Programme Area: Buildings

Project: Building Supply Chain for Mass Refurbishment of Houses

Title: Customer Engagement Exercise 1

Abstract:

Please note this report was produced in 2011/2012 and its contents may be out of date. This deliverable is number 3 of 5 in Work Package 5. The aim of work package 5 is to ensure that any mass scale retrofit mechanism designed by the consortium addresses the key needs of the end customer, the building occupant. This deliverable is the first of 2 customer engagement exercises and provides a summary of 52 semi-structured interviews with householders who have experienced a building retrofit. The interviews were held with both owner occupiers and with tenants of social housing, key conclusions from the interviews include the need to design out delays from the retrofit process, provide suitable advice as and when the householder wants it, consider the reduction of VAT from retrofit works and design solutions which allow for the use of local tradesmen with minimal levels of maintenance going forwards. The findings will be built upon in deliverable D5.4, a large scale customer engagement with UK householders who have not yet been through a buildings retrofit experience.

Context:

This project looked at designing a supply chain solution to improve the energy efficiency of the vast majority of the 26 million UK homes which will still be in use by 2050.It looked to identify ways in which the refurbishment and retrofitting of existing residential properties can be accelerated by industrialising the processes of design, supply and implementation, while stimulating demand from householders by exploiting additional opportunities that come with extensive building refurbishment.The project developed a top-to-bottom process, using a method of analysing the most cost-effective package of measures suitable for a particular property, through to how these will be installed with the minimum disruption to the householder. This includes identifying the skills required of the people on the ground as well as the optimum material distribution networks to supply them with exactly what is required and when.

Customer Engagement 1

Optimising Thermal Efficiency of Existing Homes

Deliverable 5.3 Project Report

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Executive summary

Deliverable 5.3 focuses on the engagement of customers who have experienced a retrofit, whether as owner-occupiers or as social tenants whose landlords have opted to carry out the works on their homes. Three key customer groups were identified and approached to conduct semi-structured interviews with the householders, face-to-face in their homes – the Old Home SuperHome network and Bristol Green Doors network for owner-occupiers and the Retrofit for the Future residents for social housing customers. A total of 52 semi-structured interviews were conducted across these groups.

Key findings for the SuperHomers and Bristol Green Doors members (owner-occupier groups) included:

- Typically White British, highly educated, comfortably wealthy, environmentally-minded individuals in their mid-to-late life;
- Motivations dominated by environmental concerns over economic concerns;
- A high frequency of self-managed projects;
- A preference for local trades;
- High levels of satisfaction despite high frequencies of delays;
- Greater levels of disruption for those who lived through the works;
- Poor levels of advice provided;
- No change to insurance requirements.

Key findings for Retrofit for the Future participants (social housing) include:

- Typically White British, below average education, below average income, environmentally-minded individuals with children living at home;
- High levels of satisfaction with the property as a whole but low levels of satisfaction with the installation, potentially linked to lower level of involvement in the decision-making process;
- High frequency of delays.

- High perception of disruption despite most participants living elsewhere for the duration of the works;
- Poor levels of advice provided, but clarity on a need for simple advice, in small doses at a suitable time;
- High perceived desirability of their retrofitted home.

From the findings in this report, key conclusions and recommendations include:

- Design out delays;
- Provide effective advice in appropriate quantities at suitable times;
- Consider the reduction of VAT for retrofit works, based on suggestions from interviewees;
- Design supply chain solutions that allow for trusted, local trades;
- Design for minimal maintenance;

Based on the findings from this research it is clear that these customers do not fit our customer segmentation model for the key reason that their values and priorities differ from the vast majority of the UK public. In particular, environmental values for many of those interviewed took precedence over financial concerns such as upfront cost.

Future Work Package 5 deliverables will build on the work of 5.3 to better understand the differences between these customers and the typical customers defined by our segments. The research also successfully informs Deliverable 5.4 both through the data gathered and the research tool developed to interview householders.

Introduction

Work Package 5 of the Optimising Thermal Efficiency of Existing Homes Project seeks to focus on the customer experience and requirements of domestic retrofit, developing an understanding of the customer (in most cases, the resident), exploring the different values held by different segments of the UK population and gaining valuable insight into how to design a number of attractive value propositions that will engage the different segments of the UK population.

Work Package 5 Deliverable Summary

Work Package 5's exploration of customer value in retrofit is divided into five discrete deliverables:

5.1 – Defining the Customer: Stakeholder engagement and desk-based research to establish key aspects of the customer value environment;

5.2 – Customer Value Methodology: Development of a segmentation hypothesis to focus future research on key customer groups;

5.3 – Customer Engagement Exercise 1: Primary research (face-to-face, structured interviews) with customers who have gone through a retrofit;

5.4 – Customer Engagement Exercise 2: Primary research (mass survey, workshops and "virtual retrofits") with the wider UK public;

5.5 – Synthesis Report: A consolidating report summarising key research insights and providing recommendations for exploiting customer value.

Deliverable 5.3, Customer Engagement Exercise 1, builds on the work carried out in Deliverables 5.1 and 5.2, to conduct a customer engagement exercise with members of the UK public who have already gone through a retrofit (or are living in a retrofitted home). The outputs of this deliverable will provide a vital element of Work Package 5's customer insight by providing real-world evidence as to the drivers and barriers behind retrofit and key lessons in customer value.

The outputs will also support deliverables across the OTEoEH project (such as supporting Work Package 4's development of supply chain design features and Work Package 6's proposals for regulation, policies and incentives.

This report will detail the following:

- The methodological approach used to conduct the research;
- The breakdown of findings from the different target groups;
    - Owner Occupiers – UK-wide (SuperHomes network);
    - Owner Occupiers – Community (Bristol Green Doors);
    - Social Rented (Retrofit for the Future);
- Comparative analysis of the different research groups;
- Critical evaluation of the research;

Methodology

Baseline requirements of the research tool

The agreed research tool for 5.3 was semi-structured interviews with homeowners who had gone through a retrofit. This method allowed for a flexible approach to allow participants to share a great deal of rich, qualitative data whilst maintaining the structure necessary to ensure all research questions were answered.

The tool also needed to interrogate homeowners' attitudes toward the value metrics developed in deliverable 5.1 (and updated in 5.2) – the key issues and concerns anticipated to impact on customer value in retrofit. Briefly these were:

- **Economic values** – affordability, savings on bills, asset value impact, etc.
- **Physical values** – comfort, energy performance, aesthetic features, etc.
- **Process values** – disruption, control, provision of information, etc.
- **Product values** – trust in product/brand, quality, efficient goods, etc.
- **Through-life values** – ease of maintenance, usability, longevity, etc.
- **Social values** – social status, perceived opinion of others, etc.
- **Related values** – environmental concerns and competing priorities.

Finally, the tool needed to meet any other needs highlighted by the consortium. As such, a focus group was held early in 2011 to determine additional research areas and consortium members form UCL were included in development of the tool.

Identification of research partners

To assist with locating homeowners and conducting the interviews the following research partners were identified.

Energy Saving Trust (Retrofit for the Future)

The Energy Saving Trust (EST) were the nominated organisation by the Technology Strategy Board (TSB) to carry out post-occupancy evaluation

research on properties that had gone through the Retrofit for the Future competition.

Retrofit for the Future was a social-housing-based competition in which the TSB invited Registered Providers to submit bids to carry out retrofit works to one or more social housing properties, achieving 80% CO_2 savings with a maximum budget of £150k.

In total, 86 projects made it through to the build phase of the project in 2010. Each project needed to include physical monitoring facilities for two years to monitor energy use, temperature, etc. as well as social research with the occupants of the homes through semi-structured interviews.

It was decided early in 2011 to work together with EST to develop an interview tool to meet their needs for post-occupancy evaluation as well as our needs for 5.3. This was seen as beneficial for a number of reasons including:

- Participants would not have two sets of people coming round to carry out similar interviews asking similar questions, putting the research at risk of "survey fatigue";
- EST would use a specialist social research agency (Databuild) to conduct the surveys for all 86 projects and provide this all to us; in return we would provide some partner resource to assist with a Clerk of Works (post condition survey) exercise they had planned;
- It would demonstrate value for money and close working relationships between complimentary ETI and TSB projects.

Sustainable Energy Academy Old Home SuperHome Network

The Old Home SuperHome Network[1] is a national network of homeowners who have carried out retrofit works to their homes, saving 70% $C0_2$ on average. "SuperHomers" as part of the network, also participate in knowledge sharing activities by holding open days with members of the public and often working locally to support others to take up retrofit. The network itself is driven and

[1] SEA website - http://www.superhomes.org.uk

managed by the Sustainable Energy Academy (SEA), supported by the National Energy Foundation (NEF)

Through the NEF and SEA we contacted SuperHomers and received a response of 42 interested parties. From this, 26 were targeted for interview, with SEA taking 16 of the interviews.

Each interview was scheduled to last approximately 90 minutes and participants were provided with a £40 incentive to thank them for their time.

Bristol Green Doors

Bristol Green Doors[2] is a Community Interest Company that aims to support local individuals in retrofit by offering best practice solutions, developing the local supply chain and sharing knowledge. As with the SuperHomes Network, they have a network of retrofitted homes and hold open days for members of the public.

We approached Bristol Green Doors to get a slightly different take on retrofit than that of the SuperHomers – slightly lower levels of retrofit on average but also a community-level of support. Otherwise, the same methodology and research tool were used.

Development of the research tool with EST

Once a partnership was agreed with EST in March 2011, consortium partners attended meetings and provided feedback to draft documents as they were circulated.

However, this process experienced severe delays at EST's end, with the final tool not being confirmed until August 2011. The final tool used by the consortium for the owner occupier interviews (SuperHomes and Bristol Green Doors) is, therefore, based on a final draft of the tool circulated in July 2011. As such, some minor changes were made to the format and content of the tool used by EST. However, key questions that covered the consortium's relevant value metrics

[2] Bristol Green Doors website – http://www.bristolgreendoors.org

remained and can therefore still be used to draw comparisons and conclusions from this data.

The final tool used on the Owner Occupiers can be found in **Appendix A.**

Research findings – SuperHomes

Overview

In total, 26 interviews were carried out over SuperHomers across the UK. The locations are shown on the following map:

Image 1 – Graph of SuperHome Interview locations

No SuperHomes were present in Northern Ireland and very few in Scotland or Wales. The highest concentrations of SuperHomes are in England, typically in and around major cities and more likely to be in the South of England. As such, this is a typical spread for the population in question.

Who are they?

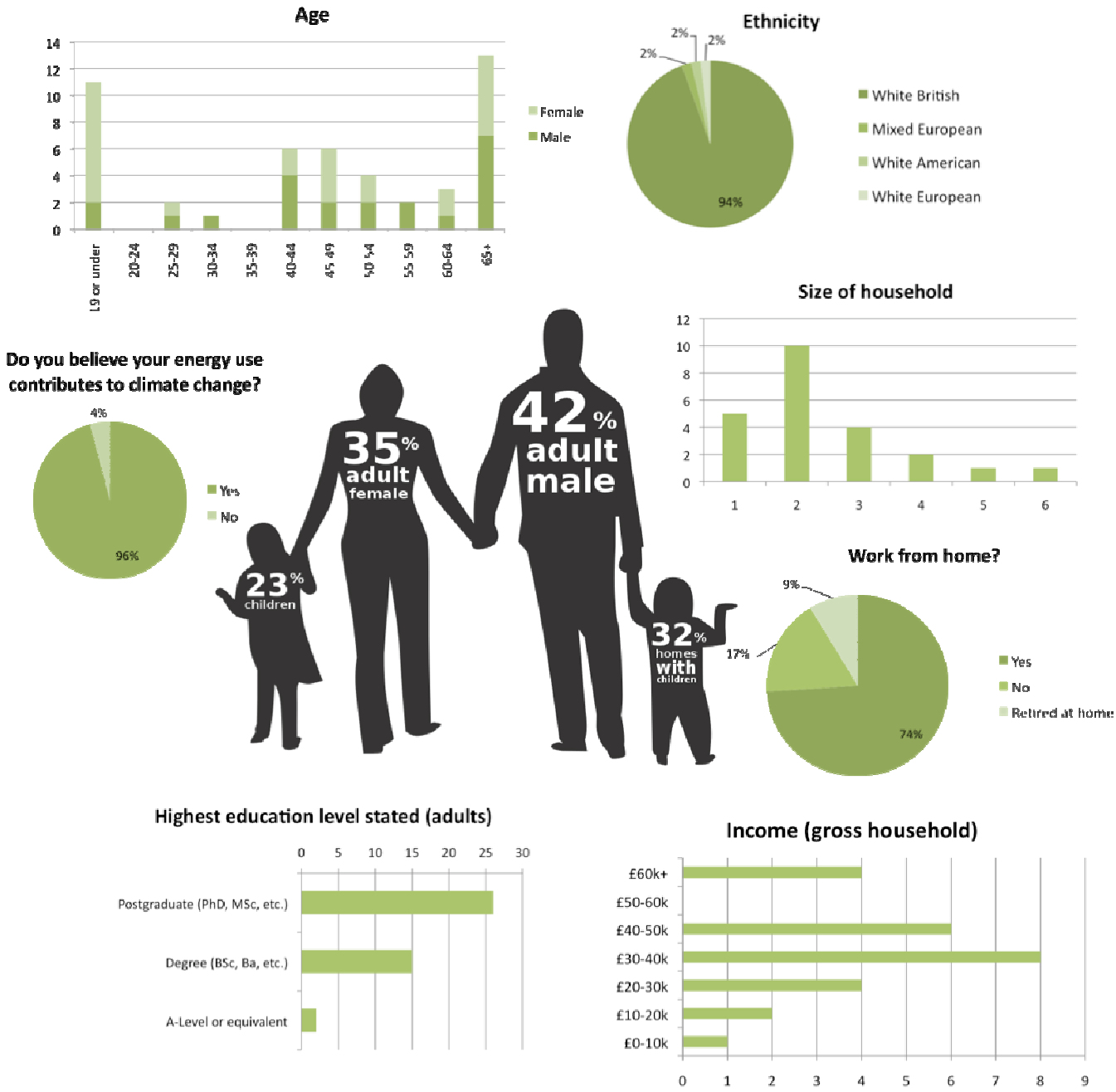


Image 2 – Demographics of SuperHomers

As shown in Image 2, SuperHomers are typically over the age of 40, with a high concentration over the age of 65. Almost all are White British and most are of above-average income. Less than one-in-three homes have children living there and the modal household size is two. Interestingly, the second most common household size is one, indicating a significant proportion of SuperHomers living alone.

Also of note is that nearly 75% of SuperHomes include a household member working from home, therefore spending large periods of time in the home during the working week.

Finally, SuperHomers are overwhelmingly supportive of the notion that their personal energy use contributes to climate change, and their post-works green behaviours are typically above average. It is worth noting that the only person to answer "no" to this question elaborated that this was because their home is carbon neutral due to being on a 100% green tariff.

Relationship with their home

Chart 1 – Residency age of SuperHomers

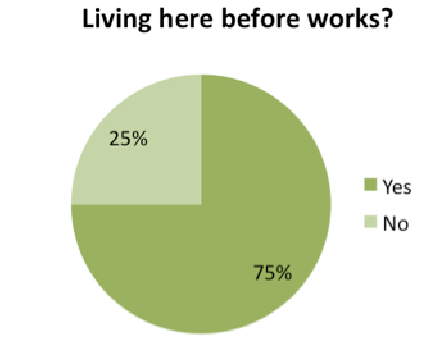


Chart 2 – SuperHomers there before works

At the time of interview, most SuperHomers had been in their property for over five years although the majority had also been there fewer than ten. This highlights a finding that most retrofit works seem to happen within the first ten years of a SuperHomer living at the property. Combined with the data on whether the participant had been living at the property before the works or not, we can note that 1 in 4 SuperHomers opted to carry out the works immediately upon purchase of the home and most of the rest within a short time after moving in.

Motivations

Referring to the value metrics identified in previous deliverables, the key values anticipated to be of importance to motivating homeowners to retrofit were anticipated to be **saving money** and **increasing comfort**. Furthermore, they identified that **environmental concerns** were of very low motivating potential.

The SuperHome interviews, however, contradict this finding. Of those interviewed, the most frequently cited motivator was **environmental concerns** with over 60% of respondents claiming this as a motivator. **Saving money** was in second place with just over 40% of respondents raising this, however the desire to improve comfort was cited by fewer than 1 in 5 respondents as a key motivator.

Other common motivators are **long term interests** (including the need to insulate against future fuel price rises and protect children) with over 20% frequency and **professional interests** (householders who work in sustainability, energy conservation or architecture wanting to "practice what they preach") also with a frequency of over 20%.

Some householders (just under 20%) also identified that the **need to refurbish** was a motivator, or that they had the chance to **seize an opportunity** as refurbishment works were already planned.

Approximately 15% of respondents identified a **desire to demonstrate** (i.e. show others how to retrofit) as a key motivator. The same number cited that they just **wanted to work out what to do**, showing that a significant number of these retrofitters undertook their projects as a learning experience, aware of uncertainty prior to embarking on the projects.

Specific issues cited by multiple householders include **climate change** and **peak oil** as well as more vague references to **social concerns.**

Finally, the following motivators were noted by only one respondent in each case: **historic purpose** (the home had previously been used to generate electricity via hydropower), **an interest in technology**, **independence from**

the grid and **improve asset value**. This final motivator is of key importance, as our value metrics identify asset value as being crucial to wide take-up. As this was only identified by one SuperHomer it is reasonable to determine that almost all individuals who have already gone through deep retrofit have done so in the expectation that the works will not add value to the home or, otherwise, that this is not important to them.

Process

SuperHomers interviewed demonstrated a perfect 50/50 split for works that had been done **all in one go** versus **working in phases**. Of those that opted for the "single hit" option, the main reasons stated were the simple preference for this approach as well as being aware of other experiences of retrofit (in the UK or abroad) where this was the best approach. Those opting for a phased approach did so primarily for logistical reasons including the need to keep one room free (or otherwise keep the home habitable), financial pressures, the desire to have a "DIY phase" or the desire to do the works in order of energy saving potential.

"I used people that I knew and, in fact, the builders hadn't done anything like this before but I trained them to understand what I was doing"

Another key finding was that most SuperHomers needed to take a **very active role in the management of their projects.** This varied from those that worked in tandem with their installers to those that took a key role in purchasing and specifying every detail of their retrofit. The general reason for this appears to be that the level/type of works was beyond the current capabilities of the trades in question and that the SuperHomer would rather use someone they already knew/trusted and train them up to carry out the work or otherwise manage them very carefully to ensure the desired result (particularly in

"I had to be very hands-on with the trades"

terms of airtightness). Also, as previously noted, many SuperHomers were carrying out the project as a learning process. Thus, a high level of involvement would help them in fulfilling this value.

Around 2 in 5 SuperHomers also carried out significant portions of their works themselves (**DIY**). Again, this varied from producing their own architectural designs to installing measures themselves.

"If you can put a set of shelves up straight you can insulate your house."

Only around 1-in-4 SuperHomers used an architect, with many of those that didn't expressly saying that they chose to design and manage the projects themselves. Chart 3 shows the range of people stated to have been involved on SuperHome retrofit projects.

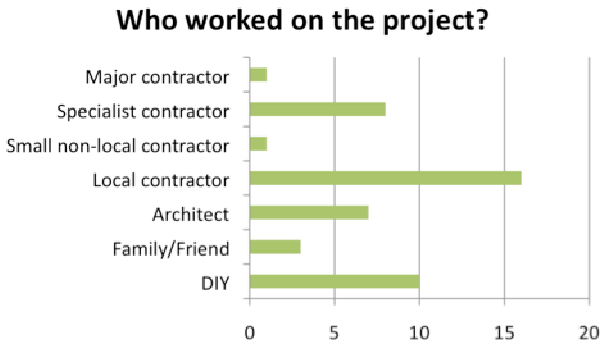


Chart 3 – Who worked on the retrofit?

The clear preference for carrying out retrofit is a local contractor, with SuperHomers using specialist contractors for measures that are beyond the scope of local tradesmen. It is also worth noting that family and friends are more frequently used than major contractors.

SuperHomers gave several answers for the method of selection of professionals to work on their homes, but the most frequent methods of selection are choosing those that the Superhomer **already knew** or those that had been **recommended by friends or family**. Other methods include those that had been recommended by professionals or experts as well as searching the internet and the Yellow Pages. However, the preference for choosing a trusted, known entity or one recommended by a trusted source seems to be the key factor.

"It was important for us to be able to find someone we knew we could trust"

Disruption

SuperHomers were, again, split in half over their perception of the disruption caused by the retrofit works. However, this perception is very closely correlated to whether SuperHomers were **living in the home during the works** or **living elsewhere.** As can be expected, those living in the home during the works were much more likely to perceive a high level of disruption whereas almost all of those living away from the site noted that disruption was minimal.

"Belongings got trashed"

For those living through the works, the major recurring disruptive intervention was **internal wall insulation** with residents finding this to cause very high levels of physical disruption with almost all of those installing this measure complaining about large quantities of dust. Other recurring disruptive processes or measures included **rewiring**, installation of **underfloor insulation or heating** and **kitchen and bathroom** installations, with the latter causing problems due to lack of sanitary or cooking facilities. One SuperHomer also cited the great deal of **psychological disruption and stress** caused by ongoing problems with a specialist heat pump contractor.

"Far worse than expected"

There were, however, some SuperHomers who lived through the works without finding them disruptive. The key differences in these cases, however, were either that their package of measures **did not involve invasive, internal measures** (i.e. no internal wall insulation, rewiring or underfloor works) or that they were **fully anticipating the level of disruption they experienced.** One other point of learning is from one case where the contractor took great efforts to keep the house tidy and tidied up at the end of every day: the unfortunate knock-on effect being that the customers perceived this to add a significant amount of time to the project.

"…as expected. Didn't bother me too much"

Of those that stayed elsewhere during the works, there was an even split between those that stayed with **friends or family** versus those who stayed **in a previous home**. No SuperHomers stayed in

"I knew it would be disruptive."

paid accommodation (e.g. a rented property or hotel).

Only one SuperHomer indicated that they experienced disruption whilst living away from the works. In this case, the works overran and this caused them to have to move all their belongings from their previous home into storage whilst they moved in with a family member, adding extra cost and inconvenience.

Speed and cost

Two other key value metrics identified earlier in WP5 were the cost of the installation and the duration/speed of works. Approximately 60% of SuperHomers noted that their works, or parts of their works, took longer than expected. In terms of cost, 40% noted that things cost more than expected; in some cases by more than double. However, this crucially **doesn't appear to correlate with respondents' satisfaction levels**, with the majority of respondents noting that they were either satisfied or very satisfied in this respect.

"First business plan was £100k. It ended up being £250k."

Two possibilities emerge for this based on the data. Firstly is that there is an **established expectation that general build projects have a tendency to go over time and over budget** and thus customers can remain satisfied due to their expectations being met. The other is that, for this particular group of individuals, cost and time were not as critical motivators (see previous sub-chaper on "Motivations") as they may be for other members of the public:

"It always takes longer than you expect"

> *"We had to explain that speed was not a primary driver for this work. It's a once-in-a-lifetime job so it needed to be done right and we were happy to pay for the extra time. Most builders would find that a difficult concept to deal with. Our priorities were performance, then appearance, then cost [and time] – an unusual priority set for most builders to understand."*

It is also interesting to note how SuperHomers funded their works. A wide range of funding solutions were given. Most commonly SuperHomers used their **own capital or savings to pay for the works** with many others **remortgaging** to pay

for them. Many SuperHomers also took advantage of **grant funding** available through programmes like the Low Carbon Buildings Programme. Unusually, some SuperHomers managed to negotiate **free or discount installations** from suppliers wanting to test new products in their homes.

However they paid for it, as shown above, cost (and cost fluctuation) does not appear to be a key motivator or value for SuperHomers. One final observation is that the high level of control exhibited by SuperHomers may factor into this – as most SuperHomers were managing their own projects, they may take a greater level of personal responsibility for cost control, making allowances for fluctuations that can ultimately be paid for but re-scoping the project for those that go beyond what they can ultimately pay for.

"[The cost] did go over what I expected it to be, but I had enough that it didn't have to worry me.""

Problems (what went wrong?) and changes of plan

As has already been noted, most SuperHome retrofits took longer than originally expected, and 2 in 5 cost more. As each project was unique, the range of problems and alterations to plan are too broad to cover in detail, however some key common threads were noted.

During the works, the key recurring problem is with **new technologies** (i.e. microgeneration and associated green technologies). This varied from poor service from installers of microgeneration technologies to incorrect specification. Other problems include **products delivered not-to-specification** (windows being most common), **planning issues** arising mid-project and **issues uncovered during the works** (such as leaks behind walls or rotten floor joists).

The importance of a strong survey was noted by at least two SuperHomers on opposite ends of the spectrum. One, an architect, noted that things ran to plan because of his thorough survey. The other blamed a poor survey from an incompetent surveyor as what caused extra cost and problems to the project from issues such as woodworm that should have been picked up.

Changes to plan were typically more positively perceived by SuperHomers as these were either seen as **part of the learning process** or otherwise presented **opportunities to add value** to their projects (e.g. a patio due to excess rubble, an extra bathroom due to available space). Doing works "while we're there" was also typically viewed as positive by some SuperHomers – problems identified during the works (e.g. wiring, leaks, etc.) could be fixed now at a lower cost then leaving them until later.

Problems arising after the works also typically revolve around new technologies, with **solar thermal** and **mechanical ventilation with heat recovery (MVHR)** being the two technologies most commonly needing second fixes. Otherwise problems are typically due to technological measures rather than structural or static measures (e.g. insulation). Problems with conventional heating systems were noted by some SuperHomers and others needed to change heating controls. The majority of these post-works issues were perceived as fairly minor by most SuperHomers and, in many cases, were yet to be rectified.

Satisfaction with professional services

SuperHomers typically had a very mixed experience with builders, contractors, architects, specialists and consultants. However, across all those interviewed, the highest levels of satisfaction were more typically associated with **established trades** (local builder, plumber, electrician, kitchen/bathroom installer, etc.). Lower levels of satisfaction were more frequently attributed to companies specialising in the installation of **new technologies** such as solar thermal or heat pumps; poor experiences were typically associated with poor specification or management of the project.

Another key area of dissatisfaction came with **architects** for those SuperHomers that had used them. Most SuperHomers using an architect spoke of problems with their architect ranging from "unprofessional" and "lack of commitment" to a "breakdown of trust" and "they wouldn't work to my specification". More than half of those who had experienced dissatisfaction with an architect ended up

firing them from the project, either finding a replacement or opting to take over the design and management role themselves.

Advice provided to customer

Another key value metric is that of high quality advice being provided to customers. Considering advice provided to the customer at handover on using their technologies, the experience of SuperHomers is that in almost all cases **advice or training is not provided** by the installer. Typical responses indicate that manufacturer manuals are provided but that there are very few cases where the installer demonstrated how to operate the system; those few that did were, with one exception, only for traditional heating technologies (e.g. gas boiler and traditional controls).

"[There was] no training on how to use the heating controls. I had to phone a technical advice line."

A common experience of SuperHomers is that the installer was not aware of how to operate the system and, in some cases, the customer felt better informed/aware than the installer. An observation from conducting the interviews is that many SuperHomers seemed to **never have expected any advice** and that it was only upon being questioned at interview that they considered whether they were satisfied with this or not.

"I'm not sure I asked for it. I didn't expect it but probably should have. I could have got more."

Satisfaction with a lack of advice was polarised. Whilst many SuperHomers agreed that advice would have been useful for them, particularly with new, green technologies, many state that they would not have wanted any and that any such training would have been a waste of time. As previously noted, for this group of homeowners, their retrofit was perceived as a personal learning experience and self-teaching seems to be an important part of that.

"SuperHomers like me are generally engaged and will have put in the research to understand the systems they are installing."

In terms of behavioural changes to fit with the new systems, SuperHomers typically accepted that it was up to them to learn how to

live with their new home. Many felt that they didn't need any advice – either because their particular system didn't need any changes to behaviour or because they already feel well aware of how to manage their behaviour (with more than one stating that providing others of this advice was their job).

Maintenance requirements and warranties

Through-life concerns such as maintenance and warranties are of key importance to the value metrics and also to the value propositions being developed in Work Package 4.

"We were careful not to pick high maintenance [measures]. This stuff is very expensive."

However, the dominant feedback from SuperHomers is that ongoing maintenance is not a great concern, with most stating that their particular retrofit is **maintenance free or otherwise very minimal.**

When SuperHomers mentioned maintenance, this was typically either **self-maintenance** or **ad-hoc maintenance.** Only two respondents mentioned service contracts and, in both cases, these were with energy companies for gas boilers only.

"I tend not to sign up to service contracts"

The most common self-maintenance concern was the **changing of filters** in ventilation systems or heat pumps. All respondents were comfortable with this responsibility. The only other self-maintenance discussed was the **removal of ash from wood-burning stoves.**

In association with this measure, a common ad-hoc maintenance service was **chimney sweeping.** Otherwise the most common ad-hoc maintenance was for **gas servicing**. However, many of those that noted a maintenance obligation for their gas boiler explained that they do not service the boiler annually (choosing a 2-5 year cycle, instead) as they use this measure little and often in comparison to a standard installation.

Otherwise, customers expressed little concern for ongoing maintenance and typically preferring the ad-hoc approach to rectifying problems.

"If there were any problems – it's a small local firm so I could get them to deal with [it]. I'm not particularly worried."

In terms of warranties, approximately half of the SuperHomers confidently stated that **they had warranties on their measures**, with many offering the details (anything ranging from one year on a heat pump to 25 years on a photovoltaic panel). However, most of the other half were **unsure** of whether they had warranties or not. This lack of awareness is particularly of note considering the typically high levels of awareness exhibited by this group on other aspects of their retrofits (e.g. technical and behavioural details).

Key elements

Respondents were questioned as to which measures or elements of the retrofit had given them the most satisfaction, following completion of the works. Over twenty unique suggestions were made across the interviews, however the most common recurring answer was the single or multiple **insulation** measures installed, primarily for the low maintenance yet dramatic effect it gave to improving comfort and reducing energy bills.

"[Insulation is] transformative… You just need it to sit there and magically transform your internal environment."

The next most popular measure was **solar photovoltaic** with the general reason being that customers could easily see the impact it was having on reducing demand from the grid. Other popular measures were **the whole heating system**, the **wood burning stove** and **new doors and windows.** Multiple SuperHomers also answered "**the whole thing**" – stating that the whole system worked together to provide them with increased benefits and, as such, no one component stood out as being particularly satisfactory over the others.

Respondents were also asked to name any measures they were unsatisfied with. Approximately 1-in-3 stated that there was nothing they were dissatisfied with, but of those that did respond, there were again a large list of unique responses. The only measures that were raised more than once were **lighting** (with some SuperHomers being dissatisfied with new low energy technologies), **wind turbines** and **controls** (where customers were either dissatisfied with their usability or their reliability).

Insurance requirements and asset value

SuperHomers were asked if the retrofit had resulted in a change to any insurance requirements. All but two responded that there had been no change in premiums as a result of the works. Of those two, the reasons stated were due to an increase in size from a two-bedroom to a three-bedroom house, whilst the other was due to on-site wind turbines.

However, around 1-in-5 SuperHomers volunteered that they hadn't actually told insurers of the details of their retrofit.

Asset value, as previously noted, is a key value metric for UK-wide retrofit, however was only considered a key motivator by one respondent. This finding was reflected again when asking respondents whether they had had the property valued since completing the works – only one had. They stated that the property had increased in value by £180-280k for a £250k investment.

Of those that had not had the property valued, most did expect the value to have increased but around half of these stated that **the increase in value would not match what they had spent on the retrofit.**

"I don't think retrofit is valued by the marketplace yet."

"It's an unusual system so this may put off some buyers and degrade the value. This isn't a major concern, though."

Respondents gave a wide range of reasons as to why the value may have gone up, but most of these had little or nothing to do with the low-carbon elements to their retrofit. Such reasons included **increased**

size, added extension, loft conversion, new double glazing, increase to base value due to market and **improved condition**. The only two reasons perceived to add value to asset value that are related to "retrofit elements" are **Feed-In Tariff income from photovoltaic panels** and **local interest in green issues** (as the home was located in a Transition Town area).

"If your motivation is a money making exercise, why would you do [this]?"

One final observation is that SuperHomers seemed unconcerned that there was little or no perceived increase in asset value as a result of doing the works. Many noted that they had no desire to sell and that this "was not important to them". This reinforces previous observations that SuperHomers are less motivated by financial values than we may expect of the wider general public. We could also postulate that SuperHomers' intentions in doing the works were to live in, and enjoy the benefits for the foreseeable future rather than sell and move elsewhere.

Respondent recommendations

Respondents were asked to make two key recommendations based on their experiences of retrofit – one to prospective retrofit homeowners and one to government and policymakers. As with the Key Elements subchapter, responses were wide and varied with approximately twenty unique suggestions for each.

Recommendations to prospective retrofitters

The most common recommendation to prospective retrofitters was to **seek good quality, professional advice and support** to inform their decisions and increase their understanding and awareness. Related to this was the suggestion to **take control of the project** by working with and managing the professionals employed by the customer and fully understanding the decisions made at every stage.

Common technical recommendations were to **focus on insulation** (with a further recommendation to **choose external wall insulation over internal**)

and draught proofing as well as **do as much as you can in one go** and **do the whole house.** The importance of **a good quality survey and good early planning** were raised by more than one SuperHomer.

Finally, attitudinal recommendations included **don't think about payback** (consider other benefits or consider long term survival) and "**just do it**" from SuperHomers advocating the approach of learning as you go along and gaining personal satisfaction from the sheer experience of doing the retrofit works.

> *"The only things I regret are the things I didn't do enough of. Don't skimp; do as much as you can. If you have a choice, do more. It will save you in the long run."*

Recommendations to government and policy makers

The most popular recommendation to government and policy makers was **abolish VAT on retrofit materials** with some that gave this answer noting their issue with a discrepancy between new-build and existing homes where VAT is concerned.

> *"To my mind it's absolutely wrong that mirrors and bathrooms of a new house are zero VAT rated if it's a new-build. I think that the zero-VAT rating should be entirely reserved for energy efficiency and airtightness."*

Other similar recommendations were to provide **better financial support** and to **make subsidies and incentives simpler and cover more people**.

"Pushing insulation" was another key recommendation given by multiple SuperHomers. Other areas noted that needed increased levels of support were **homegrown and decentralised energy** and **skills and training**.

Another popular suggestion was to **increase efforts to educate the public** with one SuperHomer elaborating to say government should aim to **change the way people think**. Another suggested that government should **legislate to make it socially uncomfortable not to retrofit** (giving the public smoking ban as a relevant, similar example) and one went as far to suggest that **wasting energy should be made illegal.**

Finally it was suggested that planning and relevant **regulation should be simplified** and that **goal posts should not be moved.** Related to this, more than one SuperHomer suggested that **planning and heritage considerations should be made more flexible** or otherwise overridden for retrofit.

Quantitative research

Throughout the interviews, quantitative questions (those that demanded a specific answer from a range provided) were asked to support the main body of qualitative data. The results from these questions are summarised below.

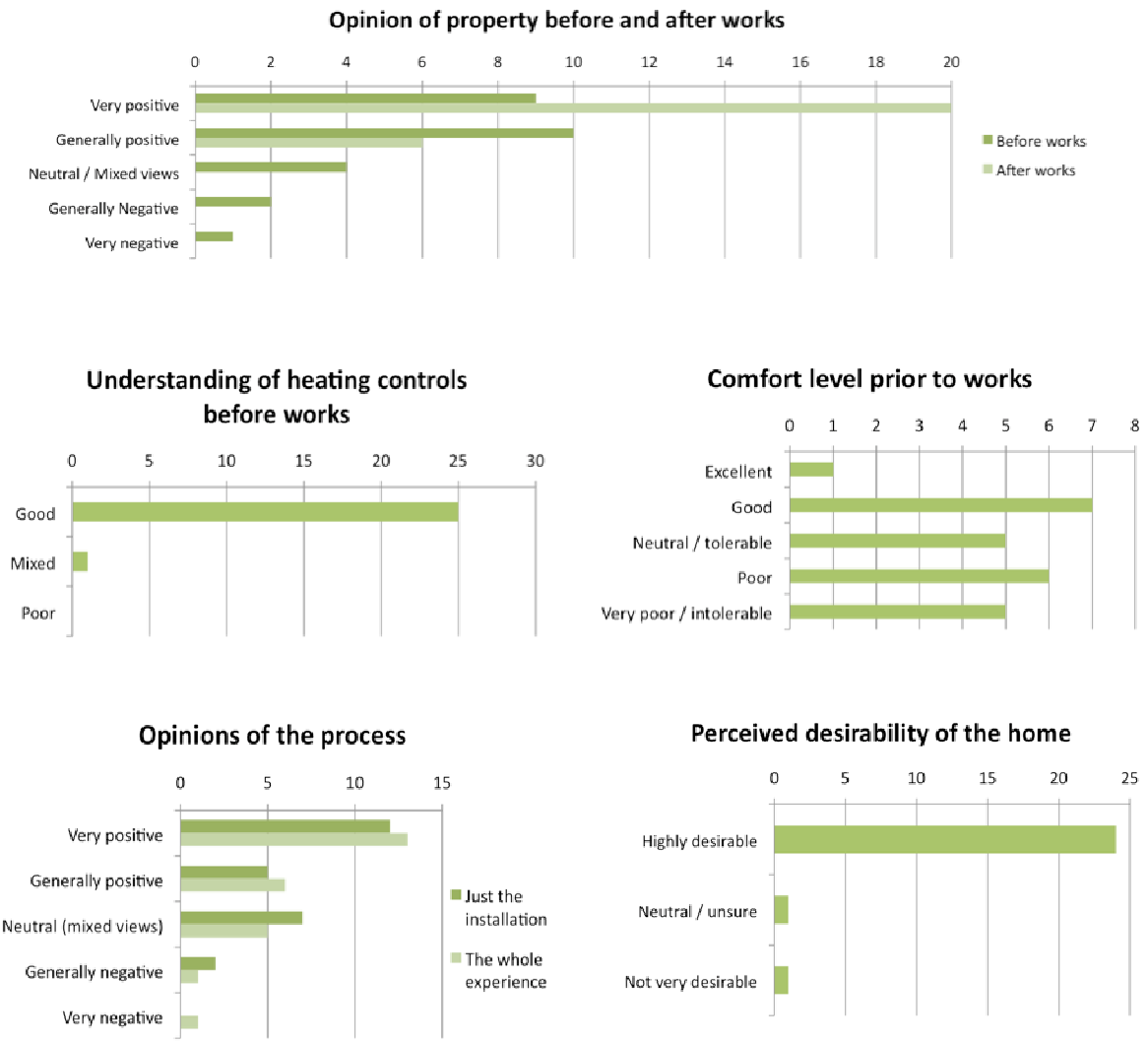


Image 3 – Quantitative data chart summary

As shown in Image 3, SuperHomers' opinions of their homes was typically positive before the works were carried out. Comparing this with the finding for the comfort level prior to the works, we see a much more varied response, with very few respondents giving a score of 'excellent' for comfort.

We can draw from this that these customers may have had typically positive feelings toward the home despite recognising a less than satisfactory comfort level. Perhaps a surprising finding is that many SuperHomers felt their comfort levels were 'good' prior to deciding to carry out works that would increase this comfort. However, as noted earlier, SuperHomers' motivations for carrying out the works did not necessarily include comfort as a key driver.

Following the works, all SuperHomers rated their home as 'generally positive' or 'very positive'. There are two possible explanations for this change – firstly that the increased positive response comes directly from making improvements to comfort and quality of the home; secondly that by the process of carrying out the retrofit, these customers may have a more positive or closer connection to their home. The high score for their perception of the desirability of the home may lend some support to this assumption.

Furthermore, most SuperHomers rate their whole retrofit experience as being either generally or very positive. This also closely matches their opinion of the installation phase of the projects with only a very slightly lower opinion on average of this element. This is another important finding when viewed alongside previous findings of a high frequency of problems, delays and cost increases. It would seem that these customers are tolerant to such problems enough to maintain a positive opinion of the process.

Finally, customers' understanding of the heating controls in the property prior to the works is very high. However as this group is typically very highly educated and engaged in this area, this is not surprising.

Summary

SuperHomers are typically a highly educated, green-minded group of people with above-average income and generally middle-aged or older. They are motivated by a wide range of values but, crucially, **very few are motivated most by financial concerns** having chosen to take on their retrofit projects for reasons other than improving asset value or payback on investment.

Other key findings include:

- SuperHomers typically took **a very active or "hands-on" role** in the management of their retrofit projects**;**
- The preferred service to carry out the works were **local tradesmen** found either from previous direct experience or through recommendations from friends, family and other trusted sources**;**
- SuperHomers who lived through the works typically had **a more disruptive experience,** particularly those who installed internal wall insulation;
- Most SuperHomers experienced **delays, cost rises or other problems** however this crucially **did not seem to translate to low satisfactions levels;**
- Installer advice on using technology and behaviour change was typically **minimal or poor.** This was met with mixed satisfaction levels**;**
- Most SuperHomers consider their home to be **low maintenance or maintenance free** and opt for **self maintenance,** where possible, or **ad-hoc work over service contracts**;
- Key recommendations to prospective retrofitters are to **seek good advice** and **focus on insulation measures**;
- Key recommendations to government and decision makers are to **abolish VAT for retrofit** and to **"push insulation"**;
- Almost all SuperHomers have not had their home valued and don't anticipate their asset value to have increased by the amount spent on their retrofit. This does not seem to be a concern to these customers.

Research findings – Bristol Green Doors

Overview

To support the findings from the SuperHomer interviews, seven (out of a target of ten) interviews were carried out with members of the Bristol Green Doors group. This group of customers typically have installed fewer measures and tackled retrofit less intensively than the SuperHomers. However, being owner-occupiers, they typically were in a similar situation to the SuperHomers. The following section, therefore, will focus on the differences between the findings from both sets of interviews.

Demographics

This group, as with the SuperHomers were typically white British, of above-average income and mostly educated to degree level or beyond. They also were more likely than not to feature someone working-from-home during a typical working week. The only notable differences on average were that they were more likely to be **slightly younger**, with more of this group being middle-aged than the typically older SuperHomers. As such, this group was also more likely to feature households with children.

Motivations

Members of this group gave similar answers to SuperHomers for their key motivations for carrying out the work, with **environmental reasons** also being chosen more often than **economic reasons**. However, they provided two new motivations that had not been given by SuperHomers. Two respondents stated that an **expanding family** motivated them to carry out the works (both involved adding an extension) and one noted that the **Feed-In Tariff** motivated them to act, by adding

"Growing family led to the need to extend and we wanted to do it 'properly.'"

photovoltaic panels as well as DIY secondary glazing and replacing all light bulbs with energy efficient equivalents.

Process

Bristol Green Doors retrofitters were **more likely to choose a phased approach** than SuperHomers, despite typically doing fewer or less intensive works. This correlation may suggest that those that choose to do a more intensive retrofit featuring multiple measures are more likely to prefer the all-at-once approach than bit-by-bit.

Specific reasons given for choosing a phased approach included **to fit in with family life** as well as the new reason of **leaving works that required planning consent until the second phase, completing all the other works for phase one**.

As with SuperHomers, most of this group managed the project themselves although the most common way of selecting contractors differed from SuperHomers with Bristol Green Doors members typically using the **internet** or other methods to find contractors before completing a **pseudo-tender process** in asking questions and obtaining quotes from multiple organisations before choosing their builder or contractor.

As with SuperHomers, a similar preference for local professionals was exhibited by this group. However, they seemed **more likely to choose an architect** than SuperHomers – generally related to the design of an extension. A possible explanation for this is that SuperHomers are more engaged in retrofit and more likely to be confident enough to take on this role than Bristol Green Doors members.

Disruption

Given the less intensive level of works, most Bristol Green Doors respondents lived through the works but didn't find them disruptive – they were either simple works like loft insulation and light bulb replacements or external installations of solar panels.

Those that had more intensive work tended to note that the major disruption came from the structural works (typically involving installation of an extension) rather than the energy-saving measures. Of the two respondents who moved out during the works, both detailed two new solutions that had not been given by SuperHomers – one **went on holiday for three weeks** while extension work was being carried out. One **rented a local flat for the duration of the works**.

"We were able to secure a flat two doors down, virtually overlooking the site. Given the scope of works, moving out was the only option."

Speed and Cost

Compared to the experience of SuperHomers, Bristol Green Doors members were even more likely to have experienced delays with 6 out of 7 noting delays to their projects. However, only one mentioned added cost to the project and confessed that this was due to their rescoping of the project mid-way through.

There was a greater spread of responses for satisfaction with the duration of the works than shown by SuperHomers, with **respondents here more likely to give a negative response.** However, still more than half noted they were satisfied or very satisfied with the duration of their projects. This, again, supports that customers can still be satisfied with works that are delayed, although the contrast is not as evident with this group. A sense of personal responsibility for delays was more clearly shown with this group, however, with three of the people experiencing delays stating that they felt partly responsible.

"We've wasted some time engaging with inappropriate pitches from architects and contractors. Perhaps because this house may not be typical and what we want to do doesn't fit into the current supply model has meant that so far it has been pretty unsatisfactory."

Problems (what went wrong?) and changes of plan

As noted above, most of the participants experienced delays to their projects, but other problems and changes to plan were noted that didn't necessarily impact on time. One key new problem noted by one participant was **the length of time getting started** as the amount of time taken to develop plans and find suitable professionals to work with took significantly longer than anticipated.

Evolution of the project was the typical reason given to changes in plan for Bristol Green Doors members as they made changes during the works to increase their ultimate benefit and satisfaction from the works. An important learning point came from one respondent who noted that the surveyor had suggested that only ten solar panels would fit onto his roof but, once the installers were on site and able to access the roof, it became clear that twelve would fit. This respondent noted that **a survey of the roof is typically difficult from ground level** and, therefore errors like this were not surprising.

Problems after the works, as with SuperHomers, included problems with new technologies (MVHR) and controls but two new problems were given – one needed **seals around windows and doors rectifying** while the other needed unexpected **stone work** completed on the external wall following installation of external wall insulation.

Satisfaction with professional services

Bristol Green Doors respondents were typically more satisfied with their contractors and other services than SuperHomers, with all but one giving a positive satisfaction rating for this element of their retrofit. This may be due to a well developed local supply chain in Bristol but could also be due to the typically more basic level of retrofit works carried out with this group combined with established, more commonplace works such as extensions, making these less unpredictable and easier to get right.

Supporting this is the finding that Bristol Green Doors members had generally positive experiences with their architects, compared to SuperHomers with their more complex needs. Also in contradiction with the SuperHomers findings was that the only type of trade that this group raised as being unsatisfactory was a local general builder. However, it should be remembered that Bristol Green Doors members were less likely than SuperHomers to select a local builder based on previous experience or personal recommendations; as such this may suggest a reason for the difference.

Advice provided to the customer

Of those questioned, only four felt that questions on handover advice were relevant. Two felt they weren't relevant as one had only had external wall insulation installed and, thus, felt that no advice was needed for this; the other similarly felt that the changes were not significant enough (and didn't involve new controls) to warrant advice on through-life interaction. The final person was yet to complete most of their works so wasn't yet able to respond to these questions.

"The contractor gave some advice and have kept in touch since the installation."

Of those four mentioned above, there was a direct split with two having very positive advice experiences and two not. The positive experiences came with one having very detailed advice on operation and behaviour from their solar thermal installer and the other being provided advice from the photovoltaic installer on the new monitoring system (although they confessed they already understood how it worked).

Maintenance requirements and warranties

As with SuperHomers, most of these customers considered their homes very low maintenance. The only maintenance requirements noted by two respondents were the occasional need to clean their own solar panels (thermal and

photovoltaic). Two other respondents also noted that they had service contracts for their boiler maintenance.

Awareness and existence of warranties typically followed the trend shown by SuperHomers, with **many customers being unaware or unsure of the level of warranty provided** on their measures.

Key elements

When asked about the measures that had given them the most and least satisfactions. Respondents from this group responded similarly to SuperHomers citing **new technologies (solar thermal and photovoltaic), insulation, the heating system, new door** and **the new extension** as their favourite measures. The only new answer from one respondent was their **new curtains** as they felt they made a big difference to their energy savings. All respondents confirmed that none of their installed measures caused them to be dissatisfied, so no *least favourite* measures were noted.

"It just works better as a living space. It's comfortable all the time. Visitors love it too."

"The solar PV are great and give us a 'smug' feeling."

Insurance requirements and asset value

As with SuperHomers' experiences, Bristol Green Doors members generally found that their retrofits did not impact their insurance premiums.

In terms of asset value, again there were similar responses from this group with none of them having had their home formally valued but most anticipating a rise in value, in some cases due to the addition of an extension, but with some noting that they didn't anticipate a monetary value increase in proportion to what they paid to carry out the works.

"The measures will probably offer an additional selling point but unlikely to add more to the market value."

Respondent recommendations

Recommendations to prospective retrofitters

Bristol Green Doors members gave similar recommendations to SuperHomers including suggesting that people just **take the plunge, invest in a quality survey, focus on insulation, see examples** and **consider the whole house**. Some new suggestions, however included **do works when you move house, futureproof your works** and **start with the simple, basic measures**.

"The sooner you do it the sooner you save."

Recommendations to government and policy makers

Again, Bristol Green Doors members gave similar recommendations as SuperHomers including **abolish VAT, improve financial support, increase flexibility for heritage/conservation sites, support education and awareness raising** and **make it simpler**. However two new suggestiong focused on providing greater clarity – one being **improve clarity on funding** and the other **provide clarity on government's motivations behind the agenda.**

Quantitative Research

The responses to the quantitative questions for Bristol Green Doors members closely matched the patterns exhibited by SuperHomers with no significant variations.

Summary

Respondents from the Bristol Green Doors group, in general, exhibited very similar attitudes and had similar experiences to SuperHomers despite typically doing **less intensive retrofit** and installing **fewer measures**.

- Bristol Green Doors members were demographically very similar to SuperHomers although were **slightly younger** and **more likely to still have dependent children**;
- These customers were also more likely to be motivated by **environmental values** than economic values;
- They were **more likely to choose a phased approach** than the all-in-one approach favoured by 50% of SuperHomers. This may suggest that small-scale retrofit is preferably done bit-by-bit and, by contrast, more intensive retrofits are more likely to be done all-at-once by preference;
- Bristol Green Doors members were less likely (than SuperHomers) to choose local trades they already knew or those recommended to them by friends or family, choosing instead to use the **internet** to find their contractors before **comparing and selecting**;
- These customers gave two new options for avoiding disruption during the works – **renting a flat on the same road** and **going on holiday for three weeks**;
- These customers were more likely to experience delays to their project and slightly more likely to be dissatisfied, despite generally remaining relatively tolerant of added time and cost to their projects;
- They were also **more likely to give high satisfaction ratings** for their contractors and professional services, however this may be linked to the comparatively less intensive projects they experienced;
- Bristol Green Doors members were more likely than SuperHomers to suggest that **greater clarity** was needed on retrofit from government and policy makers.

Research findings – Retrofit for the Future

Overview

At the time of writing this report, 19 post-occupancy interviews had been completed and provided in full by the Energy Saving Trust.

The key difference between householders in this group and those previously considered is that these are social tenants and not owner-occupiers. As such they were not the decision-makers for the retrofit project and so many of the topics considered previously (motivation, cost, selection of contractors, etc.) are not relevant for this group. As such the following section will focus on

- Process values for those householders who lived through the works (e.g. disruption, duration, etc.);
- Handover and provision of effective advice;
- Through-life values such as usability and any second fixes needed;
- Satisfaction with the home and retrofit process.

Who are they?

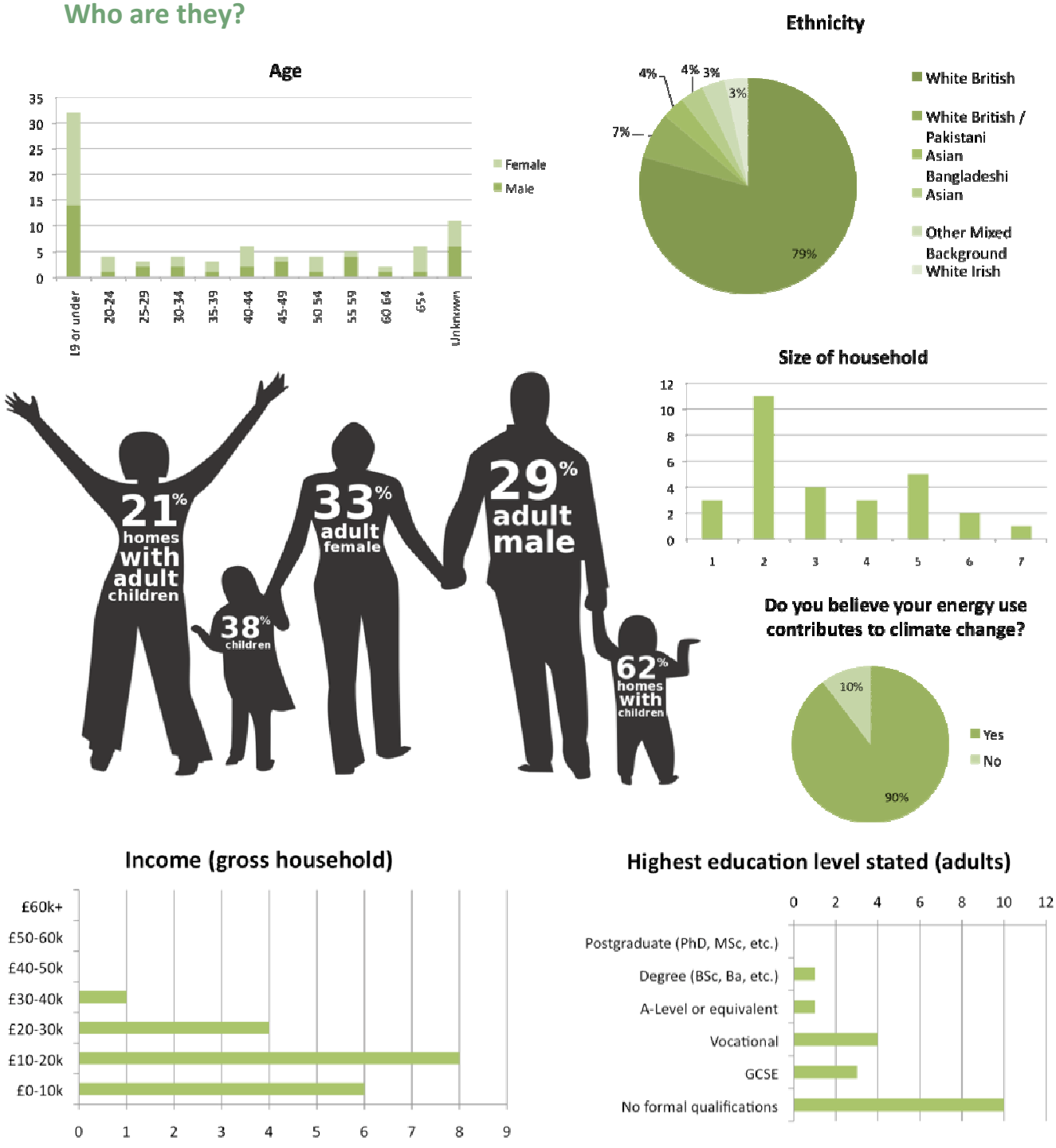


Image 4 – Demographics of Retrofit for the Future residents

As shown in Image 4, Retrofit for the Future (RFTF) homes are dominated by **homes with children,** with those under the age of 20 making up nearly 40% of the residents of these homes. Another associated finding is that more than **20% of these homes includes an adult who is a child of the main householder**

and, in some cases, a grandchild also living in the same house – i.e. three generations in the same home. For adults, a fairly even spread of ages was observed across the bandings considered for this research, however 13% of respondents refused to give their ages when asked, despite a 100% response rate for ethnicity, income and other demographic questions.

When asked about the education levels of those in the households, the majority of households answered that **no formal qualifications** were held by members of the household, whilst those with qualifications tended to be GCSE (or equivalent) or vocational qualifications with only two respondents noting that they held qualifications of A-Level or higher.

Most RFTF householders were White British although **20% were of an ethnic minority**, typically being of Asian background with one Irish and one undisclosed other ethnicity. The **modal household size was two**, however more than half were greater than this figure, with several households including five members and one **household of seven people.**

Finally, **90% of respondents stated that they believed that their personal emissions contributed to climate change.** Whilst lower than the figure for SuperHomers, this remains a high figure compared to the national average.

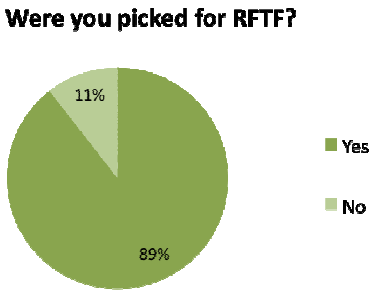


Chart 4 – Selected households

This finding demonstrates an important consideration with this group in that **nearly all of the households in RFTF homes were selected by their Housing Association to participate in the project.** Due to the contractual monitoring requirements (two years of post occupancy evaluation) for the scheme and the prevelance of new and unfamiliar technologies, many participant Housing Associations selected tenants that would be engaged and supportive of the process. This is, in part, verified by the high percentage of members of this group demonstrating an awareness of their personal impact on climate change. As such, the following findings are not necessarily representative across the whole of UK social housing.

Relationship with the home

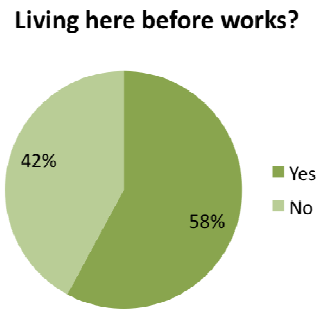


Chart 5 – RFTF residents there before works

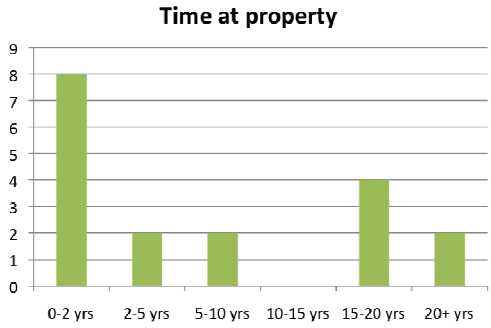


Chart 6 – RFTF residents time at property

As already noted, RFTF residents are all social renters and are therefore not responsible for the general maintenance and any retrofit works planned. As previously noted, due to the competition nature of the RFTF programme, many participant Housing Associations chose to conduct the works on a vacant or "void" property, with 42% of households moving in to the retrofitted home having not lived at the address before. Of this 42%, most of the tenants were **existing tenants** of the Housing Association waiting on a transfer list to a different property, with the remaining two households being new to the landlord.

Of those who had lived at the property before the works, **most had lived at the property for longer than 15 years**, thus having a long-established relationship with the property prior to the works.

Previous opinions of their home

As noted earlier, as these householders are not responsible for the decisions to carry out the retrofit, it is not particularly relevant to gauge their motivations toward conducting such works. What is comparable and relevant, however, is the attitude of tenants to their home prior to the works, whether or not, they lived in the same property, and their perceived notions of areas causing them dissatisfaction.

As shown in Chart 7, whether or not the tenant was living at the same home before the works, **most respondents had a negative opinion about their home**. The most common problems being that they felt the home was either **cold or draughty** (with more than 50% of RFTF tenants perceiving these issues about their pre-works home). **Damp** also appears to be a major issue although this seems to have been a bigger issue for those respondents living in a different home prior to the works.

Crucially only two respondents offered an opinion that they had particularly high energy bills prior to the works when asked if there were any things they particularly disliked about their previous property. A relevant and related finding is that only **approximately 25% of respondents were able to say what their former energy spend was**. This lack of engagement on energy spend potentially suggests that although only two respondents stated that previous high energy bills were a concern, more may have experienced this issue but have perceived other issues as being more problematic. That is, **physical comfort issues may be more apparent to this group than financial issues like high energy bills**.

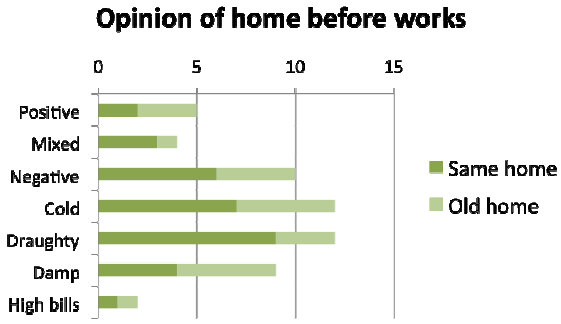


Chart 7 – RFTF residents pre-works opinions

Disruption

Due to the nature of the project and the requirement for all Retrofit for the Future properties to achieve an 80% carbon reduction target, almost all projects were tackled in an all-at-once installation with many being very disruptive. As such, **more than three quarters of RFTF homeowners were out of the property during the works**. Most households in

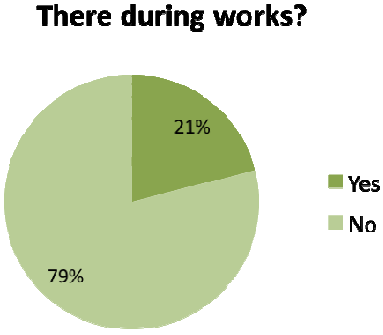


Chart 8 – RFTF respondents living through works

this category were living at their old property (as previously noted, 8 were not at this home before the works) or decanted into arranged accommodation by their housing association with only two opting to stay with friends or family. One of these latter respondents raised the issue that they worried that **staying with friends or family may jeopardise their eligibility for housing benefit**, citing a previous experience where they had been cut off for staying briefly with a family member.

Of those that lived through the works, **all stated a dissatisfaction with the disruption caused**, with the most common complaint being the loss of kitchen facilities during the works and a general lack of care or respect for the home/possessions from the contractors working on site.

Despite the majority of householders staying elsewhere during the works, **most remained dissatisfied with the disruption caused by the works** with many returning to visit during the installation. Exacerbating this, three respondents were returned to their property by their housing association before the works had been completed, generally when external works were all that remained. This approach typically led to dissatisfied residents as they still felt that the external works were disruptive to them and didn't like having builders still working around them.

Speed

Of this sample, **all but one of the retrofits took longer than planned**. This is reflected directly in the satisfaction of residents, with all of those that experienced a delayed project noting that they were dissatisfied with this delay. Delays ranged from a few weeks to several months (twice as long) over time. As these tenants were not involved directly in the management of their projects and in many cases not in direct contact with the contractors working on site, few respondents were able to give many details about the cause for delays or other problems. Of those that did comment on this, typical delays were caused by issues like late delivery or misspecification of measures like windows and

second fixes (one respondent saying the kitchen needed refitting five times over the course of the works).

Several respondents also noted that they **did not get the full compliment of measures they were told they would get** and this is reflected in a dissatisfaction with each project's ability to meet their expectations. This suggests further problems with the management or design of projects that can ultimately lead to dissatisfied customers.

Advice provided and understanding of systems

A number of different experiences of handover advice were reported by respondents ranging from nothing, to nine people on the first day spending large amounts of time showing occupants how to operate their technologies. Crucially, **in both of these extremes, occupants were dissatisfied with the level of advice provided.** In the latter case, occupants who were given a large amount of detailed information on their first day in the property felt that they were given too much information, too quickly and at a time when they were busy with moving (back) in to the property.

The advice provision styles that generally gave the highest levels of satisfaction were **demonstrations with representatives from the landlord** and **basic, jargon-free, simple written instructions.** This is supported by some of the dissatisfied customers suggesting that they would rather have had information from their landlord and in a simple, "no-nonsense" written form to refer to at later times.

Almost all respondents now feel satisfied that they understand their controls, as many who were dissatisfied with the advice provided requested advice at a later time. Based on the feedback, the general controls installed are traditional thermostats, which most respondents understand. It is, however, important to note that most of those interviewed have not yet experienced a heating season and thus had very little need to use their systems so far. When the Energy Saving Trust carry out second-round interviews in the Spring, it will be interesting to

see how well residents manage to operate their systems by putting their understanding into practice.

Perception of post-installation home

The majority of respondents noted that they were satisfied or very satisfied with the home following the works, and most of those who had lived in the same property before preferred their home following the retrofit, expressing that their homes were **warmer** and **more comfortable**. However, **over one quarter of respondents expressed dissatisfaction with major elements of their retrofit**.

The most common complaint was the **loss of space or storage**, with occupants complaining that they had lost an airing cupboard or toilet or other useful space to make way for cylinders or heating equipment. The next most common complaint was **the need to fill biomass boilers or wood-burning stoves.** Other less common complaints included **stuffiness/air quality problems, appearance of external insulation** and **issues with the new light fittings.**

It is worth raising in this section that one respondent noted that due to the savings that they had now made on their energy bills, their family had been able to afford a holiday away to Spain. This "rebound" effect is something that needs to be considered when viewing retrofit in terms of its carbon-saving potential.

Behaviour change

Across all those asked, on average, almost half of those asked felt their energy-saving behaviour was **mixed or middling before the works,** with the rest of the sample split between "poor" and "good" whereas the majority felt that their **behaviour was good following the works**, with occupants commenting that they typically exhibit positive energy behaviours "as a matter of course." Interviewers were trained to judge the validity of these perceptions through

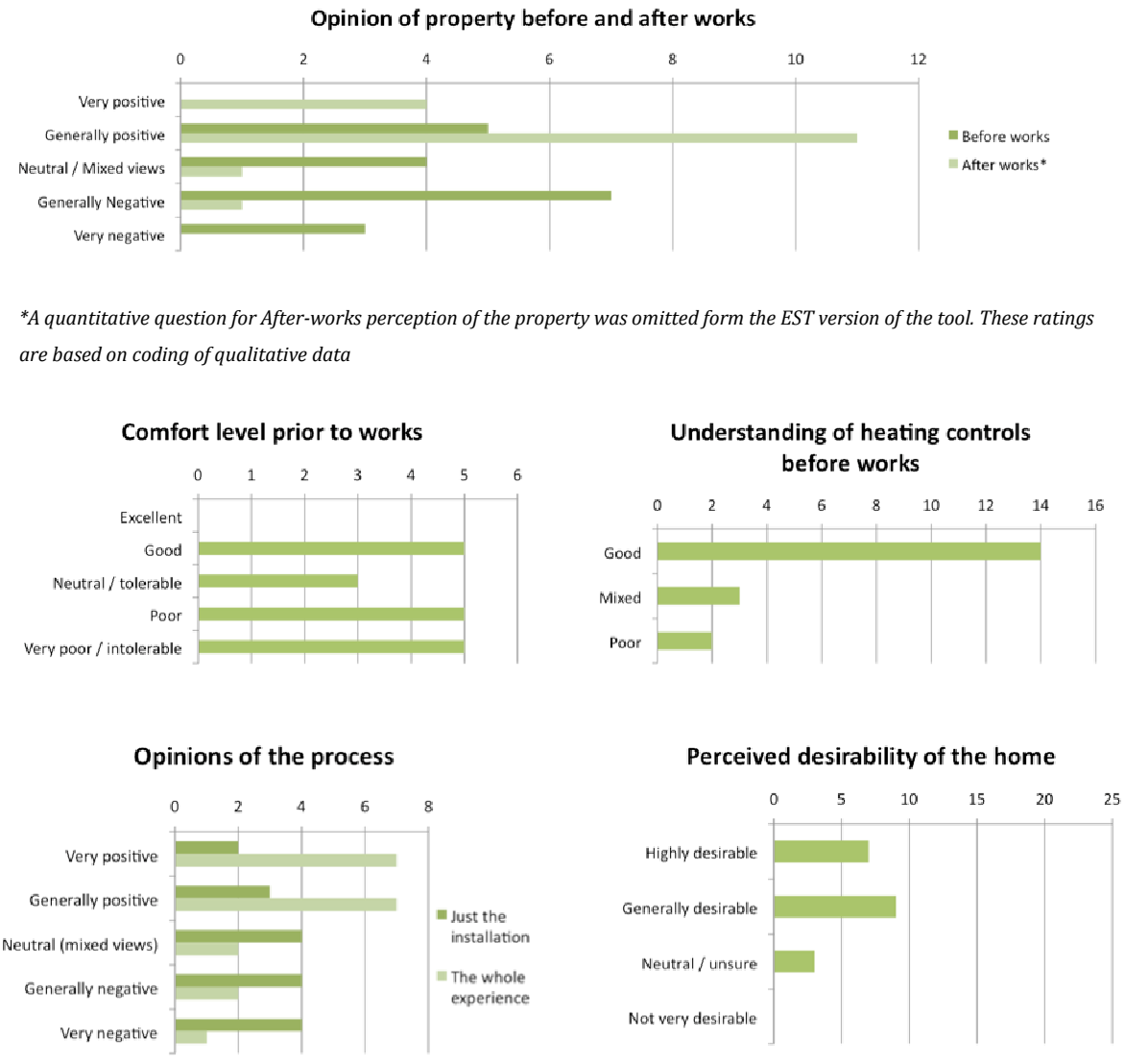
some simple questions and prompts and, in almost all cases, occupants' opinions were judged to be accurate.

However, when asked whether they felt the works had influenced their behaviour in the home, **almost 40% of occupants felt that they hadn't changed their behaviour significantly**. Generally this is because respondents felt that their behaviour was already good. However one respondent noted that their behaviour remained "mixed" as they wanted to remain "normal" following the works.

The physical monitoring data collected by the project over the coming two years will prove extremely useful to determine whether occupants' behaviour leads to the anticipated savings based on designs and whether this behaviour changes over time, for the better or the worse.

Quantitative Research

As with the other interviews, a series of quantitative questions were asked of participants. The results of these questions are summarised in Image 5, below:



**A quantitative question for After-works perception of the property was omitted form the EST version of the tool. These ratings are based on coding of qualitative data*

Image 5 – RFTF quantitative data summary

Whilst opinions across the pre-retrofit property (whether the same or a different dwelling) are spread, the spread is weighted clearly towards the negative. A much clearer response comes from the post-retrofit property with all-but-one respondent giving an overall positive rating of their home (despite earlier

findings surrounding dissatisfaction with significant elements exhibited by one quarter of respondents).

Comfort levels prior to the works similarly showed a negatively-weighted spread of answers, which closely matches the overall property satisfaction profile.

Respondents noted a typically good understanding of their previous heating controls, although more than a quarter of respondents felt their understanding was mixed or poor.

There is a striking difference between RFTF residents' opinions of the installation process versus the process as a whole, with a negatively-weighted spread for the installation versus a clear positive signal for the whole experience. The reason for this disconnect could stem from a number of possibilities; however, it is logical to assume that respondents view the installation process as just one part of a wider experience, including the through-life experience. As there is a clear difference in opinions, this suggests that residents view the installation process as a small part of the process compared, for instance, to SuperHomers (who exhibited a clear connect between installation and whole-process satisfaction). Residents' lack of control or involvement in the installation process may, therefore account for this.

In terms of desirability, respondents showed a clear positive bias for this, perceiving that the post-retrofitted property was either generally or very desirable, demonstrating that respondents perceive a wide appeal for their retrofitted homes.

Summary

RFTF residents are typically White-British, educated to an average or below-average level and living on a below average income. They are typically environmentally conscious, although it is unclear whether this is due to a selective bias from the landlord responsible for submitting bids to the competition or due to behavioural change as a result of going through the RFTF process. They typically are households with one or more children and many of these homes contain parents with adult children living in the home with them. Other key findings include:

- Respondents were a mix of those living in the home before the works and those moving into a newly retrofitted home. Of the former, there was a bias towards those having lived at the property for over 15 years;
- Residents typically had negative perceptions of their pre-retrofit home (whether the same home or different), typically perceiving their old home as being **cold, uncomfortable** and **draughty**;
- RFTF respondents demonstrated an **apparent disconnect with their energy spend**, not perceiving it as a key problem before the works;
- RFTF respondents typically perceived **significant disruption** during the installation despite the majority living away from the home;
- **All but one respondent experienced delays to the project**, resulting in low satisfaction levels with the installation process;
- Advice on operation and behaviour provided to residents varied in extent and method greatly, with **too much on the first day** and **none at all** being the two key areas for dissatisfaction;
- Approximately one quarter of residents expressed dissatisfaction with elements of their home, including a **loss of space** and **poor air quality**;
- On average, residents exhibited **higher levels of positive energy behaviours following the works** despite 40% stating that they hadn't made a significant change;

- Respondents demonstrated **a disconnect between their satisfaction with the installation and the wider process**, suggesting that the installation is not a majority factor in their general retrofit satisfaction.

Differences between datasets

The key and most striking differences between the RFTF and owner-occupier (SuperHomer and Bristol Green Doors) datasets explored in the 5.3 interviews are:

- Demographically SuperHomers and Bristol Green Doors members are very similar; the key differences between these two groups and the RFTF residents (beyond the tenure type) are that the latter are significantly **lower income** and **lower education**;
- **RFTF tenants typically demonstrated greater levels of dissatisfaction** than owner-occupiers. This may be an inherent trait of this customer type or otherwise a result of this group's lack of control and ownership over the process, making them less tolerant of delays and disruption;
- A similar finding is that the owner-occupier groups typically gave similar positive satisfaction scores for the installation and whole-process whereas RFTF tenants typically felt positively towards the process but negative towards the installation. **This suggests that the installation is a greater factor of the wider retrofit experience for owner occupiers than for social tenants** who have little control and involvement over the process. Also worth noting is that RFTF residents were **unable to select a contractor based on trust,** whereas owner-occupiers frequently did, often choosing local trades-people with whom they had a level of trust based on past experience or personal recommendation;
- **RFTF residents typically needed more advice and support** on living with their home and the new technologies following the works than owner-occupier groups. However, this may be another result of tenants not being the key decision-makers in the project and generally being disengaged with the selection of measures;
- **RFTF residents expressed dissatisfaction with measures that required self-fuelling** (such as wood burners and biomass boilers) whereas wood-burning stoves were popular with owner-occupiers;

Application to the Customer Segmentation Model

The Customer Segmentation Model developed in deliverable 5.2 was designed to focus on broad stereotypes applicable to large portions of the UK population. As such, it is unsurprising that the model does not apply to the majority of the individuals interviewed in this deliverable as, by their very nature, they are a minority of the country (in that they have experienced a retrofit).

The key factors that distinguish the interviewed respondents from the wider UK public and, by extension, our segmentation, are their **non-financial motivations** and **environmental awareness**.

For owner-occupiers, their environmental motivations and other strong, driving motivators were substantial enough to overcome the financial and logistical barriers to retrofit. For the social tenants, the majority of them were selected based on their likelihood to cooperate with the RFTF programme and, therefore, are likely to be more pre-disposed to higher levels of awareness than typically expected of our segmentation's social housing groups.

Based on their demographic profiles, however, it can be suggested that the following segments are relevant to this research:

- SuperHomers – **Elderly Established** (older homeowners, often retired, living comfortably), **Successful Ruralites** (typically middle-aged and older, wealthy, highly-educated and often with children having left home) and potentially some **Middle Grounders** (middle-income, middle-aged, middle-management);
- Bristol Green Doors – as above but also including some **Early Enterprisers** (younger families on good salaries focused on their children and settling into family life);
- Retrofit for the Future – **Unconvinced Dependent** (younger families, often single-parent, living in social housing) and **Urban Constrained** (middle-aged families on low incomes and low education living in cities) although it should be noted that there is a much bigger difference

between these segments' low green attitudes, awarenesses and behaviours and those exhibited by RFTF households.

Whether decision-makers should focus on changing customers' attitudes and values toward retrofit to bring them more in line with those shown by those interviewed in this deliverable, or whether they should focus on reducing the barriers perceived by UK retrofit customers will be discussed in more detail in deliverable 5.5 of the project.

Critical evaluation of research

Deliverable 5.3 has ultimately successfully delivered against its acceptance criteria, delivering 52 interviews (of a target of 50) using an approved and agreed methodology.

Furthermore, the data collected in this deliverable will prove extremely valuable in comparing and contrasting with the research collected in the following deliverable and the research methodology will form a vital base in the development of the virtual retrofit methodology.

There are, however, some limitations to the data collected that should be noted and considered:

- Data collected was very England-focused, with fewer than 10% of the interviews taking place in Wales and Scotland and none in Northern Ireland. This is largely due to the availability of retrofit exemplars in the devolved administrations and the dominance of English retrofitted homes in the major networks considered for this research. Nonetheless, further study into non-English retrofits would have been beneficial if they were available;
- Similarly, no private rental tenants were identified to be interviewed. Again, this is largely due to a lack of availability of private rented accommodation that has been retrofitted;
- Results may be skewed by the "self-selecting" nature of the participants – for Retrofit for the Future, as mentioned, many participants were selected by their Housing Association for their likelihood to participate in this research; for owner-occupiers, their membership of their respective networks requires them to participate in open-house events and actively share knowledge. It is possible, therefore, that there are examples of retrofitted homes in the UK where households maintain a level of independence and anonymity from such knowledge sharing exercise.

Conclusions and key recommendations

Despite frequent delays and problems in the installation processes, deliverable 5.3 has seen that households having gone through retrofit typically have had positive experiences, with households enjoying the benefits of a retrofitted home. Some key areas of learning for other work packages include:

- **Owner-occupiers tended to manage their own projects**. It is unlikely that this will be a sustainable solution for mass roll-out. However, our research noted that those projects where the occupant took on an active management role were the projects where there were higher tolerances to delays and disruption and generally high levels of overall satisfaction. As such, Work Package 4 supply chain designs will need to allow for high levels of control and perceived ownership of the project, whilst minimising the hassle for owner-occupiers;
- **Delays were an extremely common feature of retrofits discussed**. Similarly, excessive delays are not sustainable for a mass roll-out. Therefore value propositions must seek to design out delay wherever possible;
- **Minimising VAT was a very popular suggestion for government to incentivise retrofit** as was **"push insulation"**. These findings will prove relevant to the work being carried out in Work Package 6;
- **The provision of handover advice should be at an appropriate level**. providing too much on the first day that a resident moves (back) into the property can be as bad as providing nothing at all. A balanced approach seems to give the most satisfaction, where residents are provided simple, jargon-free instructions in person, where necessary, and in writing for future reference. This also is of relevance to both Work Packages 4 and 6;
- **A marked preference was shown by owner-occupiers for local trades-people** who respondents felt they could trust. Work Package 4 must therefore design supply chain solutions and value propositions that either allow local trades-people to be major delivery bodies for retrofit, or support a way to provide increased levels of trust in other delivery

bodies. The ongoing work in 5.4 will further clarify preferred delivery bodies for different customer segments;

- **Disruption was typically much higher for those who lived through the works**. As such, although customers should be given the option of a solution where they can remain in the home, effective value propositions need to be developed to reliably allow residents to move out of their home for a short duration;
- **Simple, maintenance-free solutions** were preferred over measures with high levels of variable control and maintenance. A strong preference was also expressed for ad-hoc maintenance, not service contracts. This will also feed in to the work of Work Packages 3 and 4 in developing packages of measures and compelling value propositions.

Next steps

The findings from 5.3 will prove invaluable in developing 5.4's UK-wide customer engagement work, namely:

- A UK-wide retrofit survey sent to 20,000 people;
- Focus groups across the UK with different customer segments;
- Virtual retrofits across the UK with different common housetypes and customer segments.

The research tool used in this deliverable has already been used to develop the draft tool for the Virtual Retrofits allowing for quick comparison between identical or similar questions. Also, the data collected has been useful in developing the focus group methodology and in noticing immediate differences between attitudes expressed by non-retrofit members of the public and those interviewed in 5.3.

The findings of 5.4 will help clarify the key differences between our customer segments and the participants of 5.3 who have already gone through retrofit.

APPENDIX A – Sample Interview Tool

SECTION 1 – Asked by email or phone when arranging the appointment:

1. Please list the people who live at the property (Person 1 typically being you), including their **age, gender, ethnicity (see list below) and relationship to you**

- White British
- White Irish
- Other white background
- Mixed white and Black Caribbean
- Mixed white and Asian
- Other mixed background
- Asian Indian
- Asian Pakistani
- Asian Bangladeshi
- Other Asian background
- Black Caribbean
- Black African
- Other Black background
- Chinese
- Other ethnic group – please state

2. Thinking about each person, how many hours does each one spend away from your home each day? (e.g. at work, at school, shopping)

Person 1

Person 2

Person 3

Person 4

Person 5

3. Does anyone in the household work from the home during a typical working week?

Yes/No	Who

I'd now like to find out about your home itself....

4. How long have you been living here?

5. Were you **living here** before the installation and building work was carried out or did you carry out the works **before moving in**?

6. *[if living there before]* Did you live in the home whilst the work was going on?

And just thinking about electricity and gas use within your home....

7. Do you know how much you are paying for electricity and gas each week / month? Do you know what tariff are you on?

8. How often do you have the heating switched on*?*:

- All of the time – at what temperature?
- Night time only – at what temperature? What time does the heating come on & turn off?
- Only when it feels cold – at what temperature?
- Never

Just thinking about energy use in general.....

9. Do you believe that your use of electricity and gas in the home contributes to climate change?

10. What appliances do you think use the most electricity in your property?

SECTION 2 – Main interview

- Introductions and brief chat. Give some details about the ETI project – what is the project about? Who is involved? Why we are talking to them.
- Reassurance that there are no wrong answers.
- Seek permission for interview to be recorded.
- Explain that the interview may take approximately 90mins
- Explanation of the confidentiality arrangement:
    i. All responses will be anonymised before making their way into the final report;
    ii. Personal data will be held and stored in accordance with our organisations' data protection policy;
    iii. Personal data and responses will only be used for the purposes of the OTEoEH project and will not be passed on to any third parties.

1. Briefly, what are your views in general about being green and saving energy in the home?

2. How green do you think your general lifestyle is, on a scale of 1 to 5, 1 being not at all and 5 being very?

SCALE 1 2 3 4 5 (circle)

SECTION 3 - Pre-installation experience

1. What made you decide to carry out these works at your property?
    a. Financial drivers?
    b. Social drivers?
    c. Environmental drivers?

2. Please could you tell me what your home was like before the building and installation work was started?
    i. Was there anything you particularly liked about the property?
    ii. Was there anything you particularly disliked? Did you have any specific problems with the property?
    iii. Did the house have any draughts?
    iv. Were there any damp / mould / internal air quality problems?
    v. Did your home smell?
    vi. Any noise issues?
    vii. Security?
    viii. Was your home dark (in terms of natural light)? Any lighting issues?

3. Before the installation work, was your home normally (circle answer):

- Much too warm

What did you do to cool down? Explore use of fans, opening windows, portable air conditioning?

- Too warm
- Comfortably warm
- Comfortable
- Comfortably cool
- Too cool

What did you do to warm up? Explore use of secondary heaters, turning up the thermostat, turning up the TRV.

- Much too cool

Behaviour to cool down/warm up:

4. How often did you open the windows?
   - How many windows did you open usually?
     - Open all the time – why?
     - Open at least once a day – why? For how long?
     - Rarely open – why not? How often and for how long?
     - Never open – why not?
     - When (day/night)?

5. *[if mentioned any issue with temperature, humidity, draughts, damp]* Do you feel that the conditions in your home prior to the building and installation work affected your health in any way? If so, how?

6. What sort of heating controls did you have in the property before the works? Did you find them easy or difficult to use?

Overall questions:

QUANTITATIVE CODING:

Opinion of your home prior to installations	Very positive	Generally positive	Neutral	Generally negative	Very negative
Comfort level of your home prior to installation	Excellent	Good	Neutral / tolerable	Poor	Very poor / intolerable
Understanding of previous heating controls		Good	Mixed	Poor	

SECTION 4 – Installation process

1. Did you carry out the works all in one go or did you make improvements in phases?
    - If a phased installation, what order did you do works in and why?

2. How did you go about choosing architects, contractor, consultants, etc. for the retrofit?
    - How easy/difficult was it to find these?

3. Bearing in mind the expectations you were given of the process, how closely did the actual process match those expectations?
    - Did it take as long as you were told it would?
    - Yes
    - No – took less time
    - No – too longer

4. Did any aspects of the installation vary dramatically from plan? If so, what happened and why?

5. If you lived elsewhere during any part of the works where did you live? For how long? Did this cause any problems for you?

6. If you stayed in your home for any part of the works, what was it like living in your home whilst the works were going on? How did this affect your life?

7. Overall, how satisfied were you [scale of 1–5, 1=very dissat and 5=very sat] with:

- The duration of the work

1 2 3 4 5

- The level of disruption caused by the work

1 2 3 4 5

- The professionalism of the contractors, architects and others

1 2 3 4 5

8. Please can you list the key measures you installed

9. If solid wall insulation. What product did you install

Internal/external

Manufacturer/product

depth

10. What was the main reason for choosing this type of Insulation as opposed to other options? Did you have any problems with the installation (planning, etc)

SECTION 5 - HANDOVER

1. What sort of heating controls do you have in the property now? Do you find them easy or difficult to use? How many people in the house know how they work?

2. Were you given instructions/training on **how the improvements are supposed to be used** by the architect/contractor? Details? Who? How? When?

3. Were you given instructions/training on **how you could change your behaviour** in the home (with regards to energy use) to maximise the benefits of the technologies?

4. Overall, how satisfied were you [scale of 1–5, 1=very dissat and 5=very sat] with the level of instruction/training you were given?

1 2 3 4 5

5. Since the main installation works, has there been any more work that you have needed to do? (Second fixes, rectifying problems etc)
    - Were you expecting this to happen?
    - What did this involve?
    - Did this cause any problems for you?
    - Has this changed the way you feel about the property?

6. Please describe any maintenance requirements that you have in the home following the works and how you manage these
    - Service contracts?
    - Self maintenance (e.g. cleaning filters)?
    - Are these expensive? Difficult to manage?

7. Do you have any warranty arrangements with either the installer or manufacturer of the measures installed in the home? If so please give details

QUANTITATIVE CODING:

Opinion of the installation process	Very positive	Positive	Neutral (both positive and negative views)	Neutral (dis-interested)	Negative	Very negative

8. Please could you tell me what your home is like now in comparison to before?
   - Is there anything you particularly like about your home now?
   - Is there anything you particularly dislike? Do you have any problems with the property?

   - Does the house have any draughts?
   - Are there any damp / mould / internal air quality problems?
   - Does your home smell?
   - Any noise issues?
   - Security?
   - Is your home dark (in terms of natural light)? Any lighting issues?
   - Do you have plans to rectify any of these?

9. Is your home normally:

- Much too warm

What do you do to cool down? Explore use of fans, opening windows, portable air conditioning?

- Too warm
- Comfortably warm
- Comfortable
- Comfortably cool
- Too cool

What do you do to warm up? Explore use of secondary heaters, turning up the thermostat, turning up the TRV.

- Much too cool

Behaviour to cool down/warm up:

10. How often do you open the windows now? Has this changed from your behaviour before the works were carried out?

11. *[if mentioned any issue with temperature, humidity, draughts, damp]* Do you feel that the conditions in your home affect your health in any way? If so, how?

SECTION 6 –MEASURES AND PERFORMANCE

1. In terms of the measures installed, which would you say have given you the most satisfaction, considering their installation and their through-life performance? Why?

2. Are there any installed measures which you are dissatisfied with? Why?

3. Are there any improvements you would like to suggest which you feel would have helped, but did not get done?

4. Now that the work has been done, do you:
   - Prefer your home now – why?
   - Feel no different
   - Preferred your home as it was before the work was done – why?

5. Have you noticed a change in your energy bills since the work was done? If so, please describe.

QUANTITATIVE CODING:						
Occupant opinions of the post-installation property	Very positive	Positive	Neutral (both positive and negative views)	Neutral (dis-interested)	Negative	Very negative

SECTION 7 – BEHAVIOUR CHANGE

1. Has living in this property – with its improvements / added technology - made you and the other members of the household think more about the amount of electricity and gas you are using in the house, whether through heating or appliance use?
   - If not, why not?
   - If so, what do you differently since the installation process? Why?
   - Do you use your electric appliances differently now? (use examples, tumble dryers etc.)

2. We talked a little at the start about your views on being green and saving energy in the home, and you rated yourself X on a scale of 1 to 5, 1 being not at all and 5 being very. Would you say that your views changed as a result of experiencing this project?
   - Has this affected the 1-5 rating? By how much?

SECTION 8 – OVERALL SATISFACTION

1. How satisfied were you with the way that the process went from start to end, as a whole?
   - Very satisfied – why?
   - Satisfied – why?
   - Neutral – why?
   - Dissatisfied – why?
   - Very dissatisfied – why?

- What, if anything, went particularly well?
- What, if anything, did not go well? How do you think any aspect of the whole process could be improved?

QUANTITATIVE CODING:

Occupant opinion of the whole process	Very positive	Positive	Neutral (both positive and negative views)	Neutral (dis-interested)	Negative	Very negative

If you could give one key piece of advice to people thinking about undertaking a retrofit on their home what would it be?

2. If you could give government and policymakers one key piece of advice on helping rollout retrofit for the UK, what would it be?

3. Do you think that the work that has been done to your property is something that everyone would want?
   - Yes, why?
   - No, why not? Are there particular groups that would / wouldn't want it?

4. From those who have visited your home, what were the key things they noticed? What did they say about them? Did they like them?

5. Do you feel the house is special in any way now that you have had the installations? Do you think friends / neighbours are impressed by your house?

6. Have you had your home valued since the works have been carried out? Has its market value changed? (If not, do you feel that the works will have affected its market value?)

7. Have any of the installed measures resulted in a change to things like insurance requirements?

QUANTITATIVE CODING:

Occupant perceptions of desirability	Highly desirable	Neutral / unsure	Not very desirable

FINAL QUESTIONS

1. What is the employment status of those in the household?
   What do you / they do? Is this full / part time?

2. We are interested in household income because people earning different amounts may have different opinions on things like energy bills and costs. Can I ask what the approximate total **annual gross income of the household** is? *(explain this question is optional but helps us a lot)*
   - £0 - £10,000
   - £10,000 - £20,000
   - £20,000 - £30,000
   - £30,000 - £40,000
   - £40,000 - £50,000
   - £50,000 - £60,000
   - £60,000+

3. Do you or anyone else in the house have qualifications from college or university? (Especially interested in any qualifications around engineering, building work etc)

4. Do you / other occupants have any health problems that are relevant to retrofit?

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