Contents

Executive Summary

This report presents the findings from a programme of research designed to understand what consumers need in terms of support and engagement from a government strategy intended to encourage the uptake of low carbon technologies. The research involved three main strands:

1. Rapid desk review of advice and support services available for low carbon energy and home improvements;

2. 15 one-on-one depth interviews with low carbon technology adopters in England and Wales; and

3. 4 deliberative workshops to understand consumer expectations, interest in low carbon improvements and co-creation of support mechanisms to facilitate greater uptake. These workshops were with property owners in England and Wales who had not adopted any low carbon technologies in the past five years.

The research indicates there is limited knowledge about what net zero might mean in terms of the changes consumers might need to make to their homes. The net zero challenge feels a huge, and largely unknown, task for many people and they want to see a visible Government strategy that demonstrates how the Government, Business and wider Community are tackling this so that individuals can follow their lead.

However, this research shows that home improvements related to heating and energy are more commonly driven by financial motivations - for example, capital costs, payback and reducing energy bills – rather than environmental motivations. Even where people have heard of some of these low carbon home improvements, baseline knowledge is low and there are concerns about their expense, complexity and the long list of perceived things which may go wrong.

Many consumers have a significant lack of market and product knowledge when it comes to low carbon heating solutions and energy efficiency measures. This means the customer journey is much more fluid and multi-phased (early scoping, evidence-building and reflection) than for most other large home investments and therefore support needs must stretch across these phases.

When exploring low carbon home improvements, consumers require information about a wide variety of issues; how effectiveness of the technology or any financial savings might be tracked; the financial payback period; a walk-through of the installation process and the associated disruption that would be caused, including integration with existing heating systems; space required including fuel and equipment storage; any safety implications (e.g. fire risk from insulation or solar panels); ongoing maintenance or servicing required and overall cost.

Information and guidance will need to cater for small community-scale solutions as well as individual household level options. Providing support for households that wish to collectively explore the options available to them will ensure that a wider variety of the UK's homes can participate in the net zero challenge.

An essential strand of an effective future support system will be an easy to use and comprehensive database of approved suppliers and installers of low carbon measures. Given the wide range of technological solutions available to improve home energy efficiency and heating, identifying, assessing and selecting the best option is not an easy task for many people. Participants of this research were looking for a system that will give them assurance that the supplier and/or installer has the necessary certifications and accreditations to undertake the work and allows them to easily search for installers and suppliers by product category.

The current landscape of support for consumers is disparate and lacks a coherent language frame. Currently, navigating this landscape requires a baseline level of knowledge and significant investment of time and commitment, which is very likely to present a barrier to greater uptake of low carbon solutions unless more coordinated guidance is provided.

Many consumers are willing to conduct their own research and will readily explore social media and user-generated content to support their decisions. However, they also seek a central repository of information – a one-stop-shop – that collates the variety of information sources and help to signpost them to reliable information and providers. Many consumers expect to conduct most of their search for information using online means. They expect a coordinated repository of information about the solutions available to them and call for this resource to be interactive and offer 'personalised' guidance based on property and homelife factors.

However, they call for offline as well as online guidance to ensure the digitally excluded are catered for. This is seen to be more important in the short to medium-term, particularly as the net zero campaign gathers momentum. One strand of the information architecture that participants put great emphasis on is the ability for homeowners to see, touch and feel the technological solutions. They seek demonstrators of the options and show homes so that the technology can be viewed in-situ. This source of information and advice is liked as it is seen as unfiltered and based on real-life experience. This is considered particularly important for what are perceived as newer, less proven options like heat pumps

and biomass boilers. Many see the opportunity for a network of adopters to be connected to share information while providing a network of show homes.

Consumers seek independent advice that is free from commercial bias, alongside a regulated marketplace of suppliers to provide consumers with choice while ensuring they are protected. Regulation of this sector is seen as vitally important, particularly as it grows to meet the demand generated by new policy implemented to encourage adoption. Many consumers expect to make use of user-generated content to support their decision-making process but want this to be free from paid-for content.

From this research with early adopters and other consumers, we identify six key protections that were perceived to be needed as a minimum for a successful implementation of net zero:

1. A Government regulated marketplace with a set of service standards e.g. repairs within a certain period, etc.
2. A Directory of qualified/accredited engineers that are regularly audited
3. 'Lifelong' (25/30-year) product and service guarantees for low carbon home solutions
4. A system with inbuilt validity checks of product endorsements (e.g. ones from celebrities, User sites)
5. Protection for financial packages designed to purchase low carbon home improvement (e.g. reasonable repayment terms)
6. General energy and rights/protection advice delivered by independent body e.g. Citizens Advice

1 Introduction

1.1 Background

In June 2019 the UK committed to a legally binding target to bring greenhouse gas emissions to net zero by 2050. The UK has made significant progress in decarbonising over the last 30 years, with emissions falling by almost 40% since 1990.[1]

However, more recently the CCC has stated that the target would require a significant ramping up of policies to enable it. The energy sector has been one of the most successful in delivering carbon reductions but, over the last five years, emissions reductions have been almost exclusively through improvements in electricity generation.[2] Energy efficiency, particularly building efficiency, has made far less progress. More recently the CCC has been less positive – its most recent progress report pointing out that only one of the 25 headline policy actions it suggested 12 months previously had been delivered in full and both the 4th and 5th carbon budgets are expected to be missed. In summary, "policy ambition and implementation now fall well short of what is required".

A central challenge to achieving the net zero target is the decarbonisation of heat. Steps have started to be put in place to enable this from a policy standpoint – including the 'Future Homes Standard' and an end to gas heating in new homes from 2025 – but for this to be effective it will need to be hand in hand with education, information and support to allow consumers to play their part. Accent's research for the Energy Networks Association showed that stakeholders and experts in this area see the need for a national conversation on the future of heat to help consumers understand the need for change and the possible options available to them.[3]

[1] https://www.carbonbrief.org/analysis-why-the-uks-co2-emissions-have-fallen-38-since-1990
[2] https://www.theccc.org.uk/publication/reducing-uk-emissions-2019-progress-report-to-parliament/
[3] http://www.energynetworks.org/gas/futures/gas-networks-joint-stakeholder-engagement.html

It will be key then, to bring consumers along with the decarbonisation of heat transition and enable and support them to make the efficiency improvements required. The CCC estimates that over half of the emissions cuts to reach net-zero require some form of behavioural change. This will require strong policy to support and encourage consumers to adopt different forms of technology and heating systems. However, it will also need mechanisms in place that help consumers to understand the issues, make informed decisions and experience smooth customer journeys. In turn, this will need to be informed by the experiences of consumers, their motivations for, and barriers against, taking action.

Citizens Advice represents people across essential regulated markets. It is the statutory advocate for energy consumers in Great Britain. Citizens Advice required research to support its contribution to the development of policy in this area – indeed, this will be an important component in achieving the CCC's recommendation that net zero will require "putting people at the heart of policy design."[4]

1.2 Objectives

Citizens Advice commissioned research to better understand what consumers need in terms of support and engagement from a government strategy intended to encourage the uptake of low carbon technologies. Specific objectives include understanding:

- Consumer attitudes towards new home energy technologies and the support available around these technologies;
- Which parts of these technologies (including the decision making and purchasing journey) appeal to consumers and which are off-putting/ could be barriers to adoption;
- The aspects of these technologies and the customer journey around adopting them which present difficulties for consumers and what aspects of these technologies are attractive or straightforward to consumers;
- The support consumers are likely to need in navigating these new technologies;
- What form this support should take e.g. the channel through which it is delivered;
- How consumers view the role of government and other bodies in providing this support and engagement;
- Where consumers have gone or would expect to go if things went wrong with their low carbon technologies; and
- Understanding how these views vary between different households.

The research aims to help Citizens Advice to advocate for government strategies and policies that reflect what consumers want and need, by improving understanding of consumer attitudes and behaviours in relation to home low-carbon and energy efficiency technologies.

[4] CCC Climate Change Progress Report to Parliament July 2019

2METHODOLOGY

2.1 Introduction

Accent designed a multi-phase approach to meet the research objectives including desk research, one-on-one depth interviews to explore customer journeys of Adopters of low carbon technologies, and deliberative co-creation workshops with consumers. The approach incorporated the views and experiences of 54 consumers and comprised five phases:

1. Rapid desk review of advice and support services available for low carbon energy and home improvements
2. 15 one-on-one depth interviews with low carbon technology Adopters in England and Wales
3. Review of phases 1 and 2 to create customer journeys to present in the deliberative workshops at phase 4
4. 4 deliberative workshops to understand consumer expectations, interest in low carbon improvements and co-creation of support mechanisms to facilitate greater uptake. These workshops were with property owners in England and Wales who had not adopted any low carbon technologies in the past five years.
5. Final reporting, bringing together all phases of the research

2.2 Rapid desk review

The first element of the research programme comprised a rapid review of available literature in order to assess and document the current landscape of advice and support services that are readily available for low-carbon technologies in Britain.

The review assesses the main forms of support available to consumers, with a focus on the GB market, and presents a summary of the different support mechanisms in place. The review focuses on support provided to homeowners and those who are part of the decision-making process regarding low carbon installations.

The review encompassed insulation, heating technologies, solar panels, solar panel battery storage and electric vehicle smart chargers, with the focus on heating and insulation. the review did not include initiatives or forms of support designed for or offered exclusively to very low-income consumers, nor did it include information purely about financial support available to consumers.

A report of the findings of this review has been provided to Citizens Advice and is included as Appendix B to this report.

2.3 Primary research approach

In order to meet the research objectives, it was critical that the research programme explored the views of a wide spread of consumers, including people who have already adopted new low carbon technologies in their home and those who have yet to engage (at all, or beyond the point of contemplation or initial exploration).

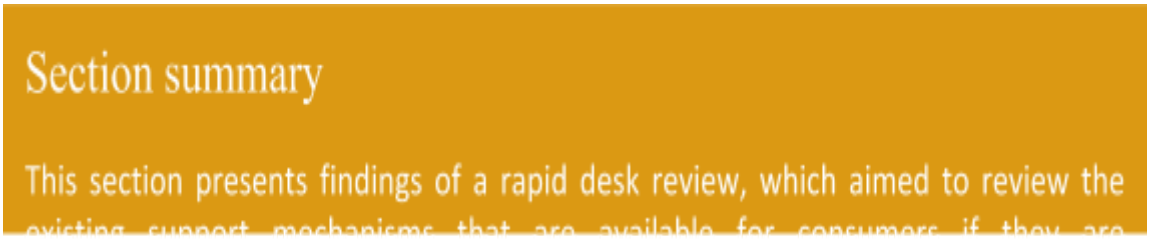
These two separate audiences required different approaches, to avoid Adopters of these technologies dominating the discussion if they were to be put together in a group with consumers with very low knowledge of these technologies. Moreover, the discussion would, by the very nature of the different groups' exposure to these issues, need to be quite different for the two audiences. A research programme was therefore designed with tailored approaches for each group, conducted in two distinct stages. The first stage was with Adopters (those who had already successfully installed at least one of the target home improvements) and the second stage with wider 'Consumers'.

- **15 Adopter depth interviews** – lasting 60-75 minutes, conducted by Skype. All participants completed a 7-day pre-task prior to the interview to aid recall of the adopter journey they went through.
    - **Core objective:** understand their customer journey, the detailed decision-making process that led them to adopt a low-carbon technology and where support options could have been improved.

- **4 Low carbon energy technology workshops** – 3-hour workshops with 9-10 participants who had not installed low carbon home improvements in the last five years. Held in Brighton, Sutton Coldfield, Caerphilly and Tingley (Leeds).
    - **Core objective:** understand current awareness and comprehension levels of the low carbon technologies, understand the barriers that prevent consumers from adopting (or considering) a particular technology, and to understand the support that consumers may need at different points of considering and adopting them.

Full methodological details, including discussion guides and stimulus materials, are included in the appendices.

3 Current low carbon support landscape



3.1 Summary findings

As discussed in Section 2.2, the first element of the research programme comprised a desk review of literature around low carbon technologies. This section summarises the key findings from this review and the full report is included in Appendix B.

Citizens Advice's Energising Homeowners report[5] grouped the most common barriers to consumers when considering whether to adopt a low carbon technology into six main barrier types:

- Awareness
- The consumer's personal circumstances (i.e. their long-term plans, uncertainty about the future and a preference for the status quo)
- Trust in conduit/messenger (mistrust of energy efficiency providers)
- Financial (upfront cost, uncertainty about return on investment and unwillingness to pay for measures that have previously been subsidised)
- Technology option (complexity of measures and disruption to the home)
- Purchase and installation (difficulty finding reliable and trustworthy tradespeople)

Of these barrier types, the consumer's personal circumstances are likely to be more fundamental than guidance and support can combat. Financial barriers can be addressed through financial incentives (although this is outside the scope of this research) while the other barriers can be supported through advice and/or information.

[5] *Energising homeowners: Research into consumer decision-making on energy efficiency improvements*, Citizens Advice (2016)

Citizens Advice's *Strengthening and streamlining energy advice and redress*[6] report found that advice needs to:

- Incorporate different styles and formats (e.g. telephone or face-to-face, group or one-on-one, one-off or long-term) in order to better match advice with consumer needs
- Be comprehensive, accurate and integrated
- Proactively support those most in need (e.g. those at greatest risk of detriment)
- Be expert and professional
- Be from an impartial source e.g. Independent from energy providers
- Be transparent and accountable (e.g. publicly available information about the organisation, its legal constitution, its governance, funding etc)
- Be accessible (free, via a variety of communication channels, compliant with equalities obligations)

As stated above, trust in the information (i.e. the creator, channel and messaging) is an important requirement, although it is found to be lacking among the public. Tradespeople are the source the public is most likely to trust to provide specific advice on installing a heating system, yet only one third trust this source, followed by friends/family[7]. Just over half used information from their heating engineer to make their decision to install a new boiler, with friends and family being the next most commonly used source (28%). Both of these information sources were found to be helpful by around three quarters, so increasing awareness and knowledge among both of these sources will help potential consumers make informed decisions.

In terms of communication channels, Citizen's Advice's *Down to the Wire* report[8] found that face-to-face communication has advantages over phone and online as it builds empathy and trust. This report focused on providing information to the hard-to-reach. It concluded that 'trusted intermediaries', i.e. staff working for community-based organisations and living in those communities, providing face-to-face advice in homes were essential in breaking down barriers and engaging with hard-to-reach households.

While the literature suggests that there is a considerable amount of information available to consumers regarding low carbon technologies, there are many different sources of information from a wide range of organisations.

Although Energy Performance Certificates (EPCs) are a common trigger to investigating low carbon opportunities, fewer than six in ten are aware of them[9]. Of the whole population, only 17% had seen the section on the EPC which recommends how they could improve the efficiency of their home. While this awareness is low, of those who had undertaken home improvements because of the recommendations in the EPC, almost half said the EPC gave them all the information they needed, and a quarter said it

[6] *Strengthening and streamlining energy advice and redress: An independent review of the adequacy of energy advice and redress*, Citizens Advice (2015)
[7] BEIS Public Attitude Tracker, December 2018
[8] *Down to the wire: Research into support and advice services for households in Scotland reliant on electric heating*, Citizens Advice Scotland (2018)
[9] BEIS Public Attitude Tracker, December 2018

gave them most of the information. Clearly information on the EPC is useful to consumers, so increasing awareness of it is key.

Knowing where to initially find information could be a barrier for consumers. An online search for "energy efficiency home improvement UK" done by Accent in November 2019 found around 122 million entries. The first nine non-sponsored websites included Government schemes, independent sources, charities, commercial comparison sites and energy suppliers.

We found that many of these sources give very little information about the improvements that can be made, and fewer still appear helpful for consumers arriving at the topic with little or no prior knowledge, or without knowing the kind of broad solution type they might need. In addition, some of the information is out of date or refers to helplines that no longer exist.

Aside from comparison sites which provided little information on energy efficiency, five forms of support were found:

- **Large-scale Government / government-backed initiatives:**
  - **Green Deal** website provides guidance for energy saving improvements that are eligible for the Green Deal loan and links to Green Deal assessors and providers (but with few assessors listed for some searches). This website is now run with private backing since the Green Deal scheme was closed by the Government.
  - **Simple Energy Advice** website provides "impartial and independent Government-endorsed" advice including the Energy Efficiency Calculator tool to receive tailored recommendations for the measures which would be applicable (and associated costs and savings) based on the home's EPC[10].
  - **Energy Company Obligation (ECO)** provides support to primarily low-income households on energy efficiency measures including insulation and solar PV[11].
  - **Renewable Heat Incentive (RHI)** is a Government financial incentive to promote the use of renewable heat (biomass, heat pumps, solar thermal etc). Beneficiaries pay for the up-front cost of the measure and receive quarterly payments via the RHI tariff[12].

- **Consumer guarantee / protection / standard**
  - **TrustMark** is the Government-endorsed Quality Scheme covering home improvements/repairs. Its remit now includes energy efficiency and retrofit measures. Its consumer portal supports consumers to manage each stage of a project.
  - **MCS** is a standards organisation that creates and maintain standards that allows for the certification of products, installers and their installations[13]. It

[10] https://www.simpleenergyadvice.org.uk/energy-efficiency/reduce-bills
[11] https://www.ofgem.gov.uk/environmental-programmes/eco
[12] https://www.ofgem.gov.uk/environmental-programmes/domestic-rhi
[13] https://mcscertified.com/

provides a directory of approved installers, summary information on different technologies and a helpdesk.

- **Independent third parties**
  - **Energy Saving Trust** is an independent, not-for-profit organisation funded by the Government and the private sector. It promotes energy efficiency, energy conservation, and the sustainable use of energy. Its website provides comprehensive information on retrofit and renewable measures, detailed information on energy efficiency measures including case studies of consumers, links to installer registration schemes. Its Home Energy Check Tool calculates how to reduce energy bills and provides a personal report giving details of which improvements will work best for a consumer's home along with possible savings.
  - **National Energy Foundation (NEF)** is an independent, national charity aiming to improve the use of energy in buildings: understanding energy use, improving new and existing buildings, helping householders save energy and money and providing impartial advice. Its "Knowledge Hub" on its website provides detailed and readily understandable information with estimate costs, time taken to install, disruption to the household and other information along with images.
  - **Which?** is a not-for-profit charitable organisation providing a range of consumer information. Some is provided free of charge with additional product-specific information available to subscribers. Information includes technical descriptions, running costs, installations, pros and cons, and the Microgeneration Certification Scheme (MCS).
  - The **Centre for Sustainable Energy (CSE)** is an independent national charity that provides advice, manages energy projects, trains and supports others to act, and undertakes research and policy analysis. It includes detailed information on low carbon technologies including funding streams and energy saving tips, publications and information sheets by technology. However, it may be confusing to use for a lay person, with consumers likely to need some degree of knowledge of their requirement to navigate it easily.

- **Regional / local level guidance hubs**
  - **Home Energy Advice Team (HEAT)** is run by National Energy Action (NEA), a national charity which aims to eradicate fuel poverty and campaigns for greater investment in energy efficiency. It provides advice and support to fuel poor households in Coventry via personal home energy advice visits, surgeries and a telephone advice line.
  - **The Home Energy Team** is a free, local and impartial advice service from CSE to residents of Bath & North East Somerset, Bristol, North Somerset and Somerset. It provides an advice line and advice on measures, support with grant legislation, referrals and signposting to other support (e.g. debt advice).
  - **Bristolian Guide to Solid Wall Insulation** is a 90-page pdf document commissioned by Bristol City Council, providing a very detailed but quite specialised resource.
  - **Warm up Bristol** is an organisation aimed at reducing the number of cold homes and families in fuel poverty. It includes an online application to

receive a technical survey and quotes for works and offers low interest loans to support adoption of measures. Information is provided around several energy efficiency measures.

- **The Renewable Energy Hub.co.uk** is aimed at business, schools, industry and government as well as homes. It allows users to search for a local installer and gives information and chat forum and call centre. Although it provides a large volume of information it is not very easy to navigate.
- **Act on Energy** encourages energy conservation by providing free and impartial advice to householders and small businesses in Warwickshire, Worcestershire, Coventry and Solihull. It provides details on funds and schemes by local area. There is very limited information on energy efficiency with no information on renewables or heating technologies.

- **Commercial**
  - **YouGen** is a 'platform that brings a public enthusiasm about renewable and efficient energy together with professional and highly recommended energy installers'. It provides an independent advice service, sponsored through ads. The information provided is very informative, covering a wide range of topics, but requires knowledge of the potential solution. Other features include a search function of installers, by technology type and region, case studies of installed technologies, a Jargon Buster and over 1,000 searchable blog entries.
  - **GreenMatch.co.uk** is a commercial website providing quotes for various types of renewable and low carbon installations. It focuses mostly on providing quotes for work but explains in detail the benefits/disadvantages of different measures.

In terms of potential future mechanisms for consumer support, regional delivery is recommended by Policy Connect[14] as it allows consumers to interact with trained advisors. It states that, as the transition to low carbon heat is expected to be delivered regionally, it will require local energy advice services that can give advice tailored and relevant to each area. It also recommends the use of "trained advisors to help the public navigate the complexities of installing new heating technologies in their homes", citing Home Energy Scotland as a positive case study using this approach. Alongside this, the report also recommends a central delivery body to collate best practice on standards, guidance, statistics and information for renewable and energy efficiency retrofit.

This regional approach is echoed in Citizens Advice Scotland's report[15] which cites a Danish example where a key factor in the successful transition to low carbon heating was the use of a network of sixteen regional advice offices providing access to local tradespeople able to install renewable electricity systems. But the report also cautions that this kind of approach may not be suitably replicable to the Scottish/UK situation which requires a combination of more diverse supply options.

[14] *Uncomfortable Home Truths: why Britain urgently needs a low carbon heat strategy,* Policy Connect, (2019)

[15] *Down to the wire: Research into support and advice services for households in Scotland reliant on electric heating*, Citizens Advice Scotland (2018)

A further information source being developed is a Data Warehouse, currently being built by TrustMark to act as the industry-facing repository of information about work undertaken and the property being improved. A Property Hub will act as the consumer-facing platform where they can access a logbook about their property, helping them establish who did what home improvements and when.

4 Consumer underlying attitudes to 'Net Zero'

4.1 Consumer attitudes to the net zero challenge

Within the consumer workshops, it was necessary to provide background information on the main driver of future low carbon home improvements; the UK's 2050 net zero target. This context was important to ensure that participants were aware of the reason why they may need to consider alternative forms of heating their home, keeping it warm and generating power.

The information presented to the participants (see Appendix E) triggered discussions around climate change in all workshop locations. The overriding emotion was one of concern and fear for the natural environment. What had changed for many participants in recent years was the sense that a tipping point was being reached and significant action was required urgently.

For most participants, awareness of the 'Climate Crisis' was generally derived from the news and social media headlines, rather than having a deeper understanding of the issue. Top of mind awareness was influenced by the news coverage around that time, with the workshop fieldwork undertaken during a time when Australian bushfires were highly publicised in the UK media and school strikes for climate were occurring regularly.

'If you have a look at people like Greta Thunberg that's constantly battering on and on about it, in a really positive way."
Brighton

Whilst some participants showed some recollection of the Paris Agreement, there was clear confusion over terminology such as zero emissions and off-setting. Overall however, there was a perceived sense of a lack of government direction and insufficient action taken by individuals.

"I don't feel we're going forward really. I think everybody's dipping their toes in but I don't think there's enough commitment really if I'm totally honest and it is concerning."
Brighton

"I feel like we should have pre-empted that we were using all the energy, we were using way too much plastic, the ozone layer and ice caps. I just think it's a big thing now because it's kind of, it's topical isn't it? It's trending I suppose and they're trying to push it on us as in the current human beings living here that we need to change it

but it's taken so many years for it to get this bad, how long is it going to take to fix it?"
Sutton Coldfield

There were a range of habitual activities where participants reported taking action, but these tended to be small-scale behavioural changes, such as recycling, switching off lights or using reusable water bottles in an effort to "do their bit".

"We do do our best in our house to recycle ...we make the kids watch all these Attenborough programmes"
Sutton Coldfield

However, few had taken more significant action and many felt ill-equipped to make a greater contribution. There was also some cynicism about the ability for UK consumers to have much of a positive impact. The minority giving this view cited a number of reasons such as:

- Climate Change is cyclical so it's not something we have control over
- Larger, rapidly growing nations, like China, more than compensate for the UK's improvements
- 2050 is ages away
- Businesses are not making changes so why should I?
- A lack of clear guidance on what consumers can do

Where they occurred, these more cynical views prevented ownership of the problem at a household level.

"We're just a drop in the ocean aren't we? Hardly matters what we do. We're pretty insignificant on the planet as a whole"
Caerphilly

"In the 1920s all the seals were dying in Greenland because the ice was melting. It was just because the seas were warming up. Every ten years or so the seas warm up and then they cool again. It's cyclical."
Caerphilly

"As individuals we can't do diddly squat and what we do has little impact when 85% of all pollution is in US and China."
Adopter, Leeds, EV Smart Charger

There was no baseline knowledge of what net zero might mean for the kinds of actions householders might need to take, however, regardless of environmental perspectives, all participants were interested in finding out about the different options, their environmental impact and any potential positive economic impact they could have on their energy bills.

Participants highlighted concerns about the net zero challenge being pushed onto households as their problem without a strong lead from government and business.

There was a strong feeling that the Government should lead the way with the introduction of financial incentives or disincentives to encourage action.

"If they really wanted change though they would create a change. Don't make it a plastic bottle scenario, actually make a monumental movement. We're just consumers who respond to the price of things."

Leeds

There was also a call for the Government to lead by example, for instance all MPs using electric vehicles or public transport and installing solar panels or alternative heating solutions in all Government buildings.

5 Consumer response to low carbon solutions

5.1 Awareness of and response to low carbon technologies

Before being given any information on the current low carbon technologies available, participants were asked to discuss any different technologies or home improvements they could make to their home to make it more energy efficient. A wide array of home energy efficiency measures such as solar panels, loft insulation, cavity wall insulation, more efficient boilers, double or triple-glazing and smart meters were top of mind. Ground source or air source pumps, solid wall insulation and biomass boilers were not mentioned at this stage.

Participants were then presented with a list of six different low carbon home improvements they could make to their homes with a description and asked whether they had heard of the technologies and whether they would consider installing them in their homes (see Self Complete C1 and C2 in Appendix E). It's important to note that the list was not exhaustive; these six technologies were chosen to focus on in the workshops, so as not to overload the participants.

The initial awareness and contemplation scores illustrated in Table 1 were encouraging with a majority of participants not only aware of solar panels and cavity wall insulation, but also being open to installing them in their homes. For solid wall insulation, and heat pumps, a higher number were open to installing them than were aware of them.

Table 1: Awareness and consideration of each technology

	Total – out of 39 participants	
	Yes – heard of this	Yes – would consider this
Solar PV Panels	36	23
Cavity wall insulation	34	21
Solid wall insulation	14	16
ASHP	8	14
GSHP	11	14
Biomass Boiler	17	12

In regard to participants who wouldn't consider installing some of the low carbon technologies, participants expressed fundamental concerns that the low carbon home improvements were expensive, complex, awkward to install and may have unintended consequences.

"I wouldn't know where to go to buy a solar panel."
Leeds

"Solar panels? Massive and cumbersome and expensive as well."
Brighton

"It [solid wall insulation] stops the walls breathing and they become damp because there's no air circulating, so it ruins the walls"
Caerphilly

"What kind of house would you need for a ground source heat pump?"
Sutton Coldfield

Participants raised concerns about the potential cost of these items. While this was not a primary focus of the research, for some participants this presented a significant barrier to even contemplating the technologies. Furthermore, they questioned the longer-term payback of the technology, for instance whether it would actually reduce their energy bills and by how much and whether the investment would add to or reduce their property value.

Concerns also related to the time it would take to install and the potential upheaval to their homes. Often, it was the uncertainty around these factors that presented the problem; until it was clear that there would be minimal disruption and that installation would be a straightforward and relatively quick process, this acted as a deterrent.

A key element of the uncertainty that some participants felt about these home improvements was who they could trust to provide credible and trustworthy guidance and where they could go to find information regarding these technologies. Even among those warmer to the idea of investigating them, there was not felt to be a clear first port of call through which this kind of information would be available.

As seen with Adopters, the motivation for considering home energy efficiency measures was driven by economic more than environmental gains. For all participants, the idea of reducing energy bills (or preventing them from increasing in the long-term, would be a big factor in serious consideration of these low carbon home improvements.

"The reason I haven't got them on my house is because I'm thinking, okay, I want to see the figures. How much money am I going to save by paying for these ultimately? For me, it's about the long-term impact. Is it going to be beneficial or not? Am I wasting my money?"
Leeds

"It's a financial for me...I was watching [my smart meter] all the time because every time I put the kettle on...It wasn't for anything to do with the environment, it was more to do with my wallet."
Sutton Coldfield

"How do you track the cost of it? How would you track how much it really cost and what saving you were making? That would be another question."
Brighton

The participants were provided with information sheets on six different low carbon home improvements and were asked to discuss the key motivators and barriers for each technology.

It is important to note that some of the heating technologies will be less relevant for some homes, for instance, whether the home has cavity or solid walls, for solar panels to work the house would need a south-facing roof, and homeowners would need enough space in their garden to place the ground source heat pump.

5.1.1. Solar Panels

Solar panels were the most well-known of all the low carbon home improvements, and were seen as a very visible and well-established example of modern low carbon technology. In contrast to some of the other forms of energy generation discussed, they were also viewed as a simple concept that, for most, is easy to buy into as an idea.

"It's not as scary because my parents have them and I've seen them obviously because they're external, you see on other people's houses so there must be something about them. More people are getting them."
Sutton Coldfield

"I've got a south facing house on the top of a hill so the back of my house gets the sun beating on it all day and I'm thinking I'm wondering if I can make money out of it and also become more sustainable as an individual."
Leeds

In general, they were considered to be a less intrusive form of technology, being placed on the outside of the home. However, the visual impact was a barrier for some participants, who were waiting until the technology had advanced to the point that their visible impact was negligible.

"I'd be fascinated to see actually how it had improved from those years when it first [started]."
Brighton

However, the perception amongst many participants was that solar panels have lost popularity with reductions in government grants or feed-in tariffs. With this in mind, participants questioned whether they remain financially viable.

Though the workshops were not focusing on the financial costs, participants did highlight the potential for a visible bill reduction, cashback and value added to the property as further key motivators to installing solar panels in their homes. However, some participants did question the effectiveness of solar panels based on the potential bill reduction and some participants even suggested that solar panels could potentially devalue their property.

Participants saw solar panels as involving a simple installation process, so this in itself was not a barrier to adoption. However, other key barriers highlighted were safety concerns regarding roof fires and the potential for damage to the property. Furthermore, the suitability of their home such as the roof structure or roof space and the lack of known, qualified installers put participants off considering solar panels.

"If they're going to put something on my roof I want to know that installer is reputable because the last thing I want is five years down the line my roof caving in."
Leeds

"Yeah, I don't know. I think you had to have so much roof space per whatever... or something and that was enough information. I was like, 'Leave it for now'."
Brighton

"I also noticed two people, one up in Hull and one that was more local who have had fires, roof fires and I don't know the technical reason but they weren't fitted properly and they created fires in the roofs of the houses which scares the life out of me. That's only two people but that's enough to put me off."
Sutton Coldfield

To alleviate these concerns relating to effectiveness of solar panels and property suitability participants reported they would require a reliable property survey from an independent body to provide reassurance that it was the appropriate choice for them.

5.1.2. Cavity Wall Insulation

Cavity wall insulation was the second most appealing low carbon home improvement as it felt sensible and simple to install. Participants were motivated by the fact that it seems low cost, non-intrusive, causes no internal home disruptions and requires no ongoing maintenance.

"The cavity wall, it's less intrusive, it's done from the outside I believe and it's a lot less money to install it. Don't need to redecorate so I think that would be that; it's the least intrusive one out of all of them."
Sutton Coldfield

"It's relatively cheap in that it's supported by grants as well. It's not very messy. It's done and finished with and it ultimately shows on your bills pretty much straightaway. You're not waiting ten years."
Leeds

However, some queried whether this approach is appropriate in the first place and might cause more substantial problems than the improvements it might bring for thermal comfort. In particular, these centred on the belief that the cavity is there for a reason and filling it could therefore be problematic.

"I'd want to know that it didn't exacerbate the problem if there was a fire. If floorboards burn it goes under the floorboards, goes up the cavity. Does that just explode because of the material?"
Brighton

This form of concern was particularly common in South Wales where participants referred to a number of local cases where faulty installations had resulted in whole streets being told to have the wall insulation removed.

"It stops the walls breathing and they become damp because there's no air circulating so it ruins the walls."
Caerphilly

Conversely, participants highlighted a few key barriers to installing cavity wall insulation. Essentially, the finished outcome would be invisible with no proof of work; therefore, participants expressed concerns over reputable tradesmen, as it would be difficult to trust if they are legitimate and filling the wall with the correct product.

"It might just turn to sludge between your wall and basically be pointless."
Leeds

Some participants questioned the actual effectiveness of cavity wall insulation, for instance, the typical impact on energy bills. The suitability of the property was also

mentioned, however; some participants felt that it should, if installed to a high standard, be mandatory for all New Builds going forward.

5.1.3. Solid Wall Insulation

Solid wall insulation ranked third on the consideration list of low carbon home improvements. However, there were more perceived barriers and issues to overcome than perceived potential benefits. Participants felt the key motivators, in addition to a potentially warmer home, were that it could fit with other building work, notably extensions, and would require no ongoing maintenance.

"I'd have to have the solid wall insulation and this is why I wish I'd have known about it when the builders were gutting my house."
Leeds

Some of the key barriers were mainly in relation to installing the internal solid wall insulation, as that would impact directly on the household. Participants cited disruption to their home interiors and redecoration costs and reducing the space of the room as concerns.

"I think the solid wall insulation sounds like an absolute nightmare…you've got to re-decorate the whole of your interiors as well which is more cost."
Brighton

"If it's an existing house, to do every single room in there, you're re-plastering the whole house."
Sutton Coldfield

External wall insulation, on the other hand, was seen to have the benefit of being relatively low mess and low disruption.

Other barriers highlighted were in relation to both internal and external solid wall insulation. Participants had concerns regarding finding reputable tradesmen and the safety of the insulation, for instance, using fire-proof materials. This concern was particularly heightened following the Grenfell disaster.

"The bit I'm very unsure of and would be quite resistant to at the moment is the solid wall. Now, I'm sure it's different but if I go back to the Grenfell fire. I mean that was wall insulation that was outside wasn't it? So, my two questions for that would be are they fire resistant? And mainly I suppose what is the depth of them?"
Brighton

Also economic effectiveness was an issue for some, for instance, what would be the typical impact on bills and whether this would be a sound financial investment.

"For a semi-detached house, which is what I've got, would be about £13k to install it but would only save you £260 a year, which would take you 50 years to pay off the £13k. So to me that is just a complete waste of time."
Sutton Coldfield

5.1.4. Air Source Heat Pumps

There was lower appeal for air source heat pumps. The predominant barrier was that participants found it difficult to understand the physics behind it; how the air is being heated and how effectively this would work in the coldest periods of the winter.

"How does it react to different seasons? If it's supposed to draw air in? So, is it working more efficiently in the summer because the air's predominantly warmer outside than it is today? And secondly, I imagine it would have to be controlled separately between the hot water and your heating. You wouldn't want heating on in the summer drawing that heat in."
Brighton

Participants suggested that the potential benefits would be that it is externally located and therefore less intrusive than some of the other options, has a straightforward installation and possibly easy to take out if needed.

However, participants found more barriers than motivators for air source heat pumps. There was a lack of real knowledge of the mechanics and how it would fit with the rest of the internal heating system. For instance, whether it could easily be incorporated into an existing central heating system or if greater structural change within the home would be required.

The need for ongoing maintenance was off putting, although there was some recognition that it might be no more than an annual service that a conventional gas boiler requires.

"But would you have to pay for someone to come and change the filter or would you do it yourself?"
Sutton Coldfield

For some participants, the lack of outside space was an issue and the overall look of the heat pump was described as unattractive and bulky.

"Looks ugly, yes. What happens in the weather when it's like icy, frosty? Is it then working harder?"
Sutton Coldfield

Ultimately, participants saw this as a new and unproven technology compared to conventional heating systems (i.e. a condensing boiler and gas central heating). Participants felt they would need to see the heat pump in action and understand how it works before considering it for their homes.

5.1.5. Ground Source Heat Pumps

Similar concerns were highlighted about ground source heat pumps as were raised for air source heat pumps. In addition to concerns over its efficacy, particularly in colder seasons, participants noted the impact of greater disruption to the home, especially the garden. Participants were concerned with something going wrong when digging up the garden and felt that maintenance would be problematic, questioning whether it had long-term impacts on future use of the garden space. For instance, would it prevent landscaping, decking or paving of the area above the pipes?

This also led to concerns over the extent to which warranties and servicing would cover problems requiring excavation of the garden space and how clear this would be at the point of purchase.

"So, the maintenance of having something underground. Okay so you'd want more information on that. What's the process if something goes wrong with the pipes that are underground. How does that get resolved? Who's liable?"
Caerphilly

A further concern was whether, for what was perceived to be such a niche product, there would be sufficient choice of installers to do the job to a high standard.

"What's the availability is another thing; how many companies can install that?"
Sutton Coldfield

Where ground source heat pumps were felt to have more appeal was as a solution for "New Builds", which could have an air or ground source heat pump fitted from the outset. It was also questioned whether ground source heat pumps would be appropriate if fitted as a communal system. This was considered particularly relevant for supporting older properties in close proximity.

"The ground source heat pump was the same for the air source for me. In principle, it's a really good idea because it's taking something from the air and it's not putting anything out into the air that's bad."
Leeds

5.1.6. Biomass Boilers

Biomass boilers received the lowest levels of consideration. Even though participants felt a much stronger emotional pull towards them, the longer-term commitment of ongoing fuel purchase was off-putting. The key motivators were that it's a known

heating source and also its visual appeal in that they are contemporary and modern and also quieter and pleasant.

"I really like the Biomass one – I have friends who have this and it's much, much warmer."
Caerphilly

However, for most, the barriers far outweighed the benefits. Participants were unconvinced about the impact on the bill, especially considering the cost of fuel. The ongoing work of filling it with a suitable fuel, the storage space required and the environmental impact of burning wood, prevented some participants from considering installing biomass boilers in their own homes.

"So, are we doing more harm to the environment by chopping down the trees?"
Brighton

"I think Biomass you'd need a lot of room for that. 4 and a half square feet is it."
Sutton Coldfield

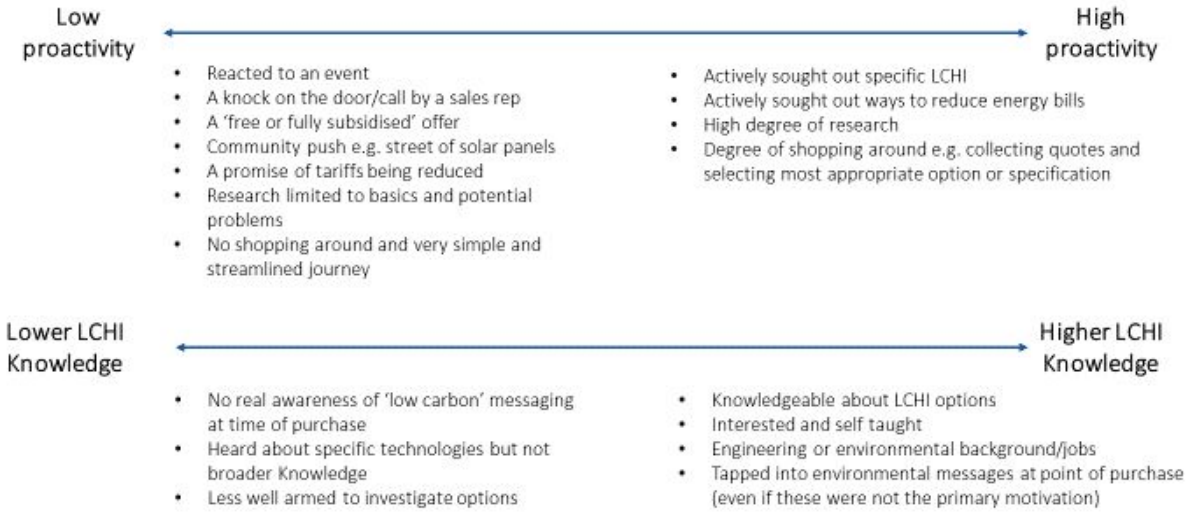
6 Adopter customer journeys

6.1 Adopter experiences of researching, purchasing and installing low carbon solutions

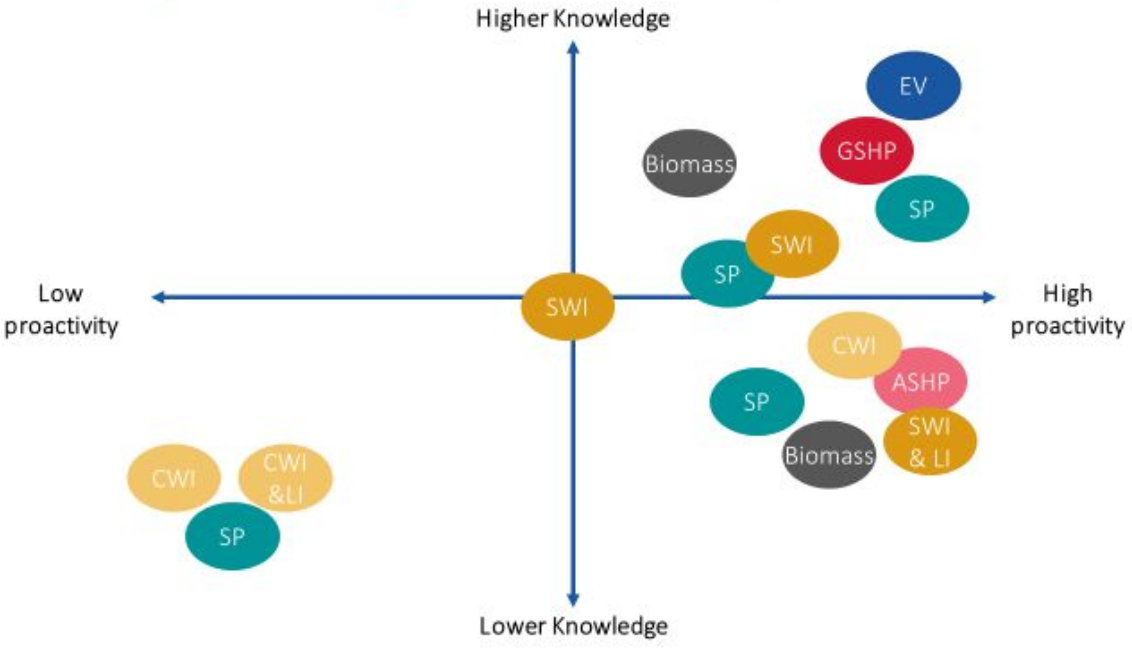
The adopter interviews showed that consumers can enter into the consideration of low carbon home improvements through a number of varied routes.

- Guidance from trusted advisor - professional (e.g. builder, architect, even in some cases solicitor)
- Guidance from trusted advisor – non-professional (e.g. friend/family member)
- Self-guided research and searching
- Direct approach from manufacturer or installer

The sample of Adopters interviewed were distinguishable on two main dimensions; proactivity in seeking a low carbon home improvement and knowledge of the options available.

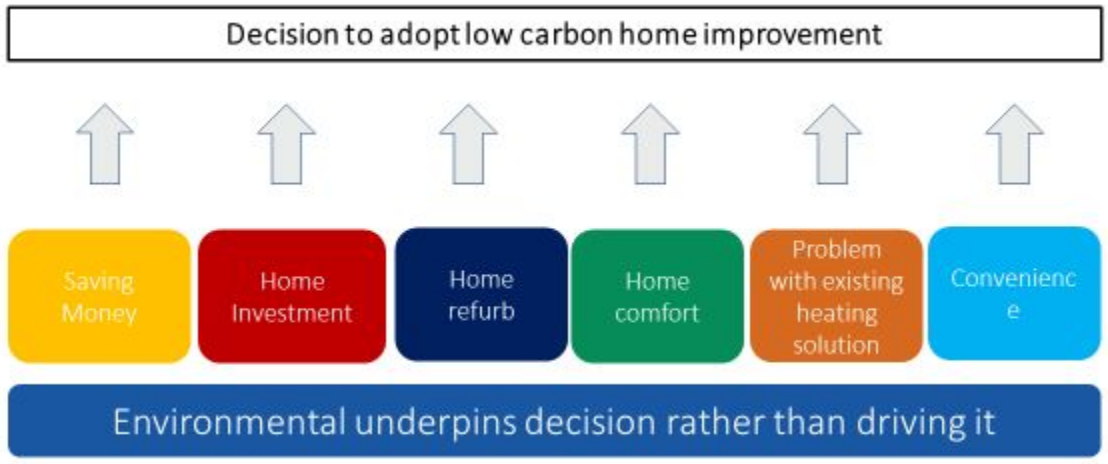


These two dimensions were not perfectly correlated, however there tended to be a positive relationship between higher knowledge and higher proactivity. Adopters with higher knowledge of the solutions available or of technical issues more generally, tended to also be very proactive in their search. However, adopters with lower levels of knowledge were split between those with a more proactive approach and those who were more reactive.



In the vast majority of cases, and in varying levels of detail, all of these were supported by a degree of personal searching for information to support, challenge and verify the information received through other sources. For those entering this journey from a more reactive starting point (e.g. responding to a cold call initiative with a heavily subsidised offer), the information sought was simpler and more focused on the potential problems that may occur.

For those entering this period of consideration in a more spontaneous manner, without prompting from other individuals or organisations, the search tended to begin online.[16] As the choices tended to be justified by economic benefits rather than 'low carbon' being the primary motivation, the search criteria used tended to be problem focused or solution-focused but in a very general sense (e.g. 'make my home warmer', 'how to reduce energy bills').



For those with a specific technology in mind e.g. solar panels, the initial response is more channelled and easier to navigate, but for the majority beginning in a more general sense and using quite open search terms, it leads to a deluge of 'switching offers' from energy retailers and firms offering their services. This initial stage, in trying to find the most suitable options available, can therefore be overwhelming and off-putting. The existing marketplace assumes a level of knowledge that most ordinary consumers do not possess and therefore risks less committed consumers dropping out of the process.

For early adopters, many have successfully navigated the information available due to prior knowledge, a technical background (e.g. working in a related profession, being very technically minded) or being signposted through this journey by trusted advisors. Even for these early adopters with high personal capability, the overriding sense is that it is their responsibility to research around the different options available and become mini 'experts' in the options prior to purchase.

This leaves some feeling unsure and nervous as to whether they are making the 'right' choice for them and seek credible and independent information to base their decisions on. Even with a capable and motivated group of early adopters this process could initially feel daunting.

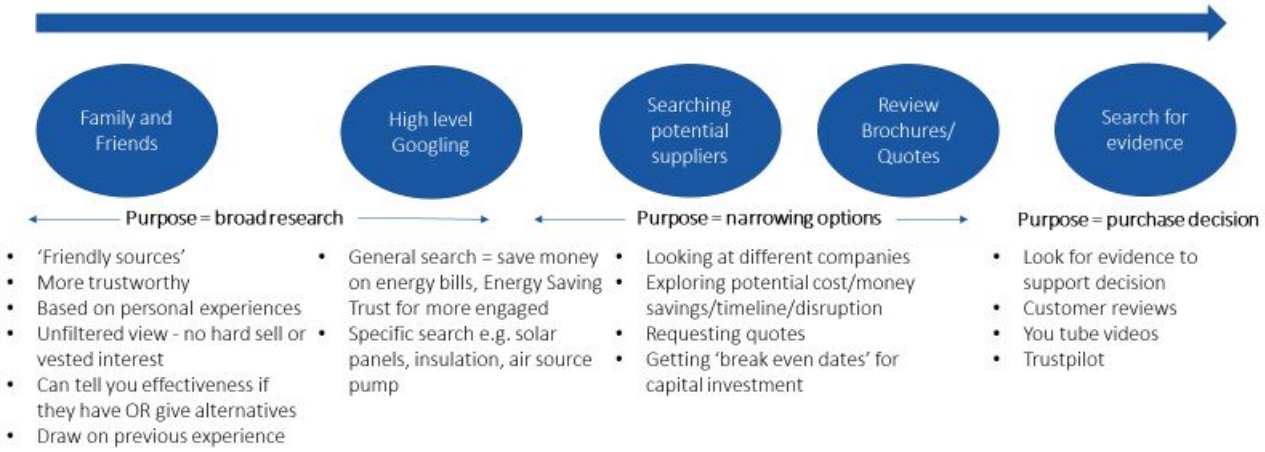
"Obviously the government just want to promote sustainability, saving energy, things like that. But there wasn't a lot out there to help people make a firm decision…If they can't find the information after a few minutes, people will think what's the point? We

[16] It should be noted that this group of adopters were generally able to finance the technology, at least in part, so lower income groups less likely to be online were not present in this sample.

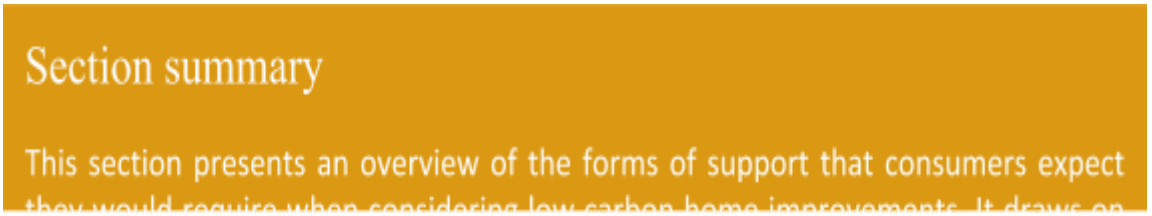
were a bit more determined we wanted to make changes, but still we found information very difficult to come by."

Adopter, London, Ground Source Heat Pump

For Adopters who had proactively sought out the options available to them, the information searching and review process took in several phases. This often began with more informal sources of information such as recommendations or advice from friends and family combined with very broad internet searches. This gradually narrowed into the details of the practicalities of the technology (installation process etc) and the potential suppliers to use. The final stage involved verifying the information already received (e.g. from suppliers) through a range of sources but often including user-generated information.



7 Consumer support requirements



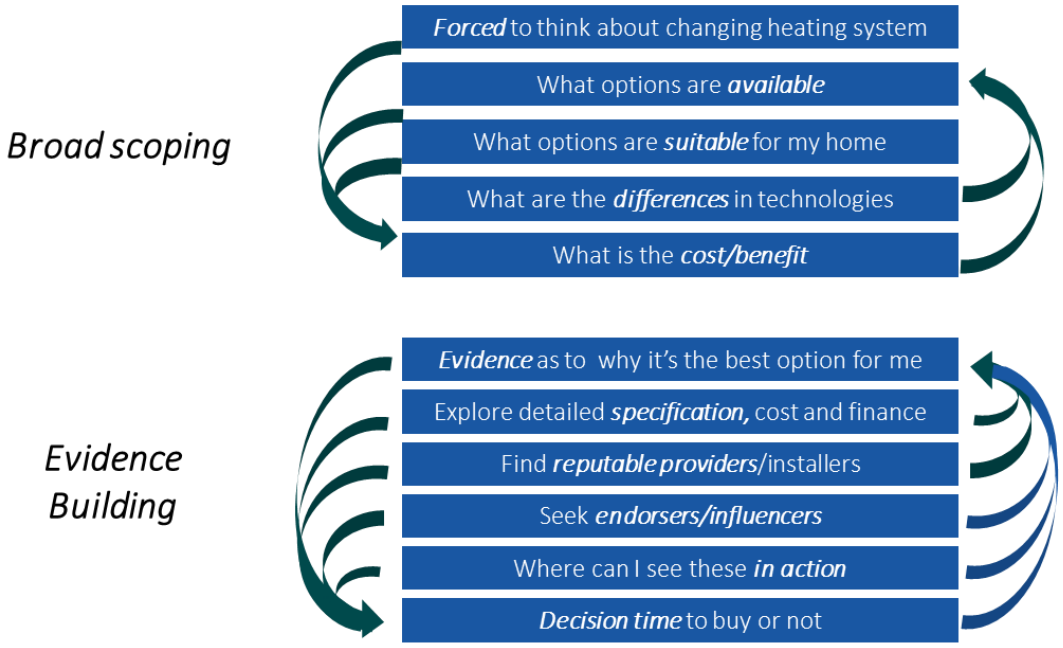
7.1 Where support needs to fit in to the customer journey

The lack of market and product knowledge of most consumers means the expected customer journey for low carbon home improvements is quite different from a more standard linear customer journey for other high-investment items. Therefore, the initial support that consumers require is to build knowledge and understanding of low carbon home improvement options.

A 'standard' linear customer journey would typically start with recognition of need, then information search, evaluation of alternatives, purchase decision and post purchase evaluation. The expected low carbon home improvement journey process is felt to be more fluid and multi-phased. This comprises many elements but, typically, can be broadly divided into two distinct phases; the first part tends to involve scoping out the options in quite a broad and basic way, gathering as much information as possible and looking for credible sources; the second part is an evidence-building process, seeking detailed evidence including robust statistics and reliable endorsements. A key element of this phase for many is the ability to see the technology, ideally in-situ, and get reassurance it is an effective option. See Figure 1.

Where the issue being addressed by the measure (e.g. making the home warmer or finding a new heating system) involves a wide variety of options, this often results in the journey being multi-phased, with points where the process begins again or goes back a few stages, as illustrated in Figure 1.

Figure 1: Illustration of Low carbon home improvement customer journey



Scoping stage: For conducting initial, scoping research, most felt this would focus on web searches and would expect to look for independent advice from third party websites and comparison sites. The initial support and information they would search for would be pros/cons of the different technologies, which would be suitable for their property type, how common and well-established the option is and its cost and savings. Participants would expect this information to be easy to find and delivered by trusted websites such as Which? or MoneySavingExpert.

For some consumers, another important step in this process is the canvassing of opinion from friends, family and colleagues. The adopter interviews illustrated that, for some, the initial inspiration for the low carbon technology came from within their social circle, so these opinions can be highly valued.

"On Facebook – there's Brighton people which is 47,000 people round the whole town but there's Hanover community which is my area – very similar houses. So, I would consider putting it out to that. We all live in the same sort of house. Has anyone done this?"
Brighton

Evidence-building: For the secondary evidence-building stage, the main components of this were reviewing vital statistics, case studies showcasing effective installations in different types of homes, bringing the technological benefits to life and a directory of accredited sellers/installers.

The information and knowledge that consumers are trying to build is multi-faceted and is summarised in Figure 2.

Figure 2: Summary of critical information needed

It should be noted that while some information is sought on the accreditations of the installer/manufacturer and guarantees provided with the measure – particularly where it is a newer or less proven technology – information regarding consumer rights, protections or redress options is not actively investigated by most at this stage. Instead, this information is considered critical but explored only when pertinent. It is also expected to be readily available should it be needed.

Early adopters' experiences of the purchase and installation process indicated that the process was generally smooth, but there were a number of information and guidance gaps during the process:

Purchase

- Greater ability to search for suppliers/installers (rather than emphasis being on the individual undertaking protracted and multi-stranded searches), along with customer reviews to support the selection
- Accurate assessment of cost savings
- Implications for EPC rating
- Walk through of the process in detail (mess caused, which rooms affected, do I have to move out during installation, any risks associated with the technology?)

Installation

- Preference for local installation firm as seen to be easier to resolve issues (e.g. delays etc)
- Greater clarity on installation process, including duration and logistics

7.2 Key pillars of support requirements

Figure 3 indicates the example support mechanisms presented in the workshops and the average scores given by participants to each one (using a scale of 10 being very useful to 1 being not at all useful). These scores should not be taken as a quantitative measure of preferences, but as illustrative of the elements of support mechanisms that are preferred and where there are broad patterns by location.

It should be noted that scores are relatively high for all support mechanisms, and that differences between the 'top 5' are minimal. Other than information via energy suppliers, which received scores as low as 3.4, no measure receives a very low score.

Figure 3: Average scores for support mechanism examples (10=very useful and 1=not at all useful)[17]

Support Mechanism	Total	Birmingham	Leeds	Caerphilly	Brighton
Government portal – information resource on potential options, installers	7.9	6.5	8.4	8.6	8.4
Third party (e.g. Which?) source of information e.g. helpdesk / web resource	7.9	7.5	7.9	8.3	8.0
User generated networking site – registered users share experiences, offer advice etc	7.7	7.4	6.8	8.8	8.0
App-based information providing options based on your household characteristics (size, current heating system etc)	7.4	6.4	8.2	7.9	7.2
Visit from local heating engineer providing quote and potential options	7.3	7.7	6.3	6.9	8.4
Architect / builder home assessment	6.5	7.4	5.7	6.1	7.1
Energy provider – link to information resource signposted on bills / leaflets	5.1	4.5	3.4	5.9	6.9

From this discussion and from Adopters' reflections on their experiences, a number of principles emerge on consumers' preferences for the support they require to facilitate their contribution to the net zero target.

There needs to be guidance delivered via a trusted voice

Consumers placed significant emphasis on trusted sources of information including websites and endorsements from trusted experts. Participants made spontaneous requests for guidance and reassurance delivered via trusted experts who have a reputation for protecting consumer interests.

[17] These were not intended to represent real or existing mechanisms of support, nor the full range of potential approaches. Rather, they represent archetypes from which consumers' preferences could be explored. The results presented in this table are based on the rankings of 39 participants and are illustrative only. The difference in rankings between the workshops is likely a function of the small group sizes and varying demographic makeup of each workshop.

The information and reassurance that consumers desire is to know that the installer/supplier is reputable, that they have options as a customer should things go wrong (see consumer protection section for further details) and being fully informed of the 'watch outs' they should be aware of (e.g. common malpractices, risks or unknowns for specific technologies etc). This is seen to be particularly relevant during the early stages of the 'roll out' of low carbon solutions when they may be less well developed and consumers are less familiar with them.

There were several participants that saw a place for Citizens Advice to provide this form of support. While it should be noted that all participants were aware from the outset that the research was being conducted on behalf of Citizens Advice, general attitudes to the organisation, raised spontaneously during the workshops, were that it would meet a number of these requirements. In particular, signposting consumers to reliable sources of information, providing a list of approved suppliers, setting out the 'watch outs' and highlighting consumer rights.

"It sounds to me as though the argument is coming forward for an employment group, maybe under Citizen's Advice or whatever. Training people to educate, advise and regulate."
Brighton

"Previously, every time there's been a government grant for something, out come the conmen to take advantage of it all and ruin it, so if the scheme had the Citizens Advice stamp of approval on it that would cut an awful lot of it I believe."
Brighton

There is a need for independent guidance

Consumers expressed a need for objective information that is not overly sales-driven. Prior to any prompting, 'Which?' was a commonly cited source of respected but independent technical information. The 'Which?' website/service fits this need for impartiality and expert advice.

Regardless of the source, participants would expect information and guidance that:

- Is independent and unbiased with no underlying profit agenda
- Covers the full range of options
- Feels expert and knowledgeable
- Represents consumers' interests
- Would identify what's best for me

"My wife goes to Dr Google and Googles everything and you end up with about 50 different conflicting reports and probably go to the first thing you look at."
Caerphilly

"I think it would have to be like an independent body doesn't it? Something like if Which? was involved."
Sutton Coldfield

Participants reflected that a number of existing bodies already provide detailed and objective guidance. For example, the Energy Savings Trust and the Carbon Trust were both referenced as providing technical but objective information.

"Research - Wow, there's soooooo much out there. Where to start? Gov.uk has a bit of advice, the Carbon Trust is also great and we use them a lot."
Adopter, Bedford, Solar Panels

In a number of the workshops, it was also suggested that well-known individuals could put their weight and voice behind the push for net zero, while informing consumers what sources of information they should and should not trust. These high-profile individuals were also seen to provide an awareness-raising role, highlighting the broader issue of net zero and what householders may do to improve domestic energy efficiency.

"Who's the guy on Grand Designs? He would be good...Kevin McCloud"
Leeds

"I'd probably watch, what's that programme like The One Show? If Martin Lewis was behind it, yes. I trust him."
Sutton Coldfield

The route to net zero needs to be competitive but well regulated

Consumers want to be able to identify, simply, the reputable suppliers and installers available in their local area. There is a desire for expertise in the specific technology solution they are investigating and sufficient choice in supplier to get the best possible deal. But there is also a concern that this would need sufficiently strong regulation (e.g. through accreditation and penalisation of malpractice) to safeguard consumers.

"If it's government or local authority it tends to get very bureaucratic. Private's okay so long as it's severely enough regulated. The regulator needs the power to come down with a tonne of bricks on misdemeanours."
Caerphilly

This was seen to be particularly important in a market that is likely to expand rapidly over the next few years as increasing emphasis is placed on reaching the net zero target, and there is greater clarity on the route to achieving it (e.g. in the form of subsidies, grants, incentives/disincentives). The concern that many consumers had is that the market may be flooded by small disreputable firms looking to make a quick profit. Participants made parallels to double-glazing salesmen and the targeting of the solar market with poor quality firms attempting to 'rip you off'. The concern was that it might open the door to more vulnerable consumers being scammed.

"What's going to happen is there's going to be loads of different companies coming up trying to put all this in, they're going to charge you way over the price and it's not going to work…You'll have a lot of dodgy companies, cowboys, doing it and the costs are just going to go higher and higher."
Sutton Coldfield

A one-stop information resource is a key strand of the preferred guidance framework

While consumers expect to do some of their own searching around for the best information, there is the expectation that a central resource would exist collating information about the low carbon options, the grants or incentives available to support adoption of these, information on potential installers and information relating to consumer protection options.

This repository of information would need to be impartial and trustworthy and the general expectation is that it would be managed by Government or at least endorsed by Government to provide it with sufficient credibility. This is seen to be beneficial as it would be independent and not involve heavy selling.

"I trust the government because they want what's best for the environment and not what's best for their pockets."
Sutton Coldfield

"Well whatever we think of the government, the civil service is neutral and it's their job to make sure the best information is given to us."
Caerphilly

An enhanced feature of this service would be if the information and advice is tailored to the individual property characteristics, or at a minimum, similar properties.

A number of examples of existing websites were given including the Energy Savings Trust, which is seen to provide well-structured technology-specific information for the scoping stage, as well as advice on any existing financial support. An additional benefit of this site were the videos and tools talking through the basics of each low carbon solution.

"There was a calculator for your savings as well, that was quite handy in one of them. But there was unfortunately a lot of information in text. One or two maybe had a video based on the ground source heat pump, how it worked, what you would save, so that was quite handy. You want an idiot's guide - you want it to be simplified."
Adopter, London, Ground Source Heat Pump

The Simple Energy Advice website[18] was not known by any of the Adopters (it did not exist when the majority were exploring the options available to them) or the workshop participants. However, when prompted with this site, it was very well received, and considered to provide good high-level technology-specific information, very useful signposting of installers, and interactive elements. The tailored energy efficiency calculator, providing options based on the household characteristics, was in particular felt to be a strong feature.

User-generated testimonials are seen to provide an important channel of consumer information.

When exploring high expenditure home improvements and purchases, many workshop participants reported using user-generated content to support their decision. This information was typically accessed via social media, other forms of networking sites and user review sites. The appeal of this type of information is that it provides an unfiltered view where both the positive and negative feedback is provided. This is an aspect that is often felt to be lacking in content coming from a more promotional angle.

This also taps into the need to get input and advice from 'people like me' and those who have been through the experience of choosing and purchasing a particular technology and can talk about it in a simple, honest way in a manner that consumers can relate to. This support option would also fulfil the need to see and hear real life stories that bring it to life, rather than the information being viewed in a more abstract way.

"An account of someone actually talking about their journey; you get to hear about all of the things you're not told, like it can be messy, that it's better to not be in the property especially if you're having a few rooms done."
Adopter, Solid Wall Insulation, Leicester

Participants saw a number of options for how this might be structured, but gave examples including Tripadvisor which was considered to be familiar, quick and simple to

[18] www.simpleenergyadvice.org.uk/

use. This form of information resource should have the ability to search and filter based on similar houses, e.g. size, location, type.

"So, I wouldn't just be going off people's opinions on something that I'm going to spend a lot of money on. I would get – give us actual experience – because that's happened to them."
Brighton

Ideally this form of platform would be moderated to ensure that it does not become commercialised, with paid-for content.

"You'd need moderators, so that it's not as rubbish as TripAdvisor where (a) hotels pay people to put things and where the most petty rubbish and nonsensical reviews come on."
Caerphilly

"Somebody in China sitting there doing all the reviews for that site - it's got to be a regulator like Mumsnet."
Sutton Coldfield

There is some appetite for tailored guidance/information provided by app.
This was seen as useful, easy to navigate, not overly text heavy and something which could be used as part of an ongoing search period that consumers can dip in and out of. It is also seen to be more likely to provide tailored advice relevant to the individual's home. Even where precise details are not available, guidance based on similar households (particularly if in the local area) is also considered useful.

This would be App-based information providing options based on household characteristics, for instance, size and current heating system. For this to be a good support option, the combination of app delivery and household level information would need to put the individual in control and feel easy to use; the majority of the participants felt this would work well for the first broad searching phase shown in Figure 1. The participants suggested the following information should be included for the app to be an effective support option:

- Pre-coded information about the types of low carbon option that might be suitable for particular postcodes
- Information tailored to specific house type
- Comparison of the different technologies
- Tied to Land Registry or planning team for detailed information (ideally)

"If they could somehow be linked to Land Registry. I was going to say that because solicitors can get it like that."
Leeds

"I use apps daily for a lot of things. So I don't know maybe it's my age."
Caerphilly

However, there is also a need for offline support, particularly in being able to see low carbon solutions up-close.

As a key element of the evidence-building phase is about bringing the technology to life (particularly for the less well-known technologies such as heat pumps), consumers expected it to be delivered via interactive and visual means including internet videos, social media and customer testimonials.

"I'd need to see it, witness it in action"
Leeds

However, many consumers also called for more physical options to see these solutions in-situ, when they expected to be able to get a better sense of them and whether they might work in their home. A number of approaches were suggested including local community exhibitions and show homes.

"A bit like an Ideal Home Exhibition where you go and look at all new things. I was thinking a sort of like roadshow type thing where they take out a house mock-up."
Brighton

"One possibility is there could be exhibitions staged so that things of that nature you view for two or three days were going to be in a certain spot. Somewhere you could go to but deal with people on your own terms."
Caerphilly

Participants saw the benefit of an informal network of adopters of these low carbon options that could be used to find first-hand experiences and share stories with like-minded people. Workshop participants made parallels to exhibit homes for items like double-glazing, loft conversions and bi-fold doors where the homeowner receives a lower rate on the basis they agree to allow interested people to view the work.

"You'll talk to the people... Like, I could talk to you and say, 'Well, how did you... ? What do you feel... ?' and like this lady said that she met someone a few years ago about solar panels and wasn't happy. Word of mouth and what other people have experienced and what they're going through is the best way of learning about anything."
Brighton

This kind of forum was seen to be useful if it could allow users to find experiences for the different stages, including searching, purchase, install and post-installation evaluation and use. Other suggestions included the idea that this network would share information, guidance and also host open days where interested individuals could visit to experience the technology in a real-life scenario.

There should be provision for community level and localised guidance.

Participants also wanted there to be local level guidance they could tap into. The idea was attractive of having expert and knowledgeable information face to face from a local point of contact who knew the area.

Some participants called for local authorities to have a role, providing guidance about local solutions. However, there were also some concerns raised about the level of bureaucracy this might entail and how well funded it might be.

"I think being delivered at a local level is a good idea. It's an international problem really. But I think it's best communicated at a local level, definitely. Particularly as different councils have particular different types of housing, so it could be tailored according to what sort of house you own, how old that house is. They could do some surveys as to who's done it and how it's affected them, have some actual real time data on that in the local area. I feel like people are more likely to get on board if it's spoken about and pushed on a local level."

Adopter, London, Solid wall insulation

To access local heating engineers, installers and suppliers, participants suggested a directory of local providers detailing engineers' accreditations and certificates as proof of qualifications for peace of mind.

Some participants also wanted to have access to more community-level guidance in addition to advice tailored to individual households. It was felt important that to include all types of household in the expansion of low carbon solutions, guidance would be required to support community level action.

"I would be interested to know if you could do any of these as a group of neighbours. Because I live in a mid-terrace. There's five of us and we have done things together in the past. So, if they could say, 'If you all did it together. The equipment needed actually is smaller'...The air heat source and the ground source. That's a lot of work but actually as a whole – for the whole row – it might work better."

Brighton

Energy providers are seen to have the necessary customer connections to provide support but are perceived to lack a trusted platform from which to promote these measures.

There was an expectation from some participants that energy providers would know their property already and therefore would be a good place to start their search for advice. Participants who had trust in their energy provider were more likely to look to them for support as a first port of call. There were also Adopters who had contacted their energy supplier to find out options for technologies like solar panels.

"They know your property already so they're best placed to give you more informed information."

Sutton Coldfield

"I'd probably contact my energy provider first to see what they can offer first. And then go from there."

Caerphilly

However, participants gave mixed assessments of how well energy providers would be able to provide a rounded and objective view on what might be best for their home. For

some, a lack of trust in energy suppliers meant they would question whether the advice they receive would necessarily provide the most effective solution for them.

"I wouldn't trust [my energy supplier] to refer me to one of these gadgets…I suppose because they've cocked up on my bills. It's a long-standing issue you know – they're always trying to offer you something. It's a sales angle rather than a customer service angle."
Brighton

7.3 Post Installation Phase

While much of the Adopters and workshop participants' focus was on the scoping and evidence building phases, and purchase and installation, some participants also spontaneously mentioned the type of support they would like to receive following installation of the low carbon home improvements.

Participants suggested households should have a mandatory annual maintenance service carried out, similar to a boiler service, ensuring the products were working correctly. Alongside this, they also suggested an annual review of the low carbon home improvements, detailing efficiency, operational costs and whether the households could become more energy efficient. It was expected that the tradesman who installed it would carry out the service and review.

"The aftercare for me also includes the operational costs. So, how efficient is it being for me? Will somebody come and look at that and can I get more out of it? Where's the statistics?"
Brighton

"I think every boiler in the country should be serviced on a regular basis so you don't have accidents that shouldn't happen…But I'm just saying perhaps these should have a mandatory maintenance service."
Brighton

Participants felt ongoing support should also be offered in the form of a helpline with an expert on the other end of the line, in case anything were to go wrong. This included potential technical problems with the technology, such as damp problems caused by cavity wall insulation, inefficient operation of solar panels and heat pumps and faults with the technology.

The overriding concern was that a problem falling outside of the warranty or guarantee might incur a significant cost, or worse, render the investment null and void. Participants wanted a longer-term guarantee or care plan as this would provide them with reassurance they were not burdening all of the risk.

7.4 Consumer protections

Adopters and non-adopters had very limited knowledge of redress options available to them should a problem arise with their low carbon technology. This scenario was not something that most considered initially, but when asked what they might do if something were to go wrong that could not be resolved with their provider, many had limited knowledge of what action they might take or their rights in this regard.

Overall, however, participants were more focused on the pros and cons of different technologies, upfront information about the installation process and costs than looking for redress options. Even participants who had experienced service failures focused more on the speed at which this got fixed than who would be accountable for it.

"There was one time, over the first Christmas after it was installed, that it was not working, but we had no idea, it was the company who monitor it – they phoned to say an engineer will be down straight away."
Adopter interview, Solar Panels

For most participants, the first point of call in the event of service failure would be the supplier or the company installing it (if these are not the same company). To prevent problems occurring post-installation, participants were looking to get the correct advice during the planning and installation phase. Critical information needed includes product lifespan, guarantees and extended guarantees and availability of maintenance packages.

From this research with early adopters and other consumers, we identify six key protections that were perceived to be needed as a minimum for market entry. These were:

1. Government regulated marketplace with set of service standards e.g. repairs within a certain period, etc.
2. A Directory of qualified/accredited engineers that are regularly audited
3. 'Lifelong' (25/30-year) product and service guarantees for low carbon home solutions
4. Checking validity of product endorsements (e.g. ones from celebrities, User sites)
5. Protection for financial packages designed to purchase low carbon home improvement (e.g. reasonable repayment terms)
6. General energy and rights/protection advice delivered by independent body e.g. Citizens Advice

1. A regulated marketplace, including service standards

To protect consumer interests, participants felt that the regulation of the domestic low carbon sector needed to extend to the standards of service that customers are entitled to. This was expected to be made clear to consumers so that householders are aware of their rights and the level of service they could expect. This was seen to be particularly important because of the nascent nature of the market.

"I would hope that the government legislation would be that people are checking on what people are doing because it's so new and so innovative. So, there are checks – even if you have to pay for them. Clearly you have to get your boiler inspected every year."
Brighton

These service standards would include the servicing that people could expect or should undertake. They were also expected to cover call-outs, the standards a householder could expect to avoid hardship and levels of insurance that might be required.

"They'd need that infrastructure, they'd need to have enough people, like a call centre that could take all the calls. Because you don't want your ground pump to leak and lose that energy for six days. So you need to know that they've got the engineers there, that if you ring they're going to answer the phones or get the engineer out."
Caerphilly

"You need to know they've got the infrastructure and capability to actually ensure you [they will] fix it, to be out on time. Not when you ring up and say, "We'll send an engineer out in ten days."
Leeds

"I think that's the problem if you've got a myriad of firms all offering different services, it's going to cause chaos. You'd need the government to make sure that like the railways they may be different companies but they're still wearing the same UK railway uniform. You'd need to say to them, "Right you're the five firms that are going to fit ground pumps, but you need to get together, have the same insurance, the same number of engineers, have the same infrastructure so that it's not all hit and miss."
Caerphilly

2. A Directory of qualified and accredited engineers

One particular concern was about the regulation and certification of the organisations selling and installing the equipment. People wanted reassurance that they would be able to easily identify that the supplier they consider using, or choose to use, has the necessary accreditations to supply the work to the required standards. Comparisons were made to existing systems that provided this, such as Gas Safe for gas boilers, as examples of how it might work.

"I think with some of those things I'd like to see a little bit more regulation. Because you've got Gas Safe for instance, so you've got to have an authorised installer to work on the boiler. But I'm not too sure if just any old Joe can turn up and fit any of that other stuff."
Brighton

"The right people installing it, are they accredited, are they trustworthy? Because a lot of people, they can have the government stamp on or whatever but the big thing is trust."
Sutton Coldfield

This was seen to be particularly important where the technology is more technical in nature and where significant structural work is undertaken on the person's home.

"They're digging up your garden or they're making holes in your walls. You want some kind of certification to say you are qualified to do that."
Brighton

As participants expected the market for low carbon home improvements to be fast moving, with regularly advancing technological options, regular audit was also considered an important element of this regulation. This was considered necessary to ensure that suppliers and installers keep pace with any changing safety or quality standards.

"Some kind of audit that they have to go through to get to where they are to give that advice and expertise. Some kind of guarantee."
Brighton

3. 'Lifelong' product and service guarantees

With the kind of investment that is required for many of these low carbon technologies, participants felt that lengthy guarantees would be required. These items were felt to require a greater length of guarantee than other high-cost items, like a new car, for two reasons; low carbon heating and insulation are not seen as indulgence or status purchases (in contrast to a new car, which is a status item and, therefore, warranties are not expected to last as long); and these technologies feel unproven so consumers require greater protection from the assumed higher risk of failure they would face than with more established products.

"If you're looking at an outlay of £17k, you don't want a guarantee of 10 years, do you? People can't afford to spend that. You want that to be lifelong."
Sutton Coldfield

Some participants also felt worry over the uncertainty of how long they might expect it to last and the implications this might have.

"You'd want 30 years at least I'd say and then you put yourself at that age in 30 years' time and then who picks up the bill? Is that your children? Do you know what I mean? It's just a lot to think about. You've got to have some guarantee you're not going to have this massive cost again."
Sutton Coldfield

The guarantees were expected to cover both the item itself as well as the maintenance agreement provided with the product. Furthermore, for some of the low carbon

technologies requiring substantial groundworks, it was felt that the cover would need to stretch to rectifying any work that had been undertaken to complete the maintenance or repair (e.g. digging up of garden space). There was some expectation that this might come at a cost and need to be in the form of insurance.

"I think it comes back to guarantees. You'd want to know that an insurance policy that you are going to take out is actually going to cover you for ground works, digging up your garden, replacing it afterwards, making sure everything is covered. Because if you've got to pay, I can't see a normal house insurance, contents insurance, policy is going to cover you for having, say, your back garden dug up because something's blocking a pipe outside."
Caerphilly

"I think you would have to have a specific kind of insurance just for peace of mind knowing that if you spent say £15-20,000 odd on a system that you know that if anything at all was to go wrong you know you'd have cover. But like my mum's point for my mum now if anything was to go wrong with her heating system, she wouldn't have the money to be able to fix that. I know she doesn't because I do her finances. She doesn't know that I secretly pay for her insurance policy but at the same time if anything was to go wrong and it would be up to her to fix, there's no way that she could find £1,000 to put a boiler in."
Caerphilly

Participants also expected there to be some for of protection for consumers should their supplier go bust during the guarantee period.

"A guarantee you'd want as well isn't it? So that if the company that installed it went bust because it's a new technology."
Brighton

4. Checking validity of product endorsements

Many participants felt that the net zero initiative would require celebrity ambassadors, and involvement of price comparison sites, to support widespread adoption of these technologies. However, there was also a concern that this should be overseen to prevent inaccurate or dishonest endorsements. It was felt that coordination would be required between regulatory bodies to ensure this kind of information could be trusted.

"I'd want fact-based, impartial information that can be tailor made to my circumstances and needs and also that is regulated by some sort of body like Ofcom."
Leeds

Related to this, there was a strong desire for user review sites to be protected from paid for content. This form of information sharing was considered invaluable, but only if it was sufficiently moderated to weed out hidden advertising and false information.

"Moneysaving Expert get kickbacks. They advertise on their website."

Leeds

"You need really good moderation, [user generated review sites] need to be regulated and make sure there are people looking at them and taking reviews off that are clearly hateful or clearly just trivial or stupid."
Caerphilly

5. Protection for financial packages

Given the high cost of some of the low carbon solutions under discussion, participants wanted to know that there would be scrutiny of the financial packages being offered to consumers as part of sales deals. For instance, this included the repayment terms that are offered but also clarity around the legalities of the financial arrangement.

This was particularly mentioned in relation to solar panels, with several participants referring to lease arrangements whereby the panels are not actually owned, at least not for an initial period of time, by the homeowner. This raised questions in participants' minds of whether homeowners may end up being tied-in to a product that they do not own.

"They're [solar panels] up there for a long time. I think it's about 15 years before you have contributed enough back to the grid to be able to own them."
Leeds

"Do you actually own them outright or are they owned dependent on the energy supplier that you're with and how frequently are they improved? You know. If I've got one and I think, 'Oh. Fantastic' in two years' time are you gonna go, 'Oh. No, you don't want to go having that one. You got to have this one because this is much better.' And am I tied in you know?"
Brighton

"So, who actually owns them and if you want to change them and then take them off can you?"
Brighton

6. General energy and rights/protection advice delivered by independent body

As a result of the number of areas in which participants felt consumers would need to be protected, they called for advice and support to be delivered by an independent body. They were looking for a low carbon sector that is regulated and has consumers' interests at heart. However, given the complexities of some of the technologies, and of the considerations that homeowners may need to take in their decision-making process, they also felt there was a place for a guidance safety net to support this regulated marketplace. This safety net was considered vital to help consumers navigate the complex low carbon landscape.

8 Conclusions

Section summary

This section summarises the main conclusions from the research.

The 'Climate Crisis' is top of mind for many consumers but the majority of participants do not really engage with the details of the environmental debate and are not looking to make any significant changes to their home to lower emissions. There is limited knowledge about what net zero might mean in terms of the changes consumers might need to make to their homes. The net zero challenge feels a huge, and largely unknown, task for many people and they want to see a visible Government strategy that demonstrates how the Government, Business and wider Community are tackling this so that individuals can follow their lead.

However, this research shows that home improvements related to heating and energy are more commonly driven by financial motivations - for example, capital costs, payback and reducing energy bills – rather than environmental motivations. Even where people have heard of some of these low carbon home improvements, baseline knowledge is low and there are concerns about their expense, complexity and the long list of perceived things which may go wrong.

Many consumers have a significant lack of market and product knowledge when it comes to low carbon heating solutions and energy efficiency measures. This means the customer journey is much more fluid and multi-phased (early scoping, evidence-building and reflection) than for most other large home investments and therefore support needs must stretch across these phases.

When exploring low carbon home improvements, consumers require information about a wide variety of issues; how effectiveness of the technology or any financial savings might be tracked; the financial payback period; a walk-through of the installation process and the associated disruption that would be caused, including integration with existing heating systems; space required including fuel and equipment storage; any safety implications (e.g. fire risk from insulation or solar panels); ongoing maintenance or servicing required and overall cost.

Information and guidance will need to cater for small community-scale solutions as well as individual household level options. Providing support for households that wish to collectively explore the options available to them will ensure that a wider variety of the UK's homes can participate in the net zero challenge.

An essential strand of an effective future support system will be an easy to use and comprehensive database of approved suppliers and installers of low carbon measures. Given the wide range of technological solutions available to improve home energy efficiency and heating, identifying, assessing and selecting the best option is not an easy task for many people. Participants of this research were looking for a system that will give them assurance that the supplier and/or installer has the necessary certifications and accreditations to undertake the work and allows them to easily search for installers and suppliers by product category.

The current landscape of support for consumers is disparate and lacks a coherent language frame. Currently, navigating this landscape requires a baseline level of knowledge and significant investment of time and commitment, which is very likely to present a barrier to greater uptake of low carbon solutions unless more coordinated guidance is provided.

Many consumers are willing to conduct their own research and will readily explore social media and user-generated content to support their decisions. However, they also seek a central repository of information – a one-stop-shop – that collates the variety of information sources and help to signpost them to reliable information and providers. Many consumers expect to conduct most of their search for information using online means. They expect a coordinated repository of information about the solutions available to them and call for this resource to be interactive and offer 'personalised' guidance based on property and homelife factors.

However, they call for offline as well as online guidance to ensure the digitally excluded are catered for. This is seen to be more important in the short to medium-term, particularly as the net zero campaign gathers momentum. One strand of the information architecture that participants put great emphasis on is the ability for homeowners to see, touch and feel the technological solutions. They seek demonstrators of the options and show homes so that the technology can be viewed in-situ. This source of information and advice is liked as it is seen as unfiltered and based on real-life experience. This is considered particularly important for what are perceived as newer, less proven options like heat pumps and biomass boilers. Many see the opportunity for a network of adopters to be connected to share information while providing a network of show homes.

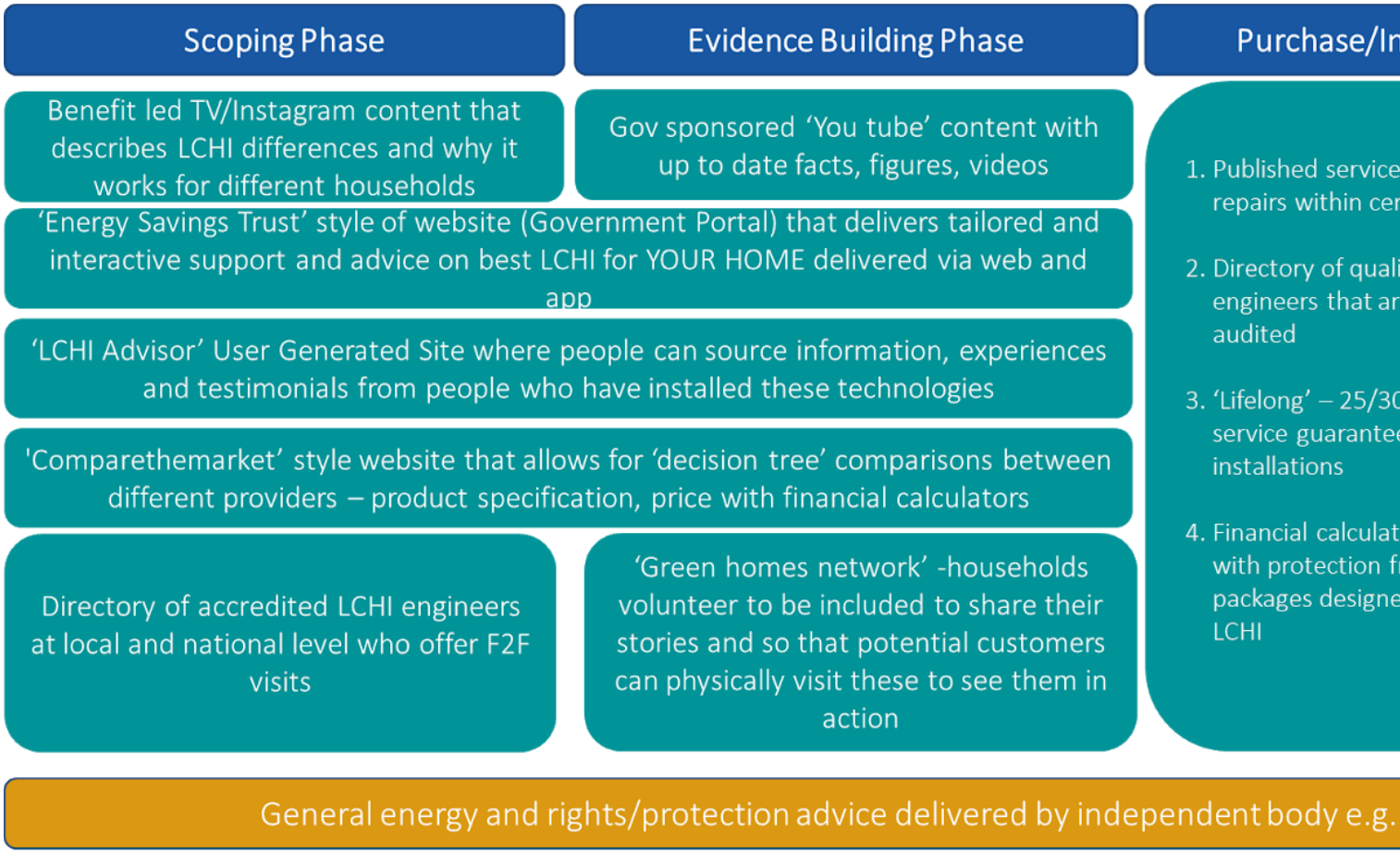
Consumers seek independent advice that is free from commercial bias, alongside a regulated marketplace of suppliers to provide consumers with choice while ensuring they are protected. Regulation of this sector is seen as vitally important, particularly as it grows to meet the demand generated by new policy implemented to encourage adoption. Many consumers expect to make use of user-generated content to support their decision-making process but want this to be free from paid-for content.

From this research with early adopters and other consumers, we identify six key protections that were perceived to be needed as a minimum for a successful implementation of net zero:

1. A Government regulated marketplace with a set of service standards e.g. repairs within a certain period, etc.
2. A Directory of qualified/accredited engineers that are regularly audited
3. 'Lifelong' (25/30-year) product and service guarantees for low carbon home solutions
4. A system with inbuilt validity checks of product endorsements (e.g. ones from celebrities, User sites)
5. Protection for financial packages designed to purchase low carbon home improvement (e.g. reasonable repayment terms)
6. General energy and rights/protection advice delivered by independent body e.g. Citizens Advice

The support architecture that consumers desire needs to include multiple strands to meet consumers' needs, set out in Figure 4.

Figure 4: Possible support architecture



Stage One: Research with Adopters

Core Objective

The core objective with Adopters was to understand their customer journey and the detailed decision-making process that led them to adopt a low-carbon technology. This stage also explored the support mechanisms they used to facilitate this journey and how this might have been improved. In particular, this element of the research sought to understand:

- what was the key motivation for choosing an alternative / low carbon solution
- what they understood to be the key benefits (and drawbacks / risks)
- what were the sources of advice or information they used to make their choice
- what support they sought/used along the way and the role it played in their decision
- how they went about their purchase choice
- what the installation process was like
- what the overall challenge points were and where other forms of support would have helped
- their ongoing experiences of the technology, including how it has benefited them in their homes, any difficulties using or maintaining it and the support they have used or would ideally need in relation to these issues

Methodology

One-to-one depth interviews were chosen as the most appropriate method of engaging with Adopters so that participants could explain the potentially complex decision-making process and their purchase journey in detail. One-to-one depth interviews allowed Adopters to go through the process at their own pace – particularly important given they were asked to recall experiences and decisions that were in some cases several years ago.

Interviews were carried out by Skype, allowing a good rapport to be built between moderator and participant. Skype interviews were selected as the most appropriate method over face-to-face in-home interviews, as the latter would have been inefficient given the very low take-up of low carbon technologies, the lack of geographic clustering and the risk of only being able to cover the more commonly used technologies - loft insulation and solar panels - within the budget. In addition, the advantage of Skype interviews over just a telephone approach is that the interviews lasted for 60-75 minutes with each participant, longer than would typically be possible via the phone. During this time participants were asked to show the moderator documents relevant to the process, which they had collated during a pre-task stage.

Pre-Task to support the recall and contemplation process

Given that some of the low carbon home energy technology installations happened several years ago, it was important to ensure that the Adopters had a chance to 'relive' their purchase journeys before the interview began so they were ready to discuss their experience of the process they went through.

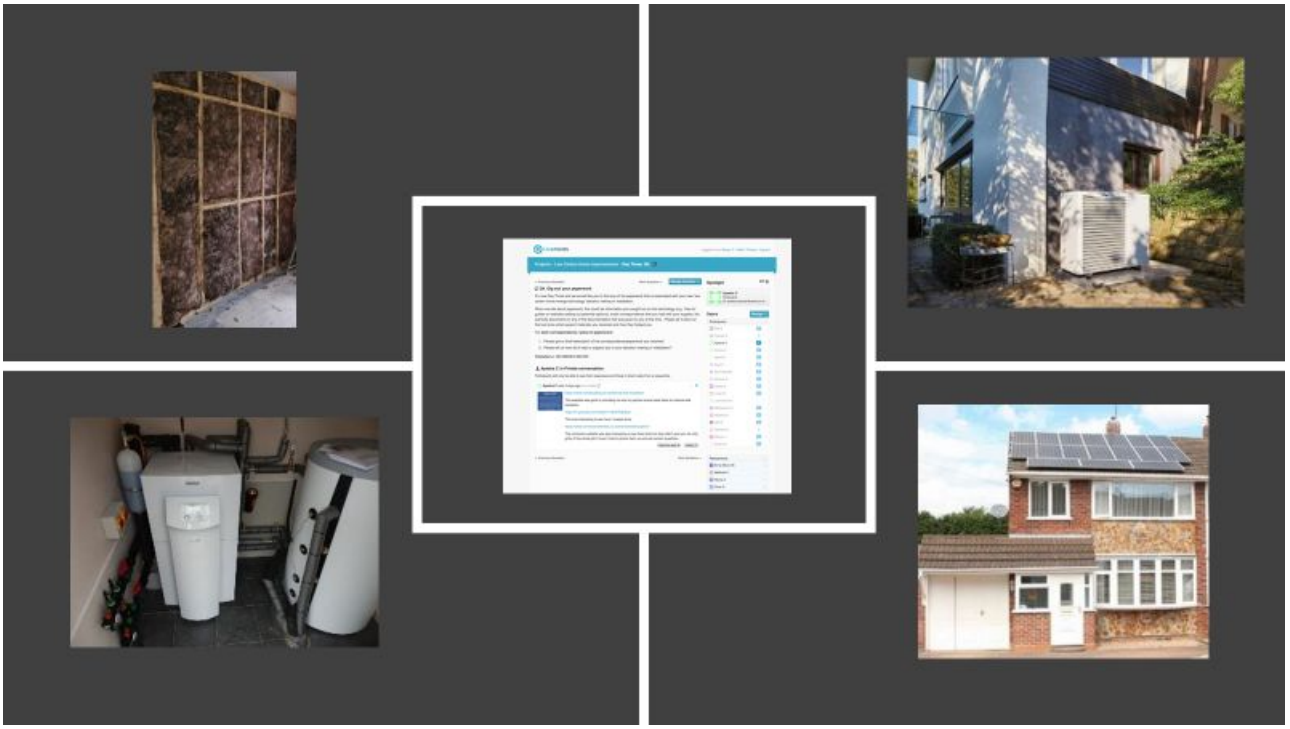
Pre-tasking allowed participants to review their energy technology before we discussed their journey and maximised the usefulness of the interviews. This had several benefits:

- Stretching the amount of time and input we had with our participants
- Elevating engagement and preparing people for the discussion
- Providing a data pool for analysis before – and after - the sessions
- During the week-long pre-task Accent moderators had access to the app dashboard so that we could see feedback, respond with comments/questions during the pre-task stage and then refer back to the content of the activities during the interview

To this end, a digital platform (LiveMinds) was used to allow participants to complete tasks, via an app, leading up to the one-to-one Skype sessions. A question was released every day leading up to the Skype session:

- **Task One: Video selfie** – introduce yourself and your home, tell us what new home energy technology you have and why
- **Task Two: How did you and your family make your decision?** Complete a comic strip to outline the key moments leading up to your new low carbon home energy technology being installed. Fill in the boxes to tell us what happened during your decision-making process.
- **Task Three: Dig out your paperwork** – find the email trial, paperwork associated with your new 'low carbon home energy technology' decision making or installation (e.g. any materials that supported your decision to install).
- **Task Four: Find your Energy Performance Certificate (EPC).** Tell us which bits are or were really useful to you, which are not useful and how you think it could be improved.
- **Task Five: Support and Help** – Think back on the whole experience, how would you change this to make it more useful, more streamlined or easier? Where would extra support have helped / how?

Figure 5: Example pre-task content



Sample Framework

In total, 15 Skype interviews were completed, with the aim of representing a range of different technology types / categories:

Table 2: Adopter interview technologies

Technology	INSULATION			HEATING			OTHER		TOTAL
	Solid wall	Cavity wall	Loft insulation	Air Source Heat Pump	Ground Source Heat Pump	Biomass heating boiler	Solar PV Panels	Smart charger for an Electric Vehicle	
Target	3			2					15
	5			5			5		
Interviews completed	3	2	1	1	1	2	4	1	15
	6			4			5		

All participants were homeowners or private tenants who had installed and paid for the technology in the past five years and had been involved in the decision to install the technology. Only those who paid something for the technology were included. This was to ensure that all participants were engaged in the process of selecting and installing the low carbon home improvement.

Participants were each given an incentive of £80 for completing the interview and pre-tasks.

Recruitment was managed by Accent with support from a specialist recruitment partner. Given the very low incidence of the target group – estimated to be well under

5% of the target population that have installed a heat pump or cavity wall insulation – we used recruiters who maintain a database of potential participants, rather than on-street or door to door recruitment. Snowballing was also used to reach the required targets. This involved asking participants/potential participants if they know of anyone else who might fit the criteria.

The depth interviews were conducted during November-December 2019.

Following the Adopter Skype depths, an informal sharing session between Citizens Advice and Accent was held to share findings before moving forward to Stage Two.

Stage Two: Research with Consumers

Core Objective

The core objective of the phase with Consumers was three-fold; firstly to understand current awareness and comprehension levels of the low carbon technologies, secondly to understand the barriers that prevent consumers from adopting (or considering) a particular technology, and thirdly (and most importantly), to understand the support that consumers may need at different points of considering and adopting them.

Specifically, we wished to understand:

- Which kind of low carbon home improvements they were aware of
- Which were appealing and relevant to their homes
- Which parts of the customer journey may cause barriers
- What would encourage them to consider the technology
- What support they would expect at different journey moments
- How they view the role of government and other bodies in supporting consumer adoption of the technologies
- Where they would expect to go for help
- Consumer responses to a range of future support services e.g. home-based advice services

Methodology

A significant barrier to the adoption of low carbon technologies is around awareness.[19] As many consumers are likely to be quite removed from the world of new home energy technologies it was important to adopt a deliberative methodology. This method allowed the audience to have time to fully understand the different technologies and the associated benefits or challenges so that we could identify the potential support they would require. It was also important to have sufficient time to ensure participants were aware of the drivers of change (the net zero target) and the reasons why behavioural change may be required.

[19] BEIS' Public Attitudes Tracker (December 2018) found that around eight in ten had either never heard of heat pumps or biomass boilers or had heard of them but did not know what they are (86% ASHP, 81% GSHP and 79% biomass boilers) https://www.gov.uk/government/statistics/beis-public-attitudes-tracker-wave-28

We conducted four 'low carbon energy technology workshops', each of which ran for three hours and comprised nine to ten Consumers. Workshops were selected as the most appropriate approach as they had the advantages of discussion groups in allowing for a good exchange of views, the ability to debate different areas and challenge the benefits of the different technologies. A further benefit of workshops was that they focused on a common purpose of designing support packages for customers who have yet to adopt these home energy technologies.

Participants were recruited by our specialist recruitment partner using a recruitment questionnaire which required that participants:

- Did not work in market research, renewable energy or as a home energy assessor
- Owned their home and did not live in a flat or maisonette
- Were not in receipt of benefits or in financial hardship
- Had not installed any energy efficiency measures in their home in the last five years

The decision was taken to exclude low income households as this research focused on consumers who would be able to contribute to the cost of the measure installed. Tenants and people living in flats and maisonettes were excluded as it was important that participants were able to install low carbon measures without getting permission from ma landlord or freeholder. Furthermore, several of the chosen technologies would not be suitable for multi-story flats or maisonettes.

A spread of participants in England and Wales was recruited to ensure representation of a range of those that have thought about these technologies before and those who have never thought about them. A mix of the following participant types were included:

- Those willing and those not willing to install one of the low carbon technologies in the next ten years
- Urban, suburban and rural locations
- Participant ages, Socio-economic Groups (SEGs)
- Property ages, property types (detached/semi-detached/terrace/bungalow)
- At least one off-gas participant in two of the workshops

Sample framework

The workshop structure was designed to cover a range of locations and participant types, as illustrated in Table 3: Workshop structure.

Table 3: Workshop structure

Workshop	One	Two	Three	Four
Location	Brighton	Sutton Coldfield	Caerphilly (participants recruited from local rural areas)	Tingley, Leeds
Date	22nd January	21st January	16th January	16th January
Urban/Rural	Urban	Suburban	Rural	Suburban
Household Size	Singles/Couples	Families	Families	Singles/Couples
No. of participants	9	10	10	10

Participants were given an incentive of £65.

All workshops were conducted in January 2020.

Topic Guide

A topic guide was designed by Accent in conjunction with Citizens Advice. Several issues were considered in designing the guide.

- **Financial barriers**: As we knew that financial barriers were likely to be the main barrier to adoption and we did not want this to be a focus of the discussions we made it clear to participants that they should assume that a package of financial incentives would be in place to encourage adoption.
- **Lack of knowledge of the technologies and installation issues**: A deliberative approach was used to initially explore spontaneous reactions to the technologies, based on limited information and with participants completing individual worksheets. Following this, the technologies were presented in greater detail while allowing participants time to digest the information (in mini-groups) before discussing in a wider group context.
- **Use of stimulus materials**: Information about the technologies was presented using a variety of photos, diagrams and text to explain them. The technology stations were presented on 'stations' that participants reviewed in turn, annotated and asked questions about.

We created information boards about the different new home energy technologies and used these with the general Consumer groups. The information boards presented information about the key elements of the technologies in a structured format and used quotes from the adopter interviews to provide real-life experience to bring the journeys to life.

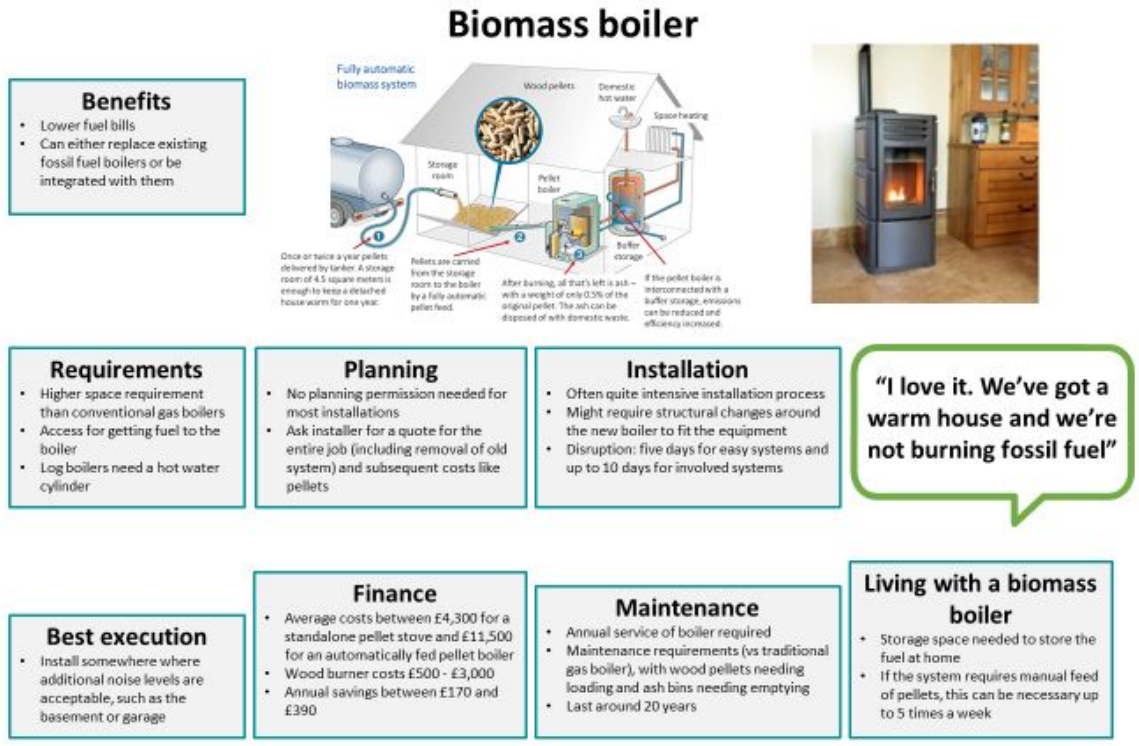
Each storyboard was built on A3 mountboard and included a consistent layout to enable participants to easily and quickly assess each technology option:

- Diagram explaining the technology and images of the technology in-situ

- Customer benefits
- Requirements (e.g. space, house structure etc)
- Planning (if planning permission is required)
- Finance (example costs)
- Best execution (other requirements to maximise effectiveness)
- Installation (duration and requirements)
- maintenance (servicing, cleaning etc)
- Quotes from the adopter interviews

The technologies presented included Air Source Heat Pump, Ground Source Heat Pump, Cavity Wall Insulation, Solid Wall Insulation, Solar Photovoltaic (PV) Panels and Biomass Boiler. An example is presented in Figure 6.

Figure 6: Example workshop technology stimulus (Biomass Boiler)



Determining future support needs

Within the adopter interviews and the consumer workshops, a number of methods were used to determine future support needs. This drew on:

- experiences of Adopters (predominantly) and consumers in researching, purchasing and installing low carbon home improvements and other similar processes such as investigating options for large home renovations;
- spontaneous suggestions from early adopters for how the available support could be improved
- spontaneous suggestions from the consumer workshops on the preferred support mechanisms; and
- reactions to prompted examples of potential support mechanisms.

For the last of these - prompted examples - workshop participants reviewed a number of hypothetical support strategies assessing how effectively they would address their expected support needs. The different options presented (see Showcard K in Appendix E) combined the type of information provided, the method through which it would be delivered and the channel or type of organisation that would deliver it. These were not intended to represent real or existing mechanisms of support, nor the full range of potential approaches. Rather, they represent archetypes from which consumers' preferences could be explored.

Introduction

Background

Citizens Advice required research to better understand what consumers need in terms of support and engagement from a government strategy intended to encourage the uptake of these technologies. The research is exploring consumer attitudes and behaviours in relation to home low-carbon and energy efficiency technologies with a particular focus on the support and guidance they use and need to enable informed decisions regarding the measure adopted, installation and any subsequent problems experienced with their use.

The primary aim of the research is to assess the effectiveness of current support services to help consumers engage in this transition and what will help them take up these new technologies. This is being delivered through qualitative interviews with Adopters of low carbon technologies and deliberative workshops with non-adopters about the forms of support they would require.

Objectives

To support the primary research with consumers, a rapid desk review was required to review the existing forms of information, guidance and support that are available to consumers. This will:

- provide a backdrop to the primary research with Adopters of these technologies (e.g. are particular forms of support being over or under-utilised?)
- offer examples of the forms of support and/or best practice that might be tested in the primary research with non-adopters

Primary aim: Assess and document the current landscape of advice and support services that are available for consumers to investigate and make decisions regarding low-carbon technologies in Great Britain (GB).

The aspects of the consumer journey that are in scope are information relating to the technologies that might be suitable for a property, support on how to use these technologies and advice for consumers who experience a problem with their low carbon technologies e.g. repairs or advice.

The review assesses the main forms of support available to consumers, with a focus on the GB market, and presents a summary of the different support mechanisms in place. The review focuses on support provided to homeowners and those who are part of the decision-making process regarding low carbon installations.

The review also summarises, from the available literature, the most commonly experienced barriers that consumers face in adopting low carbon technologies, which the available support attempts to combat.

Secondary aim: The review includes consumer protection issues only from the perspective of the main ways in which support is provided in this area. It focuses at

a general level i.e. routes through which this support/guidance is provided, but not assessing different forms of support for different types of protection issue / form of redress.

Scope of the review

The research encompasses the following technologies, including insulation, heating and other forms of low carbon technology:

- Insulation
  - Solid wall insulation
  - Cavity wall insulation
  - Loft insulation
- Heating
  - Air source, ground source and hybrid heat
  - pumps
  - Biomass heating (boilers)
  - Solar thermal
  - Heat storage to accompany renewable heat sources
  - Advanced energy efficient storage heaters
- Other
  - Solar panels
  - Battery storage to accompany solar panels
  - Smart chargers for EVs

The desk review therefore also focuses on the same technologies. However, it should be noted that the focus is primarily on heating and insulation. Battery storage and EV chargers are a secondary priority and are only therefore included where the information is part of broader consumer-facing support for low carbon technology more widely.

The review includes key literature on the subject as well as online information resources that consumers may use as part of their decision-making and adoption journey. However, given the rapid nature of the review, this should not be taken as a comprehensive summary of all available forms of consumer support. Rather, it portrays the most common themes of some of the most commonly used and documented examples of support provided to consumers.

A full list of the resources included within the review are included in Appendix B.

Out of scope:

Initiatives or forms of support designed for or offered exclusively to very low-income consumers or those in receipt of benefits are out of scope. This is because these groups of consumers are not the focus of this research (the focus being on consumers who have sufficient financial resources to contribute to the payment of the low carbon measure.

The research is focusing on the non-cost barriers that consumers face, so information purely about financial support available to consumers is also out of scope of this review.

Findings

Common barriers faced by consumers in adopting low carbon technology

Before reviewing the forms of support available consumers to support their adoption of low carbon technologies, it is worth briefly considering the most common forms of barrier that consumers face when contemplating or deciding to adopt a low carbon technology. The 2016 Citizens Advice report '*Energising homeowners*' found that consumers may a wide array of barriers including:

Barrier	Barrier type
Lack of awareness of low carbon alternatives	**Awareness**
The consumer's own long-term plans and uncertainty about the future	**Consumer personal circumstances**
A preference for the status quo / inertia	
Mistrust of energy efficiency providers and their sales practices	**Trust in conduit / messenger**
Upfront cost	**Financial**
Uncertainty about return on investment	
An unwillingness to consider paying for measures that have been subsidised in the past, for example loft insulation	
Complexity of measures and their opacity	**Technology option**
Disruption to the home, particularly with loft insulation	
Difficulty finding reliable and trustworthy tradespeople	**Purchase and installation**

Most of these are possible to tackle, to one degree or another, though advice and/or information. The consumer's personal circumstances (e.g. uncertainty about how long likely to remain in the property) are likely to be more fundamental than guidance and support can combat. The financial barriers can be supported through financial incentives or subsidy, but these are not areas of focus of this research. However, knowledge of potential payback periods will be something that guidance needs to cover.

Issues relating to trust in the messenger or provider of the information and information relating to the technologies themselves (e.g. options and their suitability

to the property and homeowner's needs), their implications for the home and tradespeople; are all issues which consumer-facing support could help to tackle.

These are all barriers to adoption of these technologies. In addition, there is also a need for information on the potential problems that adopters may face, for example with repairs or redress when something goes wrong.

Requirements of consumer guidance and support

Of the resources reviewed, '*Strengthening and streamlining energy advice and redress*' provides the most comprehensive summary of the requirements of consumer support and guidance on low carbon measures. It states that advice needs to:

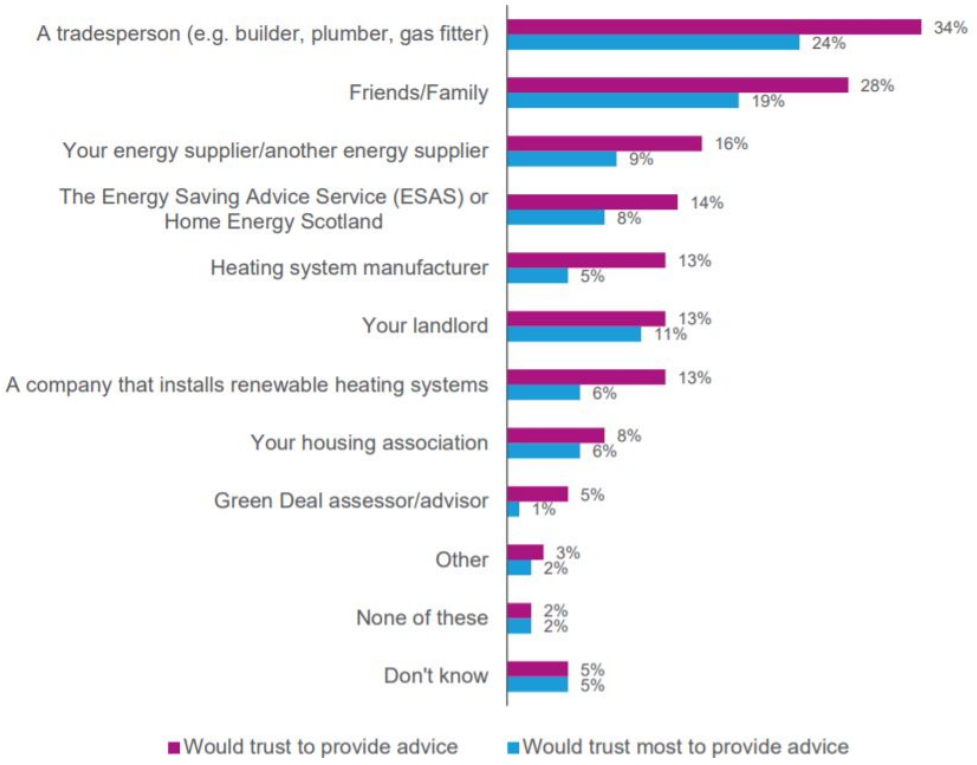
- Incorporate different styles and formats (e.g. telephone or face-to-face, group or one-on-one, one-off or long-term) in order to better match advice with consumer needs
- Be comprehensive, accurate and integrated
- Proactively support those most in need (e.g. those at greatest risk of detriment)
- Be expert and professional
- Be from an impartial source e.g. Independent from energy providers
- Be transparent and accountable (e.g. publicly available information about the organisation, its legal constitution, its governance, funding etc)
- Be accessible (free, via a variety of communication channels, compliant with equalities obligations)

Consumer trust in messenger/channel

As already noted, trust in the information, and creator, channel and messenger of the information, is an important requirement for it to be effectively received and used.

BEIS' Public Attitudes Tracker suggests the public lacks trust in many potential providers of information about which heating system to install. Tradespeople like gas installers, builders and plumbers are the sources that people most trust to provide specific advice on installing a heating system, yet only a third trust this source.

Figure 7: Sources people would trust at all and most to provide advice about which heating system to install in their home (BEIS Public Attitude Tracker, December 2018)



When asked about the broader issue of decarbonising heat, however, Carbon Connect polling found that 'energy regulation organisations' were most trusted by consumers to be given information on how the transition to decarbonised heating will affect them. This is followed by independent advice services.[20]

The channel of communication is also important. The Down to the Wire report notes that face-to-face communication has advantages over advice provided by phone and online, as it enables empathy and the establishment of personal trust. It references a USA study on the diffusion of innovation that found that consumers often rated information gained through personal communication as most important when it comes to adopting or rejecting an innovation, especially when they perceive a high risk.[21]

This report also concluded that the use of 'trusted intermediaries' - qualified staff providing face-to-face and in-home advice, working for community-based organisations and living in those communities - is essential in overcoming barriers to engaging and supporting 'hard to reach' householders. Although the report focused on information provision for the hard to reach, this is still relevant for the perspective of off-gas homes or consumers experiencing vulnerabilities.

[20] Uncomfortable Home Truths: why Britain urgently needs a low carbon heat strategy

[21] Gilly, M.C., Graham J.L, Wolfinbarger, M.F., Yale L.J., 1998. A dyadic study of interpersonal information search. Journal of the Academy of Marketing Science, 26 (1998), pp. 83-100.

Initial forms of information used

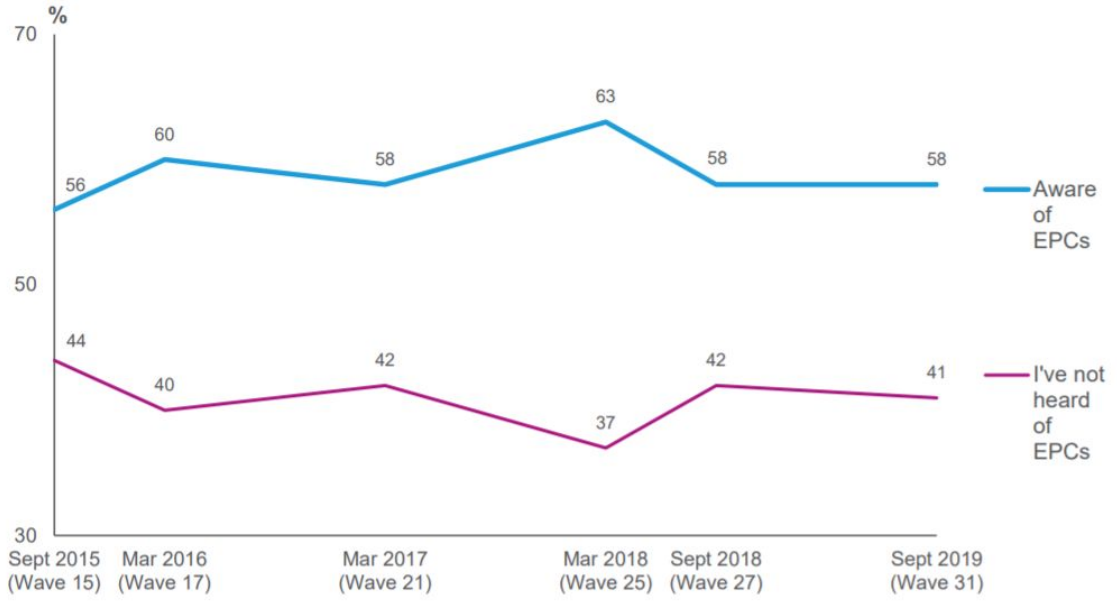
The literature suggests there is a considerable amount of information available to consumers regarding low carbon technologies. However, there are a large number of different sources of information, from a wide array of organisations. As noted in 'Uncomfortable Home Truths: why Britain urgently needs a low carbon heat strategy, there are numerous different actors and providers of information just relating to heat systems.

Figure 8: Schematic illustrating who talks to the public currently about heating systems (*Uncomfortable Home Truths: why Britain urgently needs a low carbon heat strategy*, 2019)

There are also a number of different routes through which consumers might enter the low carbon advice 'landscape' and the way in which this search begins may have an impact on the information that is first found.

Energy Performance Certificates (EPCs) are a common instigator, or facilitator, of investigating potential low carbon home improvements. BEIS' latest Public Attitudes Tracker indicates that just under six in ten are aware of EPCs (Figure 9).

Figure 9: Awareness of EPCs, 2015-2019 (BEIS Public Attitudes Tracker, Wave 31)



Q24a. Do you know what the Energy Performance Certificate (EPC) rating for your home is?

However, of those who are aware of EPCs just three in ten (29%) had seen the section on the EPC which recommended how they could improve the energy efficiency of their home (17% of the total population).

- Aware of EPCs and seen section on energy efficiency: 17%
- Aware of EPCs but not seen section on energy efficiency: 40%
- Unaware of EPCs: 42%

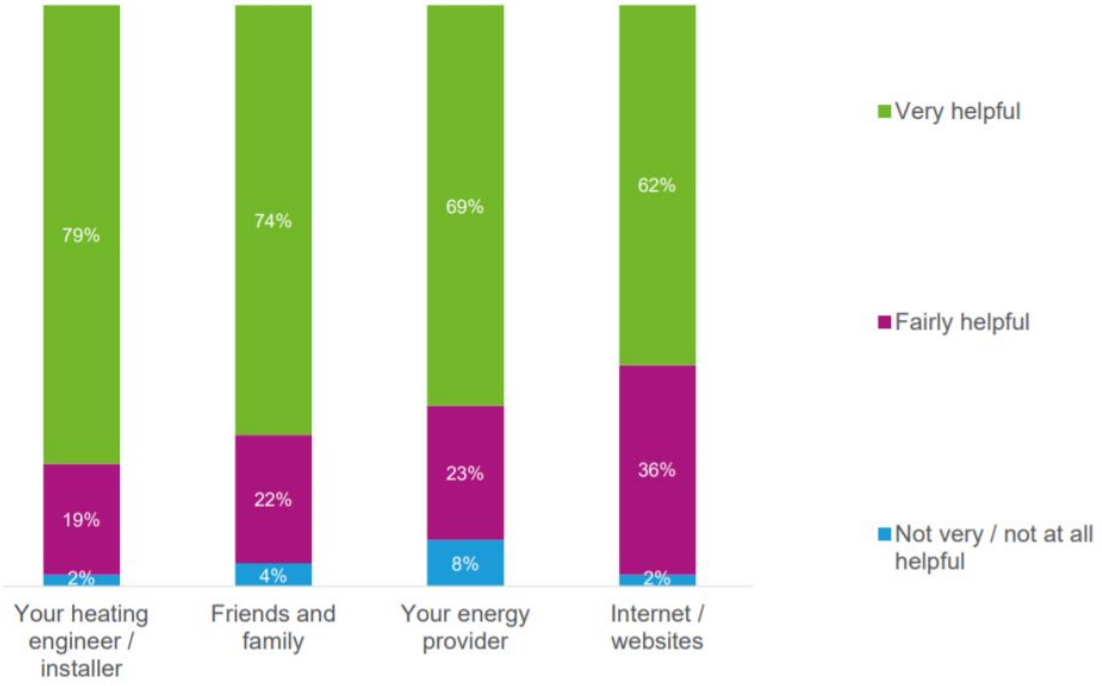
Those who made changes to their home because of the recommendations in the EPC were asked the extent to which the EPC gave them the information they needed to go ahead with the changes. Almost half (48%) said the EPC gave them all the information they needed, with a quarter (26%) saying it gave them most of the information needed and a fifth(20%) saying it only gave them a little of the information they needed and that they needed a lot of further information. It should be noted however, that the breakdown by measure installed is not available so it is not possible to determine if this is the case for more complex options.

BEIS research also shows that of people involved in the decision to install a new boiler or heating system, just over half (53%) used information from their heating engineer or installer as a source of information to make their decision. Other sources of information were friends and family (28%), internet and websites (21%) and energy suppliers (15%).[22]

Most sources of information were generally found to be helpful, but particularly heating engineers/installers (79%) and friends and family (74%). It should be noted however, that the vast majority of these related to replacement of a gas boiler, rather than low carbon technologies.

[22] BEIS Public Attitudes Tracker: December 2018 Survey (Wave 28)

Figure 10: Helpfulness of sources of information in deciding about which boiler or heating system to install, (BEIS, Public Attitudes Tracker, December 2018)



Forms of main support and guidance available to GB consumers

When considering home improvements, particularly those that increase energy efficiency of a property, it is often difficult to decide where to start. An online search for "energy efficiency home improvement UK" finds about 122 million entries. The first nine, non-sponsored sources our search on 11/11/2019 included a range of resources including Government schemes, independent sources, charities, commercial comparison sites and energy suppliers:

- Energy Savings Trust – Home Improvement Guide
- Gov.uk – Green Deal: energy saving for your home
- Gov.uk – Green Deal: energy saving for your home: Improvements and benefits for your home
- Moneysupermarket.com – Ten steps to improve energy efficiency at home
- Moneysavingexpert.com – Housing and Energy Grants
- National Energy Foundation – Improve your home's Energy Efficiency
- Citizens Advice – Green Deal funding for energy efficient home improvements
- Choose.co.uk – How to save money by being more energy efficient
- EDF Energy – How to improve your EPC rating

Many of these sources give very little information about the improvements that can be made, and fewer still appear helpful for consumers arriving at the topic with little or no prior knowledge, or without knowing the kind of broad solution type they might need. One problem the majority of sources available online have is that they pre-empt that a certain level of decision making already happened.

There are also elements of the information that can be out of date, such as on the gov.uk website where Feed-in Tariffs are still advertised[23] and references to helplines that no longer exist (such as the Energy Saving Advice Service (ESAS)). Information searches via the web often provide links to local / regional schemes or information sources.

The three price comparison sites (Money Supermarket, Money Saving Expert and Choose.co.uk) are focused on energy supplier switching and at most provide only superficial information relating to energy efficiency. These resources are therefore not included in this review.

The remainder of this section summarises the main forms of consumer-facing support in the low carbon market. The forms of support are grouped as follows:

- Large-scale Government / government-backed initiative
- Consumer guarantee / protection / standard
- Independent third party
- Regional / local level guidance hubs
- Commercial

Large-scale Government / government-backed initiative

There are a number of Government-run or Government-backed schemes providing information on financial support available to support adoption of low carbon technologies or advice on technology options available.

The Green Deal website provides guidance on the energy-saving improvements that are eligible for the Green Deal loan, including insulation, heating, draught-proofing, double glazing and renewable energy generation. It also links to Green Deal assessors and providers based on postcode, but some searches return very few assessors/providers.

Now run with private backing since the closing of the Government-run Green Deal scheme.

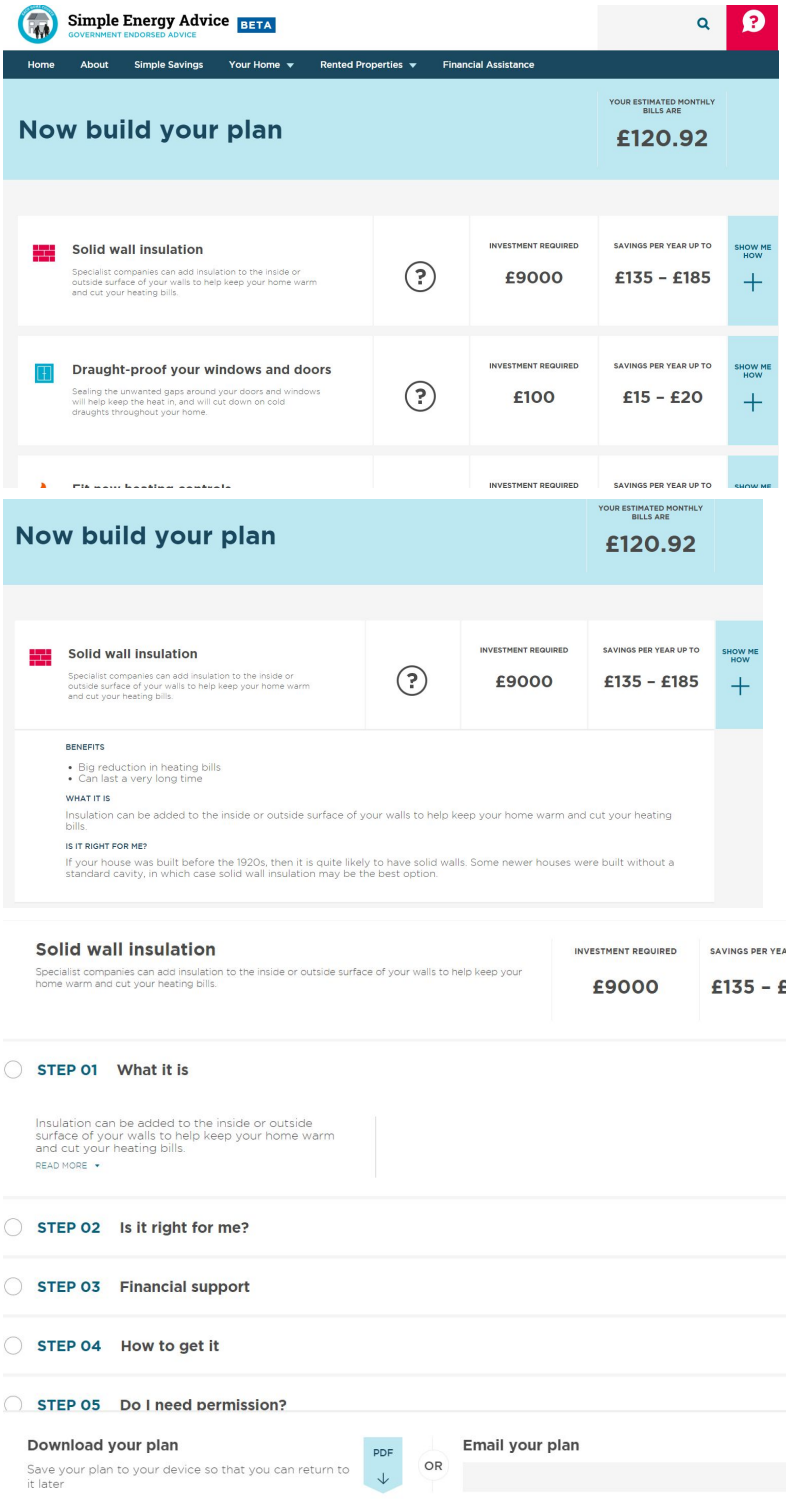
Provides advice on potential savings based on property address, by linking to the Simple Energy Advice site.

Simple Energy Advice

- BEIS supported site, providing “impartial and independent” government-endorsed” advice
- Includes the Energy Efficiency Calculator tool to receive tailored recommendations for the measures which would be applicable (and associated costs and savings) based on the home’s EPC (found via a postcode search). If an EPC is not available, it provides recommendations based on around 15 questions on factors like property type, size and age.
- https://www.simpleenergyadvice.org.uk/energy-efficiency/reduce-bills

[23] The website states clearly that the scheme has now stopped accepting new applications, but does not make this clear in the section heading. Other resources also still make reference to the FIT as a potential source of financial support.

- Step by step explanation on what can be done and how – downloadable as pdf



Energy Company Obligation (ECO) provides support to primarily low-income households on energy efficiency measures including insulation and solar PV. Also includes support for those on other benefits such as disability living allowance. Requires consumers to contact their energy supplier to instigate the process. The website is mostly targeted at those delivering the scheme.
https://www.ofgem.gov.uk/environmental-programmes/eco

Renewable Heat Incentive (RHI)
Government financial incentive to promote the use of renewable heat (biomass, heat pumps, solar thermal etc). Beneficiaries pay for the up-front cost of the measure and receive quarterly payments via the RHI tariff. Targeted at - but not limited to - off-gas households. Closes in March 2021. Includes RHI online calculator to receive tailored advice. Requires copying of key information from the EPC into the form (e.g. space heating cost and impact of measures). If no EPC exists, requires filling in of form on property variables.
https://www.ofgem.gov.uk/environmental-programmes/domestic-rhi

Consumer guarantee / protection / standard

TrustMark is the Government Endorsed Quality Scheme covering work a consumer chooses to have carried out in or around their home. TrustMark is a 'not for profit' social enterprise. It provides a list of organisations that have been thoroughly vetted to meet required standards and have made a considerable commitment to good customer service, technical competence and trading practices.

Following the '*Every Home Counts*' report, TrustMark was expanded to include all Repair, Maintenance and Improvement (RMI), Energy Efficiency and Retrofit measures, including:

- Setting up a code of conduct for businesses that sets out the minimum requirements of good business practice, including guidance on how companies are expected to behave, operate and report.
- Creating a consumer charter that sets out expectations around response times, redress processes and financial protections.
- An overarching standards framework for the end-to-end delivery of retrofit of energy efficiency and renewable energy measures that has a whole building approach incorporated into the process.

TrustMark sets out the suggested process for selecting a tradesperson and offers a 'Consumer Portal' - a platform to support consumers with each stage of a project:

- Select up to 3 businesses and begin conversations
- Maintain a record of the conversation
- Upload images to help the business understand needs
- Receive, accept & decline quotes
- Upload documents
- Track the progress of the enquiry
- Access to advice and guidance built around the Customer Charter and Code of Conduct

MCS is a standards organisation that creates and maintain standards that allows for the certification of products, installers and their installations. It provides:

- a directory of approved installers
- simple summary information on different technologies
- a helpdesk for consumer queries

https://mcscertified.com/

Independent third parties

The **Energy Saving Trust** is an independent, not-for-profit organization funded by the government and the private sector (although it is not immediately clear how it is governed). It is devoted to promoting energy efficiency, energy conservation, and the sustainable use of energy.

The 'home improvements guide' landing page of the gives a comprehensive overview of different retrofit and renewable measures, split by 'Renewable Energy', 'Home insulation' and 'Home Energy Efficiency':

- This page is a good jumping off point for further investigations, made easy due to hyperlinks to blog entries and longer articles all within the Energy Savings Trust website.
- Considerable amount of information available, often also including videos (e.g. choosing energy efficient appliances), can be seen as a good first step on the search for information on energy efficiency measures. Technology specific pages provide example savings based on property type. Case studies of consumers who have adopted measures like heat pumps and details on maintenance and planning permission where relevant
- Provides links to installer registration and accreditation schemes and guidance on steps to take when experiencing problems with installed technologies
- A key feature of the website is the Home Energy Check Tool, a free online calculator to work out how to reduce energy bills and achieve a more comfortable home. Currently under development in England, Wales and Northern Ireland so unavailable outside of Scotland. Generates a report with the details of which improvements will work best for a consumer's home and the possible savings.

National Energy Foundation (NEF) is an independent, national charity aiming to improve the use of energy in buildings: understanding energy use; improving new and existing buildings; helping householders save energy and money; providing impartial advice.

Provides general information on a range of measure that can be undertaken on the landing page. The website also offers a "Knowledge Hub" structured around 'Energy in the home', 'Solar energy', 'Wood fuel' and 'Heat pumps and other renewables'. The Knowledge Hub is detailed and easily comprehensible. It offers estimated costs where appropriate, as well as time taken to install, disruption to household and other key facts interested parties will want to know. Images are used well to illustrate the work.

The more detailed information pages offer links to other NEF topics as well as external links. For "Oil Central Heating" for example, it covers general information on the topic, as well as building regulations and a section on "Are there greener alternatives to oil?", which links to solar water heating (external link).

Which? is a not-for-profit charitable organisation providing a range of consumer information. Some is provided free of charge with additional product-specific information available to subscribers. Information is provided on 'Heating' (e.g. wood burning stoves), 'Electricity' (e.g. solar panels), 'Generating your own energy' (e.g. solar panels, wood burning stoves and heat pumps). Information includes technical descriptions, running costs, installations, pros and cons, and the Microgeneration Certification Scheme (MCS).

The **Centre for sustainable energy (CSE)** is an independent national charity that provides advice, manages energy projects, trains and supports others to act, and undertakes research and policy analysis.

The CSE website provides a considerable repository of advice and information on low carbon technologies.

- Structured by insulation & ventilation / heating and hot water / other (e.g. EVs). Separate pages on renewables.
- Provides details about funding streams and energy saving tips
- Comprehensive information resource including publications and downloadable information sheets by technology (c. 60 info sheets in total)
- The scale of the site means it takes a lot of searching for the most relevant information and to a lay reader there may be confusion about the distinction between the three main areas of the site 'CSE', 'Energy Advice' and 'Local Energy'. Consumers using the site are likely to need some degree of knowledge or a clear understanding of their requirement to be able to efficiently navigate it.
- Locally based (Bristol) but with national coverage. Strong links to regional schemes

Examples of regional / local level guidance

Home Energy Advice Team: The Home Energy Advice Team (HEAT) project is run by National Energy Action (NEA), a national charity which aims to eradicate fuel poverty and campaigns for greater investment in energy efficiency. provides advice, advocacy and support around all aspects of money advice to vulnerable fuel poor households including the elderly, families with young children, disabled households and black and ethnic minority groups in and around Coventry. HEAT is delivered through a combination of personal home energy advice visits, home energy advice surgeries, a telephone advice line, and presentations to local organisations and community groups. The majority of clients are advised either via the telephone advice line or at NEA's office - those clients unable to visit the office will receive a home visit.

The **Home Energy Team** is a free, local and impartial advice service from CSE to residents of Bath & North East Somerset, Bristol, North Somerset and Somerset. Funding from local authorities and some primary care trusts. Freephone advice line is staffed by our team of trained energy advisors. Advice on measures, support with grant legislation, referrals, signposting to other support (e.g. debt advice).

Supported by its 'Love your Home' website with information on saving energy in the home www.cse.org.uk/loveyourhome. However, this is a re-branding of the main advice section of the website, replicating the information held there. Also, Facebook page and answering energy efficiency questions on Twitter.

Bristolian Guide to Solid Wall Insulation

A 90-page pdf document commissioned by Bristol City Council. A very detailed but quite specialised resource. Structured as follows:

- How to use
- Introduction
- Responsible retrofit (info about homes and why retrofit)
- Developing a retrofit plan (incl design)
- Getting permission and consent
- Solid wall insulation: when, where and how

- Support and further information

Warm Up Bristol

Aimed at reducing the number of cold homes and families in fuel poverty. Online application to receive a technical survey and quotes for works. Offer low interest loans to support adoption of measures.

Information provided about:

- General energy advice
- Solid wall insulation and cavity wall insulation
- Boilers and heating
- Loft insulation
- Solar power
    - Rough costs and savings shown
    - Photos to determine what walls property has

The Renewable Energy Hub.co.uk

- "for home, business, schools, industry and government"
- Includes: searching for local installer, research & learn, buying equipment, blog, chat forum, call centre
- Information heavy, but not very easy to navigate

Act on Energy

Encourages energy conservation by providing free and impartial advice to householders and small businesses in Warwickshire, Worcestershire, Coventry, Solihull and surrounding local areas.

- Provides details on funds and schemes by local area
- Very limited information on energy efficiency. No information on renewables or heating technologies.
- Provide details of an 'installer network' of "trusted local contractors", although no details of accreditations / vetting process provided.

Commercial

YouGen is a 'platform that brings a public enthusiasm about renewable and efficient energy together with professional and highly recommended energy installers'.

- independent advice service, sponsored through ads
- set up by Cathy Debenham in 2005, fully online since 2009. Run by the National Energy Foundation since 2015.
- text based information – very informative, covering a wide range of topics, but requires knowledge of the potential solution looking for
- Provides search function of installers, by technology type and region

- includes case studies of installed technologies from DIY draught proofing to biomass boilers
- includes a useful Jargon Buster
- over 1,000 searchable blog entries.

GreenMatch.co.uk is a commercial website providing quotes for various types of renewable and low carbon installations. Focuses mostly on providing quotes for work but explains in great detail benefits/disadvantages of different measures.

www.renewableenergyhub.co.uk
A commercial website providing a search function of local installers, information on low carbon technologies and links to information sources on renewable energy technologies, and an online chat forum.

Potential future mechanisms for consumer support

The 'Uncomfortable Home Truths' report recommends regional delivery offering the possibility for interaction with trained advisors. It states that, as the transition to low carbon heat is expected to be delivered regionally, it will require local energy advice services that can give advice tailored and relevant to each area. It also recommends the use of "trained advisors to help the public navigate the complexities of installing new heating technologies in their homes", citing Home Energy Scotland as a positive case study using this approach.

The 'Down to the Wire' report also cites the Danish example where a key factor in the successful transition to low carbon heating was the use of a network of sixteen regional advice offices providing access to local tradespersons able to install renewable electricity systems.[24] But down to the wire also cautions that this kind of approach may not be suitably replicable to the Scottish/UK situation which requires a combination of more diverse supply options.

'Uncomfortable Home Truths' also recommends a central delivery body to collate best practice on standards, guidance, statistics and information for renewable and energy efficiency retrofit.

[24] Lund, H., 1999. Implementation of energy-conservation policies: the case of electric heating conversion in Denmark. Applied Energy, Vol. 64, Issues 1–4, 1 September 1999, pp. 117-127.

Main duties for a central delivery body		
1	Coordination of low carbon heat planning between organisations on a national, regional and local level, for example, between different LEPs and Local Authorities across the UK, and making sure that there is correct sequencing of policy implementation between national, regional and local levels.	
2	Holding a central point of information and expertise for low carbon heat planning, including holding a central database for existing energy and heat data for different regions.	
3	Coordination and facilitation of public engagement and awareness raising activities on a national, regional and local level. For example: planning and contracting out activities before a region begins a switchover to low carbon heat, and coordinating, joining up and mapping out public engagement.	
4	Alignment and coordination of standards for installation of low carbon heating options for example, between Trustmark, Gas Safety Trust and the Microgeneration Certification Scheme.	
5	Coordination of regional skills planning for local tradespeople, for example with Skills Advisory Panels or Regional Skills Assessments in Scotland.	

As recommended by the 'Each Home Counts' report, TrustMark is now developing a **Data Warehouse** – to act as the industry facing repository of information about work undertaken and the property being improved and a Property Hub to act as the consumer-facing platform where they can access a 'log book' about their property – helping establish who did what and when.

Welcome & warm up 10 mins

- Welcome and thanks for participating
- Explain independent and exploratory nature of research (conducted in accordance with the Code of Conduct of the Market Research Society (MRS) and also with the Data Protection Act, with whom Accent is registered)
- We are undertaking this research on behalf of Citizens Advice who are keen to understand your views on low carbon home improvements
- You will know some of what we are looking for from when you competed the LiveMinds tasks for us – thanks that was super helpful and we will be following the structure of that pre-task today and digging a bit more to find out how you made your home improvement decisions
- Please know that there are no right or wrong answers and we are only interested in your opinion and experience of choosing, purchasing and installing your low carbon home improvements
- The discussion today will last around 60 minutes
- Explain about tape-recorder / Skype recording if relevant – standard market research procedure and for analysis purposes only. The recordings will not be passed to any third party not associated with the research project, and none of your comments will be attributed to you by name

- Let's start with going over the basics please:

    - Tell me a bit about your home life
        - Who do you live with?
        - Any household members with a long-term health condition or disability? (physical or mental) (n.b. do not need to know details if participant does not want to provide)
    - Where they live/work
    - The area you live in
    - Describe the house for me (PROBE ON age, type e.g. semi/flat, on/off gas)
    - Tell me a little about what the low carbon home improvements are that you have made (THIS NEEDS TO BE FOCUSED ON THE ITEM'/TECHNOLOGY RECRUITED ABOUT BUT SEE IF OTHER TECHNOLOGIES ALSO INSTALLED)

Decision Making 15 mins (25)

During the pre-task you filled in the comic strip to try and break down how you and the family made your decisions

- Use comic strip as point of reference
- Tell us what was going on in your house at the time
    - What was happening in your lives, work, family at this point
    - What were the trigger points that made you start thinking about installing something different (AFTER SPONTANEOUS PROBE: cost/energy bill saving,

comfort, environmental, replacing broken item, hearing about it via media/advert etc)
  - Were there any specific events e.g. remodelling the home, extensions, breakdown of existing service, purchased an EV
- Talk about what was going through your mind and how you got to this particular solution
  - NOTE PARTICIPANT LANGUAGE IN EARLY STAGES OF INTERVIEW PRIOR TO PROMPTING WITH LOW CARBON – REPLICATE LANGUAGE WHERE NECESSARY (E.G. ENERGY EFFICIENCY OR ENVIRONMENTALLY FRIENDLY MEASURE)
  - At what point did you begin to think about 'low carbon' solutions
  - What role did 'low carbon' have in your decision making
  - Did you go out looking for a low carbon solution or did that materialise on the way
  - What role did your home's EPC have on your decision making (if any)
  - Building on the pre-task comic strip, complete a timeline together to get an understanding of what happened during the decision making
    - At each stage, what was your overriding emotion?

Support Required 20 mins (45)

It's really important to us that we understand what support you received during the decision making, purchase and installation process AND what support would have been helpful. Let's take each of these stages at a time (Use the pre-task as reference here)

MODERATOR: ASK PARTICIPANT TO SHOW ANY VISUAL INFORMATION ON SCREEN IF POSSIBLE E.G EPC OR INFORMATION LEAFLET

Decision Making Moments

- First of all, we want to think about the Decision Making Moments
  - Think about the different information, support or guidance you may have looked at or received when you were making your decision (i.e. up to the point when you finally decided on the solution/technology you needed)
  - Who, if anyone, did you speak to
  - Where did you look for information (PROMPT e.g. website / in person / telephone / industry / govt / non profit / home improvement places – explore all sources (helpful and not)
  - Why did you pick these sources?
  - How were these sources of information helpful
    - Did you search for low carbon solutions or did these just come up
    - Did you know which technology /solution you wanted or were you just looking for something to solve a particular problem?
  - How did the information help you
    - How did it talk about low carbon and the benefits of this

        - How did this persuade you? PROBE: was it the low carbon that drove the decision making or was it cost savings or something else?
        - What kind of low carbon messages did they provide that supported your decisions
    - Were there any elements / sources that were not helpful? What was it about them that was unhelpful?
    - How was the information delivered (e.g. video, pamphlet, home visit etc)
- Okay now let's look at that stage and think about what was missing and what other information might have been useful to support you at that time
    - Work through each of those steps again
    - Think about other people who might be considering this kind of thing for their home, what would help them with their decision

Purchase Moments

- Now let's talk about the actual Purchase
    - Where did you go to purchase your particular home improvement
    - Who did you speak to at this moment
    - Did you try more than one provider? How did you choose between them and what aided this process?
    - What support did you look for / receive at this point and how was this support delivered
    - What were the crucial elements / what was most useful
    - what did it give you that you didn't have/know already?
- What was missing for you at the purchase stage
    - What other support might have been useful at that time
    - Think about other people who might be buying this kind of thing for their home, what would help
    - Work through each of those steps again

- Installation Moments
- Now let's talk about when you had this installed
    - What happened
    - Who did this
    - Did you try more than one provider? How did you choose between them and what aided this process?
    - how well / badly did it go?
        - what info / support would have made this easier for you?
        - IF EXPERIENCED PROBLEM: Did you need or get any advice or support to resolve this or get redress?
    - What support did you look for / receive at this point and how was this support delivered
    - What were the crucial elements/ what was most useful
    - what did it give you that you didn't have/know already?

- What was missing for you at this installation stage
  - What other support might have been useful at that time
  - Think about other people who might be having this kind of thing installed in their home, what would help
  - Work through each of those steps again

Overall Reflection 10 mins (55)

We would like to take a step back now and think about the overall experience of having your [TECHNOLOGY]. The UK is working towards tough targets to decarbonise our homes by 2050 and we want to be able to learn from your experience as consumers who have already started on this path

- What would you say to other people who are thinking about doing this
  - Based on your experiences, would you recommend?
  - Why / why not
  - What would you say to persuade them
- Where - if anywhere - would you recommend they seek advice / support before embarking on this? why?
- what sources of advice / info - if any – should they avoid?
- How has this changed your home/lives/finances
  - How successful has your low carbon home improvement been
  - Have you experienced any problems? Did you seek any support for this?
    - From who? Was it useful? Could this process have been improved or easier in any way?
  - If you did experience any problems who would you seek support from for this?

- We asked you to find your Energy Performance Certificate
- Were you aware of this before this interview process
- What value does this add – how does it help your decision/evaluation of success
- Review the EPC
  - Overall impression
  - Use and role
  - Positives / Negatives
  - Design and layout
  - Any improvements that could be made to this to help people make decisions about low carbon home improvements

Thinking about your experience and everything we have discussed, how do you think support/guidance would best be provided to consumers thinking about installing low carbon technologies?

- Who should deliver it?
- Should this support be centralised and provided by a single organisation, or umbrella organisation? Or should there be more local level support?

On the last LiveMinds task, we asked you to think about 3 things that would have helped you and supported the overall process

- Tell me what you talked about
- Why were these important
- What difference would these have made
- And if you could give someone thinking about installing [TECHNOLOGY] one piece of advice - what would this be?
- How, if at all, do you think that Citizens Advice, as the consumer advocate in the energy market, can support consumers in this area
- What would be the things that you would have found most helpful and how could these have been delivered

Thank and take bank acct details for incentive.

Incentives £35 for pre-task and £45 for interview

Thank and Close

Welcome & warm up 10 mins

- Welcome and thanks for coming along this evening
- Explain independent and exploratory nature of research (conducted in accordance with the Code of Conduct of the Market Research Society (MRS) and also with the Data Protection Act, with whom Accent is registered)
- We are undertaking this research on behalf of Citizens Advice, a charity dedicated to providing information and advice to people in the UK. Citizens Advice is the statutory consumer advocate for energy and as such has a duty to ensure the energy market is fair for all consumers.
- Citizens Advice are keen to understand your views on a number of different areas relating to energy efficiency measures that people can make in their homes – so tonight we will be looking at different technologies that you can have installed in your homes that are designed to reduce carbon emissions, make your home warmer and reduce heating bills
- Please know that there are no right or wrong answers tonight and we are only interested in your opinion and thoughts on these different technologies and what support you would need to help you consider whether to have one of these in your house
- We have you for 3 hours this evening so it's a mammoth session!! We'll make sure we have plenty of breaks and do lots of different tasks with you
- Explain about tape-recorder – standard market research procedure and for analysis purposes only. The recordings will not be passed to any third party not associated with the research project, and none of your comments will be attributed to you by name

- Can you please start by pairing up with the person you are sitting with and find out a bit about them (SHOWCARD AA):

    - Name
    - Home life – who live with
    - Working life
    - What they think of their energy bills e.g. manageable, too high, don't notice
    - If could sum up your feeling about the environment in one word, what would it be?

    - Introduce your partner to the rest of the group

Self-Complete A – Home Investment Views 5 mins (15)

We want to start by asking you each to complete an exercise that will give us a baseline of how you feel about home investments. Please do this individually and we will collect these in.

MODERATOR - Collect in completed handouts

Self-Complete B - Quick Draw Exercise – Your Home 10 mins (25)

Okay so now we are going to hand round a picture of a house. We would like you to think about any different technologies or home improvements you could make to your home to make it more energy efficient.

- Complete the home – write in or quick draw of improvements
- Discuss what different technologies people have written/drawn
- Does anyone have any of these?

Self-Complete C1 and C2 – Technology Sheet 5 mins (30)

Next we are going to give everyone two sheets which show different technologies and we want you to look through this and fill this in. Please write in as much detail as you can.

Context - Showcard D 20 mins (50)

- Earlier we talked about your feelings towards the environment. Tell me more about that - what's your view on the environment?
- Do you do anything to try to reduce your impact on the environment? What? e.g. recycle, use water butts, use public transport, fly less, choose green energy provider, turn the thermostat down etc
- How do your views to the environment compare to, say, 10 years ago? Have they changed? Why?
- What about the next 10 years? Do you think your behaviour in terms of your impact on the environment will change at all in this time period? How? Why / why not?

We want to give you some simple context about the challenge that we face and what this means for how things may change in the future.

READ SHOWCARD D – NOTE THAT THE TECHNOLOGIES ALREADY COVERED EARLIER ARE SOME OF THE KINDS OF THINGS THAT HOUSEHOLDS WILL NEED TO ADOPT. THERE ARE ALSO OTHER OPTIONS
EMPHASISE THE 90% OF HOMES REQUIRING LOW CARBON HEATING

- What are your overall thoughts on this?
- Knowing this what would you do?
  - PROBE FOR ANY ACTIONS RELATING TO ENERGY EFFICIENCY OF HOME, CHANGING HEATING SYSTEM ETC
- IF SAY, WOULDN'T DO ANYTHING: 90% of homes will need some form of low carbon heating i.e. not mains gas boilers. 9 out of the ten of you will need to change your heating system.

- What, if anything, would motivate you to look for information on how you could contribute to reducing your home's environmental impact and which options might be appropriate for you?
- What would prevent you from doing so
  - IF INFORMATION / LACK OF KNOWLEDGE MENTIONED, PROBE ON SPECIFIC THINGS WOULD NEED TO KNOW
- Where would you look for information on this? (N.B. IF PARTICIPANTS STRUGGLE, GET THEM TO THINK ABOUT OTHER SIMILAR HOME MODERATIONS THEY MIGHT MAKE AND HOW THEY HAVE OR WOULD INVESTIGATE THEM – E.G. HOME EXTENSION, CAR PURCHASE ETC)
  - Explore search pathway
  - Where would you look first – online / speak to friend & family / call local authority or other body
  - Online: would this be general (e.g. general web search) or specific (e.g. going to known website/org online
  - If google what would you type in?
  - Where would you look next?
  - What would you be looking for?
  - What information would you want/need?
  - What support would you need – where/what?

Gallery Exercise 25 mins (75)

We would like to discuss a number of different home technologies / options / improvements to get your reaction to them. We have set up different information sheets around the room and over the next 25 minutes we want you to go round and look at each of these different technologies and read the cards.

MODERATOR GIVES 1-MINUTE RUN THROUGH OF KEY ELEMENTS OF EACH OF THE 5 TECHNOLOGIES TO EXPLAIN WHAT IT IS IN A NUTSHELL. POINT OUT THE LAYOUT OF THE INFORMATION SO THEY CAN EASILY MOVE BETWEEN EACH ONE, FOCUSING ON THE KEY ELEMENTS WHICH ARE MOST IMPORTANT TO THEM.

Grab a tea or coffee and then work on the support sheet. GIVE EVERYONE SELF-COMPLETE SHEET J.
For each technology, fill in:

- the first column indicating the questions in your mind about it and what you would need to know
- the second column listing 3 areas of support you would need and how you would want to get it (e.g. video of it in action, leaflet from sales company etc)

I'll be around to talk to you while you are doing this.

MODERATOR ENSURE PARTICIPANTS ARE MOVING ROUND BETWEEN EACH TECHNOLOGY STATION SO THEY ALL COVER EACH OF THE 5.

Response to techs 25 mins (100)

Reconvene and discuss. Work through each technology

- Which was of most interest?
- Overall thoughts
- How interesting is this?
- N.B. THE COST INFORMATION IS INDICATIVE AT THIS STAGE. THE FOCUS OF THIS RESEARCH IS NOT ABOUT THE COSTS OF THE TECHNOLOGIES. WE KNOW THAT THE COSTS ARE LIKELY TO CHANGE IN FUTURE AND THERE IS LIKELY TO BE SOME FORM OF SUPPRT TO HELP PEOPLE ADOPT THESE TO HEL PREACH THE TARGETS. HOWEVER, NOTHING IS KNOWN ON THIS AT THIS STAGE SO WE ARE INTERESTED IN YOUR RESPONSES IN GENERAL. PLEASE DO NOT FOCUS TOO MUCH ON THE COSTS AT THIS POINT.
- Why/Why not (N.B. PARTICIPANTS USE FIRST COLUMN 'MAIN QUESTIONS' TO SUPPORT RESPONSES)
- Which do you think are appropriate for your home?
- What about for the future e.g. if you moved home?
- What are the key motivators to consideration?
- What are the key barriers to consideration?
- How confident would you feel in trying to decide whether these are suitable for you and which would be the best option/how to move ahead?

Spontaneous support pathways 40 mins (140)

I would now like to focus on the information, support, or guidance you would need to be able to consider these kinds of home improvements, whether they are appropriate for your home and how to go about getting them and how you would use them.

- What are the ways in which you would want to get support to help your consideration / decision-making? **Remember that it is likely there will be strong incentives to encourage to improve the energy efficiency of their home.**
  - What did you write in the 2nd column about support you would want/need?
  - Did these differ for the different technologies, or were there similarities?

IF PARTICIPANTS DO NOT ENGAGE AS SEE THEM AS NOT OF INTEREST: Imagine that, in order to reach the targets, it is mandated that households <u>have to</u> have low carbon heating systems. What would you need to support your decision on what is best for you?

  - IF NOT ALREADY COVERED: I would now like to break this down a bit further, looking at:
    - The initial consideration stage (assessing if this is something relevant / interesting to you)

- The detailed research stage (assessing the best options / how to do it, install)
- The purchase stage
  - who to buy it from
  - who to install it

N.B. these may not be sequential. e.g. may do a lot of detailed research through talking to installers/retailers

IF PARTICIPANTS STRUGGLE TO THINK SPECIFICALLY TO THESE TECHS: What if you were buying a car? Extending your home? Where would you look then? What process would you follow?

- FOR EACH STAGE ASK ABOUT:
  - What support would you require?
  - How would you want to receive it?
    - Home visit / assessment
    - Leaflet / information packs
    - Remote advice
      - e.g. website – static information / interactive related to home scenario / apps
      - phone service
  - Who would you want to get this support from? (technology providers, local authority, energy provider, friends/family, independent body etc)

- ASSESS DEGREE TO WHICH SUPPORT REQUIRED DIFFERS AT EACH STAGE OR IF COMMONALITIES
- If particular differences, recap and explore reasons behind rational for different mechanisms at different stages

Protections:

- What would you need to have full trust that what you were purchasing the most appropriate thing for your home?
- What would give you reassurance that if something went wrong it would be resolved?
- IF NOT ALREADY COVERED: What about things that may go wrong? E.g. if the product is faulty, or does not perform at stated level. What information would you need about this?
- Who would you approach about this if you experienced a problem?

Response to potential support strategies 30 mins (170)

Now we want to share a number of possible support strategies with you and get your views on whether these would address your support needs and if so, how useful they would be

- Showcard K

- For each
  - Overall score (1-10) on how useful this would be at addressing support needs
  - Explore why it would be good/bad at supporting needs
  - Why might this be useful
  - Why is it not the answer and how can it be improved?

Simpleenergyadvice.org.uk

- Work through this website on the screen – be clear that we are not looking for a critique of the website, but we are interested in how participants feel it could support these kinds of decisions
- What do we think about this
- +/-
- How does this help you and support your needs
- What's missing
- What other ways do you think that this kind of guidance could be provided?

DELIVERY OF SUPPORT

- Thinking about everything we have discussed, how do you think support/guidance would best be provided to consumers thinking about installing low carbon technologies?
- What about other forms of advice or support you have seen or used for other big, technical or difficult decisions, or for products or services which are very unfamiliar to you?
  - What are the best examples that you can think of?
  - What made them so effective?
- And if you <u>had</u> to install some low carbon tech what would you need and from whom?
  - what's the minimum level of information and support you would need to start thinking about what technologies you could have?
  - what's the minimum you would need to pick one?
  - what about for buying one?
  - what about for installing one?
- What would this look like in an ideal world: eg what would an ideal 'customer journey' look like if UK households need to start installing low carbon technologies?
- Who should deliver it? Who would you trust or respect most to provide this information/guidance? PROBE:

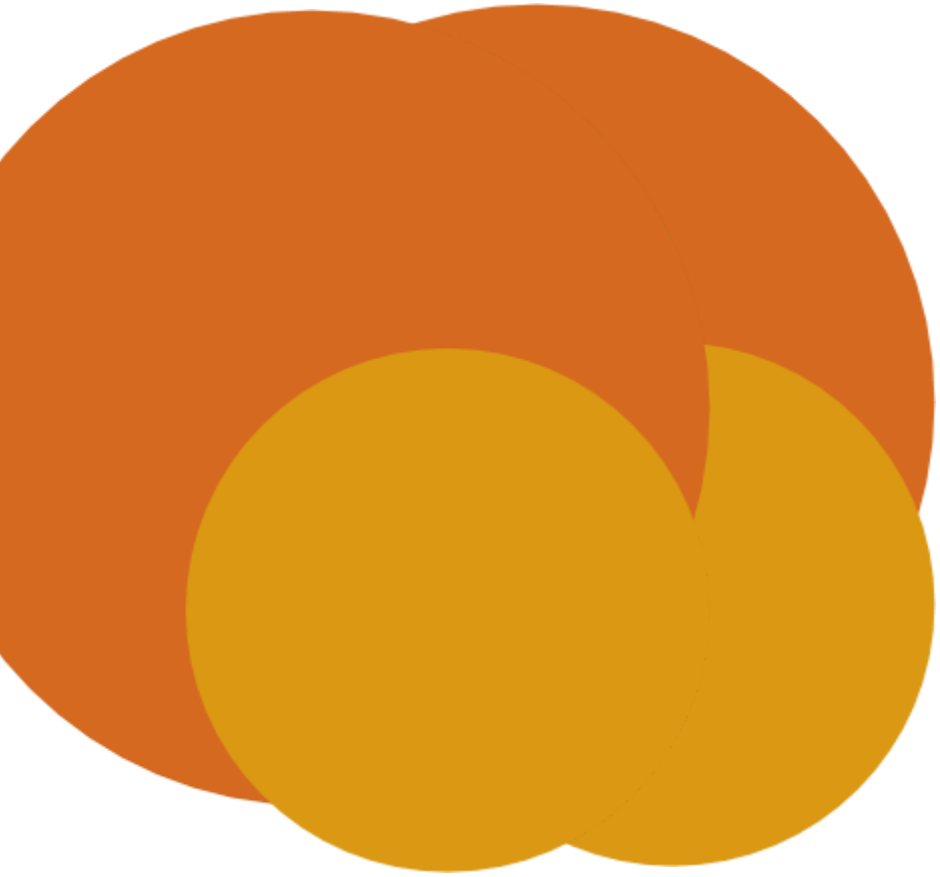
  - Government
  - environmental charities
  - product manufacturers
  - engineering/architectural consultancies
  - advice providers
  - retailers
- Should this support be centralised and provided by a single organisation, or umbrella organisation? Or should there be more local level support? (or choice between different providers)
- What about helping householders to find out more about these technologies in the first instance? Do you think anything needs to be done in this area?
  - Would you want to see/hear advertising / messaging relating to this subject?
  - How would you want it to be delivered?
  - How would it be most noticeable / impactful?

Final Voxpop 10 mins (180)

Last thing is a quick piece to camera so that we can show Citizens Advice what are the key support initiatives you need to help make decisions about these home energy efficiencies.

EACH PARTICIPANT COMPLETES CONSENT FORM SETTING OUT USES OF MATERIAL

Thank and Close



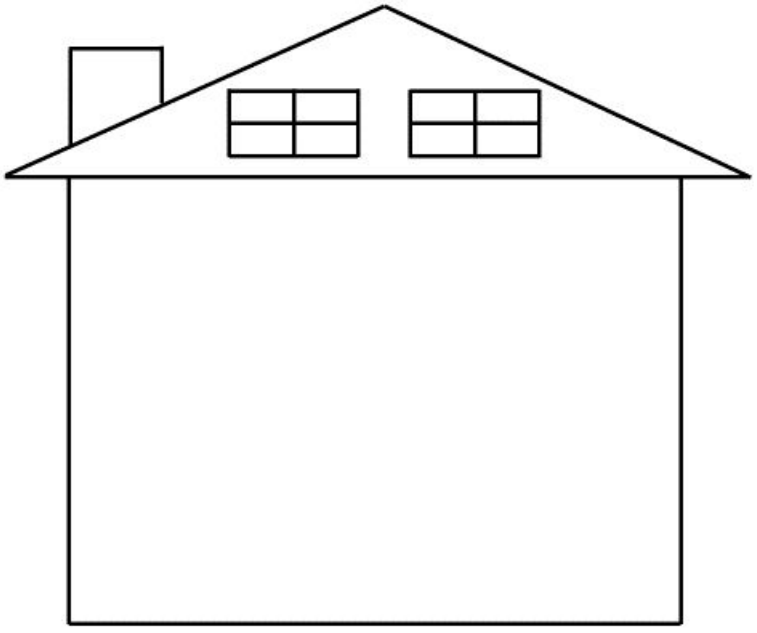
Self Complete A:

First Name:

	Agree	Disagree	Don't know
a) I don't have much money left at the end of each month for extra expenses			
b) I am always looking at ways of improving my home			
c) I am more interested in making my home look better than investing in the things you can't see, like insulation			
d) Spending money on my home is not a priority for me, there are other more important things for me just now			
e) I would rather spend money on going out and holidays than on improvements to my home just now			
f) My home is very important to me and making it comfortable is a real priority			

Self Complete B:

First Name:



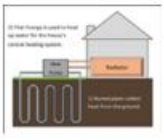
Self Complete C1:

First Name:

Technology	Description	Picture	Have you heard of this	Would you consider this	Why/Why not
Solid wall insulation	**Insulation attached to the inside or outside of your home's walls**				
Cavity wall insulation	**Insulation injected into the cavity inside your home's walls**				
Solar PV panels	**Panels that generate electricity from the sun**				

Self Complete C2:

First Name:

Technology	Description	Picture	Have you heard of this	Would you consider this	Why/Why not
Ground source heat pump	Pipes buried underground to extract heat from the ground, which is then used to heat radiators, underfloor and hot water in your home.				
Air source heat pump	**A unit that extracts heat from the outside air to heat radiators, underfloor heating systems, and hot water in your home**				
Biomass heating boiler	Wood-fuelled heating system burning wood pellets, chips or logs to power central heating and hot water boilers				

Showcard D: Net zero

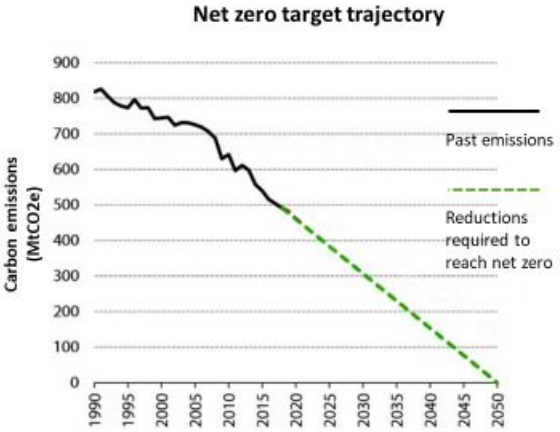
UK Government has committed to a target of net zero greenhouse gas emissions by 2050

This is a challenging target. There has been lots of progress since 1990:

- Emissions from electricity generation have fallen 64% since 1990
- % of electricity produced by coal fell from 41% in 2012 to <2% in 2019

And there are some initiatives already in place to help achieve it:

- E.g. from 2035 no new petrol/diesel cars



BUT, we are still a long way from reaching the target

- **Households will need to adopt new home energy efficiency technologies e.g. insulation, different heating solutions etc.**
- **90% of homes will need low-carbon heating systems by 2050 from 4.5% today**

Self Complete J:

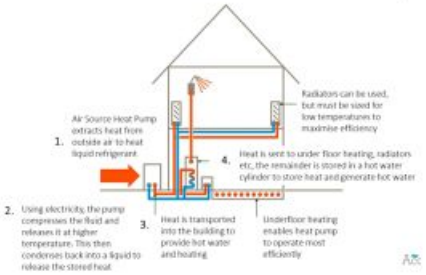
First Name:

Showcard	Technology	Main questions / things you need to know about the technology	3 areas of support you would need while researching to help you make a decision
E	Air source heat pump		
F	Ground source heat pump		
G	Wall insulation (cavity or Solid)		
H	Solar PV		
I	Biomass boiler		

E

Air Source Heat Pump

Benefits
- Lower fuel bills (esp if replacing conventional electric heating)
- Can heat your home & water
- Minimal maintenance required



"It's easy once installed and warms my home at a cheaper rate"

Requirements
- Space outside home where unit can be fitted to a wall or on ground.

Planning
- No planning permission needed unless in conservation area or listed property

Installation
- Certified heat pump installer needs to oversee all design & installation
- Disruption: no more than 2 days

Best execution
- Best with well insulated home
- Pays for itself much more quickly if replacing electricity or coal heating system.
- Perform better with underfloor heating or warm air heating than radiators

Finance
- Purchase + installation costs £10,000 - £18,000
- Savings per year:
- Old G-rated gas boiler £400-£465
- Old G-rated oil boiler £460 - £545
- Old electric storage heaters £800 - £900
- Old G-rated LPG boiler £1,145 - £1,350

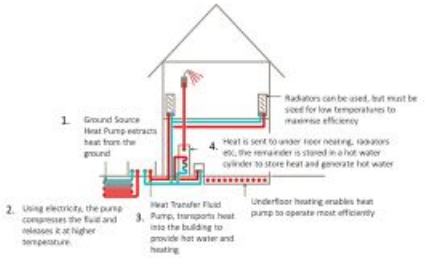
Maintenance
- Little on-going maintenance
- Recommend annual servicing
- Keep unit and equipment/parts clean
- Generally do not require replacement of expensive parts during lifetime

Living with a heat pump
- Set it to come on 30 minutes before getting up in the morning
- Needs to run for longer than a gas boiler, but at lower output
- Uses electricity to drive the pump

F

Ground Source Heat Pump

Benefits
- Lower fuel bills (esp if replacing conventional electric heating)
- Can heat your home & water
- Minimal maintenance required
- More energy efficient than air source heat pumps



"It's great for the environment and over the long-term saves me money"

Requirements
- Large garden required for ground loop or smaller area with access for drilling equipment for a borehole

Planning
- No planning permission needed unless conservation area or listed property

Installation
- Different systems exist (horizontal and vertical systems)
- Certified heat pump installer needs to oversee all design & installation
- Disruption: excavation 1-2 days, installing pipes, modifying heating system and installing pump 4-5 days

Best execution
- Best with well insulated home
- Perform better with underfloor heating or warm air heating than radiators

Finance
- Purchase + installation costs £10,000 - £17,000 (including groundwork costs)
- Savings per year:
- Old G-rated gas boiler £505-£580
- Old G-rated oil boiler £560 - £665
- Old electric storage heaters £900 - £1,110
- Old G-rated LPG boiler £1,245 - £1,470

Maintenance
- Most GSHP require annual check by a qualified technician

Living with a heat pump
- Set it to come on half an hour before getting up in the morning
- Needs to run for longer than a gas boiler, but at lower output

G

Wall insulation

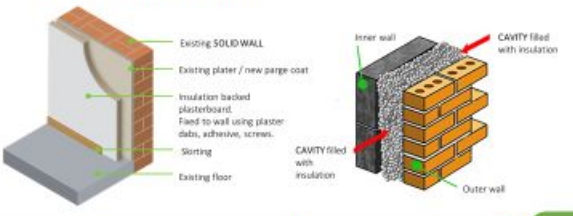
Benefits
- Lower fuel bills
- Warmer home
- No maintenance required

Requirements
Solid wall insulation (SWI)
- Home's external walls are solid (most houses built before 1930)

Cavity wall insulation (CWI)
- Home's external walls have a clear cavity of 5mm+. Most houses built after 1930
- Brickwork of property is in good condition and not in flood risk area

Best execution
- Check installer is member of Cavity Insulation Guarantee Agency

Solid wall insulation | Cavity wall insulation



Planning
- Solid wall: if external insulation, check if changes to appearance of house is allowed (conservation areas)
- Cavity wall: no planning permission required

Finance
Solid wall insulation
- Purchase + installation costs: semi-detached home: £13,000 (external walls), £7,400 (internal walls)
- Average annual savings: Detached home: £435, semi-detached: £260, mid-terrace £160

Cavity wall insulation
- Purchase + installation costs: Detached home: £725, Semi-detached: £475, mid-terrace £370
- Average annual savings: Detached home: £255, semi-detached: £150, mid-terrace £95

Installation
Solid wall insulation
- Boards are attached to the wall, so redecoration necessary
- Disruption: 2-3 weeks (external). Redecoration required for internal walls

Cavity wall insulation
- Installer drills holes in mortar joints and injects insulation
- Disruption: full access required, but installation only takes a few hours

Maintenance
- No maintenance required

"My home's much warmer now, without the draughts!"

Living with insulated walls
- Make sure the house is properly aired and kept free of moisture and mould

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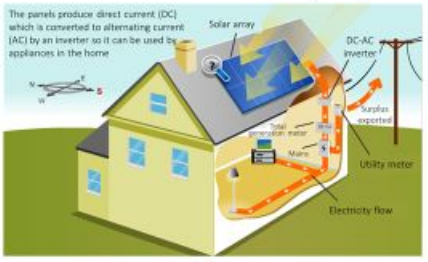
Solar Photovoltaic (PV) Panels

Benefits
- Lower fuel bills
- Little to no maintenance
- No running costs



"My electricity bills are half what they used to be"

Requirements
- Location to capture sunlight from 9am to 3pm (ideally south facing)
- Roof that can support weight of the system
- Roof angle of about 30 degrees

Planning
- Planning permission not normally needed
- Check your insurance policy

Installation
- Scaffolding required for installation, which includes fitting a frame to roof timbers and installing an inverter and a power outlet to feed back into the National Grid
- Disruption: 1-3 days for installation, + time for scaffolding install/ dismantle

Best execution
- Average UK home could be provided by a 3kW or 4kW solar panel (12-16 panels)

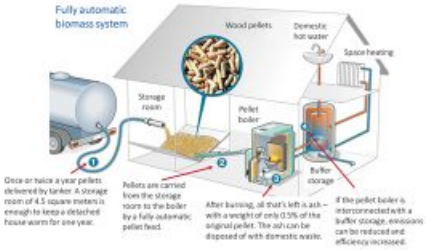
Finance
- Purchase + installation costs: £5,000 - £8,000 for a 4kW system (which covers use for a typical 3-bed home)
- Average annual savings: 40-50% of electricity bills

Maintenance
- Very little maintenance required
- Average inverter life span: 7-12 years (£800-£1,600)
- Panels need to be relatively clean

Living with solar panels
- Solar PV systems most efficient if you use the electricity they produce during the day.
- Battery storage required to use panels' power when not in operation

Biomass boiler

Benefits
- Lower fuel bills
- Can either replace existing fossil fuel boilers or be integrated with them



Requirements
- Higher space requirement than conventional gas boilers
- Access for getting fuel to the boiler
- Log boilers need a hot water cylinder

Planning
- No planning permission needed for most installations
- Ask installer for a quote for the entire job (including removal of old system) and subsequent costs like pellets

Installation
- Often quite intensive installation process
- Might require structural changes around the new boiler to fit the equipment
- Disruption: five days for easy systems and up to 10 days for involved systems

"I love it. We've got a warm house and we're not burning fossil fuel"

Best execution
- Install somewhere where additional noise levels are acceptable, such as the basement or garage

Finance
- Average costs between £4,300 for a standalone pellet stove and £11,500 for an automatically fed pellet boiler
- Wood burner costs £500 - £3,000
- Annual savings between £170 and £390

Maintenance
- Annual service of boiler required
- Maintenance requirements (vs traditional gas boiler), with wood pellets needing loading and ash bins needing emptying
- Last around 20 years

Living with a biomass boiler
- Storage space needed to store the fuel at home
- If the system requires manual feed of pellets, this can be necessary up to 5 times a week

Showcard K....

Possible support mechanisms

A. Visit from local heating engineer providing quote and potential options

B. Energy provider – link to information resource signposted on bills / leaflets

C. Architect / builder home assessment

D. Government portal – information resource on potential options, installers

E. App-based information providing options based on your household characteristics (size, current heating system etc)

F. Third party (e.g. Which?) source of information e.g. helpdesk / web resource

G. User generated networking site – registered users share experiences, offer advice etc