

Barriers to domestic retrofit: Learning from past home improvement experiences

Becky Mallaband, Victoria Haines and Val Mitchell

**Loughborough Design School, Loughborough University, Leicestershire, LE11
3TU, UK**

Introduction

The UK Government has set targets of zero-carbon homes for all new builds by 2016; however a significant problem in carbon reduction lies in the houses that already exist, with approximately 75% of the houses that will exist in 2050 already built (Wright 2008). There are many changes, both physical and behavioural, that can make a house more efficient. Changes in a household's behaviour and habits can play a big part, as can decarbonising the grid by using renewable energy. In addition, the retrofitting of energy saving technologies into existing homes is expected to play a significant role in reaching the UK's carbon reduction targets. Within the existing UK housing stock there are many homes that present particular difficulties when trying to improve their efficiency and can be classified as 'hard to treat'. According to DEFRA (2008), statistics obtained from the English House Condition Survey indicate that there are 9.2 million dwellings that would be considered hard to treat in England (43% of the total housing stock). These include:

- Homes with solid walls
- Homes with no loft space
- Homes in a state of disrepair
- Homes without a connection to a low cost fuel such as oil or gas
- Homes where staple energy efficiency measures cannot be fitted.

(Energy Saving Trust, 2008, 2009)

Solid walled houses, i.e. those without a cavity, make up 6.6 million or 31% of the total housing stock (72% of the hard to treat stock) (DEFRA, 2008). Solid walled houses tend to have lower SAP ratings than those with cavities. It is not possible to implement cavity wall insulation into these properties, which is widely regarded as a very cost effective way of improving the SAP rating of a house (Centre for Sustainable Energy, 2006) and so these homes require alternative measures to become energy efficient. Given the number of UK homes involved, the challenge of improving the energy efficiency of this sector of the housing stock is significant.

Of the 6.6 million homes in the UK that have solid walls, 4.5 million are owner-occupied (DEFRA, 2008). Many of the previous schemes and initiatives for retrofit (CERT, CESP etc) have not been aimed at owner occupied houses and have limited funds on offer or are only available for those on low income levels or benefits. This means there has been a large sector of the market that is unable to benefit from or make use of these schemes. In addition, many of the schemes only provide 'mainstream' retrofitting options, such as cavity wall and loft insulation, which means the owner occupied, solid walled houses are largely not catered for. The UK Government's 'Green Deal' policy introduced in 2012 is intended to provide, through loans, the funding necessary to carry out whole-house energy saving refurbishments, but these still require the householder to be motivated to carry out the improvements. Clearly, ensuring policies and technologies are appealing and acceptable to householders is key. To make retrofit appealing and engaging, it must be ensured that the needs of householders are met by the technologies on offer, as in many cases householders will be funding such measures themselves. It is therefore imperative that understanding of the requirements of householders is gained in order to maximise the uptake of retrofitted energy saving measures.

Home Improvement and Domestic Retrofit

The energy efficiency of a house may be improved as an additional advantage of home improvement, but rarely seems to be the main incentive for change. As energy saving measures are yet to be retrofitted into UK homes in large numbers, focusing on why and how people undertake home improvements can provide understanding of the context within which the retrofitting of energy saving measures will take place. With a view to identifying 'trigger points' (defined as the times in the lifecycle of a home where energy saving measures could be fitted as part of a wider home improvement project), the Energy Saving Trust (2011) highlighted three primary barriers to home improvement: Information & Awareness, Hassle and Cost. Carrico et al (2011) suggested that a multiple approach strategy is needed from policy makers along with the provision of information in order to achieve reduction in domestic energy use, for example; measures to increase motivation, reduce mental effort along with more relevant information.

The variation in people's attitude towards energy and the environment does pose significant challenges to those trying to engage householders in the development of measures and systems. Jackson (2005) talks of the complexity of changing people's behaviours and how individual behaviours are deeply embedded in social and institutional contexts. He describes how people can feel 'locked in' to unsustainable behaviours in spite of their best intentions. Each individual household will contain a mixture of preferences and practices which will influence the installation of

technologies and the way home improvement is carried out (EAGA, 2009). It is therefore very important to ensure that people are engaged in the process of retrofit and to see how it can work individually for their household. This means it is necessary to understand what would motivate householders to implement different measures and how the design and installation of technologies can be adapted to best appeal to the householder. It is commonly accepted that not all of the population will make an effort to increase the energy efficiency of their house, not only through lack of resource, but lack of understanding, ability and will to act. The willingness to act is of key importance; Yohanis (2011) found that although 77% of householders surveyed had a general awareness of energy and environmental issues, their adoption of energy saving measures did not reflect this. Other research suggests that lack of action is due to the fact that people believe they personally have limited impact on climate change (Lainé, 2011). However, the same report states that more than 53% of British consumers surveyed would be prepared to take action to limit climate change, with 71% of these willing to insulate their homes even if that entailed some short term disruption.

A report by Consumer Focus (2011) identified some of the particular challenges facing the installation and uptake of solid wall insulation. They highlight that solid walled houses are diverse and complex and therefore require bespoke solutions. They also point out that 'making good', which is of particular importance when installing in owner occupied houses, can comprise up to 50% of the project costs. In conclusion, they recommend that investment in product development and innovation is urgently needed in order to reduce costs and to improve acceptance of solid wall insulation by householders.

A UK home improvement survey carried out by Halifax (2009) found that 55% of householders had undertaken some form of home improvement during the previous 12 months. They also found that the two main motivations behind these home improvements were to improve the look and design of the house (44%) and to update and modernise the house (38%). Another study found that 57% of householders described their motivation to make improvements as a desire to create a nicer living environment (AA, 2009). The UK recession and the consequent fall in house prices, has impacted upon householders' decisions to sell and renovate with high levels of home improvement occurring in 2009 and 2010. This is likely to have been caused by a number of factors. One suggestion is that householders have changed their attitude towards their property and are now seeing it more as a 'home' than an 'investment' and are therefore more likely to spend money on home improvements (Anon, 2009). The fall in interest rates for savings may also have impacted the trend, as householders realise that whilst their savings are not gaining any interest they could provide better return when invested into improving their home. More competitive labour costs may also have an impact on the decision to improve.

Janda (2011) believes that occupants are often overlooked and are poorly understood even though they play a very significant role in the built environment. It is essential that we are able to understand more about householders in order to influence their choices and behaviour in relation to retrofit. Fawcett and Mayne (2012) state that, '*Very little is known about why individual owner occupiers choose to undertake eco-renovation, who those people are, the influences on that choice, the role of professionals in guiding renovations, whether and how inhabitants live differently post-renovation and so on*'. In order to fully uncover this decision making process, it is important to also understand the reasons why these improvements are not carried out.

Shove (2003) explains that the way we use our homes is grounded in '*habits, practices and norms*' and whilst these do shift and change over time, this is usually a consequence of cultural factors and social expectations that are not easy to influence. Householders may act un-sustainably out of pure habit but also because it is socially acceptable and usual to do so (SCRT, 2006). Such un-sustainable behaviours are so embedded in our daily lives that education and information are unlikely to facilitate the desired change (Jelsma, 2006) and for new behaviours to be successfully adopted by householders, they need to become social norms (SCRT, 2006).

Uncovering the barriers

There have been a number of examples of whole house energy saving refurbishments, which tend to be undertaken as a major project, requiring the householder to move out of the property for an extended period whilst their home is gutted and rebuilt. The UK Government's Technology Strategy Board has funded demonstrator whole house solutions to improve the performance of the entire property with a goal to make deep cuts in carbon emissions under its 'Retrofit for the Future' programme. Whilst this gives us an indication of the potential energy savings to be gained from major refurbishment, often at a significant cost, it does not present a realistic proposition to the mass market, in terms of willingness to undertake this type of project and being able to fund it, in particular.

In order to inform the development and installation potential of future energy saving measures, we looked to past home improvement experiences of householders. Whilst these do not necessarily give us an indication of how people in the future might take up energy efficiency measures, many home improvements are directly linked to saving energy, e.g. replacing a boiler or hot water tank, upgrading a radiator, installing loft insulation, fitting carpets, replacing windows or addressing draughts through improvements to the building fabric. By looking at these real examples of past practice, it is possible to predict, from a grounded evidence base, how people might undertake

energy efficiency improvements in the future. The study took a user centred design approach, following the approach of ISO 9241-210: 2010 which states;

“Using a human-centred approach to design and development has substantial economic and social benefits for users, employers and suppliers. Highly usable systems and products tend to be more successful both technically and commercially.”

Twenty households were drawn from the East Midlands region of the UK who met the primary study criteria of owning and living in a solid walled house. There were 66 permanent occupants in these households, 34 of whom were interviewed.



Figure 1: Typical solid walled properties within the sample area

Participants were selected using a purposive sampling approach so that they represented a wide range of family structures, incomes and social statuses, house and household types. While this was never intended to be a statistically representative sample, it allowed for a snapshot of different domestic situations to be explored, using a maximum variation sample (Marshall, 1996). Participants were chosen from a sample frame of owner occupied, solid-walled houses in Leicestershire in the UK. Data were collected through two semi-structured interviews with each household, carried out on two separate occasions. The interviews were carried out in the participants’ homes, in a room of their choice, for a comfortable environment and to allow visual cues that would prompt both the participants’ recollection and ensure that researchers could note contextual factors relating to the responses given.

The information included in this chapter was obtained through the first visit, which aimed to find out about the home improvements that had been previously carried out by participants, focussing on exploring the motivations, barriers and enablers. The first section of the interview was a timeline exercise that was designed to uncover the

different home improvements that had been carried out in the house (described in more detail in Haines, *et al*, 2010). The householders were encouraged to openly discuss the changes and improvements they had made to their home. They were asked to give the rationale for purchasing the property and to discuss the changes that had been carried out from the point of purchase onwards. As the conversation progressed, the home improvements were marked on the timeline, with the use of a set of magnetic schematic illustrations designed particularly for this study.

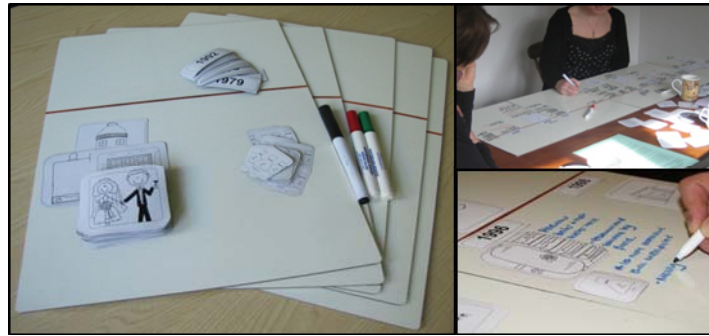


Figure 2: Timeline equipment

The participants were also asked to give an indication of the level of disruption that the home improvement caused. They were asked who had performed the improvement and whether it had been completed as a DIY task or whether professionals had been used, as well as discussing any problems in the process. The interview data were analysed using a thematic analysis approach where comments were identified and sorted into themes which emerged from the data.

What are the barriers to home improvement in the UK?

There are many factors that can influence and motivate people to make improvements to their houses, but we know less about the things that prevent or delay people from making these changes; *the barriers to home improvement*. We discuss these barriers here. Whilst focused on people living in solid walled housing, many of these barriers are relevant to all householders.

Householder Values & Preferences

Pre-existing values and preferences held by householders are strong and cover a range of topics. They relate to the physical appearance of the house, how aesthetics are prioritised, financial values, quality, craftsmanship, use of professionals and those relating to the perceived worth of making improvements, to name a few. The following quote from one of the householders demonstrates how the combination of aesthetic values, craftsmanship and new technologies can become a barrier to home improvement:

'I don't want PVC [windows], I like this style of house, I like wooden window frames, we're in a conservation area,[but] there's no restriction on whether you have PVC, but to me it spoils the house, the aspect of the visual pleasure that you get from looking at skilled work. This window is fantastic if you look at all the work that's gone into it. It gives it character...People have said, 'why don't you have double glazing' – I don't like double glazing, sorry!' (Female, aged 70)

Whilst this example may demonstrate that people are resistant to change associated with modernisation, there seems to be more fundamental issues relating to the character and aesthetic appeal of traditional homes. Regardless of the predominant reason, the overarching issue is that some people are still resistant to retrofit and introducing new technologies into their homes and this resistance needs to be overcome. If this resistance to retrofit or modernisation is widespread it could have a significant impact on uptake of new energy saving technology within homes.

A surprisingly large number of householders in our study spoke passionately about their windows, particularly those whose houses were built in the early 20th century that still had the original window frames and sometimes even glass from this period. Householders highly valued these features, boasting of the greater levels of skill and time invested in creating them.

Of course, preferences do not just refer to things within the house, but often, what people value the most in their lives. For some, their house is just that, a house: a building where they reside when not at work or elsewhere, with which they have little emotional attachment. Such people may not wish to spend more than necessary on maintaining and improving their home, but would rather spend their money on holidays, education etc.

'I'd quite like the kitchen decorated but it's not going to change my life, so it's not really priority.' (Female, aged 40)

'I don't think by spending big sums of money [on the house] it will make us any happier, so there's not much point.' (Male, aged 51)

In contrast, other households place such a high value on the quality and expense of items that they had need to delay making improvements in order to live to that standard.

'It's not finished, ... I'm so picky, I like really expensive things and really nice quality and sometimes you cannot have everything in one go. You need to buy little by little, if you see something you like you buy it, if you don't like, I wait until I find something.' (Female, aged 31)

If the preferred technology, retrofit option or expected level of quality is not available, then it is likely that this type of householder would not settle for less and their action would be delayed. It is necessary therefore that ranges of energy saving technologies are made available to suit different budgets and preferences.

Obviously, within a household, there is more than one set of personal preferences, and it is highly unlikely that multiple members of a household will hold identical views on everything! Therefore, conflicting values may result in further delays as partners try to agree on what is needed. The values of householders can therefore provide significant difficulties for policy makers. If householders do not prioritise the home improvements that could be made over other expenditure or do not consider that the measures on offer meet their quality standards, then it will be hard to encourage them to make the changes necessary to meet domestic carbon reduction targets without enforcing changes through policy and regulations.

Cost

It is of little surprise to find that cost provides a significant barrier to home improvements. Householders may not be able to afford their 'ideal' product or solution, having to save for significant periods of time in order to finance alterations, or being prevented from making any changes at all, due to insufficient funds. Some households are able to manage the financial strain by 'chunking' the improvements and doing sections at a time. One householder told us how he was only able to improve his windows by replacing small numbers at a time:

'We had some [windows] done a couple of years ago...we had most of them done [but] then there was something like 3 upstairs that we didn't have done because we didn't have the money.' (Male, aged 50)

Cost as a barrier is not purely a matter of being unable to afford to make a change. Although there may be disposable income available, improving the house is not always seen as a priority and therefore funds are allocated elsewhere.

'My feeling about that is I can cope with [the leak] and I'd rather spend my money on something else like extravagant holidays or buying a load of books or whatever.' (Male, aged 65)

This closely links to what householders' value and prioritise. Without challenging and changing existing social norms it is likely that necessary energy saving changes will not be made by many households. The key to success may be to make energy saving aspirational, so that people value the changes it brings, whether these are tangible benefits such as improved comfort or a more pleasant home environment or intangible ones, such as pride in improving DIY skills or being seen to be 'doing the right thing' for the environment. Increasing public awareness will be an essential step towards changing social norms.

Some householders with a lower income are unable to pay for improvements at all, but instead have to depend on their own DIY skills, the goodwill of friends and family or government grants. For this group of people, policies such as ECO and the Green Deal need to ensure that there is minimal or no cost to the householder or that there are DIY

options available. It is necessary to ensure that information and awareness of grant schemes reach those householders who could benefit from this type of help. It is important to remember that they may not be looking to improve their home as they may believe it is not financially viable, therefore information needs to be widely available in the public domain and at the right time in the process, which may be even before the decision making has begun. It is also worth noting that in many cases those with a very low income due to reliance on a government pension may live alone and may feel vulnerable to allow unknown professionals into the house. They may feel far more comfortable with tradespeople who they have used before and who are known to them. If grant schemes stipulate who carries out the work then this may therefore present a further barrier to the uptake of energy efficiency measures for many on low incomes.

Professionals

Although there were plenty of positive experiences involving the use of professionals to undertake home improvements reported by our householders, sometimes the reliability or quality of work was not up to the expected standard and so this acted as a barrier to further home improvement. Issues can range from failing to provide quotations, workers not turning up, generally poor service and bad attitudes to work. The following quotes illustrate the unreliability of workers experienced by householders:

'It's actually harder than you think to get reliable tradesmen, it really is quite difficult. You ring them up and try and get them round and you get quotes and it just takes forever. It can't be that difficult. If it was my business and I conducted it in the same way by turning up when I please and leaving it weeks and weeks to get a price in, I wouldn't have any work!' (Male, aged 50)

'We tried to get professionals in [to fix the flat roof]. The ones that did arrive couldn't do it. The ones that probably could have done it, never turned up, so I've done it, and it's alright for a bit.' (Male, aged 65)

Householders described problems with the quality of work, such as a lack of appropriate skills, poor workmanship and the inability to solve problems when asked. These either related to a poor general skills base or poor skills specifically related to dealing with a hard to treat, older property. In one house, the wrong type of product had been used. This caused the householder significant distress as it was felt to have devalued the property. In other households, improvements had to be either 'made good' by the householder or redone. One householder had to threaten to sue the company before they would agree to repair damage caused through the failure of their product. Other issues mentioned included the difficulty and expense of accessing good tradesmen, the legal necessity to have a specialist professional for certain jobs, bad attitude of tradesmen to householders and professionals not taking into consideration householder's needs, concerns or knowledge of the property.

In order to ensure the appropriate and sympathetic retrofit of solid walled houses, there must be an increase in the knowledge of professionals relating to these properties. It may be helpful for a recognised standard or badge for those that meet the necessary standards; an accreditation scheme focused on specific property types, for example. If, as this research suggests, the priority of the householders is the condition and character of their property and not its levels of energy efficiency, then bad experiences of professionals is likely to reduce the possibility of householders 'risking' any additional damage or devaluation through further retrofit. Refurbishment services need to understand what the householder values and build a relationship with them, in order to establish a bond.

Time

In the busy lifestyles of our western society, householders often feel that they do not have enough time to make home improvements. This not only includes the home improvement itself, but also the time needed to look around for ideas, identify suitable professionals and make decisions on changes. Comments from our householders relating to the absence of specific home improvements such as '*I haven't got around to it*' suggest that, for some, any spare time is spent doing other things. It would appear that the barrier of 'time' is not necessarily the lack of time, but purely the householder's perception of time. This is closely related to the personal capacity of the householder – some people felt that they had limited capacity to make home improvements, perhaps due to their life stage or other commitments whilst others relished having an on-going home improvement project.

Households who find that 'time' prevents them from making home improvements to their house are likely to be more receptive to professionals offering a project management approach to home improvement. For example, recruiting a trusted professional to both undertake and manage the improvement process including the sourcing of required specialists, purchase of materials etc. Similarly if it is easy for the householder to contact and commission a particular supplier whom they know and trust, then tasks will be perceived as less onerous and so more likely to be undertaken. Such householders may also respond positively to being approached by professionals soliciting work when they have not found time to investigate potential options for themselves, but trust is still likely to be a key issue in such circumstances.

Property features

Of the 4.5 million homes in the UK that have solid walls (DEFRA, 2008), many have particular features which can make home improvement more complex. This can include period features and problems relating to the design and layout of the house.



Figure 3: Common property features and layout of solid walled houses.

The most common example of this is evident when replacing windows in older properties, where non-symmetrical features and non-standard window recesses can make it difficult to install modern windows. Unusual or misshapen features can also lead to the need for bespoke and therefore more expensive solutions which can deter householders from making changes. Some properties have been irreparably changed or damaged by previous owners, which has a long term impact on the changes the current owners are able to make. In addition, uneven floors and nonstandard foundations can prevent householders from making changes. In some cases, where properties have been adapted from commercial to domestic use, original features and layout remain which restrict future home improvement including the implementation of energy efficiency measures or technologies. The shape of older properties and the close proximity to neighbouring houses also causes householders frustrations when it prevents them from extending to meet growing family commitments. In some cases, this means that the household has to move to a different property in order to meet their needs.

The property features commonly found in solid walled houses and the barriers these introduce when implementing home improvements are of particular importance when trying to increase domestic retrofit, as many hard to treat homes from the Victorian era and earlier present similar issues. The barriers relating to property features are of particular importance when viewed in conjunction with people's attitudes to older properties. Many of our householders wanted to keep their property 'in keeping' with other houses in its location or houses from its era, which may be seen as maintaining part of our national heritage. They spoke with a definite fondness of the features commonly found in older properties such as high ceilings, deep skirting boards, ornate ceiling mouldings and intricate brickwork. Even if householders have the motivation to make energy efficiency changes to their homes, it is possible that older property features will still prevent these changes from being made. Therefore it is essential that the design of the retrofit process, products and relevant policies allow older properties to keep their character and style, whilst still improving their energy efficiency.

Other barriers

Although the barriers discussed here are those that appeared with highest frequency in discussion with householders, there were a number of other barriers that were uncovered in the interviews. The household's stage of life sometimes prevents or delays home improvement, e.g. starting a family, entering older age or having elderly parents living with the family. The perceived size or difficulty of a task, including the thought of what needs to be done prior to the job being completed can also be a barrier. Some householders are overwhelmed by the difficulty of a job and so fail to do anything at all. Perceptions of how regulations might affect home improvement also prevent work from being undertaken. Householders perceive that there might be difficult issues to resolve and so are put off pursuing a project. These concerns may be unfounded, but are sometimes based on the bad experiences of others. Perception of the level of possible disruption that the home improvement might cause to the household and daily life is also a significant barrier. Experiences from previous jobs can affect perception of future likely disruption. This barrier is also related to life stage, as the impact of disruption can increase at different stages of life. The weather or commitments associated with a particular time of year, such as school holidays or Christmas, means that some home improvements only occur when they fit in with other events in a household. It is also not uncommon for householders to have problems getting hold of suitable parts or products to improve their house whilst in keeping with its age, as some traditional parts have become difficult to obtain.

The decision to undertake a home improvement requires the members of the household to reach a consensus on what should be done, how it should be done and whether the cost is justified. In some of our study households and often numerous times within a household, the lack of consensus between household members meant that an improvement was delayed until a decision or compromise could be made; this delay could last for many years. This relates to the perceived personal or emotional capacity of an individual or household to take on a task when they do not feel able to undertake a home improvement, perhaps lacking motivation or energy. There may not be any tangible reason behind the decision, just the householder's own impressions of their capacity at that time. People described themselves as '*burying their head in the sand*' over home improvement decisions. A lack of information, receiving contradicting information or misunderstanding can lead householders to misjudge the size, scale and type of home improvement required as well as not appreciating the likely benefits. Finally, householders can be reluctant to carry out home improvements if they expect to move in the near future. However, opportunities to increase the resale value may encourage retrofit at this stage.

What does this mean for the future of domestic retrofit?

This chapter has highlighted and discussed a range of interrelated and sometimes rather intangible barriers to making home improvements to older, hard to treat homes. These build upon the three primary barriers of Information & awareness, Hassle and Cost, identified by EST (2011). The Green Deal has been designed to relieve the financial barriers to making energy saving improvements to existing homes. However, it is thought that many householders will still resist taking advantage of the scheme because of the wider social and emotional barriers to change. Whilst social norms are deeply embedded, it is possible for them to shift and new behaviours can develop into new norms (Shove, 2003). We have unpacked a range of barriers that can cause inertia or even halt projects for many years. Factors relating to personal capacity, perceived difficulty of a job, likely disruption and inability to reach consensus with a partner have all been highlighted as reasons why home improvements have not been undertaken as expeditiously as they might have been.

The barriers discussed show that many of the factors are particular to older properties. Many householders choose to live in older properties at least partly because of their character and appearance. Features are lovingly restored and preserved even in the face of compelling financial reasons to modernise. There is clearly a need to better understand the priorities, values and aspirations of these owner occupiers who choose to live in harder to treat homes. This is needed in order to equip both policy makers and building professionals with the specialist knowledge that is needed to sympathetically retrofit energy saving measures whilst maintaining the character of the house and overcoming the idiosyncrasies of older properties. The depth of older property-related knowledge held by many of the householders spoken to was surprising, causing great frustration when professionals did not share the same specialist knowledge. Clearly, competent and appropriately skilled professionals are required to meet the expectations of these householders. In addition, householders need to be able to trust the professionals and contractors who are part of the retrofit process. The Green Deal hopes to address this issue by accrediting certain contractors, which allows them to carry out work financed by the Green Deal, however, this accreditation process may not be sufficient to instil a sense of trust amongst householders. It is essential that professionals are able to build a working relationship with a householder; to ensure both parties understand the work to be undertaken, that a reasonable level of communication is available and to ensure that the householder can trust the professionals to respect the character of their property.

The desire by householders to carry out work as Do-It-Yourself (DIY) projects also needs to be acknowledged, addressed and where possible, made an available option for retrofit. Those householders who enjoy and gain much satisfaction from performing DIY improvements to their homes are unlikely to want to suffer any reduction in savings because they have had to pay someone else to do the work. In addition, it is

likely that the pride and emotion felt by many towards their older properties is strongly linked to the personal efforts that have gone into the home improvement process. We have seen television advertisements for home improvement stores that tap into the ‘I did that’ pride of working on one’s own home and it is important to remember that simply paying a professional to do the work is unlikely to provoke the same emotional attachment and response. It is also important to facilitate the kind of piecemeal approach to home improvement that householders seem to prefer. It seems rare that householders will allocate a large block of time to get everything done, but would rather do smaller jobs spread out over time. Households may commit to doing one home improvement a year and do not feel they have either the time, personal capacity or finance to do any more than this, or to sustain the level of disruption for any period of time. It is important that policies such as the Green Deal enable householders to carry out work in a similar fashion to which they are used, expecting too much change at once may well result in a lack of action.

New initiatives will also need to address the issue of planning and building regulations. Rigid policies do not allow householders the flexibility that they have had in the past, which can lead them to find ‘workarounds’ or to seek professionals that will ‘bend’ the rules. The choice of professionals to carry out home improvements on a house is influenced by more factors than purely their skill to do the required job. Many householders valued knowing the professional above their specific skills. General tradesmen who are familiar to the householder may therefore be favoured for jobs above specialists because they are trusted and because of the convenience of using the same person or firm for a number of jobs instead of having to source and hire a number of different people. It is imperative that future major retrofit programmes are able to accommodate this.

It is worth remembering the rate of change that people are willing to tolerate is remarkably slow, as a result of the barriers identified here and elsewhere. At some point there may be a need to bring in an element of compulsion, to enforce a level of change, especially if large numbers of households are expected to make big changes within a relatively short period of time. However, even if a degree of coercion is introduced then retrofit will be most successful when the needs and behaviours of householders are taken into account.

Acknowledgement

This work forms part of the CALEBRE Project which is funded by the Research Councils’ UK Energy Programme and E.ON, to whom the authors express their

gratitude. Thanks are also extended to the participants, without whom this study would not have been possible.

References

- AA, (2009). 'Home Improvement: Homeowners planning for comfort ahead of value'. *The Automobile Association Limited*. http://www.theaa.com/motoring_advice/news/homeowners-improving-homes-for-comfort-ahead-of-value-328090.html, Viewed: 7/11/2010.
- Anon, (2009). 'Home improvement and increase house sizes during recession'. *Discount Landlord* <http://www.discountlandlord.co.uk/news/index.php/homeowners/home-improvement-and-increase-house-sizes-during-recession>, viewed: 7/11/10.
- Carrico, A.R., Vandenberg, M.P., Stern, P.C., Gardner, G.T., Dietz, T., Gilligan, J.M. (2011) 'Energy and climate change: Key lessons for implementing the behavioural wedge'. *Journal of Energy and Environmental Law*, 2 (61), pp61-67.
- Centre for Sustainable Energy, 2006. 'Identifying and quantifying the prevalence of hard to treat homes: Final report to the energy efficiency partnership for homes' *Insulation Strategy Group and Hard-to-Treat Subgroup*. [report]
- Consumer Focus (2011). 'Scaling the solid wall: Executive Summary'. *Consumer Focus*. London, UK.
- DEFRA, (2008). 'Energy analysis focus report. A study of hard to treat homes using the English House Condition Survey. Part 1: Dwelling and household characteristics of hard to treat homes'. Department for Environment, Food and Rural Affairs. http://randd.defra.gov.uk/Document.aspx?Document=GA0218_7164_FRP.pdf Viewed: 13/10/10.
- EAGA, (2009). 'With you through every step. Warm Front Scheme annual report – 2008/09'. *The Warm Front Team*. <http://www.warmfront.co.uk/stakeholder-info.htm>, viewed: 13/10/10.
- Energy Saving Trust, 2009. 'Hard to treat homes'. [online] Available at: <http://www.energysavingtrust.org.uk/business/Business/Housing-professionals/Interactive-tools/Hard-to-treat-homes>, viewed 5/10/10.
- Energy Saving Trust, 2008. 'Energy efficiency in hard to treat homes'. [online] Available at: <http://www.energysavingtrust.org.uk/business/Business/Information-centre/Publications-and-Report-Library/Publications-and-Case-Studies>, viewed 13/10/10.
- Energy Saving Trust, (2011). 'Trigger points: a convenient truth'. *Energy Saving Trust*. <http://www.energysavingtrust.org.uk/Publications2/Corporate/Research-and-insights/Trigger-Points-a-convenient-truth>, viewed: 13/09/11.
- Fawcett, T. & Mayne, R. (2012) 'Exploring an 'over time' model of eco-renovation', In: *Retrofit 2012 Conference proceedings, Salford, January 24-26 2012*.
- Haines, V.J., Mitchell, V.A., & Mallaband, B. (2010) 'Using a practice-orientated approach to inform the design of energy efficiency measures for older homes', In: *ERSCP-EMSU Conference Proceedings, Delft & Cape Town, October 25-29 2010*.

- Halifax, (2009). 'Average Spend on Home Improvements reaches £5,300'. *Lloyds Banking Group*. <http://www.lloydsbankinggroup.com/media/pdfs/research/250509homeimprovements.pdf>, viewed: 7/11/10.
- ISO 9241-210:2010. 'Ergonomics of human-system interaction - Part 210: Human-centred design for interactive systems'. *International Standardization Organization (ISO)*, Switzerland.
- Jackson, T. (2005) *Motivating Sustainable Consumption. A review of evidence on consumer behaviour and behavioural change. A Report for the Sustainable Development Research Network as part of the ESRC Sustainable Technologies Programme*. Guildford: Centre for Environmental Strategy, University of Surrey.
- Janda, K.B. (2011). 'Buildings don't use energy: people do.' *Architectural Science Review*, 54(1):15-22.
- Jelsma, J. (2006). 'Designing 'moralized' products: theory and practice', in Verbeek, P.P. & Slob, A. (eds), *User behaviour and technology development: shaping sustainable relations between consumers and technologies*, Springer, The Netherlands, pp. 221-31.
- Lainé, L. (2011). 'Green deal or no deal. Building customer confidence in energy efficiency services.' *Consumer Focus*, London, UK.
- Marshall, M.N. (1996), 'Sampling for qualitative research', *Family Practice*, 13 (6), pp522-526.
- SCRT, (2006). 'I will if you will. Towards sustainable consumption.' *Sustainable Consumption Roundtable*, UK.
- Shove, E., (2003). 'Comfort, cleanliness & convenience', *Berg*, Oxford, UK.
- Wright, A., (2008). 'What is the relationship between built form and energy use in dwellings?' *Energy Policy* 36:4544-4547.
- Yohanis, Y.G. (2011). 'Domestic energy use and householders' energy behaviour', *Energy Policy*, 41:654-665.