Design of a programme to retrofit energy and water efficiency into existing neighbourhoods of Ashford

Baseline survey on behavioural and attitudes to energy and water saving

Draft report (version 0.1)

by

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1. Introduction and aim

This part of the retrofit design study responds to the requirement to undertake a behavioural attitude survey within the prioritised neighbourhood to help understand more about:

- Technological preferences.
- Willingness to pay.
- Barriers to uptake.

Section 2 provides an overview of the methodology employed, the locations involved and the make-up of participating households. Sections 3, 4 and 5 then look at each of the research questions in turn. Section 6 summarises the findings and provides general conclusions.

2. Survey methodology

2.1. Identification and sampling of households

The survey sample was recruited from a list of residents within the target wards (Bockhanger, Bybrook, Kennington and Little Burton Farm) who had previously engaged with the Energy Saving Trust via the completion of a Home Energy Check (HEC)[1]. As a result of CEN's links with the Energy Saving Trust we were able to re-contact these residents and recruit them for the survey via the offer of a free home energy audit.

From an initial list of 157 households, 24 were recruited for surveys of which 20 were completed (n.b. the difference was due to client cancellations). Recruitment calls were made on a Saturday morning by trained energy advisors who used a basic call guide (see Appendix 2). Bookings were entered into a diary which was subsequently transferred to the home visitor in Ashford. All bookings were confirmed by telephone and visits took place between Wednesday 2nd and 9th of September. The duration of each visit was between 45 and 60 minutes.

2.2. Visit process

Each visit was split into two parts. The first part dealt with the energy audit and provision of advice. The need for this element was twofold. Firstly, the household was recruited based primarily on the offer of a free energy audit, rather than on the basis of participation in a research project. Secondly, it was necessary to conduct the audit in order to understand whether any energy or water retrofit had already been undertaken as this would have a bearing on how the research questions would be tackled. The second part was allocated to the retrofit research questions. Each element was allocated around 25-35 minutes.

2.2.1. Energy audit

During each visit the householder's situation was discussed, energy efficiency needs assessed and a range of actions discussed. Advice was tailored to the householder and was based on a simple technical survey to assess which actions were applicable. A new HEC was also completed during each visit. This was done to help detect any change in the energy ratings that had taken place since the original questionnaire was completed (see Appendix 1 for case studies).

[1] A self-completed questionnaire that provides a basic SAP score and A-G energy efficiency rating for domestic buildings. SAP (Standard Assessment Procedure) is the UK methodology for calculating the energy performance of dwellings.

After the HEC and energy audit had been completed, and any additional questions answered, the surveyor then moved to the retrofit survey. This was made up of three sections:

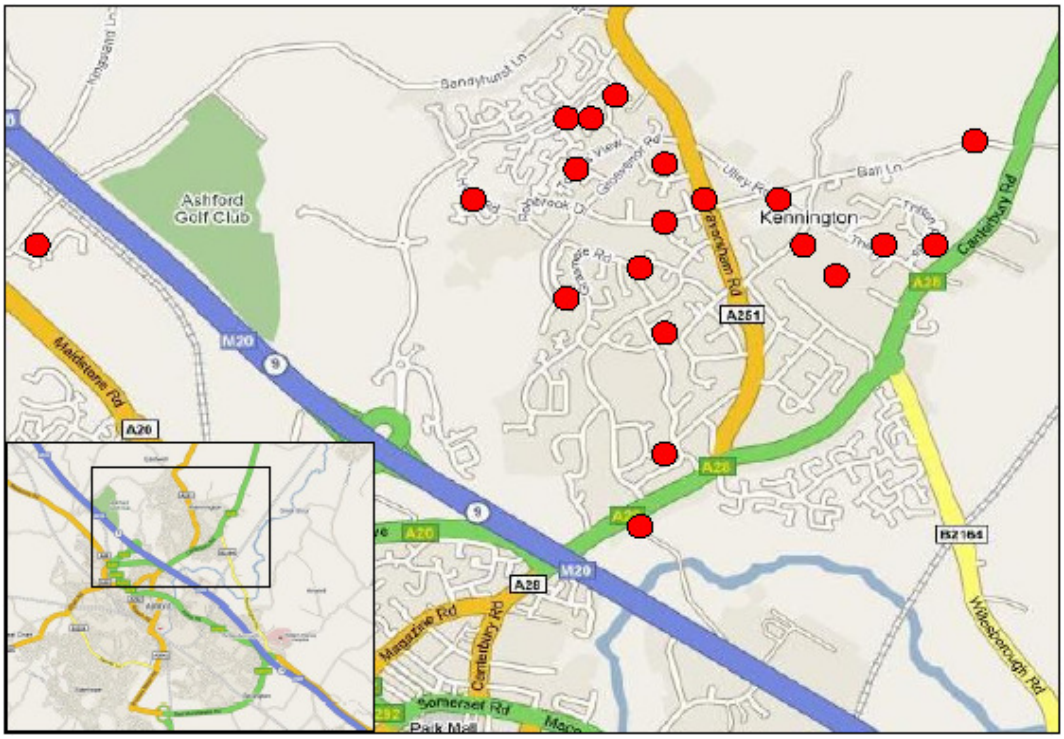
- Basic household profile.
- Energy/water measures – priorities and willingness to pay.
- Barriers/other contextual information.

This part of the survey used a 'semi-structured' interview approach and involved a topic guide consisting of a basic list of questions that were explored during the interview. The guide was used as a checklist during the interview to ensure that the same basic set of information was obtained from each interview. This is a flexible approach that allows the interviewer some freedom to explore certain issues in greater depth whilst maintaining a reasonably conversational tone.

In tandem with the topic guide the interviewer also used two 'show' cards that were designed to reveal how technological preferences were prioritised before and after cost and saving information was provided (see Appendix 4).

2.3. Area description and visit location Map

Within the target area the housing stock is diverse and range from medieval cottages to medium-rise flats, large detached houses to terraces. This diversity reflects the fact that the area has undergone expansion and development over a long period of time and different 'zones' exist in a relatively small area. This heterogeneity was useful for this survey as a wide range of types were encountered. The following map shows the location of each interview.



3. Basic profile of surveyed households

Most properties surveyed were either detached, semi-detached houses or bungalows and were mainly built after 1930. The profile of respondents appears to correspond well with the dominant housing types in the study area.

Property Type	Year Built	Detached	End terrace	Semi-detached	*Grand Total*
Bungalow	**1930-1949**		1		***1***
	1950-1965	2		2	***4***
	1966-1974			1	***1***
	1975-1981		1	1	***2***
Flat	**1991-1995**		1		***1***
House	**Before 1900**	1	1	1	***3***
	1900-1929			1	***1***
	1930-1949		1	1	***2***
	1966-1974	1			***1***
	1975-1981			1	***1***
	1982-1990	1			***1***
	1991-1995		1		***1***
	1996-2002	1			***1***
Grand Total		***6***	***6***	***8***	***20***

Figure 1: Survey profile – property type

The majority of resident surveyed were owner occupiers and more than half were aged over 60. The slight bias to the 'over 60s' may stem from undertaking the surveys during the daytime. Clearly any retrofit programme should consider the provision of evening and weekend support in order to include all target segments.

Tenure	Over 60		*Grand Total*
	No	**Yes**	
Owner occupier	5	9	***14***
Renting from Council	2	2	***4***
Renting from Housing Association		1	***1***
Renting privately	1		***1***
Grand Total	***8***	***12***	***20***

Figure 2: Survey profile – tenure by age group

Around three-quarters of the households surveyed were either 'single occupancy' or couples without dependants, two-thirds were retired. Most of the 'over 60s' households received some form of means tested benefit.

Over 60	On Benefits		*Grand Total*
	No	**Yes**	
No	5	3	***8***
Yes	3	9	***12***
Grand Total	***8***	***12***	***20***

Figure 3: Survey profile – age group by benefits uptake

The age of the resident is an important criterion for CERT funded measures. Most over 70s receive free insulation and many will be eligible for support under the Warm Front scheme. For these reasons it is not unusual for 'over 60s' properties to have already been targeted for energy saving measures and to take up retrofit measures.

In terms of existing energy saving measures most properties that could be insulated were. This probably reflects the number of 'over 60s' properties involved and the fact that most properties had good insulation potential (i.e. due to building type and property age).

Cavity wall insulation	Loft insulation		*Grand Total*
	Full	Some	
None	1	1	***2***
None - solid	1	3	***4***
Yes	7	5	***12***
Grand Total	***9***	***9***	***18***

Figure 4: Survey profile – insulation

The fact that the entire sample had previously engaged with the Energy Saving Trust might suggest that the residents were relatively pro-active in energy saving terms and had acted on the advice provided. However, an analysis of the SAP rating pre- and post-survey suggests that only minor improvements had taken place, most of which were due to errors in survey completion. This suggests that properties were already well insulated and the uptake of advice was more for general interest purposes.

A to G rating: Pre visit	A to G rating: Post visit				*Grand Total*
	B	C	D	E	
C	2	4			***6***
D	1	3	3	1	***8***
E			1	1	***2***
Grand Total	***3***	***7***	***4***	***2***	***16***

Figure 5: Survey profile – energy rating

As expected, boiler age is strongly related to the sophistication of heating controls[2]. Most households with modern boilers had full heating controls, whereas properties with old boilers (pre 1997) had only partial controls. Finally, almost all properties surveyed had double glazing and most used at least some low energy light bulbs.

Boiler age	Heating controls		*Grand Total*
	Full	Part	
1997 or earlier	1	3	***4***
post 1998	11	5	***16***
Grand Total	***12***	***8***	***20***

Figure 6: Survey profile – heating system

3.1. Summary

This basic profile of surveyed households is not uncommon for the simple reason that the majority of people who are available during working hours for 'in house' support are retired and aged over 60. Also, due to their age profile this segment has already received a lot of attention

[2] I.e. room thermostat, thermostatic radiator valves, boiler timer/programmer.

from insulation companies. Clearly any retrofit programme will need to find a way of engaging effectively with 'younger' residents who are 'time poor' but perhaps relatively 'cash rich'. However, doing this cost-effectively might be a limiting factor for any retrofit programme as engagement at the evening/weekend will be more expensive.

4. Research questions

The following sections will consider current attitudes towards energy and water saving and will also look at barriers to uptake.

4.1. Technological preferences

The analysis of technological preference was based on how residents prioritised a range of energy and water saving measures. To try and understand how preferences are influenced by the provision of advice, participants were also asked to firstly rank measures based on their current knowledge. The interviewer then revealed actual costs and saving information before repeating the ranking exercise (sees Appendix 4). The ranking of each energy and water saving measure was calculated as a cumulative total of each household's top three preferences.

4.1.1. Ranking of energy efficiency measures

In the first stage of analysis a ranking assessment was used to reveal preferences for retrofitted for energy efficiency measures. Using this approach double glazing received the highest ranking out of measures most likely to be adopted. Insulation measures (loft and cavity wall) were ranked second and fourth, with central heating boilers ranked third (see Figure 7).

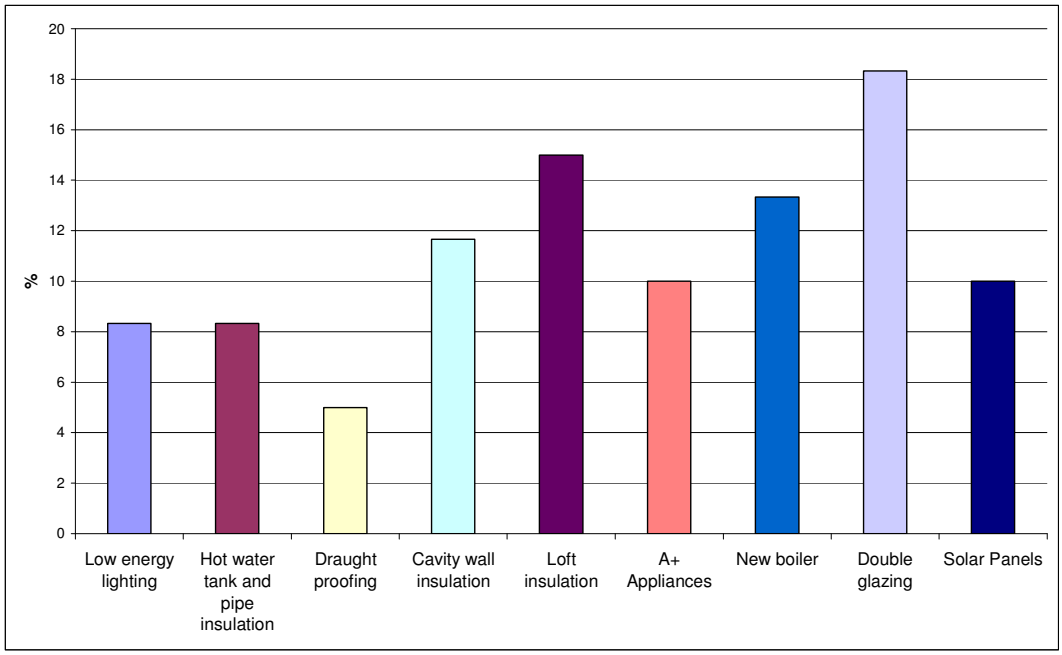


Figure 7: Ranking of energy efficiency measures

These preferences are not unexpected. Most respondents had already installed these 'core' measures and as such they were ranked favourably. Moreover, these measures are the most logical ones to choose, particularly when homes have been occupied for a long period of time and have undergone renovation/improvement. Even for respondents who were not owner occupiers, these measures were again prioritised by the landlord (in this case usually the Council or Housing Association) and had been fitted.

One of the most interesting results was the preference for high cost measures, particularly solar panels. This is interesting considering their high capital cost and long pay-back period. Although no installations of solar panels were encountered during the survey, several 'older' respondents mentioned that they *would* have invested in solar photovoltaics if they had been more widely available when they were younger. The perception was that solar panels were long term investments that should be considered alongside a mortgage or other high cost measures such as double glazing or boiler replacements that, in most cases, had been dealt with at an earlier period. In general, the older households encountered were unlikely to prioritise high cost measures, event though the perceived value of them was almost as high as insulation or double glazing.

Finally, it was clear that most respondents had already engaged with national energy efficiency programmes, primarily utility funded CERT schemes. This apparent high uptake among the respondents links to the earlier point about the age profile, and therefore eligibility, of the households surveyed. Obviously the retrofit design will need to look at targeting resources carefully to ensure that previously treated properties are excluded.

4.1.2. Response to advice on energy efficiency measures

Following first stage of analysis, respondents were given information and advice outlining the cost effectiveness of different energy saving measures. They were then asked to re-asses which measures they were now most likely to adopt (see Appendix 4).

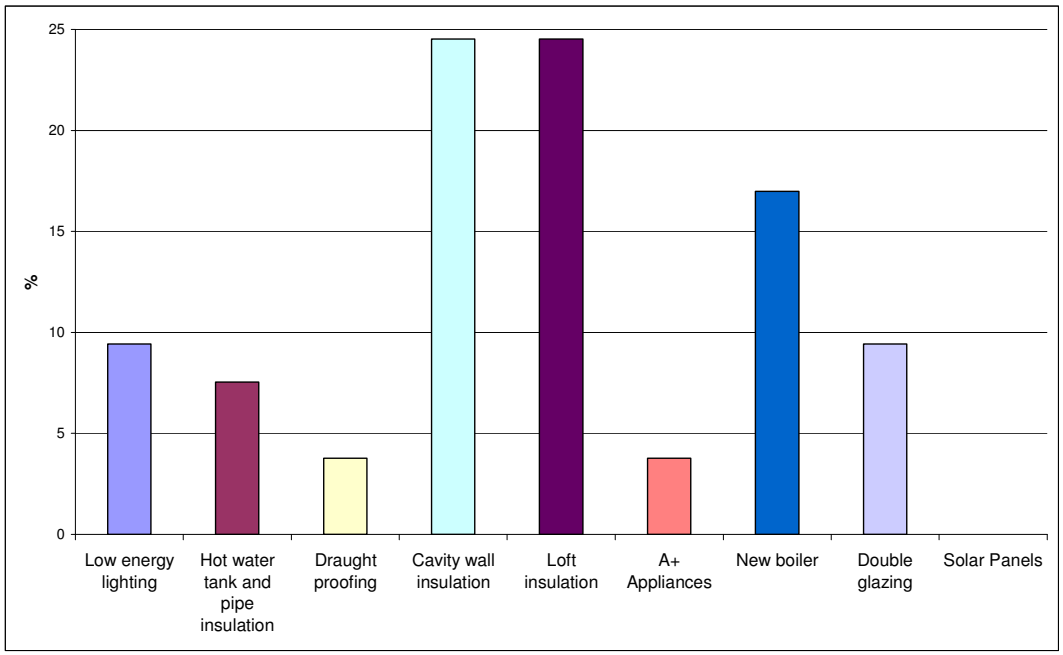


Figure 8: Ranking of Energy Efficiency Measures Following Advice

Before the actual measure cost and saving information was presented, households tended to show preference for a wide range of measures (i.e. there was a lack of differentiation). Also, we found that there was a good overall understanding of energy efficiency measures across all age groups and tenures.

However, after the actual costs and savings were revealed, there was a far greater preference for insulation measures. Clearly the provision of information in this instance significantly

focussed attention onto the most cost-effective measures. Preference for central heating improvements also increased, but significantly double glazing was demoted.

Clearly respondents re-assessed measures in terms of cost-effectiveness and consequently there was a change in the range of measures that were considered to be priorities. The fact that most respondents had previously prioritised double glazing over central heating improvements suggests that glazing improvement messaging (i.e. security, aesthetic factors) has been very successful in the past and had prompted early window replacement rather than early boiler replacement.

After receiving information on the cost effectiveness of energy efficiency measures, respondents were less likely to prioritise technology that involved a high level of investment, such as A+ rated appliances, solar panels and double glazing.

These findings suggest that consumers are liable to change their perceptions and preferences once information gaps have been filled. Also, the provision of advice in this instance has helped to reinforce decision making, rather than radically alter priorities/perceptions (i.e. the core measures remained important and the non-core measures became subordinate).

4.1.2.1. Summary

The analysis into the technological preferences provided some useful insight into how households viewed different energy efficiency measures and how their responded to advice. After receiving advice on the cost effectiveness of energy efficiency measures, households clearly changed their preferences. This would suggest that once households are given the information on the cost effectiveness of different measures, they also willing to change their preferences to high value investments. This would suggest there is value in providing more information to households on the level of savings that can be achieved through measures such as the installation of a new boiler.

4.1.3. Ranking of water saving measures

Households were asked to rank their perception and preferences of water saving technology, in a similar manner to the energy efficiency ranking process. The six water saving measures highlighted were: a water meter, tap aerators, low flow shower head, low flush mechanism, eco toilet and water efficient appliances.

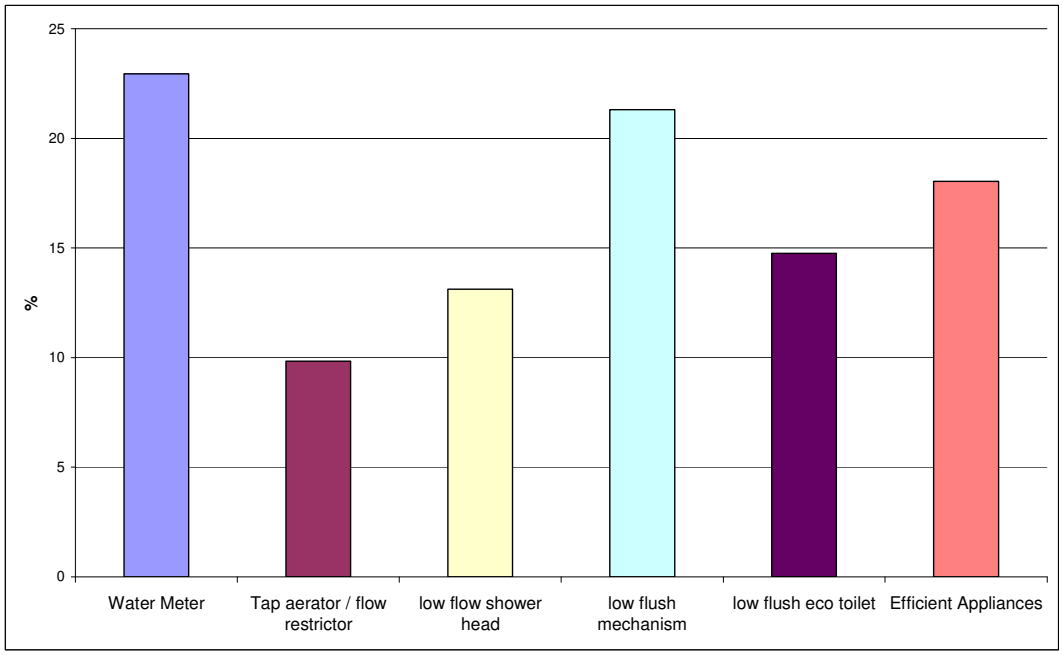


Figure 9: Ranking of Water Saving Measures

The relatively even distribution of ranking would suggest a lower level of discrimination between the technologies available. The highest ranking technology was the water meter, which was also the most recognised water saving device.

The second highest ranking device was the low flush mechanism, which is also a reasonably common water saving technology. Once again water efficient appliances, such as dishwashers and washing machines, which are well understood, were also ranked highly.

Technologies such as the low flow shower head and tap aerators did not score particularly well in the initial ranking exercise. These devices were less well known among the households surveyed and consequently were not ranked highly.

4.1.4. Response to advice on water saving measures

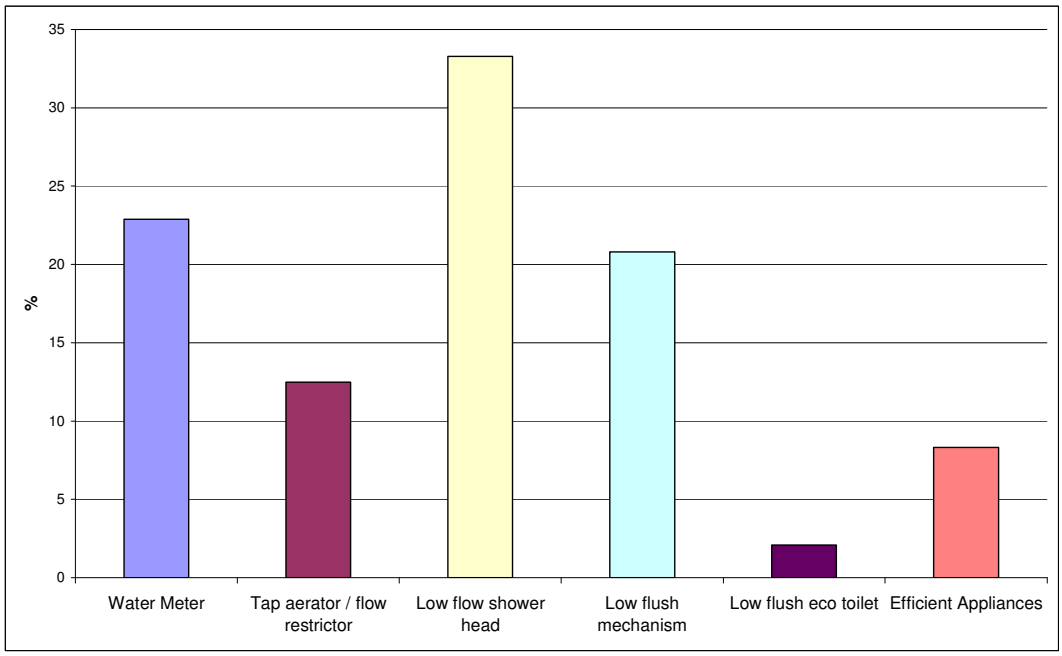


Figure 10: Response to Advice on Water Saving Measures

The ranking of water saving devices following advice on the cost effectiveness of different energy saving measures indicates a more focused level of preference.

The low flow shower head was clearly ranked as the preferred technology. Many of the households were particularly impressed by the low cost of the device and the high level of savings that could be achieved.

The water meter continued to be ranked highly. Some households did not think that the meter was cost effective or were happy monitoring their own water use. However, respondents who had a water meter did agree that it had influenced their use of water, although it was not longer seen as a money saving measure. In a few cases, some respondents reported that their bills had increased post-installation.

4.1.4.1. Summary

The ranking of several innovative water saving technologies provided a good overview of the current level of understanding among households in the survey area. In a similar manner to the energy efficiency ranking analysis, providing advice on the cost effectiveness of different measures resulted in a significant change how they were perceived among the respondents.

The survey and household interviews generally demonstrated that there was a low level of understanding about the range of water saving technologies available. Households with water meters were particularly keen to receive information and support to help with water efficiency. Low flow shower heads, low flush mechanisms and tap aerators were perceived by respondents as the most important water saving technologies.

4.2. Barriers to uptake

The next sections describe the motivations and barriers that exist for the uptake of measures among the survey sample.

4.2.1. Double glazing

Double glazing was installed at most locations visited and was a very popular retrofit measure. The perception of the measure was heavily skewed towards 'comfort' factors (i.e. warmth, elimination of draughts), security, aesthetics, and ease of maintenance, rather than for energy saving reasons. However, cost was seen as a significant barrier to installation.

Home owners also indicated that they budgeted for double glazing when buying the house in the first place. Some would pay a premium for homes with double glazing, and where it has not been installed it was usually installed as an immediate priority, often years in advance of insulation and heating improvements.

Significantly, few respondents referred to double glazing when discussing energy efficiency and clearly 'comfort', security and maintenance factors are of higher importance compared to saving money via saving energy.

4.2.2. Main heating system

A large proportion of respondents were surprised by how much they could save by upgrading to a modern boiler. However, cost remained the main barrier to uptake, particularly for single occupant and low income households. There was also a general perception that a boiler would only need replacing once the existing one had failed not simply as a way to improve energy efficiency.

This reinforces the opinion that new boilers are often a 'distress' purchase and are rarely installed purely for efficiency purposes alone. Clearly double glazing 'wins' in terms of visual impact, whereas as efficient heating systems 'lose' as they are entirely hidden from view (i.e. there is no emotional reward from new boilers, even though they deliver higher energy saving returns than new windows).

Both private home owners and rental tenants were receptive to advice on improving their energy efficiency through the proper use of heating controls.

Overall there were mixed levels of understanding and motivations about the energy efficiencies associated with the main heating system.

4.2.3. Wall insulation

A high proportion of respondents had already insulated their homes using subsidies and grant schemes. This would suggest a positive response to information campaigns on the savings that can be made from wall insulation. Once the private households with unfilled cavity walls were informed about savings that could be made, they were also keen to have their walls insulated.

Cavity wall insulation campaigns have clearly been successful for both priority and able to pay groups. Nevertheless, the survey highlighted that some eligible households still require more information to improve the awareness of the energy efficiency and cost effectiveness of cavity wall insulation. The majority of households that had chosen to insulate their own homes had

either responded to national grants for older people or to discounts advertised by utility companies.

4.2.4. Loft insulation

The savings associated with loft insulation was a key motivator for the uptake this measure. Most respondents had already received information on improving the energy efficiency of their homes using insulation. The majority of these households had also taken up grants schemes or subsidised offers for the installation of loft insulation (mainly utility offers under the CERT scheme[3]).

The benefits of loft insulation were generally well understood and few barriers to uptake existed. Most respondents had installed this measure (either full or partial) and nearly all had done so because they had been targeted by an insulation company or a national campaign (e.g. Warm Front).

Some respondents only had partial loft insulation. The barriers for not topping up to the full 270mm were generally to do with using the loft as storage or not wanting to remove existing boarding. Providing some form of assistance to households, particularly with loft clearances could therefore be an integral part of a retrofit programme.

4.2.5. Low energy light bulbs and A-rated appliances

The large majority of households in the survey area had already received free low energy bulbs from utility companies or had fitted some themselves. Although there was an overwhelming perception that low energy light bulbs were a good idea, there was still a lack of understanding about how much money they could save. Several respondents were also not sufficiently motivated to replace existing bulbs with low energy ones, primarily due to bad experiences with inferior products or bulbs that did not suit existing fittings and décor.

Electrical appliances account for a significant amount of the carbon emissions and energy used in the home. Generally, there was a good level of understanding and perception about saving energy using A–rated appliances. Most of the households interviewed agreed that they had already, or would be considering the efficiency when buying new equipment in order to save money on their fuel bills. In some households there was not just an emphasis on energy efficiency as a way to save money, but also as a means to reduce their impact on the environment.

There did not appear to be any significant uptake of A-rated appliances. However, the early replacement of appliances was not considered a sensible option and thus these measures were not prioritised. The use of incentives for appliances, such as discount vouchers, has already been used successfully in retrofit projects (e.g. Savings on Tap; Preston Water Efficiency Initiative) and this should be considered again for the Ashford programme. This approach should be linked to local procurement to ensure that economic benefits are delivered to local businesses.

[3] CERT: Carbon Emissions Reduction Target.

4.2.6. Water saving devices

Whilst many respondents were relatively aware of energy efficiency issues and solutions, water efficiency was a relatively new concept. One of the main barriers to the uptake of water saving devices was simply a lack of understanding.

Most respondents felt that water meters were the main driver for enhanced 'end user' water efficiency in the home. Once households have a meter installed they can begin to monitor their water use and become more interested in how to reduce their consumption. However, some households indicated they would prefer to, install water saving mechanisms without first having a water meter.

4.2.6.1. Summary

In order to explore the different barriers to uptake, a range of energy efficiency and water saving technologies were examined:

- **Glazing**: Many households in this survey did not just evaluate the benefits of installing measures such as double glazing in terms of energy efficiency. Double glazing was also seen as an important investment in a property, more so than other 'core' energy saving measures.
- **Central heating**: The main barrier for the installation of a new boiler was the high cost and households would continue using their current boiler until it broke down. There also appeared to be a relatively low level of understanding about the level of savings that could be achieved. Non-improved systems tended to have only partial heating controls at best.
- **Insulation**: A large number of private households had already been insulated through subsidies and grant schemes. This would suggest there has a positive uptake to previous (information) campaigns. However, there is still scope to improve the awareness of insulation and how assistance can be accessed. Loft insulation was identified as one of the most popular methods to improve domestic energy efficiency. The benefits of loft insulation were generally well understood and not many barriers to uptake exist. Among households with only partial loft insulation, the use of the loft as a storage space was identified as the main barrier to not topping up to the recommended levels.
- **Lighting and appliances**: Many of the households in the survey area had already received free low energy light bulbs. However, many respondents had not replaced their incandescent bulbs as the new bulbs were often still perceived as inferior. Most of the households in the survey area were interested in using A-rated appliances in order to save money on their fuel bills. Although there were no significant barriers to the uptake of A-rated appliances, replacement was not considered to be a priority.
- **Water saving measures**: The water meter was identified as a catalyst for the uptake of other water saving measures. Once a household is metered, there is often a shift in the emphasis given to achieving water efficiency and using water saving devices in general. A key finding was the overall lack of awareness of water saving measures, their application and the link to saving money. However, not all respondents had a water meter and this partially explains why water saving did not feature significantly in any of the households surveyed.

4.3. Willingness to pay for energy efficiency and water saving measures

A combination of 'in house' interviews and ranking exercises has been used to provide an overview of the willingness of households to pay for energy efficiency and water saving measures.

4.3.1. Methodology

The willingness of each household to pay for energy efficiency measures was analysed alongside the technological preference ranking exercise. Once the participants had identified which measures they had prioritised, they were asked to provide information on how much they would be prepared to pay for them. In order to understand how the respondents were influenced by the provision of advice, the interviewer then revealed costs and savings information. Households were then asked to repeat the ranking exercise and explain what they were now willing to pay.

4.3.2. Willingness to pay for energy efficiency measures

Overall, there was a good understanding of the costs involved in the installation of energy efficiency measures. Private home owners were prepared to pay for any investments to their property and did not generally expect any subsidies. However, they were more likely to adopt energy efficiency measures if financial support was made available. Some households also indicated that there should be support provided to encourage high capital investments such as new boilers and even solar panels.

For most measures, the perceived costs matched actual costs relatively well and there was no significant difference in the prices that respondents were willing to pay once the costs and savings of the installation measures were provided. Where discrepancies were encountered, it was due to respondents not being aware of subsidies and grants (e.g. for insulation). Once this information 'gap' had been closed, respondents tended to be quite surprised at how inexpensive the measures are.

However, the exercise did show that households were willing to change their investment preferences. For example, following the advice, households were more likely to prioritise investments such as new heating systems over double glazing.

Respondents living in rented accommodation were clear on the role of the landlord in providing energy efficiency improvements. Other than a reduction in energy bills, tenants felt that they would not benefit from adding value to a property. This is an interesting finding and suggests that tenants easily made the link between energy efficiency and saving money, yet they did not feel empowered to make changes.

A significant number of households interviewed for this analysis were over the age of 60 and owned their own property. The majority of these households had already received or were about to receive energy efficiency improvements through grant schemes. Many of these households indicated that they would not have been able to afford to install the measures themselves. Older people are also not willing to make long term investments in a property, unless there were significant short term benefits, primarily money saving and comfort.

Most of the properties owned by the Council or housing associations had either already been improved or were about to undergo improvements. On the whole, this tenure was pleased

about receiving free insulation and the associated savings it affords, but clearly the decision making for these improvements was made outside of the household.

4.3.3. Willingness to pay for water saving measures

In contrast to energy efficiency, respondents only showed a limited understanding of the costs involved in fitting water saving measures. The overall lack of understanding of the water saving measures also meant households found it very hard to quantify how much they were willing to pay for these measures.

The majority of respondents thought that the installation of water meters should be free. However, one household was prepared to pay a premium for 'smart' water meters that could be read by the water company without having to visit the home.

Respondents with water meters generally had a better understanding of the different water saving devices available. Several of these households had already invested in water saving measures such as water butts for the garden. Additionally, some households had also installed other DIY water saving measures, such as those that reduced the amount of water used in the toilet cistern. However, even in these households knowledge on the 'core' water saving devices (cisterns, low flow shower heads, aerators) was limited.

The provision of information about water saving, including costs and savings, did generate interest in the subject, although it tended to focus on outdoor measures associated with gardening. Metered houses, however, showed the greatest interest in investing in new water saving devices.

Overall, respondents were most prepared to pay for low cost/high saving devices such as the low flow showerhead tap aerators and low flush mechanisms. The more expensive measures, such as low flow toilets, received only limited interest.

4.3.4. Summary

Some of the most important measures to improve the energy efficiency of a home, such as double glazing, loft insulation, wall insulation and replacing the main heating system, involve a significant capital investment. Although households demonstrated a good understanding of the costs of energy efficiency measures, there was a dissonance in how they evaluated their priorities. The earlier analysis into technological preference indicated that households tend to prioritise major investments first in terms of comfort, security and aesthetics and only consider energy efficiency as a secondary issue. However, providing advice on the overall costs and savings demonstrated that there is a potential to influence this behaviour.

From this analysis we can conclude that:

- Older residents will not respond well to programmes that involve a high level of capital investment.
- There are also likely to be problems involving rental tenants in retrofitting projects that involve significant personal investments.
- In rental properties, when a tenant is motivated to pay for energy efficiency measures, they would not necessarily be able carry them out. One possible solution to these problems would be to develop a catalogue of programmes that can be applied to a

range of different household segments. This could include specific packages for older people as well as for landlords and tenants.

- Most respondents indicated that they would be willing to make small investments to improve energy efficiency (e.g. low cost measures such as low energy lighting, hot water tank insulation or draught exclusion).
- Higher costs measures, whilst priced accurately, were often not seen as being feasible due to constraints on household income and tenure.

For water saving measures, the survey showed there is a general lack of awareness of both what is available, how much they cost and what savings they can deliver. In general 'outdoor' water saving devices dominated the interviews. Whilst it was clear that most respondents had a fairly pro-environmental attitude towards saving water, this was done in very basic and ad-hoc ways and was not dependant on technological innovations.

However, households with water meters were more interested in receiving support and advice on water saving. These households also indicated that they were willing to pay for water saving devices if they were made aware of the costs and savings they could achieve.

5. Overall summary

Households demonstrated they were prepared to alter their preferences after receiving advice on the cost effectiveness of energy efficiency measures. This would suggest that providing information on the cost effectiveness of different measures can also be used to influence preferences to high value investments. We can conclude that there is value in providing more information to households on the level of savings that can be achieved through measures such as the installation of a new boiler.

There are a range of different motivations and barriers to uptake for each energy efficiency technology. The benefits of installing measures such as double glazing were not simply evaluated in terms of energy efficiency. Double glazing was seen primarily as an important investment in a property.

With regards to central heating, respondents indicated they were likely to continue using existing boilers until they broke down as the cost of pre-emptive replacement was too high. There also appeared to be a relatively low level of understanding about the level of savings that could be achieved by new heating systems.

Most private households had already insulated their cavity walls. For the few who had not, the provision of information would clearly assist the decision making process. Loft insulation was identified as the most popular energy efficiency measure. The barriers to uptake were only identified among respondents with partial insulation who used the loft for storage.

For appliances, no significant barriers appear to exist in the uptake of these measures and costs were generally well understood. However, early replacement of existing equipment was not considered to be a priority due to limited incomes and cost savings.

Overall, households demonstrated a good understanding of the costs involved in energy efficiency measures. However, there appeared to a range of motivations driving the evaluation of priorities. The technological preference analysis indicated that households are more likely to prioritise their investments in terms of comfort, security and aesthetics.

Energy efficiency on its own was rarely cited as a key motivator. However, the subsequent provision of advice on the overall costs and savings did appear to demonstrate that there was potential to influence behaviour.

Older residents did not appear to respond well to programmes that involve a high level of capital investment. There are also likely to be problems involving rental tenants in retrofitting projects that involve significant personal investments in properties. However, all tenures did indicate they would be willing to make small investments to improve energy efficiency.

The following table summarises each of the above sections.

Energy Topic	Main Points
Technological preferences	• Households are prepared to alter preferences after receiving advice on cost effectiveness. • Providing information on the cost effectiveness can also be used to influence preferences to high value investments.
Barriers to uptake	• The benefits of installing measures such as double glazing were not simply evaluated in terms of energy efficiency. • Households were likely to use their boiler until it broke down as the cost of replacement was too high. • Lack of understanding about savings that could be achieved by new heating systems. • Cavity wall insulation campaigns have been very successful. • Better awareness of cost effectiveness of insulation needed for those who have not already installed. • Unlikely to top up partial insulation when loft is also used a storage space. • Replacement of existing electrical appliances was not considered to be a priority. • Developing a range of programmes that can be applied to different household segments will encourage uptake.
Willingness to pay	• Households demonstrated a good understanding of the costs involved in high value energy efficiency measures. • Providing advice on the overall costs and savings demonstrated that there is a potential to influence prioritisation. • Older residents and rental tenants will not respond well to programmes that involve a high level of capital investment.

The ranking of water saving technologies provided a good introduction of how well households understand these measures. In general, respondents demonstrated a low level of understanding about water saving technologies. The water meter, the low flow shower head, low flush toilet mechanism and the tap aerator devices were considered to be the most important water saving technologies.

The installation of water meters was identified as a key catalyst in encouraging the uptake of other water saving measures. Respondents with water meters were generally more interested in receiving support and advice on water saving compared to those without meters. These households also indicated that they were willing to pay for water saving devices if they were made aware of the costs and savings they could achieve. In this situation the main barriers to uptake was the lack of understanding of the technologies available, their costs and lack of understanding of how to access assistance.

Finally, it was clear that simple and relevant advice on the different water saving measures resulted in a significant change in how they were perceived. Most respondents, particularly those with gardens, were making attempts to save water using basic common sense (e.g. grey water recycling) and DIY techniques. However, none of the households surveyed had retrofitted any water saving devices, with the exception of water meters.

The following table summarise each of the section above.

Water Topic	Main Points
Technological preferences	• Providing advice on the cost effectiveness of different measures resulted in a significant change in how they were perceived. • The water meter, the low flow shower head, low flush mechanism and the tap aerator were identified as the most important water saving technologies.
Barriers to uptake	• There was a low level of understanding about water saving technologies. • Water meters are the main catalyst to encourage the uptake of other water saving measures.
Willingness to pay	• Households with water meters were willing to pay for water saving devices if they were made aware of the costs and savings they could achieve.

Appendix 1: Case studies

A1.1. Case study 1

Address	Mr S Kelly 45 Larch Walk TN24 9BD	
Household Type	Family	
Number of people	3 Adults	
Age	1-35 and 36-50	
Gender	2x Female, 1xMale	
Profession / Occupation	Administration, Paper Manufacturing	
Household income	£45-50k	
Benefits	None	

Background

- The client lives with his partner and grown up daughter.

Summary of Perception and Motivation to improve Energy Efficiency

- He was aware of a range of energy saving measures and had already sought to make improvements to insulation, water consumption and electricity use.
- The client was keen to become more energy efficient in order to improve his quality of life, save money and have a positive environmental impact.

Wall insulation:

- Knew that wall insulation was important and lead to reduced heat loss.
- E.ON Surveyor had been round to look at walls. Insulation did not take place as there was a problem with access and the client had only just moved into the property.
- Will look into this again as there may be another approach.

Loft insulation

- The client was aware of the benefits of loft insulation through improvements in a previous property.
- The loft in the current house had been almost entirely uninsulated and was cold.
- E.ON came and surveyed the walls, loft and offered a subsidised installations so the client got the work done.

Double Glazing

- The windows were old when the client moved and the house was draughty.
- The client believed that the investment was necessary and worthwhile and was an investment in the property as a whole.
- The improved glazing was also atheistically good and felt more secure.

Low energy light bulbs and A-rated appliances

- The new washing machine and fridge appliances were chosen as they were energy efficient and water saving.

Main heating system

- The heating system is only three years old.
- Had just been upgraded before the client moved in.

Current behaviour, attitudes and awareness

Do you recycle?	Recycle, use blue box
How do you use your heating controls?	Heating controls are digital, easy to use and operate by remote control.
Do you leave things on stand-by?	Only the sky box remains on standby in order to save energy.
Do you sometimes have to limit your use of heating?	Does not have to limit the use of heating.
What are your normal heating patterns?	Normal heating patterns are on in the morning, and again in the evening.
How do they pay for their energy?	Bills are paid by Direct Debit.
How much have their recent bills been?	Gas bills have decreased since the loft insulation has been topped up. Water bills have also gone down since putting in a digital water meter.
Are you aware that energy saving measures can be free or subsidised? If so which ones?	Was only aware of grants that were available through E.ON and that supported priority groups.

A1.2. Case study 2

Address	Mr F Acott
Household Type	Retired Couple
Number of people	2 Adults
Age	Over 60
Gender	1x Female, 1x Male
Profession / Occupation	Retired
Household income	< £15K
Benefits	State Pension

Background

- A retired couple that have recently moved to a new bungalow.

Summary of Perception and Motivation to improve Energy Efficiency

- The household were actively seeking and applying for grants that would make their home more energy efficient. They have already received a loft insulation top-up and are in the process of receiving a new boiler and heating controls through the Warm Front scheme.
- There was only a limited level of understanding about energy efficiency measures such as low energy light bulbs and A-rated appliances. However, the couple were keen to find out more. They were particularly interested in water saving measures as they are currently on a water meter and would happily adopt measures that are of benefit.

Wall insulation

- The walls had been insulated prior to moving into the property.

Loft insulation

- The household had completed a Home Energy Check, from the Energy Saving Trust.
- The Home Energy Check recommended loft insulation top up.
- The client requested a survey and received loft insulation top up

Double Glazing

- The windows were already double glazed when the client moved into the property.

Low energy light bulbs and A-rated appliances

- Only some incandescent light bulbs in the living room had been replaced by low energy light bulbs**.**
- The couple did not like “the look” of the new bulbs and were surprised at the financial savings that could be achieved.
- Although none of the kitchen appliances were A-rated, the client was keen to find out more.

Main heating system

- The heating system is due to be replaced through the Warm Front grant.
- The couple had filled in an application for a new boiler and have had a survey.
- A contractor has been instructed to carry out the work and they are expecting the installation in October.

Current behaviour, attitudes and awareness

Do you recycle?	Recycle, use blue box.
How do you use your heating controls?	Heating system is turned off in the summer.
Do you leave things on stand-by?	Yes, getting to the plug is too difficult, prepared to pay for the extra electricity for the convenience.
Do you sometimes have to limit your use of heating?	The cost of heating is high and they sometimes feel they should limit it. However, they don't.
What are your normal heating patterns?	The heating is on all day in the winter.
How do they pay for their energy?	Bills are paid quarterly.
How much have their recent bills been?	They have noticed an increase in heating bills, despite energy efficiency measures. This is a worry.
Are you aware that energy saving measures can be free or subsidised? If so which ones?	Was aware of a range of grants that were available to them, including, cavity wall insulation, loft insulation and boiler replacement.

A1.3. Case study 3

Address	Mrs J Holloway
Household Type	Couple
Number of people	2 Adults
Age	Between 51-65
Gender	1x Female, 1x Male
Profession / Occupation	Householder
Household income	High (not given)
Benefits	None

Background

- An older couple with two adult children that have only recently left home and often return at weekends.

Summary of Perception and Motivation to improve Energy Efficiency

- The client was very aware of energy efficiency measures and was happy to receive additional advice. The overall motivation to improve energy efficiency was not to save money. The client was keen to "do-their-bit" to help reduce their environmental impact.

Wall insulation

- The property is only a few years old and was built with cavity wall insulation.
- The house is much warmer than all previous premises they have lived in.

Loft insulation

- The loft is already fully insulated.

Double Glazing

- The windows were already double glazed when the client moved into the property.

Low energy light bulbs and A-rated appliances

- Low energy light bulbs have been fitted almost everywhere.
- The client always chooses energy efficient appliances.
- "I have lots of electrical appliances and I want to be as efficient as possible, not for economic reasons, I believe this is what I should be doing".

Main heating system

- The heating system is vey efficient and has digital room controls.

Current behaviour, attitudes and awareness

Do you recycle?	Recycle, use blue box.
How do you use your heating controls?	Heating system not used in the summer. Efficient room controls allow a lot of flexibility when heating in the winter.
Do you leave things on stand-by?	Some appliances are left on standby. However they are all new and have good energy ratings.
Do you sometimes have to limit your use of heating?	Never.
What are your normal heating patterns?	The house is heated for 1 ½ hours in the morning and 2 ½ hours in the evening.
How do they pay for their energy?	Bills are paid by Direct Debit.
How much have their recent bills been?	Receive an energy use graph from the utility company and constantly try to use less.
Are you aware that energy saving measures can be free or subsidised? If so which ones?	Only aware of grants for loft and cavity wall insulation for the elderly.

Appendix 2: Survey recruitment guidance for outbound calls

A2.1. Background

CEN has been commissioned by Ashford Borough Council, Kent County Council and the Environment Agency to undertake research into how existing privately owned or rented dwellings can be retrofitted with energy and water saving measures to improve their overall environmental sustainability.

As part of this work we would like to recruit between 20 and 30 households to take part in a survey that will help us understand attitudes towards energy and water saving measures and the extent to which people would be prepared to pay for them. To do this we will offer people a free home energy audit during which a short questionnaire will be completed.

A2.2. Project brief

We need the advice team to make outbound calls to recruit between 20 and 30 households. Telephone numbers will be provided. Once contact has been made we need the advisor to offer the free audit and book people into an Excel diary.

Due to the use of HEC data the call will need to be from the Energy Saving Trust. The advisor should explain that the ESTac is working in partnership with Ashford Borough Council to provide free energy audits to a limited number of households as part of a wider project investigating how existing dwellings in the town can be made more energy and water efficient.

A2.3. Timings

Outbound calls to commence asap, evening or weekend without incurring additional costs. To be completed by Sept 1st. Audits will take place on September 2, 3, 4 (pm), 7, 9. A booking spreadsheet will be provided.

A2.4. The offer

- Free home visit by a trained energy advisor.
- Visual energy efficiency survey focusing on insulation and heating system.
- Bespoke advice and to how to save money via saving energy focusing on the installation of measures including advice on grants/subsidies.
- Free power down and low energy light bulbs.
- Literature for recommended measures.
- Written summary of advice.
- A bespoke energy report providing an unofficial A to G rating for your property.
- We will send a letter confirming the appointment and the home visitor will present photo ID and the time of calling.

A2.5. Example

- I'm calling from the Energy Saving Trust advice centre for Kent, Surrey and Sussex (or whatever the standard greeting is).
- We are working in partnership with Ashford Borough Council to provide a limited number of free home energy audits and I was wondering whether you would be interested in taking part?

- The audits are designed to help you save money by saving energy and our trained energy advisors will be able to advise on all aspects of energy efficiency.

What will happen if I say yes?

- Firstly we would like to book a home visit with you – we have slots available on (consult diary). We will send a confirmation of the visit by post.
- The visit will take around 45 minutes during which an energy efficiency survey will be completed.
- Based on the survey we will discuss the energy saving options that are available to you. We would also like to ask a few simple questions about how you use energy in the home and what you think about installing energy saving measures.
- We will also provide you with a free power down device, energy saving light bulbs and any literature that is appropriate.

Why are you calling me?

- Our records indicate that you have previously completed one of our home energy checks (e.g. one that came in the post or was completed at an event or on line).

Is this a sales thing?

- No – we are a government service that is designed to provide free and impartial advice about saving energy in the home. We are not selling anything.
- Our expert advisors are fully trained and accredited and will be able to answer any questions you might have about using energy in the home.

Why is the Council involved?

- The Energy Saving Trust works in partnership with all local authorities. The Council supports this initiative because it brings free and impartial service to its residents. If you would like any reassurance then I can ask a colleague at the Council to call you.

How will I know the caller is genuine?

- We will send a written confirmation of the visit by post. The letter will clearly state the name of the person coming to visit. The energy advisor will provide photo ID as a proof of ID. They will also leave their contact details should you need to make contact after the visit.

Appendix 3: Interview topic guide

Motivation to insulate:

- If insulated what motivated - How did they pay - When
- Was this reasonable - What benefits have they received?
- Cost / How did you pay? Aware of grants?
- If not insulated why not? Barriers?
- How much would they pay - Should it be free and why?

Windows:

- If not properly insulated why not?
- Have they considered? What prevents them?
- How much do they think it would cost?
- What help would they like?
- If they DO USE then what motivated?

Low energy light bulbs and A-rated appliances:

- If not already used why not? Barriers?
- Why motivated? cost?

Main heating system:

- If OLD System why not upgraded?
- Barriers?
- Do they understand link with bills?
- If NEW then what motivated? Etc.

Water saving:

- Any measures used? Which? Motivation?
- If none, are the aware of any? Which? Costs?
- Do they understand link with energy saving?

Current behaviour, attitudes and awareness

- Do you recycle?
- How do you use your heating controls?
- Do you leave things on stand-by?
- Do you sometimes have to limit your use of heating?
- What are your normal heating patterns?
- How do they pay for their energy?
- How much have their recent bills been?
- Are you aware that energy saving measures can be free or subsidised? If so which ones?

Attitudes towards water and energy saving: (1= Strongly disagree and 9=Strongly agree).

- Recycling is more important than saving energy/water
- I think it is important to do my bit
- Saving energy and water can help tackle climate change
- Saving energy and water can help save money
- Climate change is a serious problem.

Appendix 4: Measure preference show cards

Table A

	Energy Efficiency in the home	Rank (1 = most likely to adopt)	How much would you pay?
1	Low energy lighting		
2	Hot water tank and pipe insulation		
3	Draught proofing		
4	Cavity Wall Insulation		
5	Loft Insulation		
6	Energy efficient appliances (e.g. fridge, freezer)		
7	New efficient boiler and heating controls		
8	Secondary glazing		
9	Double glazing		
10	Solid wall insulation		
11	Solar panels for hot water		
12	Solar panels for electricity		

	Water efficiency in the home	Rank (1 = most likely to adopt)	How much would you pay?
1	Water meter		
2	Tap aerator / flow restrictor		
3	Low flow shower head		
4	Low flush mechanism added to cistern		
5	Low flush eco toilet		
6	Efficient appliance (e.g. washing machine)		

Table B

	Energy Efficiency in the home	Estimated installed Cost	Estimated annual saving on energy bills	Rank (1 = most likely to adopt)
1	Low energy lighting	£1-2 each	Up to £37	
2	Hot water tank and pipe insulation	£12	£35	
3	Draught proofing	£100-£200	£25	
4	Cavity Wall Insulation	From £150	£115	
5	Loft Insulation	From £150	Up to £150	
6	Energy efficient appliances (e.g. fridge, freezer)	From £200	Up to £36	
7	New efficient boiler and heating controls	From £400	Up to £235	
8	Secondary glazing	£2,500-£5,000	Up to £65	
9	Double glazing	£5,000-£10,000	Up to £135	
10	Solid wall insulation	£5,500-£14,500	£380-£400	
11	Solar panels for hot water	£3,000-£5,000	Up to £50	
12	Solar panels for electricity	£8,000-£20,000	Up to £230	

	Water efficiency in the home	Estimated installed Cost	Estimated annual saving on water bills	Rank (1 = most likely to adopt)
1	Water meter	Usually no charge	£50	
2	Tap aerator / flow restrictor	From £3	£16	
3	Low flow shower head	£15-25	£160	
4	Low flush mechanism added to cistern	£25	£50	
5	Low flush eco toilet	£250	£50	
6	Efficient appliance (e.g. washing machine)	From £250	£20	