

Retrofitting social housing: reflections by tenants on adopting and living with retrofit technology

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Abstract Retrofit has been described as one of the major engineering challenges of the twenty-first century (Kelly 2009). However, the industry needs to look beyond regarding the problem as restricted to the physical upgrade of properties. Asset managers, engineers and installers work on and in people's homes and, in many cases, are subsequently changing the way householders use their homes to meet their comfort and wider energy needs. Here we consider how the twin issues of adopting and living with retrofit technologies have affected groups of residents in social housing. We discuss issues of trust, social norms, engagement and concern that have shaped the adoption process, as well as investigating the everyday experience of living with new configurations of energy consumption. The findings have relevance not only for the social housing sector but also raise questions as to how to effectively deliver programmes such as the Green Deal and the Energy Company Obligation within the UK.

Keywords Retrofit · Adoption · In-use · Social housing · Tenants

Introduction

The domestic sector accounts for more than 25 % of carbon dioxide emissions generated by more than 26 million homes in the UK (Swan et al. 2010). In addition, rising energy costs have led to increasing levels of fuel poverty in the UK (Hills 2012), with energy prices predicted to rise by 34 % for gas and 54 % for electricity over the next 10 years (Ofgem 2009). Given these twin issues of greenhouse gas emissions and fuel poverty, the sustainable retrofit of the existing domestic stock is predicted to play a central part of the UK's strategy to reduce carbon dioxide emissions (Boardman 2012; Ravetz 2008). Sustainable retrofit can be defined as the upgrading of the building fabric, systems or controls to improve the energy performance of the property.

There have been a wide number of programmes put in place over the years with the aim of delivering this improvement: the Carbon Emissions Reduction Tariff (CERT) (Druckman and Jackson 2008), Warm Front (Gilbertson et al. 2006) and the Community Energy Savings Programme (CESP) (Reeves et al. 2010), for example. The new Green Deal and Energy Company Obligation (DECC 2010) programmes continue the UK's policy commitment to domestic retrofit. However, it has become recognised that understanding behaviour, in terms of both adoption and in use issues, represents a vital component of the

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success of sustainable retrofit programmes (Chahal et al. 2012). Adoption is concerned with how to encourage households to take up retrofit measures and is a major issue, particularly with reference to the UK's Green Deal programme. A MORI poll undertaken for the UK government, which investigated the decisions related to the adoption of cavity wall insulation with householders, highlighted a wide range of reasons for non-adoption (HM Government 2010) ranging from a lack of understanding and knowledge to sheer apathy, highlighting the challenge faced by policy makers.

Once the difficult issue of adoption has been addressed, we are then confronted with how behaviours, social norms, habits and values all interact to influence energy use. The role of behaviour can be seen to have a huge influence on the consumption of energy (Summerfield 2010), driven by a number of demographic, lifestyle and cultural differences (McMakin 2002), but this is only part of the problem. New technologies often conflict with deeply engrained energy practices and contribute to a gap between designed and actual performance (Wingfield et al. 2008). The majority of energy consumed in the domestic sector is used for space heating (Palmer and Cooper 2011), and as such this plays a major part of the issues addressed within the study reported here. However, we do include observations on both hot water, electrical and ventilation systems, which are often installed as part of a retrofit package and often interact with changes made to heating systems.

The adoption of energy efficient measures

Under sociotechnical models, such as those proposed by Geels (2005), there can be a number of reasons as to why energy efficient measures are not adopted. Weber (1997) also identifies institutional, regulatory, market and social barriers that influence adoption. Here we will consider those barriers that are specifically encountered by the occupants of residential dwellings, something Geels may define as 'market and user practices'. Currently, the market for energy efficient measures can best be described as 'emergent' (van Sandick and Oostra 2010). There has been widespread adoption of basic measures in social housing, such as loft and cavity wall insulation, driven by incentives such as the CERT and CESP programmes. However, more sophisticated or 'deep' retrofits (Kelly 2009) are still in the stage of early

adoption (Fawcett 2011). Two successive UK governments have identified the social sector as a test bed for the sustainable retrofit market (HM Government 2010; BIS 2010). The suitability of the UK's social housing sector has been largely supported by the availability of professional decision makers, asset managers, building surveyors and project managers, who can address many of the knowledge issues that were identified in the MORI poll (HM Government 2010). They may have the skills to effectively identify potential energy efficiency measures, identify supply chains that can deliver them and have available capital to fund the measures, overcoming many of the issues that might prevent owner-occupiers or small-scale landlords from adopting sustainable retrofit technologies (Jenkins 2010).

However, removing these knowledge and capital-based barriers does not mean that adoption is guaranteed. Within the UK social housing, tenants do have the right to refuse improvements that are proposed by their landlords, as they appear to fall outside the legal repair framework for social housing. However, as our research indicates, this is not always fully understood by residents and may be clouded by the approach that the social landlords take in engaging with residents. A major improvement works programme undertaken by Affinity Sutton (a large social housing landlord) included packages of sustainable retrofit, ranging in value from £6,500 to £25,000, offered to residents on the basis of their house types. This programme experienced a refusal rate of more than 50 % with the reasons of disruption and inconvenience cited as the most common responses (Willey 2012). The nature and complexity of sustainable retrofit packages make it a more complex market to transform. The success of regulatory changes has had some success in appliances (Killip 2012), but it is clear that the application of this model is not as straightforward, when applied to more disruptive and complex products and processes. A better understanding of the market behaviours for these kinds of products is essential if regulation and market-making is to be used in this way (Boardman 2012).

This study focuses very specifically on the adoption of sustainable retrofit within UK social housing. Within the UK, social housing represents some 18 % of total housing stock (CLG 2011). The triggers and barriers involved in adoption, as highlighted by Jenkins (2010), differ when compared to the owner-occupier and private rented market (Mallaband et al. 2012), where financial decisions become a major part of the adoption decision.

Studies from Sweden (Nair et al. 2010), the USA (Niemeyer 2010) and Germany (Achtnicht 2011) replicate this perspective, although Achtnicht highlights the potential importance for climate change as a driving factor. Given that climate change awareness as a factor for adoption is partially driven by income and education (Semenza et al. 2008), it seems that Chahal's (2012) assertion that it does not drive adoption in UK social housing is potentially supported. However, issues of knowledge, access to information and supply chains appeared to be universal between tenures and countries. We can see that the grouping can be cut in a number of ways that will give us different adoption drivers and barriers; tenure, environmental values and individual countries will all have slightly different issues and approaches that will change the potential weightings of the adoption issue. This can make specific studies highly context sensitive.

Understanding why some households adopt and why their neighbours refuse offers an opportunity to understand this set of complex decisions. McMakin et al. (2002) state that individuals tend to identify energy efficiency strongly with their own personal circumstances, such as their health or comfort. In an earlier paper, Mills and Rosenfeld (1996) recognise the non-energy-related reasons for improving the energy efficiency of homes, identifying a wide number of environmental, financial and health benefits that can be brought about by sustainable retrofit. They recommend adoption might be improved by marketing these benefits, rather than pure energy efficiency. These ideas are concerned with the rational side of energy efficiency adoption. However, social norms and changing values also have a part to play. The social norms (McKenzie-Mohr 2000) and value-driven (Lovell 2004) aspects of energy use should be seen as a 'moveable feast'; patterns of use and the reasons behind them will change over time, so studies concerning this aspect are both time and geographically sensitive.

Using and living with retrofit measures

The gap between as-designed and as-performed energy efficiency of properties is well documented in new build homes (Wingfield et al. 2008). Factors such as installation and build quality, specification and, specific to our question, behaviour are all contributing factors. The issues can be logically extended to substantially

refurbished homes (Wetherell and Hawkes 2011). Focusing on behaviour, there are a wide range of issues that can impact our understanding of how people use energy (Economic and Social Research Council 2009). There are large variations in energy use (Summerfield 2010), with higher levels of use often being driven by wealth, and commensurate differences in property size, as identified in the National Energy Efficiency Database Framework Report (Department for Energy and Climate Change 2011). At the other end of the spectrum, comfort taking or the rebound effect can undermine predicted energy use (Chahal et al. 2012). Another key factor that influences how and the amount of energy consumed is the inability of individuals to effectively manage energy within their homes. The use of controls is highlighted as a significant part of energy consumption, yet their design and ultimately their interface with operators create problems for people (Peffer et al. 2011). New ventilation and heating systems may require different approaches. Moving from a gas fired heating system with radiators requires a different pattern of use when compared with air-source heat pumps and under floor heating. These changes need to be both effectively communicated and reinforced. For certain groups of householders, such as older people, new technology often presents additional challenges in the way they are understood, programmed and accessed, all of which compromise the predicted efficiency of retrofit measures (Lusambili et al. 2011). For technologies, such as photovoltaic micro-generation, benefits are maximised if people can change consumption behaviours to shift in line with the demands of the technology. This, combined with unpredictable weather (a major issue in the UK when considering renewable energy), can lead to expectations not being met (Bahaj and James 2007).

The shift from using one sort of heating system to another, requiring new energy practices, is further complicated as a result of apathy or apparent resistance from householders in changing the way they use their homes. People, for the most part, appear largely unaware of how much energy they use and research suggests that they are rarely interested or engaged in the subject (Retallack et al. 2007; Whitmarsh et al. 2011; Yohanis 2012). Although we know there is a performance gap between predicted to actual use, we know comparatively little about what meaning and significance the presence of retrofit measures have for households. As such we still do not have adequate feedback from householders about what aspects appear to close the performance gap and

how this can be used to improve the roll out of these technologies. Often this longer-term engagement is not resourced as part of the retrofit project. It is often part of other resident liaison activities, and as such, data regarding levels of support to occupants in newly retrofitted properties is difficult to evidence. Affinity Sutton (2011) identified that from survey to completion, the number of visits to 102 homes within their retrofit programme ranged from 6 to 20, although this includes a certain degree of pre-adoption engagement.

Methodology

This paper reports on the findings from an initial exploratory study that formed part of the work of a Knowledge Transfer Partnership between the University of Salford, UK and Fusion 21 (a large social enterprise specialising in public procurement). The overall aim of the KTP has been to produce guidance for social housing sector on how best to deliver retrofit measures in partnership with their tenants. As part of delivering this guidance, a number of research activities have taken place; these include a literature review, a survey of 253 tenants in the social housing sector, six focus groups with tenants involving a total of 34 participants and extensive consultations with social landlords. The findings arising from the survey and literature review have been discussed elsewhere (Chahal et al. 2012). This paper reports on an analysis from the focus group phase of the research.

Tenants from six different social housing landlords located in the North West of England were invited to participate in focus group discussions during early 2011. The focus groups aimed to consider what were the drivers and barriers for tenants when presented with a programme of retrofit and what their experience was of living with the measures. Focus groups were seen as a method of data collection well suited to this stage of the research as they allow for the discussion of differences of opinion and experience within groups and facilitate a collective understanding of the particular norms and values that a specific group brings to the research (Morgan 1988; Lewis 2003).

Individuals with recent experience of retrofit were invited to take part in the focus groups. Although it was not discussed in detail, it is thought these retrofits were made possible either through the Decent Homes programme, CESP or CERT. From the 34 people who

participated in the focus groups, there was an even gender split of 17 men and women across all groups. The majority of participants were older people, over the age of 55 years. The focus groups were guided by a question schedule devised by the research team developed from the related literature review. The question schedule included issues relating to their housing type, energy consumption, their energy practices, their experience of retrofit installation and how they use their home and the technology that was installed. However, in keeping with the apparent gap in the literature, the main focus of these discussions was on the meaning the retrofit measures had for the tenants and how they fitted within their everyday lives, as opposed to the effectiveness at increasing the energy efficiency of their homes. The main technologies that were discussed were generally delivered in ‘packages’, specifically around insulation, heating and ventilation. Insulation will have included cavity wall insulation, loft insulation, windows and doors. In some cases, there was external wall insulation. Heating provided is predominately gas-fired combination boilers, while ventilation was provided by mechanical ventilation and heat recovery in cases where high levels of ventilation were provided. Also included were a number of photovoltaic installations.

The research team took ethical issues seriously and were guided by a number of principles, namely respecting the dignity, rights, welfare and safety of research participants; ensuring informed consent and voluntary participation; protecting anonymity and doing no harm. Information sheets were provided to participants which outlined the study and provided details of their rights as voluntary research participants and how the data generated might be used; signed consent was obtained from those who took part. The study was subject to the procedures required by the appropriate Ethical Approval Panel within the university. The focus groups were recorded and transcribed verbatim. The qualitative software package, QSR Nvivo, was used to store, manage and analyse the textual data. A sequential approach to thematic analysis was used following the guidelines of Braun and Clarke (2006) and King and Horrocks (2010). The analytical strategy involved a process of sustained reading and re-reading of the transcripts. Throughout this process the text was coded, sifted and sorted into key issues and themes. Although such a process shares characteristics with a grounded theory approach (Glaser 1992), the researchers significant pre-engagement with the literature and broader objectives

around the delivery of outputs meant that such a process was not possible. As a result, the objectives of the researchers to explore the issues that underpin the drivers and barriers to adopting retrofit measures, and using them efficiently, have an inevitable influence on the analysis of these accounts. However, it is thought that by adhering to the principles of rigorous qualitative analysis, such influence is made transparent in order to enhance the validity of the findings presented here.

Findings and analysis

The findings are explored following the processes that retrofit programmes are experienced by the households, from pre-installation to in-use. In particular, we look at the experiences arising around what people consider the drivers to adopting retrofit measures, as well as those aspects that are seen as barriers in some way. The installation process is explored before looking at the experience of learning and living with the new technology. While the main focus of this paper is concerned with the adoption and in-use factors, the installation process has been considered as it impacts on issues of trust between the landlord and resident. Additionally, handover processes on completion, where the property is completed and handed back to the resident, have a significant potential impact of how people might understand how to engage with their retrofitted home. The issue of handover processes and how they link to how occupiers use buildings cannot be ignored (Way and Bordass 2005), particularly in people's homes (Gupta and Chandiwala 2010). We then look at two of the main themes arising from our analysis which appear to have significant implications for delivering retrofit programmes at scale; these are issues around trust and the impact of shared knowledge, expressed in the form of community level stories, about retrofit, by residents. Quotations arising from the focus groups are presented below in order to illustrate the findings from the data. Two forms of quotation are used: one where an issue was raised by a single individual without the input of others in the group and the other where an issue was raised in discussion with other group members and possibly the facilitator. In the case of the latter instance, the speakers are distinguished by the prefix **Int** for the interviewer/facilitator and **P** (followed by a number) for each focus group participant.

Barriers to adopting retrofit measures

Although familiar issues of cost, return on investment and information are effectively redundant for households in the social rented sector, it was clear from the analysis that there were a number of significant barriers arising around the adoption of retrofit measures. In particular, the fear of the disruption caused by the installation of measures played a significant role in people's decision-making process:

The thing is with loft insulation... we put it in ourselves and then we boarded it. When they came round and said we've only got 6 inches and it needs to be 8 inches, I was going to pull all my walls up and put it in again. There is no point.

We don't. I couldn't empty the loft when they came round to do it. Because I couldn't empty it they wouldn't do it so it never got done.

Indeed, similar to previous research regarding the adoption of cavity wall insulation (HM Government 2010), the disruption caused by installing insulation in the loft was a key barrier for some people. This is something that is well known, and some of the tenants reported no support in place from their landlords:

Int: I know for some housing associations or providers they provide loft-clearing services.

P1: They never offered. It never got done.

Although the upfront cost of purchasing the equipment and technology was not an issue for people, the fear of a cost arising from the installation still concerned some residents. For example, for one tenant there was an assumption that there might be a liability on them to address the maintenance costs of the technology, particularly where this involves micro-generation:

Who carries their own cost where there will be maintenance on them and there will be transfer systems and you've got so many different things going on with these. Who looks after it?

Another tenant assumed that the installation of this technology would be followed by a subsequent increase in their rent levels to pay for it.

Another barrier identified was the apparent lack of engagement of residents in most aspects of community governance or, it seems, a lack of engagement with any issues at all. One resident, who also sat on the board of

their social landlord, described the apathy pervading tenants in their area:

We do a satisfaction survey once a year. How many did we get back? A couple of hundred, three or four hundred, five hundred if we are lucky. We send out to three and a half thousand properties. We get a very low figure back. Anything like that, people don't, they are not bothered. The only way, I've said this loads of times and people have heard me say, the only way is if you sent a letter out saying, 'A week on Monday we are knocking your house down and we are going to put you in a tent.' You would have them outside within an hour. They would be queuing to knock hell out of you.

Another participant in a different group framed their residents as mostly content but similarly apathetic to change of any sort:

I think because with anything like that, people are quite happy. Nobody really, there is not many people that can say they are not happy in their homes.

However, offering a more extreme observation, a number of people in one of the groups acknowledged that some people would refuse measures because they actively refuse to engage in any other issues:

P1: If they don't want to let you in they won't let you in. I've known people on our estate, when they do electrical checks which is for their benefit, they wouldn't even let them in.

P2: Gas as well.

P1: They wouldn't answer the door.

P3: There is some [people] you won't get anywhere with.

One participant thought that more should be done, by their landlord, to be much more active in engaging with residents. This resident thought that the mere provision of written information provided through the post was not sufficient:

The problem I think you would find is, the same as we find with things like we ... we do things like energy efficiency. What happens to them? They don't look at them they bin them. They are not interested. Not because it doesn't impinge on their lives. Not bothered. So we bin them. It's something you send. It's like getting junk mail.

Drivers to adopting retrofit measures

None of the participants reported having had a choice in the adoption of retrofit measures and so it was difficult to understand fully what their motivations were to consenting to the measures being installed. However, when the groups started discussing what they thought could be done to encourage a greater take-up of retrofit measures, these revolved around the provision of information or making residents care in some way. When taken with the comments of one participant above, the provision of information could be seen to be both a driver and a barrier. Although for people who could possibly be seen as 'positive-greens' (Government Office of Science 2008) there was an apparent need for specific and accredited information in the form of informative leaflets about specific contacts, people could consult with for more detailed information:

P1: Give a leaflet out telling you what is available.

Int: Do you think that would work?

P2: What we asked for was some advice on how to do about energy efficiency. And also, which company is the best company for us in this area.

Another person noted that signposts to solutions need to be clearer and easier than is currently the case, 'People need to know where to get them from. You need to make it easier for them'.

Another way that was seen to motivate people was by making them care about the issue in hand, or by linking it to something people did care about:

It's like it's always been said and I totally agree with it, ever since I've been involved, you will get people round this table who want to be involved and want to know and want to learn, but a very small minority. The only way you draw people out is if you have an issue and it's got to be a burning issue.

Children were seen to have a role to play here, in the way they wielded 'pester power' or if the adoption of energy efficiency measures was linked to other activities in and around their communities such as schools:

The kids are really big on it... If you set a target at the local schools in the area. They will get the information and they are going to go back home

and go, mum, mum you have to do this. You've got to do this. They will nag the older generations. It's not that scary, gran. It's not that scary. Come and see this. I think that could possibly work.

The installation of retrofit measures

The people who took part in the focus groups appear to have had a generally positive experience when their technology was installed. One contractor provided a loft clearance service that was seen as positive, whilst, in the same group, another participant relied on a family member to help rearrange their belongings that were stored in their loft:

Int: Did you have to clean your loft out for the loft insulation?

P1: They did it...it was a contractor but I didn't have much stuff in the loft then.

P2: My loft is very small. They moved my stuff from one end to the other. I had to have my son come in. I couldn't physically do it myself. I couldn't get in other than swinging on the top of my ladder.

The tenants of one landlord, in particular, reported being impressed with the way in which the contractors worked during the installation. As was discussed between them in one of the groups:

P1: They were clean. They were really tidy ... even when they had finished the job they tidied up after themselves.

P2: Mopped down the hall.

P1: Mopped down the hall and everything. Give us your mop bucket. They did look after us that way. They did clean up.

P3: They covered everything. They closed the door in the room when they were doing it. There was nothing coming out the room. They cleaned up after themselves and brushed up and mopped up.

Learning and living with retrofit measures

An area that dominated the discussion was how participants learnt to use the new technology that had been installed. For some the instruction they had been provided with regards to how to use the new system was

minimal and, for some people, insubstantial for example:

Int: Were you shown how to use a new boiler.

P1: Only a one day effort.

There was clearly a desire for more information about how to use their new system effectively:

Really, it would be better if people were asked if they need advice. If a leaflet was sent out to your household and for them to tick if they would like someone to come round and chat to them. I think that would be better.

In order to learn about the technology, people instead opted to call upon their family members, friends and neighbours. There was a sense of drawing upon the knowledge of people who were in some way 'technically proficient':

My daughter is quite good, she's set it down and advised me I know she's checked how it works. I've got it on that little thing [points to room thermostat], we had one on the wall.

I'm lucky, I've got a son who is technical. He teaches me these things and I can say to him, because you can say, bloody well slow down. Just show me and show me in plain English what I'm doing and where I'm going wrong. That is how I do my computer.

My mother is 84. She quite often gets confused with any new equipment at all. We do have to sit down and explain everything to her. I think the elderly do need more help.

Alternatively, people in the local area who were known to take an interest in energy efficiency were often used as key sources of knowledge, as one participant recounted, 'a lot of people come with problems to me'.

There was a sense of significant discomfort in having to learn how to use their heating system. One person talked about how learning technology, with which he was not particularly engaged, was just 'aggravation':

I'm 58...unless it's something I'm really interested in, I just don't want to know. I don't want the aggravation of having to work it all out and see how it works and then do it. Older people than me think housing associations tend to have a higher proportion of older people rather than younger people who shy away from technology completely anyway.

For a number of people, the technology, specifically the way the technology was controlled, was seen as mysterious. For example, one person who had a heat pump and a mechanical ventilation and heat recovery system installed was unable to understand what the warning lights and instructions were telling her and whether the signals were things she should be acting upon:

[The landlord] do know about this. I am not complaining... But it is three o'clock in the morning and this is a horrible time to wake up. I don't know what's causing it [respondent referring to warning lights] and I don't honestly think it should be causing it. It's something I think maybe wrong and I put it in the loft, presumably. It's a bit frightening. Everything about it doesn't sound right. The other thing is this emersion heater. Is that connected with this system? Is the immersion heater part of that system or is that completely separate? I found to my horror and for the first 10 days I was in, I got this thing—there was a red switch that goes to the right panel and two red switches on the side. That was turned off. The red one underneath is still.

This resident, in particular, objected to being made to feel like a novice—and powerless—whilst living in their own home:

If I start turning off switches ... I'm not an idiot. Obviously these switches are to do with the immersion but is it all right to turn them off or something?...I don't know what the one switch is doing. It hasn't stopped the water from coming out boiling.

A number of people openly acknowledged that they did not understand how their systems worked and implied that they realise they are probably not using them efficiently:

I can't say I fully understand. But I understand enough to work them, I think.

I'd understand it if mine worked efficiently or properly, but it doesn't.

Interestingly, the focus group setting obviously allowed people the space and opportunity to seek the advice from people like them on how best to operate their new heating systems, to ask questions and to share knowledge and experiences.

Mechanical ventilation and heat recovery systems prompted the most animated discussions. These were framed mostly negatively in that they made their home cold:

We've got one in the loft. It makes it cold.

For the first 3 years that we lived in the property it didn't work. We didn't know that, because when you used to talk to somebody you could actually see your own breath come out. It got fixed.

They were also concerned about circulating dust and dirt around their home:

Mine's made all my ceiling black. It gets all like black dust. The landing is quite cold.

Other respondents talked about how the new system was located in inconvenient locations within their home:

Int: Did they not show you how to use it?

P1: There are no controls. It's just fused. It's in the loft.

P2: We had a switch on our one, a little switch.

P3: We've got nothing.

P1: It's up in the loft. If the fuse blows you have to go up in the loft. It means we've got to climb up into the loft.

The role of trust and the relationships with key practitioners

Across the focus groups, it became increasingly clear that trust plays a multi-faceted role in the way in which residents within social housing view and experience the installation of retrofit measures. The issue of trust was discussed in relation to their landlord, the contractors, 'experts' and, perhaps inevitably, the technology and measures themselves. In terms of their landlords, it was clear that for a number of tenants how their landlords, and the contractors they have appointed, have approached repairs and demonstrated an apparent lack of expertise in the past helped frame their landlords as potentially incompetent in the installation of retrofit measures:

Getting the repairs done and draughts, that's the worst. I applied for the wall insulation and a chap came out and said, it's been done. I said, funny that mate, I had a repair done in the cavity wall and the chap took a couple of bricks out of one end of the wall and a couple of bricks out the other and

we both put our heads through and there was nothing there.

What you should have is a proper surveyor that's got nothing to do with [the landlord] come out and say, that's needs doing.

Although most people in the groups had had a positive experience of retrofit installation in the recent past, by far the most suspicion was directed at those who undertook the installation of measures. Most tenants were able to recall some incident that illustrated a lack of sufficient attention to detail:

I had a problem with the boiler. It was wired in wrongly by somebody from a contracting team. It worked for about 4 h after they went. After they'd installed it they'd gone and then it just conked out. It was all because it was wired wrongly. Luckily, there was a number that I could ring from the contractor. They came back out with fan heaters for us to have some form of heating. They just put these windows in...when I moved in, the day we moved in they were putting them in while we were there. They put them in, but the strip of plastic they had was the wrong strip. It's short. I'm getting a draught in the back kitchen. I've got one of the largest windows on the landing. Being on the end I've got at least an 8 foot window and you might as well not having it in. The draught comes through terrible.

Our loft, they just threw the insulation in. It's not even put down properly.

With 'experts', who were supposed to provide a level of diagnostic help and analysis, similarly offering very little comfort at all:

They reckon it's [installation of cavity wall insulation] been done. They didn't actually look at my property. It doesn't appear as if it's been done. If I go away, even just for a few days, as I do every other week and you can smell the mustiness in my hallway and that shouldn't be. It shouldn't be in any home.

A potential solution to improve performance and confidence, noted by some respondents, was the need to embed transparent quality assurance processes in the retrofit works in the form of post-installation

inspections. Apparently no resident in the focus groups had experienced an inspection:

You know when you are in the building trade, you can't do anything without an inspection. He inspects everything you do. He gets something 6 inches out of place. If you had somebody following these guys around and you've got a bit more power than them and saying, you are not leaving this property until it's right. That would be a better idea. You need somebody who knows all the specs, all the modifications

P1: I've just had that done from the gas checks. I had an inspector come round to check that the check had been done.

P2: Set up a bit more regular it would be better for us.

P3: They are supposed to come round and inspect the properties aren't they every now and again? No-one has ever been round to inspect me.

Such findings offer an insight into tenants' reasoning when they are considering the value of adopting retrofit measures and engaging with those practitioners who work in the retrofit industry. The accounts above suggest that the installation of retrofit cannot be separated from the experience the vast majority of tenants have had with housing repairs and modernisation programmes of the past. There appears a lack of confidence in the quality of the workmanship and expertise available which is perhaps compounded by the relative novelty of some of the measures being installed.

Sharing experiences of sustainable retrofit

An emerging finding from this study indicates that the reason trust takes on a central role in the discussion of retrofit is because it forms a key barrier to adoption and efficient use as a result of the way it is transmitted through the stories residents tell themselves and each other about the work being undertaken. The stories people tell about their lives are important to consider as they are strategies we all use to bring order to what can be seen as disorder (Murray 2003). Stories serve as a way for transmitting knowledge to others, as well as making sense of things to ourselves, about our beliefs about who, what, when, why and how things are done. Therefore, in the case of energy efficiency—and the refurbishment of homes—such stories offer a useful insight as to how this knowledge is being understood.

For some participants, their learning about how to be efficient in their consumption of energy and their use of technology was transmitted through their discussions with others. One person talked about how they use lights in their home based on information she had obtained from some unknown source:

I tend to leave mine on in the evening when I'm in. Leave my hall light on. If I should walk just into the bathroom, I don't put the bathroom light on or if I just go into the bedroom for something, I don't need to put the bedroom light on. I don't bother to switch—we are told that it takes more electricity to switch them on and off.

Some people recounted reasons for inaction by tenants towards initiatives because they appear 'too good to be true' for social housing tenants, for instance:

None of this applies to us and we can't—every time we have these things coming through the post and it says, do you want loft insulation and do you want this and do you want that. You can send them all off and I've often done it, just as a joke, because I know quite well it's just going to come back and say, you are with a landlord in social housing. You don't qualify.

Here their status as tenants was seen to locate them as 'undeserving' of initiatives. This narrative shares similar characteristics with the assertion by another participant outlined above who thought that the acceptance of retrofit measures would lead to them having to pay more in rent to their landlord as a direct result. Another example of this would be another participant who thought that if a utility company were installing 'free' insulation the householder would end up paying for it anyway through a hidden charge attached to their utility bill:

I heard somewhere that when they undertake cavity wall insulation say it was your gas company or electric company on the bill they take a small fee. I don't know whether that's correct or not. I've heard that.

Finally, one of the most damaging aspects of stories when discussing the retrofit of properties is the rumours that emerge about the process or the technology not working correctly:

We are lucky in this respect as when we moved in we had under floor heating that wasn't working properly. We had heaters, storage heaters that were

falling off the wall. So we contacted the landlord and through their agents we'd had all new heating put in, you know, storage heaters. Ours are working perfect. But in saying that, there is a rumour that even though these are only just over 12 months old, they have been coming out and a better system again put in. Whether they do it that way or not I can't really say until I see what they are doing.

Not my problem. I've heard negative stories, because I mean I know what it's like when one person will hear something, 'Oh well, that's it—I'm not having that'. By the time that story has got back to the landlord it's gone so far round and got so convoluted

Or the negative financial implications such changes to their homes could have:

When, I've just told you that our bungalows are terraced. The first person to have gas central heating put in she reckoned that her account doubled, immediately and have stayed that way since.

Looking at the stories people tell about why they do or do not do something offers an interesting starting point in order to begin to unpick how decision making is constructed within everyday life. As the findings above suggest, rumours, myths and misinformation transmitted by unknown and non-specific sources can have serious impacts on the ability of practitioners to introduce new programmes in local areas. This, however, offers a new way of looking at how occupants can be engaged in order to work towards a more successful programme of retrofit. Offering information, comprising of facts and figures but also positive descriptive accounts grounded in experiences within the neighbourhood, transmitted by trusted sources in ways in which people can easily absorb, may help to provide reassurance within community settings.

Conclusions

The findings discussed here throw new light on some of the issues arising when households are asked to adopt and use measures and technologies that aim to make homes more energy efficient. As a result of the lack of empirical research into the everyday experiences of households adopting retrofit measures, the participants in these groups help us to better understand what some

of the barriers to adoption are, what it is like living with these measures as well as some of the factors that underpin this area.

Although the participants in these groups were not exclusively older people, these findings build on the research of Lusambili et al. (2011) into how older people respond to technology in the home. In their paper, Lusambili et al. talked about the apparent disconnect between the ways in which technologies were designed and the requirements of the end user. Our findings would tend to support this as it was clear that the technologies and interfaces were often mysterious to the end user. Many people appeared to lack a ‘conceptual model’ (Norman 2011) of how their system worked and their role within it. People often sought the advice of those who they already trusted and relied upon, regardless of their familiarity with the specific technology, to help them navigate the controls for their heating system. Again Lusambili et al. (2011) had a similar finding where, in their sample, the vast majority of older people tended to rely on friends and family for advice and assistance. Those who were most excluded, lacking in connections in their social networks, often did not know how their system worked. However, Lusambili et al. point out that even those who relied on their social networks to understand how their system worked did not necessarily use the technology efficiently. It simply meant that there were other people who were able to understand the principles of the control interface, not how the heating system as a whole worked.

Such findings provide worrying conclusions in that although the homes of some of the most vulnerable and those on the lowest incomes are being retrofitted, the process of handover from an installer and landlord to the resident appears inadequate. However, there was evidence of a certain amount of identity work by householders who refused to be seen as novices in their own homes for not being able to use the system efficiently and who railed quietly against being forced to develop technical operating skills they did not feel comfortable with. It is unknown what was being done by the landlords to counter such crucial issues, but it could be suspected that with the scale of the task required to retrofit and upgrade the social housing stock, coupled with the general reduction in public spending, staffing resources to re-visit properties and spend time [re]training tenants in ‘best practice’ in using their domestic heating systems is unlikely.

What emerges from this analysis is the centrality of trust in the retrofit process. Tenants appear suspicious about apparently ‘getting something for nothing’ and assume there to be some kind of catch, either that they will pay additional rental charges or that their utility bills will increase. Similarly, although most participants had had positive experiences with the contractors installing retrofit measures in the recent past, there was a theme of distrust about the quality of installation that they could expect from contractors appointed by social landlords. This draws upon a broader cultural narrative of ‘shoddy workmanship’ of public sector maintenance workers. These findings indicate the need for more research into how trust can be developed and maintained between the different actors in the retrofit supply chain, particularly the tenant–installer–landlord relationship. This may though be only one part of a multi-faceted solution as it emerges as crucial to work with tenants to enhance their confidence in the retrofit endeavour as the biggest advocate and driver for the broader public acceptance of retrofit technologies will be people themselves. If we are to succeed in the mass deployment of retrofit across the UK, we will need to support the narration of positive stories about the technologies that will be re-told from home to home.

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