the research model from which the survey instrument was developed. However no definitive models that would permit application or replication within the context of users (homeowners) were found that would enable the contribution of these attitudes to be unequivocally ascertained, or to indicate with any accuracy whether they were conducive to reducing CO_2 targets.

The literature study highlighted a number of attitudes that were considered to influence attitudes to energy efficiency measures in the home. For the group of users (homeowners), these attitudes can be described as;

- Apathy regarding the installation of measures;
- A lack of knowledge regarding their contribution to CO_2 emissions;
- A feeling of no immediate urgency regarding the installation of measures to assist with the environmental problems;
- A preference to spend any disposable income on cosmetic or status enhancing products rather than install energy measures,
- A feeling that these measures were not worthwhile.

The literature study identified that there was no model in existence that attempted to explain the relationship between the attitudes and actions of homeowners. The literature study also indicated that it appears impossible to correctly characterise attitudes and behaviour of humans into a model, as it is suspected that the attitudes are largely interrelated, in that no one attitude will have a direct effect on the attitudes to energy conservation. Also it is considered that it will be a number of the factors together, which will influence the attitudes towards energy efficient measures.

However, despite no model being in existence, there has been some research relating to homeowners attitudes concerning;

- A lack of knowledge MORI (1990), Hedges (1991), Phillips & Nelson (1976).
- The concern of achieving an acceptable comfort level Shorrock (1993), DoE (1996).
- The problem of affording energy efficiency or saving energy to save money RICS (1994), Sadler & Ward (1992).

2.17.1 Users (Homeowners) attitudes

The hypothesis for the users (homeowners) has been stated as:

'The prevailing attitudes of users (homeowners) are not conducive to the attainment of the CO_2 emissions reduction set by the government'.

This was further broken down into four sub-hypothesis, each addressing specific aspects of this attitude, these were stated as;

1) Users (homeowners) are unwilling to pay for energy efficiency measures unless there is an unrealistic return on their investment
2) Users (homeowners) will consume energy to maintain comfort irrespective of other considerations.

3) Users (homeowners) attitudes are based on poor knowledge of energy use and conservation.
4) Users (homeowners) attitudes are not significantly changed by government campaigns.

2.17.2 Sub-hypothesis 1 : Users (homeowners) are unwilling to pay for energy efficiency measures unless there is an unrealistic return on their investment

This sub-hypothesis was one of the attitudes that were discernible from the literature study. Users (homeowners) are unlikely to pay for energy efficiency measures unless there is an obvious return on their investment. Therefore the existence and strength of this attitude was determined by a series of questions relating to cost and energy use, which are discussed fully in chapter 3.

2.17.3 Sub-hypothesis 2 : Users (homeowners) will consume energy to maintain comfort irrespective of other considerations.

This sub-hypothesis clearly states that users are not concerned with energy conservation when their comfort level is impinged. If this attitude is found to exist in users it will present a significant problem for the government in its attempts to reduce CO_2 emissions. It will make the preservation of comfort an inviolable objective of any initiatives to reduce CO_2, simply put, this attitude ensures that users (homeowners) will consume energy to maintain comfort levels. The influence that attitudes towards comfort have on the attitudes towards energy efficiency measures was assessed from the study by a number of factors, which are discussed fully in chapter 3.

2.17.4 Sub-hypothesis 3 : Users (homeowners) attitudes are based on poor knowledge of energy use and conservation.

The series of user (homeowners) attitudes towards energy, identified in the literature study, was that the attitude of users was founded on poor knowledge of energy use and conservation. In particular there was evidence that users had a poor knowledge of the impact of their own energy use in the home on energy use as a whole, CO_2 emissions and climate change significantly.

The attitude being targeted can be described as the level of knowledge that respondents have toward the impact that their use of energy has on the environment and the effect that individual households have collectively. This was assessed from the study by a number of factors, which are discussed fully in chapter 3.

2.17.5 Sub-hypothesis 4 : Users (homeowners) attitudes are not significantly changed by government campaigns.

Sub-hypothesis 3 (previously) was founded on the poor knowledge of energy use and conservation of users (homeowners). This sub-hypothesis clearly states a relationship between the knowledge of users (homeowners) and the fact that attitudes of users (homeowners) are not significantly changed by the Government campaigns over the years.
The study sought to determine the attitudes of respondents with specific regard government campaigns, in essence testing whether the message from the campaigns had influenced existing attitudes of homeowners that were identified in the literature study, this is determined through a series of specific questions which are discussed fully in chapter 3.

2.18 Development of the research model – Providers (housebuilders)

The literature study sought evidence of any attitudinal work relating to housebuilders, it also provided a framework of possible provider attitudes towards energy conservation, and these were used to structure the research model from which the survey instrument was developed. The study undertook to determine whether the attitudes of providers was a collective one or a fragmented set of individual attitudes. Attitudes were presented by industry wide representative bodies, such as the NHBC, but it was necessary to determine, firstly whether these were the true attitudes of providers and secondly were they representative of providers in general. Identifying the contextual and operational influences and characteristics of the housebuilding industry was also an important aim of the literature study in order to understand how the attitudes of providers were formed. However, as with the user group, the literature study contained no definitive models that would permit application or replication within the context of providers (housebuilders) that would indicate with any accuracy whether providers attitudes were conducive to reducing CO_2 targets.

The literature review highlighted a number of factors that were considered to influence the attitudes of the providers (housebuilders) towards energy measures in housing. These attitudes can be described as;

- A general lack of interest in incorporating these measures;
- A view that these measures are not considered of importance to purchasers;
- The view that these measures are not financially viable in new homes.
- A perception that new homes with energy measures are not marketable.
- A general feeling that purchasers are not conversant with energy measures.

Similarly for the providers (housebuilders), no model was discovered that represented the attitudes of the providers (housebuilders) with regard to energy efficiency in housing. The literature review revealed there to be an absence of any formal published research or empirical evidence on the attitudes and perceptions of the housebuilders towards energy. However, attitudes can be characterised from the only published information relating to housebuilders attitudes towards energy efficiency in new housing, which was gathered from press statements and assorted industry press articles (Building 1987, 1993, 1995). This information confirmed;

- A general reluctance to construct energy efficient homes en masse for the general market, rather than merely for specialist events that were primarily for advertising reasons (Building 1992, Building Homes 1990).
- A feeling that dwellings with these measures included are not marketable to the potential purchaser (Building Homes 1990).
- A reluctance to include measures as they raise the cost of the dwelling (Building 1993).

2.18.1 Providers (Housebuilders) attitudes

The hypothesis for the providers of domestic dwellings has been stated to be:

'The prevailing attitudes of providers (housebuilders) are not conducive to the attainment of the CO_2 emissions reduction set by the government'.

This was further broken down into two sub-hypothesis, each addressing specific aspects of this attitude, these were stated as:

1) Providers (housebuilders) do not consider energy to be an important issue in new housing
2) Providers (housebuilders) believe that there is no market for energy efficient homes.

The attitudes expressed in these hypotheses have been deduced from the literature study and from the survey undertaken as part of the pilot study of providers. These indicated that collectively, the providers were a single minded industry which was consistently homogeneous in its actions despite being fragmented in its structure. The industry also demonstrated a considerable amount of similarity in its product at its respective product types, even allowing for regional variations.

2.18.2 Sub-hypothesis 1 : Providers (housebuilders) do not consider energy to be an important issue in new housing

This sub-hypothesis was one of the attitudes that was discernible from the literature study. Providers (housebuilders) are reluctant to include energy measures in new homes as they raise the cost of the dwelling. The existence and strength of this attitude was determined by a series of questions relating to the specification of their new houses and is discussed fully in chapter 3.

2.18.3 Sub-hypothesis 2 : Providers (housebuilders) believe that there is no market for energy efficient homes.

This sub-hypothesis was one of the attitudes deduced from the literature study. Providers do not consider energy measures to be marketable to the potential purchaser. The existence and strength of this attitude was determined by a series of questions relating to the marketing of new dwellings and providers views of potential purchasers desires and is discussed fully in chapter 3. Collectively, these sub-hypothesis form the basis for the survey design discussed in chapter 3.

Main Hypothesis

The prevailing attitudes of users (homeowners) and providers (housebuilders) are not conducive to the attainment of the CO_2 emissions reduction set by the Government.

Hypothesis

The prevailing attitudes of users (homeowners) are not conducive to the attainment of the CO_2 emissions reduction set by the Government.

Sub hypothesis

1) Users (homeowners) are unwilling to pay for energy efficiency measures unless there is an unrealistic return on their investment
2) Users (homeowners) will conserve energy to maintain comfort irrespective of other considerations.
3) Users (homeowners) attitudes are based on poor knowledge of energy use and conservation.
4) Users (homeowners) attitudes are not significantly changed by government campaigns.

Hypothesis

The prevailing attitudes of providers (housebuilders) are not conducive to the attainment of the CO_2 emissions reduction set by the Government.

Sub hypothesis

1) Providers (housebuilders) do not consider energy to be an important issue in new housing

2) Providers (housebuilders) believe that there is no market for energy efficient homes.

CHAPTER 3 METHODOLOGY

3.1 Research Strategy

The research centres upon determining the attitudes towards energy use and conservation of two distinct groups of variables, one the users of domestic dwellings and two the providers of domestic dwellings

The research strategy adopted was a straightforward deductive approach, based on the formulation of a hypothesis from the literature study, and then fieldwork undertaken to test the hypothesis. The principles of the deductive approach were applied directly to determine the attitude of the two groups, end users and providers. (Bryman 1993). The process of the deductive approach used is underlined below.

For the users (homeowners) group, the research adopted a logical sequence of tasks;

- Define the context and parameters of known user attitudes from the literature study
- Develop an explanatory model of user attitudes from a study of the literature
- Select and define the sample of users
- Develop a survey instrument to ascertain the attitudes of users
- Pilot the survey instrument and adjust
- Determine the attitudes of users using the survey instrument
- Analyse the results to determine the conduciveness of users to a reduction in CO_2 emissions.

For the providers (housebuilders) group, the research adopted a logical sequence of tasks;

- Define the context and parameters of known provider attitudes from the literature study
- Develop an explanatory model of provider attitudes from a study of the literature
- Select and define the providers sample
- Develop a survey instrument to ascertain the attitudes of providers
- Pilot the survey instrument and adjust as required
- Determine the attitudes of providers using the survey instrument

- Analyse the results to determine the conduciveness of providers to a reduction in CO_2 emissions.

The two groups (users and providers) were treated as distinct from each other, and although interrelated in practice, a separate research methodology was adopted for each group.

The research objective sought to determine whether the attitudes of users (homeowners) and providers (housebuilders) towards energy use and conservation were conducive to the attainment of reduced CO_2 emissions committed to by the government. The hypothesis is separated into the two sub hypothesis, one for each group (users and providers) and are stated as:

'The prevailing attitudes of users (homeowners) are not conducive to the attainment of the CO_2 emissions reduction set by the government'.

'The prevailing attitudes of providers (housebuilders) are not conducive to the attainment of the CO_2 emissions reduction set by the government'.

For users (homeowners), the key areas to be tested were deduced from the literature study, which grouped the factors under consideration into four broad areas. These areas were then developed into a questionnaire as it was considered that a questionnaire would be the most effective way to collect the information required on a large scale. A representative sample of homeowners in the South East was then selected. The questionnaire was piloted, with the main questionnaire being administered after restructuring, in light of the results from the pilot phase.

The questionnaire returns were then analysed against variables that were considered to have a potential association to attitudes and from this analysis the factors deduced from the literature study were tested and conclusions drawn.

For the providers (housebuilders), the main factors for testing were deduced from the literature study. A representative sample of housebuilders in the South East was selected for testing. The factors from the literature study were then combined into a questionnaire for use in face-to-face interviews, after piloting the questionnaire by post. The results of the interviews were then analysed and the factors deduced from the literature study were then tested and conclusions drawn.

3.2 Ascertaining Attitudes

The literature study had identified the likely attitudes of users (homeowners) towards energy conservation and similarly those for the providers (housebuilders). Once the attitudes had been deduced, the methodology then set out to test whether the impact of these attitudes obtained from previous studies were those attitudes that did have an impact in practice. This was achieved by undertaking an extensive attitude study of both groups in the form of questionnaires and structured interviews.

3.3 Users (Homeowners) Study

3.3.1 Selection of Survey Instrument

With regard to the selection of the most appropriate survey instrument, consideration was firstly given to using a small sample of first stage questionnaires followed up with more detailed structured interviews. However, on further deliberation it was considered that this method would not provide an adequate representation of the population, especially when trying to elicit attitudinal and behavioural data. Therefore the decision was taken to select a larger sample and provide more detailed questionnaires, using a quantitative approach that would provide the capacity for generating quantifiable data on a large number of people, known to be representative of the wider population, an approach used by Hirshi (1969). Bryman (1993).

By using this method, it was considered that the larger sample would be more representative of the population, which would provide a greater diversity of respondents residing in different dwellings with different attitudes and behaviour towards energy use and conservation. This was considered to be more advantageous than using the smaller sample as there was a possibility, that although the data would be more detailed with the smaller sample, a greater chance of bias would exist (Oppenhiem 1996). In addition, it was considered that the use of a more detailed questionnaire using a large sample could provide as much detail as elicited from a structured interview (Moser and Kalton 1979).

3.3.2 Design of the questionnaire

The questionnaire aimed to elicit a number of different types of data. Contextual and factual data such as the energy efficient measures the respondents had installed, the cost of their fuel bills, and the personal and social data that gave a profile of the respondents. These questions mainly consisted of Yes/No and categorical responses. Other data collected revealed the behavioural practices of the respondents, these questions aimed to identify actions of the respondents in certain instances. The questions were primarily aimed at energy use through heating patterns and practices.

Categorical answers were used in certain instances, giving a choice of the behaviour or factual response of the respondents, this was to ensure that the respondents had the opportunity to select an appropriate response, rather than insert one. This enables a more structured questionnaire to be used, and less effort required on the behalf of the respondent to consistently have to complete or write in these responses.

For the purpose of cross checking the responses to avoid respondent error, the questionnaire was planned in such a way that in many instances cross checks could be achieved to check the validity of the responses, this was by triangulation in most instances. In this particular questionnaire the use of triangulation proved an invaluable tool as it enabled some erroneous responses to be further clarified or discounted.

In the case of some questions contained in the questionnaire, which posed an open question: as an example, the questionnaire asked "Why?" these open ended responses supported genuine responses.

Despite the inclusion of some open ended questions; the main questionnaire was structured in such a way that the respondent was only required to give a single-minded response in the majority of instances.

3.3.3 Testing the sub-hypothesis

To test each individual sub-hypothesis, specific sets of questions were included in the questionnaire design. These specific questions had been deduced from the literature study. To restate these sub-hypothesis;

1) Users (homeowners) are unwilling to pay for energy efficiency measures unless there is an unrealistic return on their investment

2) Users (homeowners) will consume energy to maintain comfort irrespective of other considerations.

3) Users (homeowners) attitudes are based on poor knowledge of energy use and conservation.

4) Users (homeowners) attitudes are not significantly changed by government campaigns.

3.3.4 Sub-hypothesis 1: Users (homeowners) are unwilling to pay for energy efficiency measures unless there is an unrealistic return on their investment

For sub-hypothesis 1, the topics for the questionnaire that were considered to assist in assessing users attitudes towards paying for energy efficient measures can be seen in figure 3.

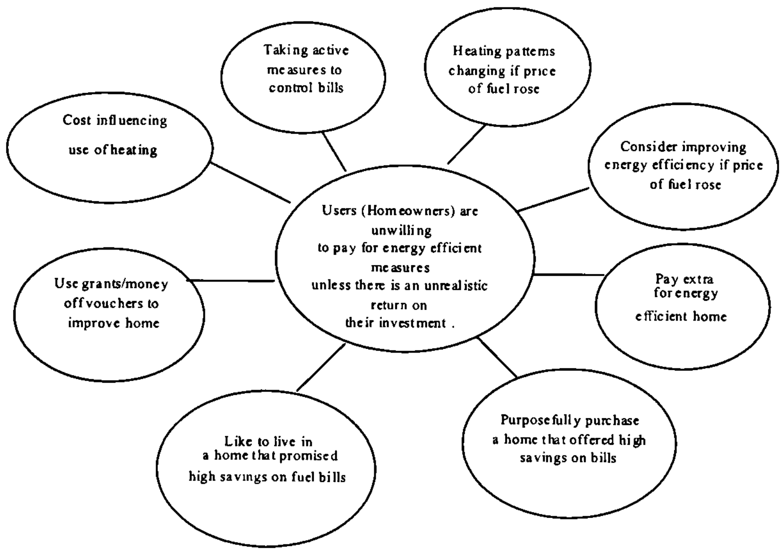


Figure 3: Sub-hypothesis 1.

This sub-hypothesis was one of the attitudes that were discernible from the literature study. Users (homeowners) are unlikely to pay for energy efficiency measures unless there is an obvious return on their investment. Therefore the existence and strength of this attitude was determined by a series of questions relating to cost and energy use.

Initially the survey sought to establish whether users regarded the prospect of living in an energy efficient house to be desirable. Without a strong basic desirability for this the subsequent questions regarding cost and energy efficiency would be logically invalid.

The study sought to determine the willingness of the users (respondents) to pay extra for energy measures and the degree to which a return on an investment is an incentive to invest. When combined these factors will provide an indication of the number of respondents that would like a dwelling that saves money on fuel and the number of respondents that would pay extra for a dwelling of this kind. In addition, an indication will also be given of the respondent's willingness to invest in energy efficient measures for certain payback percentages.

The study also sought to determine the attitude that respondents had towards various aspects relating to the cost of heating. Specifically, whether cost influenced use and whether the respondents actually took active measures to control the fuel bill (energy use) in their home, together with the respondents attitude towards changes in the cost of heating if the price of fuel rose.
In addition, the attitudes of the users were assessed with respect to the likelihood of them improving their property if fuel costs rose. This would give an indication of which measures the respondents would install when VAT on fuel bills was added at the 17.5% rate (rather than the 8% rate at the time of the survey), and as a result their fuel bills rising.
Another attitude was assessed by the respondent's ability to pay for the installation of energy measures; the study will show the amount of grants for energy measures taken up by the respondents to install energy saving measures in their home. This will give an indication of proportion of respondents who are prepared to use grants to help subsidise the cost of installing energy measures in their home. When

combined, these factors would give an overall indication of the attitude of users (respondents) regarding investment in energy efficiency and how a return (in the form of reduced fuel bills) is an incentive to invest.

3.3.5 Sub-hypothesis 2: Users (homeowners) will consume energy to maintain comfort irrespective of other considerations.

For sub-hypothesis 2, the topics for the questionnaire that were considered to assist in assessing users attitudes towards comfort can be seen in figure 4.

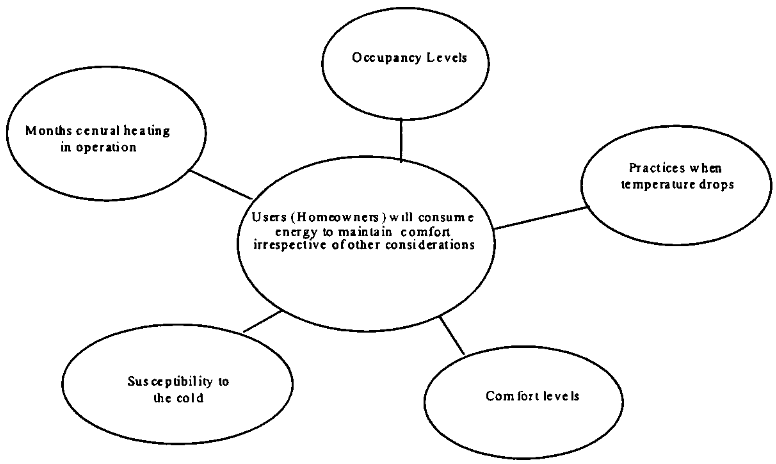


Figure 4: Sub-hypothesis 2.

This sub-hypothesis clearly states that users are not concerned with energy conservation when their comfort level is impinged upon. If this attitude is found to exist in users it will present a significant problem for the government in its attempts to reduce CO_2 emissions. It will make the preservation of comfort an inviolable objective of any initiatives to reduce CO_2. Simply put, this attitude ensures that users (homeowners) will consume energy to maintain comfort levels.

Comfort is subjective to each individual user but can be quantitatively measured in temperature bands with an acceptable level of accuracy. For the purposes of this study the comfort level of the respondents will be measured by a number of indicators.

For the duration of this study, the term comfort refers to the level that respondents try to achieve with the use of heating, and not the concept of thermal comfort discussed by other authors such as Oseland and Humphreys (1994).

The influence that attitudes towards comfort have on the attitudes towards energy efficient measures was assessed from the study by a number of factors.
The study sought to provide an indication of the attitude to comfort by an assessment of the heating patterns of the respondents. The study also assessed the energy use of the respondents with regard to their achieved comfort level and also investigated heating patterns and duration of heating times. In addition to this, the respondents susceptibility to feeling the cold together with the practices of respondents when the temperature drops were investigated. When combined, these factors would give an overview of the importance that homeowners place on their own comfort in the home and provide an indication of whether this factor had an effect on the attitudes of the respondent towards energy efficient measures.

3.3.6 Sub-hypothesis 3: Users (homeowners) attitudes are based on poor knowledge of energy use and conservation.

For sub-hypothesis 3, the topics that are considered to gain an indication of attitudes to energy use and conservation have been illustrated in figure 5.

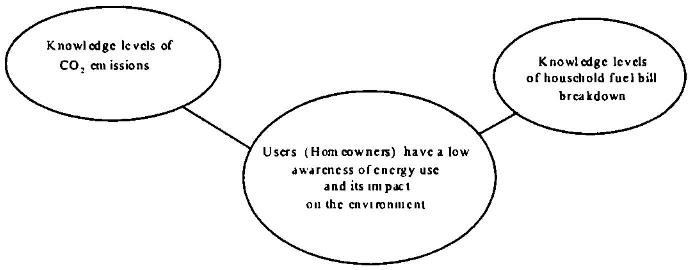


Figure 5: Sub-hypothesis 3.

The series of user (homeowners) attitudes towards energy that was identified in the literature study was that the attitude of users was founded on poor knowledge of energy use and conservation. In particular there was evidence that users had a poor knowledge of the impact of their own energy use in the home on energy use as a whole, CO_2 emissions and climate change significantly.

The attitude being targeted can be described as the level of knowledge that respondents have about the impact that their use of energy has on the environment and the effect that individual households have collectively.

The study will provide an indication of the attitude of the respondents towards certain facts regarding the environmental problems and the effect of domestic fuel use on the environment. User (homeowners) attitudes are assessed directly by questions dealing specifically with awareness of respondents towards the impact of energy use generally on the environment and awareness of their impact as domestic fuel users specifically.

3.3.7 Sub-hypothesis 4: Users (homeowners) attitudes are not significantly changed by government campaigns.

For sub-hypothesis 4, the main topics considered to gain an indication of attitudes to government campaigns have been illustrated in figure 6.

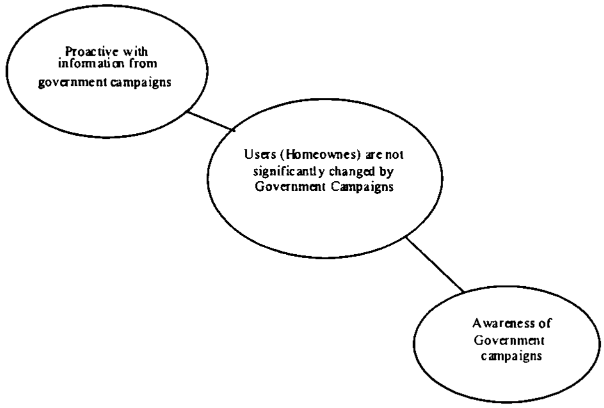


Figure 6: Sub-hypothesis 4.

Sub-hypothesis 3 (previously) was founded on the users (homeowners) poor knowledge of energy use and conservation. This sub-hypothesis clearly states a relationship between knowledge of users (homeowners) and that attitudes of users (homeowners) are not significantly changed by the government campaigns over the years.

The study sought to determine the attitudes of respondents with specific regard to government campaigns, in essence testing whether the message from the campaigns had influenced the existing attitudes of homeowners that were identified in the literature study.

The study also sought to determine through a series of specific questions, whether attitudes had been influenced with specific regard to the installation of energy measures and whether users (homeowners) attitudes were proactive as a result of the campaign messages.

3.3.8 Intervening variables.

A number of intervening variables have been identified and analysed with respect to all the results to determine whether any of them have a significant effect on the attitudes of the respondents, these are; the age of the respondents, income level, gender, and size of the dwelling.

3.3.9 Statistical validation

The results have all been tested using the Chi square statistic to test whether the frequencies could have arisen by chance or accident, in all the cases for this group of variables it was shown that the distributions were valid and that they could not have occurred by chance. In addition, the *t* - test for one sample was calculated to prove that the means for the variables used are similar to that of the population. The results were also validated through observation of simple frequency distributions and later through observations of contingency tables. This enabled the data to be checked through the use of statistics, but be founded on a strong logical intuitive approach.

3.3.10 Piloting the questionnaire

The pilot questionnaires were for the purpose of testing the questionnaire responses. In addition, the pilot would also provide an indication of likely response rate, demonstrating whether this type of respondent had an interest in the subject, which would be reflected, in the number of returns. Piloting the questionnaire also assisted in determining whether the response rate was spread across the required range of property type. Areas to the north, south east and west of London were selected and used for the distribution of pilot questionnaires, which were considered to be a suitable range of areas, where the distribution of the questionnaires would not be affected by bias in any particular regional area.

It was essential in the design of the questionnaire to ensure that the phraseology of the questions did not lead to misinterpretation, mislead, or cause ambiguity for respondents. Therefore, piloting was used to validate a number of factors. Firstly, because a large sample was being used and the respondents were primarily considered to be fairly uneducated with respect to the subject matter. Therefore it was felt that the questionnaire should be piloted to ensure that the questions were fully understood, that the terminology used in the questions was appropriate and concise. Of particular concern was to ensure that the terminology and structure of the questions was understood across all ages, as the sample would cover all age ranges, including the elderly.

Initially it was discovered that some of the social questions posed were causing unreliable data and misinterpretation. As a result, the group of questions dealing with the social profile of the respondents were re-written and presented in a way that would be easier for the respondents to answer and easier to code for the final study analysis, as well as providing more accurate and reliable responses.

Also the pilot study showed a great deal of misinterpretation for technical questions such as terminology for double glazing and secondary glazing with many respondents being unaware of the difference between the two, which in some ways can be considered indicative in itself. However, for the main questionnaire phase, terminology such as this was restructured. In the pilot study some respondents claimed they had double glazing when they actually had secondary glazing, which was discovered in a randomised checking exercise. Therefore, as a result of this misinterpretation, two separate categories were added for each element to ensure that this would not re-occur.

The pilot study also revealed that many of the respondents were unaware of the correct age of their property, and this was therefore removed from the final survey where the approximate age of the property was noted at the distribution point, therefore eliminating incorrect gauging of the age of the property by the respondents.

It was also found from the pilot that the questions dealing with attitudinal data in the pilot studies did not work well, as the answers were primarily of a categorical nature such as *Essential, Desirable* or *Useful* as a required response. Taking this into consideration, a 5 point Likert scale replaced these in the final questionnaire. This enables a much more accurate set of verbal indicators which in turn gave a more accurate representation of the respondents attitudes and a consistently stronger set of responses than the pilot.

By carrying out the pilot study, many initial poor question designs were restructured and re-administering of the questionnaire was possible. A low response rate was also a characteristic disadvantage of questionnaires, however, a carefully piloted cover letter and a pre-paid return envelope was found to aid the response rate in this study (Oppenhiem (1992), De Vaus (1996) and Moser & Kalton (1979).

Normally occurring respondent bias was recognised in respect of the selection of areas for the pilot questionnaire, where the responses highlighted the fact that no bias, in the form of attitudes towards energy efficient measures or bias towards a particular type of energy measure, for any particular area, was detected.
In addition, bias was also considered to come from the respondents in their need to provide a) their perception of the correct response or b) the response that they felt the questionnaire wanted. This was minimised by the style and structure of the questionnaire, which ensured that questions were mixed in the overall structure of the questionnaire and not grouped together. The responses to the pilot survey in the selected areas showed a diversity of attitudes and a similar indication of knowledge levels regarding energy efficiency from the sample. This indicated that a larger sample using the same selected areas would provide a reliable indication of the knowledge and behaviour of homeowners in the South East. This method of selecting the areas was used in an attempt to gain the full diversity of attitudes to the subject, rather than using fixed groups in defined areas where other studies were being carried out over a period of time (i.e.: using the sample upon which the English house condition surveys are carried out). It was considered that respondents from these latter groups would possibly not be as objective or unbiased, as respondents who have had no involvement with similar surveys. This planning resulted a successful response rate over a diversity of house types and ages. The responses were then tested statistically using the Chi square statistic and *t*-test to test whether the frequencies could have arisen by chance or error and whether the means for the variables concerned were similar to that of the population. Therefore, overall no significant bias from the sources affected the data.

3.3.11 Administering the questionnaire

The homeowners survey was designed as a blind questionnaire administered to the selected sample. Each questionnaire was hand delivered to the selected property types and areas for addresses, age of property and type of dwelling recorded by the individual distributor. This ensured a representative spread of house types, and ages and also correct addresses recorded for any follow-up work.

Consideration was given to the disadvantages of this method, which are mainly, misinterpretation of the questions, generally low response rates, no checks on incomplete responses, no opportunity to supplement the data by observation and in some cases ambiguity.

Despite the disadvantages, the use of early pilot studies, together with a few selected interviews, assisted in the design of the questionnaire with specific regard to unfamiliar terms used and ambiguity in the questions. As a result it was considered that this approach minimised the potential disadvantages associated with the use of postal questionnaires.

The number of questionnaires per property type was calculated by assessing the existing distribution of property types in Britain and calculating the proportion of questionnaires to distribute to each property type. 1,000 questionnaires were distributed to the selected areas; 308 were returned. A response rate of 31% was achieved, which is considered more than reasonable. It also reflects an interest in the subject of the questionnaire on the part of the householder.

The number of questionnaires required to give results that could be treated with an acceptable degree of confidence was determined using a standard statistical formula for the number of questionnaires required to give a confidence of 95%. This required that 260 questionnaires would be sufficient. The confidence produced by the actual number of responses was calculated, resulting in a confidence level of 98%, therefore it was concluded that the number of questionnaires issued and returned were sufficient to provide results that could be treated with an acceptable degree of confidence.

3.3.12 Reliability of the data

Of importance, is the representativeness of the sample of homeowners with regard to initial selection of the sample and also the way in which the data was collected so that the resultant data would be considered valid.

It has been suggested by Oppenhiem (1992) that the reliability of attitudinal data can result, in some instances, in poor attitudinal validity. Oppenhiem (1992) also suggests that for reliability checks with attitudinal questions posed, a number of internal checks should be made (the triangulation technique can be used) to ensure the reliability of responses. Checking the actual reliability of the data can either be done through other avenues of published work (statistics if relevant) or alternatively constructing sets of questions that are all relevant to one particular attitude.

For this study the triangulation technique was used in many instances, which aided the confirmation of certain aspects of the responses. The literature study provided a strong basis for the attitude survey and some attitudinal data was supported through the occasional use of this published literature. This technique was found to be of particular use with the homeowner study, in confirming whether the respondents actually did what they claimed to do. Without the use of this technique it is probable that some aspects of the data would have bought forth responses that were previously undetected.

3.3.13 The Sample and Limits Of The Study

The sample was determined by two key factors, firstly homeowners and secondly house type. Homeowners, rather than tenants or people in shared ownership schemes were used for this particular study for a number of reasons. Firstly, because the majority of dwellings in the UK are privately owned. Secondly, it was considered that homeowners have already passed through the process of purchasing a dwelling and are therefore familiar with the various features they would prefer in a new home. Thirdly, the study was also concerned with collecting attitudes towards energy measures in the home and it was considered that tenants would not provide the necessary responses, as the decision and responsibility to install energy measures to a property does not lie with the tenant.

House type was considered crucial in the sample selection criteria. For this study the house type of terraced, semi-detached and detached homes were identified as constituting the bulk of the housing type distribution in Britain (OPCS 1993). In addition to this fact, it was also considered that while owners of flats and maisonettes would provide a similar type of attitudinal response to the majority of the questions that were posed, it was considered that these individuals may have difficulty with some of the questions concerning the installation of certain measures such as loft insulation and/or cavity wall insulation, which is in some cases the responsibility of the whole group of residents or the managing body in a block of flats. Therefore the occupier would not be the sole decision maker on the subject of the installation of energy efficient measures to a property of this nature. With this in mind, flats and maisonettes were omitted from the study. The number of each house type included in the sample was selected to reflect the proportions of each house type in the national housing stock.

The geographical areas selected for the survey was limited to the South East, each within a 25-mile radius of central London. By using this 25-mile radius this would eliminate central London, where housing type is diverse and unpredictable. It was considered that the inclusion of central London in the sample, the likelihood of an unrepresentative sample was too great and would produce erroneous results due to the majority of the housing stock in central London not being typical to that of housing distribution in the UK. In using the 25-mile radius, the sample was found to be representative of national housing and social profile figures. However, it is recognised that to a certain degree regional influences, with respect to culture may be present. A map showing the areas of distribution is include as Appendix 2.

3.3.14 Representativeness of the sample

The sample was based on the OPCS to ensure that the spread of house type was a representative as possible. The sample collected was considered to be representative as the dwelling types under scrutiny covered the majority of the housing types found in the UK, the distribution can be seen in following section (OPCS 1993).

3.3.15 Property Type.

Table 2 shows the distribution of property types compared with the national distribution.

Table 2. Property type distribution.

Property Type	Survey Sample	National (OPCS 1993)
Terraced	24%	29%
Semi Detached	55%	31%
Detached	20%	19%

It can be seen from table 2 that the distribution of housing for this sample covers the majority of the housing types found in England (OPCS, 1993). The figures illustrate acceptable differences between the distribution of property types in the sample and for the national distribution. The distribution of house types used in the study can therefore be considered sufficiently representative of the distribution of house types in Britain. Despite a slight difference in distribution between the national sample and that of the research sample, with specific regard to semi-detached dwellings, an analysis of responses was undertaken with specific regard to house type and produced no significant differences in attitude between respondents, except in a minority of instances and these have been specifically noted.

The number of questionnaires per property type was calculated by assessing the existing distribution of property types in Britain and calculating the percentage of questionnaires to distribute to each property type. This resulted in 240 questionnaires being distributed to detached housing with a response rate of 26%, 390 questionnaires being distributed to semi-detached housing with a response rate of 43% and 370 questionnaires being distributed to terraced housing with a response rate of 20%.

3.3.16 Age of the Dwelling

The age of the dwelling was not considered a fundamental factor in the determination of attitudes, however in the administration of the questionnaires, care was taken to ensure that a representative spread of property ages were present in the sample, which ranged from Victorian, Edwardian, to present day. Properties older than Victorian were excluded due to the likelihood of the property (or certain aspects of the property) being listed and the associated planning requirements being needed to install some of the simplest energy measures.

Age of the dwelling was used as a useful crosscheck of the validity of a number of responses made by householders. As an example, a respondent claimed to have installed double glazing in a property that was actually constructed in 1995, where double glazing would have been standard to conform to the current building regulations. Therefore the age of the property was useful in the further triangulation of responses.

3.3.17 Number of Bedrooms

The size of house is also indicated by the number of bedrooms in the dwelling. Table 3 shows the distribution of the number of bedrooms per dwelling for the sample. The sample provides a generally representative distribution across the range of dwellings reflecting the distribution in the national housing stock. However, as the table shows, one and two bedroom dwellings are under-represented against national housing statistics (OPCS 1993). This under-representation in the sample was evaluated further in order to determine its influence upon the validity and reliability of the results produced by the sample. In overall terms one bedroom and two bedroom dwellings account for 42% of the national housing stock, as a consequence any unreliability would be limited to this extent. Additionally, one bedroom dwellings are 12% under-represented and two bedroom dwellings are 18% under-represented, therefore the deficiency is further limited when considered against the results for the whole sample. The main potential for invalidity and/or unreliability of the data would arise of the attitudes of one bedroom and two bedroom users if they were found to be significantly different from the users of dwellings of other sizes. Consequently, to identify whether this occurs, and to quantify the extent should it exist, the results for one and two bedroom dwellings will be crosstabulated against the remainder of the sample. Where significant differences occur, these will be stated and evaluated in the results.

Table 3. Number of bedrooms.

Number Of Bedrooms	Survey Sample	National (OPCS 1993)
1 Bedroom	2%	14%
2 Bedroom	10%	28%
3 Bedroom	61%	33%
4 or more bedrooms	27%	25%
Total (308)	100%	100%

3.3.18 Ownership of Heating Systems

Significantly, the vast majority of the respondents, 98%, had central heating, with 93% being gas fired. 'Wet' systems using radiators were by far the most common form of distribution system.
The second aspect of heating systems considered important was to determine whether respondents had instigated the installation of central heating. To this end the respondents were questioned on whether central heating was present in their property or whether they had instigated its installation. In this respect, of the sample 27% of respondents (who had some form of central heating) had instigated its installation.

Although not directly asked, it is suspected (and further underpinned by the literature study) that the 27% of respondents who had instigated the installation of central heating had done so largely for comfort reasons, plus as a secondary reason to increase the value or saleability of the property and not surprisingly economic considerations played a major influence. In terms of attitude, gas being the cheapest fuel, was the fuel of choice, cheap in operating costs, but not in capital costs, where electricity would have been much cheaper and simpler to install.

It confirms that homeowners are influenced by longer term economic costs provided they are sufficiently low. The perceived greater comfort from the use of radiators versus electric heaters is also a factor to be considered, but appears to be a minor consideration to the user (homeowner) compared to the long term operating cost advantage of gas.

Gas was the primary fuel used for heating systems by users (homeowners), as shown in figure 7.

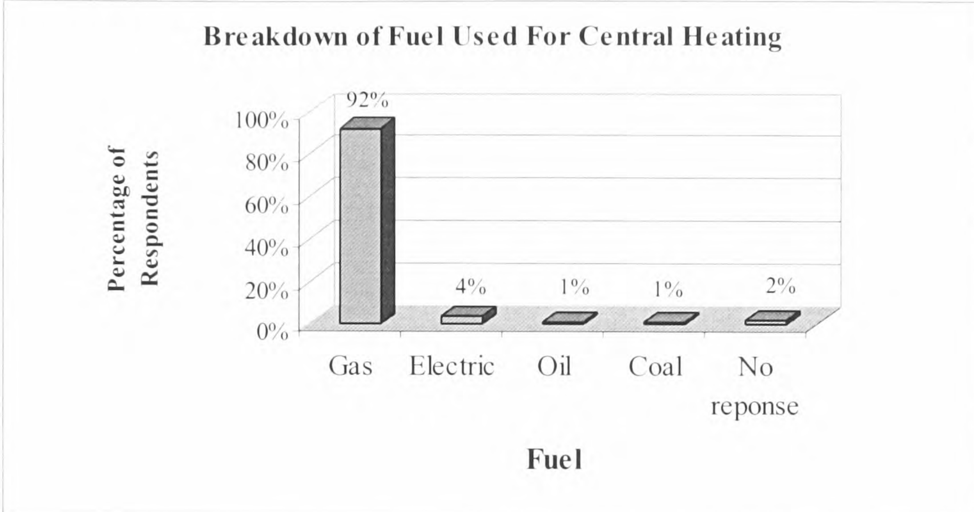


Figure 7: Breakdown Of Fuel Used For Central Heating

The predominance of gas fired central heating systems reflects the preference for gas as a fuel. Gas has increased greatly in popularity over the years, as it is a virtually instantaneous form of heat. However, the widespread use of gas for central heating or cooking in the home contributes greatly to environmental problems. On average a typical home with gas as the main fuel for heating and cooking produces around 7.5 tonnes of CO_2 emissions per year at point of use. The Energy Efficiency Office recommends that this can be reduced by up to a half by improving the efficiency of homes (DOE 1993). This is clearly the crux of the issue as to why it is important to know the fuel used in the central heating and cooking, because it shows that the users have direct control over 7.5 tonnes of CO_2 emissions per annum. It makes them directly responsible in the issue of CO_2 emissions.

3.4 Demographics of the user sample

3.4.1 Age of Respondents

It can be seen from Table 4 that the sample broadly representative of homeowners in the UK and shows no obvious bias towards any particular demographic grouping. In a general comparison to resident population statistics, (ONS, 1996) the sample corresponds with 1994 statistics and can be considered an acceptably representative spread of the population.

Table 4. Age of respondent.

Age Of Respondent - Years	**Percentage of Sample**
18 - 25 years	1%
26 35 years	19%
36 - 45 years	23%
46 - 55 years	19%
56 - 65 years	19%
65+ years	18%
No responses	*1%*

The age of respondents was also compared to 1996 figures from the Council of Mortgage Lenders (Housing Finance 1994) where the distribution of age range for borrowers can be seen in table 5.

Table 5. Age range of borrowers.

Age Of Borrower	**Total UK Percentage**
Under 21	1%
21-24	7%
25-34	37%
35-44	30%
45-54	18%
55 and Over	7%

The results from the survey are broadly in line with the figures from the Council of Mortgage lenders, however it must be remembered that especially in the case of individuals aged 55+ years, it is fairly unlikely that these respondents would have recently taken a mortgage to purchase a property and have probably been in occupation for a number of years, possibly having no mortgage.

3.4.2 Gender

Forty eight percent of the respondents were male, 51% were female, with 1% not responding. The age of the respondents was compared to gender to gain an indication of the distribution of age and gender, and showed a reasonable spread of both genders across the age ranges. However, analysis of the data did show that in some aspects female attitudes do tend to differ significantly from the male attitudes.

3.4.3 Occupation /Employment

Employment was ascertained to provide contextual information regarding potential disposable income that may influence homeowners attitudes to the affordability or otherwise of energy use and energy conservation. Employment also assisted with the cross-checking of occupancy patterns and with regard to heating patterns. This is reflected in practices amongst retired individuals, which differ from respondents with differing employment status. Table 6 below shows the distribution of respondents and their occupations.

Table 6. Respondents and their occupations.

Occupation	**Respondent**	**Spouse/Partner**
Unemployed	1%	1%
Self Employed	1%	1%
Employed	58%	48%
Retired	28%	17%
Housewife/Husband	10%	9%
No Responses	2%	24%
Total	**308**	**308**

3.4.4 Income Level

Income was expected to have a major influence on householder's energy use and energy conservation, specifically with respect to perceptions of the affordability of certain energy measures. The income levels of the sample were grouped into the following categories shown in Figure 8. The majority of the respondents fell into the income bracket of £0 - 40,000 per year, with the highest responses being in the income range of £20,000 - £30,000 per year and £10,000 - £20,000 per year.

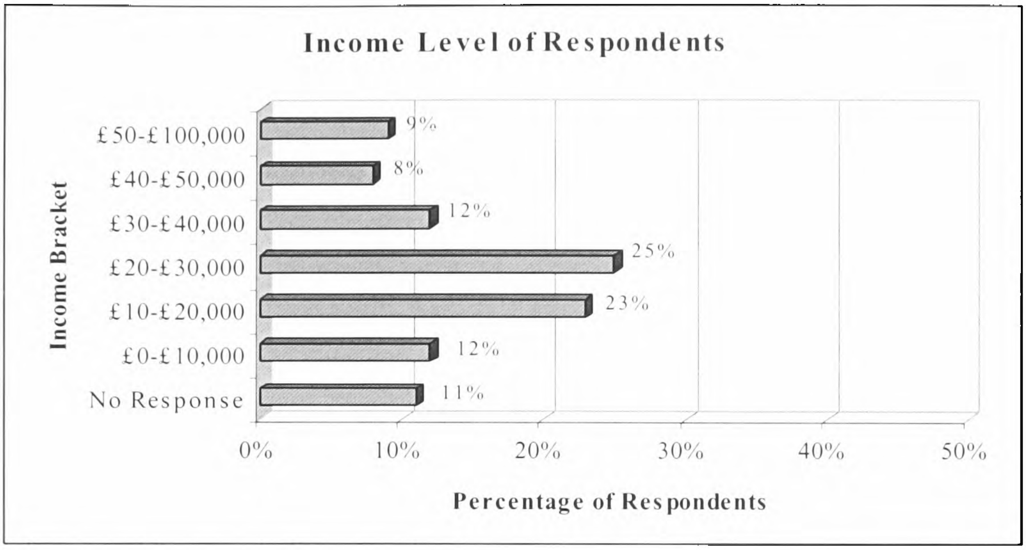


Figure 8: Income Level of Respondents

In comparison to the Regional Trends Survey 1996, and the Annual Abstract of Statistics 1997, the income level for households in the South East per year is in the region of £19,808 £22, 646. The sample for this study shows that 48% of the respondents fall within this band; this supports the reliability of these returns. Age and income were found to be statistically associated with a confidence of 99.9%.

The association demonstrated that the respondents in the older age range of 56 - 65+ were mainly in the lower income areas. The figures also suggest that the earning power of respondents remains fairly constant through to middle age, when it begins to reduce. This suggests that as the older generation are less affluent than the rest of the sample, this group may be less inclined, or able to invest in energy efficiency. These findings are underpinned by Salvage (1993) whose research found many people aged 65 years and over were living in extremely cold conditions, even in relatively mild winter months. Salvage also draws conclusions regarding the specific relationship between ‘old’ and ‘cold’. For the remainder of the respondents whose earning power is fairly constant, this would suggest that this group are able to invest in energy efficiency as they appear to have the potential to afford energy measures, however, the inclination may not exist.

3.4.5 Years In Occupation

The length of occupation in the dwelling by respondents was ascertained to determine whether the period of time in occupation would influence attitudes to energy use.

Table 7. Years in occupation.

Duration	**Percentage of Respondents**
1 5 Years	22%
5 - 10 Years	25%
10 - 15 Years	18%
15 - 20 Years	9%
20 - 25 Years	7%
25 + Years	19%

The highest number of respondents were those that had been in occupation for 5 10 years.

3.5 Data analysis

A number of intervening variables that were considered significant were also included in the questionnaire and subsequently analysed against the data to assess whether these variables had an influence upon the data. This was undertaken not to determine causality, but to determine whether these variables had an association to attitude. The intervening variables comprised social factors, such as age and income, personal factors such as gender, and susceptibility to the cold of the respondents, together with contextual data such as size of the house. The ethnic group of the sample was not collected, as in the UK the total percentage of the population of ethnic minority groups is 5.5%. In the south east the population of ethnic minorities as a percentage of the total population is 9.9%. Therefore it was considered that as this percentage is relatively small, the responses would not be unduly biased from groups within this minority. (CSO 1994).

Because of the type of data being gathered in the surveys, a number of different varieties of data were collected. Nominal, ordinal and interval data were collected, along with anecdotal data. Anecdotal data was not analysed statistically.

In addition to the structure of the questions to ensure reliability, the measures taken to ensure the reliability of the data once it had been collected were in the form of a non-parametric test using the Chi-square statistic and the parametric test using the *t*-test statistic. All of the variables were tested using the Chi square statistic to test whether the frequencies could have arisen by chance or error and in all cases showed that the statistics were valid and could not have arisen by error or chance. Similarly the *t*-test was calculated to assess whether the means for the variables concerned were similar to that of the population, from this analysis there appeared to be no variable mean that was significantly different to the population mean.

Simple initial statistics were employed such as frequency distributions, but the most revealing test was provided by the use of contingency tables, with the use of the Chi-square statistic for the comparison of two variables. This statistic assessed the statistical significance if an association existed between two variables at the lowest confidence limit of 95%, with the highest being 99.9%. In most cases when dealing with the intervening variables that were considered to have an association to the dependent variables, these two variables were plotted in a contingency table with the use of the Chi-squared statistic to discover whether associations existed.

The shape of the distributions were also investigated to discover whether the selected variables were positively or negatively skewed or of a normal distribution. The type of analysis used on the variables yielded a number of issues due to the various types of data collected.

Initially a wide variety of statistical data analysis was undertaken. The data was subjected to correlation analysis, factor analysis and in some instances regression techniques. However, during this process it became apparent that some of the data did not lend itself fully to these techniques, also the logic underlying the relationships between the sets of results demanded a much more intuitive approach needed to justify the findings emerging from the data. Simple frequency analysis together with crosstabulations proved to be the most revealing. A Chi square analysis of the contingency tables was used to check the validity of data when looking for associations between variables.

As the data was mainly of an indicative nature relating to people, their attitudes and behaviour, it was considered that some statistics were unsuitable for the data as they were categorical with less than 4 or 5 points, which is considered by Bryman & Cramer (1990) to be unsuitable to treat as interval data for analysis such as correlation and regression. It is suggested that only data with 5 or more categories are suitable for treatment as interval data in analysis such as this. In addition, with regard to the logic of the factors concerned, together with preliminary analysis from the pilot data, this analysis indicated that cause and effect relationships did not exist; instead the indicators were that associations between the factors did occur. Consequently statistical analysis such as regression was not considered an appropriate method to employ.

Linear correlation was also not applied to the data as it was also felt that due to the very nature of the data it was unnecessary to gauge the intensity of relationships between the variables. During the final stages of analysis, factor analysis was considered for use in the weighting of certain attitudes, however due to the very nature of the data, the analysis was considered to be not statistically significant as the main criteria for this type of analysis is for the use of categorical data. As further statistics could not perform a statistical weighting of the attitudes, a deeper inductive and logical analysis was undertaken which provided an indication of the degree that each of the factors affected the uptake of energy efficiency. This enabled the key attitudes of the respondents to be identified.

It was noted during the process of analysis, that the intent of the survey was not to establish causality or to use regression to obtain a predictive indication, the use of statistics was primarily to discover and confirm associations present between the variables that had initially been deduced from an intuitive investigation of the variables. In addition, the survey was concerned specifically with attitudes and behaviour of homeowners towards energy use and conservation. This, together with the lack of any statistical or predictive model discovered in the literature review that would assist in identifying key behaviour patterns and attitudes underpinned the purpose of the survey. The key purpose was not to determine a predictive overview of attitudes towards energy use and conservation by homeowners, nor to determine whether certain factors had a strong cause and effect on attitudes and behaviour. Instead the purpose of the survey was to intuitively deduce certain criteria that may have an influence on the attitudes and behaviour of homeowners towards energy use and conservation in the home.

In order to obtain the specific groupings of users (homeowners) that form the basis of the original contribution to knowledge, which are discussed fully in Chapter 4, a method of filtering was employed using the statistical package SPSS. Specific key criteria were identified which formed the basis of the analysis, such as certain attitudes to the cost of energy, practices with regard to the use of energy together with certain social aspects. In this way, the group of 'income sensitive' was identified, together with the group of the 'elderly' and the proportion of the sample that they accounted for. The group that constituted the 'ambivalent' was subjected to a slightly different treatment. Once the group of 'income sensitive' and 'ambivalent' were identified, it became apparent that there was another group present, the two groups that had already been identified were filtered out from the results and initial frequencies were run to gain an insight into the characteristics of this other group. From an investigation of these frequencies it became clear that this group had very specific characteristics and these were then applied to the data through the use of a filter, which identified the proportion of the sample that the 'ambivalent' group accounted for.

3.6 Providers (Housebuilders) Study

3.6.1 Selection of survey instrument

Initially consideration was given to using a representative sample of detailed postal questionnaires. However, the pilot survey revealed a number of issues that prompted a change in methodology for this group. Therefore the main data collection phase for providers consisted of structured interviews. Using this method instead of postal questionnaires facilitated a number of issues that postal questionnaires would not have provided. These included background rationale for certain responses and a guarantee of selecting the consistent respondent in each instance. Adopting a qualitative approach in favour of a quantitative approach will enable meanings to be mediated through language and actions (Dey 1993, Oppenheim 1992, Moser & Kalton, 1979).

3.6.2 Design of the questionnaire

The questionnaire schedule used for the structured interviews aimed to elicit the attitudes of the housebuilders towards energy measures and design. Contextual and factual data such as specification standards, type of construction built, the use of energy ratings, and the use of NHBC were included. These questions mainly consisted of Yes/No and categorical responses. Other data collected revealed the attitudinal practices of the respondents, these questions aimed to identify attitudes of housebuilders in certain instances. The questions were primarily aimed at ascertaining true attitudes of the respondents towards energy measures and conservation from a company, rather than personal perspective.

A questionnaire was developed to test the criteria representing the anticipated attitudes of housebuilders as identified by the literature research. This was primarily achieved by the grouping of the questions in modules or particular subject headings. However, care was taken to mix the modules of the questions within the questionnaire so that bias or respondent fatigue would not occur.

In every instance where a importance rating was used, the respondent was given a clear set of verbal indicators, based on a likert scale. The design ensured that the areas between the scales remained constant, and enabled the respondents to be more precise in their selection of response to an attitudinal question. In addition effort was taken to keep the set of verbal indicators as consistent as possible, despite changing subject matter within the questionnaire.

3.6.3 Testing the sub-hypothesis

To test each individual sub-hypothesis, specific sets of questions were included in the design of the structured interview questionnaire. These specific questions have been deduced from the literature study and were discussed fully in chapter 2.

To restate the two sub-hypothesis;

1) Providers (housebuilders) do not consider energy to be an important issue in new housing

2) Providers (housebuilders) believe that there is no market for energy efficient homes.

3.6.4 Sub-hypothesis 1: Providers (housebuilders) do not consider energy to be an important issue in new housing

For sub-hypothesis 1, the topics for the questionnaire that were considered to assist in assessing providers attitudes towards the importance of energy measures in new housing can be seen in figure 9.

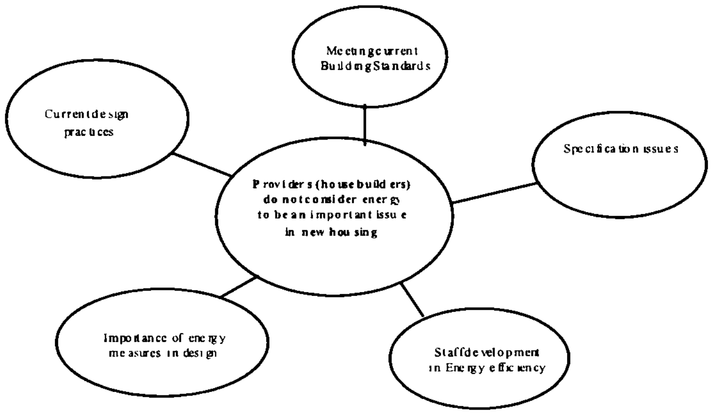


Figure 9: Sub-hypothesis 1

This sub-hypothesis was one of the attitudes that were discernible from the literature study. Providers (housebuilders) are reluctant to include energy measures in new homes as they raise the cost of the dwelling. The existence and strength of this attitude was determined by a series of questions relating to the specification of their new houses.

The study sought to provide an indication of the attitudes that the housebuilders had towards specific energy efficient measures and also assessed the views of providers (housebuilders) towards the incorporation of these measures into the design of new houses.

The study also sought to establish the level of importance that providers (housebuilders) placed on energy measures in new houses. Other factors such as adherence to current building standards and staff training and development in energy efficiency were also assessed.

3.6.5 Sub-hypothesis 2: Providers (housebuilders) believe that there is no market for energy efficient homes.

For the second sub-hypothesis, the topics for the questionnaire that were considered to assist in assessing provider attitudes towards energy conservation and the market, can be seen in figure 10.

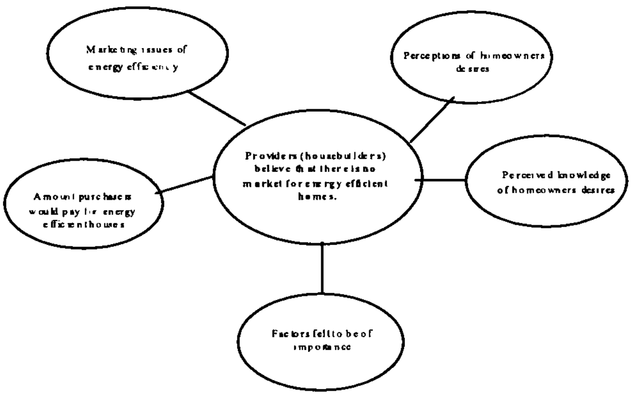


Figure 10: Sub-hypothesis 2.

This sub-hypothesis was one of the attitudes deduced from the literature study. Providers do not consider energy measures to be marketable to the potential purchaser. The existence and strength of this attitude was determined by a series of questions relating to the marketing of new dwellings and providers views of potential purchasers desires.

The research was concerned with gaining an indication of the attitudes that the housebuilders' had towards energy efficiency in the marketplace. This would confirm or reject the hypothesis that the attitude of the housebuilders is that homeowners/purchasers do not consider energy measures to be important, therefore do not demand it in new housing, resulting in the perception by providers that no market exists for energy efficient dwellings. As housebuilders are market focused and commercially driven, they are unlikely to produce a dwelling that homeowners are not demanding. By investigating this factor, the study would provide an indication of housebuilders' views regarding energy efficient homes and the presence of a market for these homes.

This factor was assessed by determining the attitudes of the housebuilders towards energy efficient homes.

The study would provide an indication of the attitudes of the housebuilders towards out the view of whether there is a market for energy efficient homes and housebuilders attitudes towards a market being present in the future. It would also provide information regarding the housebuilders appreciation of homeowner's knowledge about energy efficient measures.

In addition, the study would also provide an indication of housebuilders attitudes towards the importance of energy measures to potential purchasers. The study would provide evidence of the factors that the housebuilders felt purchasers would find important in a new dwelling, and a direct comparison with the homeowners study of the factors that homeowners find important when purchasing a new dwelling.

The study would also provide an indication of the housebuilders' views of the propensity of homeowners/purchasers paying extra for energy efficient measures in new dwellings and the degree to which they would pay. The study would provide an indication of the housebuilders views on the amount extra of the purchase price the homeowners/purchasers would be prepared to pay for a dwelling that included energy efficient measures.

3.6.6 Piloting the questionnaire

The purpose of piloting the questionnaire to the housebuilders was to ensure that the questions and terminology of the questions was understood by all respondents

and identifying which subject matters, particularly those of a sensitive nature, the respondents would be prepared to answer.
No concern existed regarding the use and understanding by respondents of technical phraseology. It was felt that the selected respondents level of seniority and their job function itself would support the fact that these individuals would be more than familiar with the specific types of terminology used in the pilot survey.

The pilot study consisted of a postal questionnaire specifically sent to the technical director of each selected housebuilder, to ensure that the respondents management level and job function were as similar as possible. In total 20 housebuilders were initially selected for the pilot study.

Additionally, a specific respondent in each company was selected, which would result in continuity of job role and function of the respondents. This also ensured that the respondents selected from each organisation were of the same managerial level and had the same function, which would eliminate the possibility of skewed results that may be obtained from an individual who perhaps performed a different function in the organisation or was not in a role as senior.

The questionnaire succeeded in obtaining the required objective data from the respondents, but was found to be deficient in attitudinal data. It was also found to be inconsistent with regard to the respondent from each company, as in some cases the questionnaire had been passed to other individuals rather than the selected respondent. The pilot study also revealed that in some instances the survey did not fully address the issues under investigation and did not elicit valuable anecdotal data.

Following analysis of the returned questionnaires from the pilot study, it was considered that the full survey would be better undertaken in the form of a structured interview. This form of survey was considered to be the best and most efficient way to obtain the necessary information, rather than a postal questionnaire, which was found to collect useful factual information from the sample, but lacked the provision of any background rationale for the facts gathered.

Some of the data to be collected was of a sensitive nature and by administering an interview, the respondents would be assured of confidentiality, secondly in the case of questions of a sensitive nature, selected prompts could also be administered in the case of the respondent not being forthcoming.

However, the prompts used were only to elaborate on specific questions and every effort was made to be not biased by the interviewer in any way.

The pilot survey was essential in refining the questions asked of the housebuilders, it also highlighted the attitudinal areas of the responses that had been unsuccessful in the pilot study. By amending the questionnaire, for administering as a structured interview by adding attitudinal questions, together with opportunities for the respondents to raise other issues and collect anecdotal evidence and additional data, the questionnaire administered for the full survey was considered to be highly successful.

It was also felt that anecdotal data would be useful for clarifying responses and exposing any underlying rationale regarding attitudes, which could only be collected during an interview.

Therefore, the housebuilders survey took the form of structured interviews using a questionnaire that had been piloted with successful results. In this particular instance the very same questionnaire and terminology prompts in the administration of the surveys was essential to produce valid results.

3.6.7 Administering the questionnaire.

In total, ten housebuilders were interviewed in the period from 25th January 1996 - 19th February 1996. Each interview lasted on average 45 minutes. Five nationwide companies with a good reputation for house building and five large regional builders of a similar reputation were selected. Ten was considered an adequate representation of the housebuilders as it was considered that the companies concerned would all be influenced by similar factors and operate in essentially a similar or the same environment.

The profile of the housebuilders within the industry was assessed. This included the annual output of new dwellings as a percentage of national outputs and regional outputs, and the respective price range of the dwellings. This profiling of the size and output of the housebuilders elicited a representative sample of the large scale housebuilders on both a national and regional scale.
Despite selecting a representative sample of providers (housebuilders), consideration was given to the theories provided by Glaser and Struass (1967), who advocate that in qualitative research less attention should be given to the need to meet statistical sampling criteria in assessing the adequacy of the sample and rather, the researcher should be more concerned with the issue of whether the sample conforms to the investigators emerging theoretical framework (Bryman 1993)

The aim was to undertake a two stage study, firstly interviewing 10 housebuilders and then ascertaining whether the responses were reliable and if so were they consistent, as they were expected to be. If this had not been the case a further 10 housebuilders would have been interviewed. The interviews produced a very high consistency of responses. This was evident in the first few interviews and was consolidated with each subsequent interview. Overall, it was found that there was little difference between the regional and national companies with regard to their attitude towards design and energy measures.

3.6.8 Reliability of the data

Of importance, is the representativeness of the sample for the housebuilders with regard to initial selection of the groups and also the way in which the data was collected, to ensure that the resultant data would be considered valid.

Each interview was conducted in private with the selected respondent from the company and executed identically for each interview, with the same interviewer. It must also be stated that for each company selected, the interviewee held the same position in each instance. This therefore eliminated the chances of bias from this source a possibility identified by Sapsford & Jupp, (1996). Bias was considered to come from the respondents in the form of their perceptions of the correct response to the questions or their perception of giving the response that they perceive the interviewer wanted. In addition it was also expected in the form of the respondent giving a personal opinion rather than that of the company's, to avoid this prior to each interview beginning, each interviewee was given a standard introduction to the survey with the reasons for the survey stated clearly, this was to ensure that in each interview the respondents had the same expectations of the survey.

3.6.9 The Sample & Limits of The Study

It was not feasible to determine the opinions of all housebuilders in the construction industry, nor was it considered feasible to determine the attitudes and behaviour of all homeowners in Britain, as the time scale and resources were not available for such a survey. Consequently representative samples of each would be sufficient to provide a reliable representation of the attitudes of both.

The pilot study selected a number of similar housebuilders in terms of size and output gained from the profile that the companies had within the house building industry, therefore the sample represented the views of large and regional housebuilders. The annual reports from each of the large housebuilders were scrutinised to verify size and output, together with NHBC listings of housebuilders that built over 250 new homes per year. The number of housebuilders that produce over 250 dwellings per year has remained relatively stable over the years, between 70 and 75 (within this figure large housebuilders with regional offices around the country have been counted as one). This gave an indication of the scale of output that the housebuilders had and as a result companies similar in size and output were selected to participate with the study. Smaller housebuilders were not selected due the very small proportion of the marketplace they held. On initial approach, all of the selected housebuilders were found to be willing to partake in the study, however this was only on the grounds of strict anonymity. Therefore for the duration of this study, no direct references will be made to any particular company. The pilot studies highlighted that the housebuilders selected were similar on both a national and regional basis, which indicated that these builders were an accurate representation of large housebuilders in the construction industry.

3.7 Representativeness of the sample

3.7.1 Property Features

Ninety percent (90%) of the respondents built homes in a traditional style i.e. masonry construction, with only 10% of the respondents building timber frame. It was suggested by the 90% that built traditionally, that this was representative of the market at the time.

3.7.2 National House Building Council Certification

All the housebuilders were NHBC registered and used NHBC building control.

3.7.3 Economic outlook at the time of survey

The economic situation at the time the survey was carried out, was that the private house building industry had been in a period of reduced output, which had dropped to the lowest figures of £25,618 (million pounds output per year) in 1993, from high figures of an output of £34,990 (million pounds output per year) recorded in 1989. In 1996 when the survey was carried out the figures were still very low with the output having only slightly increased to £27,715 (million pounds output per year). This reduced output bought about intense competition between housebuilders for sales of new homes and as a result both profit margins and building practices were tight (Building 1997).

3.8 Data analysis

Analysis of the interviews with the housebuilders was essentially based on logic. The type of data being collected in the interviews was treated differently to that of the quantitative data collected from the users (homeowners). As the housebuilder data was largely qualitative and dealing with attitudes, it was not valid to subject it to a rigorous battery of statistical analysis. Further, the type of data collected, together with the very nature of the survey determined that applying statistics of a predictive nature, or determining causality would largely be an unnecessary exercise as the survey was concerned with ascertaining attitudes of housebuilders' (Bryman & Cramer 1990).

In certain instances, categorical responses were coded and treated as quantitative data, which then enabled simple initial statistics to be employed, such as frequency distributions. However, the most revealing test was provided by the use of contingency tables, with the use of the Chi-square statistic for the comparison of two variables. This statistic assessed the statistical significance of an association between two variables at the lowest confidence limit of 95%, with the highest being 99.9%. In most cases, testing of the presence of a statistical association was not deemed necessary, but was undertaken to determine whether one existed.

The shape of the distributions were also investigated to discover whether the selected variables were positively or negatively skewed from a normal distribution.

The main aim for this data was to discover any associations that may be present between the variables that would be indicative and not assess strengths, depths and intensity of relationships between the variables for either the homeowners or housebuilders. Therefore, the main objective of the analysis of the results was to:

- Determine the reliability of each variable,
- Identify where associations existed between variables,
- Identify which of the attitudes had the most impact on the uptake of energy efficient measures.

Analysis of the anecdotal evidence collected during the interviews also took the form of an intuitive approach. In this instance this process was straightforward as so many of the responses were consistent across the interviews. Responses were `sorted` into areas and various deductions and conclusions were drawn, these were used to underpin findings from the categorical data. The anecdotal data was extremely valuable in two ways, firstly it allowed a more accurate interpretation of the interview data provided in response to the specific questions and secondly it provided a valuable insight into the mindset and thinking that underlies the attitudes expressed.

In summary, it was felt that with the results obtained and the type of data involved in the analysis of both homeowners and housebuilders, the use of statistics was in the form of simple association statistics that were primarily used to underpin conclusions obtained by a detailed intuitive and logical analysis of the data.

CHAPTER 4

USERS (HOMEOWNERS) RESULTS

4.1 Introduction

This section presents the results and analysis by sub-hypothesis, together with any subsequent areas associated with each sub-hypothesis. Also included is the analysis of results where intervening variables occur. Conclusions are drawn where associations are found to exist between the intervening variables and other variables in the study. This section also provides a profile of the respondents, e.g.; specific attributes of respondents that are more likely to conserve energy efficiency.

4.2 Sub-hypothesis 1.

The first sub-hypothesis relating to users has been stated as;

Users (homeowners) are unwilling to pay for energy efficiency measures unless there is an unrealistic return on their investment

4.2.1 Introduction

This sub-hypothesis was one of the attitudes that was discerned from the literature study. Users (homeowners) are unlikely to pay for energy efficiency measures unless there is a disproportionately large return on their investment. In the context of this study, this attitude was determined directly and indirectly using a range of indicators. These indicators were;

a) The attitude of the respondents towards residing in an energy efficient dwelling
b) The willingness of the respondents to pay extra for an energy efficient home;
c) The influence that the cost of heating has on the respondents attitude to energy use;
d) The practices of the respondents with regard to energy use;
e) The attitude of the respondents towards accepting financial aid to improve the efficiency of their home.

4.2.2. Attitudes towards paying extra for energy efficiency.

It was important to determine the respondents' attitude towards living in an energy efficient dwelling and their attitude towards paying extra for it. The respondents were questioned on a number of key issues to determine these attitudes.

Respondents were asked whether they desire to live in a dwelling that promised high savings on fuel bills.

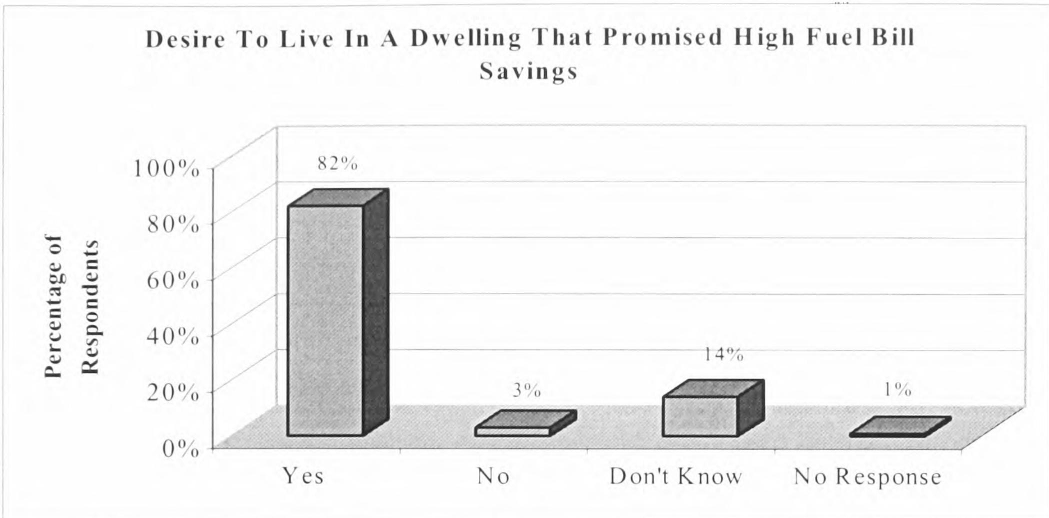


Figure 11: Desire To Live In A Dwelling That Promised High Fuel Bill Savings

As shown in figure 11, the majority of respondents stated that they would like to live in a dwelling that promised high savings on fuel bills.

The question was phrased in 'cost saving' terms rather than CO_2 reduction or energy efficiency terms because the pilot study indicated that respondents would not accurately understand the question if expressed in these terms, whilst if expressed in cost savings terms they would. The result shows that not surprisingly 82% responded positively with only 3% responding negatively. Clearly most users (homeowners) wish to live in an energy efficient home, which is unsurprising.

No associations were discovered between the results from this question with any intervening variables.

When questioned on whether they would purposefully purchase a home that promised high savings on fuel, the results showed that under half of the sample (41%) would. This is an encouraging result with regard to desire to live in an energy efficient home, however, it can be interpreted as users (homeowners) wishing to save money on fuel bills, rather than reducing CO_2 emissions. Although this is a clear indication that a significant proportion of users (homeowners) would intentionally purchase a home that promised high savings on fuel bills, there are a significant proportion (24%) who would definitely not actively seek to buy an energy efficient home, plus a further 32% who do not know. These taken together, outweigh the proportion who responded positively which suggests a low level of awareness of the energy issue and a low priority for energy efficient homes. It provides a clear indication that the prospect of saving money is a strong consideration for at least 41% of users (homeowners).

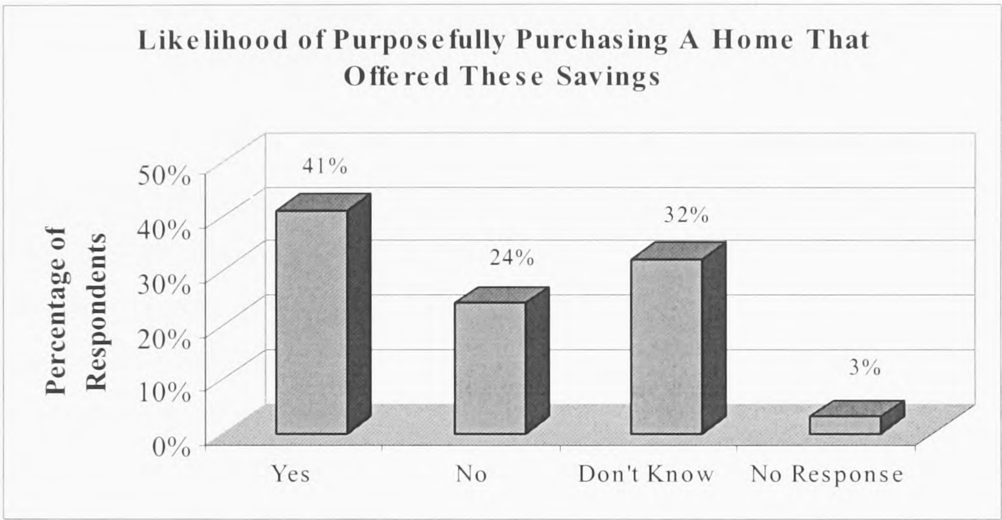


Figure 12 : Likelihood of purposefully purchasing a home that offered these savings

The sensitivity of the response to the question of intentionally purchasing a home that offered high savings on fuel bills was tested by determining whether the respondents would pay an additional £5,000 for an dwelling that offered these savings.

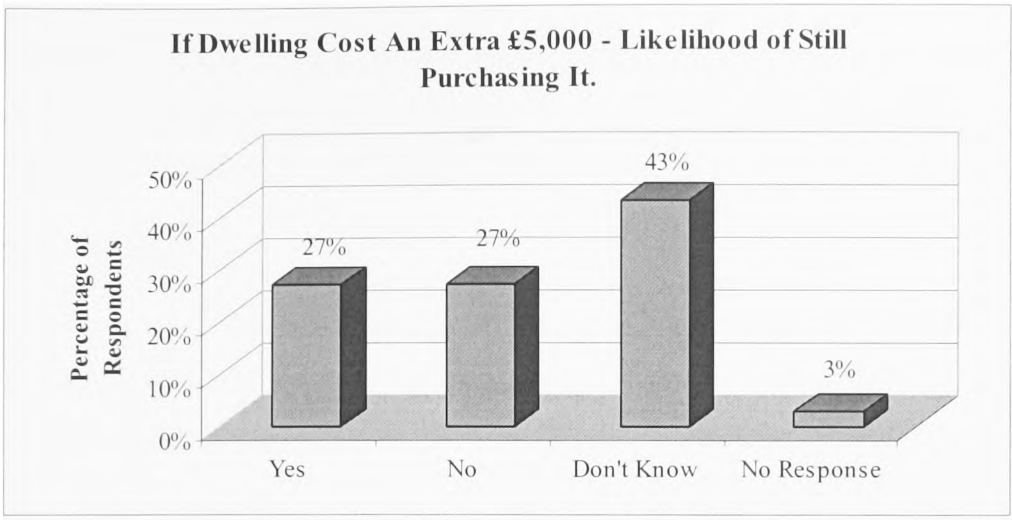


Figure 13 :If dwelling cost an extra £5,000 - likelihood of still purchasing it

Only 27% of users (homeowners) were prepared to pay the extra cost, significantly the same number (27%) were definitely not prepared to pay, leaving the largest number 43% undecided.

A comparison of the variables, (for example, preferences to live in an energy efficient dwelling and the likelihood of paying an extra £5,000 for one) shows that 32% of users who would like to live in a dwelling that promised savings on fuel bills, would also pay an extra £5,000 for it. This shows that at least of third of users (homeowners) say they are prepared to act and pay an extra cost to achieve a reduction in fuel costs. It also shows that 68% of users (homeowners) will not (or are undecided) pay an extra cost for a home that would provide them with significant savings on their fuel bills. No statistical associations were discovered between the results of this question with any intervening variables. Table 8 shows the comparison.

Table 8: Comparison of opportunity to live in an energy efficient home by likelihood of paying an extra £5,000 for it.

	If dwelling cost an extra £5,000 likelihood of still purchasing it		
Opp to live in an energy efficient home	**Yes**	**No**	**Don't know**
Yes	32%	25%	43%
No	0%	80%	20%
Don't know	9%	30%	61%
Total	**27%**	**27%**	**45%**

It appears from this set of questions, the prevailing attitude one of great appeal if no cost is involved, however, if cost is an issue to gain efficiency then a significant proportion of users are undecided or unwilling.

4.2.3 Deductions

The low priority afforded to energy efficiency and by default CO_2 emissions, is clearly illustrated by the emerging 'something for nothing' desire held by a large proportion of users in relation to the issue. Whilst the majority of the respondents (54%) liked to concept of living in a dwelling that saved money on fuel bills, they were reluctant to pay extra for it. Those respondents who stated a willingness to pay the extra were mainly respondents in a financial position to do so.
The Department of Environment (1996) study of energy practices confirms that the public insulated their homes in various ways, with the objective mainly to improve comfort rather than to save energy. The extent of the energy saving measure installed was found to be largely dependent on the affordability of the insulation. This also reflects the beliefs and attitudes of providers shown in the study of providers (volume housebuilders), (discussed later in chapter 5), the majority believe that the public consider that they should not pay extra for energy efficiency and that it should be part of the package at no extra cost.

The price sensitivity of users (homeowners) was tested further with subsequent questions that sought to identify the elasticity of the willingness to pay versus returns in the form of savings.
The question was posed as a matrix, shown below, and phrased; 'How much extra would you be prepared to pay for an energy efficient home that promised substantial savings on heating bills and running costs?'

Table 9 : Percentage savings from outlay.

	Savings Per Annum				
Outlay	**£50 pa**	**£100 pa**	**£150 pa**	**£200 pa**	**£250 pa**
£1,000	7%	7%	5%	7%	12%
£2,000	2%	5%	3%	6%	11%
£3,000	2%	1%	4%	3%	8%
£4,000	0%	1%	1%	3%	2%
£5,000	1%	1%	1%	0%	12%
Total	12%	15%	14%	19%	45%

Table 9 shows that a significant proportion of respondents (45%) choose the highest savings per annum for their investment. This suggests that these respondents (45%) are concerned with gaining the best possible payback from their investment. It also suggests that return may be important to most of the respondents, however the underlying attitude emerging from these results is that users (homeowners) want as much as possible for as little as possible. The results also show that users (homeowners) have no experience in making decisions concerning economic returns from these sorts of investments. If the respondents had been experienced in economic returns such as these, it is suggested that a higher proportion of respondents would have selected more realistic payback options. This signifies that users (homeowners) do not have sufficient knowledge of what to expect as a payback to be able to make decisions on the level of investment and therefore have to rely on their intuition for what they perceive to be the best answer, which in simple terms, is wanting as much as possible for as little as possible

These results add further support the hypothesis where users (homeowners) are unwilling to pay for energy efficiency measures unless there is an unrealistic return on their investment.

However, 12% of the respondents were relatively unconcerned with obtaining a payback on their investment by choosing the lowest payback of £50pa for their investment.

Whilst no statistical associations were discovered between the intervening variables and this set of results, 51% of the respondents (that selected the £50pa saving) were found in the middle income range of £20,000-£50,000 which indicates that they could be affluent enough to be unconcerned with a return payback and income did not unduly influence them. A comparison of respondents that selected the £50pa payback by income levels is seen in table 10. However, 14% of respondents that were fairly unconcerned about payback and selected a realistic option of £50pa saving for their investment were in the very lowest income level of £0 £10,000, this would indicate that this group either finds energy to be very important despite low income levels, or that they were more educated regarding the most realistic paybacks for investments. It could also be argued that this group only selected the lowest payback as a way to 'minimise involvement' due to not understanding the concept of paybacks.

Table 10 : Comparison of respondents that selected the £50pa payback by income level.

Income level	£0-£10,000	£10,001 - £20,000	£20,001 - £30,000	£30,001 £40,000	£40,001 - £50,000	£50,001 - £60,000	£60,001 - £70,000	£70,001 £80,000
Users Selecting £50pa	14%	23%	14%	26%	11%	3%	0%	3%

The results show that a certain amount of similarity with the findings of Bhatti & Sarno's (1996) study, which showed that 36% of households were unwilling to pay more for an energy efficient house, whilst the same percentage were willing to pay 5% more if they received a payback in two years and very few were willing to pay more than 7.5% for an energy efficient house under any circumstances.

Another aspect of the attitude of users (homeowners) towards their willingness to pay for energy efficient measures was to examine the influence of cost on the use of the heating system in their home.

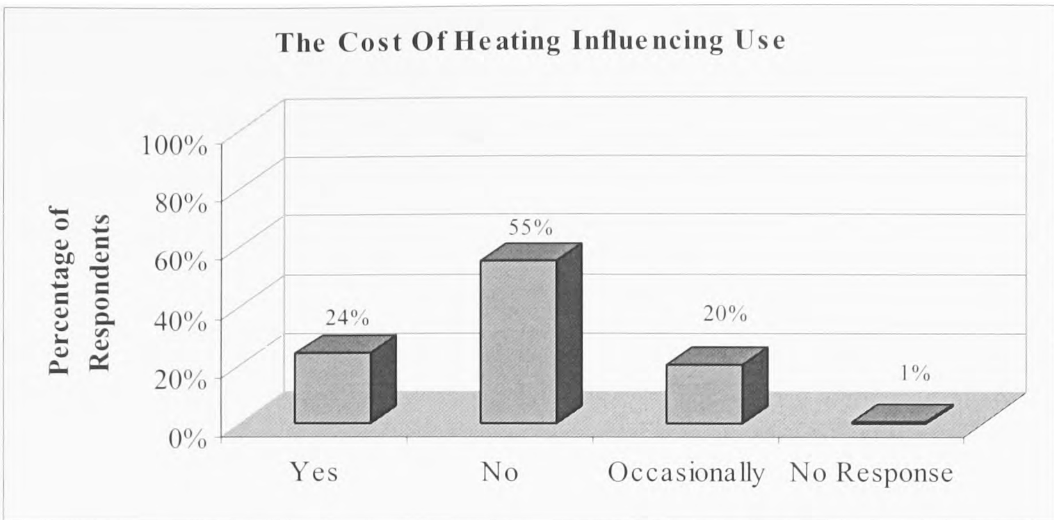


Figure 14 :Cost of Heating Influencing Use

Respondents were asked whether the cost of heating directly affected their use of the heating system. The responses showed that the majority of the sample, 55% did not consider the cost of fuel to be a controlling factor in their use of the heating system. Of the remaining respondents, 20% considered that the cost did on occasion influence their use of the heating system, whilst 24% regarded cost as the controlling factor in the use of the heating system. These findings concur with earlier findings from the Department of Environment (1986).

Further analysis of the results identified that the 24% of respondents who were influenced by cost, were mainly in the lower income levels and were generally more susceptible to the cold and claimed to only heat their home while they were there. (The results of questions dealing with susceptibility to the cold and heating patterns are discussed later in this chapter). This provides an early indication that respondents on lower incomes do tend to be more frugal in their use of heating systems, probably because they are cautious about incurring high fuel bills with a limited income. However, this group did not fall into any specific category with respect to age, size of dwelling or gender.

These results are beginning to indicate the existence of sub categories existing within what was previously assumed to be a homogeneous user (homeowner) group, which as a group is more complex than had been formerly understood.

These results relate directly to the effect that income appears to have on attitudes towards energy efficiency measures and the users expectation of unrealistic returns on investment. However although these particular findings relate to low income, and a complex user group, low income cannot be classed as a particular sub group in itself as it covers a range of ages, users and dwellings.

To explore this attitude further, a number of follow-up questions were used to ascertain whether the respondents' expressed attitude was in practice supported by their actions.

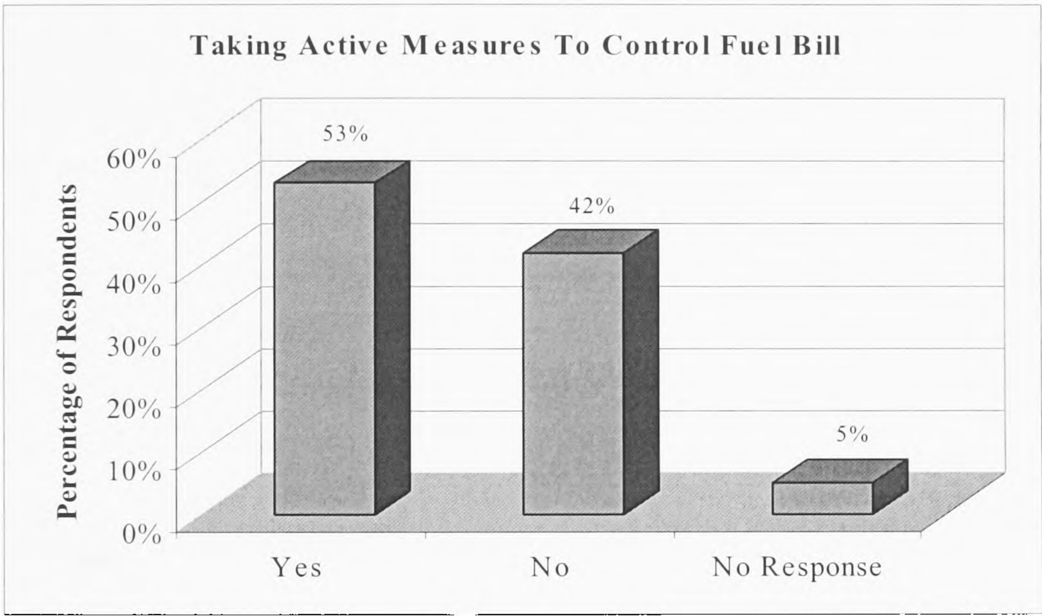


Figure 15 : Taking Active Measures To Control Fuel Bill

The first of these follow up questions asked was 'Do you take active measures to control the fuel bill in your home?' Fifty three percent of respondents stated that they did take active measures to control the fuel bill in their home. This was further reinforced by the generally low income levels of these respondents. Results from the previous question showed low income to influence 24% of respondents' use of the heating system. A clear pattern is now emerging with regard to low income users and the influence that income has on their use of energy.

42% of respondents claimed that they took no active measures to control fuel bills. No statistical associations between these results and the intervening variables were discovered.

From the anecdotal evidence provided on the questionnaires, which asked respondents which active measures they took, it was determined that the 'active' measures taken to control fuel bills were mainly fairly small scale, such as turning off lights, closing curtains and shutting doors. Analysis of the results revealed a small but discernible group of respondents who took more positive active measures. It is notable that these respondents did not fall specifically into any particular age group, income level, gender or size of dwelling. Some respondents considered more immediate 'active' measures to be wearing more clothing or adjusting the thermostat, both of which they considered to be more effective. This demonstrates a clear lack of knowledge on the part of respondents regarding how energy use can be controlled and the perception by respondents that the ineffectual 'active' methods that they take are helping to control their fuel bill.

With regard to the previous questions ('Does the cost of heating your home influence the use of the heating system' and 'Do you take active measures to control the fuel bill in your home'), combining the results showed that a significant association (99.9% confidence limit) existed between the two variables.

Table 11: Comparison of 'Does the cost of heating your home influence the use of the heating system' and 'Do you take active measures to control the fuel bill in your home?'

	Do you take active measures to control the fuel bill?	
Does cost influence use?	**Yes**	**No**
Yes	83%	17%
No	42%	58%
Occasionally	61%	39%
Total	**53%**	**42%**

Two distinct groups of respondents emerge from this analysis, one group states cost to be a factor, the other that states cost not to be a factor in their use of energy. Analysis shows that respondents who felt cost did influence use and also took active measures totalled 83%. Although this group appeared to have no specific inclination for doing this, they tended to be in the lower income levels and were shown to be more inclined to save costs on heating when the temperature dropped, by adding clothing rather than turning up the heating, which indicates that cost is the critical factor in decisions regarding the use of energy.

The responses to the questions regarding the influence of cost on use were analysed by another indicator of attitude; the use of heating if the cost of fuel rose (discussed further in this chapter).

Further analysis of the same group of respondents (17%) who stated cost to be a factor in their use of heating but claimed not to take active measures to control their fuel did admit, to being concerned with the prospect of the cost of fuel rising and as a result would be prepared to change their heating patterns. These respondents were found to be quite comfortable with the heat in their home and in the lower income levels. This would indicate that at the present time they achieve an acceptably comfortable heating standard which is affordable. In the event of a rise in fuel price it would be most likely that they would have to change their heating patterns to accommodate cost.

For the group of respondents who did not feel that the cost of heating influenced their use, but did claim to take active measures, 42% of these respondents appeared less concerned about a change in the price of fuel, as they were prepared to change their heating practices 'an average amount'. These respondents, despite claiming to take active measures, were also shown to be considerably more likely to turn up the heating rather than do anything else if the temperature dropped, which is inconsistent with taking active measures to control the fuel bills, but shows a strong response to maintain comfort. These results correlate with the high level of ambiguous responses from respondents with regard to their use of heating and perceptions of active measures to save money on fuel bills. This would suggest that the attitude of this group towards willingness to pay for energy efficient measures is largely based on a lack of knowledge of how to use and save energy. In addition, this group demonstrates a strong commitment to maintaining comfort in the form of turning up the heating rather than adding clothing or taking other active measures.

The group (58%) that did not feel cost influenced their energy use and did not take active measures appeared to be unconcerned regarding the cost of heating or attempting to control it. This group appeared to be in the lower to middle income levels and were more than comfortable with the heat in their home. Additionally, the results showed that the majority of the group were likely to turn up the heating in cold weather rather than adding clothing to save additional heating costs. Finally, perhaps the most important point, was that this group, in the event of a rise in fuel price, would be extremely unlikely to change their heating patterns or improve the energy efficiency of their dwelling. The clear attitude emerging from this group is that they would not be willing to invest in energy efficiency. Energy has no obvious importance to this group and to a certain extent nor does income influence their attitude.

4.2.4 Attitudes to the cost of heating

As well as determining whether the cost of fuel influenced the use of the heating system, it was also considered important to determine the attitude of the respondents towards whether a change in fuel cost would make cost an issue in the future. This was considered important because if the cost of heating, cooking and lighting rises significantly, this may provide an impetus for users (homeowners) to alter their practices or improve the efficiency of their home. To this end, respondents were asked whether they would change their heating patterns and practices in the home if the price of fuel doubled.

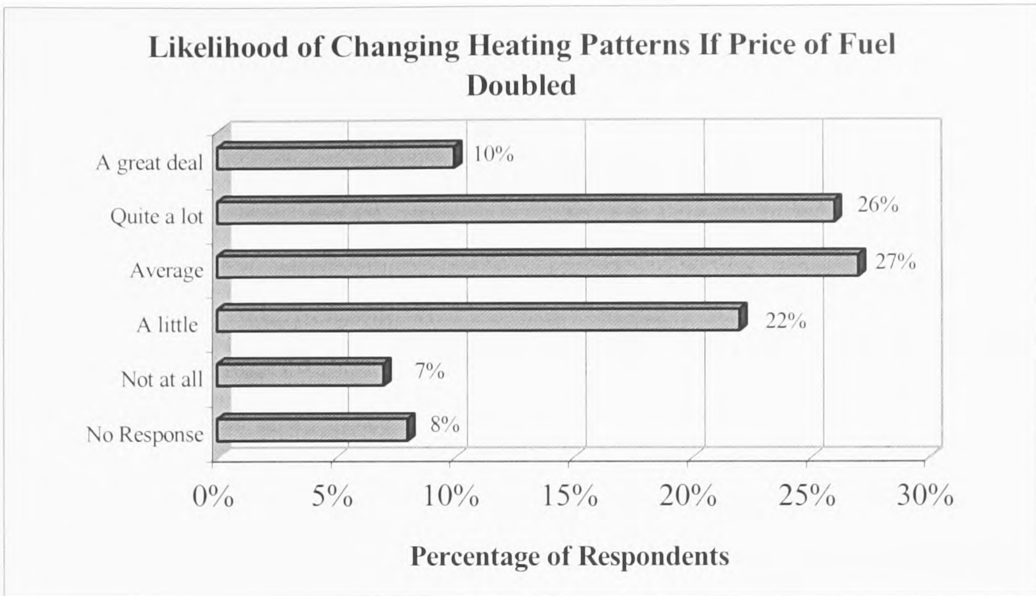


Figure 16 :Likelihood of Changing Heating Patterns If Price of Fuel Rose

As figure 16 shows, it is evident that the majority of respondents would change their practices to some extent if the cost of fuel increased. The respondents who would change their practices more than an average amount, were mainly those in the lower income levels. This provides further corroboration that the attitude of the respondents in the lower income levels are sensitive to costs to a greater extent than other respondents. Further analysis showed a small percentage (17%) of respondents would not change their practices at all if the price of fuel increased and appeared to be unconcerned about taking active measures to save energy in the home, generally felt that the cost of heating their home did not influence their use of the heating system.

In order to obtain further insight to the association that the likelihood of changing heating patterns and practices if the price of fuel rose had to the previous two questions (the cost of heating influencing use and taking active measures to control the fuel bill) a series of sub analysis were undertaken. This would determine two things, firstly; whether respondents that took active measures to control their fuel bill would also be influenced to change their heating patterns if the price of fuel rose.

Secondly, whether respondents that felt the cost of heating influenced use, would be influenced to change their heating patterns if the price of fuel rose.

The first sub analysis revealed an association between those respondents that felt cost did not influence use of heating *and* respondents that did not take active measures to control their fuel bill. The association showed that these respondents would be more inclined to change their practices in the home if the price of fuel increased.

Further analysis of the question 'does the cost of heating influence your use of the heating system' showed that there was a significant difference between the groups. This indicated that the group that did feel the cost of heating influenced the use of their heating system, were more inclined to alter their practices if the price of fuel doubled. Unfortunately, further analysis by the question (do you take active measures to control your fuel bill) failed to show any associations between the two variables.

It can therefore be concluded from this analysis, that those respondents who claimed they would change their practices if the price of fuel doubled, were those respondents that were actively concerned with the cost of fuel and who were controlling their use of fuel at the present time.

From this section of results, it can be seen that the majority of users (44%) consider cost to be a controlling factor in their use of fuel, especially if the cost of fuel was to increase significantly. However, where the respondents attempted to control fuel bills, they tended not to use the heating system (which would compromise comfort) but used other less effective measures, such as turning off lights and shutting doors. This concurs with the findings of Phillips and Nelson (1976) who concluded that whilst interest in energy saving was primarily to save money, it was not at the expense of comfort levels. Their study also found that homeowners did not know how to save energy, and thought in terms of switching off lights rather than insulating their home.

As well as investigating the influence of cost and paying to improve energy efficiency on the attitudes of users (homeowners), the opposite approach was undertaken to investigate the attitude of users towards reducing the cost of heating.

This section investigated and determined the attitude of users towards improving the energy efficiency of their dwellings in the event of incurring a high winter fuel bill and the likelihood that the users would do anything physical about it. The objective was to highlight the reality of the situation by facing respondents with a tangible and immediate cost scenario, being faced with an immediate cost, rather than a cost over time. It investigated the likelihood of respondents investing 'in a one off' series of energy conservation improvements to reduce the fuel bill, rather than a notional deferred payment.

The question was stated as; 'If your heating bill for a winter quarter was unusually high, would you consider improving the energy efficiency of your home?'

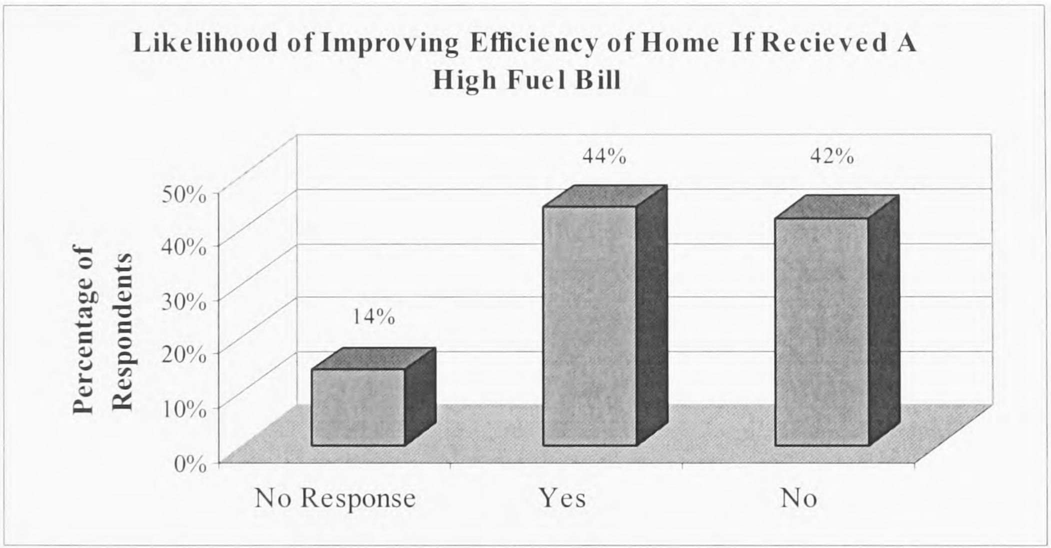


Figure 17 :Likelihood of Improving Efficiency of Home If Received A high Fuel Bill

The results shown in figure 17 reveal that just under half of the respondents, 44% would consider improving the efficiency of their home on receipt of a high winter fuel bill, while 42% would not consider it at all. This result is a clear indication of the split that exists in what was previously assumed to be a homogeneous user (homeowners) group. Two distinct attitudes emerge, the first attitude being positive towards energy conservation, whilst the second attitude being negative, even when faced with an immediate stimulus in the form of a cost penalty. It also shows that even with the stimulus of a cost penalty nearly half of the respondents are still unwilling to pay anything for improved energy efficiency.

The respondents who would consider improving the efficiency of their home on receipt of high fuel bill, were primarily those respondents who had previously responded that cost influenced their use of heating.

Respondents who would not improve the energy efficiency of their home if they received a high fuel bill were predominantly in the group that felt cost was not an issue, in influencing use of heating, and had expressed similar attitudes with respect to not taking active measures to control fuel bills. Therefore this result could be considered to be inconclusive, with only a 2% difference between the responses, however, it confirms the existence of a substantial group of users (homeowners) with clearly discernible attitudes towards energy use and energy consumption.

Detailed questions were asked of the users to determine the seriousness with which they viewed and approached energy conservation, these questions asked what measures they would take in response to a high fuel bill, ranging from simple draught proofing up to more expensive cavity wall insulation.

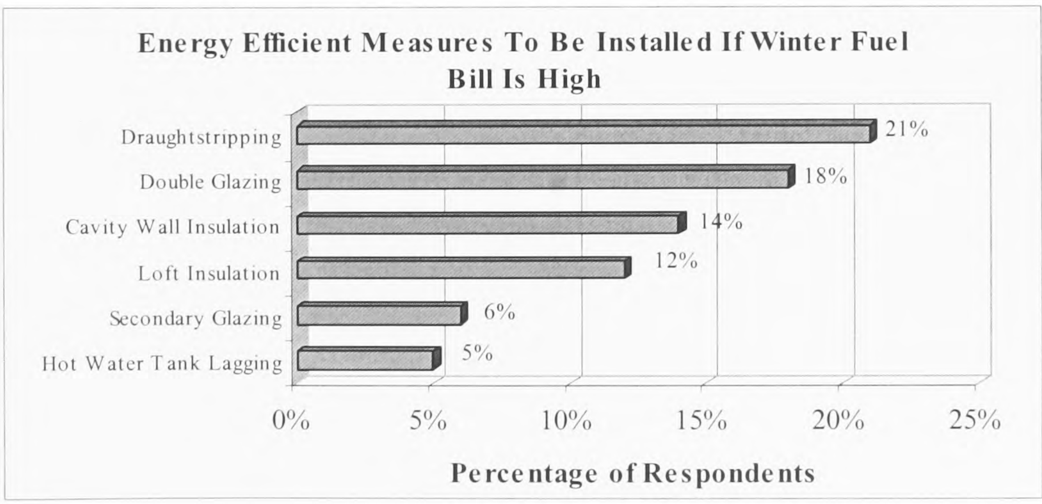


Figure 18 :Energy efficiency measures to be installed if winter fuel bill is high

The responses shown in figure 18, showed draught stripping was the most popular measure adopted by respondents, probably because this is the cheapest and most effective method that provides an instant improvement. Cavity wall insulation, loft insulation and double glazing were less popular, with secondary glazing, and hot water tank lagging being the least popular measures to be installed, despite the fact that these are some of the most effective measures to install with the shortest payback periods. Cost and knowledge of the cost, appears to be the deciding factor in the choice of respondents. The low cost measures are selected first, followed in cost order by the others, where the cost implications are known. Knowledge or the lack of it, would appear to show why hot water tank lagging is bottom, most respondents not realising that it is cheap and very effective.
No associations were discovered between these results and the intervening variables apart from an association (at a confidence of 99.9%) with respondents who selected to install cavity wall insulation, these tended to be in the younger age ranges, which could be due to a heightened awareness of cavity wall insulation and its benefits.

Closer investigation revealed that the group of users on the lower incomes and who were quite susceptible to the cold were also shown to be more inclined to improve the energy efficiency of their home. This is another division of the potential categorisation of users (homeowner), where cost has a significant influence due to a low income level, but further categorisation can occur with certain users (homeowners) being driven to improve the efficiency of their home for comfort reasons.

With regard to the cognisance and priority given to energy use and conservation by respondents, it is indicative that over half of the respondents were either not inclined to improve the efficiency of their dwelling at all or simply chose not to answer the question.

Generally respondents who felt the cost of heating influenced their energy use, were much more inclined to install measures to improve the efficiency of their home than those respondents who felt that cost did not influence energy use.

4.2.5 Deductions

This section demonstrates that with regard to whether respondents would consider improving the energy efficiency of their home as a result of an increase in the cost of fuel, a high proportion of the respondents would not improve the efficiency of their home. This suggests that even if the cost of fuel increased there is a large proportion of the sample that would not attempt to save money by installing energy efficiency measures to reduce the fuel bill. This is also in line with findings from a MORI (1990) study where householders did not comprehend that the most effective way to save money on fuel bills was to improve the insulation of their homes. These findings also confirm those of the Department of Environment (1996) and the findings of Shorrock *et al* (1993) whose conclusions state that the main reason for improving insulation tends to be an attempt to make the home warmer rather than to reduce fuel bills. Quite clearly there is a reticence on the part of users to pay for energy efficiency measures, due in part to a lack of knowledge, but mainly due to an unwillingness to pay for such measures without a guaranteed immediate and substantial return, and even then half of users (homeowners) would still not do so. Even where the incentive is a negative one in the form of a higher fuel bill, half of users would still not be willing pay for energy efficiency measures. There is a clear lack of understanding and cognisance of energy issues by a substantial proportion of users, even when they have been sensitised to the issues by penalties.

Having identified the users (homeowners) attitude towards paying for energy efficiency under normal and penalty circumstances, it was logical to determine their attitude to paying for these measures where financial incentives were offered. These questions sought to determine users (homeowners) attitudes towards grant aided measures. The question was asked whether respondents had used grants or vouchers available under earlier government schemes for the installation of energy efficiency measures. This touched upon their attitude towards accepting 'charity'. Four energy efficiency measures were given in the questionnaire, namely; loft insulation, draught stripping, hot water tank lagging and energy saving light bulbs. Table 12 demonstrates the responses.

Table 12. Measures installed with a grant.

Measure Installed	**Percentage of respondents**
Loft Insulation	8%
Hot water tank lagging	2%
Draught stripping/proofing	3%
Energy saving light bulbs	1%

Table 12 demonstrates that the majority of respondents had not used the grants or vouchers available from the government to assist with the cost of installing energy efficiency measures. The high rate of non-use tells little about the attitudes of the majority of users towards incentives, because of the many other factors influencing the low take up of these grants. The conditions of the grants were often restrictive and even onerous which discouraged users from applying, additionally the grants were only partial, the balance of the cost being met by the user. Thirdly the extent of knowledge of the scheme amongst users is uncertain, it could be that 90% of users were not aware of the grants.

In terms of attitude, the unwillingness to pay for energy efficiency measures has been shown to be firmly held by the majority of users, partial incentive grants did not change this substantially for whatever reasons. It is probable that full grants would be acceptable to the majority of users, however, it remains uncertain at what proportion full grants would stimulate users to install energy efficiency measures, many would find the effort of participating in the scheme too much trouble.

The low take up of the grants also indicates that this particular form of government initiative and campaign are not particularly effective (this is tested further later in this chapter). No associations were discovered between these results and any of the intervening variables. Further analysis revealed that a majority of the respondents that had used grants to install these measures were in the lower income levels and were aware of the government campaigns that promote these initiatives. Therefore, it can be concluded that the majority of the respondents who used a grant did so because they knew of their availability and did not have the necessary capital to do the improvement without financial aid, and therefore qualified for the eligibility guidelines governing the grants.

In a further analysis of the groups that did or did not feel cost influenced their use of heating and those that did or did not take active measures to control their fuel bill, a comparison of whether these groups used the grants produced no meaningful results. The figures for the take up of grants, indicate that in general, the implementation of these schemes has been poor, which is consistent with the poor performance of previous schemes and these results merely serve to reiterate this.

The use of these grants is probably minimal due to a lack of awareness regarding their existence. This corresponds with findings from MORI (1990) and CSW (1990) studies which concluded that if homeowners were offered an incentive scheme to improve the energy efficiency of their home they were twice as likely to want to insulate their homes. This also confirms the findings of the RICS (1994), whose study concluded that there are many reasons why householders have shown little interest in energy efficiency, but it is thought that the most important reason is the lack of available capital.

4.2.6 Testing the sub-hypothesis

With regard to the sub-hypothesis deduced from the literature study, 'Users (homeowners) are unwilling to pay for energy efficiency measures unless there is an unrealistic return on their investment', the results presented in the former section clearly indicate this to be the case.

The results indicate that for a significant proportion of users the prospect of saving money is a strong consideration, however, there is a large proportion of users (homeowners) who are unwilling to pay an extra cost for a home that would provide them with significant savings on their fuel bills. The prevailing attitude amongst all users is that if no cost is involved then energy efficiency has great appeal, but if cost is an issue to gain efficiency then respondents are undecided or unwilling. The results also indicate that respondents who can afford to pay extra for energy efficiency are more inclined to have a positive attitude towards energy measures.

The results show that the majority of respondents are concerned with gaining the best possible payback from any investment in energy, and that return is highly important to the majority of the respondents. The attitude emerging from these results is that users (homeowners) want as much as possible for as little as possible. The results also indicate the existence of sub categories within the user (homeowners) group and these are significantly more complex than had been previously assumed. These groups relate directly to the effect that income appears to have on attitudes towards energy efficiency measures and the users expectation of unrealistic returns on investment. In short, there is a clear pattern emerging particularly with regard to low income users and the influence that income has on their use of energy.

There is also clear evidence emerging from the results which indicates that a proportion of users (homeowners) will not be willing to invest in energy efficiency. Energy has no obvious importance to this group; cost does not influence their use of heating nor does the prospect of increased fuel bills influence their decision to change heating patterns or improve the efficiency of their property. The result provides further corroboration that respondents in the lower income levels are sensitive to costs, to a much greater extent than other respondents.

Additionally, the majority of the sample considered cost as a controlling factor in their use of fuel and the respondents attempted to control fuel bills, but not with the use of the heating system (which would compromise comfort) but by other less effective measures such as turning off lights and shutting doors.

Two distinct attitudes exist in what had been previously assumed to be a homogeneous user (homeowners) group. The first attitude being positive towards a CO_2 emission reduction and the second being negative when faced with an immediate stimulus in the form of a cost penalty. This reveals two points of note with respect to the attitudes of users, the first shows that users attitudes can be influenced by cost penalties. The second point shows that even with the stimulus of a cost penalty nearly half of the respondents are still unwilling to pay anything.

The results also revealed another indication of potential categorisation of user (homeowner), specifically, users on lower incomes that were quite susceptible to the cold. It is suspected that these users are poverty driven and feel the cold to a significant extent in their home. As a result, this group of respondents (28%) were found to be more inclined to improve the energy efficiency of their home.

One of the most pertinent findings is the clear reticence on the part of users to pay for energy efficiency measures, without a guaranteed immediate and substantial return, and even then half of users (homeowners) would still not do so. Even where the incentive is a negative one in the form of a higher fuel bill, half of users would still not be willing pay for energy efficiency measures.

In terms of attitude, the unwillingness to pay for energy efficiency measures has been shown to be firmly held by a significant proportion (56%) of users, and partial incentive grants did not change this substantially at all.
It can be concluded, that the cost of fuel appears to have a minimal impact on the uptake of energy efficiency measures and the any willingness on the part of homeowners to take action to improve dwellings with energy efficiency measures.
It can also be concluded that the respondents are not inclined to pay extra for energy efficiency and in the instance of those who would, they desire an unrealistically high payback for any investment.

4.3 Sub-hypothesis 2

The second sub-hypothesis relating to users has been stated as;

Users (homeowners) will consume energy to maintain comfort irrespective of other considerations.

4.3.1 Introduction

For the purpose of this study, the term comfort is not attempting to quantify comfort in the absolute terms discussed by authors such as Oseland and Humphreys (1994). The focus is to ascertain the attitude that prevails concerning 'perceived comfort' of users, and the influence this has on their energy use and conservation. Based on deductions from the literature study (Shorrock, 1993, DOE

1996) it was hypothesised that homeowners will consume whatever energy is necessary in order to maintain their desired comfort level.

The survey sought to determine the influence of comfort on the users' attitude towards energy use and conservation. Three facets of users energy use in relation to comfort were used;

a) A determination of the heating patterns of the respondents and duration of heating times to attain comfort;
b) The energy use of the respondents with regard to their achieved comfort level in relation to their susceptibility to feeling cold;
c) The actions of respondents when the temperature drops and what influence these factors have on the attitude of respondents towards energy efficient measures.

4.3.2 Heating patterns of the respondents

Users attitudes to comfort can be ascertained by the use of their heating system. Initially, respondents were asked the months of the year during which they used their central heating.

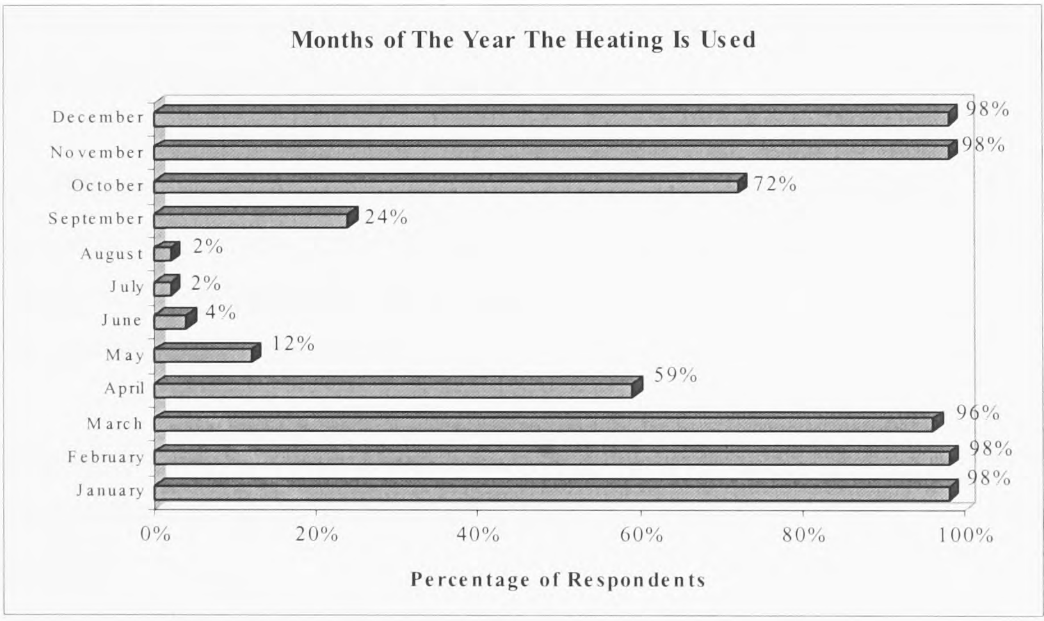


Figure 19: Months Of The Year That The Respondents Used Central Heating

The results shown in figure 19 reveal that nearly 100% of the respondents heated their home for five months of the year.

Another 72% and 59% used their heating system during the 'transition' season i.e.; the autumn and spring months of October and April respectively.
Only a very small percentage (8%) claimed to use their heating during the summer months of June, July and August. The figures indicate that as soon as there is a perceived need for heat, most users activate the heating system.

Of interest is the readiness with which users use their heating system in the marginal months of May and September, when cool periods are generally moderate in severity and short in duration, and where it might be reasonable to adopt other measures to maintain comfort rather than use energy. It is also indicative of the comparatively poor thermal performance of our dwellings that an active energy response is needed to respond to these cool periods.

Ultimately, the use of the heating system will always be a direct result of climate, of which the UK possesses a particularly variable one. This makes it difficult to attribute particular attitudes to users with any certainty without a close correlation to weather data. For example in a particularly mild winter heating patterns may be significantly different to that of a very harsh winter.

No statistical associations were discovered to the intervening variables, such as income or age. It was expected that those respondents that did heat their home during the summer months would be more sensitive to feeling the cold, however, this was found not to be the case.

To gauge the users (homeowners) use of their heating systems to provide comfort, respondents were questioned on whether they heated their homes while they were not there.
The results show that 56% of respondents heated their home regardless of whether they were there or not. 44% stated that they did not heat their home whilst absent, this indicates that only a slightly higher percentage of respondents were more inclined to heat their home only while they were there. No statistical associations were discovered between the intervening variables, such as age, gender or susceptibility to the cold, nor were these respondents found to be particularly concerned with the cost of heating.

Respondents were also questioned on whether they heated their homes before returning to it. The results to this question found that 43% of respondents in employment, pre-heated their home before returning, 19% of users that were classified as high occupancy (retired, housewives etc) also heated their home before returning to it if they were out. As a proportion of the total sample, this shows a high proportion of users (64%) that are heating their home while they are not there. This shows clearly that the comfort level of the home is paramount to this group, and they choose to heat their home before returning, rather than activate the heating once they arrive. Figure 20 illustrates these results.

The age of the respondents was also found to have a statistical association (at a 99% confidence), which indicated that those respondents who pre-heated their home prior to returning, were mostly in the middle age ranges, which suggests that these users are driven by comfort and use their heating in a systematic fashion that is dictated by their lifestyle.
Gender was also found to have a statistical association suggesting that 56% of women pre-heat the home before returning, compared with 44% of men.

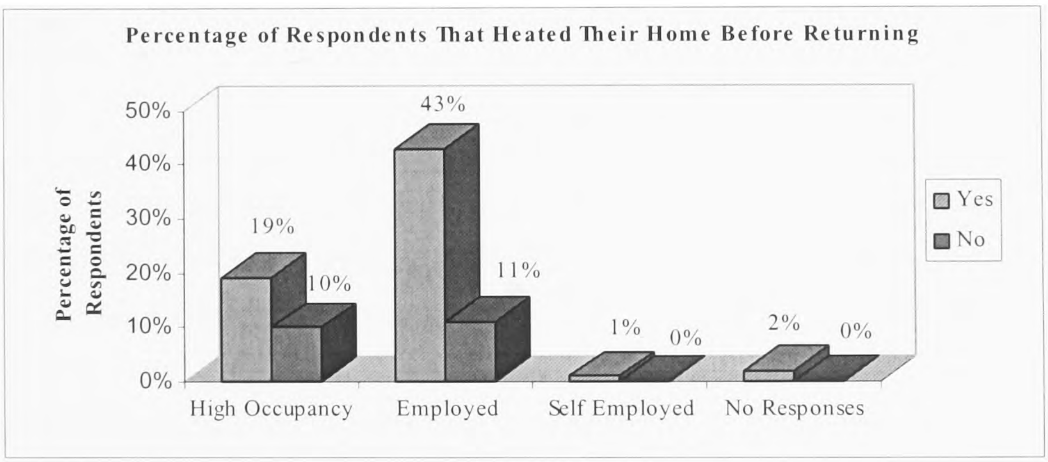


Figure 20: Percentage Of Respondents That Heated Their Home Before Returning

The pattern of users daily use of their heating system provides an important insight into their attitude towards energy use and conservation. The daily heating patterns of users provides a clear indication of their use of energy in relation to their pursuit of comfort or economy. Respondents were asked to state the number of hours per day that they heated their home. Figure 21, illustrates the results.

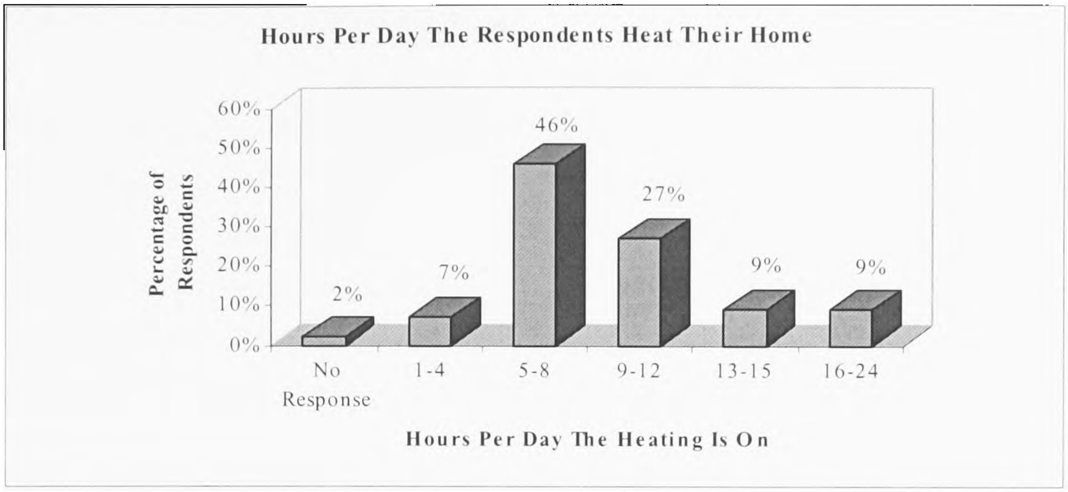


Figure 21 : Hours Per Day The Respondents Heat Their Home.

The results show that the largest proportion of respondents (73%) heat their home between 5 and 12 hours per day, with only 7% heating for less than 5 hours and 18% for longer than 12 hours per day. These results are obviously highly dependant upon lifestyle and patterns of occupancy, but they do indicate a level of influence that permits the attainment of thermal comfort for the vast majority, if not all users.

Age was found to have a strong influence on this variable, it was discovered that the longer heating patterns constituted a major influence on attitudes to energy conservation and use. Heating patterns from 13 - 24 hours a day were adopted by older respondents, reflecting comfort needs, lifestyle and pattern of occupancy of the users.
The shorter heating periods of between 5 - 12 hours per day are attributed to respondents in the young to middle age ranges. Those respondents who heated their home for 1 - 4 hours were primarily employed and in the younger age range. No other statistical associations were discovered between income or gender. However, it can be deduced from the results that the majority of the respondents heating their home for between 5 - 12 hours daily were those who were employed, while the longer heating patterns of 13 - 24 hours daily were distributed between

retired individuals and the unemployed. This would suggest that in most instances the respondents lifestyle is the main determinant of the use of the heating system, given that comfort is not compromised.

These findings indicate that comfort remains of paramount importance to the respondents, and their heating use reflects this. There is no evidence from the results or further analysis that a significant group of users (homeowners) exist who adopt a conservation or economy approach to their use of heating when compared to their lifestyle. All the results show heating use is undertaken on a comfort basis. The pursuit of comfort is the overriding factor for the majority of users.

4.3.3 Respondents disposition to warm and cold.

The survey sought to determine the perception of respondents with regard to their sensitivity to temperature, particularly towards the cold, with a view to determining whether this influenced or determined their actions in respect of comfort. To obtain an indication of the respondents disposition to temperature, the sample was firstly questioned on whether they felt the cold. Figure 22 illustrates the responses.

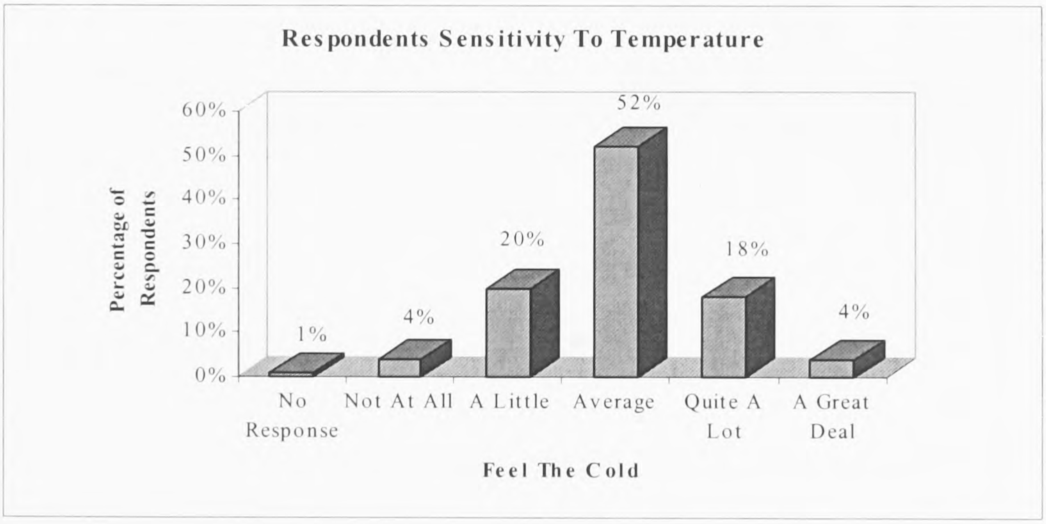


Figure 22: Respondents Sensitivity to Temperature

The results show that the majority of the respondents considered themselves to be averagely sensitive to temperature (52%) and did not claim to feel the cold to any great amount. Twenty two percent of the sample felt the cold more than average amount.

Further investigation of the results revealed that the respondents who did not feel the cold were mainly in the younger age range, while those respondents who claimed to feel the cold considerably, were in the older age ranges. This finding concurs with those of Salvage (1993), who found that the older generation is much more susceptible to the cold. Confirmation, if needed of a commonly held belief, but a significant influence on heating system use for both age groups.

Respondents were also questioned on whether they were comfortable with the heat in their homes on the coldest days. Figure 23 illustrates the responses.

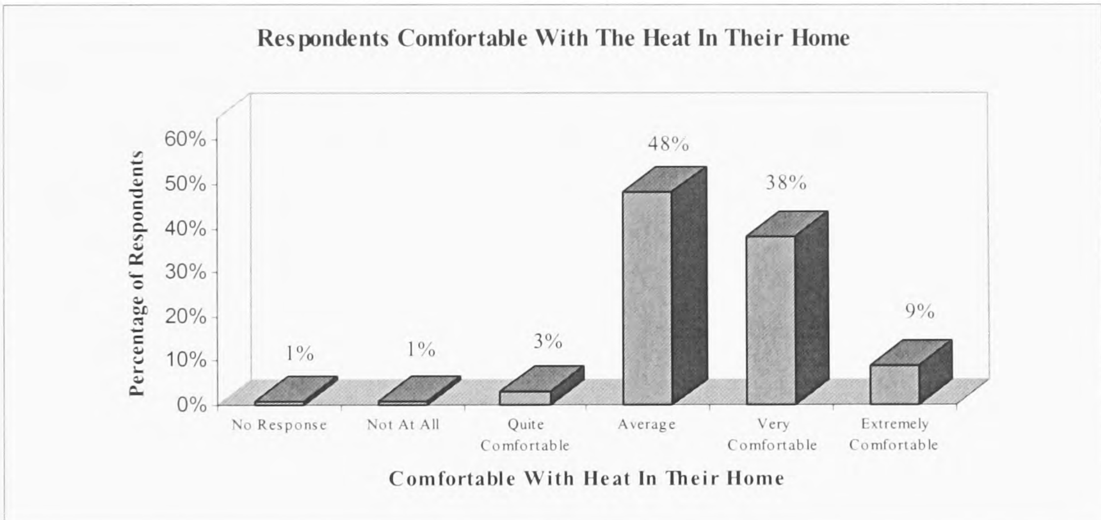


Figure 23: Respondents Comfortable With The Heat In Their Home

The results show that an overwhelming majority (98%), of the respondents are comfortable with the heat in their home on the coldest days. Only 1% of the sample did not feel comfortable but these respondents were without central heating. Proof that comfort was indeed attained irrespective of other considerations, however in the UK context with its poor levels of insulation in dwellings, comfort is attained through the use of the heating system, and by default, the burning of fossil fuels.

It is interesting, but inconclusive, to note that the same level of satisfaction was not reflected in the non heating seasons, as 52% of the respondents felt their home was too warm in the summer months. Whilst it is not possible to ascertain absolute causes, it is highly probable that it is because of the poor thermal performance of their dwellings.

These results indicate that whether the respondents are sensitive to the cold or not, they still achieve a more than satisfactory comfort level, and therefore have no desire to improve comfort. It can be concluded that government campaigns aimed directly at improving comfort levels for the public by insulating the home will probably be ineffective, as users generally feel no need to improve their comfort and are satisfied with the heating in their home.

From this particular series of questions, the results show that the pursuit of comfort is an overriding factor for the majority of respondents. This is clearly demonstrated through the respondents use of their heating, even in the summer months and while absent from the home. What is also clear is that the use of heating to maintain and achieve comfort is driven strongly by lifestyle.

4.3.4 The responses of users when the temperature drops.

To determine further the attitude of users with respect to comfort, users were posed with the question of how they responded when faced with a sudden fall in temperature outside the normal heating season i.e. during the summer.
This would provide further positive indication of the actions resulting from their attitude towards energy use and conservation. Table 13 shows the responses.

Table 13. Action taken by respondents if temperature drops outside the heating season.

Switch the heating on	50%
Add another layer of clothes	35%
Do both	10%
No response	5%

The results show that 95% of the sample would take some action to maintain their comfort if the temperature dropped, establishing clearly that pursuit of comfort is a fundamental aim. The largest proportion (60%) indicated that they would put the heating on which demonstrates that the majority of the sample are not concerned with energy use or the cost involved, but reinforces the attitude that achievement of comfort is paramount. 35%, a significant proportion would put on additional clothing to maintain comfort in a more energy efficient manner, whilst 10% stated that they would do both. No associations were found between the results and other variables, however age was found to have an influence on action. In some instances older respondents were slightly more inclined to put the heating on if the temperature dropped, whilst younger respondents were more inclined to add another layer of clothing. The results also showed that older respondents were the ones who were most likely to do both, switching on the heating and adding another layer of clothing. The strength of this association is shown in Table 14.

Table 14. Age compared to practices if temperature drops.

Age	Put Heating on	Add clothing	Both
18 – 25	2%	1%	0%
25 – 45	36%	54%	27%
45 – 55	22%	13%	27%
55- 65	39%	30%	46%

The fact that the older respondents are more inclined to maintain comfort levels by whichever means possible (adding clothing together with increasing temperature), is not an unexpected result and correlates strongly with older respondents experiencing a higher degree of susceptibility to the cold. However, there is a small amount of energy consciousness present in the number (35%) who will add clothing rather than employ their heating system. Reasons can be surmised but one which must be considered is the ease of adding clothing compared to starting up the heating. Response time is also a factor, adding clothing would restore comfort almost immediately whilst starting up the heating would take much longer.

Attitudes were further explored by eliciting their actions with regard to a perceived temperature drop occurring during the heating season. Respondents were asked if in the cold weather they perceived a temperature drop, what actions do they take? Figure 24 shows the responses of the respondents.

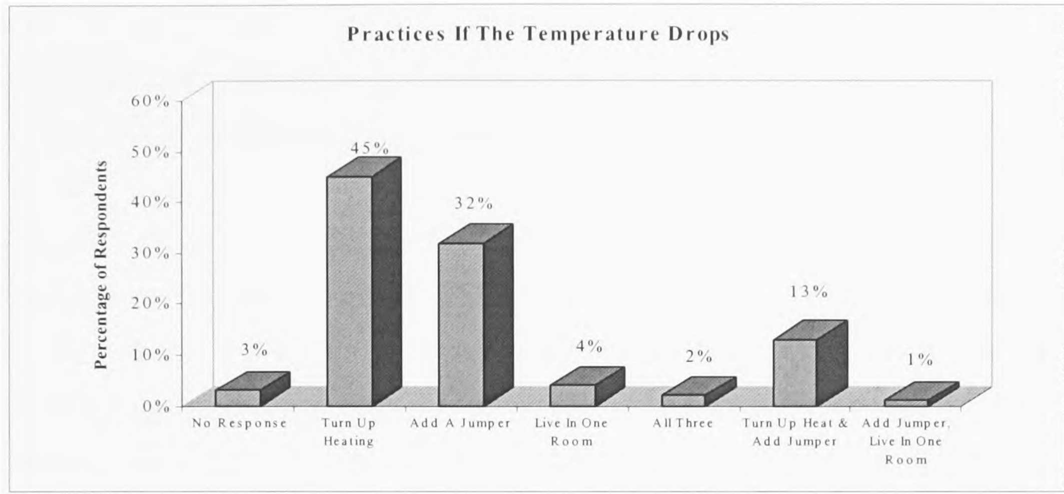


Figure 24: Practices Of The Respondents If The Temperature Drops In The Heating Season.

The results to this question show users actions to be almost exactly the same as a summer. The responses show that the majority of respondents (60%) elected to turn the heating up if the temperature dropped in the winter months, with 48% of respondents adding a jumper.

The results also indicated that a slight difference existed, with men being more inclined to turn up the heating, and women being more inclined to add clothing. A statistical association was also discovered between the income level and action taken, indicating that respondents who turned the heating up were more affluent than those respondents who added a jumper.
Another association was discovered between the fuel used to provide heating indicating that respondents using gas were more likely to turn up the heating, while respondents on more costly energy sources such as electricity, added a jumper. This result is expected as poverty does play an important part in fuel use, with those on lower incomes being more frugal with their use of heating systems.

These results indicate that the attitude of respondents is to pursue comfort by the most convenient means, mainly, but not completely irrespective of energy considerations.

To further characterise the respondents and their attitudes to energy use and conservation it appeared from the sample that, despite women appearing to feel the cold more than men, they were more conservative in their heating patterns and practices. Women were also more likely to add a jumper if they perceived a temperature drop, rather than use the heating. Comparatively, men were found to be more likely to turn on the heating and have longer heating patterns, making them less conservative with the use of energy. The older respondents were more likely to have longer heating patterns to maintain their comfort level and put the heating on if the temperature dropped, as this group tended to feel the cold more. The younger respondents tended not to feel the cold and as a result had lesser heating patterns than the older respondents. This group were also more likely to add a jumper if they perceived a change in temperature rather than activate the heating. The more affluent respondents also tended to be less conservative with the use of heating than less affluent respondents.

4.3.5 Testing the sub-hypothesis

With regard to the sub-hypothesis; 'Users (homeowners) will consume energy to maintain comfort irrespective of other considerations'.
The results strongly support this.
It can be concluded from the results that respondents achieve a more than acceptable comfort level. The majority of the sample were found to be more than comfortable with the heat in their home, which means that they are achieving and are able to afford an acceptable level of comfort.
This is reflected in the results where the achievement of an acceptable comfort level appears paramount to users. This is also indicative of respondents attitudes to energy use and conservation, where the use of energy is not a concern as long as they are comfortable in their home, therefore the attitude of achieving comfort irrespective of other considerations firmly exists. In addition, no evidence exists in the results that show a significant group of users that adopt a conservation or

economic approach to their use of heating in comparison to their lifestyle, or pursuit of comfort. All the results show unequivocally, that heating use is undertaken primarily on a comfort basis only.

The results show that energy conservation in the form of controlled heating patterns by the user does not occur, comfort is the overriding factor, conservation of energy is not considered.

It can also be concluded, in light of these results that efforts to promote energy conservation by the government in the way of promoting the concept of improving comfort for occupants, will have little or no effect as they already achieve it. Similarly any scheme that required users to compromise on comfort is also likely to fail.

4.4 Sub Hypothesis 3

The third sub-hypothesis relating to users has been stated as;

Users (homeowners) attitudes are based on poor knowledge of energy use and conservation.

4.4.1 Introduction

Knowledge informs attitudes, therefore gaining an indication of the knowledge level of users with respect to energy use and conservation and the environmental impact of energy use, was considered important.

The focus was to ascertain the extent that users attitudes are based on poor knowledge of energy use and conservation. Based on deductions from the literature study (MORI 1990, Phillips and Nelson 1976, Hedges 1991) it was hypothesised that a lack of awareness exists among users concerning the damage that domestic energy consumption has on the environment and that users are unaware of their personal contribution to the environment.

To determine the level of knowledge upon which users form their attitude towards energy and energy conservation, a number of questions were posed that sought to test various aspects of the users knowledge.

Firstly questions were asked to determine their underlying knowledge of energy conservation and its impact on the environment. More recent and specific knowledge was then tested by determining the extent to which information campaigns had contributed to users knowledge and whether these had produced any action on the users part. Finally, sub-conscious knowledge of energy conservation through practices was gauged through assessing certain practices of respondents with regard to energy conservation, in simple terms do respondents know they are acting in an energy conservative manner, regardless of being aware of the issues of energy use and conservation.

4.4.2 Awareness of the respondents impact on the environment.

A series of indicators were selected to determine the knowledge of respondents towards energy use and its environmental impact. Respondents were asked about their knowledge of CO_2 emissions emanating from the domestic sector. The question posed was: 'What do you think is the percentage of CO_2 (carbon dioxide) emissions that are attributed to the domestic sector?' Respondents were given a series of percentages to select, ranging from 10% to 100%.

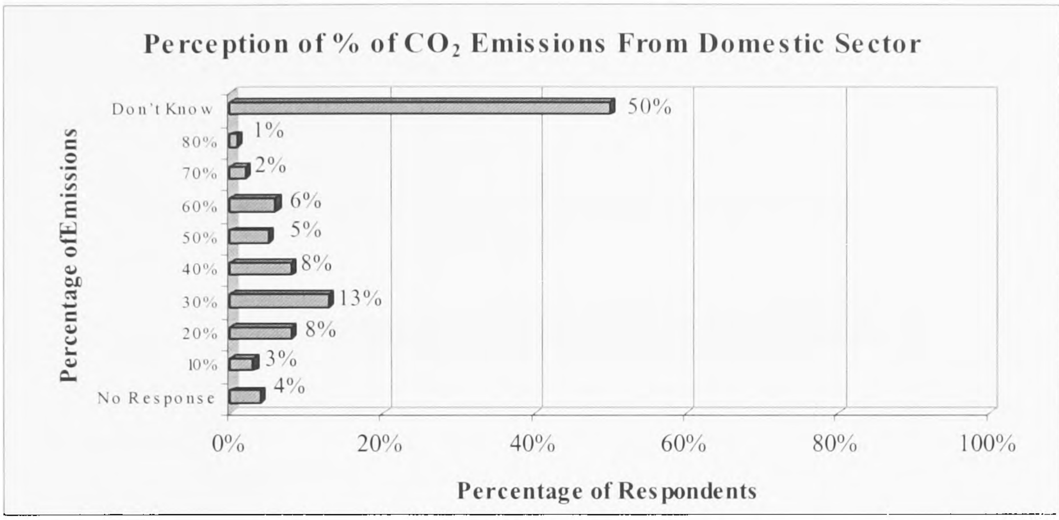


Figure 25: Perception of CO_2 emissions from domestic sector

The results shown in figure 25 reveal that the majority of respondents (50%) were completely unaware of the amount of CO_2 emissions from the domestic sector. Only 13% of the sample actually selected the correct option, of 30%, however this result could be reasonably attributed to the element of chance. The result was consistent across all the sample irrespective of age, dwelling size or income, except gender which indicated that men were slightly more aware of the correct answer than women.

This clearly shows that users have no awareness at all of the impact that their energy use in domestic housing has on the environment. With regard to gender, the results show that for the more realistic responses (ie. the lower percentages) men outnumber women by two to one with regard to correct perceptions of the impact of energy on the environment.

Of the remaining 50%, even allowing for a +/- 10% accuracy of their response, only 29% had a reasonable idea, the other 21% also had in reality only a minimal level of awareness. In overall terms, it can be reasonably deduced that 71% of users do not have an acceptable threshold level of knowledge regarding domestic energy use and the CO_2 emissions it generates on a national scale.

The follow up question sought to discover the users knowledge with regard to the individual impact of their dwelling on CO_2 emissions. Respondents were questioned on their knowledge of the amount of CO_2 that an average home created each year, with the question `What do you think is the amount of $CO_2$ emissions created by the average home per year?`

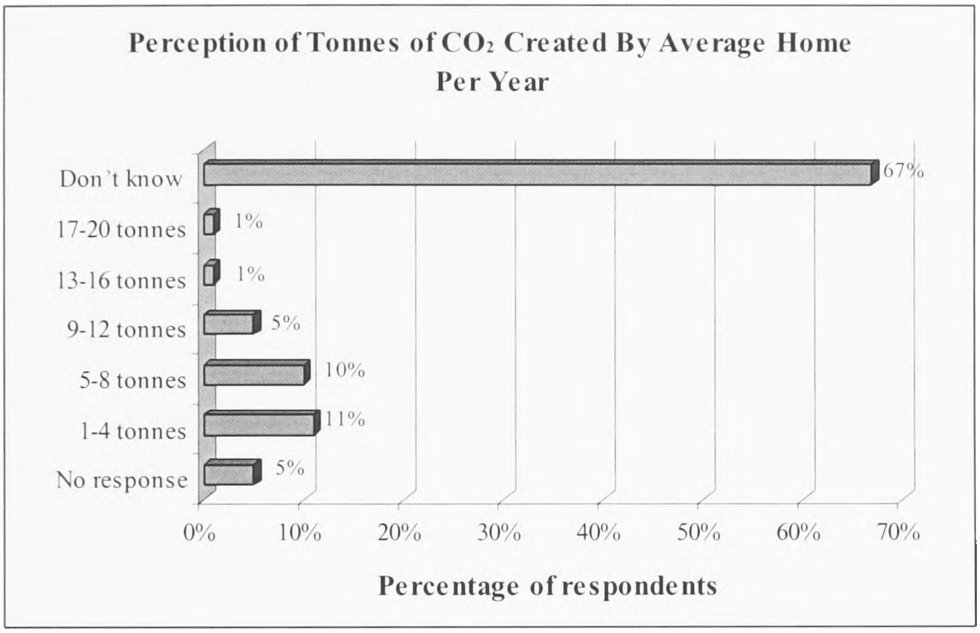


Figure 26: Perception of CO_2 created by average home per year

The results shown in figure 26 demonstrate that the majority of respondents did not know the amount of tonnes generated by the average home. This underpins the conclusions from the previous question which found high levels of unawareness from users about environmental impact, and more specifically, their individual impact on the environment. With regard to the quantity of emissions produced by a domestic dwelling, it could be construed that many did not even know that domestic dwellings produced CO_2 judging by the number of don't know responses (67%). Of the respondents who replied, only 10% were within the correct band (5-8 tonnes) although an additional 16% were in the bands either side, which indicates an element of knowledge rather than a mere guess.

Of the remaining 7% these are clearly incorrect and can only be attributed to guesswork on the part of the user.

These figures indicate that a significantly high proportion of users are completely unaware of CO_2 emissions, both on a national and a domestic scale.

4.4.3 Awareness of their personal energy use in domestic dwellings.

The previous question determined the extent of knowledge that users had with regard to the impact of their energy use on a national scale. The questions that followed, sought to determine their knowledge of energy use on a personal scale. Respondents were asked about the distribution and use of energy in their homes and questioned on proportions of each. Questions were posed that dealt with awareness of the percentage of the fuel bill used for heating, lighting and cooking.

The proportion of the fuel bill that heating accounts for is between 50% and 60%. The results shown in figure 27 shows there was a substantial group of respondents, 38% that selected the correct answer, however, there was a larger group (41%) that did not know the correct response.

Significantly, 21% of respondents had no idea at all about the proportion of energy cost attributed to heating. This is a significant proportion, which if added to those who were considerably inaccurate in their estimate (41%), accounts for 62% of users who do not have a reasonable knowledge of their heating cost.

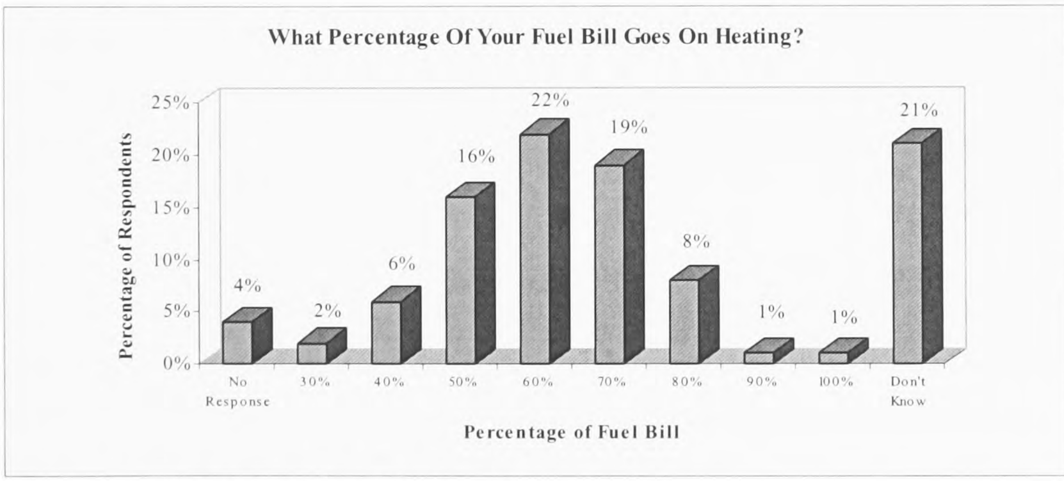


Figure 27: Percentage of fuel bill that goes on heating

The variable of income was found to be statistically associated (at a confidence of 99.9%) where the respondents on the lower income levels tended to know the proportion more accurately than those in the higher income levels. The results of the comparison are shown on table 15.

Table 15 :Comparison of the percentage of fuel bill that goes on heating by income level.

					Income level					
% of bill	**£0-£10,000**	**£10 -£20,000**	**£20-£30,000**	**£30-£40,000**	**£40-£50,000**	**£50-£60,000**	**£60-£70,000**	**£70-£80,000**	**£80-£90,000**	**£90-£100,000**
30%	14%		29%		29%	14%		14%		
40%	14%	21%	29%	21%			7%		7%	
50%	11%	34%	32%	13%	4%	2%		2%	2%	
60%	10%	25%	23%	12%	17%	8%	3%		2%	
70%	12%	22%	36%	10%	14%		2%	4%		
80%	15%	19%	31%	19%	4%		8%	4%		
90%		33%		67%						
100%	50%									50%
Don't know	18%	29%	30%	14%	5%	4%				
Total	13%	25%	29%	14%	9%	3%	2%	2%	1%	1%

The comparison clearly shows a trend between respondents on lower income and awareness of the amount of the fuel bill that is attributed to heating. This could be an indication of the lower income respondents having a less ambivalent attitude towards energy use as they find heating difficult to afford, as a larger proportion of their income is taken up with the fuel bill.

No other associations with any intervening variables were discovered. However, further analysis revealed that with regard to the awareness of the respondents towards the information campaigns that promote this information, only 3% of the group that claimed to be aware of the government campaigns actually selected the correct percentage of heating that makes up the fuel bill. This suggests that although respondents claim to be *aware* of these campaigns, they still lack the essential knowledge of factors such as fuel use and the percentage of the total fuel bill. This indicates the lack of effectiveness of these campaigns in 'getting the message across'. A full discussion of the impact of government information campaigns is undertaken in later in this chapter.

A similar question was asked with respect to the proportion of total energy bill accounted for by lighting.

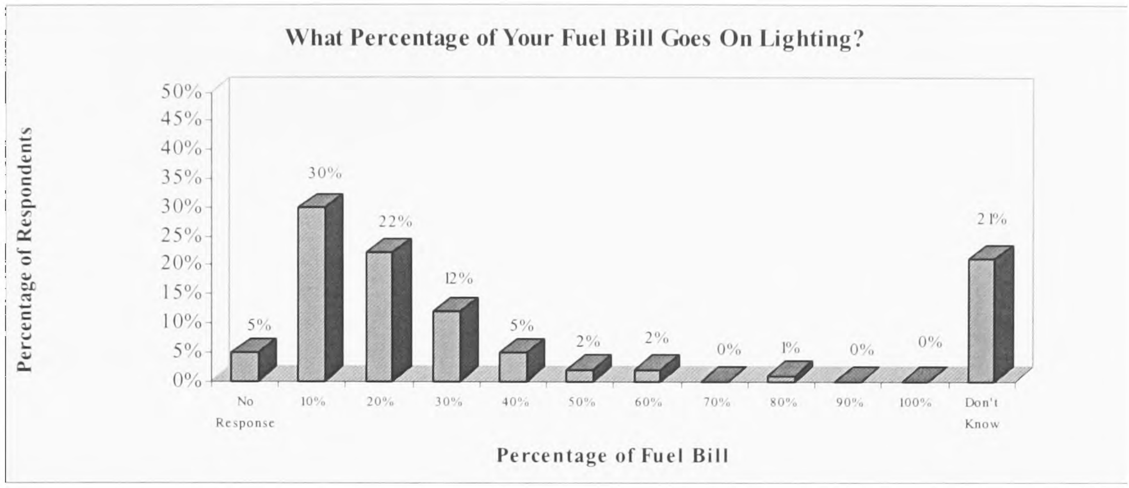


Figure 28: Percentage of fuel bill that goes on lighting

Results to the question are shown in figure 28, where half (52%) of the respondents selected the correct answer (this being 10-20%).
Most respondents selected a realistic percentage of the fuel bill that lighting accounted for. It can be surmised that these results show a very basic awareness of the balance of energy use in the home, at least with respect to one aspect.

Respondents were then asked the percentage of their fuel bill that went on cooking. The results to the question are shown in figure 29.

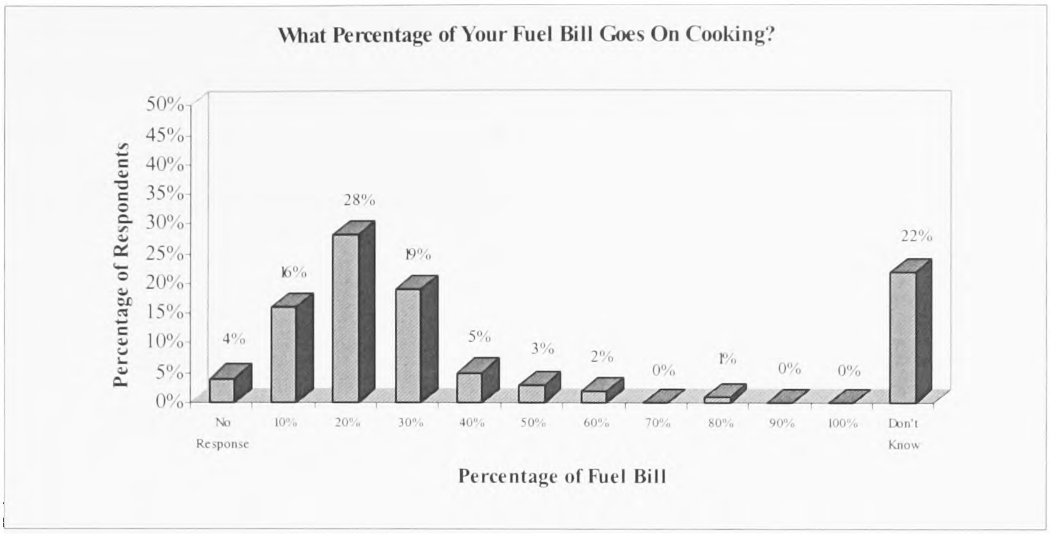


Figure 29: Percentage of fuel bill that goes on cooking

The majority of respondents selected lower percentages, but only a small group selected the correct response of 10%. This would suggest that the majority of users have no clear idea as to the proportion of their fuel that cooking accounted for, but assumed it to be a lower proportion than heating. Further investigation however, did reveal that the majority of the respondents who selected the very unrealistic options were also those respondents who were actually aware of the government campaigns that promote this information. This shows that the information campaigns have been particularly ineffective for this group of respondents.

This provides evidence that despite awareness of the information campaigns promoting this information, users remain uninformed with regard to their specific use of energy and the effect that everyday energy use has on the environment.

4.4.4 Overview

To collectively give an overview to the previous questions regarding awareness of proportion of energy costs, the results found that 40% of the respondents who did not know the proportions of activities that made up their fuel bill, were aware of the campaigns, but as this result shows, the message of the campaigns have been unsuccessful.

Summarising the results which are shown in table 16 shows a significant proportion of users demonstrate a lack of knowledge with regard to fuel use in the home.

Table 16 : Summary of responses – fuel use in the home.

	Know (%)	Don't know (%)
Heating	38%	62%
Lighting	52%	48%
Cooking	16%	84%

Generally, there was a clear indication that respondents are lacking in essential knowledge of factors such as, fuel use and the proportions of their fuel bill made up from lighting, heating and cooking. Overall, the conclusion is that respondents lack essential information, with high numbers of respondents being unaware of energy saving methods and measures available to them and significantly for CO_2 emissions the impact that the individual has on energy use and potential energy savings. These conclusions are in line with those of the DOE (1981) study which found that a third of households without roof/loft insulation were also found to be unaware of the grants available to assist with installation.

4.4.5 Sub-conscious knowledge of energy

To further gauge respondents knowledge of energy use and conservation, questions that did not deal specifically with energy use or emissions, but concentrated more on sub-conscious actions were posed. These would determine whether users were knowledgeable regarding conservation sub-consciously in their actions, rather than consciously as the previous questions regarding energy conservation assessed.

The respondents were questioned on whether they considered energy actively. Questions were posed that dealt with whether energy was considered (in the form of checking the depth of loft insulation when respondents moved to another property).

In addition, respondents were also asked how often they service their boiler. This was considered an important indicator, not only because efficient boilers aid conservation, but also because the boiler drives the heating system, which is the main comfort provider in most instances.

The results in figure 30 demonstrate that 53% of respondents check the depth of loft insulation when moving to another property. Further investigation indicated, that the majority of these respondents had installed loft insulation to their dwelling previously and so had a level of consciousness regarding this measure.

A statistical association was discovered with gender (at a confidence of 99%). This association showed that the gender of the respondents that did check the depth of loft insulation were primarily male. In addition another statistical association was also discovered with the awareness of government campaigns (at a confidence of 99%). The association suggested that the majority of the respondents that did check the depth of loft insulation when moving to another property were aware of the government campaigns. This result does underpin previous conclusions regarding the installation of loft insulation, the relationship in this instance to awareness of government campaigns can be treated as valid as in the early 1970's loft insulation was very well promoted as a low cost, high return measure and still is today.

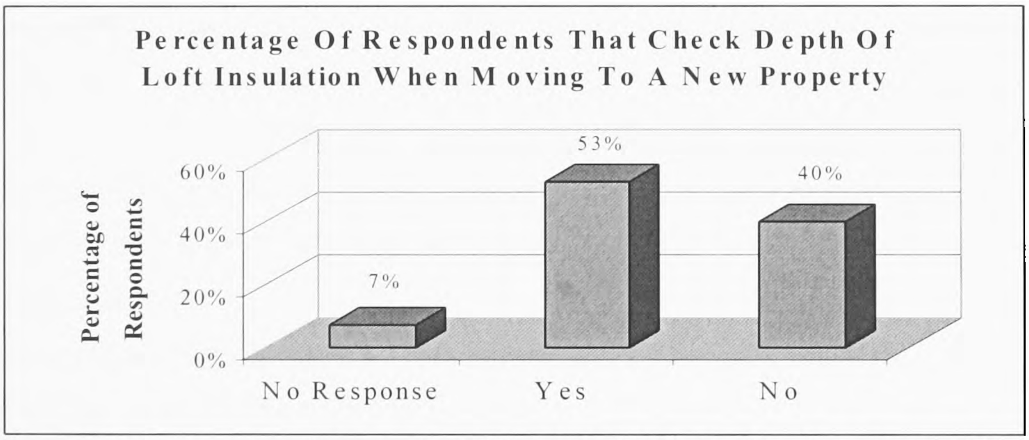


Figure 30: Percentage of Respondents That Check Depth of Loft Insulation When Moving To A New Property

Another indicator of knowledge, with respect to sub-conscious knowledge through practices was determined through the regularity of boiler servicing, which is known to aid efficiency of the heating system, particularly with regard to the obvious importance of comfort to the respondents. Figure 31 shows that most of the respondents had serviced their boiler at some time.

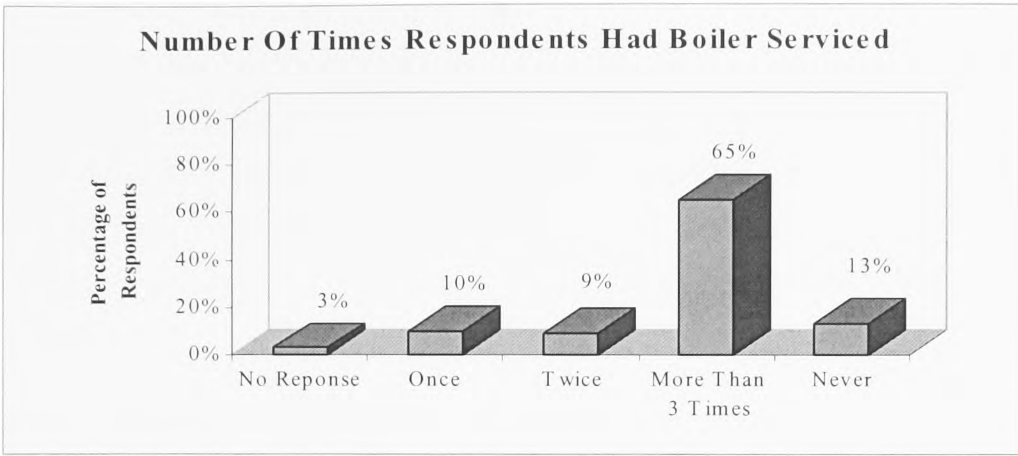


Figure 31: Number of times respondent has had boiler serviced.

Not surprisingly, time in occupation had a strong association to the number of times the boiler had been serviced. The respondents who claimed to have never serviced their boiler were the respondents that had the shortest occupation time in their home. Correspondingly for the respondents that had high occupancy periods, their boilers had been serviced accordingly. Age of the respondent was also found to be statistically associated to the number of times that the boilers had been serviced. The association indicated that the respondents that had serviced their boiler more than three times were in the older age range. Susceptibility to the cold was also found to be statistically associated (at a 99% confidence), and this indicated the respondents that had serviced their boiler more than three times were slightly more susceptible to the cold than the respondents that had serviced their boiler only once.

This suggests that the main driver of servicing the boiler is to preserve a comfort level or in some instances for safety reasons.

These results determine that the majority of the respondents have serviced their boiler at some time, the amount of times being largely dependent on the period of occupation, which was to be expected. It was also found that susceptibility to the cold appeared to have an influence on the regularity of the boiler being serviced. However, whether the servicing of the boiler was driven by an sub-conscious form of energy awareness or whether it was done to preserve a comfort level is uncertain.

In addition, the results suggest that those respondents who were aware of the information campaigns, were more likely to check for an adequate depth of loft insulation when moving to another property. This could be an indication that in this particular instance the historic prevalence of loft insulation in government campaign messages has influenced these respondents practices, directly or indirectly.

4.4.6 Importance of energy conservation measures.

The level of importance that users place on energy measures being present in a new home was assessed. Although this question did not test knowledge directly, it was considered that the perceived level of importance of certain measures would reflect knowledge. This was considered important to determine, firstly to further establish the attitudes of users towards energy measures, and secondly to assess the attitudes of users towards these measures in a comparison to the attitudes of providers deduced from the literature study.

Users were asked to rate the importance of twenty factors that they would consider important when purchasing a new home. The question was asked 'when purchasing a new home, which of the following factors do you feel to be important', with the scales, not at all important, not very important, average, very important and extremely important.

The results in table 17 show location and price to be at the high end of the importance scale when purchasing a new property. Central heating was also considered important by 90% of respondents when purchasing a new home, which was expected and can be attributed to the high level of comfort that respondents demand.

Table 17: Rating of importance of factors

	Not at all important	Not very important	Average	Very important	Extremely important
Price	0%	1%	9%	39%	51%
Location	1%	1%	7%	43%	48%
Central heating	0%	1%	9%	49%	41%
Garage	2%	2%	14%	48%	34%
Garden	1%	1%	22%	43%	33%
Resaleability	1%	4%	25%	42%	28%
Loft Insulation	1%	7%	30%	37%	25%
Size of property	0%	1%	18%	58%	23%
Double Glazing	2%	6%	32%	37%	23%
Appearance of Property	0%	2%	21%	59%	18%
View	0%	2%	42%	38%	18%
Lounge space	0%	1%	37%	48%	14%
Scope for improvement	4%	13%	40%	30%	13%
Council tax	4%	12%	49%	24%	11%
Draught proofing	4%	19%	41%	27%	9%
Cavity wall insulation	7%	29%	39%	18%	7%
Kitchen & Bathroom	3%	13%	48%	30%	6%
Condensing boiler	13%	25%	42%	16%	4%
Furnishings	18%	29%	42%	9%	2%
Solar Panels	34%	39%	24%	2%	1%

Six distinct energy measures were included in the list of 20 measures that respondents were asked to rate for importance.

Table 18 : Level of importance of energy measures.

	Not at all/ Not very important	Very/Extremely important
Loft insulation	8%	62%
Double glazing	8%	60%
Draught proofing	23%	36%
Cavity wall insulation	36%	25%
Condensing boiler	38%	20%
Solar panels	73%	3%

As table 18 shows, loft insulation and double glazing are considered by respondents to have quite a high degree of importance, but not in comparison to price or location, which is not surprising as these are probably the two main purchasing criteria for many homeowners. Closer investigation of the results revealed that respondents who placed a high degree of importance on location were primarily found in the lower income ranges, while the respondents who considered it to be of greater importance were in the higher income ranges. It is also interesting to note that loft insulation and double glazing are considered to be significantly less important, compared with other factors such as a garage, garden, appearance of the property and resaleability of the dwelling. This shows a clear attitude that energy conservation measures such as loft insulation and double glazing are a secondary consideration to factors that are perceived to be of cosmetic value or status enhancing. It was also found that older respondents felt double glazing to be more important than the younger respondents, which is most likely to be a comfort issue. Measures such as loft insulation were considered to be more important by those respondents in lower income brackets.

Draught proofing was considered important by a third of respondents, however this result is not surprising due to the prevalence in the new homes market of double glazing and UPVC doors, all of which are pre-draught proofed. It is also possible that users tend to associate the measure of draught proofing with older properties, rather than brand new homes. Draught proofing and its importance were found to be directly related to the respondents susceptibility to the cold, i.e. those who felt it was important were those who felt the cold. In addition it was also found that men appeared to find draught proofing much less important than women. (This could be because females tended to feel the cold more than men).

Cavity wall insulation was considered important to only a quarter of respondents. This could indicate that energy measures (such as cavity wall insulation) are a secondary consideration, it could also be an indication of a lack of knowledge, either respondents are expecting it to be present in the home regardless, or that they have no understanding of this measure and therefore attribute no importance to it.

Condensing boilers were considered to be important by only a fifth of respondents. It is not clear whether respondents understand the concept of condensing boilers, and arbitrarily made their selection of importance regardless of understanding what these boilers actually do, or whether a degree of knowledge existed to be able to attribute some importance to this measure. The results showed no associations with variables such as awareness of campaigns, age or gender.

Solar panels were rated as important by only 3% of respondents. This was considered unsurprising as this measure is not widespread in new housing and historically is associated with countries with sunny, warmer climates.

To further underpin the attitudes of users and those hypothesised by the providers towards energy measures, these criteria were also applied to the providers, discussed in chapter 5.

4.4.7 Testing the sub-hypothesis

With regard to the sub-hypothesis of 'Users (homeowners) attitudes are based on poor knowledge of energy use and conservation', the results show this to be substantially the case.

It can be concluded from the results that a significant proportion of users had no reasonable level of knowledge regarding domestic energy use or the CO_2 emissions that domestic energy use generates nationally. This was further demonstrated by the significant proportion of users (homeowners) that had no knowledge of the proportion of their fuel bill that heating, lighting and cooking accounted for.

This provides a strong indication that a large proportion of homeowners are lacking in essential knowledge when it comes to the use of energy, and have no clear understanding or awareness of their personal energy use and the impact that this has on the environment. This supports the findings of MORI (1990) where less than 4% of their study correctly recognised that the major cause of CO_2 emissions in the UK was the generation of electricity and fuel for heating and power in homes. It was mistakenly thought that the biggest culprits were car emissions or industrial and manufacturing processes. This fact was also underpinned in the pilot study for this research, where most respondents felt that cars were the greatest producer of CO_2 emissions, with the second most prolific being industry.

It is also suggested that part of the lack of knowledge could be attributed to the fact that users are totally unaware that domestic homes actually emit CO_2. The results also demonstrate the attitudes of users towards energy measures as being one of relative indifference. In simple terms, the attitude appears to be that energy has little importance when compared to other cosmetic, value or status enhancing factors such as a garage, garden or the appearance of the property.
These findings suggests that the lack of knowledge regarding the connection between energy use and CO_2 emissions is a relationship that most users are totally unaware of. However, there is no indication that a change in practice or behaviour regarding energy use would occur if users were aware of the connection between energy use and emissions.

4.5 Sub-hypothesis 4

The fourth sub-hypothesis relating to users has been stated as;

Users (homeowners) attitudes are not significantly changed by government campaigns.

4.5.1 Introduction

In addition to assessing the respondents awareness of the environmental impact that the use of domestic energy has on the environment, respondents were questioned on whether they were aware of government campaigns that promote energy saving in the home and the environment. Awareness would provide an additional indicator of the knowledge level of users, but on its own it also demonstrates whether users attitudes are influenced by government energy conservation campaigns.

4.5.2 Awareness of information campaigns

Respondents were asked 'Are you aware of government campaigns such as Wasting Energy Costs The Earth?' Table 19 shows the results.

Table 19: Awareness of government campaigns

Yes	51%
No	47%
No response	2%

Just over half of the respondents (51%) claimed to be aware of the latest government campaign which could be considered low for a national campaign such as this, but is consistent with the low level of awareness of environmental impact in the previous section.

Age was found to have an influence on awareness (at a confidence of 95%), showing respondents who were aware of the campaigns were mainly in the older age range. It is postulated by Salvage (1993) that this was possibly because older respondents are usually targeted more by campaigns, cold weather payments and are usually more vigilant regarding the control of their fuel bills. However, there is no evidence to show that these particular campaigns were specifically targeted. Another reason that older respondents showed a higher level of awareness of the campaign could be due to a number of factors; older people tend to watch more television and would therefore tend to see adverts concerning the campaigns on a daily basis. Older people may be more receptive to these campaigns because of low incomes and concerns over paying fuel bills; they may also be more receptive to public service messages, as historically these used to be commonplace.

With regard to the previous section, which discussed the level of awareness of environmental impact, no compelling evidence was discovered that suggested knowledge of the campaigns that promoted this type of information, had influenced the findings in any way. The evidence suggests that overall, the level of awareness regarding environmental issues is low, despite over half of the respondents claiming to be aware of the campaign. This is further underpinned by the significant proportion of respondents that had no knowledge of the elements of energy use in the home that make up their fuel bill, nor how energy use in the home contributes to environmental problems. More importantly, this is a direct indication that users attitudes have not been influenced or changed by government campaigns.

Respondents were also questioned on whether they had found the information from government campaigns useful, (the 51% of respondents that had been aware of the campaigns in the previous question then went onto to answer this question). The results shown in figure 32 show the majority of the respondents found the information 'quite' to 'averagely' useful.

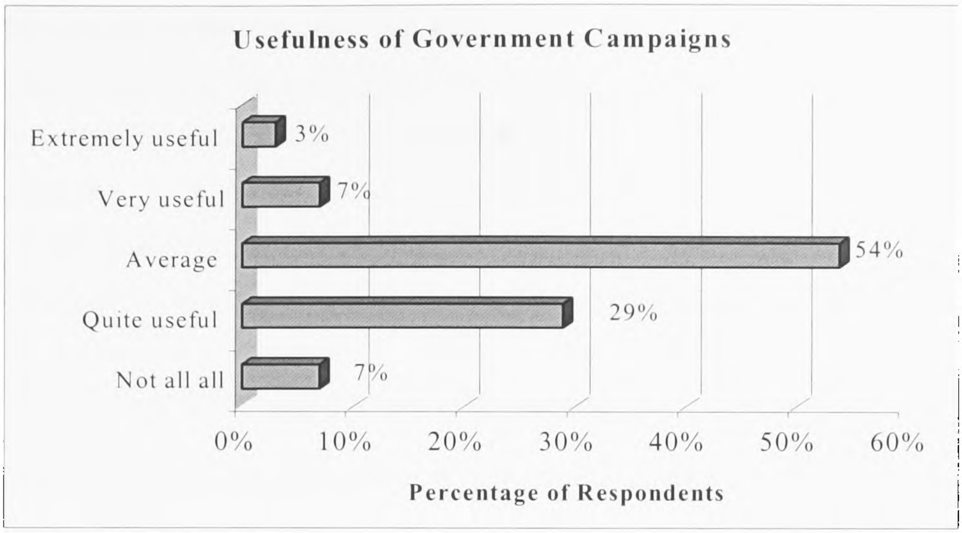


Figure 32: Perceived usefulness of government campaigns

Ninety three percent of the group that responded to this question considered the campaigns to be useful to varying degrees, whilst 7% considered the information to be not useful at all. The proportions are such that when the campaign and its information have been recognised they do influence the attitude of users. The question remains of what effect will that influence have in terms of motivating users to take energy conserving measures. The follow up questions sought to determine this. In overall terms at best, only 51% were cognisant of government campaigns, 49% were not.

4.5.3 Utilising information

The respondents (51%) who were aware of the campaign were asked whether they had implemented any of the measures that the campaign had promoted, in essence, had they acted upon the information. Table 20 presents the results to this question, it shows that 47% of respondents claim to have implemented some of the measures and therefore acted on the information.

Table 20: Percentage of respondents that have done measures the campaign suggested.

Yes	47%
No	53%

To assess whether these campaigns had informed the attitude of the users sufficiently to provide an impetus for users to install particular energy measures voluntarily, a series of specific questions relating to individual energy conservation measures prompted by the government campaigns were posed. The questions sought to determine whether an awareness existed between the campaign and the respondents acting on the information by installing particular energy saving measures.

The first question related to cavity wall insulation.

Table 21. Percentage of respondents that have installed cavity wall insulation

Yes	8%
No	92%

The results presented in table 21 show that only a small percentage (8%) of respondents had installed cavity wall insulation in their homes. The largest proportion 92% had not installed cavity wall insulation. No associations were found between the results and other variables such as age, income, property type or age of dwelling.

The second question related to the installation of double glazing, the results are presented in table 22 which shows that 29% of respondents had installed double glazing.

Table 22. Percentage of respondents that have installed double glazing.

Yes	29%
No	71%

The results indicated that was mainly older respondents who had installed double glazing. No statistical associations were found, however, 47% of respondents that had installed double glazing were over 55 years of age. It was also found that respondents who had been in occupation for the longest time had installed double glazing, with 49% being in occupation for over 15 years, therefore lived in older dwellings which did not have double-glazing, which provided an opportunity to install this measure. This reflects the findings of the DOE (1996), which found that cheaper measures of insulation tended to be installed first, while people tended to wait longer to install more expensive measures such as double glazing.

Similarly with respect to the installation of secondary glazing, the results shown in table 23 show that only a very small proportion (8%) of the respondents had installed this measure.

Table 23. Percentage of respondents that have installed secondary glazing.

Yes	8%
No	92%

Further investigation revealed that respondents who had installed secondary glazing did feel the cold to a greater extent. The primary reason for installing secondary glazing is to achieve or improve a comfort level and it is suggested that this was the main impetus for this group of respondents. This corresponds with the findings of Shorrock *et al,* (1993), who found that the installation of secondary glazing was installed usually to improve a comfort level rather than for any other reason.

Users were further questioned with regard to the installation of loft insulation. The results are shown on table 24.

Table 24. Percentage of respondents that have installed loft insulation.

Yes	32%
No	68%

The figure shows 32% of the respondents had installed this measure. Although no statistical associations were found, 48% of the respondents over the age of 55 years had installed this measure. This indicated that mainly the middle aged to older respondents were prone to install this measure, possibly because of its historic prevalence. In addition, the results indicated that respondents that had been in the property longer were more likely to have installed this measure, with 38% of respondents that had been in their property over 20 years installing loft insulation. Again this may be an issue of opportunity, in that older dwellings are more likely to be in need of loft insulation, newer dwellings would not. However, closer investigation revealed that it generally appeared to be the respondents in the lower income levels that had installed this measure, with 43% earning under £20,000 per year. This is not surprising as this measure is cheap and effective, costing in the region of £60 to insulate an average loft.

An association was also discovered with the awareness of the government campaigns (at a confidence of 99%) this suggested that those respondents who were aware of the campaigns had a greater propensity to install loft insulation. However, despite this association, the significant extent that government campaigns have promoted this measure over the years must be taken into account.

It is probable that many of these users had been influenced, either directly or indirectly. It should also be noted that the installation of loft insulation as a means to achieving immediate improvements in comfort and cost saving has been common knowledge for a long time. Therefore, its installation is not necessarily attributable to just the most recent government campaign.

A question relating to the installation of hot water tank lagging, table 25 shows that nearly a third of respondents had installed this measure. This is a quite significant proportion who had acted in this way, however, as with the previous question regarding the installation of loft insulation, the knowledge must in part be attributable to government campaigns, but direct correlation between particular campaigns and installation are not possible. Similar counter arguments also apply, which leaves the conclusions uncertain.

Table 25. Percentage of respondents that have installed hot water tank lagging.

Yes	31%
No	69%

No statistical associations were found, however, further analysis showed length of occupation in the property had influenced the installation of this measure. 48% of respondents that had been in the property over 5 years had installed this measure, in addition, 65% of respondents in the middle to older age range had installed hot water tank lagging. The high proportion of middle to older aged respondents installing this measure may be due to the measure itself being cheap and highly effective and very easy to install, together with this measure enjoying very similar levels of promotion as loft insulation over the years.

A question relating to the installation of draught stripping, shows only a quarter of respondents installing this measure, the results are shown on table 26.

Table 26. Percentage of respondents that have installed draught stripping.

Yes	16%
No	84%

No associations were discovered between these results and the intervening variables. Further investigation showed respondents in the lower incomes (43% earning under £20,000 per year) had installed this measure, together with respondents who were quite susceptible to the cold. The fact that such a small percentage of the respondents had installed this measure could be in line with findings by Shorrock *et al* (1993), where it was found that people do not feel the need to draught strip their home if they already have a satisfactory comfort level. An association was also discovered with the awareness of the government campaigns, this suggested that respondents who were aware of the campaigns had a greater propensity to install draught stripping. However, as argued previously, the number and extent of government campaigns that promoted this measure must be taken into account and that users have been influenced, either directly or indirectly.

4.5.4 Testing the sub-hypothesis

With regard to the sub-hypothesis deduced from the literature study: 'Users (homeowners) attitudes are not significantly changed by government campaigns'. The results shows that this is definitely the case.

The results have shown that the highest measures of installation for users was loft insulation, double glazing and hot water tank lagging, which is in line with Department Of The Environment findings (1991). It was also found from the survey that the majority of the installations of these measures were carried out by respondents in the lower income levels. It can also be seen that just over half of the respondents claimed to be aware of the campaign promoting energy efficiency, however, when testing this knowledge it was found that the respondents were essentially unaware of the messages promoted by the campaigns. This is in line with findings from Salvage (1993) regarding the effectiveness of government campaigns which concluded that publicity alone was not enough to persuade many people to insulate their homes and that more positive action was required.

In essence, with regard to the level of awareness of respondents reflected in the level of energy measures installed, little evidence could be found to profile an increased propensity to install measures by having knowledge of the campaigns, which appears consistent with a lack of awareness regarding the messages of the campaign.

These results generally indicate a low awareness of the environmental impact of the use of energy in the home by users, which would also support the reason for the government introducing energy saving campaigns in the first instance. People cannot save energy if they do not know how to.

However, it can also be surmised from the findings, that despite a large amount of advertising regarding the benefits of energy saving and environmental impact, this information has not been utilised by users to any great extent. It can also be proposed that if government campaigns had been introduced on a much more regular basis, than once every few years, there may be a greater awareness among users than is found at present. However, in contrast, it can be argued that even if users were more aware of the environmental impact there is no evidence that would suggest they would use this knowledge to a greater extent than at present, as they possibly do not feel a personal level of responsibility towards the environment and are therefore of the opinion that why should they have to spend money improving their home, when the government should be doing it.

4.6 Research Findings – Users (homeowners)

For the users (homeowners) study, the hypothesis for the research was stated as:

'The prevailing attitudes of users (homeowners) are not conducive to the attainment of the CO_2 emissions reduction set by the government'.

With respect to this hypothesis, the evidence produced by this study strongly supports the hypothesis that users attitudes are not conducive to the attainment of a reduction of the CO_2 emissions set by the government.

1) The findings demonstrate that only a minority of users would pay an extra premium for an energy efficient dwelling that promised savings on fuel bills. In addition, an attitude of reluctance to invest in energy measures indicates that users will not voluntarily invest in energy measures for energy efficient purposes.

2) A significant proportion of users are concerned with obtaining the best possible payback from any investment in energy, which demonstrates that return is highly important to the majority of the respondents. Users want as much as possible for as little as possible. In addition, a clear reticence exists from users to pay for energy efficiency measures, without a guaranteed immediate and substantial return.

3) Comfort is of paramount importance to the respondents, with heating patterns strongly reflecting this. Heating use was undertaken on a comfort and lifestyle basis and the pursuit of comfort is the overriding factor for the majority of respondents. Energy saving to reduce CO_2 emissions is not a consideration in the use of heating.

4) A clear grouping of users exists whose actions were influenced by income and cost. However, quite significantly for CO_2 reductions, any energy saving action taken by this group tended to be done to reduce energy costs on fuel bills, rather than for environmental reasons.

5) Users have a low awareness of energy use and its impact on the environment. They see no need to conserve energy or be pro-active and install measures to assist with energy saving.

6) Users also have no perception of the link between their energy use and the impact of this on the environment, and therefore perceive that they collectively have little to do with the environmental problems. Users (homeowners) are deficient in essential knowledge of factors such as fuel use and the proportions of which make up their fuel bill for lighting, heating and cooking, or how energy use in the home contributes to environmental problems.

7) Users attitudes have not been influenced or changed by government campaigns. Users were essentially unaware of the messages promoted by the campaigns. Little evidence could be found to profile an increased propensity to install energy measures by having knowledge of the campaigns. Nor did the availability of grant aided energy measures produce a greatly increased propensity to install energy measures.

8) Energy measures hold little importance to purchasers when deciding to purchase a new home, other factors such as appearance of the property, size of the dwelling, presence of a garage and garden, take significant priority over energy efficiency.

9) The results from the study form the basis for the conclusion that Users (homeowners) attitudes are not conducive to the attainment of a reduction of CO_2 emissions set by the government.

4.7 User (homeowner) profile.

One of the most significant factors that has emerged from the research findings is a categorisation of users. Users of domestic dwellings cannot be regarded as a homogeneous group with a consistent attitude towards energy use and conservation. It is clear that users are composed of several distinct groups, each with discernible attitudes towards energy. Previous work in this area had recognised certain characteristics of these groups such as the elderly and the poor, but had not recognised them according to their profile of attitude towards energy.

The results from the study show unequivocally that it is not possible to provide a uniform 'profile' of the public and their attitudes or practices towards energy. This also underpins the findings from the literature study and methodology where no model was found that quantified particular types of person and the practices or attitudes that they are likely to possess or adopt. As a result it must be realised that the public attitude towards energy efficiency is not as homogeneous as has been previously assumed. The implications of this are, that the government must adopt an approach that will encourage homeowners to insulate their homes, and as a result assist in the reduction of CO_2 emissions. Simply, the government must implement a range of solutions that will cater for the diversity of the general public who are homeowners.

One finding from this research was that distinct groupings of homeowners exist and these distinct groupings should be taken into account when targeting campaigns or information flow concerning energy conservation. This conclusion is derived from the analysis of homeowners attitudes. This analysis produced three distinct profiles of homeowners, namely, the income sensitive, the elderly and the ambivalent.

These groups have been derived from a categorisation of homeowners practices and attitudes by using the table below and the results as a whole, which shows the key attitudes and practices, coupled with the social profile of the respondent.

Table 27. Profiling the respondents.

	Low Income	**Susceptible To Cold**	**Male**	**Female**	**Older Age Range**	**Middle Age Range**	**Younger Age Range**
Whether cost of heating influences use	✓	✓					
Take active measures to control fuel bill	✓	✓		✓			
Change practices in the home if the price of fuel rose	✓						
Would improve energy efficiency of dwelling if had high bills	✓	✓					
Made use of grants	✓						
Installed energy measures		✓		✓	✓		
Service boiler regularly	✓		✓		✓		
Like to live in an energy efficient home							
Turn up heating if temp drops			✓		✓		
Add a jumper if temp drops				✓	✓	✓	✓
Aware of the impact of energy		✓	✓		✓		
Aware of government campaigns						✓	
High heating periods			✓		✓		

In profiling the attitudes, the table shows that low income householders appear to be more inclined to try and control their fuel bill and to be slightly more aware of the cost of heating, this also appears to be the case for those respondents that are susceptible to the cold. The older age range of respondents appear more likely to turn up the heating in the colder weather despite these respondents being slightly more aware of the impact of energy use and being slightly more inclined to install energy measures. The younger and middle age ranges were more likely to add a jumper when the temperature dropped rather than turning up the heating.

Gender appeared to have an effect, with men being more likely to have boilers serviced, although they were more prone to longer heating periods than women. Women, were more likely to have installed energy measures and were also more frugal with use of the heating than men, adding a jumper rather than turning up the heating and generally trying to take active measures to control fuel costs.

4.7.1 The income sensitive

As a proportion of the sample, this group accounts for 35%. The income sensitive appear to have a more positive attitude to energy saving, although it is perhaps this group that require financial assistance to install additional insulation promoted by the government to assist with CO_2 emissions. It is this group that need the most assistance, as grants available for the installation of energy efficient measures offered by the government are only available to people on income support or the elderly. From this sample, no respondents were on income support, but were still considered income sensitive which means that in general terms this group are unable to afford energy measures but are outside the requirements of the governments remit to be eligible for a grant. The income sensitive were found to be positive about energy and did attempt to take active measures to try and control their bills, and compared to other respondents from the study did appear to be more responsible regarding energy use. It is suggested that this group are important in the reduction of CO_2 emissions. If grant aid was provided to this group it is suspected that they would be more likely than other groups to improve the efficiency of their home.

4.7.2 The elderly

As a proportion of the sample, this group accounts for 31%. The elderly were found to have a fairly positive attitude towards energy, however, it is their practices that need changing. The elderly were found to be responsible with regard to factors such as regular servicing of boilers and installing certain energy measures, however, it is this group with high heating and occupancy patterns, together with an inclination to keep turning the heating up rather than adding a jumper or installing simple cheap energy measures such as draught stripping. It can be argued that this group of people are eligible for a grant, however it is suspected that the majority of the older age range are unaware of their eligibility of the grants themselves, or feel that it would be too much upheaval to apply for one. This coupled with the fact that in some instances, some elderly people do not fully understand energy measures. As an example one elderly respondent claimed to have loft insulation and actually had none at all, this respondent had confused roofing felt with loft insulation. Therefore for the government to achieve CO_2 reductions from this group, it is education that is needed on what energy measures are and how they work, together with the best way to use energy in high occupancy situations, together with financial assistance. It is also important to note the vulnerability of the elderly, and their greater need for good thermal conditions, which reinforces the need for better thermal insulation ahead of other energy efficiency measures.

4.7.3 The ambivalent

As a proportion of the sample, this group accounts for 41%, clearly the largest of the three categorisations of user and considered to be the most significant. The group considered to be ambivalent were mainly in the younger to middle age ranges. This group can afford to install energy efficiency measures but are ambivalent towards actually taking action. It can also be deduced that it is the middle to higher income homeowners who are less likely to be concerned with saving energy in the home as they are more able to afford energy. It is these groups that are in need of a change of attitude regarding energy use in the home and the need to save energy. Whether this is achieved through increased knowledge or a form of direct penalisation is a decision that will have to made, most probably in parliament.

Therefore, the distinct groupings of the respondents can be categorised below.
The groupings are;

1) Income sensitive: this group need financial aid to install measures as they fall just outside the criteria for eligibility for grant aid, but given financial assistance it is suspected that they would install measures to save energy to assist in controlling their fuel bill.

2) The elderly: who often reside in the most poorly insulated homes. Mainly due to a lack of income to be able to improve the efficiency of their property, together with a 'historic' use of fuel that is very often highly

inefficient (e.g.; coal or oil fired boilers, or open fires). It is this group that are eligible for grant aid to install measures but are often completely unaware of the fact that they can obtain assistance.

3) The ambivalent: this group can afford to install energy measures but have no impetus to do so. It is this group that requires a more aggressive approach to change attitudes and raise awareness.

It is crucial for these groupings of users to be taken into account when targeting future campaigns or information flow by the government. From a 'campaign' and 'initiative' perspective, the results from the research suggest that the solutions that will be effective in reducing CO_2 emissions will be focused and group specific and not generalised across the whole population as has been assumed in previous government energy saving campaigns.

CHAPTER 5

PROVIDERS (HOUSEBUILDERS) RESULTS.

5.1 Introduction

This section provides the results and analysis by each sub-hypothesis.

These indicated that collectively, the providers, were a single minded industry which was consistently homogeneous in its actions despite being fragmented in its structure. The industry also demonstrated a considerable amount of similarity in its product and its respective product types, even allowing for regional variations.

5.2 Sub-hypothesis 1.

The first sub-hypothesis relating to providers has been stated as;

Providers (housebuilders) do not consider energy to be an important issue in new housing

5.2.1 Introduction

Taking the first sub-hypothesis, that providers (housebuilders) do not consider energy to be an important issue in new housing, a number of questions were designed into the survey to test the sub-hypothesis.

5.2.2 Specification decisions

Initially the survey sought to find out at what level the attitude towards energy emanated, this was achieved by determining at what level the energy specification for each provider's product was set. Providers were asked who determined the specification for their dwellings.

Table 28: Who determines specification.

Sales, marketing, design	60%
Board of Directors	40%

The results show that 60% of providers stated that their specifications were set at head office by the sales and marketing department, whilst 40% admitted that these were set by the board of directors. None of the providers set the specification at local or individual customer level. Clearly the implications from these results are that the product specifications, including those for energy, are set centrally by all the providers. The attitude is a central one and will therefore apply to all the provider's products without variation.

Providers were further questioned on what criteria the specification was based upon. For all providers, the criteria for the specification was based upon their standard housetype design, tried and tested in the marketplace. This further underpins the attitude being set centrally by providers, it also indicates that deviation from the standard housetypes is unlikely to occur.

A follow-up question was asked; 'Is this specification subject to modification?'

Table 29: Specification subject to modification.

Yes	50%
No	50%

Half of the respondents claimed that the specification was subject to modification, while half claimed that it was not. The respondents who claimed the specification was subject to modification, gave the following reasons, shown in table 30.

Table 30 : Reasons why specification is modified

Requested by NHBC, or more insulation needed in certain elements	20%
Maximising number of dwellings on a site	10%
Availability of a construction element	10%
Price or area influence	10%

The 20% who stated that it was only ever modified by order of the NHBC or if the building needed additional insulation at jambs or floors because of an exposed area, or sound levels needed improving in certain areas. Whilst 10% stated that the design was only modified in the sense that if the company was experiencing difficulties in fitting the correct number of dwellings onto a site, then a garage may well have to be moved to another side of a house, the following anecdote confirms the point.

"The construction is not altered at all, it is only the layout of the house that may be altered, for example, a garage could be moved to the other side of the house if we are having trouble fitting all of the dwellings on it. Or if we are having trouble meeting the SAP rating a condensing boiler may be put in".

The remaining 10% of the sample who stated that the specification could be modified cited the reason to be, when availability of a construction element was low. While 10% claimed that the specification varied because of the price and area in which the dwellings were to be constructed. It is interesting to note that none of the housebuilders changed their specifications to include specific energy measures. Specifications were only modified to ensure the design passed through the planning process, to decrease build time and maximise profits. A clear indication of the providers commercial focus.

Providers were questioned further on whether the designs or specifications were related to different value properties, for example; were they varied for ordinary or executive homes. 90% of the respondents claimed that the design and specification were not altered to accommodate different value properties, while 10% of the respondents claimed that this was the case. However, although the standard specification and design is not altered (and if so only to accommodate an increase in the size of the dwelling), certain aspects of the design such as fittings are altered, with the following anecdote confirming this;

"We only change things in the sense that we wouldn't spend as much on a home selling for £½ a million, than we would on a £2 million property, the details are all fairly standard, its just the quality of things that alter"

For the 10% of providers who varied their designs for different value properties, the measures were not energy based, but factors such as upgrading the standard staircase, and improving the kitchen and bathroom fittings. Aesthetic features quite clearly took precedence over anything else.

It is clear from the positions and reasons expressed by the providers, that the specification for the dwellings was not changed to meet energy efficiency demands, nor was it changed to accommodate the desires of customers should they demand greater energy efficiency. (Significantly, it is also noted from the results that there is no evidence of such demands being made by potential purchasers). Changes to the specification of the dwellings are made, in the main, to maintain the technical and economic feasibility of the dwelling. This will be seen later to be totally in keeping with the attitudes of providers, which is one that is singularly focused on commercial profitability.

A second set of questions were asked of providers aimed at determining the extent to which they concerned themselves with energy use and conservation. The first question sought to determine the extent to which the providers developed their (staff) knowledge on energy use and conservation, thus indicating the potency with which they regard these issues within their business.

Providers were asked 'Does your company provide staff training and development in energy efficiency?'

Table 31 : Provision of staff development in energy efficiency.

Yes	30%
No	70%

Table 31 clearly shows that 70% of providers stated that their company did not provide staff training in this area, whilst the remaining 30% did. Further investigation of the group that did provide training revealed that this was primarily training as an energy assessor for the SAP requirements included in the revised Building Regulations and not a broader education relating to the most effective types of energy saving materials, heating systems etc.

The results show that the extent of training is limited, with the majority seeing no benefit to such training and therefore not partaking. Of those that do undertake training, the objective of which is shown to be strictly and directly supportive of a perceived business need (the SAP requirements). The deduction from these results shows the singular focus of these firms in respect to energy use and conservation, one of strict commercial necessity leading to maximum profit, which determines their attitude towards energy.

5.2.3 Importance of energy measures in design.

Questions were asked to discover the degree of importance providers currently placed on energy efficiency measures. The question was posed; 'How important are the following to you as part of the design team?' Respondents were asked to rate the importance of certain factors on an importance scale of not at all important, not very important, average, very important and extremely important. Table 32 shows the results.

Table 32:Importance of energy measures to the design team

	Not at all important	Not very important	Average	Very important	Extremely important
Double glazing	0%	0%	0%	20%	80%
Heating systems	0%	0%	20%	20%	60%
Draught stripping	10%	10%	20%	10%	50%
TC Valves	0%	0%	30%	50%	20%
Condensing boilers	20%	50%	20%	0%	10%
Triple glazing	70%	10%	0%	10%	10%
Exceeding regulations	0%	40%	20%	30%	10%
Site planning/orientation	30%	20%	30%	10%	10%
Solar panels	90%	10%	0%	0%	0%

The results indicate that providers consider double glazing, heating systems and draught stripping as extremely important to them as part of the design. Thermostatic control valves were considered very important, but these are standard in most new homes and an integral part of the heating system. Thermostatic control valves can also influence a SAP rating favourably.

A number of measures were considered to be not at all important, these were condensing boilers, and triple glazing. Exceeding the regulations was considered not to be important at all, this is another indication that energy measures are considered to be unimportant.

Site planning and orientation were also considered to be not at all important, this was defined to the respondents as being, 'the design of the site as a whole in the sense of utilising factors such as passive solar gain and using existing vegetation to shelter the properties'. Providers did not feel this to be important as their major concern with site planning and orientation was limited to the maximum number of dwellings that would be fitted onto a site. This again demonstrates how commercially driven housebuilders are. Site planning and orientation of dwellings can aid energy efficiency significantly and reduce the need for space heating. Housebuilders do not consider this to be important at all as utilising these methods will most likely affect the number of dwellings on a site, and ultimately profitability.

This finding underpins the previous finding where specifications for dwellings are based on tried and tested standard housetypes. Therefore if providers were to utilise site planning and orientation of individual sites, it is inevitable that their standard designs may have to undergo alterations at additional cost, which in probability would be seen by the providers as commercially unacceptable.

These results clearly show that the measures that are to the fore are those that directly affect the profitability of the development, such as double glazing, heating systems and draught stripping. Purchasers clearly expect these measures as standard, which is reinforced and reflected in the users (homeowners) series of results. This shows a conscious decision on the part of providers and a knowledge that these measures are of great importance in a design, particularly to purchasers.

The other more advanced measures such as condensing boilers and site orientation do not constitute a consideration in the housing market at this time and so are not to the fore. This suggests that providers do not have a high level of knowledge surrounding these measures and hence, this lack of knowledge informs their attitude.

5.2.4 Attitudes towards including energy measures

Providers were asked a series of questions directly concerning the energy efficiency of their dwellings, as a means of determining their attitude towards energy use and conservation, by identifying the energy approach they had taken.

The first question asked providers whether they deliberately provided energy efficiency measures in their homes.

Table 33: Deliberately provide energy measures.

Yes – provide energy measures	60%
No – only meet minimum standards	40%

In total, 60% of the respondents stated that they deliberately provide energy efficiency measures by constructing their homes above the minimum standard set by the Building Regulations. The remaining 40% constructed their homes to the minimum thermal standards required by the Building Regulations.

Further questioning of the 60% of respondents who claimed to deliberately provide energy efficiency measures revealed a contradiction, quite clearly attributable to poor knowledge levels. Providers clearly stated that they included energy measures, however, the energy measures that were installed were insignificant as the providers increased the insulation levels slightly in the external walls, which is not construed as a definitive 'energy measure'. Increasing the insulation in walls, is probably one of the cheapest ways to exceed the regulations, without costing the provider a great deal more. Despite the respondents not being forthcoming on the actual type of insulation used, it is suspected that the insulation was selected for operational reasons, i.e. it was easier and/or quicker to install, provided less waste, needed no protection, was easily available and was most likely cheaper, either as a capital purchase or in overall installation terms. Therefore, it is postulated that the providers specified thicker insulation voluntarily, as it was a cheaper option. The fact that this material provided an energy benefit is seen as purely incidental. This still maintains the hypothesis that the providers are profit focused, rather than energy conservation focused.

Another respondent claimed that up until the new regulations were introduced, they exceeded the regulations by deliberately adding more insulation, but with the introduction of recent revisions to the regulations these designs no longer exceeded the standard requirements. It is interesting to note that this provider elected not to continue to exceed the regulations by adding more insulation over and above the requirements. This goes further to support the attitude of providers towards energy measures as being a lesser consideration.

A second question asked respondents whether they exceeded the minimum standards of performance set by the Building Regulations in their designs.

Table 34: Exceeding the Building Regulations.

Exceed the minimum standards	60%
Do not exceed minimum standards	40%

Table 34 shows that over half of the respondents (60%) claimed to exceed the thermal regulations in their house designs. When questioned further on which particular aspects of the design were exceeded, all 60% of providers stated that they exceeded the minimum standards in the walls. This is a clear indication of the extent that providers are focused on profit. As discussed previously, wall insulation is a cheap method of increasing insulation values as many manufacturers provide and promote wall insulation material that is easy to use, optimises build time and exceeds the standard thermal requirements of the Building Regulations. It is also interesting to note that the majority of the providers did not exceed the regulations in areas that would have a greater impact on energy saving, such as such as heating systems, triple glazing or condensing boilers, but would have a greater impact on profitability.

These results provide another indication of the attitude of the providers and the influence that profit plays in their design. The incorporation of energy conservation measures above and beyond thermal requirements is quite clearly not a consideration. The fact that a proportion of the providers happen to exceed the regulations in their wall specifications, is purely incidental and is driven by the insulation material specified, which is suspected to be the most cost effective material available at the time of specification.

Further analysis of the responses showed that the 60% of respondents that did claim to deliberately provide energy measures in new dwellings, were the same respondents that stated they exceeded the regulations thermally.

Table 35: Comparison of exceeding the Building Regulations and deliberately providing energy measures.

	Deliberately provide energy measures	
Exceed the regulations	**Yes**	**No**
Yes	60%	0%

No	0%	40%
Total	60%	40%

This analysis shows that the providers are of the belief that they are providing energy measures, when they are merely adding to an existing construction element, that is clearly not construed as being an 'energy measure'. This is a clear indication of the minimal knowledge of providers about energy measures, which underpins the attitude of providers that energy measures are not important in new houses.

The results also suggest that providers who do claim to build above the Building Regulations do so, but only to a very limited extent, and in most instances only do so to meet required SAP ratings. The following quote summarises the attitude of the respondents who did build above the regulations.

> *"Where the proposed design does not meet the required SAP rating, the programme is used and played with until the correct value is achieved. Usually it is met by adding energy efficient light bulbs and thermostatic control valves and not by altering the construction or adding extra insulation"*

Providers' attitudes towards energy use and conservation was further explored by seeking to ascertain their intent towards energy. With regard to ascertaining whether housebuilders had a positive attitude towards energy efficiency, the respondents that did not currently exceed the regulations (40%) were asked whether they would *like* to build above the Building Regulations thermally. The question was phrased as; 'Would you like to build all of your properties above the thermal regulations?'

Table 36: Respondents that did not build above the Building Regulations- would they like to.

Yes	40%
No	0%

All of providers that did not exceed the Building Regulations thermally stated that they would like to. Anecdotal evidence from the providers clearly identified the reasons for the response, one provider explained the rationale that respondents felt that there was no market for energy efficient homes at the present time. Similarly, another respondent stated that at the present time it was not cost effective for the company to build energy efficient homes, as no market existed.

The general consensus was that at the present time there was no market for energy efficient homes, a reality that is clearly reflected in the attitudes and actions of users (homeowners).

More is revealed about the attitude of providers towards energy efficiency and in particular users, by a number of unsolicited responses from providers.

One respondent stated that despite having energy efficient homes, users (homeowners) had no real concept of how to use them properly and until homeowners became more aware of energy and its use, there was little point in building energy efficient homes. Another respondent stated that in the future, energy efficiency would probably be used as a marketing tool but only then would housebuilders begin to incorporate energy efficiency into their designs.

These reveal a realism on the part of providers towards energy and their customers, it provides further insight into the underlying influences for their attitude of commercial necessity.

The literature study highlighted the attitudes of the housebuilding industry towards changes to Part L of the Building Regulations, and how any proposed changes are invariably met with resistance from the industry. This question was aimed to assess the attitudes of these housebuilders and to determine whether the attitudes towards the new regulations were centrally held by all providers, or whether they differed significantly.

The respondents were questioned on their attitudes towards the new energy regulations (Part L of the Building Regulations 1996) and whether they found them satisfactory, too stringent or not stringent enough.

Table 37: Attitudes towards the new Building Regulations (Part L)

Satisfactory	70%
Too stringent	20%
No response	10%

10% of the respondents declined to respond to this question, due to having no knowledge of the new regulations, an ignorance which is of concern. 70% of respondents felt them to be satisfactory, while 20% felt the regulations to be too stringent. Further questioning of the providers confirmed the general feeling among all respondents that any changes to the Building Regulations are invariably met with resistance, due mainly to the cost implications involved and a reluctance to incorporate new measures that would reduce profit margins. Providers (housebuilders) did feel that in some instances the Building Regulations were 'headed in the right direction', but that the government would 'go too far' with them and make them even more stringent.

These latter comments provide further insight to the influences that contribute to the attitude of providers, their wish is for as much certainty as possible, in this case through maintaining the status quo with respect to purported changes; an expression of their inherent conservatism. Another aspect of commercial necessity.

5.2.5 Testing the sub-hypothesis

With regard to the sub hypothesis that 'providers (housebuilders) do not consider energy to be an important issue in new housing', the results show this clearly to be the case.

This section has demonstrated energy not to be at the forefront of considerations for providers, and this was further reinforced by the limited training or development in this respect for staff of the providers. In addition, there is evidence of little interest or knowledge of more advanced or possible future energy considerations that may be of interest to customers. However, recognition did exist that energy efficiency may be bought to the fore in the future.

Overall, providers are working on commercial realism, which at the moment is that energy is not an issue in new houses and therefore providers are paying it little attention. This is not what is required to reduce CO_2 emissions. These findings clearly demonstrate the extent to which providers regard energy and supports the sub-hypothesis.

5.3. Sub-hypothesis 2.

The second sub-hypothesis relating to providers has been stated as;

Providers (housebuilders) believe that there is no market for energy efficient homes.

5.3.1 Introduction

Taking the second sub-hypothesis that providers (housebuilders) think there is no market for energy efficient dwellings, a number of questions were designed into the survey to test the sub-hypothesis. It was considered important to determine the providers (housebuilders) attitude to their customers, in a number of areas;

a) What measures customers desire,
b) How informed customers are
c) How much customers are willing to pay for energy efficiency.

Determining the strength of these factors would act as major determinants of the housebuilders rationale for not incorporating energy efficiency into houses, confirming the hypothesis that no market exists for energy efficient dwellings.

5.3.2 Providers attitudes towards potential purchasers

Firstly, providers were questioned as to whether purchasers specifically requested energy efficiency measures at the time of interest in a purchase. This would determine the extent that providers considered or were influenced by the needs of their purchasers.

Eighty percent of providers stated that purchasers never requested energy efficiency measures, while the remaining 20% of respondents did not know. In explaining the response, one provider suggested a reason why potential purchasers never request specific energy efficiency measures is that their knowledge regarding energy efficiency was low and that homeowners would only request what they already had, or a recognised improvement on that.

Providers were questioned on how informed they thought purchasers were with regard to energy efficiency. The results are shown in table 38.

Table 38: How informed purchasers are with regard to energy efficiency

Not at all informed	30%
Scarcely informed	70%
Average	0%
Fairly well informed	0%
Extremely well informed	0%

The results found that 30% of the providers felt that purchasers were 'not at all informed' about energy efficiency, while 70% of the respondents felt that the public were 'scarcely informed'. This is a clear indication of the rationale that providers have adopted with regard to not installing energy efficient measures in their houses. If purchasers have no knowledge of energy efficiency, then they will perceive the measures to have no value.

The general opinion of the providers towards homeowners not demanding energy efficient homes, or energy measures in their new homes was based on the belief by providers that purchasers did not have sufficient knowledge to demand energy measures and did not perceive the savings that energy efficiency could offer.

Providers (housebuilders) suggested that at the present time there is no incentive for purchasers (homeowners) to request or demand energy efficiency, but did believe that if VAT on fuel rose, then this may provide an incentive for homeowners to start demanding energy efficiency. It was also suggested by some providers that if energy efficiency was made known to the public in the same way as the car industry did with miles per gallon, the public (homeowners) would know more about the subject of energy efficiency and possibly demand it. One respondent in particular made the following point.

> *"If the public had a measure of energy efficiency, like the miles per gallon, then they would know more and as a result, demand more. Mind you if the property was very energy efficient and still the same price but we fitted cheaper kitchen and bathroom fittings, they would not buy it. It all boils down to the purchasers value for money"*

To further underpin the attitudes of the providers towards their customers (purchasers), the providers (housebuilders) were requested to rate what they felt would be important to purchasers, when purchasing a new dwelling. Table 39 presents the results.

Table 39 : Factors considered by providers to be important to purchasers.

	Not at all important	Not very important	Average	Very important	Extremely important
Price	0%	0%	0%	10%	90%
Location	0%	0%	0%	10%	90%
Appearance of Property	0%	0%	10%	30%	60%
Kitchen	0%	0%	10%	30%	60%
Lounge space	0%	0%	20%	30%	50%
Garage	0%	10%	10%	40%	40%
Bathroom	0%	0%	30%	30%	40%
Central heating – fuel	20%	0%	20%	30%	30%
Resaleability	0%	0%	20%	60%	20%
Furnishings	20%	20%	30%	10%	20%
Garden	0%	30%	40%	20%	10%
K Glass	80%	10%	10%	0%	10%
Council tax	50%	0%	40%	0%	10%
Draught proofing	10%	20%	50%	10%	10%
Increased Insulation	60%	0%	40%	0%	0%
View	0%	20%	70%	10%	0%
Scope for improvement	30%	40%	30%	0%	0%
Condensing boiler	70%	30%	0%	0%	0%
Solar panels	80%	10%	10%	0%	0%

The table shows the factors that providers (housebuilders) think purchasers find to be of importance when purchasing a new home. These factors were location, price, appearance of the property, kitchen, garage, lounge space, bathroom, the fuel source for heating and resaleability.

With regard to energy efficiency measures, the providers are clearly of the attitude that purchasers place little if any importance on these measures. This attitude is further reinforced by all the providers having the perception that purchasers have little or no knowledge at all of energy measures, therefore would not consider these factors to have any importance above other measures such as the kitchen or lounge space. Quite clearly, the providers perceive the factors to be important to purchasers are the same factors that providers base their marketing strategies and designs upon.

To further underpin the attitudes of providers (housebuilders) towards energy measures, these criteria were also applied to the users (homeowners).

The users (homeowners) study showed location, price, central heating, garage, size and appearance of the property, garden, lounge space and resaleability to be the most important criteria when purchasing a new home.
With regard to the energy measures, the results clearly showed the attitudes of users (homeowners) towards energy measures as being one of relative indifference. In simple terms, the attitude appears to be that energy has no importance when compared to other cosmetic or status enhancing factors such as a garage, garden or the appearance of the property.

This comparison of attitudes shows the uniformity of responses, between the perceptions that providers have towards measures that purchasers find important, and the measures that purchasers have stated they find important, to be exceptional.

These results strongly demonstrate how acutely aware providers are of their market and the needs and desires of their purchasers. This is also a clear demonstration that underpins the sub-hypothesis that providers believe there is no market for energy efficiency homes. Purchasers clearly do not demand energy measures and place no importance on having these measures in a home, therefore providers respond to this by not including energy measures in their houses.
This also underpins the perceptions of the providers, who are of the opinion that purchasers (homeowners) are not informed about energy efficiency and therefore do not consider it or recognise it as a purchasing criteria.

5.3.3 Marketing and energy efficiency

The attitude of providers (housebuilders) towards the issue of marketing and energy efficiency were determined to ascertain the influence of these issues on their attitudes towards purchasers.
Providers were questioned on the extent marketing affected the design of a dwelling, the results are shown in table 40.

Table 40: The extent marketing affected the design of a dwelling

Not at all	0%
Marginally	10%
Average	20%
Quite a lot	40%
Totally	30%

Thirty percent of providers stated that marketing affected the design of a dwelling 'totally' as they were entirely market led. 40% stated that marketing affected the design of their dwelling 'quite a lot', while 20% stated that it affected it 'an average amount'. Only 10% stated that it affected it 'marginally'. One of the respondents explained the process that marketing has on the design of the dwelling;

> *"The sales office more or less dictate what should be built and where and which area of the market to aim for, the market research people then go out and analyse potential sites, look at the schools etc in the area and then decide what sort of homes would sell there"*

These results show clearly that the vast majority of providers (90%) were driven by their marketing department and this consequently informed their attitude that there is no market for energy efficiency in housing. It could be argued that this had never been tested, however it must be acknowledged that the marketing strategies adopted by these departments have been very successful, so it is difficult to doubt the correctness of their marketing assumptions – one of which is that energy efficiency is not a market issue for purchasers.

Providers were asked directly whether they felt there to be a market for energy efficient homes. Only 30% of the respondents thought that there was a market for energy efficient homes, while the remainder (70%) were adamant that there was not.

Perhaps one of the most important findings from this question was that 60% of the providers who felt there was not a market for energy efficient homes, gave the reason to be that homeowners would be unlikely to spend an extra few thousand pounds on a property that only offers a few hundred pounds saving a year. It was interesting to note that no mention was made by the providers of the reduction in CO_2 emissions that energy efficient homes achieve.

This is another manifestation of attitude that underpins the sub-hypothesis, there is no market for energy efficient homes because purchasers would be very unlikely to pay extra for an energy efficient dwelling. This finding also demonstrates that the providers primarily associate energy efficient dwellings with savings on fuel bills, rather than a reduction in CO_2 emissions.

Further analysis of the providers (30%) that felt there was a market for energy efficient homes, showed clearly that in the opinions of the providers, the market at the present time was a niche market. One respondent stated why;

"There is a market for energy efficient housing somewhere just like there is a market for houses with darkrooms for photographers and studios for artists. At the moment people want more important things.. you know the old saying Location, Location, Location!"

This finding is further underpinned by the attitude of this group, providers felt that there was a point when homeowners lived in insulated homes with double glazing and felt that nothing else was needed to add to comfort levels.

Respondents were also questioned on whether they envisaged energy efficiency becoming a marketing factor in the future. The majority of the sample (70%) felt that energy efficient housing would become a marketing factor in the future, and many felt this would occur if VAT on fuel was increased, or if a major housebuilder began to build energy efficient homes, then the rest would follow to keep competition in the market place.

One respondent made the following point;

> *"Energy efficiency is bound to become a marketing tool, its got to happen sooner or later. The question is who will be the first to take the risk, once that happens the rest of the housebuilders will have to jump on the bandwagon to keep up. It also comes down to money if you are quite poor then you buy a car that is good on miles to the gallon, however, you buy a Jag and you don't care how many MPG it does as you can afford it anyway. The same applies to a house, or will do"*

The 30% of the respondents who felt energy efficiency would not become a marketing tool in the future, were mainly adamant because they considered that homeowners did not know enough about energy at present to demand energy efficiency.

5.3.4 Attitudes towards purchasers paying extra for energy efficient homes.

The issue of whether the providers (housebuilders) felt purchasers would pay extra for energy efficiency was explored. Providers were asked (as a percentage of the sale price) how much extra they thought purchasers would be prepared to pay for energy efficiency.

Over half of the respondents (60%) felt that the public would not pay anything extra for energy efficiency. This generally expressed consensus by housebuilders was that the public would not pay any extra for energy efficiency in the housing market, mainly because they expect all these features to be included in the property at no extra cost. This also confirms the attitudes of the providers in that no market exists for energy efficient homes because purchasers are unlikely to pay extra for an energy efficient house. One particular respondent felt that in the future homeowners may pay extra for energy efficient housing, but only after a great deal of persuasion.

With regard to how much extra respondents felt purchasers would pay, 10% of the respondents felt that purchasers would only pay an extra 1%, whilst 20% felt that purchasers would pay only 2% extra, 10% felt that purchasers would pay an extra 5%. This result is similar to the findings of Bhatti & Sarno (1996) whose conclusions showed that 36% of households were unwilling to pay any more at all for an energy efficient house, while the same percentage were willing to pay 5% more if they received a payback in two years. Very few were willing to pay more than 7.5% for an energy efficient house.

In general, housebuilders do not consider that the purchasers will pay extra for energy efficiency. The findings from this section are in line with the findings from the users (homeowners) study, where 82% of the respondents claimed that they would like the opportunity to live in an energy efficient home, while 41% of the respondents also claimed that they would actually purchase one. When questioned on whether the homeowners would pay an additional £5,000 for an energy efficient home, only 27% of the homeowners claimed that they would, while the remainder were unwilling to commit.

It can therefore be confirmed that the housebuilders are correct in thinking that purchasers (homeowners) would be unlikely to pay extra for energy efficiency.

5.3.5 Testing the sub-hypothesis

With regard to the sub-hypothesis 'providers (housebuilders) believe that there is no market for energy efficient homes', the results show this clearly to be the case.

The attitudes of the providers (housebuilders) towards energy measures have been shown to be clearly driven by market forces. Even the providers that did not include energy measures in their dwellings, but stated they would like to, did not do so because they felt there was no market for energy efficiency. This was further underpinned by the exceptional uniformity of responses from the providers and purchasers regarding factors considered to be important in a new home. Providers clearly know their market and respond to it accordingly.

Providers considered homeowners to have very little knowledge of energy efficiency, or its benefits, which was their conclusion for homeowners not demanding energy efficiency in any way. Similarly, the responses to the questions regarding the possibility of homeowners paying extra for an energy efficient home, the housebuilders were fairly unanimous in the fact that they considered homeowners would not pay extra for an energy efficient home, a fact underpinned by the user (homeowner) study.

The results also showed that the lack of energy measures incorporated into new housing was mainly due to cost restraints and the perception by the housebuilders that homeowners know very little about energy efficiency and as a result do not demand it or expect it in new properties and would therefore be reluctant to pay for measures they know little about.

The attitude of providers towards energy use and conservation has been developed in response to two powerful influences, firstly their business mission to maximise their profit, and secondly the market will not pay a premium for energy conservation features in new housing. In respect to the second influence this has been shown to be an accurate perception of the market as users have indicated unequivocally that they are not prepared to pay more than an almost non-existent premium for energy efficiency.

This is not what is required to reduce CO_2 emissions. These findings clearly demonstrate the extent to which providers (housebuilders) regard energy as having little importance and supports the sub-hypothesis.

5.4 Research findings – Providers (Housebuilders)

The hypothesis for the research was stated as:

'The prevailing attitudes of providers (housebuilders) are <u>not</u> conducive to the attainment of the CO_2 emission reduction set by the government'.

With regard to housebuilders attitudes and whether these are conducive to the attainment of a reduction CO_2 emissions set by the government, the evidence from this study suggests that they are not.

1) Providers (housebuilders) do not rate energy as being important in housing design, they correctly assume that other factors such as en-suite bathrooms and fitted kitchens have greater importance than energy measures to potential purchasers.

2) Providers correctly perceive that no market to exist for energy efficient housing. This attitude was drawn from the correct assumption that purchasers (homeowners) have scarce knowledge of energy efficiency and therefore do not demand it when purchasing a new home.

3) Providers are totally commercially driven and the incorporation of energy efficiency in new dwellings is highly unlikely to occur unless the providers (housebuilders) see a reasonable return on this investment.

4) Providers (housebuilders) have the attitude that homeowners would not be prepared to pay extra for an energy efficient home and this has been conclusively reinforced by the users (homeowners) chapter.

5) Collectively the attitudes of housebuilders focuses on the fact that they do not consider energy efficiency to be worth including in new housing as profit margins appear to be the driving factor that this decision hinges upon.

6) Providers are acutely aware of their market and the needs and desires of their purchasers. Purchasers clearly do not demand energy measures and place no importance on having these measures in a home, therefore providers respond to this by not including energy measures in their houses.

7) Providers are not focused on conserving energy or environmental impact, they associate energy measures and conservation with reduced fuel bills rather than CO_2 emission reductions.

8) Therefore it can be concluded from this research that housebuilders attitudes are not conducive to the attainment of a reduction of CO_2 emissions set by the government.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

Analysis of the results and reflection on the research provides a number of main conclusions together with a number of lesser, but nonetheless significant conclusions. The conclusions drawn have far reaching implications on the government's attempts to reduce the CO_2 emissions from the domestic housing sector, as they affect both the policies adopted and the methods used. The conclusions (and the results upon which they are based) also change the fundamental understanding of homeowners and their use of energy held by government. The results have shown in overall terms that the hypothesis for the research has been substantially supported; the attitudes of users (homeowners) and providers (housebuilders) are not conducive to the reduction of CO_2 emissions. This result/conclusion produces a number of other conclusions, each of which is discussed below.

6.2 Summary of Conclusions

The main conclusions are summarised below

1) The attitudes of both users (homeowners) and providers (housebuilders) are not conducive to the reduction of CO_2 emissions.

2) Government initiatives to date have been ineffective in a) reducing CO_2 emissions, b) changing attitudes or, c) building the knowledge of users.

3) The effects of government information campaigns on users are only transitory.

4) The government's perception of users (homeowners) is incorrect and its understanding of them incomplete.

5) Users do not constitute or act as a homogeneous body, as had previously been assumed.

6) Users (homeowners) remain largely ignorant of CO_2 and energy conservation issues.

7) The government has to change its tactics or methods to get CO_2 reductions it wants from the domestic sector.

8) Income and affluence are shown to have a significant influence on both the attitude of the user towards energy and their willingness to pay for energy efficiency measures.

9) Providers (housebuilders) are driven purely by commercial considerations.

10) No market for energy efficiency exists in the housing market;

11) Providers (housebuilders) are singularly market driven

These conclusions are supported by a number of other, more specific conclusions, relating to the two main facets of the study, users (homeowners) and providers (housebuilders).

The specific conclusions drawn from the results of this study with respect to users (homeowners) are:

- Users have insignificant knowledge of the impact of their use of energy. ,
- Users feel no collective responsibility towards CO_2 emissions.
- Users have little knowledge of how to save energy in the home.
- Users are unwilling to pay for energy efficiency measures.
- Users are largely self-centred with regard to their decisions in relation to the use of energy and energy measures.
- Strategies that primarily rely upon appealing to the conscience of users are unlikely to be more than marginally successful.

The specific conclusions drawn from the results of this study with respect to providers (housebuilders) are:

- Providers do not consider energy efficiency to be important in new homes;
- Users will not pay a premium for energy efficiency measures in housing;

6.3 Conclusions – Users (homeowners)

The main hypothesis of the research was largely supported by the results, this allows us to conclude that the conducive attitude of users towards energy use and conservation does not exist and, significantly for the government in its efforts to reduce CO_2 emissions, cannot be relied upon.

The research has shown that at the present time the government cannot rely upon the voluntary contribution of domestic dwelling energy users to the reduction of CO_2 emissions. Homeowners' attitudes and actions are not conducive to conserving energy. The implications for the government are extensive. Traditionally, governments have taken for granted the premise that homeowners would respond to energy saving campaigns, reduce their energy consumption and thereby contribute to energy conservation. The research has shown this not to be the case; the government will have to rethink this approach to users if they are to be part of future campaigns. The conducive attitude that has always been assumed to exist will instead first have to be generated, if the government intends to utilise this approach as part of its efforts to reduce CO_2 emissions. The research also strongly suggests that a conducive attitude, if and when generated, will need to be continuously maintained in order for it to last (discussed further in 6.3.2.). The research has established the crucial role played by user attitudes in the conservation of energy and the consequent reduction in CO_2 emissions. Previous research has not revealed the crucial role of users attitudes towards energy use or CO_2 emissions; it is now an issue that cannot be ignored in future schemes to effect CO_2 reductions.

It is reasonable to conclude that the domestic sector cannot be ignored in any future policy/scheme to reduce CO_2 emissions, because of its size accounting for over a third of all UK CO_2 emissions. This importance of the domestic sector in the reduction of CO_2 emissions has been confirmed by this study, which has extended the findings of previous research to unequivocally confirm the importance of the domestic sector in overall energy consumption and CO_2 emissions. That being the case, the study shows that the attitude of users will be an unavoidable, if not essential, part of any feasible scheme that includes the domestic sector.

6.3.1 Government initiatives to date have been largely ineffective in reducing CO_2 emissions, changing attitudes or building knowledge amongst homeowners.

One of the conclusions emerging from the research is that so far government initiatives have been largely ineffective in the effort to reduce CO_2 emissions, change attitudes or build knowledge amongst homeowners.
The results show that users remain largely ignorant of energy and CO_2 issues, their level of knowledge regarding the impact that their use of energy has upon the environment remains very low, whilst their knowledge of how to reduce their consumption of energy in the home is similarly lacking. The full extent of these findings are fully discussed later in sections 6.3.6 - 6.3.8.

The absence of a substantial awareness of energy use and its conservation, together with the lack of significant knowledge amongst users, supports the conclusion that government campaigns have been ineffective. The implication of this conclusion is that the government will need to seriously reconsider the way in which the message of energy conservation is communicated to the public, as the methods used to date have proved to be largely ineffective in the long term.

If the principle is accepted that the attitude of users is an important aspect of campaigns to reduce CO_2 emissions then the government must recognise the failure to change attitudes to date and instigate alternatives. Amongst other things, the literature recognised the influence that consumer behaviour would have on the outcome of any government campaign. The literature relating to consumer behaviour suggests that the government needs to understand and incorporate the principles of consumer behaviour and decision making more fully into its campaigns, as a campaign implemented one year, is known to not be as effective the following year due to consumer behaviour being dynamic and changing over a period of time. The principles and practice of consumer behaviour are crucial in our current society to achieve increased success. The connection between consumer behaviour and energy conservation programmes has not previously been promulgated or explored, but is likely to form a central consideration in future campaigns.

6.3.2 The effects of government information campaigns are only transitory.

Government information campaigns have been implemented since the 1970's, some achieved a small increase of awareness and increased knowledge on the part of users, however the evidence showed that these gains stopped and fell back again shortly after the campaign ended. The conclusion drawn from this finding is that the effect of campaigns to change the behaviour of users towards using energy tends to be transitory, rather than permanent. The implication of this conclusion is that the government must re-examine the methods used in previous campaigns with a view to finding methods that will produce more enduring results. Alternatively, consideration will have to be given to a more continuous approach to information campaigns.

A supplementary consideration for the government is that it should monitor the effectiveness of its campaigns over a longer time or on a continuous basis.

6.3.3 The government's perception of homeowners is incorrect and its understanding of them incomplete.

The continued long-term ineffectiveness of government initiatives over the years raises questions about the methods used to implement them and the way in which they were administered. It is reasonable to conclude that the government has not fully understood users of domestic energy (homeowners). The research has shown that users (homeowners) are not the homogeneous group they were thought to be. To date, the approach of most government campaigns were firmly based on this unitarist premise.

The study found that identifiable groupings exist within homeowners (these are discussed further in section 6.3.11). The implication of the existence of these groupings is that a different approach is needed for each group, to ensure that the message effectively reaches each individual. To target these effectively, the government must undertake to correctly identify, characterise and understand the groupings to be involved in any campaign.

Historically, the government has never adopted a deliberately focused approach in its campaigns that could cater for the different groups of the population. This study adds to the existing body of knowledge, which had not recognised the issue of diversity and still assumed users to act as a homogeneous body. This has now been clearly shown not to be the case; the research demonstrates that specific, identifiable groupings exist and that the government must address this in any future initiatives.

6.3.4 Users remain largely ignorant of CO_2 and energy conservation issues.

This conclusion derives from the lack of effectiveness of government initiatives over the last few decades. Despite frequent initiatives over the years to educate and influence the use of energy, Users remain ignorant of why and how to save energy, as well as the general principles of energy conservation and their impact on the environment. (This is discussed further in sections 6.3.6 6.3.8.) The implications of this ignorance means that to achieve a significant reduction in CO_2 emissions from the private domestic sector, concerted measures need to be taken on the part of the government to overcome this ignorance, or to find a way of avoiding it possibly through the application of technology. In any event, it is likely that the government will need to educate users, because of their influence on CO_2 emissions, and the part that they and their use of energy in the home plays on these emissions and how this affects the environment.

The knowledge that users have in relation to energy use and conservation has been based on needs other than CO_2 and the environment. These needs are more deeply rooted in the self-needs of the individuals and access some fairly basic needs, such as personal comfort and gain. To change these needs may require different approaches than has so far been used.

6.3.5 The government will have to change its tactics and/or methods to achieve the required CO_2 reduction from the domestic sector.

This conclusion becomes almost inevitable, having regard to the ineffectiveness of previous government campaigns to effect any significant reductions. Changing the attitudes of either, or both users and providers sufficiently to effect action that will meet the required CO_2 emission targets will not be easy. Ultimately the government will have to select from a number of strategies, namely to legislate, coerce, subsidise or embark on intense propaganda, or any combination of these, to change attitudes and influence behaviour. The implications of not changing tactics or approach by the government will most likely result in further largely ineffective campaigns and no results.

6.3.6 Income and affluence [c4]has a significant influence on both the attitude of the user towards energy and their willingness to pay for energy efficiency measures.

Attitudes and practices of users are strongly influenced by income and affluence. These two factors alone are not new, but in energy terms they dictate a) the practices of users in the home in relation to energy use and b) the decision making process when considering investment in energy efficiency measures and c) how investment in these measures are valued against other products, (this is discussed further in section 6.3.9).

The effect that income has can be seen in a number of specific findings.

Users in general are reluctant to invest in energy conservation measures. Users see nothing 'tangible' for their money when they invest in energy conservation measures, any benefits come later and are indirect in the form of a saving rather than something received directly, consequently they are reluctant to invest in energy conservation measures.

Users will spend money to maintain comfort, irrespective of income. The influence that comfort plays in the use of the heating installation and consequent expenditure of money is significant and has been shown to disregard income level or affluence (see section 6.3.10). The implication of these attitudes is that until users see the benefits of energy conservation and understand why there is a need to do it, attitudes will remain largely unchanged.[c5]

6.3.7 Homeowners have insufficient knowledge of the impact of their energy use on CO_2 emissions.

There is clear evidence in the research findings to conclude that users are not aware of the impact of their actions on the environment. Homeowners have been shown to have a general awareness of the term `energy efficiency', but significantly, did not know what this related to or the implications of it, or how to actively save energy in the home. Crucially, there was almost total ignorance of the reasons for needing to do so in the first place.
This conclusion strongly reinforces and extends the findings from previous research in the field. A 1976, study of homeowners by Phillips & Nelson, showed that householders had a minimal knowledge of how to save energy and limited their activities to switching off of lights, rather than more substantial measures such as insulating their homes. A subsequent study by MORI in 1990 also showed that homeowners had little cognisance of the impact of their energy use and considered the main culprits of CO_2 emissions to be car emissions or industry.
These studies clearly indicate a lack of knowledge on the part of householders regarding energy conservation, but also the impact that their energy use has on the environment. The two aspects interact in a vicious circle, firstly users have no knowledge (are ignorant) of the impact of energy use on the environment (including their own) they therefore perceive no need to change their behaviour, whilst at the same time having insufficient knowledge to modify their energy use behaviour even if they did perceive a need.

With regard to homeowners having insufficient energy knowledge and a lack of knowledge regarding the impact of energy use on CO_2 emissions, the study provides evidence that these are long-term problems, remaining as they do after nearly two decades of government campaigns dedicated to raising awareness of energy use and saving.

This research has also shown that users over-claim with respect to their awareness of government campaigns promoting energy saving, but in practice knew nothing of the information these campaigns were trying to promote. Only a small minority of users had made use of the government initiatives, acknowledging that they had done so as a result of hearing about them from the various government campaigns. The implication is that when evaluating the success of future campaigns the government must take this into account; feedback is unreliable.

The presence of some short-term cognisance and an absence of long-term cognisance of the energy efficiency measures promoted by these campaigns leads to the deduction that users have only a transitory cognisance of energy efficiency. This raises a whole range of issues for the government as it contemplates how to achieve its CO_2 emission targets, most notably, how to change the long-term recognition of energy to one of importance, a pre-cursor to making substantial progress towards its target.

It is postulated that if government campaigns had been more effective in conveying the message of energy efficiency, then a significantly higher proportion of homeowners would have demonstrated a greater knowledge of the more generalised aspects of energy efficiency, than has been established in this survey.

6.3.8 Users (homeowners) feel no collective responsibility towards CO_2 emissions.

An important conclusion from the research is that users do not demonstrate any collective responsibility towards their environment or CO_2 emissions. The findings clearly show a substantial proportion of users do not perceive a link between their use of energy and the environment and as a result exhibit no actions or attitudes towards that end. This absence of collective responsibility is the result of larger societal influences that are outside the remit of this study, but is firmly based on the insufficient knowledge of users with regard to the environment, especially the effects of CO_2 emissions

This conclusion extends our understanding of users attitudes and develops a conclusion from previous research undertaken by. Phillips & Nelson (1976), who concluded that homeowner's felt that no immediate crisis existed with regard to energy. A MORI (1990) study showed that homeowners did not comprehend that the single and most effective way of reducing the carbon dioxide emissions was to improve the insulation in their own homes. Critically this study found that homeowners could be made to understand how their personal energy use would affect the environment, but it was, and is, considered unlikely that education alone would sufficiently affect attitudes to induce a change in behaviour. Hedges (1991) also noted in his study that homeowners demonstrated an air of 'not being bothered' as energy conservation was not considered to be significant. Crucially, the evidence now indicates that it is not just a change in attitude by education that will be the catalyst for change.

The study provides further significant evidence of a lack of government activity in promoting collective responsibility towards the environment amongst the population in general and homeowners in particular. .

6.3.9 Users (homeowners) have little knowledge of how to save energy in the home;

The research showed that users have no clearly defined actions that appeared to constitute saving energy in the home. Users perceptions of 'actively' saving energy in the home were restricted to that of using methods that have little or no effect. This study has conclusively shown that the limited knowledge possessed by users has restricted their energy saving measures to basically ineffective measures, such as shutting doors and switching off lights.

This conclusion updates and extends the knowledge obtained by previous research, the MORI study (1990) concluded that the lack of knowledge on the part of householders regarding energy use was evident from the suggestions made to reduce the green house effect, which included, eating less meat, dropping less litter, stopping smoking and purchasing organic products. Similarly Phillips & Nelson (1976) concluded that householders had a minimal knowledge of how to save energy, and limited their activities to switching off of lights, rather than more substantial measures such as the insulation of their homes.

This study confirms that the lack of knowledge continues at an equivalent level and has not changed, it demonstrates that users (homeowners) remain largely uninformed regarding how to save energy in the home, despite efforts by the government since the early 1970's to raise awareness. The perceptions of the public with regard to how to save energy in the home remain roughly similar to those recorded in 1976 by Phillips & Nelson (1976). Clearly no substantial improvement has occurred since that time, despite the best efforts of the government and this finding further demonstrates the consistent ineffectiveness of government energy saving campaigns.

A considerable and consistent programme of education will be required for homeowners, (or a different type of propaganda is needed) to effect a change in household energy saving practices that will result in a significant reduction in CO_2 emissions.

6.3.10 Users (homeowners) will not pay for energy efficiency measures;

The research concluded that users were not willing to pay for energy efficiency measures. The idea of paying extra for energy efficiency, whether in the form of paying extra for measures to be incorporated into new housing or retrofitting existing dwellings was highly unpopular with users.
The research showed that users were reluctant to expend money on energy conservation measures. When tested, users would only expend minimal amounts of money, but expected a disproportionately greater financial return for their investment. This attitude reveals the lack of realism that exists amongst users with regard to energy, which probably has its origins in the lack of knowledge they possess and the lack of importance attributed to energy conservation measures. It is another indication that energy use and conservation is not an issue that receives conscious consideration by users.

The alternative of forcing users to pay for energy conservation measures by taxing fuel heavily in an effort to prompt investment in energy measures is almost certainly unworkable. Recent attempts in the form of the fuel tax escalator for petrol became so unpopular, that at the point of becoming effective the government were forced to abandon it. A similar response could be expected to an equivalent scheme for domestic fuel, as the Conservative government's attempts to change VAT clearly showed. Apart from its unpopularity with users even with moderate increases, it would require a very large increase to force the necessary change in users attitude, a policy that would be electoral suicide for the political party in government at the time.

It can be concluded from these findings that the government will not be able to finance its CO_2 reductions entirely from the users pocket, it will have to financially support its measures, which means it will be a political problem, it therefore needs to be an issue with which the electorate are concerned.

Income and affluence were shown by the study to have a significant influence on the attitudes of users towards energy and their willingness to pay for energy efficiency measures. Users in higher income bands were more prepared to pay extra for a new home that promised higher savings on fuel bills, this is probably because these users were in a position to be able to pay the additional cost, provided it is considered at an appropriate time. It is also reasonable to surmise that these additional sums are proportionally smaller to this income group than they would be to others. However, the additional amount they would be willing to spend is limited and the expectations in terms of savings on fuel bills quite large. These users did not regard these energy measures as anything other than a reduction in running costs; significantly they did not attach any investment value in terms of the property value to them.

Users in the lower to middle income levels invariably expended more on energy as a proportion of their income, but used it regardless of the cost or the environmental impact to achieve and maintain a desired comfort level.

Despite this high use of energy, this group of users are principally unwilling to pay for energy conservation measures, claiming limited affluence.

The findings of this study add to the previous research findings of Hedges (1991), whose study showed that householders rarely thought of investing in energy efficiency measures. The study concluded that householders were reluctant to pay for something that they felt was not significant and energy efficiency does not compete well with more cosmetic or status-enhancing projects. This research also adds to the work undertaken by the University of Northumbria (1994) who found that over three quarters of their respondents were unwilling to pay extra for a property with energy efficient components. The work of Bhatti & Sarno (1996) showed a third of respondents would not pay the extra small premium for an energy efficient home.

In summary it is apparent that users (homeowners) will invest a limited amount in energy measures but only if it is likely to result in an improvement to their comfort level and if that improvement is perceptible and quick. The principles of consumer behaviour regard this attitude as nothing less than expected, to improve the take-up of energy conservation measures by users will require the government to treat the transaction as a commercial one and to manage it accordingly.

This research extends the existing knowledge of user behaviour further. The findings demonstrate that users (homeowners) expect energy efficiency measures to be included in the price of new dwellings and will not pay a premium for an energy efficient dwelling. These findings also demonstrate that the lack of importance attributed to energy efficiency, so that it does not compete with cosmetic or value-enhancing projects. Users (homeowners) see no benefits from energy efficiency and therefore will not dedicate time or money to it. This attitude suggests that any policy that forced users to install measures without offering subsidies or financial assistance would probably be unworkable and/or unfeasible and could again be electoral suicide for the government concerned.

6.3.11 Users (homeowners) are largely self centred with regard to their decisions relating to the use of energy and energy measures;

Personal comfort is shown to be the first and foremost consideration for the vast majority of users. The results conclusively indicated that users seek to achieve an acceptable personal comfort level irrespective of the energy or environmental implications.

Comfort level is clearly a major reason for users to install energy measures, if the UK had a climate similar to that of Scandinavia then the impetus for users to become more efficient by installing measures to improve or maintain comfort levels would be assured.

This study confirms the findings from previous research by Phillips & Nelson (1976), which was the first to provide an insight into the relationship that comfort has with regard to energy conservation in the home. The study concluded that although householders prime interest in energy saving was to save money; they were unwilling to sacrifice their standards of comfort in order to achieve it. Subsequent to the Phillips & Nelson (1976) study, comfort has not been a factor seriously explored in any of the later studies.

The findings from this study add and reinforce the existing body of knowledge regarding users and the influence of comfort. It demonstrates that users (homeowners) are more strongly influenced by comfort than had previously been thought to be the case. Comfort is the main influencing factor in their use of energy and their decision-making in relation to energy conservation. Comfort should be recognised as an important factor in further studies as the majority of user practices regarding energy conservation are governed by this factor alone. Users (homeowners) will use more energy to achieve a comfort level, which could be contrary to the government's intentions, if energy measures are not in place.

6.3.12 Users (homeowners) do not constitute the homogeneous body that had been previously assumed.

One of the most important findings from this research was that users did not constitute the homogeneous body that could be treated in a unitarist manner. This had previously been the assumption in government initiatives

The groupings have been identified as:

- The income sensitive;
- The elderly;
- The ambivalent.

These distinct groupings of homeowners were distinguished based upon their attitudes towards energy and energy conservation, and by their actions in relation to these. These distinct groupings that must be taken into account when targeting campaigns or information.

Previous research identified certain groupings of the population based upon the opposite influence, i.e. the grouping is determined by the effect energy saving and use has upon them. In this study the attitude towards energy use and conservation provides the basis for the categorisation. Salvage (1993) identified the elderly population as a distinct group and discussed the relationship between 'old and cold'. The English House Condition Surveys identified low income families who reside in under insulated homes and who find it difficult to achieve a satisfactory level of comfort. These are logical groups from a sociological and economic perspective, they revealed possible causes and situations, but were not intended to categorise according to attitude.

6.4 Conclusions - Providers (housebuilders)

As with users of domestic dwellings, a conducive attitude towards energy use and conservation does not exist amongst providers of domestic dwellings and cannot be relied upon by the government in its efforts to reduce CO_2 emissions.

The research has shown that the government cannot rely upon the voluntary contribution of providers (housebuilders) to reduce CO_2 emissions. Provider's attitudes and actions in the design, specification and construction of new dwellings are not conducive to energy conservation. The implications for the government are extensive. To date the only mechanism currently in place that has had significant influence on providers attitudes and actions towards energy has been that of legislation, which has always been greeted with resistance and resentment on the part of the housebuilders.

The government will have to seriously rethink its approach to providers. Legislation is one solution to reduce CO_2 emissions, however providers have been shown to be so commercially driven, that if a market was created for energy efficient homes then the providers would respond to market demand and provide homes of this standard as a matter of course. Creating this market in energy efficiency will inevitably involve considerable efforts to change the attitudes of housing consumers, a task that is not simple or straight forward.

The study has produced the first comprehensive research into the attitudes of providers towards energy and the research has unequivocally demonstrated the significance of provider attitudes in the long-term campaign to reduce CO_2 emissions. The study has shown that at present providers build to the very minimum standards permitted by the Building Regulations where energy is concerned. The housebuilding industry, individually and collectively consider energy conservation to be of little or no importance to their business. To reduce CO_2 emissions to the levels required by the government, the housebuilding industry must be included in the government's efforts

6.4.1 Providers (housebuilders) are governed purely by commercial considerations.

The research has ascertained for the first time that providers are irrevocably governed by commercial considerations. Providers will not embark on any voluntary changes in design that would benefit energy conservation if it would be likely to affect profit levels in any way. [Dr6]([Dr7]This is discussed further in section 6.4.6.) The implications of this commercialism are that providers will not build their dwellings above the Building Regulations. The only way in which providers will increase the thermal standards of their dwellings is if the government changes the legislation or legislates the private housebuilding market to build energy efficient homes.

6.4.2 Providers are exceptionally market aware

Despite providers being governed solely by commercial considerations, they are exceptionally attuned to their market. They anticipate the needs and trends in the market and react accordingly. Rarely do providers misjudge the market. They correctly perceive that there is no demand amongst consumers for energy efficient houses, a fact confirmed by this study. On a positive note, because providers are so aware of their market and attuned to what purchasers require, if purchasers did demand energy efficient homes, then providers would most likely provide them. The alternative strategy for government is to create a demand and therefore a market for energy efficient dwellings, the difficulty arises in how to do so.

6.4.3 Providers (housebuilders) do not consider energy efficiency to be important in new homes.

Providers have a fairly generalised and technically biased knowledge of energy efficiency, which is likely as a direct result of being commercially driven and professionally trained. The lack of knowledge of the broader energy measures is probably a reflection of these influences; unfortunately it almost directly reflects the attitude of users who do not see energy use and conservation to be important. Providers regard energy efficiency measures to be unimportant.

This attitude was confirmed in the study, which showed no divergence whatsoever between the attitudes of providers and users with regard to the attributes felt to be important in new homes, neither put energy efficiency near the top of their list. Providers know that energy efficiency is not important to purchasers.

This study provides the first empirical study into the attitudes of providers (housebuilders) towards energy conservation. To date, there has been no previous research in this field, only supposition and deduction obtained from reports in the building press. This study clearly demonstrates for the first time the attitude of providers (housebuilders) towards energy conservation and the lack of importance that is attributed to it.

6.4.4 Providers (housebuilders) consider that no market exists for energy efficiency.

It was also concluded that providers felt that at the present time there was no market for energy efficient homes. This applies to both the innovative types of low energy housing or to standard types of housing built with higher standards of insulation and more efficient space heating systems. Providers are correct in their perception. The study revealed that a significant proportion of users regard the concept of living in an energy efficient home to be appealing but are not demanding energy efficiency in the market place to an extent that would require providers to act upon or consider it to be a viable investment. The conclusion that the providers are commercially driven supports this, if energy efficiency was being demanded in new homes then it is likely that the providers would know this.

This study provides the first evidence of the extent that providers (housebuilders) are purely governed by profit and commercialism and the extent to which energy conservation is ignored because of the commercial implications of including additional measures into new homes. Clearly the providers (housebuilders) consider energy conservation measures to have such little importance in the overall purchase decision of potential purchasers that they can safely ignore it.

6.4.5 Providers (housebuilders) do not believe that homeowners will pay for energy efficient measures in housing.

Providers are of the opinion that purchasers will not pay extra for an energy efficient home, despite the users study showing that a large proportion of homeowners liked the concept of living in a dwelling that promised high savings of fuel bills. Some respondents stated that they also prepared to purposefully purchase one, however, would not to pay more than a minimal amount, which would be unlikely to be economically viable for the housebuilders. To a certain extent this is true if, providers are considering energy efficient homes to be the type of dwellings that raise construction costs significantly. However, the costs of installing higher levels of insulation and more efficient heating controls are marginal and in some instances only add another £1,000 or so onto the construction costs of a dwelling. These costs can be easily recouped on the purchase price. Therefore it is likely that purchasers will be prepared to pay that little extra, but not necessarily know they are doing so. However, the cost implications to the providers in design and specification changes would most probably not make this a commercially acceptable proposition for most providers.

This finding underpins previous research undertaken by the University of Northumbria (1994) who found that a significant proportion of respondents were unwilling to pay extra for a property with energy efficient components. Bhatti & Sarno (1996) also found that a third of respondents would not pay the extra premium for an energy efficient home.

This study provides evidence to the existing body of knowledge to show that quite clearly, providers are highly aware of their market and as a result know that homeowners are unlikely to pay extra for energy measures in new homes, therefore do not these measures as they are unlikely to see a return on their investment.

6.4.6 Providers (housebuilders) are governed by commercial demands and profit.

Demand affects attitude of this group significantly. Providers are exceptionally attuned to their market and driven by financial and commercial influences. If demand for energy efficient dwellings was present in the market, then the housebuilders would build energy efficient homes, as it would be in their interests to do so and foolhardy not to. Presently providers are clearly not constructing energy efficient dwellings because, as the conclusions show, there is no market for them. Conversely, homeowners do not demand energy efficiency in new dwellings, mostly because (as previously discussed) they have very little knowledge of the benefits of energy efficiency in terms of savings together with having no concept of the greater need to conserve energy and reduce CO_2 emissions. Other factors are considered much more important in the decision to purchase a new home, such as en-suite bathrooms and fitted kitchens, rather than high levels of energy efficiency.

What has also emerged from the research is the commercial watching brief that the housebuilding industry has adopted regarding energy efficiency. The industry has reflected `trends` occurring in the industry, such as the 1996 Energy World, which received significant public attention together with Futureworld, also in 1996. When these `trends` of energy efficient homes were popular and could possibly become commercially viable and produce o have a beneficial effect on sales, providers invested in these demonstration schemes.

Providers concluded that building energy efficient homes would reduce profit margins. It is the main reason why providers are building to minimum standards. In general, it can be concluded that housebuilders main concerns are selling properties on a large scale for the maximum amount of profit regardless of energy efficiency. Only if energy efficiency became a marketable issue that would either increase or at least not reduce their profitability would housebuilders become more concerned.

The research has shown that the housebuilders know their market exceptionally well, however this does not assist in the reduction of CO_2 emissions, as the housebuilders will not voluntarily change the level of energy efficiency features they incorporate into their dwellings.

This adds two factors to the body of knowledge, firstly that providers are very attuned to their market and secondly that they are profit and commercially driven. It is therefore fair to conclude that no market exists for energy efficient homes.

6.5 Collective Recommendations

Consideration of the findings and the conclusions collectively, concludes that there is no single or simple solution to the problem of improved energy conservation in the private domestic sector. It is also clear that the responsibility for resolving the problem and providing the catalyst for change both for users and providers lies largely, if not entirely with the government.

A number of recommendations for both users and providers are proposed, however as the emphasis for these recommendations is considered to lie with the government, and involve significant investment or policy change, some of the recommendations are likely to be considered politically unfeasible.

The recommendations are considered separately for each group, namely users and providers, what is irrefutably clear until this time, is that there has been no degree of urgency in any of the campaigns so far. The continued change in global climate and in global warming continues unabated, which adds urgency to the need for effective measures to reduce CO_2 emissions. Whatever measures are adopted they need to be regarded as urgent. An obvious way for energy efficiency to be accorded the urgency that is required in the UK is for it to become a crisis situation, however that may be too late and would probably have occurred because of a worldwide crisis. More likely it will be incumbent upon the government to create a sense of urgency that would provide the environment in which the measures could succeed.

6.5.1 Comprehensive energy policy

Considering the broader issues of the environment, energy conservation and the need to reduce CO_2 emissions, it is clear that concerted action needs to be taken on a large scale, and not be confined to certain groups or areas. What is needed is a comprehensive energy policy based upon political consensus. A policy where all the political agreed to remove the issue from the political arena and to join together to develop a comprehensive policy regarding energy conservation and the UK's commitment to reducing CO_2 emissions. No government of either party has been consistent in their policy towards energy, except to avoid it becoming an issue that required dealing with. Energy needs to be made a national issue. This must be comprehensive, long term, sensible and have guaranteed funding regardless of the political party in power.

6.5.2 Creation of a market for energy efficient homes.

A comprehensive solution that would include both users and providers would be to create a market for energy efficiency, in both new and old housing. The manipulation of markets is fraught with difficulties, however there is a precedent in the area of energy conservation. By applying the principles of the Danish Heat Survey Scheme to the UK, under this scheme every house sold has to provide an overview of what has been done and what needs to be done to bring the home up to a required standard of energy efficiency. This could be implemented through the proposed homebuyers pack (still with government), which has to include land searches and a homebuyers survey and other aspects, which are still under consultation. The principles of a heat survey could be included within this report; homes that do not reach the required level would have to suffer a price reduction similar to the value of having the work done. This would act as the catalyst that would raise awareness of users, which in turn would most likely raise expectations of users that these measures be included in the property. This would then have to be reflected in the price of new homes in the market. If the market in general is demanding energy efficient measures in homes, purchasers will quickly develop energy awareness.

6.6 Recommendations – Users (homeowners)

There are a number of solutions that the government could implement for the user group, however all the solutions are likely to be met with varying degrees of resistance from users. The recommendations are:

- Information campaigns and associated initiatives.

- Energy ratings on properties to prompt investment into energy measures
- Raising VAT on fuel to subsidise measures
- Penalisation or reward schemes
- The government to pay all costs.

6.6.1 Information campaigns and associated initiatives.

The government must develop the attitude of users to be conducive to energy conservation and to be aware of the environmental impact of their energy use. This is absolutely critical to enable the required changes in energy use to be effective.

The government would need to instigate a multi-level approach that deals with the general sensitising of the population towards environmental issues in general and energy issues in particular. At the same time the campaign must raise the specific knowledge of users towards energy conservation and CO_2 emissions to a point where they can contribute to the reduction of emissions by making informed choices about their use of energy. The campaign must be focused and targeted at the respective groups of users who make-up the population, which will require a thorough survey prior to commencement to identify and categorise all users. The campaign must also be properly monitored and accurately reviewed to ensure its effects are being genuinely successful. Finally, the campaign must be continuous and long-term in order for the effects to remain potent.

The need to actively engage the users in the reduction of CO_2 emissions has been clearly established in the research, the reduction of CO_2 emissions must involve the improved efficiency of domestics dwellings, new and existing, the question remaining is who will pay for the necessary measures. The government will inevitably have to pay some or all the cost of the measures, politically the trend is to offset as much of the cost away from the public purse. It is likely that a future government of whatever persuasion will attempt to minimise its obligation, which means that its campaign to convince users to adopt the necessary measure voluntarily will have to be as effective as possible.

Expecting users to become consumers of energy conservation campaigns and products will oblige the government to treat them as such and to draw upon the full range of marketing and consumer behaviour knowledge.

Embarking on an intensive 'hard hitting' campaign promoting the 'worst case scenario' if the world does not reduce its energy use, i.e. using scare tactics, would be extremely risky, unless the situation has truly become critical. Users will test the validity of any campaign and in the event that the campaign is found to be dishonest then its effects will be lost and the issue as a whole set back.

In addition to any information campaigns other initiatives need to operate concurrently. Subsidies and grants need to be thoroughly re-assessed, to ensure that the maximum potential of these grants and subsidies are fully realised. Two aspects of grants and subsidies need to be considered, firstly they must be specifically targeted to ensure that they reach receptive users, secondly they may need to be needs tested to ensure they are available to the recipients who are most needy. There is some merit in the proposition that these grants or subsidies for energy works could be reassessed based on disposable income rather than total income and graded up to a cut off point. This would enable homeowners with relatively high salaries but low disposable incomes to qualify for certain specific measures. This would enable more individuals, such as the income sensitive to be eligible.

However homeowners with high incomes and inefficient properties, or the ambivalent groups are not likely to be eligible for grants in this way. For other groups different approaches will be required, tailored to each particular group.

6.6.2 Energy ratings on properties

As a means to develop a positive attitude amongst users, a mandatory scheme of energy rating of domestic dwellings could be introduced. There is some evidence that similar schemes have been successful when applied to commercial properties, provided the scheme is accompanied by financial incentives there is good evidence to suggest that it would work for domestic dwellings.

An energy rating system would have the advantage of including all existing houses as well as new ones, it would require an energy survey to be carried out on every privately owned home in the UK. Energy surveys would consist of an easily understandable rating of the property and a list of realistic improvements that the homeowner should make to bring the property up to the required level, imposed or recommended by the government. For this to be policed efficiently and to ensure widespread uptake, the government need to legislate. Energy surveys could be policed through local councils and a 'one off' charge levied on each homeowner that could be added to their council tax. Alternatively they could become a compulsory part of selling a property.

These energy surveys could also form the information basis for a series of initiatives that would result in a continued higher uptake of energy conservation measures and reduced CO_2 emissions. However, legislation such as this would only be successful if used in conjunction with other initiatives.

6.6.3 Raising VAT on fuel.

Raising VAT on fuel by a few percent could raise essential revenue, which could be used to finance other energy efficiency initiatives. This would only be possible if the general public had been sufficiently persuaded of its necessity by concurrent information campaigns. There would also need to be a political accommodation, as raising VAT has been met with much resistance from certain political parties.

6.6.4 Penalisation or reward schemes.

As an incentive to homeowners to install energy efficiency measures and to develop a conducive attitude, a solution could be for the government to penalise or reward homeowners based on the energy performance of their dwelling. This would rely upon the earlier discussed (Danish) energy surveys, more energy efficient the property, the less homeowners would be penalised. The most sensible approach would be for homeowners to be rewarded or penalised for inefficient properties through council tax. A substantial additional yearly charge could be levied on council tax; homeowners with a good energy rating for their home would not pay the extra charge. Homeowners with dwellings that were inefficient would be penalised.

This might provide the necessary incentive for homeowners to install energy efficiency measures in their dwellings. To succeed energy efficiency measures would need to be made affordable, especially for income sensitive and the elderly. However, although the property might be efficient, this scheme does not address the key issue of use and how users use energy, which has formed the focus of this research and which would need to be considered along side any penalty scheme. A rigorous and comprehensive education regarding energy use needs to go in tandem with this approach.

6.6.5 Recommendations specific to each group of respondents.

Considering the three groups of users (homeowners) that have been distinguished in the survey, there are specific recommendations that should to be applied to each group. These are:

The income sensitive,

- Provide subsidised, or free energy measures. This could be done through a thorough re-assessment of the grant system for energy measures.
- The government information campaign should be as widespread as possible, actively and comprehensively promoting the fact that income is not directly related to eligibility for grant measures.
- Include in the campaign extensive information on how to save energy in the home, explaining why individuals need to save energy and what individuals can do to their home to reduce their energy use and improve the comfort of their homes to reduce energy use.

The elderly:

- Consideration needs to be given to the mind set of this group as in most instances it is felt that direct mail or TV adverts may not get the message across unless the information is specific to this group. A solution is to provide more 'tailored' information for this group with easy explanations or diagrams. This information should be distributed with a reliable source such as pension information, or through the local council, so that it appears more 'trustworthy' than just 'junk mail'.

- Afternoon and early evening TV adverts aimed specifically at the elderly, what they are entitled to, how easy it is and how it won't cost them a penny.
- Home visits by a representative from a local council (again a trustworthy source) who will explain what these individuals could do and what benefits could be achieved by using energy more efficiently or having measures installed.

The ambivalent group:

It is this group where the more radical measures of reward or penalisation are more likely. It is considered that this would be an effective way to stimulate investment in energy efficiency measures as this group have no problem affording these measures and have a certain awareness of energy, but simply cannot be bothered.

6.7 Recommendations – Providers (housebuilders)

As with homeowners, the non-conducive attitude of housebuilders towards energy conservation measures, the responsibility for solving the problem of CO_2 emissions and providing the incentive for change lies almost solely with the government.

A number of recommendations have been proposed, which could result in dwellings being constructed to higher thermal standards and which would contribute to significant reductions in CO_2 emissions from the domestic sector.

The recommendations for housebuilders are:

- Legislation
- Partnerships with manufacturers
- Innovation
- Penalisation or reward schemes
- Energy efficiency by demand.

6.7.1 Legislation

History has shown that legislation has been the only effective way of getting providers to improve the efficiency of their new dwellings. This is the only reliable way that energy efficient measures will be incorporated into new dwellings.

The government would need to be significantly more stringent in the thermal requirements included in the Building Regulations for new dwellings. Past experience shows that providers will do everything in their power to oppose these measures, preferring the status quo and the certainty it offers. In addition to stringent thermal requirements for new buildings, the government could extend the regulatory process for buildings to include a separate energy application which would encompass clear indications of insulation standards, approximate end user costs and a comprehensive specification for space heating, in each application. This allows local authority planners to ensure that the most practical energy solutions are incorporated, which will eliminate [CC8] providers circumventing the regulations.

6.7.2 Partnerships with manufacturers.

The government and the housebuilders could enter into partnerships with material providers and manufacturers to stimulate the development of new technology. The cost of materials could be subsidised (possibly by raising costs on fuel as discussed earlier) to make energy efficient materials cheaper to install, therefore minimising the effect on profit margins. The disadvantage of such a scheme would be the need to have it exceptionally well policed, to prevent housebuilders using the cheaper materials and not passing on the savings to purchasers.

6.7.3 Innovation

Alternatively, the government and top housebuilders could work with the major universities and industry to find a technological solution to CO_2 emissions.

6.7.4 Penalisation or reward schemes

Finally, a penalisation or reward scheme. The government or local authority could impose penalties in the form of business tax for developers on a scheme-by-scheme basis. The less energy efficient a development is the more business tax on that scheme. Conversely, a reduction in business tax would be available if the development exceeded a certain standard. In real terms this would probably work well for the smaller builders, however this penalisation is likely to be 'eaten up' or set off against other developments by large housebuilders.

6.8 Reflections of the research process

A reflection of the process of the research concluded that the methodology employed worked extremely well for the study.

Firstly, the response rate for the user (homeowner) group was very encouraging, together with the response rate for the providers (housebuilders).

Using a deductive approach for the study enabled the data to be collected and analysed in a logical way. The methodology selected for the user (homeowners) group was considered initially, and after the fieldwork to be the most effective way of collecting data from a cross section of owner-occupiers. This was further reinforced by analysing previous research in the field, which mainly used a qualitative methodology of interviews, rather than a quantitative one. Using a quantitative approach reinforced the perception that reliable data collected on a large scale was just as effective as using a qualitative methodology, as the analysis of the responses showed that they were valid and reliable and linked strongly to the existing body of theory in the area.

The methodology selected for the provider (housebuilder) group was considered initially, and after the fieldwork to be the most effective way of collecting the information required. A postal questionnaire would not have sufficiently obtained the candid responses from this group, nor the anecdotal underpinning that was obtained. Interviewing respondents in a face-to-face environment enabled the interviewer to probe certain responses and elicit as much anecdotal evidence as possible.

The data analysis of the user (homeowner) group proved problematic in the first instance. This was mainly due to the vast quantity of data involved and an initial uncertainty with regard to which statistics to use to obtain the best and most rigorous results and conclusions. Many weeks were spent applying a variety of different statistical analysis techniques, however, after a time it was considered that these statistics were not doing the results justice, together with the data not lending itself to some type of analysis. Instead a decision was made to employ simple statistics and apply a much more intuitive and logical approach to the data. This was by far the best approach to adopt as the data then spoke for itself and was not subjected to the intricacies of complicated statistical analysis.

No major problems occurred with the analysis of the provider (housebuilder) results, simple statistical analysis was employed to some of the more categorical responses, and the anecdotal responses were grouped together and applied to underpin conclusions from the categorical data.

To conclude, the research process and methodology was considered acceptable and in the event of having to repeat the same study, employing the same methodology, sampling criteria and data analysis, it is considered that the results of the study would be valid and representative of the population.

Reflecting on the actual process of the research illuminated a number of interesting points for consideration, these pertain to both the success of the study and more specifically, the effectiveness of the methodology employed.

The research question determined the strategic approach that was adopted to the research and the methodology used. The initial design of the survey reflected the primary objective, which was to determine the attitudes of users and providers. To facilitate this, a logical-deductive approach was adopted. One of the main research considerations was to ensure that accurate attitudes were obtained from each sample An examination the methodologies recommended by leading research texts, such as Moser & Kalton (1979) and from similar attitudinal studies, indicated that a logical-deductive approach was the most appropriate and reliable method upon which to determine the attitudes of users and providers. In retrospect this logical-deductive approach has been shown to have been the correct methodology if judged by the quality of the results produced.

The study was undertaken as two mutually exclusive, but with comparable results. The study was focused on one sample of users (homeowners) and another sample of providers (housebuilders), these were undertaken as parallel studies without interference with each other in any way. Defining a representative sample for each

of the two groups was considered to be of critical importance in order to ensure the validity of the results, particularly with regard to the more varied and larger user group. The sample selection was based on two key factors, firstly homeowners and secondly house type. Most importantly in the selection of users was the house type and this was considered crucial in the sample selection criteria. House types of terraced, semi-detached and detached homes were identified as constituting the bulk of the housing type distribution in Britain and it was also considered that while owners of flats and maisonettes would provide a similar type of attitudinal response to the majority of the questions that were posed, it was considered that these individuals may have difficulty with some of the questions and that these occupiers would not be the sole decision maker on the subject of the installation of energy efficient measures to a property of this nature. Therefore, by targeting house type, rather than randomly selected names and addresses, meant that all returned questionnaires met the quota of house type and homeowner.
Sampling of the providers was performed easily and effectively through the use of industry league tables and annual reports for the providers, filtering the top 10 housebuilders. Retrospectively, both of these approaches proved highly effective, both in response rate and quality of response.

On reflection, the data collection methods employed for both groups (users and providers) proved highly effective, both in quality and quantity of response. For the user group, using a postal questionnaire rather than structured interviews or focus groups avoided interviewer bias, which can often occur in a group setting and provided a representative sample of users which would have been unlikely to occur with structured interviews or focus groups due to cost and resource constraints.
The response rate for the user (homeowner) group was very encouraging and considered high for a postal questionnaire of this nature and length. The confidence levels attained from this number of returns allowed the responses to be used with a high degree of reliability and validity, enabling their use in, and securing the effectiveness of this quantitative approach. This was further reinforced by analysing previous research in the field, which had mainly used a qualitative methodology for the interviews for homeowners, rather than a quantitative one. Using a quantitative approach reinforced the proposition that

results deduced from data collected on a large scale could be as reliable and effective as using a purely qualitative methodology. The analysis of the responses showed that they were valid and reliable and contributed significantly to the existing body of knowledge in this field.

For the providers, the use of structured interviews proved extremely successful, both in the collection of more categorical data and also the anecdotal data, which would not have been collected using other mediums. The pilot survey for this group revealed a number of issues that prompted a change in methodology from postal questionnaires to structured interviews. Using this method instead of postal questionnaires facilitated a number of issues that postal questionnaires did not provide. These included background rationale for certain responses and a guarantee of selecting the consistent respondent in each instance. In addition, focus groups would not have been acceptable for this group in any way as many of the questions were commercially sensitive. The methodology of structured interviews selected for the provider (housebuilder) group was considered initially, and again after the fieldwork was completed, to be the most effective way of collecting the information required. Interviewing respondents in a face-to-face environment enabled the interviewer to probe certain responses and elicit a greater amount of anecdotal evidence. This collection of anecdotal underpinning from the providers added strength to their responses, which would not have been gained using a postal questionnaire.

The willingness of providers (housebuilders) to participate in the research was exceptional. All ten providers who were initially approached for an interview agreed to take part. This was considered very positive and demonstrated a willingness on the part of providers to be involved in a study of this nature. At the time of requesting an interview, the providers were only presented with a very general overview of the purpose of the study. On reflection of this point, it is considered that this response was even more exceptional, as this research turned out to be the first to be directed at housebuilders with respect to energy, CO_2 emissions of the environment in general. Some reticence on their part was expected, yet none emerged, only a high degree of genuine co-operation.

Therefore, both methodologies employed were considered to be the most effective and this is confirmed and underpinned by the quality of the results produced.

The methodology used in this study contributes to the development of methodology in the field in three ways.
Firstly, this is the first time that users and providers have been studied concurrently with specific respect to CO_2, energy use and conservation. Implementing the surveys concurrently, provided opportunities to cross reference the providers opinions of a market being in existence for energy efficient homes and users opinions of the same factor (see Chapter 4).

Secondly, this is the first cross sectional quantitative study of users, in house type and also income level and proved the efficacy of the methodology employed. The study also established that when researching attitudes towards CO_2, energy use and conservation in domestic dwellings, it is essential that dwellings (house type) and ownership must be the principle determinants of the sample.

Finally, when researching the user group, distributing the questionnaire at the end of the week (Thursday or Friday) elicited a much higher response rate than questionnaires distributed at the beginning of the week.

Initially a wide variety of statistical data analyses were undertaken. The data was subjected to a broad battery of statistics such as correlation analysis, factor analysis and in some instances regression techniques. The logical-deductive basis demanded re-evaluation of each statistical test in relation to the reality of the situation that existed, this revealed that some of the data did not lend itself fully to these techniques, also the logic underlying the relationships between the sets of results demanded a much more intuitive approach to their analysis to justify the findings emerging from the data. Reverse logical analysis of statistical results showed many of these to be unsustainable or unreliable in reality, which reinforced the tendency to rely more on the deductive-logical result rather than the numerical statistical result, although these were always carefully analysed in every instance.

In the first instance, the data analysis of the users (homeowners) attitudes proved problematic, mainly due to the vast quantity of data involved and the initial uncertainty with regard to which statistics to use, as difficulties emerged in reconciling the results of the statistical analysis with the underlying logic present and the results produced by more basic statistical analyses, such as frequency distributions and crosstabulations. Many weeks were spent trying to establish a reliable statistical framework, applying and evaluating a large variety of different statistical analysis techniques with a result. After some time it was concluded that the application of a number of statistical analyses were not valid, the statistics produced results, but the interpretation of these could not be supported by the underlying logic of the situation. There were also many instances where the data did not lend itself to certain types of analysis, which reinforced the need for a different approach to be adopted.

As a result of this initial difficulty in finding the right statistical tests to analyse the data, further extensive attention was given to exactly what the data was indicating and more importantly the meaningful findings and conclusions that could be drawn from the data. In essence, much of the data analysis was achieved through basic frequencies and cross-tabulations and the application of statistics to underpin or reject any associations that were considered to be present and to test the strengths of these associations. This proved to be the best approach, as the data then revealed much, which would have been lost in the intricacies of more complicated statistical analysis.

With regard to the analysis of the providers (housebuilders) results, the problems of the scale experienced with the analysis of the user (homeowner) group did not recur. As with the analysis of the user results, complicated statistical analyses were not employed in the analysis of this data, as it was largely qualitative and for the reasons discussed above did not lend itself well to intense statistical analysis. Simple statistical analyses were employed with respect to some of the more categorical responses (cross-tabulations and frequencies), anecdotal responses were grouped together in subject or response types and applied to support and/or interpret the conclusions drawn from the categorical data. The data produced in the provider study was remarkably consistent and uniform, consequently much time and effort was spent in interrogating and challenging this data to test its reliability, which in the end was proven.

To conclude, the research process and methodology was considered successful and in the event of having to repeat the same study, employing the same methodology, sampling criteria and data analysis, it is considered that the results would be valid and representative of the groups under scrutiny.

6.9 Original contribution to knowledge

The study has made an original contribution to knowledge in a number of areas.

1) The study establishes the existence of a link between the attitudes of users (homeowners) towards energy conservation and CO_2 emissions. It also establishes the link to be a strong one between the two factors.

2) The study determines and defines the attitudes of users (homeowners) towards energy use in the home

3) The study identifies that users (homeowners) atitudes towards energy use and conservation are not the homogeneous. A premise that the Government had always assumed. Specifically, three distinguishable groups of users are identified; the elderly, the income sensitive and the ambivalent.

4) The study identifies the knowledge levels and awareness of users (homeowners) towards energy is low, despite two decades of cognitive information campaigns regarding energy conservation from the Government. The study has also shown that previous government campaigns to reduce energy use have been largely ineffective, their effects at best, transitory.

5) The study identifies that maintenance of comfort is the most significant factor in the use of energy by users (homeowners).

6) The study determines for the first time the attitudes of providers (housebuilders) to energy conservation and CO_2 emissions. It shows them to act unitarily and to be singularly driven by profit.

7) The study creates a field of its own, investigating both the attitudes of users (homeowners) and providers (housebuilders) and the whether these attitudes are conducive to a reduction in CO_2 emissions.

6.10 Recommendations for further study.

The sample used in the research were located in the South East of England, as such it is impossible to determine whether these conclusions would be valid if extrapolated to the rest of the UK. Further research, replicating this study could be undertaken throughout the UK to determine whether the findings from the South East sample are influenced by regional or cultural differences.

A study carried out in conjunction with a government campaign would be recommended over a period of over two years, rather than the cross sectional study used for this work. It is perceived that by carrying out a longitudinal study along the same principles of this study, that attitudes and behaviour can be monitored carefully and also energy improvements when and why they occur. This study could also track changes that occur in attitude and practice as a result of the campaign. This would provide a clear indication of the level of information being disseminated and determine which specific groups were benefiting from the campaign.

A comprehensive attitudinal and more specific behavioural study of homeowners in the UK with regard to energy saving practices and attitudes. This should be undertaken prior to any new government campaign. This would provide more extensive profiling on the habits of energy use of homeowners. The deliverables of this study would provide the government with a comprehensive overview of attitudes and practices that homeowners adopt. Using this information the government can then target specific information and groupings that have been identified through the study.

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Appendix 1 – Changes in Building Regulations

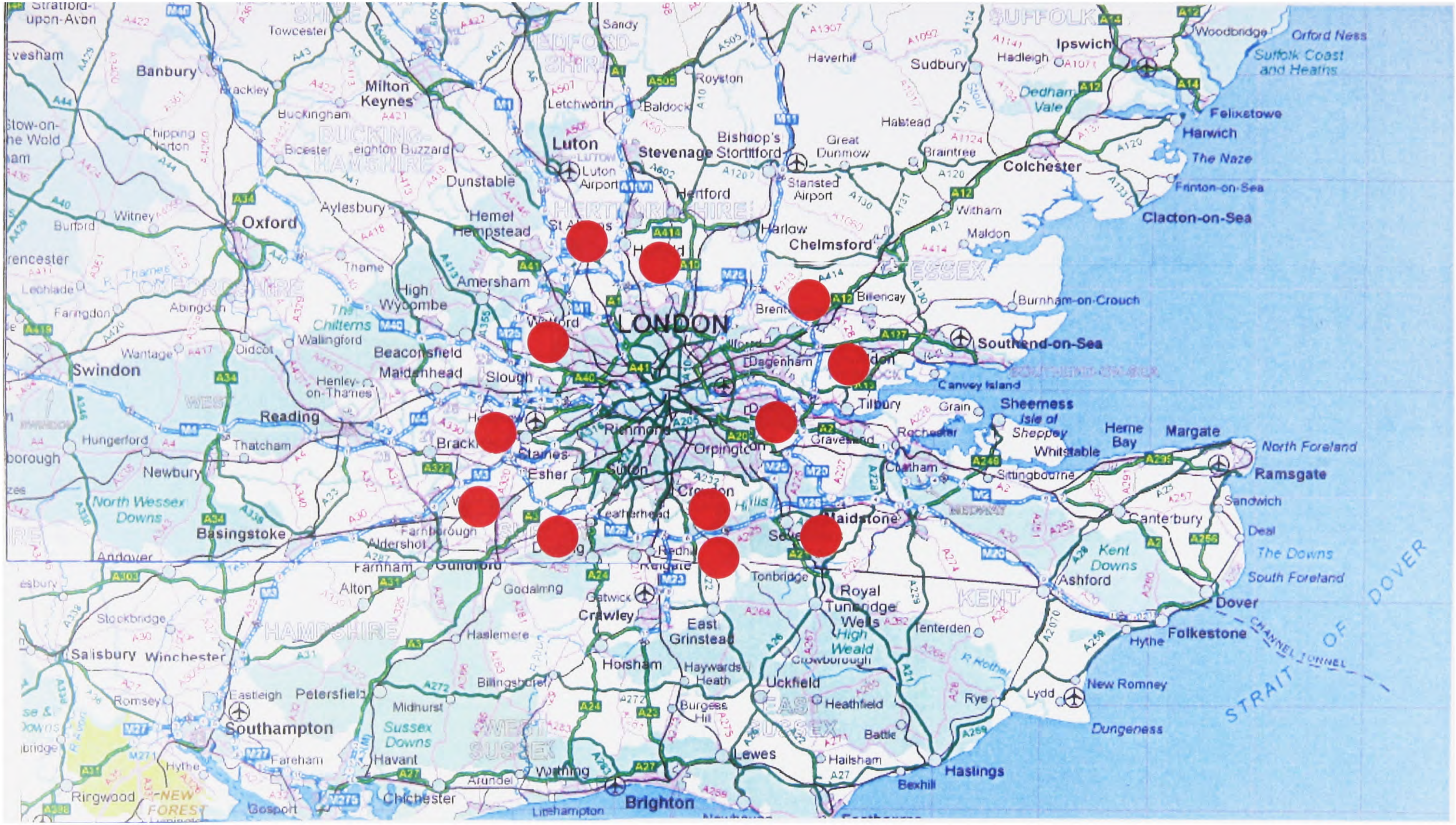
U Values in approved document - W/M^2K

	ROOF	WALLS	FLOOR
1965	1.42	1.70	1.42*
1976	0.60	1.00	1.00*
1982	0.35	0.60	0.60*
1990	0.25	0.45	0.45~
Figures for this year denote a property that has a SAP rating of over 60			
1995	0.25	0.45	0.6 ~
The 1995 Figures below denote a building with a SAP rating of 60 or less,			
1995	(0.2)	(0.45)	(0.6)~
		(0.35)*	(0.45)*

*Applies to exposed floors only.

~Applies to all floors including those in contact with the ground (Building Regulations 1965 1991).

Appendix 2 - Map showing areas of questionnaire distribution.



LONDON
SUFFOLK
ESSEX
KENT
HAMPSHIRE
Oxford
Reading
Swindon
Luton
Stevenage
Chelmsford
Colchester
Ipswich
Southend-on-Sea
Basingstoke
Southampton
Brighton
Hastings
Folkestone
Dover
Ramsgate
Margate
Canterbury
Ashford
Maidstone
Crawley
Guildford
Milton Keynes
Banbury
Clacton-on-Sea
Harwich
Felixstowe
Sheerness
Chichester
Worthing
Lewes
Uckfield
Horsham
East Grinstead
Royal Tunbridge Wells
Dungeness
STRAIT OF DOVER
CHANNEL TUNNEL
North Foreland
South Foreland
The Downs
Kent Downs
North Wessex Downs
Sussex Downs
The Chilterns
High Weald

Appendix 3 -User (homeowner) questionnaire

the UNIVERSITY of GREENWICH

Energy Use Questionnaire

Name and Title *(Optional)* ____________________

1. Please tick your age range (and of others living in your household).

	1 - 5	5 - 10	10 - 18	18 - 25	25 - 35	35 - 45	45 - 55	55 - 65	65 +
Yourself									
Spouse / Partner									
Children									
Children / Dependents									
Children / Dependents									
Children / Dependents									

2. Are you: Male ☐ Female ☐

3. What is your occupation? ....
What is your spouses / partners occupation? ....

4. Is your property :
Owned by yourself ☐ Rented (Privately) ☐ Housing Association ☐ LA/Council Rented ☐

5. How many years have you lived in your property?
1-5 years ☐ 5-10 years ☐ 10-15 years ☐ 15-20 years ☐ 20-25 years ☐ 25 years + ☐

6. How many bedrooms does your property have?
1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 5+ ☐

7. What income bracket would your household be in? (Total income per year)
£0-£10,000 ☐ £10,000-£20,000 ☐ £20,000-£30,000 ☐ £30,000-£40,000 ☐ £40,000-£50,000 ☐
£50,000-£60,000 ☐ £60,000-£70,000 ☐ £70,000-£80,000 ☐ £80,000-£90,000 ☐ £90,000-£100,000+ ☐

8. Would you say that you felt the cold? *(Please indicate by ticking the line at the appropriate point).*
Not at all — A little — Average — Quite a lot — A great deal

9. Do you have central Heating? Ie Radiators / Warm air. Yes ☐ No ☐
Is it:
Gas ☐ Electric ☐ Oil ☐ Coal ☐ Calor Gas ☐
Other ....

10. Do you have:
Radiators ☐ Storage / Wall Heaters ☐ Warm air ducts ☐

11. | Yes | No
Was central heating present in the property prior to your occupation? ☐ ☐
Did you decide to have it installed ☐ ☐
In what year? ....

12. Do you use any other additional heating? Yes ☐ No ☐
Is it:
Open fire ☐ Bottled Gas Fire ☐ Electric Fire ☐ Fan/Convector Heater ☐ Paraffin Heater ☐
Why? ....
When? ....

26. When you carry out DIY work to your property do you take energy saving into consideration? *For example, if you were upgrading/improving your heating system would you also fit thermostatic radiator values?* Yes ☐ No ☐

27. Have you made use of any grants or 'money off' vouchers from the government?:

	Yes	No
Loft Insulation	☐	☐
Hot water tank lagging	☐	☐
Draughtstripping/Proofing	☐	☐
Energy Saving Lightbulbs	☐	☐

28. In what range do your fuel bills fall:

	Gas	Electricity
£0 - £50 per Year	☐	☐
£51 - £100 per Year	☐	☐
£101 - £150 per Year	☐	☐
£151 - £200 per Year	☐	☐
£201 - £250 per Year	☐	☐
£251 - £300 per Year	☐	☐
£301 - £350 per Year	☐	☐
£351 - £400 per Year	☐	☐
£400 - £500 per Year	☐	☐

29. Do you pay your fuel bill by:
Direct Debit ☐ When the bill arrives ☐ By Stamps/Budget Methods ☐

30. Does the cost of heating your home influence your use of the heating system
Yes ☐ No ☐ Occasionally ☐

If Yes, How?

31. Do you take active measures to control the fuel bill in your home? Yes ☐ No ☐

If Yes, What are they?
1.
2.
3.

32. If the price of fuel doubled, would you change your heating patterns and practices in the home?

Not at all — A little — Average — Quite a lot — A great deal

If Yes, What would they be?
1.
2.
3.

33. If you had the opportunity, would you like to live in a home that promised high energy savings on heating and cooking?
Yes ☐ No ☐ Don't know ☐

34. Would you purposefully purchase a home that offered these things?
Yes ☐ No ☐ Don't know ☐

35. If the home in question cost an additional £5,000 would you still purchase it?
Yes ☐ No ☐ Don't know ☐

36. How much extra would you be prepared to pay for an energy efficient home that promised substantial savings on heating bills and running costs? *(Please tick the box of your choice)*

Outlay	£50 pa saving	£100 pa saving	£150 pa saving	£200 pa saving	£250 pa saving
£1,000					
£2,000					
£3,000					
£4,000					
£5,000					

45. Have you done any of the measures that it suggests? Yes ☐ No ☐

Where they any of the following?

	Yes	No
Loft Insulation	☐	☐
Hot water tank lagging	☐	☐
Draughtstripping/Proofing	☐	☐
Cavity Wall Insulation	☐	☐
Double Glazing (sealed units)	☐	☐
Secondary Glazing	☐	☐

46. What do you think is the percentage of CO_2 (carbon dioxide) emissions that are attributed to the domestic sector?
Don't know☐ 10% ☐ 20% ☐ 30% ☐ 40% ☐ 50% ☐ 60% ☐ 70% ☐ 80% ☐ 90% ☐ 100% ☐

47. What do you think is the amount of tonnes of CO_2 (carbon dioxide) created by the average home per year?
Don't know☐ 1-4 tonnes☐ 5-8 tonnes☐ 9-12 tonnes ☐ 13-16 tonnes☐ 17-20 tonnes☐

48. What do you think is the percentage of your fuel bill that goes on the following?

Heating
Don't know☐ 10% ☐ 20% ☐ 30% ☐ 40% ☐ 50% ☐ 60% ☐ 70% ☐ 80% ☐ 90% ☐ 100% ☐

Lighting
Don't know☐ 10% ☐ 20% ☐ 30% ☐ 40% ☐ 50% ☐ 60% ☐ 70% ☐ 80% ☐ 90% ☐ 100% ☐

Cooking
Don't know☐ 10% ☐ 20% ☐ 30% ☐ 40% ☐ 50% ☐ 60% ☐ 70% ☐ 80% ☐ 90% ☐ 100% ☐

49. On your fuel bill would you find it useful to see a breakdown of the energy that you use in the home? For example, how much you spend and use on heating, lighting and cooking?

Not at all — Quite useful — Average — Very useful — Extremely useful

50. If you were to rate yourself on how energy efficient you were in the home, what would it be?

Not at all — Not very good — Average — Very good — Extremely good

Would you be prepared to answer a few more questions concerning energy efficiency? If so please fill in your name, address and telephone number.

Name

Address

Telephone

Many thanks for your time in completing this questionnaire.

Appendix 4 – Providers (housebuilders) questionnaire

Company Name:

Date:

Do you build traditional or timber frame homes? Timber Framed☐ Traditional ☐

If both, which is the main form of construction?
Timber Framed☐ Traditional ☐

Are your dwellings NHBC or NHBC

Do you exceed the building regulations in any of your designs? Yes ☐ **No** ☐

	B Regs	Exceed	Why	How
Loft				
Walls				
Floors				

Does this value vary for different types of home ie Ordinary or Executive?
Yes ☐ **No** ☐

HOW:?

	How	Why
Ordinary		
Executive		

Do you deliberately provide energy efficient measures in your housing designs?

Yes ☐ **No** ☐

If so, what:

DO YOUR BUILDINGS HAVE AN ENERGY RATING?

What rating value does _ our property's have?

NHER	MVM	SAP

Do these ratings vary on your different house types? **Yes** ☐ **No** ☐

	HOW	WHY
TERRACED		
SEMI - DETACHED		
DETACHED		

Who determines the specification for homes?

What criteria is the specification based on?

Is this specification subject to modification? Yes ☐ No ☐

Who	How

Does your company provide staff training and development in energy efficiency? (site staff, sales, design team)

Yes ☐ No ☐

Do you feel that detail is very important when designing in energy efficient measures?

Yes ☐ No ☐

How important are the following : to you as part of the design team:

Condensing boilers:

Not at all — Not very important — Average — Very important — Extremely important

Thermostatic control valves:

Not at all	Not very important	Average	Very important	Extremely important

Double glazing:

Not at all	Not very important	Average	Very important	Extremely important

Triple glazing:

Not at all	Not very important	Average	Very important	Extremely important

Designing above the regulations : thermally:

Not at all	Not very important	Average	Very important	Extremely important

Draughtstripping:

Not at all	Not very important	Average	Very important	Extremely important

Heating systems:

Not at all	Not very important	Average	Very important	Extremely important

Site planning/orientation:

Not at all	Not very important	Average	Very important	Extremely important

Solar Panels:

Not at all	Not very important	Average	Very important	Extremely important

Would you like to build all of your properties above the thermal regulations?

Yes ☐ No ☐

Why?

How do you regard the new regulations? Satisfactory ☐
Too stringent ☐
Not stringent enough ☐

Do you think there is a market for energy efficient homes? **Yes** ☐ **No** ☐

Do purchasers specifically request any energy efficient measures?
Yes ☐ **No** ☐ **Rarely** ☐ Dont know ☐

What	Why	How often

How informed are purchasers with regard to energy efficiency?:

Not at all — Scarcely informed — Average — Fairly well informed — Extremely well informed

What do you think is most important to purchasers?

Please rate the following.

Location:

Not at all	Not very important	Average	Very important	Extremely important

Price :

Not at all	Not very important	Average	Very important	Extremely important

Appearance of property:

Not at all	Not very important	Average	Very important	Extremely important

View:

Not at all	Not very important	Average	Very important	Extremely important

Garage / Off street parking:

Not at all	Not very important	Average	Very important	Extremely important

Garden:

Not at all	Not very important	Average	Very important	Extremely important

Lounge Space:

Not at all	Not very important	Average	Very important	Extremely important

Quality of the kitchen.

Not at all	Not very important	Average	Very important	Extremely important

Quality of the bathroom:

Not at all	Not very important	Average	Very important	Extremely important

Curtains / Carpets:

Not at all	Not very important	Average	Very important	Extremely important

Draughtproofing:

Not at all	Not very important	Average	Very important	Extremely important

Resaleability:

Not at all | Not very important | Average | Very important | Extremely important

Scope for improvement:

Not at all | Not very important | Average | Very important | Extremely important

Council Tax Level:

Not at all | Not very important | Average | Very important | Extremely important

Fuel Source:

Not at all | Not very important | Average | Very important | Extremely important

Increased insulation:

Not at all | Not very important | Average | Very important | Extremely important

Energy efficient glass:

Not at all | Not very important | Average | Very important | Extremely important

Condensing Boiler:

Not at all | Not very important | Average | Very important | Extremely important

Solar panels:

Not at all | Not very important | Average | Very important | Extremely important

Do you think that purchasers would buy a house - if allowed - that was substandard.

Yes ☐ No ☐

How much extra do you think purchasers are prepared to pay for energy efficiency ? As a percentage.(of the total cost)

5% 10% 20 30 40 50% 60 70 80 90 100%

To what extent do you think marketing affects the design of a dwelling:

Not at all Marginally Average Quite a lot Totally

Do you envisage energy efficient housing becoming a marketing factor in the future ?

Yes ☐ No ☐

Appendix 5 – Users (homeowners) results (frequencies)

Frequency Table

Age of property

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	3	1.0	1.0	1.0
	1930	54	17.5	17.5	18.5
	1940	20	6.5	6.5	25.0
	1950	71	23.1	23.1	48.1
	1960	15	4.9	4.9	52.9
	1970	64	20.8	20.8	73.7
	1980	50	16.2	16.2	89.9
	1990	12	3.9	3.9	93.8
	1900	6	1.9	1.9	95.8
	1920	13	4.2	4.2	100.0
	Total	308	100.0	100.0	

Type Of Property

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	3	1.0	1.0	1.0
	Terraced	75	24.4	24.4	25.3
	Semi	168	54.5	54.5	79.9
	Detached	62	20.1	20.1	100.0
	Total	308	100.0	100.0	

Age Range: Respondent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No data	4	1.3	1.3	1.3
	18-25	4	1.3	1.3	2.6
	25-35	60	19.5	19.5	22.1
	35-45	69	22.4	22.4	44.5
	45-55	58	18.8	18.8	63.3
	55-65	57	18.5	18.5	81.8
	65+	56	18.2	18.2	100.0
	Total	308	100.0	100.0	

Spouse/Partner

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	63	20.5	20.5	20.5
	18-25	4	1.3	1.3	21.8
	25-35	48	15.6	15.6	37.3
	35-45	63	20.5	20.5	57.8
	45-55	50	16.2	16.2	74.0
	55-65	49	15.9	15.9	89.9
	65+	31	10.1	10.1	100.0
	Total	308	100.0	100.0	

cHILDREN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	163	52.9	52.9	52.9
	1-5	43	14.0	14.0	66.9
	5-10	27	8.8	8.8	75.6
	10-18	39	12.7	12.7	88.3
	18-25	21	6.8	6.8	95.1
	25-35	12	3.9	3.9	99.0
	45-55	1	.3	.3	99.4
	65+	2	.6	.6	100.0
	Total	308	100.0	100.0	

cHILDREN/DEPENDENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	224	72.7	72.7	72.7
	1-5	12	3.9	3.9	76.6
	5-10	23	7.5	7.5	84.1
	10-18	27	8.8	8.8	92.9
	18-25	20	6.5	6.5	99.4
	25-35	2	.6	.6	100.0
	Total	308	100.0	100.0	

cHILDREN/DEPENDENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	281	91.2	91.2	91.2
	1-5	4	1.3	1.3	92.5
	5-10	10	3.2	3.2	95.8
	10-18	8	2.6	2.6	98.4
	18-25	5	1.6	1.6	100.0
	Total	308	100.0	100.0	

cHILDREN/DEPENDENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	300	97.4	97.4	97.4
	5-10	5	1.6	1.6	99.0
	10-18	2	.6	.6	99.7
	18-25	1	.3	.3	100.0
	Total	308	100.0	100.0	

mALE/FEMALE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	3	1.0	1.0	1.0
	MALE	149	48.4	48.4	49.4
	fEMALE	156	50.6	50.6	100.0
	Total	308	100.0	100.0	

OCCUPATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	nO DATA	7	2.3	2.3	2.3
	uNEMPLOYED	2	.6	.6	2.9
	SELF EMPLOYED	4	1.3	1.3	4.2
	EMPLOYED	180	58.4	58.4	62.7
	rETIRED	86	27.9	27.9	90.6
	hOUSEWIFE	29	9.4	9.4	100.0
	Total	308	100.0	100.0	

sPOUSES OCCUPATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	nO DATA	75	24.4	24.4	24.4
	uNEMPLOYED	3	1.0	1.0	25.3
	SELF EMPLOYED	2	.6	.6	26.0
	EMPLOYED	147	47.7	47.7	73.7
	rETIRED	54	17.5	17.5	91.2
	HOUSEWIFE	26	8.4	8.4	99.7
	HOUSE HUSBAND	1	.3	.3	100.0
	Total	308	100.0	100.0	

Is your property /tenure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	1	.3	.3	.3
	Owned by yourself	307	99.7	99.7	100.0
	Total	308	100.0	100.0	

How long in occupation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5years	68	22.1	22.1	22.1
	5-10years	77	25.0	25.0	47.1
	10-15years	54	17.5	17.5	64.6
	15-20 years	29	9.4	9.4	74.0
	20-25 years	22	7.1	7.1	81.2
	25+ years	58	18.8	18.8	100.0
	Total	308	100.0	100.0	

How many bedrooms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	2.3	2.3	2.3
	2	32	10.4	10.4	12.7
	3	187	60.7	60.7	73.4
	4	70	22.7	22.7	96.1
	5	12	3.9	3.9	100.0
	Total	308	100.0	100.0	

Income Bracket

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No data	33	10.7	10.7	10.7
	0-10,000	38	12.3	12.3	23.1
	10,000-20,000	71	23.1	23.1	46.1
	20,000-30,000	78	25.3	25.3	71.4
	30,000-40,000	37	12.0	12.0	83.4
	40,000-50,000	27	8.8	8.8	92.2
	50,000-60,000	9	2.9	2.9	95.1
	60,000-70,000	6	1.9	1.9	97.1
	70,000-80,000	5	1.6	1.6	98.7
	80,000-90,000	2	.6	.6	99.4
	90,000-100,000	2	.6	.6	100.0
	Total	308	100.0	100.0	

% oof income on fuel bill

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	41	13.3	13.3	13.3
	0.83	3	1.0	1.0	14.3
	1.5	11	3.6	3.6	17.9
	1.625	4	1.3	1.3	19.2
	1.75	6	1.9	1.9	21.1
	1.8	4	1.3	1.3	22.4
	2	21	6.8	6.8	29.2
	2.25	9	2.9	2.9	32.1
	2.33	4	1.3	1.3	33.4
	2.5	19	6.2	6.2	39.6
	2.75	7	2.3	2.3	41.9
	3	10	3.2	3.2	45.1
	3.25	3	1.0	1.0	46.1
	3.5	15	4.9	4.9	51.0
	4	16	5.2	5.2	56.2
	4.5	10	3.2	3.2	59.4
	5	11	3.6	3.6	63.0
	5.5	9	2.9	2.9	65.9
	6	7	2.3	2.3	68.2
	6.5	8	2.6	2.6	70.8
	7	12	3.9	3.9	74.7
	8	9	2.9	2.9	77.6
	16.6	1	.3	.3	77.9
	3.33	1	.3	.3	78.2
	0.6	2	.6	.6	78.9
	1.66	4	1.3	1.3	80.2
	10	5	1.6	1.6	81.8
	9	2	.6	.6	82.5
	2.83	1	.3	.3	82.8
	1.1	3	1.0	1.0	83.8
	1.0	5	1.6	1.6	85.4
	1.375	2	.6	.6	86.0
	1.25	5	1.6	1.6	87.7
	0.75	1	.3	.3	88.0
	7.5	3	1.0	1.0	89.0
	0.5	3	1.0	1.0	89.9
	8.5	3	1.0	1.0	90.9
	1.33	6	1.9	1.9	92.9
	2.66	2	.6	.6	93.5
	0.72	1	.3	.3	93.8
	3.75	4	1.3	1.3	95.1
	1.4	2	.6	.6	95.8
	1.16	2	.6	.6	96.4
	0.85	1	.3	.3	96.8
	2.125	1	.3	.3	97.1
	2.16	3	1.0	1.0	98.1
	1.6	1	.3	.3	98.4
	0.375	1	.3	.3	98.7
	0.92	1	.3	.3	99.0
	4.25	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

Would you say that you felt the cold?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	3	1.0	1.0	1.0
	1- Not at all	13	4.2	4.2	5.2
	2	12	3.9	3.9	9.1
	3-a LITTLE	50	16.2	16.2	25.3
	4	17	5.5	5.5	30.8
	5- AVERAGE	126	40.9	40.9	71.8
	6	18	5.8	5.8	77.6
	7-QUITE A LOT	50	16.2	16.2	93.8
	8	6	1.9	1.9	95.8
	9- a GREAT DEAL	10	3.2	3.2	99.0
	10	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

cENTRAL HEATING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	301	97.7	97.7	97.7
	NO	7	2.3	2.3	100.0
	Total	308	100.0	100.0	

Is the central heating:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	5	1.6	1.6	1.6
	Gas	285	92.5	92.5	94.2
	Electric	14	4.5	4.5	98.7
	Oil	3	1.0	1.0	99.7
	Coal	1	.3	.3	100.0
	Total	308	100.0	100.0	

Do you have:(heating)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	1	.3	.3	.3
	radiators	284	92.2	92.2	92.5
	Storage/wall heaters	18	5.8	5.8	98.4
	Warm air ducts	5	1.6	1.6	100.0
	Total	308	100.0	100.0	

Was central heating present in your home

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No data	3	1.0	1.0	1.0
	Yes	221	71.8	71.8	72.7
	No	84	27.3	27.3	100.0
	Total	308	100.0	100.0	

Did you put in in?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	190	61.7	61.7	61.7
	Yes	78	25.3	25.3	87.0
	No	34	11.0	11.0	98.1
	REPLACED IT	6	1.9	1.9	100.0
	Total	308	100.0	100.0	

In what year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No data	223	72.4	72.4	72.4
	1963	4	1.3	1.3	73.7
	1968	4	1.3	1.3	75.0
	1978	4	1.3	1.3	76.3
	1970	5	1.6	1.6	77.9
	1967	2	.6	.6	78.6
	1969	7	2.3	2.3	80.8
	1964	2	.6	.6	81.5
	1976	3	1.0	1.0	82.5
	1995	2	.6	.6	83.1
	1989	2	.6	.6	83.8
	1973	1	.3	.3	84.1
	1984	3	1.0	1.0	85.1
	1994	2	.6	.6	85.7
	1983	3	1.0	1.0	86.7
	1972	4	1.3	1.3	88.0
	1990	3	1.0	1.0	89.0
	1980	3	1.0	1.0	89.9
	1986	5	1.6	1.6	91.6
	1982	4	1.3	1.3	92.9
	1975	5	1.6	1.6	94.5
	1992	5	1.6	1.6	96.1
	1977	3	1.0	1.0	97.1
	1988	2	.6	.6	97.7
	1979	2	.6	.6	98.4
	1993	1	.3	.3	98.7
	1956	1	.3	.3	99.0
	1966	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

Do you use additional heating?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	5	1.6	1.6	1.6
	open fire	34	11.0	11.0	12.7
	Bottled gas fire	3	1.0	1.0	13.6
	Electric fire	22	7.1	7.1	20.8
	fan/convector heater	28	9.1	9.1	29.9
	NO	148	48.1	48.1	77.9
	YES	8	2.6	2.6	80.5
	Gas fire	50	16.2	16.2	96.8
	elecfire/fan heater	5	1.6	1.6	98.4
	Bottled gas/electirc fire	1	.3	.3	98.7
	OPENFIRE/FANHEATER	2	.6	.6	99.4
	OPEN FIRE/ELEC FIRE	1	.3	.3	99.7
	OPEN FIRE/GAS FIRE	1	.3	.3	100.0
	Total	308	100.0	100.0	

Do you have TCV on each rad?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	15	4.9	4.9	4.9
	Yes	87	28.2	28.2	33.1
	No	201	65.3	65.3	98.4
	Dont know	5	1.6	1.6	100.0
	Total	308	100.0	100.0	

Did you install these yourself?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	209	67.9	67.9	67.9
	Yes	27	8.8	8.8	76.6
	No	28	9.1	9.1	85.7
	HAD THEM INSTALLED	44	14.3	14.3	100.0
	Total	308	100.0	100.0	

wOULD YOU SAY THAT YOU FIND THESE USEFUL?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	220	71.4	71.4	71.4
	1- Not at all	3	1.0	1.0	72.4
	2	2	.6	.6	73.1
	3-a LITTLE	12	3.9	3.9	76.9
	4	1	.3	.3	77.3
	5- AVERAGE	11	3.6	3.6	80.8
	6	4	1.3	1.3	82.1
	7-QUITE A LOT	27	8.8	8.8	90.9
	8	10	3.2	3.2	94.2
	9 - a GREAT DEAL	9	2.9	2.9	97.1
	10	9	2.9	2.9	100.0
	Total	308	100.0	100.0	

Has your HW tank got built in insulation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	11	3.6	3.6	3.6
	Yes	284	92.2	92.2	95.8
	No	10	3.2	3.2	99.0
	Dont know	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

HAVE YOU INSTALLED/ cavity wall insulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	31	10.1	10.1	10.1
	Yes	47	15.3	15.3	25.3
	No	229	74.4	74.4	99.7
	Already there	1	.3	.3	100.0
	Total	308	100.0	100.0	

Cavity wall/ in what year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	280	90.9	90.9	90.9
	1977	3	1.0	1.0	91.9
	1986	1	.3	.3	92.2
	1985	8	2.6	2.6	94.8
	1983	4	1.3	1.3	96.1
	1973	1	.3	.3	96.4
	1993	4	1.3	1.3	97.7
	1990	2	.6	.6	98.4
	1981	2	.6	.6	99.0
	1970	2	.6	.6	99.7
	1989	1	.3	.3	100.0
	Total	308	100.0	100.0	

Double glazing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	24	7.8	7.8	7.8
	yes	178	57.8	57.8	65.6
	no	105	34.1	34.1	99.7
	already there	1	.3	.3	100.0
	Total	308	100.0	100.0	

In what year/double glazing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	158	51.3	51.3	51.3
	1989	12	3.9	3.9	55.2
	1992	9	2.9	2.9	58.1
	1990	16	5.2	5.2	63.3
	1980	7	2.3	2.3	65.6
	1985	7	2.3	2.3	67.9
	1988	10	3.2	3.2	71.1
	1986	11	3.6	3.6	74.7
	1994	13	4.2	4.2	78.9
	1976	1	.3	.3	79.2
	1987	5	1.6	1.6	80.8
	1996	4	1.3	1.3	82.1
	1977	2	.6	.6	82.8
	1995	21	6.8	6.8	89.6
	1993	6	1.9	1.9	91.6
	1975	3	1.0	1.0	92.5
	1991	8	2.6	2.6	95.1
	1974	1	.3	.3	95.5
	1982	10	3.2	3.2	98.7
	1970	1	.3	.3	99.0
	1978	1	.3	.3	99.4
	1979	1	.3	.3	99.7
	1984	1	.3	.3	100.0
	Total	308	100.0	100.0	

Secondary glazing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	84	27.3	27.3	27.3
	Yes	56	18.2	18.2	45.5
	No	168	54.5	54.5	100.0
	Total	308	100.0	100.0	

In what year/secondary glazing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	277	89.9	89.9	89.9
	1986	3	1.0	1.0	90.9
	1977	2	.6	.6	91.6
	1960	1	.3	.3	91.9
	1992	3	1.0	1.0	92.9
	1971	1	.3	.3	93.2
	1993	1	.3	.3	93.5
	1980	4	1.3	1.3	94.8
	1994	3	1.0	1.0	95.8
	1987	3	1.0	1.0	96.8
	1984	3	1.0	1.0	97.7
	1981	2	.6	.6	98.4
	1968	2	.6	.6	99.0
	1974	2	.6	.6	99.7
	1991	1	.3	.3	100.0
	Total	308	100.0	100.0	

Loft Insulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	29	9.4	9.4	9.4
	yes	215	69.8	69.8	79.2
	no	62	20.1	20.1	99.4
	already there	2	.6	.6	100.0
	Total	308	100.0	100.0	

In what year/loft insulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	164	53.2	53.2	53.2
	1986	11	3.6	3.6	56.8
	1960	1	.3	.3	57.1
	1978	3	1.0	1.0	58.1
	1988	10	3.2	3.2	61.4
	1962	1	.3	.3	61.7
	1967	3	1.0	1.0	62.7
	1985	10	3.2	3.2	65.9
	1959	1	.3	.3	66.2
	1982	5	1.6	1.6	67.9
	1984	3	1.0	1.0	68.8
	1983	9	2.9	2.9	71.8
	1992	9	2.9	2.9	74.7
	1977	2	.6	.6	75.3
	1980	10	3.2	3.2	78.6
	1991	10	3.2	3.2	81.8
	1976	9	2.9	2.9	84.7
	1995	13	4.2	4.2	89.0
	1970	7	2.3	2.3	91.2
	1968	1	.3	.3	91.6
	1974	4	1.3	1.3	92.9
	1972	3	1.0	1.0	93.8
	1965	3	1.0	1.0	94.8
	1966	4	1.3	1.3	96.1
	1954	1	.3	.3	96.4
	1989	4	1.3	1.3	97.7
	1981	4	1.3	1.3	99.0
	1994	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

HW Tank lagging

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	53	17.2	17.2	17.2
	yes	180	58.4	58.4	75.6
	no	73	23.7	23.7	99.4
	already there	2	.6	.6	100.0
	Total	308	100.0	100.0	

In what year/HW tank

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	205	66.6	66.6	66.6
	1986	5	1.6	1.6	68.2
	1960	4	1.3	1.3	69.5
	1978	3	1.0	1.0	70.5
	1991	3	1.0	1.0	71.4
	1967	2	.6	.6	72.1
	1985	7	2.3	2.3	74.4
	1959	1	.3	.3	74.7
	1976	10	3.2	3.2	77.9
	1983	6	1.9	1.9	79.9
	1992	12	3.9	3.9	83.8
	1995	8	2.6	2.6	86.4
	1977	2	.6	.6	87.0
	1988	5	1.6	1.6	88.6
	1982	5	1.6	1.6	90.3
	1970	4	1.3	1.3	91.6
	1980	4	1.3	1.3	92.9
	1968	2	.6	.6	93.5
	1974	5	1.6	1.6	95.1
	1989	2	.6	.6	95.8
	1965	4	1.3	1.3	97.1
	1979	2	.6	.6	97.7
	1951	2	.6	.6	98.4
	1972	2	.6	.6	99.0
	1994	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

Draughtstripping/proofing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	58	18.8	18.8	18.8
	Yes	78	25.3	25.3	44.2
	No	172	55.8	55.8	100.0
	Total	308	100.0	100.0	

In what year/draughtstripping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	256	83.1	83.1	83.1
	1995	11	3.6	3.6	86.7
	1959	2	.6	.6	87.3
	1978	2	.6	.6	88.0
	1986	3	1.0	1.0	89.0
	1983	5	1.6	1.6	90.6
	1994	5	1.6	1.6	92.2
	1990	4	1.3	1.3	93.5
	1988	3	1.0	1.0	94.5
	1989	3	1.0	1.0	95.5
	1985	2	.6	.6	96.1
	1976	1	.3	.3	96.4
	1992	6	1.9	1.9	98.4
	1974	2	.6	.6	99.0
	1981	1	.3	.3	99.4
	1966	1	.3	.3	99.7
	1960	1	.3	.3	100.0
	Total	308	100.0	100.0	

Energy saving lightbulbs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	47	15.3	15.3	15.3
	yes	67	21.8	21.8	37.0
	No	194	63.0	63.0	100.0
	Total	308	100.0	100.0	

In what year/light

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	255	82.8	82.8	82.8
	1992	7	2.3	2.3	85.1
	1995	19	6.2	6.2	91.2
	1994	7	2.3	2.3	93.5
	1990	5	1.6	1.6	95.1
	1993	7	2.3	2.3	97.4
	1989	1	.3	.3	97.7
	1980	1	.3	.3	98.1
	1996	5	1.6	1.6	99.7
	1985	1	.3	.3	100.0
	Total	308	100.0	100.0	

sOLAR PANELS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	64	20.8	20.8	20.8
	yes	2	.6	.6	21.4
	No	242	78.6	78.6	100.0
	Total	308	100.0	100.0	

In what year/SOLAR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	306	99.4	99.4	99.4
	1992	1	.3	.3	99.7
	1985	1	.3	.3	100.0
	Total	308	100.0	100.0	

Boiler serviced?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	8	2.6	2.6	2.6
	Once	31	10.1	10.1	12.7
	Twice	29	9.4	9.4	22.1
	More than 3 times	199	64.6	64.6	86.7
	never	41	13.3	13.3	100.0
	Total	308	100.0	100.0	

Months that heating is used

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	6	1.9	1.9	1.9
	January, feb, March, Oct, nov, dec	37	12.0	12.0	14.0
	Jan,Feb, march, april,may, sept, oct,nov,dec	27	8.8	8.8	22.7
	Jan Feb Nov Dec	6	1.9	1.9	24.7
	jan, feb, march, april, oct,nov,dec	108	35.1	35.1	59.7
	Jan,feb,march,april,se pt,oct,nov,dec	40	13.0	13.0	72.7
	jan.feb,march,nov,dec	73	23.7	23.7	96.4
	all months	6	1.9	1.9	98.4
	jan,feb,march,ap,may, june,oct,nov,dec	5	1.6	1.6	100.0
	Total	308	100.0	100.0	

In months that heating on/& temp drops do you

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	15	4.9	4.9	4.9
	Put the heating on	155	50.3	50.3	55.2
	add another layer of clothing	108	35.1	35.1	90.3
	both	30	9.7	9.7	100.0
	Total	308	100.0	100.0	

Does anyone work at home during the day?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	14	4.5	4.5	4.5
	Yes	82	26.6	26.6	31.2
	no	153	49.7	49.7	80.8
	occasionally	59	19.2	19.2	100.0
	Total	308	100.0	100.0	

If so : for how many hours per day

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	213	69.2	69.2	69.2
	1	1	.3	.3	69.5
	2	3	1.0	1.0	70.5
	3	7	2.3	2.3	72.7
	4	13	4.2	4.2	76.9
	5	8	2.6	2.6	79.5
	6	8	2.6	2.6	82.1
	7	5	1.6	1.6	83.8
	8	9	2.9	2.9	86.7
	10	5	1.6	1.6	88.3
	ALL DAY	36	11.7	11.7	100.0
	Total	308	100.0	100.0	

For how many hours per day is the heating on?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	7	2.3	2.3	2.3
	1-4	22	7.1	7.1	9.4
	5-8	139	45.1	45.1	54.5
	9-12	80	26.0	26.0	80.5
	13-15	27	8.8	8.8	89.3
	16-24	33	10.7	10.7	100.0
	Total	308	100.0	100.0	

Do you only heat your home when you are there?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	4	1.3	1.3	1.3
	yes	173	56.2	56.2	57.5
	no	131	42.5	42.5	100.0
	Total	308	100.0	100.0	

Do you heat it before returning home?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No data	45	14.6	14.6	14.6
	Yes	197	64.0	64.0	78.6
	No	66	21.4	21.4	100.0
	Total	308	100.0	100.0	

How many hours before you get home does your heating come on?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	121	39.3	39.3	39.3
	1hour	124	40.3	40.3	79.5
	2 hours	49	15.9	15.9	95.5
	3 hours	4	1.3	1.3	96.8
	4 hours	1	.3	.3	97.1
	5 hours	6	1.9	1.9	99.0
	leave it on low	1	.3	.3	99.4
	on all day	2	.6	.6	100.0
	Total	308	100.0	100.0	

on the coldest days are you comfortable with the heat in your home?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	4	1.3	1.3	1.3
	1 - Not at all	2	.6	.6	1.9
	2	2	.6	.6	2.6
	3-quite comfortable	7	2.3	2.3	4.9
	4	12	3.9	3.9	8.8
	5-Average	114	37.0	37.0	45.8
	6	23	7.5	7.5	53.2
	7-very comfortable	101	32.8	32.8	86.0
	8	16	5.2	5.2	91.2
	9- extremely comfortable	18	5.8	5.8	97.1
	10	9	2.9	2.9	100.0
	Total	308	100.0	100.0	

Summer months is your home too warm

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	5	1.6	1.6	1.6
	Yes	141	45.8	45.8	47.4
	no	162	52.6	52.6	100.0
	Total	308	100.0	100.0	

If yes:How do you cool your home?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	127	41.2	41.2	41.2
	open windows and doors	137	44.5	44.5	85.7
	Use fans coolers	6	1.9	1.9	87.7
	Air cond	1	.3	.3	88.0
	oPEN WINDOWS,DOORS, USE FANS	37	12.0	12.0	100.0
	Total	308	100.0	100.0	

when moved t proerty have you ever checked loft ins depth?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	22	7.1	7.1	7.1
	Yes	163	52.9	52.9	60.1
	no	123	39.9	39.9	100.0
	Total	308	100.0	100.0	

If doing diy do you think of energy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	23	7.5	7.5	7.5
	yes	233	75.6	75.6	83.1
	no	52	16.9	16.9	100.0
	Total	308	100.0	100.0	

make use of grants /loft insulation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	11	3.6	3.6	3.6
	yes	24	7.8	7.8	11.4
	no	273	88.6	88.6	100.0
	Total	308	100.0	100.0	

hot water tank lagging

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	26	8.4	8.4	8.4
	yes	5	1.6	1.6	10.1
	no	277	89.9	89.9	100.0
	Total	308	100.0	100.0	

Draughtproofing/stripping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	24	7.8	7.8	7.8
	yes	8	2.6	2.6	10.4
	no	276	89.6	89.6	100.0
	Total	308	100.0	100.0	

energy saving lightbulbs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	27	8.8	8.8	8.8
	yes	4	1.3	1.3	10.1
	no	277	89.9	89.9	100.0
	Total	308	100.0	100.0	

Gas Bill

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No data	32	10.4	10.4	10.4
	0-50	2	.6	.6	11.0
	51-100	5	1.6	1.6	12.7
	101-150	11	3.6	3.6	16.2
	150-200	24	7.8	7.8	24.0
	201-250	31	10.1	10.1	34.1
	251-300	40	13.0	13.0	47.1
	301-350	45	14.6	14.6	61.7
	351-400	54	17.5	17.5	79.2
	400-500+	64	20.8	20.8	100.0
	Total	308	100.0	100.0	

Electricity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	32	10.4	10.4	10.4
	0-50	2	.6	.6	11.0
	51-100	16	5.2	5.2	16.2
	101-150	30	9.7	9.7	26.0
	151-200	54	17.5	17.5	43.5
	201-250	46	14.9	14.9	58.4
	251-300	31	10.1	10.1	68.5
	301-350	31	10.1	10.1	78.6
	351-400	36	11.7	11.7	90.3
	400-500+	30	9.7	9.7	100.0
	Total	308	100.0	100.0	

Do you pay your fuel bill by:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	4	1.3	1.3	1.3
	direct debit	166	53.9	53.9	55.2
	when the bill arrives	109	35.4	35.4	90.6
	Stamps/budget method	17	5.5	5.5	96.1
	Gas DD/elec when arrives	10	3.2	3.2	99.4
	elec bill arrives/budgetgas	2	.6	.6	100.0
	Total	308	100.0	100.0	

Does cost of heating influence heating system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	4	1.3	1.3	1.3
	yes	74	24.0	24.0	25.3
	no	167	54.2	54.2	79.5
	occasionally	63	20.5	20.5	100.0
	Total	308	100.0	100.0	

do you take active measures to control fuel bills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	15	4.9	4.9	4.9
	yes	164	53.2	53.2	58.1
	no	129	41.9	41.9	100.0
	Total	308	100.0	100.0	

If the price of fuel doubled:change your heating patterns?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	25	8.1	8.1	8.1
	1-not at all	22	7.1	7.1	15.3
	2	14	4.5	4.5	19.8
	3-A little	54	17.5	17.5	37.3
	4	4	1.3	1.3	38.6
	5-average	60	19.5	19.5	58.1
	6	18	5.8	5.8	64.0
	7- quite a lot	69	22.4	22.4	86.4
	8	12	3.9	3.9	90.3
	-A Great Deal	21	6.8	6.8	97.1
	10	9	2.9	2.9	100.0
	Total	308	100.0	100.0	

if opp live in an en eff home

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	2	.6	.6	.6
	Yes	252	81.8	81.8	82.5
	No	10	3.2	3.2	85.7
	dont know	44	14.3	14.3	100.0
	Total	308	100.0	100.0	

would you purchase a home that offered these things?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	10	3.2	3.2	3.2
	yes	125	40.6	40.6	43.8
	no	74	24.0	24.0	67.9
	dont know	99	32.1	32.1	100.0
	Total	308	100.0	100.0	

If it cost an extra £5000 would you still buy it?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	9	2.9	2.9	2.9
	yes	84	27.3	27.3	30.2
	no	82	26.6	26.6	56.8
	dont know	133	43.2	43.2	100.0
	Total	308	100.0	100.0	

% of savings per year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	88	28.6	28.6	28.6
	1%	1	.3	.3	28.9
	1.7%	3	1.0	1.0	29.9
	2%	1	.3	.3	30.2
	2.5%	5	1.6	1.6	31.8
	3%	4	1.3	1.3	33.1
	3.4%	3	1.0	1.0	34.1
	3.7%	2	.6	.6	34.7
	4%	1	.3	.3	35.1
	5%	55	17.9	17.9	52.9
	6.25%	3	1.0	1.0	53.9
	6.7%	5	1.6	1.6	55.5
	7.5%	5	1.6	1.6	57.1
	8.4%	15	4.9	4.9	62.0
	10%	24	7.8	7.8	69.8
	12.5%	32	10.4	10.4	80.2
	15%	9	2.9	2.9	83.1
	20%	19	6.2	6.2	89.3
	25%	33	10.7	10.7	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	285	92.5	92.5	92.5
	£1000 -@50PA	23	7.5	7.5	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	285	92.5	92.5	92.5
	£1000 @ £100PA	23	7.5	7.5	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	292	94.8	94.8	94.8
	£1000 @£150PA	16	5.2	5.2	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	285	92.5	92.5	92.5
	£1000 @ £200PA	23	7.5	7.5	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	271	88.0	88.0	88.0
	£1000@£250PA	37	12.0	12.0	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	302	98.1	98.1	98.1
	£2000@£50PA	6	1.9	1.9	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	292	94.8	94.8	94.8
	£2000@£100PA	16	5.2	5.2	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	300	97.4	97.4	97.4
	£2000@£150 PA	8	2.6	2.6	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	290	94.2	94.2	94.2
	£2000@£200PA	18	5.8	5.8	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	275	89.3	89.3	89.3
	£2000@£250PA	33	10.7	10.7	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	303	98.4	98.4	98.4
	£3000@£50PA	5	1.6	1.6	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	305	99.0	99.0	99.0
	£3000@£100PA	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	297	96.4	96.4	96.4
	£3000@£150PA	11	3.6	3.6	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	300	97.4	97.4	97.4
	£3000@£200PA	8	2.6	2.6	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	285	92.5	92.5	92.5
	£3000@£250PA	23	7.5	7.5	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	308	100.0	100.0	100.0

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	305	99.0	99.0	99.0
	£4000@£100PA	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	306	99.4	99.4	99.4
	£4000@£150PA	2	.6	.6	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	299	97.1	97.1	97.1
	£4000@£200PA	9	2.9	2.9	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	301	97.7	97.7	97.7
	£4000@£250PA	7	2.3	2.3	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	306	99.4	99.4	99.4
	£5000@£50PA	2	.6	.6	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	306	99.4	99.4	99.4
	£5000@£100PA	2	.6	.6	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	305	99.0	99.0	99.0
	£5000@£150PA	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	307	99.7	99.7	99.7
	£5000@£200PA	1	.3	.3	100.0
	Total	308	100.0	100.0	

PAY EXTRA FOR AN ENERGY EFFICENT HOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO DATA	270	87.7	87.7	87.7
	£5000@£250PA	38	12.3	12.3	100.0
	Total	308	100.0	100.0	

The clothes you wear at home are they for

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	2	.6	.6	.6
	Comfort	233	75.6	75.6	76.3
	Both	73	23.7	23.7	100.0
	Total	308	100.0	100.0	

In winter, what do you wear

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	4	1.3	1.3	1.3
	T shirt	18	5.8	5.8	7.1
	T shirt & jumper	72	23.4	23.4	30.5
	Long sleeved shirt	29	9.4	9.4	39.9
	long sleeve shirt & jumper	127	41.2	41.2	81.2
	thermals & a jumper	23	7.5	7.5	88.6
	Dress	1	.3	.3	89.0
	dress & a jumper	5	1.6	1.6	90.6
	dress, thermals a jumper	6	1.9	1.9	92.5
	Lss, Thermals & jumper	3	1.0	1.0	93.5
	T shirt,lss,jumper	14	4.5	4.5	98.1
	LSS & T shirt	6	1.9	1.9	100.0
	Total	308	100.0	100.0	

If the temp drops do you

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	11	3.6	3.6	3.6
	Turn up the heating	140	45.5	45.5	49.0
	Add a jumper	98	31.8	31.8	80.8
	tend to live in one room	11	3.6	3.6	84.4
	turn up heating & add jumper	41	13.3	13.3	97.7
	all three	5	1.6	1.6	99.4
	Add jumper/live in one room	2	.6	.6	100.0
	Total	308	100.0	100.0	

If you entertain in the winter do you increase the comfort levels

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	9	2.9	2.9	2.9
	yes	131	42.5	42.5	45.5
	no	168	54.5	54.5	100.0
	Total	308	100.0	100.0	

do you always do this

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	180	58.4	58.4	58.4
	Yes	48	15.6	15.6	74.0
	No	1	.3	.3	74.4
	only for certain occasions	79	25.6	25.6	100.0
	Total	308	100.0	100.0	

If bill was high would you improve efficiency of your home

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	44	14.3	14.3	14.3
	yes	136	44.2	44.2	58.4
	no	128	41.6	41.6	100.0
	Total	308	100.0	100.0	

if yes:what: Loft insulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	262	85.1	85.1	85.1
	yes	38	12.3	12.3	97.4
	no	8	2.6	2.6	100.0
	Total	308	100.0	100.0	

hwtank lagging

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	281	91.2	91.2	91.2
	yes	15	4.9	4.9	96.1
	no	12	3.9	3.9	100.0
	Total	308	100.0	100.0	

draughtstripping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	237	76.9	76.9	76.9
	yes	64	20.8	20.8	97.7
	no	7	2.3	2.3	100.0
	Total	308	100.0	100.0	

cavity wall insulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	253	82.1	82.1	82.1
	yes	42	13.6	13.6	95.8
	no	13	4.2	4.2	100.0
	Total	308	100.0	100.0	

Double glazing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	239	77.6	77.6	77.6
	yes	57	18.5	18.5	96.1
	no	12	3.9	3.9	100.0
	Total	308	100.0	100.0	

secondary glazing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	276	89.6	89.6	89.6
	yes	19	6.2	6.2	95.8
	no	13	4.2	4.2	100.0
	Total	308	100.0	100.0	

Location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	21	6.8	6.8	6.8
	1-Not at all	2	.6	.6	7.5
	3-Not very important	2	.6	.6	8.1
	5-average	17	5.5	5.5	13.6
	6	5	1.6	1.6	15.3
	7-very important	104	33.8	33.8	49.0
	8	19	6.2	6.2	55.2
	9-extremely important	126	40.9	40.9	96.1
	10	12	3.9	3.9	100.0
	Total	308	100.0	100.0	

draughtproofing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	31	10.1	10.1	10.1
	1-Not at all	8	2.6	2.6	12.7
	2	5	1.6	1.6	14.3
	3-Not very important	48	15.6	15.6	29.9
	4	4	1.3	1.3	31.2
	5-average	100	32.5	32.5	63.6
	6	10	3.2	3.2	66.9
	7-very important	67	21.8	21.8	88.6
	8	8	2.6	2.6	91.2
	9-extremely important	26	8.4	8.4	99.7
	10	1	.3	.3	100.0
	Total	308	100.0	100.0	

appearence of property

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	16	5.2	5.2	5.2
	3-Not very important	6	1.9	1.9	7.1
	4	1	.3	.3	7.5
	5-average	52	16.9	16.9	24.4
	6	9	2.9	2.9	27.3
	7-very important	147	47.7	47.7	75.0
	8	24	7.8	7.8	82.8
	9-extremely important	51	16.6	16.6	99.4
	10	2	.6	.6	100.0
	Total	308	100.0	100.0	

cond boiler

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	63	20.5	20.5	20.5
	1-Not at all	31	10.1	10.1	30.5
	2	8	2.6	2.6	33.1
	3-Not very important	53	17.2	17.2	50.3
	4	3	1.0	1.0	51.3
	5-average	96	31.2	31.2	82.5
	6	5	1.6	1.6	84.1
	7-very important	35	11.4	11.4	95.5
	8	5	1.6	1.6	97.1
	9-extremely important	9	2.9	2.9	100.0
	Total	308	100.0	100.0	

size of house

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	15	4.9	4.9	4.9
	3-Not very important	5	1.6	1.6	6.5
	5-average	40	13.0	13.0	19.5
	6	11	3.6	3.6	23.1
	7-very important	147	47.7	47.7	70.8
	8	22	7.1	7.1	77.9
	9-extremely important	66	21.4	21.4	99.4
	10	2	.6	.6	100.0
	Total	308	100.0	100.0	

cav wall insulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	35	11.4	11.4	11.4
	1-Not at all	19	6.2	6.2	17.5
	2	9	2.9	2.9	20.5
	3-Not very important	70	22.7	22.7	43.2
	4	2	.6	.6	43.8
	5-average	93	30.2	30.2	74.0
	6	12	3.9	3.9	77.9
	7-very important	45	14.6	14.6	92.5
	8	5	1.6	1.6	94.2
	9-extremely important	17	5.5	5.5	99.7
	10	1	.3	.3	100.0
	Total	308	100.0	100.0	

garage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	16	5.2	5.2	5.2
	1-Not at all	5	1.6	1.6	6.8
	3-Not very important	6	1.9	1.9	8.8
	4	1	.3	.3	9.1
	5-average	29	9.4	9.4	18.5
	6	10	3.2	3.2	21.8
	7-very important	119	38.6	38.6	60.4
	8	22	7.1	7.1	67.5
	9-extremely important	90	29.2	29.2	96.8
	10	10	3.2	3.2	100.0
	Total	308	100.0	100.0	

central heating

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	15	4.9	4.9	4.9
	1-Not at all	1	.3	.3	5.2
	2	1	.3	.3	5.5
	3-Not very important	2	.6	.6	6.2
	5-average	19	6.2	6.2	12.3
	6	7	2.3	2.3	14.6
	7-very important	116	37.7	37.7	52.3
	8	26	8.4	8.4	60.7
	9-extremely important	113	36.7	36.7	97.4
	10	8	2.6	2.6	100.0
	Total	308	100.0	100.0	

Garden

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	9	2.9	2.9	2.9
	1-Not at all	4	1.3	1.3	4.2
	3-Not very important	4	1.3	1.3	5.5
	4	3	1.0	1.0	6.5
	5-average	45	14.6	14.6	21.1
	6	16	5.2	5.2	26.3
	7-very important	104	33.8	33.8	60.1
	8	24	7.8	7.8	67.9
	9-extremely important	90	29.2	29.2	97.1
	10	9	2.9	2.9	100.0
	Total	308	100.0	100.0	

dglaz

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	13	4.2	4.2	4.2
	1-Not at all	6	1.9	1.9	6.2
	2	2	.6	.6	6.8
	3-Not very important	16	5.2	5.2	12.0
	4	4	1.3	1.3	13.3
	5-average	64	20.8	20.8	34.1
	6	26	8.4	8.4	42.5
	7-very important	90	29.2	29.2	71.8
	8	20	6.5	6.5	78.2
	9-extremely important	64	20.8	20.8	99.0
	10	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

loft ins

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	13	4.2	4.2	4.2
	1-Not at all	4	1.3	1.3	5.5
	2	2	.6	.6	6.2
	3-Not very important	18	5.8	5.8	12.0
	4	6	1.9	1.9	14.0
	5-average	62	20.1	20.1	34.1
	6	17	5.5	5.5	39.6
	7-very important	92	29.9	29.9	69.5
	8	19	6.2	6.2	75.6
	9-extremely important	71	23.1	23.1	98.7
	10	4	1.3	1.3	100.0
	Total	308	100.0	100.0	

price

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	13	4.2	4.2	4.2
	3-Not very important	2	.6	.6	4.9
	5-average	23	7.5	7.5	12.3
	6	5	1.6	1.6	14.0
	7-very important	87	28.2	28.2	42.2
	8	27	8.8	8.8	51.0
	9-extremely important	143	46.4	46.4	97.4
	10	8	2.6	2.6	100.0
	Total	308	100.0	100.0	

scope for improvement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	23	7.5	7.5	7.5
	1-Not at all	11	3.6	3.6	11.0
	3-Not very important	38	12.3	12.3	23.4
	4	8	2.6	2.6	26.0
	5-average	96	31.2	31.2	57.1
	6	11	3.6	3.6	60.7
	7-very important	68	22.1	22.1	82.8
	8	16	5.2	5.2	88.0
	9-extremely important	34	11.0	11.0	99.0
	10	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

council tax level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	20	6.5	6.5	6.5
	1-Not at all	11	3.6	3.6	10.1
	2	2	.6	.6	10.7
	3-Not very important	31	10.1	10.1	20.8
	4	8	2.6	2.6	23.4
	5-average	120	39.0	39.0	62.3
	6	14	4.5	4.5	66.9
	7-very important	61	19.8	19.8	86.7
	8	9	2.9	2.9	89.6
	9-extremely important	29	9.4	9.4	99.0
	10	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

furnishings

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	33	10.7	10.7	10.7
	1-Not at all	49	15.9	15.9	26.6
	2	10	3.2	3.2	29.9
	3-Not very important	69	22.4	22.4	52.3
	4	7	2.3	2.3	54.5
	5-average	92	29.9	29.9	84.4
	6	16	5.2	5.2	89.6
	7-very important	19	6.2	6.2	95.8
	8	6	1.9	1.9	97.7
	9-extremely important	7	2.3	2.3	100.0
	Total	308	100.0	100.0	

kitchen & bathroom

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	18	5.8	5.8	5.8
	1-Not at all	10	3.2	3.2	9.1
	2	6	1.9	1.9	11.0
	3-Not very important	31	10.1	10.1	21.1
	4	7	2.3	2.3	23.4
	5-average	108	35.1	35.1	58.4
	6	23	7.5	7.5	65.9
	7-very important	72	23.4	23.4	89.3
	8	15	4.9	4.9	94.2
	9-extremely important	18	5.8	5.8	100.0
	Total	308	100.0	100.0	

resaleability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	18	5.8	5.8	5.8
	1-Not at all	2	.6	.6	6.5
	2	1	.3	.3	6.8
	3-Not very important	11	3.6	3.6	10.4
	4	2	.6	.6	11.0
	5-average	49	15.9	15.9	26.9
	6	21	6.8	6.8	33.8
	7-very important	99	32.1	32.1	65.9
	8	24	7.8	7.8	73.7
	9-extremely important	77	25.0	25.0	98.7
	10	4	1.3	1.3	100.0
	Total	308	100.0	100.0	

View

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	21	6.8	6.8	6.8
	1-Not at all	1	.3	.3	7.1
	2	1	.3	.3	7.5
	3-Not very important	6	1.9	1.9	9.4
	4	2	.6	.6	10.1
	5-average	90	29.2	29.2	39.3
	6	27	8.8	8.8	48.1
	7-very important	89	28.9	28.9	76.9
	8	21	6.8	6.8	83.8
	9-extremely important	47	15.3	15.3	99.0
	10	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

Lounge space

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	17	5.5	5.5	5.5
	1-Not at all	1	.3	.3	5.8
	3-Not very important	3	1.0	1.0	6.8
	4	1	.3	.3	7.1
	5-average	87	28.2	28.2	35.4
	6	20	6.5	6.5	41.9
	7-very important	113	36.7	36.7	78.6
	8	25	8.1	8.1	86.7
	9-extremely important	39	12.7	12.7	99.4
	10	2	.6	.6	100.0
	Total	308	100.0	100.0	

Solar panels

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	28	9.1	9.1	9.1
	1-Not at all	96	31.2	31.2	40.3
	2	21	6.8	6.8	47.1
	3-Not very important	87	28.2	28.2	75.3
	4	6	1.9	1.9	77.3
	5-average	53	17.2	17.2	94.5
	6	8	2.6	2.6	97.1
	7-very important	7	2.3	2.3	99.4
	9-extremely important	2	.6	.6	100.0
	Total	308	100.0	100.0	

Aware of gov campaigns?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	5	1.6	1.6	1.6
	yes	157	51.0	51.0	52.6
	no	146	47.4	47.4	100.0
	Total	308	100.0	100.0	

have you found the information useful?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	153	49.7	49.7	49 7
	1-not at all	11	3.6	3.6	53.2
	2	7	2.3	2.3	55.5
	3-quite useful	38	12.3	12.3	67.9
	4	11	3.6	3.6	71.4
	5-average	64	20.8	20.8	92.2
	6	9	2.9	2.9	95.1
	7-very useful	9	2.9	2.9	98.1
	8	2	.6	.6	98.7
	9-extremely useful	3	1.0	1.0	99.7
	10	1	.3	.3	100.0
	Total	308	100.0	100.0	

have you done any of he measures that it suggests

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	123	39.9	39.9	39.9
	yes	87	28.2	28.2	68.2
	no	98	31.8	31.8	100.0
	Total	308	100.0	100.0	

have you done any:Loft insulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	197	64.0	64.0	64.0
	yes	97	31.5	31.5	95.5
	no	14	4.5	4.5	100.0
	Total	308	100.0	100.0	

hwtank lagging

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	199	64.6	64.6	64.6
	yes	95	30.8	30.8	95.5
	no	14	4.5	4.5	100.0
	Total	308	100.0	100.0	

draughtstripping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	236	76.6	76.6	76.6
	yes	48	15.6	15.6	92.2
	no	24	7.8	7.8	100.0
	Total	308	100.0	100.0	

cavity wall insulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	247	80.2	80.2	80.2
	yes	23	7.5	7.5	87.7
	no	38	12.3	12.3	100.0
	Total	308	100.0	100.0	

Double glazing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	199	64.6	64.6	64.6
	yes	90	29.2	29.2	93.8
	no	19	6.2	6.2	100.0
	Total	308	100.0	100.0	

secondary glazing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	249	80.8	80.8	80.8
	yes	24	7.8	7.8	88.6
	no	35	11.4	11.4	100.0
	Total	308	100.0	100.0	

Co2 emissions from domestic

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	20	6.5	6.5	6.5
	10%	9	2.9	2.9	9.4
	20%	23	7.5	7.5	16.9
	30%	39	12.7	12.7	29.5
	40%	24	7.8	7.8	37.3
	50%	14	4.5	4.5	41.9
	60%	18	5.8	5.8	47.7
	70%	5	1.6	1.6	49.4
	80%	2	.6	.6	50.0
	dont know	154	50.0	50.0	100.0
	Total	308	100.0	100.0	

tonnes of co2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	16	5.2	5.2	5.2
	1-4 tonnes	34	11.0	11.0	16.2
	5-8 tonnes	31	10.1	10.1	26.3
	9-12 tonnes	16	5.2	5.2	31.5
	13-16 tonnes	4	1.3	1.3	32.8
	17 - 20 tonnes	1	.3	.3	33.1
	dont know	206	66.9	66.9	100.0
	Total	308	100.0	100.0	

% of fuel bill on heating?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	11	3.6	3.6	3.6
	30%	7	2.3	2.3	5.8
	40%	18	5.8	5.8	11.7
	50%	49	15.9	15.9	27.6
	60%	69	22.4	22.4	50.0
	70%	57	18.5	18.5	68.5
	80%	26	8.4	8.4	76.9
	90%	4	1.3	1.3	78.2
	100%	4	1.3	1.3	79.5
	dont know	63	20.5	20.5	100.0
	Total	308	100.0	100.0	

% of fuel bill on lighting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	15	4.9	4.9	4.9
	10%	91	29.5	29.5	34.4
	20%	69	22.4	22.4	56.8
	30%	36	11.7	11.7	68.5
	40%	14	4.5	4.5	73.1
	50%	6	1.9	1.9	75.0
	60%	6	1.9	1.9	76.9
	70%	1	.3	.3	77.3
	80%	2	.6	.6	77.9
	100%	1	.3	.3	78.2
	dont know	67	21.8	21.8	100.0
	Total	308	100.0	100.0	

% of fuel bill on cooking

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no data	13	4.2	4.2	4.2
	10%	50	16.2	16.2	20.5
	20%	87	28.2	28.2	48.7
	30%	59	19.2	19.2	67.9
	40%	16	5.2	5.2	73.1
	50%	9	2.9	2.9	76.0
	60%	5	1.6	1.6	77.6
	70%	1	.3	.3	77.9
	80%	2	.6	.6	78.6
	100%	1	.3	.3	78.9
	dont know	65	21.1	21.1	100.0
	Total	308	100.0	100.0	

Appendix 6 – Providers (housebuilders) results (frequencies)

Frequency Table

Type of construction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	timber frame	1	10.0	10.0	10 0
	Traditional	9	90.0	90.0	100.0
	Total	10	100.0	100.0	

Registered?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	nhbc	10	100.0	100.0	100.0

Do you exceed the regs?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	6	60.0	60.0	60.0
	No	4	40.0	40.0	100.0
	Total	10	100.0	100.0	

Does this differ for different housetypes?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	9	90.0	90.0	90.0
	Not applicable	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

NHER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	70.0	70.0	70.0
	no	3	30.0	30.0	100.0
	Total	10	100.0	100.0	

Do you delibertatly provide energy measures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	60.0	60.0	60.0
	No	4	40.0	40.0	100.0
	Total	10	100.0	100.0	

Both,nher/sap

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	both	5	50.0	100.0	100.0
Missing	no data	5	50.0		
Total		10	100.0		

sap rating

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	2	20.0	20.0	20.0
	Yes	8	80.0	80.0	100.0
	Total	10	100.0	100.0	

Do these ratings vary on different housetypes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	3	30.0	30.0	30.0
	no	7	70.0	70.0	100.0
	Total	10	100.0	100.0	

WHO DETERMINES THE SPEC FOR HOUSING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Arch, sales, @H Office	6	60.0	60 0	60.0
	MD/board of dircts Level	4	40.0	40.0	100.0
	Total	10	100.0	100.0	

What critera is the spec based on?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	standard regional spec that conforms	6	60.0	60.0	60.0
	Spec that has been throrughly resaerched	1	10.0	10.0	70.0
	Based on marketing and company spec	3	30.0	30.0	100.0
	Total	10	100.0	100.0	

Is this spec subject to modification?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	5	50.0	50.0	50.0
	No	5	50.0	50.0	100.0
	Total	10	100.0	100.0	

Do you provide staff training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	30.0	30.0	30.0
	No	7	70.0	70.0	100.0
	Total	10	100.0	100.0	

Do you think detail is important with en eff?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	9	90.0	90.0	90.0
	no	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Condensing boilers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	2	20.0	20.0	20.0
	2	1	10.0	10.0	30.0
	3: not very important	4	40.0	40.0	70.0
	4	1	10.0	10.0	80.0
	5: Average	1	10.0	10.0	90.0
	9:Extremely important	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

TCValves

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Average	2	20.0	20.0	20.0
	6	1	10.0	10.0	30.0
	7:very important	5	50.0	50.0	80.0
	9:extremely important	1	10.0	10.0	90.0
	10:	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Double Glazing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	8:	2	20.0	20.0	20.0
	10:	8	80.0	80.0	100.0
	Total	10	100.0	100.0	

Triple glazing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	7	70.0	70.0	70.0
	3: not very important	1	10.0	10.0	80.0
	7:very important	1	10.0	10.0	90.0
	10:	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Above regs thermally

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	10.0	10.0	10.0
	3: not very important	3	30.0	30.0	40.0
	5: Average	1	10.0	10.0	50.0
	6	1	10.0	10.0	60.0
	7:very important	1	10.0	10.0	70.0
	8:	2	20.0	20.0	90.0
	10:	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Draughtstripping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	1	10.0	10.0	10.0
	2	1	10.0	10.0	20.0
	6	2	20.0	20.0	40.0
	7:very important	1	10.0	10.0	50.0
	10:	5	50.0	50.0	100.0
	Total	10	100.0	100.0	

Heating systems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	1	10.0	10.0	10.0
	6	1	10.0	10.0	20.0
	8:	2	20.0	20.0	40.0
	9:extremely important	2	20.0	20.0	60.0
	10:	4	40.0	40.0	100.0
	Total	10	100.0	100.0	

Site planning/orientation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	3	30.0	30.0	30.0
	2	2	20.0	20.0	50.0
	4	1	10.0	10.0	60.0
	6	2	20.0	20.0	80.0
	8:	1	10.0	10.0	90.0
	10:	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Solar panels

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	9	90.0	90.0	90.0
	3: not very important	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Would you like to build above the regulations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	4	40.0	40.0	40.0
	Do anyway	6	60.0	60.0	100.0
	Total	10	100.0	100.0	

How do you regard the new regulations?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Satisfactory	7	70.0	70.0	70.0
	Too stringent	2	20.0	20.0	90.0
	Unaware	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

do you think there is a market for energy eficent homes?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	3	30.0	30.0	30.0
	no	7	70.0	70.0	100.0
	Total	10	100.0	100.0	

Do purchasers request any en eff measures?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	8	80.0	80.0	80.0
	Dont know	2	20.0	20.0	100.0
	Total	10	100.0	100.0	

How informed are purchasers about en eff

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	30.0	30.0	30.0
	2	1	10.0	10.0	40.0
	3:Scarecly informed	6	60.0	60.0	100.0
	Total	10	100.0	100.0	

Location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	8	1	10.0	10.0	10.0
	9:Extremely important	1	10.0	10.0	20.0
	10	8	80.0	80.0	100.0
	Total	10	100.0	100.0	

Price

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	8	1	10.0	10.0	10.0
	10	9	90.0	90.0	100.0
	Total	10	100.0	100.0	

Appearence of property

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Average	1	10.0	10.0	10.0
	7: Very important	2	20.0	20.0	30.0
	8	1	10.0	10.0	40.0
	9:Extremely important	1	10.0	10.0	50.0
	10	5	50.0	50.0	100.0
	Total	10	100.0	100.0	

View

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	10.0	10.0	10.0
	3: not very important	1	10.0	10.0	20.0
	4	1	10.0	10.0	30.0
	5 Average	4	40.0	40.0	70.0
	6	2	20.0	20.0	90.0
	7: Very important	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Garage/off street parking

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	10.0	10.0	10.0
	6	1	10.0	10.0	20.0
	7: Very important	2	20.0	20.0	40.0
	8	2	20.0	20.0	60.0
	9:Extremely important	3	30.0	30.0	90.0
	10	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Garden

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3: not very important	3	30.0	30.0	30.0
	4	1	10.0	10.0	40.0
	5: Average	2	20.0	20.0	60.0
	6	1	10.0	10.0	70.0
	7: Very important	1	10.0	10.0	80.0
	8	1	10.0	10.0	90.0
	9:Extremely important	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Lounge space

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Average	2	20.0	20.0	20.0
	7: Very important	2	20.0	20.0	40.0
	8	1	10.0	10.0	50.0
	9:Extremely important	2	20.0	20.0	70.0
	10	3	30.0	30.0	100.0
	Total	10	100.0	100.0	

Quality of kitchen

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	1	10.0	10.0	10.0
	7: Very important	1	10.0	10.0	20.0
	8	2	20.0	20.0	40.0
	9:Extremely important	2	20.0	20.0	60.0
	10	4	40.0	40.0	100.0
	Total	10	100.0	100.0	

Quality of bathroom

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	1	10.0	10.0	10.0
	5. Average	1	10.0	10.0	20.0
	6	1	10.0	10.0	30.0
	7: Very important	2	20.0	20.0	50.0
	8	1	10.0	10.0	60.0
	9:Extremely important	1	10.0	10.0	70.0
	10	3	30.0	30.0	100.0
	Total	10	100.0	100.0	

curtains/carpets

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	2	20.0	20.0	20.0
	3: not very important	2	20.0	20.0	40.0
	5: Average	3	30.0	30.0	70.0
	7: Very important	1	10.0	10.0	80.0
	9:Extremely important	2	20.0	20.0	100.0
	Total	10	100.0	100.0	

Draughtstripping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	1	10.0	10.0	10.0
	2	2	20.0	20.0	30.0
	4	3	30.0	30.0	60.0
	5: Average	1	10.0	10.0	70.0
	6	1	10.0	10.0	80.0
	8	1	10.0	10.0	90.0
	10	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

resaleability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Average	1	10.0	10.0	10.0
	6	1	10.0	10.0	20.0
	7: Very important	3	30.0	30.0	50.0
	8	3	30.0	30.0	80.0
	9:Extremely important	1	10.0	10.0	90.0
	10	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Scope for improvement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	3	30.0	30.0	30.0
	2	3	30.0	30.0	60.0
	3: not very important	1	10.0	10.0	70.0
	4	1	10.0	10.0	80.0
	5: Average	2	20.0	20.0	100.0
	Total	10	100.0	100.0	

Council tax level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	5	50.0	50.0	50.0
	5 Average	4	40.0	40.0	90.0
	10	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Fuel source

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	2	20.0	20.0	20.0
	5: Average	1	10.0	10.0	30.0
	6	1	10.0	10.0	40.0
	8	3	30.0	30.0	70.0
	9:Extremely important	2	20.0	20.0	90.0
	10	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Increased insulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	6	60.0	60.0	60.0
	4	2	20.0	20.0	80.0
	5: Average	1	10.0	10.0	90.0
	6	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

K Glass

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	8	80.0	80.0	80.0
	2	1	10.0	10.0	90.0
	5. Average	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

condensing boiler

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	7	70.0	70.0	70.0
	2	3	30.0	30.0	100.0
	Total	10	100.0	100.0	

Solar panels

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1: Not at all	8	80.0	80.0	80.0
	2	1	10.0	10.0	90.0
	4	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

do you think that purcahsers will pay for substandard home?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	8	80.0	80.0	80.0
	no	2	20.0	20.0	100.0
	Total	10	100.0	100.0	

Extra for purchasers to pay

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5%	1	10.0	10.0	10.0
	0%	6	60.0	60.0	70.0
	2%	2	20.0	20.0	90.0
	1%	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

maketing affects a dwelling

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3:Marginally	1	10.0	10.0	10.0
	6	2	20.0	20.0	30.0
	7	1	10.0	10.0	40.0
	8:Quite a lot	3	30.0	30.0	70.0
	10:Totally	3	30.0	30.0	100.0
	Total	10	100.0	100.0	

marketing factor in the future

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	7	70.0	70.0	70.0
	no	3	30.0	30.0	100.0
	Total	10	100.0	100.0	