The Potential for Domestic Micro-Generation:

Would Micro Work in Woking?

Town Planning MPhil Thesis
University College London/ University of London
Louise Kidd
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Abstract

This thesis has focussed on micro-generation which has been seen to have a potentially massive role to play in reducing emissions from the household sector, which currently accounts for around a third of emissions in the UK. The key barriers to take-up of micro-generation have been identified as; cost, a lack of information, a lack of understanding about the technologies and problems with bureaucratic red tape. The research highlighted the exact nature of these barriers from the point of view of the consumer through a series of structured interviews with householders in Woking.

A review of the literature on attitude, behaviour, behaviour change theory and communications theory has demonstrated the complex nature of the challenge to encourage and motivate the public to install micro-generation technologies. This research has focussed on information provision and marketing/influencing strategies as a way to address the barriers identified.

The key findings of this research are:

- That Woking Borough Council should develop a policy to increase the number of micro-generation installations on residential properties in the borough, as an extension to its existing Climate Change Strategy and which will complement the emerging sustainable energy policies in the Council’s new Local Development Framework,

- That the micro-generation policy should be based on the fundamental principles of sound and ethical communications, and on a solid understanding of the nature of sustainable consumption and behaviour change theory,

- The policy should be delivered through a marketing and influencing strategy, which will include an element of information provision, and address the key barriers identified.

As a result of the findings of the research, a number of recommendations have been made about exactly how a micro-generation policy and its related Strategy could be executed in Woking.
"Climate change can be difficult - you could ask the dinosaurs, if they weren't extinct"  
(UNFCC, Web, 2005)
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1.0 Introduction

1.1 This thesis focuses on micro-generation and the potential it has to significantly reduce greenhouse gas emissions from the household sector.

1.2 The specific aim of the research is to establish the potential for take-up of micro-generation technologies and identify what the barriers to take up are at the local level. Taking these findings in to account, practical suggestions for encouraging behaviour change are put forward.

1.3 The thesis begins with an explanation of the wider context for this research, including a brief discussion of sustainable development and climate change policy in the UK, and the role that micro-generation has to play in delivering sustainable development and combating climate change.

1.4 The role of micro-generation being established, the discussion then moves on to the barriers to take-up of micro-generation technologies. The findings of the literature review and of the primary research are then used to develop some practical recommendations for Local Authorities.

1.5 The Wider Context

1.6 The wider context for the research that has been undertaken is set out in the following sub-sections. It sets out the importance of the subject and explains why this particular area of research was chosen.
1.7 **What is Sustainable Development?**

1.8 The notion of sustainable development was ‘born’ in the 1980’s when it became clear, through much scientific evidence, that human activity was having a massive impact on the natural environment and resources. In 1987, the World Commission on Environment and Development (set up by the United Nations in 1983) presented its report ‘Our Common Future’ which called for the need for sustainable development. The report, sometimes referred to as the Brundtland Report after the Chair of the WCED, gained backing from world leaders, who, in 1992 attended the Earth Summit in Rio where it was agreed to develop the 27 principles of sustainable development (Langston and Ding, 2001).

1.9 Several definitions of sustainable development have been developed over recent years, however, the most commonly quoted is that which appears in the Brundtland Report itself:

"**Development that meets the needs of the present without compromising the ability of future generations to meet their own needs**"

1.10 Elliott (1994) explains that despite this seemingly simplistic definition of sustainable development, this is offset by the challenges that the Brundtland Report identifies for effecting sustainable development. The WCED set out six ‘core issues’ for sustainable development, as described
by Elliott (1994, p. 4): Population and development; Food security; Species and ecosystems; Energy; Industry; The urban challenge.

1.11 Sustainable Development in the UK

1.12 In the UK, the concept of sustainable development was originally set out in the document ‘A Better Quality of Life’ (1999). This document has recently been updated to take in to account policy advances since 1999. ‘Securing the Future’ was published in March 2005.

1.13 Securing the Future sets out the new framework goal for sustainable development (p.17):

"The goal of sustainable development is to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising the quality of life of future generations”

1.14 The Government (including the devolved regions) have developed a set of five ‘guiding principles’ (see box x) that will be used to achieve the framework goal. These principles form the basis for future policy in the UK; sustainable policies must respect all five of the principles. Any trade-offs must be made in an ‘explicit and transparent way’ (DETR, 2005).

1.15 Consultation on the new strategy revealed four updated priority areas for action:
• Sustainable Consumption and Production
• Climate Change and Energy
• Natural Resource Protection and Environmental Enhancement
• Sustainable Communities.

1.16 What is Climate Change?

1.17 There is much evidence that climate change is human-induced, brought about by industrialisation and specifically, the burning of fossil fuels. The consequence of this, often referred to as the ‘enhanced greenhouse effect’ is a warming of the earth's surface and lower atmosphere, resulting in changing weather patterns. Computer modelling estimates that the average global temperature will rise by between 1.4 to 5.8 degrees by the end of this century (UNFCCC, web, January 2005).

1.18 Some amount of climate change is already inevitable due to current levels of greenhouse gasses in the atmosphere (e.g., carbon dioxide, which makes up 60% of these gasses, methane and nitrous oxides). Current evidence of climate change shows, for example, that there have been more frequent and more powerful hurricanes and cyclones, drier summers and periods of droughts as well as more intense and frequent flood events, and irreparable damage to ecosystems including the extinction of some species. It is likely that over the coming decades the effects described above will only become more serious (UNFCCC, web, January 2005).
1.19 As identified in paragraph 1.5, one of the core issues identified in the Brundtland Report was energy use in light of growing acceptance of global warming. One of the major results of the 1992 Earth Summit was the signing of The United Nations Framework Convention on Climate Change (UNFCCC) – a treaty that most countries signed up to in order to consider ways in which to tackle global warming and ways in which to cope with the rises in temperature that were already inevitable.
1.20 In 1997, the Kyoto Climate Summit was held in order to set (legally binding) targets for reduction of greenhouse gasses as a response to the growing evidence of the threat of climate change and as an addition to the UNFCCC.

1.21 Climate Change in the UK

1.22 In the UK, the Government published the UK Climate Change Programme (UKCCP) in 2000, which detailed how the UK will meet its Kyoto targets for greenhouse gas emissions by 12.5% by 2010 (and move towards a domestic goal to cut carbon dioxide emissions by 20% below 1990 levels by 2010). DEFRA undertook consultation to revise the UKCCP in September 2004. The revised UKCCP was published in March 2006 and introduces a series of additional measures that will assist in achievement of the Governments targets.

1.23 In addition, the Energy White Paper was published in 2003. It set out the long-term energy policy for the UK and states that the UK will reduce carbon dioxide emissions by some 60% by 2050 (DEFRA, web, February 2005). Climate change actions, however, are dealt with across many Government departments; for example, the climate change levy is administered by HM Customs and Excise and planning policy on renewables, for example, is set by the ODPM (now DCLG).
1.24 It can be seen that the Government has made a firm commitment in the new UK Sustainable Development Strategy to deal with the challenge of climate change. Although climate change was addressed in the 1999 strategy, its relative importance was not made explicit within the document. The new strategy is therefore a clear step in the right direction with a whole chapter dedicated to energy and climate change. This will be discussed in greater detail later on in this thesis.

1.25 The link Between Sustainable Development and Climate Change

1.26 The link between climate change and sustainable development has been made clear at an international level, starting with the identification of climate change as a key issue at the Earth Summit in 1992.

1.27 Grubb (2003, editorial) states, "The relationship between climate change and development – sustainable or otherwise – is crucial and complex". The Intergovernmental Panel on Climate Change's (IPCC) Working Group III Report on Mitigation, for example, highlighted the extent to which climate change issues were inextricably linked with wider development issues and the need for closer links to be drawn. Downing et al (2003) expand that climate impacts and adaption influence the prospects of sustainable development and, in turn, development paths determine the level of greenhouse gas emissions and the capacity to adapt to and mitigate climate change impacts. They further that policy linkages need to be clearer, with climate policies integrated in to sustainable development
strategies in order that development planners, who naturally consider development first, can access a clear policy.

1.28 Wilbanks (2003) reports on the theory that the importance of climate change is overestimated in the context of sustainable development, but that an understanding of climate change can act as a catalyst towards sustainable development.

"At least over the next several decades, climate change may be the most significant for sustainable development, not because it is the dominant threat but because it triggers broader international, regional and local concerns about destabilising 'Spaceship Earth' and because it stimulates international resource allocations to meet sustainable development needs, many of which exist without the threat of climate change" (Wilbanks, 2003, p. 149)

1.29 Wilbanks calls for the need for a "balanced perspective"; recognition that climate change does act as a catalyst for broader attention to sustainable development issues, but that this must not detract from the 'place-based, nature-society' relationships within which sustainable development is nested.

1.30 Again, as discussed above, in the UK, the link between sustainable development and climate change has been made clear through the new Sustainable Development Strategy.
1.31 Planning, Sustainable Development and Climate Change

1.32 The planning system has the potential to play a massive role in delivering sustainable development and tackling climate change. Indeed, Planning Policy Statement 1, the first in a series of national planning policy statements, sets out that sustainable development is the key aim of the British planning system (ODPM, 2005).

1.33 December 2006 saw the long awaited draft Planning Policy Statement on Climate Change – this has been published as a ‘supplement’ to Planning Policy Statement in order to send the message that climate change should be placed at the centre of the planning system alongside sustainable development. The draft PPS states that spatial planning has a central role to play in mitigating future climate change and ensuring that new developments are resilient to the changes in our climate that are already inevitable. It also states that, through planning, the local action on climate issues can be facilitated, and an attractive environment for innovation and investment can be created. The PPS, if adopted in its current draft form (which is unlikely to happen until the end of 2007), would place requirements on both regional and local planning bodies to, for example, produce carbon emissions trajectories as part of Development Plans and to require developers to meet the standards set out in the long awaited Code for Sustainable Homes (which was originally prepared in 2005 as the Code for Sustainable Buildings).
1.34 However, as has been alluded to in the discussion above, a major flaw of the planning system is that Plan making is a lengthy process. The publication of the final PPS1 supplement on climate change will come too late for many planning authorities, many of which will have already submitted or even adopted their Regional Spatial Strategies and Core Strategies by the end of 2007, in line with the Governments requirements to adopt three years from the commencement of the Planning and Compulsory Purchase Act 2004. With the possibility of no climate change policies in the first round of new style Development Plans, it is possible that many local planning authorities will leave the issue of climate change by the wayside. Some authorities, however, have embraced the climate change agenda at a corporate level and, even in the absence of planning policies, will be able to tackle climate change through other means. In the absence of climate change policies in Development Plans, and with no likely prospect that the majority of local authorities will not have adopted planning policies to deal with climate change until 2010, this thesis explores what other options exist in order to tackle climate change with immediate effect.

1.35 Summary

1.36 This section has provided a summary of the concept of sustainable development, climate change and the role of the planning system in achieving sustainable development and combating climate change, which has provided a brief background to the context of this research and sets the
scene for the detailed literature review which follows. Figure 1, below, provides a graphical representation of how the analysis of the literature that follows is inter-related.

Figure 1: Literature Map
2.0 Climate Change: A UK Perspective

2.1 In the UK, climate change will mean an increase in sea levels around most of the UK shoreline, wetter winters, drier summers, an increase in heat related deaths and cases of food poisoning and skin cancer are anticipated. The number of natural disasters caused by flooding and storms will also increase (Securing the Future, 2005). These wide-ranging climate change impacts are likely to effect the following sectors: flooding and coastal defence, water supply, agriculture and forestry, ecology, cultural heritage, leisure and tourism, the insurance industry and other economic sectors (SECCP, 1999). As an example of the scale of the problem, it has been estimated that one flood through the Thames Barrier would cost around £30billion (George Osborne MP, Shadow Chancellor, REA Conference, June 2006).

2.2 As a response to this threat, and as described under Para. 1.14, above, the UK Government has committed itself to reducing its carbon dioxide emissions by 20% below 1990 levels by 2010 as set out in the UK Climate Change Programme (UKCCP).

2.3 The Government has set out policy in order to meet its emissions reduction targets. This policy is explained in the following paragraphs.

2.5 The Energy White Paper was published in 2003. The Paper describes the three key challenges faced by the UK in terms of energy: the threat of climate change; the decline of the UK’s indigenous energy supplies; and the need to update much of the UK’s energy infrastructure.

2.6 In response to these three key challenges, the Paper sets out four key goals (p. 11):

- "To put ourselves on a path to cut the UK’s carbon dioxide emissions — the main contributor to global warming — by some 60% by 2050, as recommended by the RCEP, with real progress by 2020"
- To maintain the reliability of energy supplies
- To promote competitive markets in the UK and beyond, helping to raise the rate of sustainable economic growth and to improve our productivity
- To ensure every home is adequately and affordably heated."

2.7 The Paper states that energy efficiency is likely to be cheapest way to meet all four goals, however, renewable energy is also set to play an important part in reducing emissions.

2.8 In simple terms, there are two key ways in which emissions reductions can be achieved: energy efficiency and low carbon generation (or ‘renewable energy’).
2.9 Energy Efficiency

2.10 The 2003 Energy White Paper places emphasis on the need to achieve greater levels of energy efficiency in the UK. The Government see energy efficiency as the "cheapest, cleanest and safest way of addressing [...] energy policy objectives" (p.32) – using less energy cuts bills and reducing demand therefore putting less pressure on energy supplies.

2.11 The Government’s existing Climate Change Programme requires that around half the emissions reductions in the UK should come from energy efficiency - equivalent to around 10 MtC per annum by 2010 (DTI, 2003, p. 32). 5 MtC of this is expected to come from household energy savings, the rest from businesses and the public sector. The White Paper also suggests that further reductions can be expected from energy efficiency measures to 2020.

2.12 Low Carbon Generation

2.13 The White Paper also explains the importance of developing low carbon generation energy sources in the UK – i.e. renewable energy and combined heat and power (CHP) systems. The Government has committed itself to ensuring that 10% of electricity generation comes from renewable sources by 2010. Further explanation of renewables policy in the UK will be provided in later sections of this thesis.
2.14 As discussed in the first Chapter of this thesis, the Government recognise the essential link between sustainable development and climate change, and the key mechanisms for delivering policy aims are based in both of these paradigms.

2.15 Securing the Future (2005)

2.16 In March 2005, the Government published its new Sustainable Development Strategy: ‘Securing the Future’ (replacing the original 1999 strategy).

2.17 In this strategy, the Government has made clear the links between climate change and sustainable development and placed emphasis on the need to deal with climate change impacts (p.73):

"Sustainable development and climate change are two vitally important and interrelated challenges facing us in the 21st century. Our ability to develop more sustainably will determine the speed and degree of climate change we experience. And as the climate changes the choices available to us to develop sustainably will change".

2.18 The strategy explains how policies to reduce emissions in the UK fall under six broad sectors and provides details about current and intended policy in each of these areas:

- The energy supply industry
• Business
• Transport
• Households
• Agriculture, forestry and land use
• The public sector.


2.20 The Energy Act 2004 covers three key areas: the civil nuclear industry; sustainability and renewable energy sources; and energy markets and regulation. It implements the commitments made in the Government's White Paper (discussed above).

2.21 The key requirements of the Act are cited below in Box 2, and Figure 2 overleaf explains the Governments integrated approach to climate change.
Box 2: Sustainability and renewable energy sources

- Amend the Sustainable Energy Act 2003 (c.30) to require the Government to publish information about the development and bringing into use of new energy sources, actions taken to ensure that the requisite scientific and engineering expertise is available to develop new energy sources, and actions taken to achieve the statutory energy efficiency aim or aims designated under sections 2 and 3 of the Sustainable Energy Act. This information will be published as part of the annual report required under section 1 of the Sustainable Energy Act 2003;

- provide for publication and implementation of a micro-generation strategy;

- place a new duty on the Secretary of State and the Gas and Electricity Markets Authority to carry out their respective functions under Part 1 of both the Gas Act 1986 (c.44) and the Electricity Act 1989 (c.29), in a manner best calculated to contribute to the achievement of sustainable development;

- establish a comprehensive legal framework to support renewable energy developments beyond territorial waters and augment the regime for inshore waters;

- provide the Secretary of State with a power to specify shorter
obligation periods under the Renewables Obligation, impose surcharges to be made on late payments to the Renewables buy-out fund and to require mutualisation payments from electricity suppliers to cover a shortfall in the buy-out fund;

- **make provision regarding the mutual recognition of Northern Ireland and UK Renewables Obligation Certificate**;

- **make provision regarding the issue of Renewables Obligation Certificates in respect of electricity generated from renewable sources outside Northern Ireland and supplied to customers in Northern Ireland**;

- **enable the Secretary of State to introduce a renewable transport fuel obligation**.

Energy Act 2004 (Chapter 20):
• UK ETS
• EU ETS
• Climate change levy
• Climate change agreements
• Fiscal incentives
• Sustainable Buildings Code
• Revision of Part L of building regulations
• White Certificate Trading
• Voluntary agreements on fuel efficiency with the auto industry
• Renewables Obligation
• Energy Efficiency Commitment
• Energy Efficiency action Plan
• CHP

• Carbon Trust programmes for business and public sector
  Energy Saving Trust programmes for consumers
• Climate Change Adaptation Framework
• Emissions labelling on goods such as cars
• Providing climate change scenarios

Enable
Engage
Exemplify
Encourage

• Review of UK Climate Change Programme
• Climate Change Communications Initiative (CCCI)
• International negotiations during G8 and EU presidencies
• REEP

• Commitment on clean vehicle purchasing
• Pilot carbon off setting scheme
• Schools and hospitals building programme
• Governments targets for reducing emissions

(DTI, 2003)

Figure 2: An Integrated Approach to Climate Change.
3.0 National Versus Local Action

3.1 At this point in the literature review it is deemed appropriate to open the discussion around national versus local action on climate change in an attempt to go some way to further explain some of the problems experienced in meeting emissions reductions and in order to justify the spatial scale applied in this research.

3.2 In the UK, the household sector accounts for 32% of energy use (RCEP, 2000). The amount of energy used by households is only set to increase as the number of households increase over the coming years (Barr et al., 2005).

3.3 Most climate change science is, however, top down – a key feature of which are the global atmospheric climate models. Indeed, climate policy has conventionally been seen as the province of international organisations and agreements, and of nation states (Lindseth, 2004, pp. 325).

3.4 Agyeman (1998, pp. 245), however, agrees with the likes of Lindseth, and states that

"The actions taken in greenhouse gas abatement are never really global. They are, and will continue to be, mostly local, the result of efforts by local institutions, communities and individual consumers."

3.5 Glass (2002, p. 97) concurs:
"Local Governments are key to sustainability – they plan and control the very elements at stake (development, resource use, waste, energy consumption, and land use control)."

3.6 The recent literature finds great support for the need to frame climate change as a local issue requiring local solutions.

3.7 Lindseth (2004) carried out a desktop study, analysing the content of the documents produced by Cities for Climate Protection (CCP) to explore to what extent climate change had been framed as a local issue.

3.8 Von Secht and Hauke (2002) report on their study on the socio-economic impacts of local climate protection policies. They state that

"Local environmental policies are sometimes regarded as a threat to the socio-economic objectives of local communities [...] plans to increase environmental protection are often scrapped."

(Von Secht and Hauke, 2002, pp. 23)

3.9 They propose that the reason for this is that the primary benefits of climate policies are not felt at a local level or in the short term and hence are unattractive to local communities who do not feel the immediate benefit. They distinguish between primary effects (e.g. the long-term effects on the stability of greenhouse gas emissions) and secondary effects (i.e. those that
do not directly relate to the primary purpose of the climate policy – such as the new sales potential for the producers of biomass, job creation and local energy supply security).

3.10 Von Secht and Hauke (2002) suggest that communities are more likely to be interested in these secondary effects of climate policy. However, despite the control local authorities have over land use planning, for example, they state that climate options are often not taken on at the local level due to a lack of motivation, a lack of information, a lack of money for investment and unfavourable institutional and legal conditions (pp. 28).

3.11 They conclude that

"Not addressing the issue of climate change would mean giving away the chance to improve local economic development as well as the quality of life"

(Von Secht and Hauke, 2002, pp. 23)

And recommend that local authority officers and politicians should carefully examine the potential secondary effects of climate change measures and provide information of this to the community.

3.12 Betsill (2001) conducted a study on opportunities and obstacles to mitigating climate change in cities in the United States. Like Von Secht and Hauke, Betsill found that climate change is only likely to be re-framed
as a local issue when the reduction of greenhouse gas emissions can be linked to issues (such as air quality, job creation and enhancing alternative transportation) that are already on the local agenda.

3.13 The study finds that there is a need to “think locally, act locally”, i.e. there is a need to find a ‘local hook’ to hang the issue of climate change from. Betsill expands that there is perhaps a need for a more indirect approach to dealing with the threat at the local level in order to make climate policies more appealing to the community, for example, by exploring how reducing greenhouse gas emissions can help address other issues that are ‘more pressing’ in public opinion.

3.14 National Versus Local Action – UK Policy

3.15 Coenen and Menkveld (in Kok, 2002) explain that climate change is a classic example of multi-level decision-making; the balance between national and local powers impacts upon the room that local authorities have to move.

3.16 Brown and Dhur (in Rydin and Thornley, 2001) highlight some fundamental problems with UK policy in the context of this. In the UK, policy ‘cascades’ down from national to the regional and local levels. Regional and local level policy may attempt to push ahead of national policy and is therefore constrained rather than informed by national policy. Another difficulty is that national policy on energy and climate change is
constantly evolving in the UK. At lower level tiers of Government, the policy and decision making process is much slower and policy documents may therefore be out of date by the time they are formally adopted.

3.17 The Role of Local Government

3.18 In the UK, local authorities have no statutory obligation to produce greenhouse gas emissions reduction strategies or to implement reduction measures. This seems perverse in light of the above discussion regarding the fact that actions to reduce emissions largely take place at the local level. Flemming and Webber's research (2004) highlighted that UK policy tends to focus on initiatives through the regulator, the utilities, and then through fiscal measures (such as the climate change levy). They state that there is

"...Some specific regulation through HECA but other legislation (for example, planning and building regulations) does not address the greenhouse gas emissions reductions deemed necessary by the RCEP or do not yet address the 'step change' in energy efficiency advocated by the Cabinet Office Strategy Unit".

(Flemming and Webber, 2004, pp. 761)

3.19 Although there is no specific legislation requiring greenhouse gas emissions strategies of local authorities, other legislation exists which, for example, places a duty on local authorities to improve the energy efficiency of housing stock in the area (HECA, 1995), to tackle fuel poverty (Warm
Homes and Energy Conservation Act, 2000) and to draw up community plans (Local Government Act 2000).

3.20 It is clear that local authorities play a leading role in improving greenhouse gas emissions from its own properties through HECA, for example, and by providing leadership in their own communities. However, Allman et al (2002) found that only around 20 local authorities in England had actually committed themselves to a target for reducing CO2 emissions.

3.21 In Flemming and Webbers’ case study of Leicester, it was found that

"The implementation of greenhouse gas emissions measures in a local authority area is a complex issue with numerous individual energy consumers and national, regional and local policies influencing consumption and emissions. This complexity and lack of a single technical solution make it more difficult to implement measures to reduce greenhouse gas emissions than other local authority policies."

(Flemming and Webber, 2004, pp. 770)

3.22 Flemming and Webber concluded from their research that Leicester’s progress on emissions reductions had in the main been an ‘opportunistic, ad hoc approach’ reflecting funding availability rather than strategic priorities, due to the fact that despite having enthusiastic officers and support from local politicians for energy projects, there is a lack of clear
guidance from the Government on the role of local and regional bodies in reducing emissions.

3.23 Finally, Flemming and Webbers research (pp. 770) identified four key attributes of local authorities that have been successful in reducing emissions:

1. Strong political/Chief Officer support
2. Strong technical knowledge of the issues amongst energy professionals
3. Strong knowledge amongst other professionals
4. An increased awareness of the general public.

3.24 In 2004, Allman, Flemming and Wallace compared the results of two surveys of local authorities progress in addressing climate change. Again, it was found that most authorities were not making substantial progress, although there was a small number of authorities that have successfully prepared emissions inventories, developed strategies and implemented some adaption and CO2 reduction measures.

3.25 The study found (pp. 271) that the success of those few authorities was due to three key factors:

1. The recognition of secondary benefits of tackling climate change
2. Strong political, professional and technical support to champion climate change activities

3. A partnership approach with utilities companies, public, private and voluntary groups in order to raise the finance needed to implement measures.

3.26 The research revealed the key reasons for a lack of progress in developing climate change strategies and a fairly comprehensive list of reasons for a lack of any real action regarding climate change over and above the statutory requirements. Box x lists these reasons.

3.27 Coenen and Menkveld (in: Kok, et al. 2002) propose that in order to optimise the contribution of local authorities to the achievement of a climate neutral society, local authorities need to either endeavour to assume an enlarged role in climate policy or optimise the use of its existing powers. Coenen and Menkveld explain that the key obstacles to local greenhouse gas reductions come under four categories: political, communicative, organisational/institutional and resource constrained.

3.28 *Local Government Reform*

3.29 In acknowledgement of the fact that Local Authorities constitute an important framework for advancing sustainability, the Local Government Modernisation Agenda (LGMA) aims to enable stronger, more effective local leadership to deliver improved public services (Evans and Blair,
2004). Key elements of the LGMA were introduced through the Local Government Acts of 1999 and 2000, which included:

- A new corporate management framework under a new duty to achieve Best Value;
- New political structures to provide greater accountability for strategy and policy functions;
- A duty to prepare Community Strategies;
- A legal power to promote and improve economic, social and environmental well-being.

3.30 The 2001 Local Government White Paper *Strong Local Leadership - Quality Public Services* (DETR, 2001) sets out the Governments aims to improve public services and local leadership, building on the 1998 White Paper which introduced the modernisation agenda and the subsequent Local Government Acts (as described above) to increase accountability at the local level.

3.31 Key to the White paper is the relationship between central and local government. Central themes are: proposals for a performance framework, deregulation, enhanced community leadership, training, partnership rationalisation and enhanced freedoms.
Box 3: Reasons for Lack of Local Authority Progress

Lack of progress towards development of a climate change strategy
- No statutory requirement therefore not a priority
- Lack of accurate energy use data available at a local level
- Lack of inter-departmental cooperation – climate change is a multi-disciplinary subject
- Problems with engaging with the wider community
- Staff and skills shortages

General issues
- Lack of awareness/ interest from elected members
- Lack of awareness/ interest from other public organisations
- Lack of funding
- Lack of coordination between departments
- Lack of appropriate Government guidance
- Lack of communication between County and Local levels
- Insufficient staff/ skilled staff
- Lack of awareness/ interest from community groups and the voluntary sector
- Other issues have a higher priority
- Lack of ICT support
- Lack of awareness/ interest from local businesses
- Insufficient LA powers
- Difficulties in exploiting EU funding assistance
- Local resistance to specific schemes
- Bidding for funding uses too many resources
- Risk of litigation (e.g. planning appeals)


3.32 Summary

3.33 This section of the literature review has attempted to explain, in part, the reasons for a lack of progress towards emissions reductions in terms of community support and local authority action. It has highlighted the importance of the local context in tackling climate change and therefore justifies the spatial focus of this research.
4.0 Renewable Energy in the UK

4.1 The previous sections have explored the links between sustainable development and climate change and provided a brief description of current UK policy regarding each of these. The discussion of the Energy White Paper (2003) has described how the UK Government see increased energy efficiency and thus energy conservation, and the development of renewable energy sources as the key to delivering it’s international and national greenhouse gas emissions reductions targets.

4.2 Due to the nature of this thesis and the various resource constraints that have been placed upon it, it has not been within the scope of this research to focus on both energy efficiency and renewable energy. It is acknowledged that the two emissions reduction strategies are of equal importance if the Government’s aims are to be met, however, this research has focussed on renewable energy for the above stated reasons.

4.3 Another key reason for the focus on renewable energy is the admission by the Government, which has received much media attention, that the UK is not as far ahead as it had hoped to be in achieving it’s goal of 10% of the nations electricity supply coming from renewable sources by 2010. The Energy White Paper alludes to the fact that achieving this will be difficult (p. 45). In fact, currently only 1.5% of energy was sourced from renewables in the UK (DTI, 2003, p.55). It is evident, therefore that research in to how the demand for renewable energy can be increased is essential.
4.4 This section of the thesis therefore looks in greater detail at current UK renewables policy and, through the literature, attempts to highlight reasons for the slow uptake of this type of energy source.

4.5 Renewable Policy in the UK

4.6 First, a definition of renewable energy from the Energy White Paper (DTI, 2003, p. 44):

"Renewable electricity can be generated from wind power, wave, tidal, solar photovoltaics, hydro generation, geothermal and biomass. [...] They all produce no carbon at all, or in the case of biomass, only the carbon they have already absorbed from the atmosphere when growing. Some forms of waste are also classed as renewable under the Renewables Obligation."

4.7 Descriptions of the different types of renewable energy can be found in Chapter 5.

4.8 As discussed briefly in the previous section, the Energy White Paper stated that a shift towards energy sources and energy generation technologies, which produce little or no carbon, is essential if targets for reducing emissions are to be met. The Government Paper set out that, for the UK, low carbon generation means the development of renewable energy
sources, including CHP. The Government stated that although nuclear power is carbon free, it is uneconomic to develop this as an energy source at present. The Governments 2006 Energy Review, however, has revealed a u-turn on its nuclear position, stating that nuclear energy sources are necessary to secure the UKs energy future. The nuclear debate is a complex one and it is not within the remit of this thesis to explore this option.

4.9 Currently, the UK target for renewable energy generation is 10% by 2010, increasing to at least 30 – 40% by 2050 if 60% reduction in carbon emissions is to be achieved (source UKCCP, 2000).

4.10 Current Policy Measures

4.11 Box 4, below, details the range of measures in place to deliver on the renewables targets.
Box 4: Renewables Policy Measures as at July 2005

- The Renewables Obligation was introduced in April 2002. It places an obligation on generators to supply progressively higher levels of renewable energy over time. The cost is met by higher prices to consumers
- Exempted renewable energy from the Climate Change Levy
- A renewables support programmes worth £250m between 2002/3 and 2005/6
- A strategic framework for the development of offshore wind energy
- A new organisation within Government – Renewables UK – to assist in the development of the renewables industry
- The EU emissions trading system – providing further incentive for renewables
- The Renewables Advisory Board has a remit to provide independent advice to the DTI.

(Source: DTI, 2003, p. 45)

4.12 The impact of these measures is yet to be really felt within the UK, as they are relatively new. The Government recognises that there is still a long way to go with regards to renewables policy and in the Energy White Paper; the steps that will be taken to increase take-up of renewables are described, and include:
• The pursuit of policies to enable the intended target of generating 20% of energy from renewable sources by 2020

• An intention to review and elaborate on the Renewables Obligation strategy

• An increased fund of £60m to 2010 to support renewables technology

• A review of innovation spending across Government, including that for renewable energy

4.13 The figure below explains the Government’s renewables timeline.

Louise – Insert the renewables timeline

4.14 In 2004, the ODPM published the new Planning Policy Statement (PPS22) on Renewable Energy, which sets out the Governments national policy for land use planning for renewable energy.

LK: Intention for Climate Change PPS.

LK: Now DCLG

4.15 Box 2, overleaf, provides the key principles for planning for renewable energy as set out in PPS22.

4.16 The PPS is accompanied by a Companion Guide (ODPM, 2004a), which offers practical advice about how the policies in PPS22 can be
implemented on the ground. It sets out in detail the social, environmental and economic benefits of developing renewable energy and explains the type of planning policies that should be adopted at both the regional and local levels. It also highlights the importance of community involvement in the process of planning for renewables.

4.17 Barriers to Renewable Energy Development

4.18 The Energy White Paper highlights some key obstacles to renewables development in the UK, these include, for example:

- Often, renewable generators need to be connected to local distribution networks rather than the national network due to their small size and/or their location. Changes in the design, organisation and financing of these networks will therefore have to be revised.

- The New Electricity Trading Arrangement (NETA) has experienced some teething problems which the Government need to keep under close review as the impact has been that some renewables generators have been subject to very high costs.

- The planning system has been seen as a major barrier to renewables development – the ODPM have recently released new planning policy statements in an attempt to combat this.

- The development of renewable energy relies heavily on communities supporting local projects – consultation on the White Paper provided evidence that although there was support in general for renewables,
the public lacked knowledge of how the technologies worked in practice

- Conflicts of interest regarding national security have occurred (e.g. the effect of wind farms on radar monitoring) – this is being addressed with the MoD

- Intermittency (in terms of how intermittent the renewable energy source is, e.g. wind and solar) causes system problems concerning the security of energy supplies

- Renewable technologies are at different stages of development meaning that some are more economically viable than others.
Box 5: Key Principles in Planning for Renewable Energy

(i) Renewable energy developments should be capable of being accommodated throughout England in locations where the technology is viable and environmental, economic, and social impacts can be addressed satisfactorily.

(ii) Regional spatial strategies and local development documents should contain policies designed to promote and encourage, rather than restrict, the development of renewable energy resources. Regional planning bodies and local planning authorities should recognise the full range of renewable energy sources, their differing characteristics, locational requirements and the potential for exploiting them subject to appropriate environmental safeguards.

(iii) At the local level, planning authorities should set out the criteria that will be applied in assessing applications for planning permission for renewable energy projects. Planning policies that rule out or place constraints on the development of all, or specific types of, renewable energy technologies should not be included in regional spatial strategies or local development documents without sufficient reasoned justification. The Government may intervene in the plan making process where it considers that the constraints being proposed by local authorities are too great or have been poorly justified.

(iv) The wider environmental and economic benefits of all proposals for renewable energy projects, whatever their scale, are material considerations that should be given significant weight in determining whether proposals should be granted planning permission.

(v) Regional planning bodies and local planning authorities should not make assumptions about the technical and commercial feasibility of renewable energy projects (e.g. identifying generalised locations for development based on mean wind speeds). Technological change can mean that sites currently excluded as locations for particular types of renewable energy development may in future be suitable.

(vi) Small-scale projects can provide a limited but valuable contribution to overall outputs of renewable energy and to meeting energy needs both locally and nationally. Planning authorities should not therefore reject planning applications simply because the level of output is small.

(vii) Local planning authorities, regional stakeholders and Local Strategic Partnerships should foster community involvement in renewable energy projects and seek to promote knowledge of and greater acceptance by the public of prospective renewable energy developments that are appropriately located. Developers of renewable energy projects should engage in active consultation and discussion with local communities at an early stage in the planning process, and before any planning application is formally submitted.

(viii) Development proposals should demonstrate any environmental, economic and social benefits as well as how any environmental and social impacts have been minimised through careful consideration of location, scale, design and other measures.

(ODPM, 2004, p. 9)

4.19 Again, it is evident that the subject of renewable energy is in itself a vast subject and it is outside of the scope of this research to look in any great detail at the whole subject.
4.20 For this reason, it has been necessary to reduce the scope of the research and focus right down on just one element of the renewable energy debate. The issue of community support for micro-generation in existing homes has been selected as the focus of concern. The author could have potentially chosen any one of these policy areas as the focus for the research, however, it is felt that the importance of tackling the climate challenge as a matter of urgency is of the utmost importance, and that the findings of this thesis should have the potential to facilitate some real action on the ground. Research into the other policy areas described are of equal importance, but they require significant time and financial resource which are not at the disposal of the author.
### 5.0 The Case for Micro-Generation

5.1 Micro-generation is:

"The production of heat and/or electricity on a small scale [i.e. homes and small commercial development buildings] from a low carbon source. Various technologies can be used for micro-generation – air source heat pumps, ground source heat pumps, fuel cells, micro-CHP, micro-hydro, micro-wind, bio-energy and solar"

(DTI, 2005, p. 6)

5.2 The different types of micro-generation technologies are summarised below.

<table>
<thead>
<tr>
<th>Summary of Technology</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solar Thermal Hot Water Heating</strong></td>
<td>Solar water heating can provide almost all hot water requirements during the summer months and about 50% year round. The average domestic system reduces carbon dioxide emissions by around 400kg per year, depending on the fuel replaced.</td>
<td>For optimum performance properties need 2-4m² of southeast to southwest facing roof receiving direct sunlight for the main part of the day. The typical installation cost for a domestic plate collector system is £2,000 - £3,000 and for an evacuated tube system around £3,500 - £4,500.</td>
</tr>
<tr>
<td>Solar PV Electricity</td>
<td>The typical power output for a domestic installation is 1-3 kW (about half an annual household supply) but this depends on the number of PV modules installed. The PV system generates no greenhouse gases and</td>
<td>The average domestic system is usually between 1.5 and 2 kWP (kilowatt peak) in size and costs are around £4,000 - £9,000 per kWP. Solar tiles, which can be integrated into a roof, can also be used.</td>
</tr>
<tr>
<td><strong>Micro Wind Turbines</strong></td>
<td>save approximately 325kg of CO2 per year or about 8 tonnes over system’s lifetime – for each kWp.</td>
<td>The installation of these causes more upheaval but some consider them to give a better appearance.</td>
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<tr>
<td>------------------------</td>
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<tr>
<td>Wind turbines use the wind's lift forces to turn aerodynamic blades that turn a rotor which creates electricity. The efficiency of a domestic system will depend on factors such as location, size of home and surrounding environment but the electricity output is usually between 2.5 and 6 KWs for a typical domestic system.</td>
<td>The performance of domestic wind systems depend upon the size and type of the turbine and location. 1kW will reduce an average annual electricity bill by up to 1/3 or around 3.2MW per annum. This would save approximately 500kg or half a tonne of CO2 per year.</td>
<td>Systems up to 1kW will cost around £3,000 and larger systems between 1.5kW and 6kW will cost around £4,000 to £18,000 installed. A major constraint is the perception that the turbines are noisy.</td>
</tr>
<tr>
<td><strong>Biomass</strong></td>
<td>Biomass fuel is either specifically grown as an energy crop or utilizes the waste product from timber industries it is classed as a renewable energy source. A biomass boiler works in much the same way as a conventional gas boiler with the biomass being burnt directly in a combustion chamber and heat transferred to water via a network of pipes within the boiler itself.</td>
<td>Depending upon the size and type of system, typical costs for stand-alone room heaters are between £1,500 - £3,000 installed and for a typical 20kW pellet boiler around £5,000 installed. Running costs are based upon the type of fuel, which generally depends on the distance from the supplier.</td>
</tr>
<tr>
<td><strong>Micro-CHP/Small Scale CHP</strong></td>
<td>A CHP (combined heat and power) unit is essentially an electrical generator which has a heat recovery system located in the exhaust gas stream to utilize the waste heat from the process.</td>
<td>CHP is a very efficient technology for generating electricity and heat simultaneously. A typical domestic sized micro-CHP unit will deliver the same comfort levels as a modern boiler, whilst reducing the emissions of a typical house by 25% or 1.5 tonne of CO2 per year.</td>
</tr>
<tr>
<td><strong>Heat Pumps</strong></td>
<td>Heat pumps work by moving heat energy from one place to another and changing the temperature from lower to higher. Heat will naturally flow from a warmer area to a cooler one. A heat pump is a device which forces the heat to flow in the opposite direction, usually via a vapor compression cycle.</td>
<td>Based on current fuel prices, a ground source heat pump with a CoP of 3-4 can be cheaper than space heating fuelled by oil, LPG and electric storage heaters.</td>
</tr>
<tr>
<td><strong>Micro Hydro</strong></td>
<td>Micro Hydro schemes convert the energy in flowing water into electrical energy, usually using a turbine submerged in a river. The power available will depend on the efficiency of the generation equipment and the flow rate of the water. The flow rate depends on the volume of water in the river and the steepness of the stream.</td>
<td>The performance and size of micro-hydro schemes is very site specific with plant ranging from a few hundred watts to 100kW, with the higher range used for commercial schemes.</td>
</tr>
</tbody>
</table>

5.3 **Micro-Generation in the UK**

5.4 In 2004 there were just over 82,000 micro-generation installations in the UK, most of which were solar water heaters. The number of installations was found to be directly correlated to the level of grant funding available (EST, 2005).

5.5 The Energy Savings Trust (EST) who were commissioned by the DTI to look in to the potential for micro-generation in the UK found that by 2050 micro-generation has the potential to provide 30-40% of the UK’s
electricity needs and reduce household carbon emissions by 15% per annum (EST, 2005).

5.6 The Government’s Energy White Paper (2003) set out a vision for 2020 – where energy generation is much more diverse, is generated locally with a fuller connection to the distribution network. It states that micro-generation will play an important part in achieving the Government’s aims (DTI, 2005, p. 6):

- Reducing carbon emissions - micro-generation has the potential to cut emissions of greenhouse gases
- Ensuring reliable energy supplies – micro-generation would reduce pressure on the distribution network, reduce transmission costs and has the potential to avoid over-dependence on imports
- Promoting competitive markets – micro-generation introduces additional products to the energy markets and allows suppliers to produce more innovative energy services packages
- Affordable heating – although currently more expensive than energy efficiency measures, micro-generation has the potential to reduce fuel bills and therefore reduce fuel poverty.

5.7 Micro-generation is widely considered to be a crucial factor in tackling the climate challenge with many ‘qualitative’ benefits, in addition to those listed above. The Sustainable Consumption Round Table, for example, state that:
"qualitative impacts of micro-generation technology can be substantial, presenting a living, breathing and emotionally engaging face to energy consumption."


5.8 As discussed in Chapter 3, a major difficulty in achieving emissions reductions is the need to encourage action at the local as well as the national and international levels – if a third of emissions in the UK are from households, it is essential that individuals make changes to their energy behaviours. This issue is dealt with more closely in Chapter 6 of this thesis.

5.9 Section 82 of The Energy Act 2004 required the Government to produce a Micro-Generation Strategy in order to meet the aims of the White Paper, and in recognition of the ‘qualitative’ impacts of micro-generation technologies.

5.10 Micro-Generation Strategy

5.11 In June 2005 the Department for Trade and Industry (DTI) consulted on its draft Micro-Generation Strategy. The document set out how the development of micro-generation would have a positive impact on all four of the Governments energy policy objectives as stated in the White Paper, and described in para.5.5.
5.12 The benefits of micro-generation are well reported (DTI, 2005, and London Assembly, 2005, for example). Despite this, there is currently a very low take-up of micro-generation technology.

5.13 The DTI micro-generation consultation paper stated that the key barriers to the widespread deployment of micro-generation technologies were:

- Cost constraints
- Information constraints
- Technical constraints.

5.14 Just a month before the publication of the micro-generation consultation document, the London Assembly published a research report on domestic scale renewable energy in London (London Assembly, web, May 2005). Their report found that the key obstacles were:

- Cost
- Lack of information
- Problems finding installers
- Bureaucracy.

5.15 Further research into the specific reasons for slow uptake of solar water heating technology for the home revealed the barriers to be (London Assembly, 2005, p.10):
• Cost: financial and length of payback period
• House/ hot water systems unsuitable
• Lack of information
• Difficulties with/ need for planning permission
• Breakdown in contact with installer
• Doubts over benefit or reliability
• Problems with receiving quotes.

5.16 Some bodies expressed their concern following the publication of the draft micro-generation strategy. The MicroPower Council, for example, had reservations about the effectiveness of a strategy that does not contain quantified targets for micro-generation:

"The consultation document highlights the importance of targeted investment in new produce development. Despite this, the document contains no mention or discussion of setting targets to stimulate this investment"

(Dave Snowden, MicroPower Council, web, July 2005)

5.17 Indeed, the Chairman of the Sustainable Energy Partnership, Andrew Warren, also conveyed his disappointment with the strategy:
"CO2 emissions are up and CO2 reductions are due to be missed by one third; warm words are in abundance but there is an absence of clear targets. This is not a serious strategy. We urge a major rethink."

(MicroPower Council web, July 2005)

5.18 The Government's Micro-Generation Strategy entitled 'Power From The People' was published in March 2006 (DTI, 2006).

5.19 The Strategy states that micro-generation is essential in order to encourage people to change their energy use behaviours and to move towards reducing overall energy consumption. The objective of the strategy is to:

"Create conditions under which micro-generation becomes a realistic alternative or supplementary energy source for the household, for the community and for small businesses."

(DTI, 2006, p.4)

5.20 The Strategy sets out the Government's commitment to funding micro-generation, with £80 million allocated through the Low Carbon Buildings Program between 2006 and 2009. At the time of writing, the DTI were in discussions about exactly where this money should be directed.

5.21 The Government have not expressly addressed the concerns of the MicroPower Council, as discussed above, in the Strategy. The DTI consider that it is 'too early' at this stage to set targets for micro-generation
- the Strategy states that before targets can be set, a clearer idea is needed over which technologies will prove to be the most attractive to consumers. The DTI plan to set micro-generation targets in 2008 through the Climate Change and Sustainable Energy Act (should it gain Royal Assent). At the time of writing, no comments were published from those campaigning for targets to be set about this decision.

5.22 In addition to the funding, the DTI have set out a number of actions required to implement the Governments ambitions for micro-generation, and to address the barriers that exist to the wide-spread take-up of micro-generation technologies. These are presented under four categories:

i. **Cost Constraints:** for example; research in to consumer behaviour and factors influencing early-adopter purchase decisions, publication of exactly how the funding allocation will be spent.

ii. **Information Constraints:** for example; development of an accreditation scheme, possibility of a communications/ awareness campaign, training of planning officers and the construction industry.

iii. **Technical Constraints:** for example; Developing relationships with energy suppliers and distribution network suppliers, development of ‘smart meters’.

iv. **Regulatory Constraints:** Review of householder development consents, review of local plans.

5.23 **Schemes Currently Promoting Micro-Generation**
5.24 The primary scheme that promotes micro-generation at the national level is the Low Carbon Buildings Program, which is funded through the DTI, as described above. The Program replaces the Clear Skies and Solar PV programmes which closed in March 2006. It provides funding for a whole range of micro-generation technologies, and has recently been awarded additional monies from the Treasury to further support the program.

5.25 There are also a handful of local schemes in operation. Lewes Renewables is operated by Lewes District Council and provides capital grants in addition to those provided through the national schemes. To date, Lewes Renewables has assisted in funding for 35 households (www.lewes.gov.uk, May 2006). Similarly, the Oxford Solar Initiative, which operated during 2003-04, provided funding for 78 new solar installations in the area, which Oxford Council state has resulted in a far better informed public (http://oxfordsolar.energyprojects.net, May 2006)

5.26 This section has outlined the current situation in the UK with regard to micro-generation and briefly looked at the problems that face the mainstreaming of micro-generation technology, thus setting the scene for the research. Again, it has been described how micro-generation technology can be used in both the residential and commercial sectors. For clarification, due to resource constraints, this research will focus on the household level, although it is recognised that these technologies are equally valid for both residential and commercial uses.
6.0 **Attitude and Behaviour**

6.1 As has been discussed, UK Government have committed to significantly reducing greenhouse gas emissions. As households account for nearly a third of the UK’s energy use, it is imperative that the Government seek to reduce emissions from this sector if its targets are to be achieved.

6.2 Chapter 5 of this report has explained the important role that micro-generation technologies have the potential for in cutting emissions from the household sector, and outlined some of the barriers to the widespread implementation of these technologies.

6.3 There are four key mechanisms that the Government can use to influence peoples decisions in order to meet its environmental goals:

- Legislation;
- Economic instruments;
- Information provision;
- Marketing and influencing strategies.

6.4 In reality, a complex policy area such as this requires a combination of all four of these mechanisms in order to produce the desired results (Green Alliance and DEMOS, 2003). Previous sections of this report have described briefly the legislative framework and economic instruments in place to encourage take-up of micro-generation technologies. The
literature search has, however, found that the Governments efforts in respect of information provision and marketing and influencing strategies is in its infancy.

6.5 In recent years, the Government have increasingly recognised that the achievement of major policy outcomes rely on increased public engagement and participation, and the acknowledgement that the Government cannot do it alone (PM Strategy Unit, 2004). Alongside this is the recognition that behaviour-based interventions can be significantly more cost-effective than traditional service delivery, as well as there being strong moral and political arguments for protecting and enhancing personal responsibility. Because of this, there has been renewed interest in behaviour theory and how this can be used to develop more sophisticated policy. This chapter will look in some detail at behaviour theory and how it may be applied in policy development.

6.6 Consumer Behaviour

6.7 Behaviours are influenced by many different factors: moral, normative, emotional and social, for example, all effect the decisions we make. This makes policy development in the context of behaviour change incredibly complex, however, as the Centre for Environmental Strategy (CES) state: “Consumer behaviour is key to the impact that society has on the environment” (CES, 2005) and it is therefore something which cannot be ignored by policy makers.
6.8 Consumption of material goods (in this instance, of energy) is important to us, not just for its functional use, but for the symbolic role it plays in our everyday lives:

"An individual's main objective in consumption is to help create the social world and to find a credible place in it"


6.9 People are, however, often 'locked-in' to unsustainable consumption patterns through, for example, institutional barriers, the design of incentives schemes, inequalities in access, as well as from our habits, routines, social norms and expectations.

6.10 'Unlocking' unsustainable consumption of energy is imperative if emissions reductions targets are to be achieved. Understanding consumer behaviour is therefore a prerequisite for understanding how to encourage or motivate change; in this case, encouraging the public to purchase micro-generation technologies. Despite the complexities described above, the avenues for bringing about behaviour change are limited to persuasion and various forms of modelling (or social learning).

6.11 Persuasion

6.12 Successful persuasion is, at its most basic, is reliant on three stages:
1. The credibility of the speaker/source

2. The persuasiveness of the argument/message

3. The responsiveness of the audience.

6.13 This early model of Persuasion Theory, developed by Hovland et al in 1953, assumes that attitude change and hence behaviour change will occur throughout the process. Subsequent empirical research into persuasion theory (Abelson, 1968, Petty et al, 2002, for example) has found that learning can occur without any change in attitude/behaviour and, likewise, that attitudes and behaviours can change without any assimilation of the persuasion message. The literature has also established that people like consistency in terms of their own attitudes, motivations and behaviours, as well as in their interpersonal relationships. This concept – ‘Balance Theory’ – therefore suggests that it is possible to exploit this preference for consistency, for instance, by suggesting or highlighting inconsistency in order to change peoples attitudes and behaviours.

6.14 Rational Man

6.15 Rational Man Theory is based upon the premise that people seek to improve their welfare through an assessment of choices in terms of costs and benefits. Many of the characteristic tools of Government follow from this theory: legal punishments, price signals and information provision, for example.
6.16 Rational Man Theory is, however, subject to three major constraints, as described by the PMSU (2004):

- There are often large gaps in the information available, which poses the question of how to weigh a definite cost and benefit against an uncertain one?
- Empirical evidence has often found that peoples actual wishes and aspirations go against the claims of the model;
- The model does not take in to account a persons ‘ecology’; peer pressure plays an important in determining peoples actions, for example.

6.17 Ecology of Behaviour Models

6.18 Ecology models are often used to supplement or refine the Rational Man model. Ecology models recognise that factors compete to influence behaviours, for example; interactions with other individuals, institutions and businesses. Ecological theories can be placed under three different categories:

1. Individual level theories
2. Interpersonal level theories
3. Community level theories

6.19 Each of these models is in itself complex, and due to the nature of this report, it is only feasible to provide a brief description of each here. The
detail is sourced primarily from the PMSU (2004), CES (2005) and the Green Alliance/DEmos (2003).

6.20 Individual Level Theories

6.21 These theories are based on an understanding of behaviour by looking at the influences and processes involved in and individuals decision making.

*Instrumental and Classical Conditioning*: where behaviour change is achieved through learning new associations and/or removing existing associations. A classic example of this is Pavlov's experiment in 1927 where the association between food and bells was learnt, resulting in behaviour change.

*Cognitive Consistency and Dissonance*: where people are motivated to seek consistency between their beliefs and values. If discrepancies exist, attitudes and values are changed rather than behaviours. Commitment and Consistency is a powerful tool for behaviour change where a consumer will change their behaviour in order to act in line with their stated beliefs and values – people who make a public commitment are more likely to stick to it.

*Heuristics*: where people use mental 'short-cuts' in order to process information, which makes people prone to misunderstandings, based on the assumption that people can only process a certain amount of information and that in order to process the information and increase its usability they combine information in to 'chunks'.
Stages of Change: where peoples propensity to change is seen as a process of readiness, the stages of which are not necessarily passed through sequentially.

Theory of Planned Behaviour: where intention is the key determinant, which is controlled by a persons perception of the behaviour, the social pressure to change and the perceived control over the potential behaviour change.

6.22 Interpersonal Level Theories

6.23 These theories are based on the assumption that behaviour change is better effected by focussing on the relationships individuals have with those around them.

Social Cognitive Theory: where a persons confidence in being able to make a change is emphasised, and small, incremental steps are set in order to achieve the goal of behaviour change.

Social Networks and Support: where the influence of the people within a persons network will influence behaviour. The assumption that people will do business with people they like and trust is important.

Social Influence and Interpersonal Communication: describes how people influence and interact with each other (for example, with authority, through a feeling of guilt or debt, or where both parties stand to gain for a behaviour change).
Attribution and Balance Theories: where people explain the behaviour of others.

6.24 Community Level Theories

6.25 Community level theories are based on an understanding of how groups, organisations, social institutions and communities function.

Social Capital Theory: where social networks have value, and, those networks with higher social capital are more likely to act and take responsibility for themselves.

Diffusion of Innovations: where new ideas, products etc spread within a community or between communities.

6.26 Social Marketing

6.27 Social Marketing approaches are one example of the uses of ecological theories. The aim of social marketing is to change the individual or their environment or both, the effect of which is the gradual establishment of new social norms.

6.28 The starting point for community-based social marketing is the identification of the barriers that people perceive to exist when attempting to engage in a given activity. This, together with information about social
norms and community engagement can be used to develop policy which will encourage behavioural change.

6.29 The four keys steps are:

- Selecting the desired behaviour and identifying the perceived barriers
- Designing a programme to overcome the barriers
- Piloting the programme
- Evaluation.

6.30 The Elaboration Likelihood Model (ELM)

6.31 ELM suggests that there are two distinct types of psychological processes involved in attitude and behaviour change. Central processing is where change occurs as a result of careful consideration of the content of the persuasive message, elaboration of its implications and integration of the message into the persons attitude. This requires that the message must be personally relevant to the audience in order for them to engage with it fully. Peripheral Processing occurs when the audience’s ability to engage/motivate is low; ‘persuasion cues’ are used in order to increase the attractiveness of the message.

6.32 Again, more recent research into the ELM (for example, Pratkanis and Greenwald 1993, and Bator and Cialdini, 2000) has expanded upon this model. The importance of the credibility of the source, the careful design
of the message and knowledge of the target audience are imperative. Bator
and Cialdini, 2000 found that the characteristics of successful persuasion
are:

- Emotional, imaginative appeal of the persuasive message;
- The immediacy, directness and relevance of the message;
- The use of ‘commitments’, for example: bumper stickers, loyalty
  schemes;
- The importance of identifying ‘retrieval cues’ that will help to remind
  people of the message.

6.33 Social Learning Theory

6.34 Social Learning Theory recognises that exhortation and information
provision are the most commonly used methods of encouraging behaviour
change, but that they are also among the least effective. Information
campaigns, despite being widely used, are known to be less effective than
other forms of learning – providing people with information does not
necessarily mean they will change their behaviours. Learning by trial and
error, observing the behaviours of others and modelling our behaviour on
what we see around us is more likely to bring about behaviour changes than
information and awareness campaigns.

6.35 Control, Helplessness and Participatory Problem Solving
6.36 Again, increasing the amount of information available does not necessarily bring about changes in behaviour. In fact, it could be that misguided attempts at persuasion may increase people's sense of helplessness; people like to feel in control of their lives and choices.

6.37 Kaplan and Kaplan (1989) identified three key factors about the nature of information processing and peoples propensity to solve a problem:

- People are motivated to know and understand a situation; they dislike feeling disorientated or confused;
- People are motivated to learn, discover and explore, acquiring information at their own pace and answering their own questions
- People like to participate and play a role in what is going on around them.

6.38 Conclusions

6.39 The previous chapters have explored the need for a more sophisticated approach to policy development in terms of encouraging behaviour change and, fundamentally, helping people to help themselves. This chapter has attempted to describe the complex nature of behaviour and behaviour change theory through which the necessary changes can be achieved. In the PMSU 2004 report, the authors explain the challenges faced in developing behaviour change based policies. For example, there is an issue of public acceptability where there is a balance to be struck in policy development regarding where it is considered appropriate for the
Government to intervene and where the role of Government is less certain. Broadly speaking, it is accepted that the Government have a legitimate intervention role where there are significant external factors influencing behaviour. There is also the possibility that behavioural change policies can widen class differences and inequalities.

6.40 It is now widely accepted by the public that the Government have a central role to play in improving public services and in achieving environmental goals. It is understood that a key method to achieve this is policy that encourages behaviour change.

6.41 Behavioural change psychology is, as demonstrated in this chapter, in its infancy in terms of policy development. There have been few attempts to undertake a comprehensive understanding of the knowledge base and as such, policy has been developed on a somewhat ad hoc basis. The PMSU (2004, p. 67) state that:

"There is an evident need to strengthen our theoretical and empirical understanding of what drives behaviour and behaviour change, just as important will be the wider testing out of policy tools to develop a more sophisticated tool kit for policy makers."

6.42 It is clearly not within the remit of this report to attempt the kind of study described above. However, this thesis does use the behaviour change theory and potential applications of this theory in an attempt to develop
ways in which the public can be motivated to purchase micro-generation technologies.

6.43 The next Chapter will look in some detail at the evidence for behaviour change in relation to climate change.
7.0 Domestic Consumers and the Potential for Change

7.1 Over recent decades, the pervasive feature of many western societies has been the contrast of slow growing or static populations against the sharp rise in the total number of households, which have diminished in size (Tanner, in Noorman and Uiterkamp eds. 1998). This trend has significant implications for resource use and the generation/disposal of waste.

7.2 Two elements have been revealed in the literature so far — the importance of community support for local projects and the potential for renewable energy at a domestic scale. The primary focus of the research was on public attitudes to, behaviour regarding, and the potential to change these behaviours concerning domestic scale renewable technologies — or ‘micro-generation’.

7.3 As discussed above, the literature finds that there is a need for local action to combat the impacts of climate change. Previous sections of this report have highlighted what kind of barriers exist to the widespread take-up of micro-generation, and Chapter 6 has looked specifically at the behaviour change theory.

7.4 This following section will look in more detail at the literature to explore the need to change the attitudes and behaviours of householders, and the potential for this change. Little academic research has been undertaken on this subject in relation to micro-generation. For this reason, the following
sub-section draws largely upon previous research on the whole climate change issue and energy efficiency in particular.

7.5 Links Between Attitude and Behaviour

7.6 The previous sections of this literature review have highlighted some of the barriers to the reduction of greenhouse gas emissions. The IPCC (2001) state that

"The successful implementation of greenhouse gas mitigation options needs to overcome many technical, economic, political, cultural, social, behavioural and/ or institutional barriers which prevent the full exploitation of the opportunities of these mitigation options."

7.7 However, as has already been mentioned, national policies have tended to focus on technical barriers rather than changes in behaviour. The PIU (2002) report on energy policy in the UK

"[...] Demonstrated the neglect of behavioural strategies to increased energy conservation in the home and made little reference to the need for householders to reduce energy consumption and adopt alternative behavioural strategies to conserve energy"
7.8 Both the PIU and RCEP have argued that government targets for domestic energy usage are not likely to happen without shifts in attitude and behaviour (Bar et al., 2005).

7.9 The non-technical barriers are a major obstacle to reducing greenhouse gas emissions; the attitudes of the public to energy efficiency and renewable energy are vital to improving domestic energy consumption (Flemming and Webber, 2004).

7.10 In light of this, Kok et al. (2002) raise the question: Is removing the barriers going to be enough? They propose that perhaps societal ‘trend breaks’ (substantial shifts in societal developments) are also necessary if a climate neutral society is to be achieved.

7.11 As part of a wider Dutch research programme, Kok et al. explore the need for such societal trend breaks. They state, as has been discussed previously, that whatever goals are set by politicians at international and national levels, achieving these goals will be dependent on the day to day decisions of individuals who may be sceptical and ignorant of the issues surrounding climate change.

"[Achieving emissions reductions] mainly depends on the acceptance and willingness of many businesses, local institutions and individuals to contribute to the transitions. This in turn will depend on the perceptions
these various groups have on their contribution to the problem and of their own and other's responsibility and possibilities to address it.”

(Kok, et al., 2002, p. 41)

7.12 Kok et al explain that some research into the attitudes to and public support for climate policy and contemporary practices of various groups in society has been undertaken. This research is incomplete and several different approaches have been undertaken, however, Kok et al conclude that

“The overall picture shows a significant difference between declared public support for climate policy and daily practices and routines.”

(Kok, et al., 2002, p. 47)

7.13 They state that public opinion is so important in this context because it drives the political process and is crucial to changing future consumption patterns. Kok, et al., further explain that the perception of personal responsibility may be the most important explanation for the gap between attitude and behaviour.

7.14 Gatersleben, Steg and Vlek undertook research, published in 2002, which assessed the determinants of environmentally significant consumer behaviour, based on the theory that “measures of pro-environmental behaviour in psychological studies do not always reflect the actual environmental impact of a person or household” (pp. 335).
7.15 Gatersleben, Steg and Vlek found, through two large-scale surveys of Dutch households, that those who state that they behave pro-environmentally do not necessarily use less energy. They also found that pro-environmental behaviour is closely linked to attitudinal variables and that actual energy use has much more to do with variables such as income and household size.

7.16 Aarts (1999) cites Breemhaar et al. (1995) who showed that consumers assess their options based on their values (e.g. freedom, autonomy, health, personal development, social appreciation, etc.) and that environmental issues such as climate change are rarely included in these sets of values. Aarts continues, in line with discussions in Section 5, above, that the public does not respond to the issue of climate change as such, but to environmental issues as a whole. He finds that although there is public support for addressing climate change at the level of attitudes – this does not roll out into day-to-day actions.

7.17 Poortinga, Steg and Vlek (2004) study the role of values in household energy use by using the concept of quality of life. They state that values represent important lifestyle goals or set standards. These values then shape attitudes and, consequently, have impacts on behaviour. Their research aims to fill the gap that exists in the literature concerning the link between values and household energy use.
7.18 Poortinga, Steg and Vlek conducted a postal survey of 2000 households in the Netherlands and had a response rate of around 23%. Household representatives were asked; to indicate how important certain quality of life indicators were to them; the level of concern about certain environmental issues; questions about specific beliefs about global warming; questions about level of support for climate policies; the extent to which people would be willing to make energy saving changes in the home, and; questions about actual energy behaviour in the home.

7.19 The research found that there was a strong link between the extent of environmental concern, environmental behaviour and basic human values. However, it is concluded that although this strong link exists, environmental behaviour is also determined by various contextual factors such as individual opportunities and abilities.

7.20 Who will break the Trend?

7.21 Kok et al. present the findings of three Dutch research projects aimed at exploring the potential for change within the household sector.

7.22 Perspectives Project

7.23 The Perspectives Project involved a practical study investigating the possibility of reducing energy consumption through information induced behavioural change of consumption patterns. Twelve households
participated in a two-year project that aimed at reducing energy consumption by 40%. The three key outcomes of the project were that the householders considered that the lifestyle changes involved were a positive experience, that initially the additional attention to energy whilst shopping was a burden. Attitudes to the restriction of mobility on order to save on energy were negative.

7.24 *Greenhouse Programme*

7.25 The Greenhouse Programme was

"*Designed to reach an integral assessment of the medium term potential for reducing the energy requirements and greenhouse gas emissions of households*"

(Kok, et al., 2002, p. 97)

7.26 The programme involved participants receiving a package of reduction options aimed at reducing household CO2 emissions by 50%. This included both technical and behavioural aspects. The study found that householders were willing to make some changes to their household activity following the programme, for example, switching to energy efficient devices. However, participants were reluctant to stop using the private car for transport and to do without appliances such as freezers and driers.
7.27 Homes

7.28 The Homes project looked at the concept of sustainable household metabolism. The study took a multi-disciplinary approach looking in to possibilities and constraints for realising a more sustainable household consumption pattern.

7.29 The project found that householders might be prepared to accept moderate energy reductions (e.g. between 10 and 15%) in order to achieve a more sustainable society. Householders stated that reductions of up to 25% were unlikely to adversely affect their quality of life.

7.30 Summary of Findings

7.31 Kok, et al. summarise that the findings of the three studies enable them to draw some conclusions about the potential for energy reduction at the household level. The Perspectives project, for example, showed that there is real potential for change in energy behaviour in Dutch households.

7.32 It was concluded from this research that societal trend breaks are required if energy consumption at the household level is to be significantly reduced. They recognise that there are opportunities for changing consumption patterns in a climate neutral direction, but state that more than just goodwill from householders is required:
"The achievement of climate neutral consumption presents a major challenge, for society as a whole to strive for this goal, and for national and local government to develop strategies and secure support for organising society in an environmentally sound way."

(Kok, et. al., 2002, p. 105)

7.33 Box 6 lists the three strategies that the researchers propose should be implemented in order to push households in a climate neutral direction.

**Box 6: Strategies to Encourage Climate Neutral Households**

1. "Make available general information about the climate system and the role of energy consumption as well as information about specific energy saving options at a technical and behavioural level

2. National and local government should stimulate and implement indirect strategies to change household behaviour. Direct strategies are difficult and ineffective because of the enormous number of households and the pluriformity of the household sector

3. Local and national government should adapt the general cons for household consumption in a climate neutral direction. The physical infrastructure (houses, roads, transport and energy systems) should be renovated and restructured to facilitate an agreeable lifestyle and climate neutral behaviour."

(Kok, et. al. 2002, p. 104-5)

7.34 Householders and Micro-Generation
7.35 As this section has shown, previous research has focussed on encouraging energy efficiency. Until very recently, little research has been undertaken regarding householders and the widespread implementation of micro-generation, and, in fact, the research that has been undertaken has come from the public sector rather than from academia. It is noted that, of course, if householders are able to produce their own renewable energy, there will be no need or concern over the amount of energy used, as the energy will be ‘clean’. However, the literature on the potential for domestic scale energy efficiency has perhaps provided some evidence about the extent to which the attitudes and behaviours of householders towards the installation of micro-generation technology in the home could be changed.

7.36 The remainder of this section will look specifically at the literature that does exist on the potential to change the attitudes and behaviour of householders to the installation of micro-generation technology in the home.

7.37 The Green Alliance’s micro-generation manifesto (2004) puts forward that:

"Despite the evidence from opinion polls of widespread public support for policies to tackle climate change, the signs are that in practice the majority of consumers remain disengaged, energy efficiency policy meets with apathy; wind farm proposals meet with antagonism from a vocal minority. Government has yet to confront head-on the challenge of engaging the public, both as citizens and consumers. It is the belief of the Green Alliance
that both apathy and antagonism can be overcome through micro-generation. Micro-generation means building climate change solutions into everyday life, giving individuals and communities contact with, and control over, the generation of green energy.”

(Green Alliance, 2004, p. 4)

7.38 The Green Alliance state that, as well as meeting Government targets for reducing the use of fossil fuels and tackling fuel poverty, for example, micro-generation is a powerful driver for behaviour change. They believe that as more micro-generation technologies are installed, conversation will be stimulated and householders will be encouraged to think about how their own energy actions impact upon climate change. As discussed in Chapter 5, this has since been reflected in the new micro-generation strategy.


7.40 In January 2003 the results of a national survey on ‘Attitudes to Renewable Energy’ (commissioned by the DTI) were published. The objective of the research was to identify how the public form opinions on renewables and what factors influence these opinions. The data was collected through the use of 20 discussion groups with members of the public.

7.41 The research found that there was generally a low awareness of the term ‘renewable energy’, however, once prompted, most people knew of at least one type of renewable technology. In general, participants were favourable
to and supportive of renewable energy, with the exception of the pre-family group in Preston, although they could not give any specific reasons for their scepticism. Solar power was the most accepted form of renewable energy. Participants were unclear about how biomass was defined as environmentally friendly and were unsure of how it operated.

7.42 Participants main concerns were over visual impact, particularly in terms of wind farms. Noise and electrical interference were also seen as disadvantages of renewable energy. Impacts on house prices, the effects on the tourism industry and on the natural environment were also raised as concerns.

7.43 The report concludes by making recommendations based on the findings of the discussion groups:

- Inform the public on the full range of renewable technologies, through the use of practical examples and in plain English
- Address the publics main concerns (visual impact, noise disturbance and emissions from biomass plants)
- Promote the benefits of renewable energy to the public
- Provide incentives and recompense; and
- Promotional campaigns which should utilise a mix of media and links to websites.

7.44 London Renewables: Survey 2003
7.45 In 2003, London Renewables commissioned research on the attitudes to renewable energy in London. There were four phases to the mixed methods approach of the research; an electronic survey emailed to relevant stakeholders (including local planners, councillors, construction companies and property investors, for example); focus groups with a number of London residents; a survey of over 500 London residents; and a series of stakeholder workshops. The focus of this research is on the householders themselves, and so obviously, this section will focus on the householders’ responses rather than the opinions of the other stakeholders.

7.46 London residents were asked questions to gauge the level of awareness and acceptance of renewable technologies. The research found that the vast majority of Londoners had heard about both solar and wind technologies and that most felt that they knew at least a little about how they work. It was found that residents felt that they lacked more detailed knowledge about the practicalities of these technologies, for example, costs and how they are installed. It was found, however, that residents were far less familiar with renewable sources such as CHP, organic waste incineration and anaerobic digestion, with the majority having never heard of them or having heard of but having very little knowledge.

7.47 In terms of acceptance of renewable technologies in principle, it was found that 81% believe that it is a ‘good idea’ or a ‘very good idea’. The percentage of residents who thought that renewable energy was a very good idea in principle was found to rise according to traditional stereotypes –
white British residents, those aged between 35 and 54, home owners and those who were ‘environmentally active’. Support for specific technologies was also found, and the level of support was commensurate with the level of awareness of the different technologies, for example, those who knew little about technologies such as CHP and anaerobic digestion were unable to make an informed decision about whether or not those technologies were acceptable.

7.48 When they were asked specific questions about current energy behaviour in the home, it was found that although residents are aware of their energy use in the home, it is not something which is thought about every day or that translates in to habitual changes – thinking about the need to save energy does not mean that residents will actually try to save energy in practice.

7.49 Residents were also asked about their reactions to the potential development of solar and wind technologies in their local area, in recognition of the potential Not In My Back Yard (NIMBY) reaction to such technologies. Little evidence of NIMBYism was found in the case of solar energy with 81% supporting solar development in principle, which decreased slightly to 76% in residents’ local areas. It is noted that there was a lack of specific concerns regarding the installation of solar panels with 43% of residents having no concerns about it at all. The two key areas of concern were cost (19%) and the perception that the lack of sunshine in London would affect the reliability of solar technology (19%). Only 5% were found to be concerned about the aesthetics of solar panels.
In terms of wind power, however, an element of NIMBYism was detected with 75% of residents supporting wind technology in principle but only 58% supportive of wind development in their local areas. Despite there being more concerns about wind power in local areas, one third of residents stated that they did not have any concerns at all (compared to 43% for solar). Lack of space was a key concern (25%), followed by aesthetics of the installation (16%). Noise, reliability, safety, size, and cost were other areas of concern. Many of the residents did not think that residential areas were suitable for wind turbines. It is noted, however, that this research did not distinguish between domestic scale micro turbines and the larger scale turbines.

The London Renewables research is one of the few pieces of research that has been undertaken on public opinion and renewable energy in the UK. Although it does not concentrate specifically on micro-generation, it does provide some indications about the level of acceptance of the different types of renewable energy and of the sorts of concerns that the public have on these technologies. The London Renewables research therefore provides evidence for the research that has been undertaken in this thesis and the data collected by London Renewables can be used to validate and confirm the data collected in this research on householders and micro-generation technologies.

London Assembly: Renewable Energy Survey 2004
7.53 In 2004, the London Assembly commissioned ORC International to conduct a telephone survey of 601 homeowners in order to canvass the opinions and attitudes of Londoners towards renewable energy options. This survey found very similar results to the London Renewables research (above). Whilst few people were familiar with the term ‘renewable energy’ and were not generally well informed about the different technologies, again, it was found that most people were most familiar with solar options. Once more, there was lower recognition of micro wind turbines and very low knowledge of green tariffs.

7.54 It was found that there was strong support for renewable energy. The 55-64 age group were the best informed, and it was also found that men were generally better informed than women.

7.55 Around 20% of respondents were ‘likely’ or ‘fairly likely’ to consider installing solar power options. It was considered that the lack of knowledge about micro wind energy impacted on the likelihood to consider installation.

7.56 Interestingly, it was found that, although the 55-64 age group were the best informed, it was the 25-34 age group who were more likely to consider installation. There were also differences to be found across the different socio-economic classifications.
7.57 Cost was found to be the key discouraging factor when considering renewable energy installations, although there was a clear lack of knowledge about actual costs. Other concerns raised were about the aesthetics of renewable energy and concern about the reactions from neighbours.

7.58 This research resulted in the document *Power to the People*, published in May 2005, by the London Assembly’s Environment Committee, which sets out the findings of the research, identifies the key barriers and makes recommendations for action.

7.59 **Summary of Findings**

7.60 The preceding analysis of the various surveys relating to renewable energy and public opinion has highlighted that there are several key variables, for example:

- Education (in terms of level of academic educational attainment and exposure to information programmes)
- Age
- Income
- Type of technology
- Cost of technology

7.61 Certain key barriers have also been identified in the literature review:
• Lack of knowledge of the types of technology and how they work
• Lack of knowledge of the costs of technology
• Concerns over aspects such as visual amenity, NIMBYism, noise and reliability of the technologies.

7.62 These findings have all been used in developing this thesis.
8.0 Marketing and Influencing Strategies: The Theory

8.1 As has been discussed in previous chapters, marketing and influencing strategies are seen to be key to motivating behaviour change (PMSU, 2004, CES, 2005) in modern policy development.

8.2 Marketing (or 'public relations') is:

"the management function which evaluates public attitudes, identifies the policies and procedures of an individual or organisation with the public interest, and plans and executes a program of action to earn public understanding and acceptance"


8.3 In other words, marketing involves identifying the needs and wants of the consumer, and offers products and services which will satisfy those demands. According to Cutlip, et al (1994), the principal tools of public relations are research together with sound and ethical communications. The activities of public relations personnel are varied and include, for example:

- Publicity; the most visible aspect of the role
- Advertising; through various media
- Public affairs; building and maintaining mutually beneficial relationships
- Press agentry; creating newsworthy stories to attract media attention and gain public notice
• Issues management; a proactive process of identifying, evaluating and responding to policy issues.

8.4 It is widely accepted in the marketing world (Cutlip, et al, 1994, and Gregory, 2003, for example) that PR starts with the senior management of an organisation, and that long term success in marketing relies on a commitment to and participation in public relations, incorporation of public relations perspectives in policy, the necessity of two way communication and the presence of clearly defined goals and objectives.

8.5 Communication and Public Opinion

8.6 In the modern day message-crowded environment we live in, it is imperative that in order to compete, marketing personnel must succeed in:

• Gaining the attention of the target audience
• Stimulating interest in the content of the message
• Building a desire to act upon the message
• Directing the action of those who chose to behave consistently with the message.

8.7 Figure 3, below, provides a diagrammatic representation of a basic communication process model, as developed by Schramm. Key to this model is the recognition that communication is a two-way process, where exchanges of information are necessary in order to ensure that the message
that has been received by an individual is the same as the message that was originally intended, and that the message has had the desired influencing effect on the receiver. The model confirms that:

"Communication is a reciprocal process of exchanging signals to inform, instruct, or persuade, based on shared meanings and conditioned by the communicators' relationship and the social context"

(Cutlip, 1994, p. 229).

![Communication Process Model](image)

Figure 3: Communication Process Model. Cutlip et al (1994)

8.8 Cutlip furthers this by explaining that the process of informing involves four steps: 1) attracting attention to the message, 2) achieving acceptance of the method, 3) having the message interpreted as intended, and 4) getting the message stored for later use. The process of instructing, however, involves a further step in the process, 5) stimulating active learning and practice. Persuasion requires one further step of 6) accepting change –
yielding to the wishes of the sender. Clearly, the achievement of the outcomes of informing, instructing and persuasion are reduced with the introduction of the fifth and sixth stages. The key elements of the model are briefly discussed below.

8.9 The Sender

8.10 Cutlip explains that there are two arguments in the literature regarding the characteristics of the source of the message. One school of thought puts forward that the more credible the source of information, the greater the value of the information to the receiver. The other school of thought argues that, in the long term, it does not matter who the source of the information is as this has no impact on the retention of the content of the message.

8.11 The Message

8.12 Many scholars agree that "meaning is in people, not words", i.e. different people will interpret a message in different ways, attributing different meanings to it and reacting in different ways. The characteristics of a message can therefore have powerful effects, and it is not always simple to define 'rules' that apply in all communication situations. Generally, it is accepted that if the receiver is likely to disagree with the message, both sides of the argument should be presented, with no omissions. If the audience is likely to agree with the message, it is acceptable to only present one side of the argument.
8.13 The Medium

8.14 Historically, it has been considered that face to face communication is the most effective method for channelling a method. However, this is not always a practical (or cost effective) medium, particularly when the audience is a large one. An understanding of media and media effects is a prerequisite for deciding on the most appropriate means of communication. It is not feasible to explore all the different media channels here.

8.15 The Receiver

8.16 Public relations programmes often position the recipients of a message as a monolithic, passive entity, despite evidence of the necessity of a two-way communication. Messages need to be directed for different audience segments and enable audience participation wherever possible.

8.17 The Relationship Context

8.18 The communicator’s relationship affects many aspects of the communication process. Communication in relationships helps form assumptions about others in the relationship; communication reduces uncertainty about potential outcomes and sets the scene for future exchanges.
8.19 The Social Environment

8.20 Communication both affects and is affected by social setting. For example, individuals often form groups to achieve a desired outcome. Communication with a group will very much depend on the size of the group, the characteristics of the people within the group, the purpose of the group and the groups effectiveness at making decisions.

8.21 Summary

8.22 This section has briefly described the theory behind marketing and public relationships which has been shown to be an essential factor in the development of policy which aims to motivate behaviour change.

8.23 There is very little literature on communication which motivates attitude and behaviour change in relation to climate change policy (and none has been identified which specifically relates to micro-generation). The first major attempt at this was in the form of research undertaken by Futerra, backed by research conducted by Darnton (2005). The result of this research, which was sponsored by DEFRA, the DTI and the Energy Savings Trust, was a proposal for a UK Communications Strategy on Climate Change, published in February 2005. The remainder of this section looks in some detail at this research and the actions that have resulted from its publication.
8.24 A UK Climate Communications Strategy

8.25 Futerra’s research aimed at finding methods to communicate climate change in order to change peoples attitudes. It clearly states that influencing behaviour change is outside of the remit of the research, an acknowledgement of the fact that attitude change does not necessarily lead to behaviour change, as has been discussed elsewhere in this thesis. Changing attitudes is, however, in itself a complex task and has important consequences for generating support for policy development and indeed opening the door for behaviour change.

8.26 The result of the desk top research under taken by Darnton (2005) together with the experience of the Futerra communications team is a proposal for a UK Climate Change Communications Strategy, summarised by the model (overleaf)

8.27 The key elements of the model are described here:

- Big, Hairy, Audacious Goal/ Statement: This should cover an extensive time frame, be written in clear, compelling language and be consistent with the values and purpose of the organisation.
- Local/ National Communications: These are inextricably linked; local communications should be supported by a national campaign.
- Hard Links: Hard links, such as the proposed energy efficiency labelling of products, should be promoted along side the BHAG and website.
- Soft Links: The use of appropriate terminology, tone and imagery should be employed.

- Website: A national web ‘portal’ should be developed providing information to the public on climate change.

8.28 The Futerra report, prepared for the Governments Climate Change Working Group, has facilitated the development of the UK Climate Change Communications Initiative, which includes a funding scheme for local climate communications as well as good practice information on communicating climate change. This initiative is still in its infancy and so it is too soon to ascertain its level of success at this time.
9.0 Summary of Thinking

9.1 Despite climate change being a global issue, the literature review has explored the necessity of framing it as a local one as it is at the local level that the majority of climate actions take place. Households account for nearly a third of energy use, and with the number of households only set to rise, it is a sector that needs addressing sooner rather than later.

9.2 The literature review has explored methods for which greenhouse gas emissions can be reduced at the household level, and specifically the role of micro-generation.

9.3 Several barriers to the take-up of micro-generation have been identified, including: cost, information, technology and bureaucracy. The key methods by which take-up of micro-generation technologies can be encouraged are through the introduction of new legislation, economic instruments, information provision and marketing/ influencing strategies.

9.4 It is really only the provision of information and marketing/ influencing strategies that can take place at the local level with any great impact; introducing new legislation and economic instruments are generally beyond the scope of Local Authorities.

9.5 Key to this then, is the theory of behaviour and behaviour change which can be brought about through such information provision campaigns and marketing/ influencing strategies. The literature has looked in some detail
at the nature of human behaviour change and the evidence for this in relation to climate change. It was found that there was very little research on the propensity for attitude and behaviour change specifically in relation to micro-generation in the UK, although it was found that the knowledge base on behaviour change in policy development was growing in the wider policy arena.

9.6 In light of the findings of the literature review, this research explores the potential for take-up of micro-generation at the household level, with particular reference to the need for policies that bring about attitude and behaviour change.
10.0 Research Strategy, Design and Method

10.1 A number of factors need to be taken into consideration before undertaking any social research. These factors include issues of the relationship between theory and research, epistemological issues, ontological issues, the different types of research strategy as well as issues of how values and practical issues affect research. This section will briefly explain how the research undertaken has taken account of these issues and how the research design and research methods have been developed. Figure 4 provides a graphical representation of the research process.
10.2 The primary research conducted as a part of this thesis employs the quantitative research strategy which uses post-positivist claims for developing knowledge (i.e. cause and effect thinking).

10.3 The research design employed in this thesis is a Cross-Sectional Social Survey. The social survey has both strengths and weaknesses in terms of its performance against the criteria described above:

- Reliability and measurement validity are primarily related to the quality measures that are put in place to consider the concepts of interest.
• Replicability is likely to be present in terms of the procedures that are set out for selecting respondents, designing measures of concepts, administration of the research method and for analysis of data.

• Internal validity is considered to be weak in social surveys. Establishing causal direction from the resulting data is often problematic as the social survey produces associations rather than findings from which causal inferences can be made.

• External validity is often strong in this research design, specifically when the sample is randomly selected.

• Ecological validity is often jeopardised because the research method itself interferes with the ‘natural habitat’ of the participants.

10.4 The Quantitative Research Process

10.5 Figure 6, below, outlines the main steps involved in undertaking quantitative research, although, as Bryman (2001) states, the model is rarely found to exist in this ‘true’ form as research is rarely this straightforward and linear.

10.6 Figure 6 starts with Theory which implies that a broadly deductive approach to the relationship between theory and research is taken. The figure describes that a hypothesis is deduced from the theory and then tested, however, Bryman explains that this is not always the case in quantitative research (it is more likely to occur in experimental designs).
Instead, theory can act loosely as a set of concerns that guides the researcher. Indeed, this is the case in this particular research.

1. Theory
2. Hypothesis
3. Research Design
4. Measures of Concepts
5. Select Research Site(s)
6. Select Sample
7. Administer Research Method
8. Process Data
9. Analyse Data
10. Findings/ Conclusions
11. Write Up

Figure 6: The Process of Quantitative Research. Adapted from Bryman (2001).

10.7 **Purpose and Objectives of the Research**

10.8 This section explains the purpose of the research undertaken (i.e. its aims) and the objectives that were set in order to meet those aims.

10.9 **Purpose Statement**

10.10 The purpose of this study was to explore the attitudes and behaviours of householders in Woking to climate change, renewable energy and in
particular, micro-generation, and the factors that affected these attitudes and behaviours. This evidence base was used to explore methods to encourage take-up of micro-generation technology in line with the findings of the literature review regarding behavioural change theory and communications.

10.11 Focus of the Research

10.12 The research set out to answer the following seven questions:

1) What is the level of appreciation of climate change and its causes amongst Woking householders?
2) What is the level of acceptance for renewable energy and in particular, micro-generation?
3) Does the level of acceptance vary with the particular type of micro-generation technology, and if so, how?
4) How does the level of acceptance vary between different groups of households?
5) Is there a link between attitude and behaviour?
6) What is the potential for take-up of micro-generation technologies amongst householders?
7) What steps can Woking Borough Council take in order to encourage the widespread implementation of domestic scale micro-generation technology within the Borough?
10.13 Research Method

10.14 As discussed above, this research was conducted from the perspective of a quantitative research strategy and employed a cross-sectional research design (the social survey). Social surveys can take several forms; questionnaires and structured interviews are the most common. The structured interview was chosen as the research method for this research. The pros and cons of this method are described below.

10.15 Structured, Face to Face Interviews

10.16 A structured interview requires the administration of an interview schedule to participants. The aim of this is to ensure that all interviews are given in exactly the same way. Responses can be aggregated because participants respond to identical cues through an interview schedule that offers a fixed range of (closed) answers. The structured interview is a popular method of data collection in the social sciences as it requires the interviewer to both ask the questions and to record the answers. The structured interview has two key benefits:

- Standardising the administration of questions and the recording of answers means that variations in responses will represent 'true' variation rather than variations in the interview context.
• Closed questions (which, for example, require a tick in a box) reduce the possibility of misinterpretation and help to avoid problems with coding, which in turn assists with data processing.

10.17 The interview schedule used in this primary research can be found in Appendix 2.

10.18 Structured interviews can be conducted either face to face or over the telephone. Although telephone interviews are generally quicker and cheaper to conduct, in this instance, it was considered that face to face interviewing would be more appropriate as it has the advantages of the interviewer being able to observe the participant and respond to signs of puzzlement or unease. Face to face interviewing also enables the interviewer to target specific people (in this case home owners). This method also enabled the interviewer to show flash cards to the participant.

10.19 Bryman (2001) explains that there are several ‘rules’ that must be observed when conducting structured interviews. Prior to the interviews taking place, the author held a briefing session with the team of interviewees, where a background to the research was given and the schedule was explained in detail. The key issues are described below.

• Before the interviews take place, it is essential that the interviewer is fully conversant with the interview schedule in order to avoid error.
• The research should be introduced to the participant in order to provide a credible rationale for the research as well as provide a reason for the participant giving up their valuable time.

• Establishing rapport with the participant at an early stage is important in order to ensure that answers are given ‘freely’.

• It is important to adhere to the order of questions as set out in the schedule to avoid questions being skipped and to ensure that all participants are exposed to information at the same time.

• The answers given should be recorded in an exact way in order to avoid embellishment or misunderstandings which will lead to error.

• Interviewers were warned to be careful when probing for answers to questions when they are not initially forthcoming as such probing may influence the answer given.

• If interviewers are to provide cues/ suggest possible responses, it is important that all participants receive the same prompts.

10.20 In addition to the ‘rules’ described above, Bryman (2001) explains that the structured interview comes with three key limitations:

• The characteristics of the interviewer (race, gender, socio-economic status) may impact on the participants replies in some instances. This is really an unavoidable limitation, and the only way to deal with this issue is to ignore it.

• It has been necessary to make the assumption in this research that the issue of interviewers and interviewees perhaps not sharing the same
meaning of certain terms of reference is not an issue here. The flash card and the wording of the questions sought to reduce the impact of this as much as possible.

- The perceived social desirability of answering questions in a certain way can lead to ‘response sets’ which describes how people often respond to a series of Likert-style questions in a consistent manner. Bryman explains that this may also be due to ‘acquiescence’ - the yeasaying or naysaying effect.

10.21 The author has made every reasonable effort to ensure that the ‘rules’ of conducting structured interviews were adhered to and to reduce the impact of the limitations as outlined above.

### 10.22 Credibility of the Research

10.23 A described previously, there are certain criteria that apply to such quantitative research strategies. This research was developed to ensure that the requirements of these criteria were met:

- **Reliability** is concerned with the question of whether or not the results of a study are repeatable; the consistency of measures employed to tap in to concepts. The interviews were developed to ensure that:
  - The measures of concepts would be stable over time
  - Problems with internal reliability (as described by Bryman, 2001, p. 71) were avoided by not requiring multiple indicator measures
- Problems with inter-observer consistency were overcome through asking closed questions wherever possible.

- Replicability, closely related to reliability, is concerned with the ability of other researchers to replicate the method used. The structured interviews were designed in such a way (through the interview schedule) that the same results and observations could be achieved by other researchers, as can be seen in Appendix 2.

- Validity is concerned with the integrity of the conclusions that are drawn from the research and, in particular, ensuring that the measure devised of a concept reflects that concept. This was not a significant issue in this research as ‘concepts’ were not specifically employed.

10.24 Data Processing and Analysis

10.25 Responses were recorded on the interview schedule at the time of interview by the administrator. The results were transferred on to an SPSS database within a few days of the interviews taking place to ensure understanding of the points made and their contextual meaning. The results are presented in Chapter 12.

10.26 Sampling

10.27 Figure 6 shows that two of the key stages in the quantitative research process are selecting the site and sampling. Woking was chosen as the survey ‘site’ for this study. A brief background to Woking Borough
Council and its climate change and micro-generation track record are described below. This sub-section looks briefly at the sampling method employed in this study.

10.28 The Site: Woking Borough

10.29 Woking Borough Council is situated in the South East of England, covers around 65KM² and services a population of around 89,900 (WBC web, May 2006).

10.30 The Council has made significant achievements in relation to Climate Change. Some of these are described in Box 8.

Box 8: Woking Borough Council's Energy Initiatives

- "The environment is the second priority only to affordable housing
- The Council formed two special purpose vehicles (companies) in 1999 to further the energy and environmental objectives – Thameswey Ltd and Thameswey Energy Ltd.
- Corporate Energy Efficiency Strategy in 1990/91 to achieve 40% reduction in energy consumption in 10 years – by March 2004 WBC had already achieved 48.6%.
- WBC is well on track to meet the 2006 30% HECA target – by March 2004, 26% had been achieved.
- By March 2004 the Council had seen a reduction in CO2 emissions of 77% under its own property and a saving of 91,270 tonnes per annum under HECA.
- In 2001, WBC was awarded the Queen’s Award for Enterprise – the only local authority to have been granted this award.
- Approximately 1200 Council owned properties benefit from low heating and power charges and 3,700 residents have been provided with free or subsidised insulation.
- Climate Change Strategy (CCS) adopted by the Council in December 2002 with three overarching themes: reduction of CO2 equivalent emissions; adaptation to climate change; and promotion of sustainable development.
- CCS seeks to achieve the Royal Commission on Environmental Pollution’s
targets of 60% reduction in C02 equivalent emissions by 2050 and 80% by 2100.

- Climate Neutral Practice Note which seeks to promote voluntary cooperation between parties involved in the local development process to achieve 80% reduction in C02 emissions and mitigation against climate change.
- Since the inception of the CCS, a reduction of 17.23% in C02 equivalent emissions Borough wide has been achieved (March 2004).
- The Borough has a sustainable energy 200kWe fuel cell CHP
- The Borough has more than 9% of the total UK installed capacity of PV and a private wire distributed generation system, providing electricity, district heating and cooling directly to local customers.”
- The Council has been awarded Beacon Status for Sustainable Energy 2005-06.

IDEA, 2004

10.31 Woking Borough Council has been chosen for this case study for several main reasons:

- The Council already has Climate Change as an issue high up on it’s agenda. With strong political and officer level support, as well as the ownership of Thameswey, it is an Authority that is already leading by example.
- The Council has the resources and reputation to deliver in this area.
- In October 2005, the Council’s Executive approved a motion to develop a micro-generation strategy as a part of its Climate Change Strategy.
- The author is a Policy Officer (Planning) for the Council and has been able to gain access to information and interviews, which would perhaps be more difficult to gain access to in other circumstances.

10.32 Micro-Generation in Woking

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10.33 As mentioned above, in October 2005, the Council’s Executive agreed to incorporate micro-generation as a feature of the Councils Climate Change Strategy. Through the Climate Change Working Group, the Climate Change Strategy and Action Plan will be amended to include a target to increase micro-generation in private homes in the Borough by 2007.

10.34 In early 2006, ECSC were commissioned by the Council to explore opportunities and methods for promoting micro-generation to households, and to recommend the most appropriate technologies in terms of energy efficiency and financial viability.

10.35 As a part of this initiative, in February 2006, the Energy Savings Trust awarded funding to Woking Council for the Woking Solar Initiative, which will operate in a similar manner to the Oxford scheme, which is described in Chapter 5, and will be run by ECSC.

10.36 Planning in Woking

10.37 As seen in Box 8, above, Woking’s achievements in the field of climate change have been successful at a corporate level and have involved large scale schemes. Little progress has been made in terms of the planning process. As mentioned, the Council adopted its Climate Neutral Development Note in 2005. This document, however, has not been adopted as Supplementary Planning Guidance and does not form a part of the Development Plan for Woking as, at the time of production, there was
not a higher level Development Plan policy to hang it from. It exists to solely provide information to developers and asks questions such as “have you considered using renewable energy in your development?”.

The document, although a material planning consideration, does not hold any significant planning ‘weight’ and is not used as a reason for refusal of planning permission on its own.

10.38 The Surrey Structure Plan 2004 contains a policy requiring 10% of energy for new development to come from renewable sources. The Council have been successful in securing this for some of the larger development schemes in the Borough, but due to a lack of Officer expertise in this area, the details of this 10% are left to legal agreements, and as at December 2006, the Council had not signed off on any such agreement. This problem is compounded by the fact that the Council does not have a condition monitoring Officer to ensure that these conditions and legal agreements are being followed through.

10.39 Woking’s Core Strategy submission document (published after submission of this Thesis in September 2006) does in fact contain a policy that will require a 40% reduction of CO2 emissions above the prevailing Building Regulations. This is considered by many planners to be an ambitious policy target and the policy has received several objections on the basis that the requirement would make many schemes financially unviable. This matter is now out of the Council’s hands and it will be up to the Planning Inspectorate to decide the final content and
wording of the policy, which is not likely to be established until December 2007. The Council’s Local Development Scheme sets out a timetable for a Supplementary Planning Document which will provide applicants with information about exactly how this 40% reduction target can or should be met. Again, due to the lengthy process of producing Local Development Documents, it is unlikely that this policy document will be prepared before adoption of the Core Strategy in December 2007.

10.40 It can be seen that Woking, like many other districts and boroughs, face significant problems in finding a policy ‘hook’ to require developers to incorporate renewable energy in their schemes, and that when a policy hook does emerge, problems with officer training and resources mean that implementing such a policy is inadequate, as outlined in Box 3. The need to act on climate change immediately is well reported, and although the role of the planning system has the potential to play a massive part in facilitating renewable energy and in particular micro-generation, it is not something that will happen overnight. Again, this thesis recognises the need to act sooner rather than later and seeks to find ways in which the Council can make an impact now.

10.41 The Sample

10.42 Woking is home to around 89,900 people living in just over 36,000 households. For obvious resource constraint reasons, it was not possible in the study to survey each of these households. For this reason, it was necessary to survey only a ‘sample’ of the population. Bryman (2001)
explains that there are several types of sampling that can be utilised when undertaking social surveys, but key to sampling in this survey was the need to be able to make *generalisations* about Woking’s householders from the findings of the research; i.e. a *representative* sample was required.

10.43 The two key methods for selecting a sample are:

- *Probability Sampling*, where a sample is selected at random so that each unit in the population has a chance of selection;

- *Non-Probability Sampling*, where the sample is not randomly selected, implying that some units of the population are more likely to be selected than others.

10.44 In the case of this study a non-probability sampling method was used. This was because it was considered by the author that owner occupiers were the group most likely to take up micro-generation (as opposed to those who rent and do not have the power to decide about installing micro-generation on their homes).

10.45 There are three main types of non-probability sample: the convenience sample, the snowball sample and the quota sample. This study employed the convenience sample, which is described below.

10.46 The convenience sample, at its most basic, is simply one that is the most accessible to the researcher at the time of study. It is recognised that in interviewing those owner occupiers who were available at the time of study, a representative sample is unlikely to have been achieved. As discussed, this will mean that making generalisations about Woking’s owner occupiers from this sample is problematic.
10.47 It is considered, however, that it is not hugely important in the instance of this research to be able to make generalisations; the research acts as a starting point – a basis – for further, more detailed research that would need to be undertaken. It acts, perhaps, as a ‘pilot’ study, testing out the attitudes and knowledge of the sample, and is not in any way, shape or form considered to be a comprehensive survey of Woking’s householders.
11.0 Primary Research

11.1 On the 2\textsuperscript{nd} and 3\textsuperscript{rd} of July 2005, structured interviews were carried out face-to-face with a total of 84 Woking householders. A full list of interview questions can be found in Appendix 2. A picture card was also made available to interviewees which showed what each of the micro-generation technologies, together with a brief description of how they worked. This can be found in Appendix 3.

11.2 The interviews took place in Woking’s Wolsey Place shopping centre between the hours of 10am and 4pm. Fifteen interviewers (all Woking Borough Council employees) collected the data in 2 hour slots over the course of the two days. A large information stand provided by Woking Borough Council was placed in the shopping centre with the dual purpose of encouraging people to take part in the survey and of raising awareness of the Council’s various climate change initiatives.

11.3 Demographics of Interviewees

11.4 There is much evidence in the literature regarding which groups in society are more likely to change their behaviour in a pro-environmental manner (see for example, Carlsson \textit{et al.} 2005 and Gatersleben \textit{et al.} 2002). This study only involved a relatively small sample, and so it has not been possible to look in to these findings in great detail in Woking. The findings here are really for interest purposes only.
11.5 There was a fairly even split between male and female respondents (44 male, 50 female). The most common age group in the survey was the 51-60 category (26% of respondents). Those under the age of 20 were not deliberately targeted by the survey team as it was presumed that this age group would not be owner-occupiers.

11.6 The ethnicity breakdown was as follows: 78 white, 1 mixed-white, 1 Asian and 4 'other' (includes European).

11.7 In terms of education, only 1 respondent declined to supply this information. The breakdown is shown in the graph below and is roughly representative of education levels in Woking.

![Graph showing level of education](image)

**Figure 7: Level of Education**
11.8 12 respondents declined to provide details of household income (14%).

Figure 8 shows the household income details of those who did respond.

Figure 8: Household Income

11.9 Awareness and Concern

11.10 The householders were first asked whether or not they had heard of a number of environmental terms. Two of the respondents said that they had not heard of any of them. The results are shown in Figure 9.

11.11 These findings show a higher awareness than the levels identified in similar survey questions (e.g. COI in 2003, London Assembly in 2004), which have been described in Chapter 7 of this thesis. It is possible that this is due to the fact that Woking Borough Council, as described
previously, has been particularly innovative in this policy area, which has received much coverage in both the national and local press, for example, which has potentially brought the issue to the attention of Woking’s householders. However, it is also recognised that:

- There may be an issue of ‘response sets’ where participants respond according to social desirability or in the yeasaying/naysaying effect, described in para. 10.27.
- Just because people have heard of a term, it does not necessarily mean that they understand it.

![Graph of Awareness of Terms](image)

Figure 9: Awareness of Terms
11.12 The overwhelming majority (84%) of householders interviewed stated that they were either fairly (30%) or very (54%) concerned about changes to the earth's climate due to greenhouse gas emissions.

11.13 Causes of Climate Change

11.14 Despite a relatively high level of awareness of environmental terms and a high reported level of concern about environmental issues, when 'put to the test' it was found that the participants actual knowledge about climate change was much lower than initially found. When asked about the causes of climate change, there was clearly some confusion about what the sources of greenhouse gas emissions were. Two people stated that they did not believe that any of these methods of energy generation caused climate change.

![Causes of Climate Change](image)

Figure 10: Causes of Climate Change
11.15 *Impacts of Climate Change*

11.16 Similarly, there was confusion about what the consequences of continued greenhouse gas emissions might be among some householders:

- 15.5% did not think that there would be rises in temperature
- 21.4% did not think that there would be an increased risk from flooding
- 11.9% did not think that there would be changes in weather patterns
- 27.4% did not think that there would be a risk of drought/ water shortages
- 48.8% did not think that there would be an increased risk of disease
- 22.6% did not think that there would be loss of habitats.

11.17 Indeed, 6% of respondents did not think that *any* of these impacts would come about.

11.18 *Awareness of Targets*

11.19 65.5% of those interviewed stated that they were aware that the Government had set a target to reduce greenhouse gas emissions, but only 7 people actually stated that they knew what that target was.

11.20 54% of participants stated that they were aware that Woking Borough Council had adopted a Climate Change Strategy, 30% of those were
aware of the targets within the Strategy to reduce emissions. There were mixed feelings concerning whether or not the Council's emissions reductions targets were realistic, with the vast majority of householders stating that they did not know.

11.21 Attitude and Behaviour

11.22 The remainder of the interviews sought to establish the attitudes, behaviours and potential behaviours of the householders.

11.23 Trust and Responsibility

11.24 When asked what level of trust they placed in various stakeholders to mitigate climate impacts, it was found, perhaps not surprisingly, that Environmental Groups were the most trusted group. Woking Borough Council was considered to be the second most trustworthy stakeholder, perhaps a reflection on the Council's reputation for innovations in emissions reductions. Business and Industry was considered to be the least trustworthy group, followed by central Government. Interestingly, 85% of people said that they trusted individuals to take responsibility for climate change mitigation.
Figure 11: Trust

11.25 When asked who they thought should take the major responsibility for dealing with Climate Change in the local area, 83% of people stated that they thought that Woking Borough Council should take the lead, followed by central Government (56%). In reality, people thought that the answer to this question should be a ‘shared effort’, but recognised the need for the lead to come from somewhere.

11.26 Interestingly, although 85% of respondents said they trusted individuals to take responsibility for emissions reductions, only 36% thought that individuals should take the major responsibility. This finding is well evidenced in the literature (e.g. Darnton, 2004) which finds that there is a lack of feeling of personal responsibility in some areas of policy,
primarily due to a lack of knowledge and a feeling that the individual will not make an impact on his own.

![Who Should Take The Major Responsibility for Climate Change Mitigation?](image)

Figure 12: Responsibility

11.27 The findings of these questions do perhaps indicate that there is a desire from the public that Woking Borough Council should continue to take the lead on climate change.

11.28 **Potential for Renewables**

11.29 Householders were asked to state whether or not they thought that renewable technology could replace conventional fuels in Woking. 70% of participants thought that solar could replace conventional energy
sources, 55% that wind energy could, 23% for geothermal and 25% for biomass/wood fuel. A large number of participants stated that they did not know whether Geothermal and Biomass/Wood fuel results were capable of replacing conventional sources; again, a reflection on the lack of knowledge among the public about these technologies, and about the carbon cycle.

11.30 Only one respondent (the same who felt that Climate Change was not a serious threat and therefore required no action) stated that the UK Government should not pursue the development of renewable energy. Two people stated that renewable energy should not be developed in Woking.

![Can renewable Energy Replace Conventional Energy Sources in Woking?](image)

Figure 13: Can Renewables Replace Conventional Energy Sources in Woking?
11.31 When asked which technologies should be developed in Woking, the response was mixed, and many interviewees commented that they did not feel that they knew enough about the technologies to say either way.

Figure 14: Should Renewable Energy be Developed in the UK and Specifically, Woking?

11.32 The results can be compared to the findings of a survey carried out in 2003 by Thames Valley Energy (TVE) which sought public opinion on renewables in general in Reading. It can be seen that there was a much higher level of acceptance for these technologies in Reading. This may be for many reasons, not least including the differences in sample size (The TVE sample was much larger and constituted a representative population sample).
<table>
<thead>
<tr>
<th>Energy Type</th>
<th>Support in Woking</th>
<th>Oppose in Woking</th>
<th>Support in Reading</th>
<th>Oppose in Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar</td>
<td>59%</td>
<td>11%</td>
<td>74.7%</td>
<td>1%</td>
</tr>
<tr>
<td>Wind</td>
<td>46%</td>
<td>23%</td>
<td>72%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Biomass</td>
<td>21%</td>
<td>35%</td>
<td>16%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Geothermal</td>
<td>31%</td>
<td>19%</td>
<td>Not in Survey</td>
<td></td>
</tr>
</tbody>
</table>

Figure 15: Support for Renewable Energy Development in Woking Compared to Reading.

11.33 Although only 21% of respondents were aware of the availability of green/ renewable energy tariffs, all but one of the respondents stated that they would be prepared to purchase ‘green’ energy through such a system. 57% of those respondents stated that they would be prepared to pay a little more for green energy if they were able, and 28% would expect to pay about the same as they do currently.

11.34 75% of respondents stated that they need more information about renewables and, specifically micro-renewables. Preferred methods for information provision were leaflets (56%), local newspaper articles (44%) and online (46%). Displays in public buildings and radio were the least favoured options. Householders also had their own ideas about how they would like to receive information:

- Public meetings/ Workshops (7)
- A Council-run website (5)
- Woking Magazine (2)
- An e-mail newsletter from the Council (1)
• A ‘Panto’ or similar for children (1)
• Door to Door (1)

11.35 When probed, seven of the interviewees requested that information provided should be written in plain English, free of jargon. Five interviewees stated that they did not want to be bombarded with massive quantities of information, rather that information leaflets and websites, etc. should be used to signpost them to sources of more detailed information.

11.36 The suggestion was also made by two of the interviewees that it was important to involve the whole community in such activities, and so information should be made available to people in their own languages and in formats suitable for all audiences.

11.37 Who Would Consider Buying a Property With Micro-Generation Technologies Already Installed?

11.38 When asked whether or not they would purchase a property which already had micro-generation technologies installed, many people said that their decision would depend on factors such as aesthetics and whether or not the technology looked acceptable in the properties’ setting. A number of householders responded ‘don’t know’, as although they did not fully understand the technologies in terms of how they
worked, maintenance and costs at the time of interview, they did not want
to rule it out as an option by responding ‘no’.

- 61% Would consider buying a property with Solar PV
- 60% Would consider buying a property with Solar Thermal
- 38% Would consider buying a property with a Micro Wind Turbine
- 45% Would consider buying a property with Geothermal technology
- 27% Would consider buying a property with a Biomass/ Wood fuel system.

11.39 60% of respondents stated that they would consider buying a property
with solar installations. The perception that the weather in the UK is ‘not
sunny enough’ was a key concern of respondents, although many stated
that if it was proven that solar pv/ thermal was a viable technology, they
would ‘switch’ from a no/ don’t know response to a ‘yes’.

11.40 People were reluctant to consider moving in to a property with micro-
wind, primarily because of the perceived noise generated by the turbine,
the aesthetics of the turbine and the perceived cost of maintaining it.

11.41 The key concerns regarding Geothermal and Biomass/ Wood fuel
technologies were that maintenance would be a burden and the perception
that Biomass/ Wood fuel technologies are not ‘green’, representing a lack
of knowledge about the carbon cycle.
Figure 16: Would You Buy a Property With These Installations?

11.42 Who Would Consider Installing Micro-Generation Technologies on the Existing Property?

11.43 Householders were then asked to state whether or not they would consider installing micro-generation technologies on their existing properties. 60% of people stated that they would consider solar installations (PV and Thermal). This compared to 66.8% of participants in the TVE Reading study, indicating that perhaps knowledge about micro-generation technologies is higher in Reading and highlighting a need for some sort of information provision campaign in Woking.
Figure 17: Would You Consider Installing Micro-Generation on Your Property?

11.44 Those that stated they would not were then asked to explain their reasons why. Figure 18 provides a summary of the reasons cited. Figures 19 – 23 show the reasons for each technology individually.

11.45 A total of 213 reasons were cited by householders, across each of the five technologies. For the purpose of presentation, the responses have been categorised. The categories are listed below, with a brief description of each.

- Perceived Cost. Although nearly 50% of the householders were aware that Government grants were available for some of the technologies, only a handful of them were aware of the actual costs involved in installing and maintaining the technologies.
• Physical Constraints. Some of the householders felt that they were unable to consider a certain type of installation due to the physical constraints on their property. Examples include: the property being in a block of flats, and the property being located in a Conservation Area.

• Bureaucracy. Some of the householders cited that they feared they would face ‘red tape’ if they were to consider installing these technologies. The problems cited were specifically in relation to the planning process; there was a total of 13 citations across the technologies where people believed that they would not receive planning permission for installing these technologies, or the perception that applying for planning permission was too problematic.

• Lack of knowledge about technology. Responses under this category can be divided in to two subsections. Many of the householders were happy to admit that they had very little knowledge about how the various technologies operated, etc. The second group of respondents were subject to a number of ‘misconceptions’ about the technologies, for example, with the belief that the UK weather was ‘not sunny enough’ to power solar panels, that micro-wind turbines were very noisy, and that biomass/ wood fuel energy sources were not environmentally friendly.

• Perceived lack of need. A few of the interviewees stated that their current energy supply was adequate and that they had no need to consider installing micro-generation technologies.
• Noise. The perception that wind turbines were very noisy was an issue for 12 of the householders.

• Aesthetics. The perception that micro-generation technologies are unattractive was an issue for several of the householders, particularly in relation to solar and wind installations. Concerns were not just for themselves, but the attitudes of their neighbours and the impact they would have on the street scene.

• Negative attitude. One of the householders considered that climate change was not an important issue and therefore there was no need to consider micro-generation technologies. Another householder was of the opinion that renewables were costly in general and not something that should be pursued in any eventuality.

• Upheaval. There was concern that Geothermal and Biomass/ Wood fuel would require significant upheaval if it were to be installed.

• Maintenance. The perception that Biomass/ Wood fuel technologies created filth was an issue for 13 respondents.

• Already Own. One respondent was already the owner of solar thermal technology.
11.46 As figure 18 shows, the two main reasons for not considering installation of micro-generation technologies in general was a lack of knowledge (or misconceptions) and perceived cost.

11.47 It is interesting to note that a handful of people stated that although they would not consider installation on their existing properties, they would consider purchasing a property that already had the technology installed as it would mean that the problems involved with the physical installation had already been overcome.

![Barriers to Take-Up of Micro-Generation Technologies](image)

Figure 18: Barriers to Take-Up of Micro-Generation Technologies

11.48 The perceived cost of installing and maintaining Solar PV was the key reason why 35 people would not consider installation (40%). An acknowledged lack of understanding/ misconceptions (the weather is not
(‘sunny enough’) about the how Solar PV operates was another barrier (17%), followed by concerns about aesthetics (14%).

![Barriers to Take-Up of Solar PV](image)

**Figure 19: Barriers to Take-Up of Solar PV.**

11.49 Figure 20 shows that the householders reasons for not considering installation of Solar Thermal were very similar to those for Solar PV.
Figure 20: Barriers to Take-Up of Solar Thermal

11.50 Twelve of the 53 householders who had concerns about Micro-Wind installations stated that the turbines were too noisy and would be a nuisance to themselves and their neighbours. Ten of the interviewees were not convinced that the turbines would make attractive features and were particularly concerned about the visual impact it would have on the street scene and the reactions of their neighbours.
Figure 21: Barriers to Take-Up of Micro-Wind

55% of those interviewed stated that they would not consider installing geothermal technology for their property. Lack of knowledge was the primary reason for this, with 17 people stating that they did not understand how the technology worked.
Figure 22: Barriers to Take-Up of Geothermal

11.52 65 people said they would not consider installing Biomass/Wood fuel system at the moment. The key reasons for this was a lack of knowledge about how the technology works, the belief that they do not produce 'clean' energy and the amount of maintenance that would be required in their up-keep.
Figure 23: Barriers to Take-Up of Wood fuel.

11.53 When asked how they would fund the installation of micro-generation technologies on their properties, 57% of people said that they would apply for a Government grant, 54% of people said that they would consider funding through a Council-led scheme, and 23% said they would consider taking part in a community funding scheme. 17% said they would consider adding the cost on to their mortgage and 9% would consider paying up front.
Figure 24: Financing Micro-Generation Installations

11.54 Summary of Findings

11.55 The key findings of the primary research were:

1) Although there is a high level of awareness of environmental terms among householders in Woking, when ‘challenged’ it was found that there was often a lack of understanding of the causes and effects of climate change.

2) Environmental groups, followed by Woking Borough Council, were the stakeholders most trusted to address the issue of climate change in Woking. The majority of householders felt that Woking Borough Council should take the major responsibility for addressing climate change at the local level. Although 85% of respondents said they trusted individuals to
take responsibility for emissions reductions, only 36% thought that individuals should take the major responsibility.

3) All but one interviewee thought that renewable energy should be developed in Woking.

4) 75% of interviewees felt that they needed more information about climate change, renewable energy and, specifically, micro-generation. The favoured channels of communication were leaflets, local newspaper articles and the internet, respectively.

5) Around 60% of interviewees stated that they would consider purchasing a property that had solar installations, 45% geothermal, 38% micro wind and 27% biomass/wood fuel technologies. It was found that these figures had the potential to increase following an increase in understanding of the technologies. The percentages were roughly the same for those who would consider installation on their existing properties.

6) The key barriers to take up of micro-generation were found to be: cost, physical constraints, bureaucracy, lack of knowledge, perceived lack of need, noise, aesthetics, upheaval and maintenance.

7) 57% of people said that they would prefer to apply for a Government grant to pay for micro-generation installations on their existing properties, 54% of people said that they would consider funding through a Council-led scheme, and 23% said they would consider taking part in a community funding scheme. 17% said they would consider adding the cost on to their mortgage and 9% would consider paying up front.
12.0 Conclusions and Recommendations

12.1 This thesis has explained the importance of reducing greenhouse gas emissions in order to mitigate, and adapt to, the impacts of climate change, and has demonstrated the significance of climate actions in achieving the wider aims of sustainable development.

12.2 In light of the fact that the vast majority of climate actions take place at the local level, the necessity of framing climate change as a local issue has been explored, as has the need to ‘think locally, act locally’. It has been demonstrated that local authorities are key to delivering sustainability and emissions reductions; council’s plan and control development, resource use, and energy consumption, for example. Importantly, local authorities are also the level of administration which is closest to the citizen to whom council’s provide their services.

12.3 The two key means through which emissions reductions can be achieved – energy efficiency and low carbon generation – have been explained, and the context for this in the UK has been explored. This thesis, however, has focussed on just one mechanism for emissions reductions: micro-generation. It has been seen that micro-generation has a potentially massive role to play in reducing emissions from the household sector in particular, which currently accounts for around a third of emissions in the UK.
12.4 The findings of the primary research that has been undertaken here correspond with the findings of the literature in many respects. For example, it has identified the key barriers to take-up of micro-generation technology as cost, a lack of information, a lack of understanding about the technologies and problems with bureaucratic red tape. The interviews that took place provided an insight into the exact nature of these barriers from the point of view of the consumer, highlighting the need for those barriers to be addressed if the public are to be persuaded to install micro-generation technologies on their homes.

12.5 A review of the literature on attitude, behaviour and behaviour change theory has demonstrated the complex nature of the challenge to encourage and motivate the public to install micro-generation technologies. Four possible policy mechanisms for encouraging behaviour change; legislation, economic instruments, information provision and marketing/influencing strategies have been identified. As has been discussed, the focus of this research has been on the final two of these.

12.6 A review of the literature on marketing and public relations demonstrated that the development of an information provision campaign or of a marketing and influencing strategy is a complex task, which requires a comprehensive understanding of the communications process, together with an appreciation of behaviour change theory.
12.7 This thesis employed a social survey to explore the barriers to and potential for micro-generation technology in the household sector in Woking. Woking has a strong reputation as an innovator in the field of climate change, and as box 8 in Chapter 10 of this thesis describes, has achieved significant emissions reductions in council-run properties and through the Council's own energy company, Thameswey. Key to this is Woking's Climate Change Strategy and its accompanying Action Plan, through which many of these achievements have been delivered.

12.8 The key findings of this research are:

- That Woking Borough Council should develop a policy to increase the number of micro-generation installations on residential properties in the borough, as an extension to its existing Climate Change Strategy and which will complement the emerging sustainable energy policies in the Council's new Local Development Framework,

- That the micro-generation policy should be based on the fundamental principles of sound and ethical communications, and on a solid understanding of the nature of sustainable consumption and behaviour change theory,

- The policy should be delivered through a marketing and influencing strategy, which will include an element of information provision, and address the key barriers identified.
12.9 The remainder of this chapter will outline key recommendations for this new policy and supplementary strategy, linking the recommendations back to the barriers identified in Box 3 in Chapter 3.

12.10 Recommendations

12.11 A key barrier highlighted through the literature is the problems associated with a lack of Member and Officer support. It is therefore essential that the policy itself has full support within the Council, both at Officer and Member level. It should therefore be developed through the Climate Change Working Group which reports to the Council’s Executive Committee.

12.12 In line with good practice guidance on policy development, it is essential that the Council set a SMART target for this policy. It is suggested that the policy itself need not be, and indeed should not be, worded in a complicated manner, and it is suggested that it may read something like:

"The Council will seek to encourage the take-up of micro-generation technologies in 1,000 residential properties across Woking by 2010".

12.13 The effect of such a policy is well evidenced in the literature. As well as the actual reduction in emissions resulting from the installation of micro-generation technologies on residential properties, there is the theory that when the public can see living, breathing examples of micro-generation
in their neighbourhood, it is an emotionally engaging form of education in itself, and may lead to further take-up (Sustainable Development Commission, 2003).

12.14 Recommendations for the accompanying marketing and influencing strategy are listed below. It is recognised, however, that the implementation of such a strategy is highly dependent on available funding. It has not been viable to explore in great detail here the various funding options, but the assumption is made that the Council’s energy company Thameswey would be the primary source of financial support.

12.15 Cost

12.16 Cost was identified, both in the literature review and through the primary research, as one of the most significant barriers to the public taking up micro-generation technologies.

1) As discussed in Chapter 11 of this thesis, 54% of those interviewed stated that they would consider paying for micro-generation installations for their property through a Woking Borough Council-led scheme. In light of this, it is considered that the Council should, perhaps financed through Thameswey, develop a funding scheme to alleviate the costs associated with purchasing, installing and maintaining micro-generation technologies. Such a scheme could take several forms, and should be
available to both existing householders and applicants for new housing development:

- A grant scheme which would provide funding for householders to enable them to purchase the appropriate technology for their property. The grant could also be used as a ‘top-up’ for those householders who may also wish to apply for funding through the Low Carbon Buildings Program.

- A lease scheme, where the Council would enter into a long-term rental agreement with the householder. The Council would retain responsibility for the maintenance of the installation. The householder would therefore avoid the initial capital cost.

2) The literature review, and in particular the findings highlighted in Box 3, found that cost and a lack of information about installers was a significant barrier to take-up. The Council should therefore develop an accreditation scheme and/or a list of ‘approved’/‘preferred’ suppliers. This would serve to ensure that householders deal with qualified and experienced installers, reducing problems faced when people deal with ‘cowboys’. It will also go some way to ensure that householders are not paying excessive prices for their installations.

3) A lack of funding was identified through the literature and the primary research as a barrier to take-up. Funding, it has been explained, does exist for householders and applicants who wish to install micro-generation technologies. The Council therefore should promote existing
funding schemes, for example the Low Carbon Buildings Program, which provides grants to householders for micro-generation installations, for those who do not wish to participate in a Council-led scheme.

12.17 Bureaucracy

12.18 Again, the literature review and the results of the primary research found that a key barrier to the installation of micro-generation was bureaucracy. The main issue is with the planning system. In part, the problems with the planning process in relation to climate change and micro-generation are being dealt with through Local Plans/ Local Development Frameworks, which now must include policies on renewable energy for new developments. Changes to the General Permitted Development Order are also being considered by the Department for Communities and Local Government (DCLG) in order to make it more clear to both planning officers and the public, what constitutes permitted development in terms of micro-generation installations. However, as has been explained, this process takes time. Alongside this, is the public perception that planning permission would be required in all instances and that obtaining planning permission for installations is problematic.

4) The Council must address the problems regarding the planning system. It is suggested that the Council:
• Produce a guidance note informing the public about the instances where planning permission is and is not required, together with a standard enquiry form with a guaranteed quick response,

• Employ an Officer dedicated to dealing with planning applications for micro-generation installations.

• Ensure that all planning applications for micro-generation are fast-tracked through the decision making process (perhaps a target of 5 weeks).

• Fast track the production of a Climate Change SPD through the system as soon as possible with the aim to have it in place in time for, if not before, adoption of the Core Strategy.

• Commission training workshops for planning officers and Members to ensure that they are equipped to properly implement policy.

• Commit to an early review of the Statement of Community Involvement which should include a commitment to engage with the public on major renewables schemes in an open and transparent way and explain the Council’s new marketing and communications strategy.

12.19 Technology

12.20 It is clear from the literature and from the findings of the primary research that not only is there a lack of understanding of micro-generation technology, there are also many misconceptions about the technology.
The public are highly unlikely to purchase technology which they do not understand and so it is essential that information is made available to them, and that the myths surrounding micro-generation (including, for example, that the weather in the UK is not sunny/ windy enough) are cleared up.

5) A series of leaflets explaining each of the micro-generation technologies should be prepared.

6) Events should be held to explain the technologies to the public. This could take the form of public meetings/ workshops, or even guided tours of real life examples in the local area.

12.21 Information

12.22 Although it is evident that there is generally a high level of awareness of the terms ‘climate change’ and ‘renewable energy’ in Woking, it is clear that there is a real need for more specific, detailed information, especially about micro-generation. As discussed previously, an information provision campaign on its own is rarely effective in motivating behaviour change, and so it is considered that the Micro-Generation Strategy should be about more than just bombarding the public with information; it should be based on communication and behaviour change theory. It is recommended that the Council should consider utilising some of the
methods outlined in the Futerra (2005) strategy proposal (specifically the use of a branded message).

7) The Micro-Generation Strategy should be developed in conjunction with the Council’s Marketing and Communications Team, who will ensure that the Strategy is based on strong communication theory together with the Teams’ expert knowledge about the most effective methods of communication with the public of Woking. The literature review has highlighted the importance of adhering to the fundamental principles of marketing and public relations, including making room for feedback to the Council from the public.

8) Chapter 3 of this thesis explained the necessity of framing climate change as a local issue, finding a local ‘hook’ to hang the issue from and encouraging the public to ‘think locally, act locally’. The Strategy should highlight the impact that climate change will have on the local area (for example, how much damage would a major flood event of the River Wey cause?), and explain the opportunities that tackling climate change brings to the local community (new jobs, for example). In line with the findings of the Futerra (2005) report, all this must be achieved without scaremongering.

9) The primary research found that the internet was a preferred channel for the provision of information. It is suggested that the Council consider developing a website dedicated to climate change (and perhaps other
sustainability issues) which will act as a ‘One Stop Shop’ for information. Leaflets (as described above in recommendation 5) could be made available here in electronic form, as well as in a variety of other languages, etc. Information for schools could also be available here in line with Thameswey’s Green Education initiative. The website could support online applications for funding, information about the planning process and signposting to further information.

10) The Council should consider funding an advice centre which offers impartial advice about the various micro-generation technologies. This could take the form of a dedicated phone line, combined with a drop in service. The Advisor could even be on hand to visit the property and advise on appropriate technology, and could make site visits before, during and after installation.

11) Promoting the existing work of the Council could prove to be an important element of the Strategy. As mentioned previously, Woking Borough Council has a reputation as an innovator in the field of climate change and ensuring that the public are aware of this through a continued public relations effort will assist in building the Council’s reputation, increasing levels of trust and help to achieve ‘buy-in’.

12) The Council should also utilise its existing channels of communication with the public, for example, by promoting the Strategy through the
Woking Magazine, which is circulated to all households on a quarterly basis.

13) Marketing campaigns will be essential if anywhere near 1,000 households are to become micro-generators by the end of the decade. Mail-outs are generally considered to be the most direct way to communicate a message to the public, however, they can also be the most expensive. Targeting communications effectively can reduce the amount of waste and increase the likelihood of take-up. It is suggested that, as well as advertising the new policy through general advertising (local paper, website and the Woking Magazine), households that are most likely to take-up micro-generation should be targeted specifically in the first instance. This would probably include some of the more affluent households who are able to afford the initial costs of the technology and its installation, and also those who are in need of energy efficiency measures. Those households who are off the gas network should also be targeted as those are the households who would most benefit from reduced energy bills. It is suggested that the Surrey and East Sussex Energy Advice Centre’s ‘Zero – IN’ GIS technology could be used in order to identify where these properties are in spatial terms.

14) It is important that the Council monitor their progress in terms of micro-generation (and indeed its other climate and sustainability policies). It is suggested that the Council undertake further social surveys, perhaps similar in content to the one undertaken in this study. Although this
study has been successful in highlighting some of the key issues, the research has been flawed by the (mainly financial) resource constraints that have been placed upon it. Further research should be based on a much larger and statistically representative sample size. It is suggested that the Council's existing database of consultees on energy matters could be used as the basis for this further research. The Council should also consider employing a wider range of research methods; perhaps using this interview schedule as the basis for a questionnaire which could be supplemented by more detailed questioning in the form of interviews and/or focus groups.

15) Finally, it is suggested that the Council 'rope in' a local celebrity or dignitary to install micro-generation on their property. If Woking's Mayor, or the Woking FC Manager, for example, were to do this, it would stimulate media attention, which in turn would raise public awareness, and convince the public of the Council's commitment to combating climate change.
Sustainable Energy for a Sustainable Woking – Have Your Say!

Section 1 – Environmental Issues

Q. 1 Which of the following terms are you aware of?
(Please tick as many as apply)

<table>
<thead>
<tr>
<th>Global Warming</th>
<th>Energy Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Green House Effect</td>
<td>Sustainable Development</td>
</tr>
<tr>
<td>Climate Change</td>
<td>The Kyoto Protocol</td>
</tr>
<tr>
<td>Renewable Energy</td>
<td>None of the above</td>
</tr>
</tbody>
</table>

Q. 2 How concerned are you about the changes to the earth’s climate and long-term weather patterns?

Not at all concerned
A little concerned
Indifferent
Fairly concerned
Very concerned

Q. 3 Electricity can be generated in many different ways. Which of the following methods do you believe increase the risk of climate change?
(Please tick as many as apply)

<table>
<thead>
<tr>
<th>Biomass (wood, straw)</th>
<th>Coal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar (energy from the sun)</td>
<td>Oil</td>
</tr>
<tr>
<td>Wind</td>
<td>Incineration (of waste)</td>
</tr>
<tr>
<td>Hydro-electric</td>
<td>Gas/ natural gas</td>
</tr>
<tr>
<td>Nuclear</td>
<td>None of the above</td>
</tr>
</tbody>
</table>

Q. 4 Which of the following do you feel may be the consequence of climate change in the UK?
(Please tick as many as apply)

<table>
<thead>
<tr>
<th>Rise in temperatures</th>
<th>Drought &amp; water shortages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased risk of flooding</td>
<td>Increased risk of disease</td>
</tr>
<tr>
<td>Change in weather patterns</td>
<td>Loss of natural habitats</td>
</tr>
<tr>
<td>None of the above</td>
<td></td>
</tr>
</tbody>
</table>

Q. 5 How concerned are you about the following issues?

<table>
<thead>
<tr>
<th>The need to save energy</th>
<th>Very Concerned</th>
<th>Fairly Concerned</th>
<th>Not Concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td>The need to recycle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The development of renewable energy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household waste disposal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic congestion</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q. 6 Are you aware that the Government has set a target to reduce the amount of CO2 that the UK produces by 80% by the end of the century?

Yes/ No

Q. 7 How much trust do you place in the following groups to make the right decisions about the environment?

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>Some</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientists</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business &amp; Industry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Government</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woking Borough Council</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individuals</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q. 8 Are you aware that Woking Borough Council has a Climate Change Strategy?

Yes/ No

Q. 8a If yes, were you aware that Woking Borough Council has committed itself to reduce the amount of CO2 that the borough produces by 80% by the end of the century?

Yes/ No

Q. 9 How realistic do you think this target is for Woking?

<table>
<thead>
<tr>
<th></th>
<th>Not at all realistic</th>
<th>Unlikely</th>
<th>Possible</th>
<th>Very Realistic</th>
<th>Don’t Know</th>
</tr>
</thead>
</table>

Section 2 – Renewable Energy

Q. 10 Do you believe that energy generated from renewable sources can replace the use of fossil fuels (such as gas and oil) for generating the electricity and heating requirements of your home?

<table>
<thead>
<tr>
<th></th>
<th>Agree</th>
<th>Disagree</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind Energy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar Energy</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q. 11 Who do you think should take the major responsibility for implementing renewable energy schemes in Woking Borough?

<table>
<thead>
<tr>
<th>Business &amp; Industry</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Groups</td>
<td></td>
</tr>
<tr>
<td>The Government</td>
<td></td>
</tr>
<tr>
<td>Woking Borough Council</td>
<td></td>
</tr>
<tr>
<td>Individuals</td>
<td></td>
</tr>
</tbody>
</table>

Q. 12 Do you think you need more information on renewable energy?

Yes/ No

Q. 12a What would be the best method for providing such information?

<table>
<thead>
<tr>
<th>Newspapers</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Television</td>
<td>Public buildings/ Libraries</td>
</tr>
<tr>
<td>Radio</td>
<td>Other (please specify)</td>
</tr>
<tr>
<td>Leaflets</td>
<td></td>
</tr>
</tbody>
</table>

Q. 13 Do you think we should increase the use of renewable energy in the UK? (please explain to interviewer)

Yes/ No

Q. 14 Do you think we should increase the use of renewable energy in Woking? (please explain to interviewer)

Yes/ No

Q. 15 Are you aware of a ‘renewables’ or ‘green’ tariff from your electricity supplier?

Yes/ No

Q. 15a What price would you be prepared to pay for such an energy tariff?

<table>
<thead>
<tr>
<th>A lot more than I pay now</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A little more than I pay now</td>
<td></td>
</tr>
<tr>
<td>The same as I pay now</td>
<td></td>
</tr>
<tr>
<td>Less than I pay now</td>
<td></td>
</tr>
<tr>
<td>Not interested</td>
<td></td>
</tr>
</tbody>
</table>
Q. 16  Do you have any of the following at home?

<table>
<thead>
<tr>
<th>Solar panels/ PV</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar hot water heating</td>
<td></td>
</tr>
<tr>
<td>Wood burning stove/ fire place</td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

Q. 17  Are you aware that Government grants exist to help you install renewable energy products such as solar panels?

Yes/  No

Q. 18  Would you consider installing any of the following into your home? (interviewer to show flash cards)

<table>
<thead>
<tr>
<th>Solar electric PV Panels</th>
<th>Don't Know</th>
<th>Yes</th>
<th>Too noisy</th>
<th>Not attractive</th>
<th>Too Expensive</th>
<th>Do not understand how works</th>
<th>My current supply is adequate</th>
<th>It would not produce enough energy</th>
<th>Gaining planning permission would be problematic</th>
<th>Other (please explain)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar water heating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small wind turbine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground source heat pump</td>
<td></td>
<td></td>
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<tr>
<td>Wood fuelled boiler system</td>
<td></td>
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<td></td>
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<tr>
<td>None of the above</td>
<td></td>
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</tr>
</tbody>
</table>

Q. 19  If you are looking in to buying a new home, would you be more likely to buy one with renewable energy installations? (interviewer shows flash cards)

<table>
<thead>
<tr>
<th>Solar electric PV Panels</th>
<th>✔</th>
<th>✗</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground source heat pump</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar water heating</td>
<td>✔</td>
<td>✗</td>
<td>?</td>
</tr>
<tr>
<td>Wood fuelled boiler system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small wind turbine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None of the above</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q. 20 If you were to consider having renewable energy installed in to you home, how would you prefer to pay for it?

Add on to mortgage?
Community scheme?
Grant (e.g. Clear Skies)?
Through a Woking Borough Council-led scheme?
Other (please specify) ...........................................................

Q. 21 Do you have any of the following energy saving devices at home?

<table>
<thead>
<tr>
<th>Double glazing</th>
<th>Loft insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cavity wall insulation</td>
<td>Energy saver light bulbs</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

Section 3 – About You

Q. 21 Age ..........
Q. 22 Male/ Female
Q. 23 Ethnicity (as per Census)
Q. 24 Education

<table>
<thead>
<tr>
<th>No formal qualifications</th>
<th>GCSE/ equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Level/ equivalent</td>
<td>University/ equivalent</td>
</tr>
<tr>
<td>Higher Degree</td>
<td></td>
</tr>
</tbody>
</table>

Q. 25 Household Income Bracket

<table>
<thead>
<tr>
<th>£10,000</th>
<th>£10,000 - £20,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>£21,000 - £30,000</td>
<td>£31,000 - £40,000</td>
</tr>
<tr>
<td>£41,000 - £50,000</td>
<td>£51,000 - £60,000</td>
</tr>
<tr>
<td>&gt;£60,000</td>
<td></td>
</tr>
</tbody>
</table>

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References


29. DETR (1999) *A Better Quality of Life*. HMSO.


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76. PMSU. (February 2004). Personal responsibility and Changing behaviour: The State of Knowledge and Its Implications for Public Policy. PMSU, Web.


**Websites**

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Best Foot Forward. [www.bestfootforward.com](http://www.bestfootforward.com)

BioRegional. [www.bioregional.com](http://www.bioregional.com)
BRE. www.bre.co.uk
Centre for Sustainable Energy www.cse.org.uk
Combined Heat and Power Association. www.chpa.co.uk
Department for Environment, Rood and Rural Affairs. www.defra.gov.uk
EcoSE. www.ecose.org.uk
Energy Saving Trust. www.est.org.uk/
Global EcoVillage Network. www.ecovillages.org
Hockerton Housing Project. www.hockerton.demon.co.uk
Office for the Deputy Prime Minister. www.odpm.gov.uk
Royal Commission on Environmental Pollution. www.rcep.org.uk
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SEEDA. www.seed.co.uk
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South East Climate Change Partnership. www.climatesoutheast.gov.uk
Sustainable Construction: www.sustainable-construction.org.uk/
Sustainable Homes: www.sustainablehomes.co.uk/
The Carbon Trust. www.thecarbontrust.co.uk
The Sustainable and Secure Buildings Bill www.parliament.uk
Thames Valley Energy (TV Energy) www.tvenergy.org
United Nations Framework Convention on Climate Change www.unfccc.int
UK Climate Impacts Programme. www.ukcip.org.uk
UK Government Sustainable Development. www.sustainable-development.go.uk
Woking Borough Council. www.woking.gov.uk
World Wildlife Fund. www.wwf.org.uk