

RAF063/2122 Supporting consumers through the transition to low carbon heating

Research findings

Completed by Verian for the Department for Energy Security and Net Zero prior to the general election in the United Kingdom in July 2024.

As such, any references to government policies, commitments, or initiatives may reflect the stance of the previous administration and were accurate at the time of fieldwork and writing.

Views expressed in this report are from the relevant research agencies, based on data collected from research participants and other evidence, and not necessarily those of the UK government.



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1. Executive Summary

1.1 Research background

Context

The transition to Low Carbon Heating from fossil fuels is a critical component of the UK's commitment to reaching Net Zero by 2050. There is a need to understand households' perspectives on the long-term goal to install low-carbon heating in their homes, including the support they require and what behaviours they might engage in.

Research objectives

DESNZ commissioned Verian (formerly Kantar Public) in 2023 to conduct deliberative research to gain a broader understanding of what support consumers will need throughout the transition to low carbon heating and when and how to engage the public to give sufficient notice for them to take positive action. This research was conducted to explore 3 main research questions:

1. How do consumers need to be engaged in the transition to low-carbon heating?
2. What would consumers need in terms of policies and support to take up a technology, ideally voluntarily?
3. What behaviours might consumers adopt relating to the transition?

Methodology

The research consisted of five reconvened online workshops conducted with on gas grid and off gas grid homeowners and landlords. In total, 75 homeowners and 9 landlords participated in the full research programme. Workshop groups were split into on gas grid and off gas grid homeowners to enable discussions and supporting materials to be tailored and relevant to these two different groups.

The first workshops introduced the low carbon heating context. Participants were given scenarios relating to potential regulations to phase out fossil fuel heating¹, low carbon heating technologies, and the support available now to make the transition. All participants then completed an interim task, capturing their reflections on workshop 1 and conducting their own research to try and find the answers to any questions they may have had. Two weeks after the first workshops, second workshops comprised of discussions on the role of government, industry and the public in the transition. Participants explored scenarios to gauge feelings towards the transition and to understand how people may behave in specific situations, and discuss the support required to facilitate the transition in greater depth.

¹ Note that this research was conducted in 2023, before the new government in July 2024. Scenarios tested in this research were a range of policy options being explored under the previous government.

1.2 Key findings

Participants were broadly open to considering different low carbon heating options, once they had been able to understand the options in sufficient detail and concerns were addressed where possible. The key findings for each of the three research questions were:

How do consumers need to be engaged in the lead up to a fossil fuel phase out?

Participants began the research with limited understanding and familiarity with low carbon heating. Familiarity was predominantly confined to heat pumps, and participants with more knowledge were not necessarily more open to transitioning to low carbon heating. Throughout the research process, participants developed both a greater understanding and became more open to transitioning to low carbon heating.

Once fully understood, participants felt that a requirement to install low carbon heating in their homes would be daunting and would constitute major decisions. Participants consistently stressed the need for engagement and education as early as possible to prepare the public before any potential regulations come into force.

Participants wanted to be educated and consulted, where possible, on various issues including the timeline for potential regulations, which technologies will be available, exemptions to possible regulations, and the support available. As the landscape of current and emerging low carbon technology is expected to change significantly, participants also stressed the importance of keeping the public up to date with changes so that individuals can make better informed decisions about their homes.

Participants did generally understand and acknowledge that they may have limited choice about which technology is installed in their home. Most accepted this, as long as concerns about having an unsuitable technology 'imposed' could be addressed.

Participants felt that mass communications from government to inform consumers about the overall transition away from fossil fuels systems to low carbon heating were essential and felt that these should begin as soon as possible. Participants did acknowledge that this would mean starting communications before some information will be available (e.g. the role hydrogen will play in the transition), but on balance felt it will be more important to give consumers as much notice and time to prepare as possible.

Participants emphasised the importance of communications to increase awareness about the need to transition, the support currently available, and the actions consumers can take to get homes 'ready' for LCH such as improving insulation. Government was seen as the most important messenger to lead communication about the need to transition. Participants also highlighted a need for other independent, trusted sources of guidance for consumers on areas such as implementation.

What would consumers need in terms of policies and support to take up a technology, ideally voluntarily before possible regulations?

Participants felt that government, industry, and the public all have important roles and responsibilities to facilitate the transition to low carbon heating. Government was consistently seen as needing to take the lead as the driving force behind the transition, at least for the foreseeable future. Participants felt the public have a responsibility to be open minded and consider low carbon heating, as long as sufficient support is available.

Most importantly, participants stressed the need for continued and in some cases extended financial support to address the high installation costs of low carbon heating. Participants were also concerned that running costs could not be guaranteed to reach parity with fossil fuel systems.

Participants often found the process of transitioning to low carbon heating, particularly associated works and home upgrades, to be daunting and in some cases prohibitively expensive. All welcomed government support schemes to improve insulation, but thought this should be highlighted more explicitly as 'getting homes ready' for low carbon heating in order to break down the transition into more manageable incremental tasks.

Participants also highlighted the importance of industry training, upskilling, and accreditation schemes, to provide the public with reassurance that low carbon heating systems will be reliably installed and maintained.

What behaviours might consumers adopt relating to the transition?

Throughout the research participants were asked to consider, and predict as far as possible, what decisions and actions they would take throughout the transition to low carbon heating. Participants expected to consider a broad range of factors when making decisions including: urgency, financial support available, advice from other households, future availability of alternatives, availability of technicians and the maturity of technology.

With these considerations taken into account, participants expected to take a range of actions. These can be grouped into: deciding to invest now, delaying the decision, making a reluctant short-term fossil fuel replacement (potentially using a less expensive fossil fuel system as a bridge before transitioning), and holding out with fossil fuels for as long as possible. These expected behaviours were driven both by the potential circumstances when making a decision, and by participants' varied attitudes to low carbon heating.

Most participants were generally open to transitioning before potential regulations phasing out fossil fuel heating, if certain circumstances proved favourable. Participants could be grouped into three broad groups: potential early adopters (intending to transition for their next replacement), an undecided but open middle group, and potential late adopters who intended to delay transitioning. Some intended to install a replacement fossil fuel system as close to the cut-off date as possible, to extend the time before having to replace with LCH.

2. Background

2.1 Project context

The UK Government is committed to a 100% reduction of greenhouse gas emissions by 2050 compared with 1990 levels. Decarbonising buildings is a key priority for achieving this goal, with emissions from heating of domestic homes accounting for 17% of the UK's carbon emissions. At present 85% of UK homes are heated using natural gas distributed via the national grid; another 10% of homes are not connected to the gas grid and are heated by other fossil fuel sources, such as oil, liquified petroleum gas or coal; and the final 5% of homes are heated from other sources, such as local heat networks and heat pumps.

The Government expects that most properties will ultimately transition to heat pumps. This is underlined by the Government's commitment to accelerating the deployment of low-carbon heating as part of its Warm Homes Plan, which will be published in 2025. Heat networks will also be an alternative option for some households, where available. The Government recognises there will be a role for other low carbon heating technologies – potentially including high temperature heat pumps, air-to-air heat pumps, electric boilers, heat batteries, storage heaters, infrared heating, solid biomass and renewable liquid fuels – especially where heat pumps cannot be installed. Some consumers may also be able to switch to hydrogen heating if it is rolled out in their area.

Previous research has identified a number of barriers to the uptake of different low carbon heating technologies. They are currently usually more expensive to install and, in some cases run, than fossil fuel heating. Installation can also cause significant disruption to the home, and can require preliminary energy efficiency measures or upgrades to heating systems (e.g. radiators). New heating systems may also require behaviour change from customers in relation to how they heat their home and using heating controls. To help support the transition, there is government support available such as the Boiler Upgrade Scheme, Home Upgrade Grant and Energy Company Obligation for those owner occupiers who wish to act early.

Note that this research was conducted in 2023, when the previous government was in place. The research was based on the Heat and Buildings Strategy², which set out a roadmap to decarbonising UK homes, with a primary focus on reducing emissions from heating. It outlines plans to phase out legacy fossil-fuel technologies in 2035, so that when current heating systems come to the end of their life, they would need to be replaced with more carbon-efficient technologies. The research tested scenarios relating to this roadmap set out in the previous Government's Strategy publication. The current Government will publish its Warm Homes Plan in 2025, which will set out plans to transform homes by making them cleaner and cheaper to run.

² <https://www.gov.uk/government/publications/heat-and-buildings-strategy>

2.2 Objectives

A previous DESNZ project from 2020³ used deliberative workshops to explore public awareness and perceptions of a transition to low carbon heating. The aim of this research was to build on knowledge from the 2020 research and introduce scenarios to participants that were in line with policy development at the time (2023). The focus was to move beyond an understanding of consumers' initial reactions to the different technologies and barriers to transitioning, to gain a broader understanding of what support consumers will need throughout the transition and when and how to engage the public giving sufficient notice for them to take positive action.

Specifically, this research has been conducted to explore 3 main research questions:

1. How do consumers need to be engaged in the lead up to a fossil fuel phase out?
 - a. What would consumers need to know and when in a scenario where fossil fuel heating is phased out?
 - b. Who do consumers trust to communicate with them?
 - c. To what extent do they want to be involved and engaged in the decision-making process?
2. What would consumers need in terms of policies and support to take up a technology, ideally voluntarily before a possible fossil fuel heating phase out?
3. What behaviours might consumers adopt relating to the transition?
 - a. Would they wait until after a possible fossil fuel heating phase out when their current heating system is no longer available, make a pro-active decision beforehand, or get their homes ready instead (e.g. upgrade radiators)?
 - b. What undesirable behaviours might they adopt, such as replacing their fossil fuel system just before a possible fossil fuel heating phase out or selling their home to avoid changing the heating system?

³ BEIS (2020). The future of heat: findings from workshops with the public on the transition to low carbon heating. Available at: <https://www.gov.uk/government/publications/future-of-heat-workshops-on-the-transition-to-low-carbon-heating-in-great-britain>

3. Methodology

This section provides an overview summary of the methodology and sample included in this research. Additional detail can be found in Annex 6.1.

3.1 Deliberative workshops

After initial scoping work, this research consisted of five reconvened online workshops conducted with on gas grid and off gas grid homeowners and landlords. All groups were conducted online via Zoom in October and November 2023 and moderated by Verian. DESNZ representatives also attended the workshops to observe discussions. Topic guides and stimulus materials were developed by Verian and agreed with DESNZ. All participants were also asked to complete an interim activity in their own time between workshops.

Workshop 1 introduced the low carbon heating context and started discussions of the options available. The flow of the workshops was designed to introduce information on possible regulation scenarios and low-carbon heating technologies, for context around the transition rather than to capture specific views on each technology. The interim task gave participants time to reflect on workshop 1 and conduct their own research to try and find the answers to any questions they may have had. Workshop 2 took place two weeks after workshop 1. It involved discussions on the role of government, industry and the public in the transition and introduced hypothetical scenarios to gauge feelings towards the transition and to understand how people may behave in specific situations.

3.2 Sample and recruitment

The total target sample was ninety participants across the workshops - the final number achieved was eighty-four. The sample included a range of heat sources, income, region, age, and attitudes towards the environment and technology. One to two participants in each workshop had a heat pump installed. The workshops were split into on gas grid and off gas grid homeowners to enable discussions and supporting materials to be tailored to each group.

The research aimed to recruit a small sample of landlords (n=10) and achieved nine, who took part in a separate workshop. Landlords were split into breakout groups of on gas grid property owners and off gas grid property owners. Due to this sample size, findings relating to landlords should be taken as indicative with more research needed into their specific considerations.

A decision was made to include a small number of participants who used direct electric to heat their homes within the off gas grid workshops. Although this group is not considered to be using fossil fuel heating and therefore in scope of a possible fossil fuel phase out, it was decided that it was still important to hear their views on the transition given they may change the source of their heating in future or consider moving to a new property.

4. Findings

4.1 Understanding of the need to transition and openness to change

This section highlights the wider contextual factors that impacted attitudes towards the transition to low carbon heating throughout the research process.

Key findings:

1. Participants started the research with low awareness and understanding of LCH, and were generally resistant to the idea of installing LCH in their own homes.
2. Over the course of the workshops, including the time taken to do their own research, participants gained a sense that the transition to LCH is inevitable and gaining momentum.
3. Anxiety around the cost of living exacerbated concerns around cost, and increased scepticism around when LCH will become cheaper.
4. Participants generally felt most positive about a possible 2035 date for the introduction of regulations to phase out fossil fuel heating compared to alternative suggestions, feeling that this date would give consumers enough notice but still contribute meaningfully to the Net Zero 2050 commitment.

Changes seen over the course of the research

At the start of the research, participants were generally surprised to learn about the 2035 regulations. As discussed in later sections, participants generally had low baseline levels of knowledge about low carbon heating technologies and considered them to be niche and still developing. Participants also started the research with a sense that their own (fossil fuel) heating systems ‘worked well’ in most cases, and were cautious about replacing these with entirely new systems.

*“If it isn’t broke, why fix it? The heating works fine in our house” On gas grid,
female, 35-54*

By the end of the research, with a clearer understanding of LCH and more reassurance on key questions such as expected cost, these opinions had generally shifted. Participants had a stronger sense that the transition to low carbon heating is necessary to meet Net Zero targets, and understood the possible 2035 regulations in this context. Participants also understood more about the range of technologies and support currently available, and had a sense that low carbon heating is ‘gaining momentum’ although not yet mainstream. Some participants were also more open to alternative ways of heating their home than their current fossil-fuel

based system. However, despite this increase in openness, participants still had concerns and hesitations.

“Now we’ve been through all this I’m definitely more open to the idea. I still hope I don’t have to but I won’t think it’s the end of the world if we do” Off gas grid, female, 55+

Awareness of the need to transition

Initially, there was limited awareness of the contribution of home heating to the UK’s emissions, although when prompted some found 17% surprisingly low. Framing the contribution of heating as a proportion of their own personal emissions was felt to be more powerful and tangible. Some participants found the 17% contribution figure to be demotivating, due to the perceived amount of disruption required to achieve a relatively small reduction of overall emissions.

“So much hassle for 17% of emissions, surely there are easier things to start with in the other 83%” On gas grid, male, 35-54

Participants were largely unaware of the previous government’s planned 2035 regulations to end the installation of new fossil fuel systems. There was some awareness (including some misconceptions) of Net Zero targets recently being ‘pushed back’, but participants generally had limited understanding of the specific details of recent announcements⁴. Through the research, some participants became more aware of other policies relating to the Government’s Net Zero legal commitments and their concerns around the transition to LCH (detailed over the following sections) became less significant.

Participants felt a high degree of scepticism towards the government’s priorities and its commitment to Net Zero. Even when moderators emphasised the government’s legal commitment to achieve Net Zero by 2050, some participants continued to express cynical attitudes. These attitudes included expecting that priorities could shift again, preventing the government from sticking to a clear long-term plan for the transition to low carbon heating.

“Not only does it [the government announcement in September 2023 to change deadlines for certain carbon reduction measures] undermine the policy... it shifts the goalposts so if I know I’ve got to do some transitions in 2035, I’ve got 12 years to plan, if you then make it 2030 you’ve cut five years off that.” On gas grid, male, 35-54

Anxiety about cost of living

Concerns over the cost of living crisis were near ubiquitous, with participants expressing apprehensions about the financial impact of the transition on themselves, people they knew or

⁴ Research took place soon after the previous Government announced a new ‘pragmatic, proportionate, and realistic approach’ to Net Zero in September 2023. <https://www.gov.uk/government/speeches/pm-speech-on-net-zero-20-september-2023#:~:text=This%20country%20is%20proud%20to,eases%20the%20burdens%20on%20families>.

members of the public more generally. Some participants anticipated waiting until closer to the possible 2035 regulations before making the transition, hoping to have been able to save enough money by then. Low carbon heating was seen by some as an imposed cost which would need to be managed on top of various already competing priorities. This was exacerbated by a feeling that transition costs would be an unfair burden placed, disproportionately, on households, although this had shifted for some participants by the end of the research.

“You know we would all like to be greener but sometimes you can't be greener... sometimes you have conflicting things where you want the public to go in one direction, but a lot of people can't afford to go into that direction.” On gas grid, male, 55+

As discussed in more detail later in this report, there was a high level of scepticism around claims that low carbon heating will reach cost parity with fossil fuel systems in the long term. Some participants initially struggled to conceive of low carbon heating as something that would become widespread, whilst others persistently expressed doubts over the likelihood of electricity prices decreasing and expected high running costs. Several participants expressed a desire to see evidence for the expected decreases in the costs associated with installing and running of low carbon heating.

“Generally when we hear in the media or by the Government what an average cost is, it is usually way higher in reality and I don't know where they get their figures from”. Landlord, on gas grid, female, 35-54

Anxiety over cost was exacerbated further for participants who reported struggling with finances. Some participants had limited or no savings and felt that even replacing their current heating system with a like-for-like would be a severe stretch, let alone the perceived higher cost of replacing with LCH. These participants were particularly anxious about needing to replace their current system with a low carbon heating option if this turned out to be more expensive.

Feelings around the timeline for phasing out fossil fuel heating

Participants were asked to consider a 2035 date for introducing possible regulations, in line with the previous government's approach, and also alternative timelines for earlier and later introductions in 2030 and 2040 respectively. In this context, participants consistently felt that a 2035 date would be most appropriate. While there may have been some degree of anchoring effect due to presenting the 2035 date as the current intention, participants consistently had strong rationales for why this would be the preferred date. The earlier date was felt to be too soon, not giving consumers enough time

to prepare or allowing future technologies such as hydrogen to be considered. The later date was felt to be too late to contribute meaningfully to the Net Zero 2050 commitment, which some participants felt would undermine the purpose of requiring consumers to undergo such significant changes.

4.2 Perceptions of low carbon heating technologies

This section discusses perceptions of low carbon heating technologies shown in the workshops and highlights the cross-cutting themes. Detailed perceptions of each technology can be found in Annex 1.

Key findings:

1. Baseline familiarity with low carbon heating was generally limited, and those who were more familiar were not necessarily more positive about installing it in their own homes.
2. The cost of installing and running low carbon heating was the most significant and concerning factor when considering any technology, and participants were consistently concerned about high costs which they were not certain would come down.
3. Participants were also concerned about the level of disruption required in the home, and to a lesser extent in the surrounding area, to install low carbon heating.
4. There are additional concerns around the available skilled workforce, supporting infrastructure, reliability and safety of new technologies.
5. Participants struggled to consider their preferences towards low carbon heating options which were at different stages of readiness and availability, which presents a challenge for future communications.

Participants generally accepted that households will have limited ability to choose which technology is used for their home, but were concerned about having the wrong solution 'imposed' leaving them with an ineffective or expensive heating system and no alternative.

Baseline familiarity with low carbon heating

While participants had heard of at least one of the low carbon heating technologies, understanding beyond baseline awareness was generally limited. Participants in on gas grid and off gas grid groups had generally heard of heat pumps, and in off gas grid groups were generally aware of biomass as a heat source. Familiarity with heat networks or hydrogen boilers was much more limited (these technologies were only discussed with on gas grid participants, as they were considered to be less relevant for off gas grid homes).

There were exceptions to this, for instance: participants who either worked in relevant trades or knew someone who did, and participants who knew someone with low carbon heating already installed. However, those participants were not necessarily more positive about the technologies they had more knowledge of (predominantly heat pumps). Those with connections to relevant trades were often sceptical and either felt or had heard that the technology was in some way 'not ready yet'. They tended to dismiss claims from the Government or energy companies to the contrary.

“I’ve got mates who work with them [heat pumps] and they don’t recommend them. Maybe in ten years but not yet.” On gas grid, male, 18-34

Some participants who knew someone with low carbon heating had heard about negative experiences, or dismissively claimed that their house was different from that person’s. However, some participants who knew someone with positive experiences of low carbon heating, in a similar house, did feel reassured and more open to transitioning to low carbon heating than they may otherwise have been.

“I personally would want that reassurance of seeing neighbours, friends, whoever, with it first before I did anything.” On gas grid, female, 35-54

Cross-cutting themes across perceptions of low carbon heating technologies

Cost of installation

Financial considerations dominated the initial discussions of each low carbon heating technology. Participants wanted to understand the full upfront cost of installing any low carbon heating technology and to understand if and how this would pay off over time. Some participants were particularly concerned about their household’s ability to absorb additional costs for heating, although did appreciate that this would not be impacting them until some time in the future.

For technologies where installation costs were a known factor (heat pumps and biomass boilers), participants were shown a range of average installation costs for typical homes. Participants were consistently sceptical about the ranges shown, assuming that costs would be towards the higher end or above. In some cases, participants’ own experience of asking for quotes were significantly higher than the average range given. Materials did not divide expected costs into the cost for the heating unit itself and costs for associated works, however the latter was raised as a concern more often by participants.

Participants across groups felt that as the requirement to transition is ‘imposed’ by the government, it would be fair for a subsidy to broadly bridge the gap between the cost to install low carbon heating and a like-for-like replacement. This would only be the case if the consumer is being required to purchase a unit themselves (as in the case of a heat pump, biomass boiler, or hydrogen boiler). The section below on perceptions of the BUS and other support includes more detail on this.

Running costs

Participants were informed that installing low carbon heating would generally keep costs broadly similar, or in some cases bring costs down, compared to fossil fuel systems, particularly as we get closer to possible regulations in 2035. This was seen as a significant positive, although participants were disappointed to learn that for many households there would not currently be a significant reduction. Some felt this would undermine the cost for investing in low carbon technology at the present time, but would change to a significant advantage if price differentials became more favourable in the future.

Participants were encouraged when they learnt in the research that the price of energy, and therefore the running costs of some low carbon heating technology, is expected to fall. Some found this counter-intuitive, citing the greater demand for electrification (driven both by homes but also in other sectors such as transport) and questioned how the UK will be able to reduce costs. Participants were hesitant about investing in expensive technology now without certainty that running costs will come down, and relatedly were concerned about rising electricity costs. Several participants wanted more guarantees from government communications that the transition to renewable energy generation would prevent electricity prices from rising.

The materials shown to participants also acknowledged the lack of certainty over heat networks and hydrogen running costs. Across all technologies, participants wanted assurance that total costs (installation and running) would not rise significantly over the lifecycle of a low carbon heating system, and that overall a consumer should not be 'punished' with higher prices for making the more sustainable choice.

Disruption to the home and local area

Participants consistently felt daunted and, in some cases, overwhelmed by the scale of work required to install low carbon heating in their home, in addition to the cost.

"I know it's selfish, but I've just got my house how I wanted it. It's taken me ages, I've done everything I could do myself rather than paying people. Now I have to smash it all up to put in something new? I can't even think about it" Off gas grid, female, 35-54

Participants felt that installing low carbon heating would ideally need to be planned years in advance, as they felt that it would constitute significant changes in the home (potentially less so for hydrogen and heat networks, although the scale of disruption was less well known for these technologies). Workshop materials explained that the level of disruption would vary and would not be expected to be significant for all homes, but participants generally expected a high level of disruption. For some participants these expectations were also influenced by prior experiences requesting quotes for low carbon heating or hearing from others who had done so.

With these expectations, participants felt that having a long planning window would allow them to save up and to make incremental preparations as needed, such as upgrading insulation or radiators (discussed in more detail in the section below). This would also allow participants to plan other refurbishments around the transition as needed. Participants who had recently completed a refurbishment in their home were concerned that the disruption of installing low carbon heating would result in further alterations or require works to be re-done.

Participants were also concerned that once installed, low carbon heating technology could significantly alter the feel of their home or garden. Some highlighted the perceived aesthetic downsides and noise concerns of having heat pumps attached to the home. Space requirements were also mentioned, for smaller homes needing to fit hot water tanks (e.g. to replace a combi boiler with a heat pump) and for biomass boilers.

Participants had concerns about the potential disruption to local areas, such as road closures and noise, that some low carbon heating options would cause whilst being installed (such as heat networks or hydrogen). This was felt to be less significant than disruptions within the home, but participants did feel that local residents and communities should be kept informed throughout any works and consulted on major changes in their area.

Concerns about having an inappropriate system imposed on them

Participants generally accepted the practical necessity that households will have limited ability to choose, but all were concerned about having the wrong solution ‘imposed’ on them. The degree of limitation felt to be acceptable varied across participants. Whilst some participants felt that being able to choose the right low carbon heating technology (at a household level) is important, others were more concerned with having the ‘right’ solution and did not feel it would be realistic for individual households to get to choose from a range of potential low carbon heating technologies.

Participants also needed to be, and by the end of the research mostly were, reassured that they would get the ‘right solution’ whilst retaining control over other choices, such as timing, whether to move or not move into a property with the technology, and which low carbon heating system to install, if relevant.

“It’s not like they can go door-to-door with a menu of all these options and we’ll be able to choose the best one. It’s probably best they [Government] work out what the best options are... I just don’t want to be lumped with something totally wrong for my house.” On gas grid, male, 35-54

Concerns about control

Some participants, predominantly off gas grid, raised concerns about having less control over purchasing fuel. Participants with LPG or oil boilers reported timing their yearly purchase of heating fuel to coincide with dips in the price, but suggested that they would be unable to do this with biomass (or other low carbon heating) and so would become more vulnerable to fluctuations in price. For participants who prided themselves on being self-reliant and using price fluctuations to their advantage, this was a considerable drawback when considering the transition. (Off gas grid participants were more engaged with heating options and taking control of options for heating their homes and making decisions is broadly more familiar to them. Some had already made changes to reduce costs, environmental impact or market price volatility by installing solar panels or log burners.)

“I always buy the [oil] fuel when the price is low for the year, if you time it right you save hundreds. Don’t like the idea of having to buy fuel constantly and being totally on the hook when the prices jumps up” Off gas grid, female, 35-54

Participants in homes which might be suitable for a heat network also raised some fears about a lack of control. Several raised the inability to switch energy supplier as a significant drawback, although additional detail about the possible regulations did provide some reassurance (additional detail can be found in annex 1 on technology-specific findings). Participants did not have enough information to establish if this was a concern for hydrogen.

Retaining the ability to switch energy supplier was seen as important and reassuring when considering a heat pump.

“I don’t like the idea of being locked to one supplier. I wouldn’t want to be stuck with my energy supplier for life or have to move” On gas grid, female, 18-34

Workforce and supporting infrastructure

The availability of technicians for installation, servicing, and repair works for low carbon heating systems was also a highly salient issue. Some participants described having long-standing, trusting relationships with tradespeople such as builders or plumbers, and a preference to work with them whenever possible. In some cases, participants had been advised by them not to invest in new systems including heat pumps.

By contrast, working with new and unknown technicians or firms was seen as considerably more worrying and stressful, and a potential barrier to transitioning to any new low carbon heating technology. Participants also questioned if there would be enough technicians available to service any problems with low carbon heating systems quickly, contrasting this with how quickly e.g. gas technicians can be called out.

“I know they’re trying to hire [technicians] everywhere to work on these at the moment, the wages on job ads are pretty good. But it does suggest there’s a shortage of people qualified” On gas grid, male, 18-34

Confidence in this workforce had been further undermined for some participants by direct experience of pushy and aggressive sales tactics encountered when attempting to get quotes for heat pumps. This contributed to a sense that the market is ‘overheated’ by the subsidies, with firms rushing trying to secure customers. This has made some participants feel wary, and raised concerns about being left to try and rectify poor quality installations at further expense.

“It’s already so expensive, and if some cowboy installer messes up the work, you’re thousands more out of pocket and that nice government subsidy is long gone” On gas grid, female, 35-54

Reliability and safety

Participants also raised concerns about the reliability and safety of low carbon heating technologies. Participants did acknowledge that fossil fuel heating systems, particularly gas, can also be dangerous inside and outside the home. However it was generally felt that these risks are well known and understood. By contrast, some participants felt that new technologies may be considered to be safe on paper but have not yet been proven. Safety concerns around specific technologies, particularly hydrogen, are detailed in annex 1.

“It’s by definition not proven because it hasn’t been done yet. It’s not proven safe” On gas grid, male, 35-54

Suitability for different homes

Participants were consistently positive to see that there would be a range of options for low carbon heating technology, particularly those with concerns or prior misgivings about heat pumps. The knowledge that different technologies would be used for the most appropriate contexts, rather than a 'one-size-fits-all' approach, was felt to be reassuring and gave participants more confidence that the transition will succeed.

Off gas grid participants tended to be more knowledgeable around heating options and more engaged in how their home is heated. These participants were more likely to be concerned that their homes would not be suitable for heat pumps in particular, for example, due to insufficient insulation on older properties. The cost involved with improving insulation in older properties (which was not provided in the workshop materials, so came from participants' own understanding) was seen to be prohibitively high. Some had already explored the possibility of installing a heat pump and not been eligible for the Boiler Upgrade Scheme (BUS).

Off gas grid participants were generally positive about being able to have an alternative low carbon heating technology to heat pumps. However some participants were concerned that this would reduce their chances of securing an exemption to the requirement to install low carbon heating under the possible regulations. These participants felt that although their home might not be suitable for a heat pump, it could be 'technically' possible to heat with biomass even if this would be a significant reduction in their living space. Overall, this meant that off gas grid participants were particularly keen to have further detail about exemptions for unsuitable homes as soon as possible. Participants thought that there should be transparency around any criteria for determining which properties should be exempt, and who the arbiter of that decision would be, as these may be contentious.

"My worry is that it is quite vague at the moment. Who is going to say it's viable or not? It might be technically possible but would dominate the space in your home"
– Off gas grid, female, 35-54

Difficulty considering different technologies under uncertainty

Throughout the research participants discussed a range of low carbon heating technologies, at varying stages of development. This included technologies which are already widely implemented (heat pumps and biomass boilers), available in limited cases (heat networks), and technologies which are not expected to be deployed at scale for several years (hydrogen boilers). While research did not ask participants to 'choose' between technologies, some participants were required to consider technologies at different stages to understand their own needs and expected behaviours. Some participants found this difficult, as their future needs could change significantly depending on the development of new technologies. For example, the benefits and downsides of investing in a heat pump were felt to vary significantly according to whether a viable alternative, such as heating their home with hydrogen, would be possible in a few years' time. Messaging on the different technologies will need to carefully consider this

to avoid causing confusion and potential inertia. The potential impacts on this for consumer behaviour and decision-making are discussed in more detail in section 4.5.

4.3 Expectations and perceptions of policy support

This section discusses participants' views on the role the public, industry, and government should play in the transition to low carbon heating, and responses to information provided on financial and other government support for the transition to low carbon heating

Key findings:

1. Participants saw government, industry, and the public as all sharing responsibility to facilitate the transition to low carbon heating. However, they perceived the responsibility to make decisions, lead the process, and support the public to fall with government.
2. Reactions to the BUS and other financial incentives were positive once the purpose and availability of the scheme were fully understood.
3. Participants were keen to know more about insulation schemes, and felt these should be communicated as part of a joined-up approach from the government towards getting ready for low carbon heating.
4. Extensive industry upskilling was seen as essential to providing reassurance when considering switching to low carbon heating.

Perceived responsibilities of government, industry and the public towards the transition

Participants felt that government, industry, and the public should all share responsibility to facilitate the transition, although the level of responsibility varied for each actor. Participants thought that the public should be responsive to the challenge of the transition. They felt the public have an obligation to pay attention to government policy and scientific consensus, and, using whatever support may be available, make the switch to low carbon heating when they can afford to.

Participants felt government has a crucial role in providing leadership, policy direction, and support to make the transition possible. All groups stressed the importance of government providing financial incentives and disseminating information to the public. In particular, participants expressed a preference for a national road-map with clear information on the necessity of this transition and transparency on what support consumers could expect. Reassurance from government that decisions taken by households are part of a broader joined-up plan (i.e. that all the onus had not been placed on the public) was seen as essential.

Participants also stressed the importance of effective regulation around low carbon heating and saw this as another crucial role for government to take. Regulations were not explored in detail but participants raised the need for regulations to prevent suppliers taking financial advantage of households, and to ensure the safety of LCH.

“If government does the regulation well and the businesses do innovate and offer suitable products to people, then it's fair to expect the public to cooperate.” – Off gas grid participant, male, 55+

Participants expected industry to invest in improving the quality of their products, standardise offers across the market, upskill their workers, and refrain from profiteering. However, there were divided opinions over whether industry could be trusted to perform this role or whether government needed to incentivise or enforce this via regulation. Participants consistently voiced a lack of trust in energy companies and a concern that the public would be ‘taken advantage of’ if regulations allowed this. Some participants, particularly those working in jobs with technical knowledge of the area, highlighted the unforeseen challenges of meeting increased electricity demand (mostly discussed in the context of heat pumps replacing gas boilers). These participants questioned if the transition before 2050 would be technically feasible and saw government working closely with industry to address this as essential.

“I would like there to be some kind of government oversight onto the charges ... so you haven't got someone down the road who's being horrifically ripped off because they feel like ... they've got no choice” – On gas grid, female, 35-54

Additionally, participants suggested that members of the public who had already transitioned to low carbon heating could act as ambassadors. Suggestions included holding doors-open days for others to experience the heating system and disseminating useful information in their social networks or local area, in exchange for some kind of incentive. Participants also identified landlords as a group with their own responsibilities, notably to improve the housing stock to ensure that properties were suitable for low carbon technologies.

Perceptions of the Boiler Upgrade Scheme (BUS)

Participants were eager that the government provide financial incentives and assistance in the transition. Some participants had awareness of the BUS, but others learned about the scheme for the first time in this research. Participants were positively surprised to learn that the grant amounts are not means-tested and that all eligible households are able to claim the full amount, after initially assuming that this would be the case. Some participants, particularly from the landlord group, were also positively surprised to learn that BUS grants would be available for all properties if they owned more than one.

However, some expressed concerns over the details of the Boiler Upgrade Scheme. There was a widespread scepticism that the £7,500 grant was sufficient to cover potential ‘hidden’ installation costs and the added cost of re-decorating after installation. Participants felt these had been overlooked by the government. Several participants were also concerned by the lack of clarity over availability of funding beyond the 2028 cut-off date, one participant referred to

the date as ‘scaremongering’; however, for others this was an incentive to make the transition more promptly.

Participants often indicated that the appropriate level of funding would ensure that there was no difference in price between purchasing a replacement boiler and transitioning to low carbon heating. The grant was not understood by participants as achieving that:

“I’m still not convinced it’s a sufficient grant to cover the difference between existing technology and getting a heat pump.” – Off gas grid, female, 18-34

This stemmed from a more general scepticism that the UK’s housing stock was not suitable for low carbon heating due to a perceived lack of high quality insulation. Workshop materials did communicate to participants that 90% of homes in the UK are expected to be insulated enough for heat pumps, but some participants questioned this figure. Participants contrasted this figure with their own (or people they knew) experiences of living in poorly insulated homes, and some contrasted the quality of insulation in homes in the UK with those in other countries. There was an additional sentiment from participants that communication from the government around financial support had been insufficient so far. Participants were often unaware of related funding around solar panels and insulation, and wanted these to be priorities.

These findings were consistent across different audiences and groups. However within this, landlords placed a particular emphasis on ensuring that the grant should be extended beyond 2028 and should cover the full cost difference relative to a like-for-like replacement.

Insulation and making preparations for low carbon heating

In relation to home improvements, some participants had recently undertaken or were considering insulation upgrades to their homes. There was mixed awareness of insulation schemes such as the Great British Insulation Scheme (GBIS), but participants saw this as something which should be linked explicitly to low carbon heating particularly in communications. Insulation and heating technology were seen by participants as important components of the same ‘problem’ for government, industry, and the public to solve.

A small minority of participants had considered fitting larger radiators in a refurbishment in case they were needed down the line for heat pumps (in one case making this change during the research). This was without deciding for certain whether they would replace their current system with LCH or if this was preparing for a later transition after replacing their current system with a like-for-like.

Responses to financing options

Participants were positive about the suggestion of zero per cent interest loans.

Participants who were in favour of the loan suggested that the most appropriate repayment schedule for the loan would be one with a long repayment time, ensuring that the instalments did not become additional financial concerns. Several participants indicated the appropriate loan term would be the lifetime of the low carbon heating technology it financed, although

others did raise concerns about the length of time this would take to pay off and potential complications for selling the home.

“The loan, I could be swayed if it was a long repayment period. There’s no point in getting a 0% interest loan if its only 12 months” – *On gas grid, female, 35-54*

However, some participants were hostile to a potential loan and resented the idea of being in debt to the Government. This attitude was expressed in groups where participants were unconvinced that widespread adoption of renewable energy would halt the increase in electricity prices, indicating broader concerns about the affordability of low carbon heating.

Landlord participants expressed an additional concern that the installation process would require the property to be vacant and expressed an interest in government compensation for any lost revenue.

Training schemes

When informed about the heat pump training grant, participants indicated that industry upskilling was vital to ensure that there were sufficient, qualified tradespeople to both install low carbon heating in line with the timeline and maintain it once in operation. Participants saw a role for both government and industry in ensuring that there will be the relevant skills within the labour pool. Some participants suggested that the Government should provide financial support to smaller companies to upskill their workers.

“It’s huge. It’s something that matters a lot to me and I think for the success of it as well, it’s very important to have that skilled workforce and to know it’s there.” – Off gas grid, female, 35-54

This was linked to concerns about the unaffordability or inadequacy of heating during the winter, which seemed to stem from more general anxieties about the reliability of unfamiliar technologies. Additionally, some participants suggested that low carbon heating technology felt more complex than fossil fuel-based systems.

“It’s a bit like with an electric car, you can’t just take it round to Jonny’s mechanics round the corner, you need to take it back to the dealer who has expertise” – On gas grid, male, 55+

Participants proposed a government approved list of installers (discussed in more detail in the heat pumps section of annex .1), although others worried this would encourage rising prices with approved companies charging a premium. Some participants suggested follow-up inspections to assure quality as an alternative. These all seemed to be rooted in a much broader concern about the reliability of both tradespeople and energy companies; several participants had had poor experiences with what they felt were either unprofessional or exploitative tradespeople. These concerns led several participants to suggest that installers should not be employed by energy providers to avoid consumers being too reliant on energy companies and potentially unable to change provider if electricity costs rose too sharply.

4.4 Behaviours and decision-making journeys towards the transition

This section discusses the expected journey to making a decision about low carbon heating, the considerations that would come into this, and the potential behaviours in a range of different scenarios.

Key findings:

1. Participants would consider a broad range of factors when making the decision to transition to low carbon heating, including: urgency, financial support available, advice from other households, future availability of alternatives, availability of technicians and the maturity of technology.
2. Participants were generally open to transitioning before the possible cut-off date if certain circumstances proved favourable, with some exceptions. Some participants considered themselves to be potential 'early adopters', while others may wait until the replacement after next.
3. Expected behaviours can be grouped into broad categories: deciding to invest now, delaying the decision, making a reluctant short-term fossil fuel replacement, and holding out with fossil fuels for as long as possible.

Considerations for interpreting results

The findings in this section should be interpreted with some caveats. Participants were asked to consider, and predict as far as possible, their expected behaviours in a range of potential circumstances related to low carbon heating. As participants themselves noted, none had the information available that would be required to confidently predict such a major decision. Participants also noted that there might be additional factors influencing their decision-making which could not be predicted at the time the research took place. These findings can therefore be considered reliable and useful as an indication of the kinds of considerations and behaviours that citizens might take, but should not be interpreted as more definitive than this.

Consumer journeys when making a decision about low carbon heating

While the factors under consideration varied across groups, participants' imagined journeys to making a decision about low carbon heating followed consistent steps.

Firstly, doing their own self-guided research was a consistent starting point (covered in more detail in the following section 4.5). Participants then expected to talk to trusted influencers, including friends, family or neighbours with direct experience of the system if available, to understand their satisfaction or regret after investing. Other trusted influencers would include experts in relevant trades, such as tradespeople known already as friends or through previous

work. This was felt to be crucial for reassurance and impartial guidance from a trusted advisor without an incentive to sell them a system.

At this point, participants then expected they would be able to make a cost-benefit analysis to guide their decision, based on an estimated calculation of the financial impact and payoff, factoring in expected installation, running cost, maintenance cost and property value. Lower carbon emissions were generally considered a positive result but not a main driver for most participants in making this trade-off calculation.

Considerations influencing expected behaviours

Participants expected to consider several factors, in generalised order of importance (with some variation by individual participants' priorities):

The urgency to replace the system: The most significant consideration influencing a decision around low carbon heating was if they were undertaking a planned or emergency replacement of their current heating system. In an emergency, other considerations about the 'ideal' replacement system were relegated beneath considerations of availability and lead times. This was particularly true for landlords with tenants in situ.

The level of government financial support available at the time: Whether the BUS or a similar scheme was available was the next most important consideration. In particular, participants noted that if a scheme was currently available but ending soon this would be a powerful driver to consider low carbon heating at this point.

Perceived satisfaction/regret of others who have already transitioned: Another important consideration would be learning from the advice and experience of other people in situations similar to theirs, to understand how they felt about their decision. Many participants expressed a hesitance to make such a significant decision without this reassurance.

The likely availability of other technologies in their area in the future: Participants also intend to weigh up the likelihood of another technology becoming available. In particular, participants expressed a wish to avoid undertaking the cost and effort to install a heat pump if an alternative technology would be available in a few years' time.

Availability of technicians: Participants also intended to assess how robust and widespread the support network of technicians would be before deciding to invest.

How far the technology has evolved and improved: Finally, some participants raised that low carbon technology will be improving between now and the introduction of possible regulations in 2035 and they may regret transitioning 'too early'.

Expected behaviours around low carbon heating

Taking the above range of factors into consideration, participants' self-predicted behaviours fell into four broad categories. These were: replacing their current system with low carbon heating now; preparing the home for low carbon heating pre-transitioning; making emergency/reluctant

fossil fuel replacements, and delaying the transition. Delaying making a decision could be further divided into a 'passive delaying' mindset or an 'active delaying' mindset.

These expected behaviours broadly corresponded with three groups, according to participants' attitudes to and willingness to transition to low carbon heating: early, middle, and late adopters. Most participants fell into the 'middle adopter' group in this research, but further quantitative research would be needed to draw conclusions on the relative size of each group.

Early adopter attitudes and expected behaviours

Some participants considered themselves likely to be 'early adopters', intending (as far as they could reasonably expect) to replace their current system with low carbon heating. Many of these participants saw themselves as ready now or almost ready with some reassurance, and expected to transition before or around 2028 to take advantage of the BUS.

"I'd like a heat pump for this house, if it doesn't work out too expensive and there is still the grant in place which I hope there will be" On gas grid, male, 18-34

Making the transition to low carbon heating early

These participants expected to transition the next time their current system required replacement, as long as a cost/benefit analysis considering installation and running costs is at least broadly in favour of transitioning. The additional considerations outlined above would also need to be broadly in favour, or at least not present significant barriers to making the switch.

Getting the home ready pre-transition

Other expected behaviours for this group included taking incremental steps to increase their home's suitability for low carbon heating. These included upgrading underfloor heating or radiators, and having insulation assessed and if necessary upgraded. Participants highlighted benefits of these behaviours and the cumulative impact of doing several: all were expected to improve comfort and efficiency in the home straight away, and reducing the cost and disruption required when installing a new system by taking some steps in advance. This is consistent with findings from behavioural science such as the goal-gradient effect, which identifies the power of incremental steps to encourage effort towards a goal or task⁵.

Middle adopter attitudes and expected behaviours

Another group of participants were not as open as the group above, but were not set against transitioning before regulations might require them to. In some scenarios, they would expect to replace their current heating system with a low carbon alternative. However in others, they would expect to make a like-for-like replacement and then transition to low carbon heating for the replacement after this.

⁵ Kivetz, R., Urminsky, O., & Zheng, Y. (2006). The goal-gradient hypothesis resurrected: Purchase acceleration, illusionary goal progress, and customer retention. *Journal of Marketing Research*, 43(1), 39–58. <https://doi.org/10.1509/jmkr.43.1.39>

These participants generally expected the cost-benefit analysis to improve in favour of transitioning before the possible 2035 date, but were uncertain about when parity would be reached, meaning their intended behaviour varied by currently unpredictable circumstances.

“I think I would get one if the sums added up. I wouldn’t want to be the guinea pig though so it won’t be in the next few years” On gas grid, female, 35-54

Delaying making a decision around low carbon heating

Participants in this group expected to delay making decisions around low carbon heating, without necessarily ruling it out. This was generally the expected behaviour in situations where no emergency replacement was needed, for example if a system was coming to the end of its expected lifespan but still functioning effectively.

Cheaper like-for-like replacement as a bridge to low carbon heating

Participants also considered their expected behaviours when needing to replace their current heating system while there is uncertainty over alternative low carbon heating options coming to their area in the future. (For example, if needing to replace a gas boiler imminently but with hydrogen or a heat network potentially coming to their area soon). Some participants expected to replace their current system with a relatively inexpensive fossil fuel system as a bridge until the alternative was readily available. This was felt to be important to avoid investing in a heat pump and undergoing significant disruption and cost of installation. Some other participants also felt this would be an option if they intended to have a heat pump installed eventually, but were not yet confident that the supporting infrastructure such as maintenance technicians is sufficiently in place.

“It might be better to wait if I could, or get a cheap and cheerful [gas] boiler, if they’re going to rip it up to put in hydrogen soon anyway” On gas grid, female, 18-34

Participants stressed the importance of ensuring residents of local areas have as much detail as possible about potential low carbon heating options, and with as much advance warning as possible. This was seen as essential to allow consumers to make informed decisions, and to minimise delays caused by consumers deciding to ‘wait and see’ what options become available.

“I think I would wait and hope something else turns up” On gas grid, female, 55+

Emergency or reluctant replacements with fossil fuel heating

Participants also expected there to be some scenarios where they would need to replace their existing system with a like-for-like, despite being ostensibly willing to transition. This was expected if waiting for low carbon heating was not feasible, such as requiring an emergency replacement with a long lead time for installation. (This was cited as a particular concern for landlords with tenants in situ, who would not have the ability for a major refurbishment.)

Some participants also expected that they, and other consumers, would be unable to afford to transition until total upfront costs come down. These participants considered some reluctant like-for-like replacements to be inevitable unless costs move closer to parity.

Late adopter attitudes and expected behaviours

Finally, some participants expressed a desire to avoid transitioning if at all possible, and taking active steps to delay the transition (compared to more passive delays outlined above).

Generally these participants were not intending to move house again, making resale value less of a concern. They were also likely to be living in homes they felt would be very difficult to retrofit low carbon heating to (but were not confident of being granted an exemption). These participants were also typically more sceptical about Net Zero and less trusting of the government's intentions in this area. Participants in this group were also generally older, in some cases feeling that decisions about heating for after 2050 were less relevant to them.

Replacing with fossil fuel systems just before regulations

Participants in this group often voiced a determination to replace their fossil fuel boiler as near as possible to the possible 2035 regulations, in order to extend the time they could use this system as much as possible. Most of these participants remained open to low carbon heating alternatives if they could meet the required criteria discussed above, but did not trust that this would be feasible in time.

“Right now I'm thinking I'm getting a new gas boiler in 2034” On gas grid, male, 55+

Taking steps to extend the longevity of their fossil fuel system

Some of these participants also expected to take further steps to extend the time they could use their existing system rather than transition. Potential examples included stocking up on replacement parts in advance or purchasing a 'spare' unit in advance to keep until required. Some participants also speculated about potential black market sales of fossil fuel units if a ban on fossil fuel sales is implemented.

Selling homes rather than taking a decision

Some of these participants also voiced a potential preference to sell a home when the fossil fuel system comes to the end of its lifespan, to have someone else take the responsibility for the replacement. This was voiced most often by landlord participants, who predicted that they and many other landlords would choose to sell their properties rather than incur the expense and disruption of fitting low carbon heating.

*“I would just sell up if I was made to spend this much money on every property.”
Landlord, on gas grid, female, 55+*

Supplementing fossil fuel systems with other heat sources

Some participants also expected to supplement central heating with another source such as a wood burner, if fossil fuel sources become prohibitively expensive after 2035. Participants considered purchasing storage heaters or using wood burners as a supplementary source of fuel rather than transitioning to low carbon heating.

Importantly, participants who reported intending any or all of the above behaviours were generally confident that many others would do the same. This meant they were confident in still having enough support available to facilitate their choice such as technicians still working with gas boilers in mid-2040s.

Moving home versus installing low carbon heating in their current home

When considering future behaviours, participants predominantly imagined themselves to be making the decision about either their own home, or a home they are likely to have moved into over the next few years before low carbon heating is installed.

Some participants did note that moving into a home with an existing low carbon heating system would be ‘a relief’ to avoid the cost and disruption of transitioning, as well as the benefit of having a lower environmental impact. As long as performance and running costs were broadly comparable to (or better than) their current heating system, participants were happy to move into a home with low carbon heating and would consider this a positive attribute if choosing a property.

“If I could move in tomorrow, and it [low carbon heating – tech not specified], as long as it works fine and my first bill isn’t ridiculous, that’s perfect” On gas grid, male, 35-54

“It’s putting the thing [a heat pump] in I can’t bear the thought of. If someone else has done the work for you, that’s great.” Off gas grid, female, 18-34

4.5 Information and communications to support the transition

This section discusses findings on the information and communications participants wanted to see around the transition to low carbon heating.

Key findings:

1. While lots of general information about low carbon heating is available, participants struggled to find answers about what might be required for their home and saw messaging on this as an important ‘gap’.
2. Providing clarity on the steps required to get homes ‘ready’ for the transition (especially related to insulation, where relevant) was overall seen as the most important message for government to communicate in the short term.

3. Participants felt that a combination of central government and other messengers would be most effective for communications.
4. Despite acknowledging trade-offs, participants overall wanted communications to start as soon as possible and to focus predominantly on heat pumps in the short term, while not ignoring other technologies.

Participants struggled to find tailored, relevant information

Participants were consistently surprised at the amount of information available online, from a broad range of different sources, when conducting their own research into low carbon heating between workshops. This contributed to participants' emerging understanding over the course of the research (discussed above) that low carbon heating is already more established and widespread than they initially assumed. When conducting their own research, participants were easily able to find details including high-level guides to different technologies, details from manufacturers, and upfront costs. Participants predominantly highlighted that detail about heat pumps and biomass boilers were easy to find compared to heat networks and hydrogen boilers, as would be expected considering the maturity and availability of each technology.

However, participants consistently struggled to find answers about what might be required to retrofit a low carbon heating system to their own home. While understanding that an in-person consultation would be needed to give definite answers, participants struggled to find guidance or examples on the factors that they would need to consider to make a system viable and affordable. This was further exacerbated by the variation in quotes for installation, with installers offering widely varying quotes on the extent of work required to retrofit the home. Participants highlighted the need for more information and guidance in this area before a widespread call to action is made by the UK Government.

“There is information out there but it’s harder to find what’s relevant to this house, it’s got some things I’d have to take into account.” On gas grid, female, 55+

Participants also struggled to find relevant information on the expected running costs for homes broadly similar to their own, which prevented them from gaining an understanding of the long-term financial implications of transitioning to LCH. Several participants voiced a desire for some form of tool which would enable them to input factors such as characteristics about their home and current spending on energy, to give an estimate of expected running costs.

Value of information on gov.uk

Participants generally found information on low carbon heating from gov.uk to be helpful as an overview, but limited in specific figures and more individualised information. A small minority of participants found the list of trusted installers on the government website, which they liked, and this was mentioned spontaneously by other participants throughout the workshops as a resource that they would want. However, there was some scepticism around example and average costs on gov.uk because they did not align with figures given on other websites, such as those of suppliers.

“I looked at local installers and the quotes were about double what was being quoted by the 'average' figures the government are saying it will cost” – Off gas grid participant, female, 55+

Because some participants found such a wide range of information available (sites and search terms used are detailed in Annex 6.2), some wanted one place where they could find all the answers to their questions. Some participants felt that gov.uk should be expanded as a central hub for information about low carbon heating including tailored guidance and directories of certified installers. As discussed above, participants were also keen for signposting between low carbon heating and insulation resources, and felt that a central hub for all home upgrade information should include this.

Overall, the government website has the potential to be a valuable resource amidst a lot of ‘noise’ online, but is currently lacking in the level of detail desired by participants.

Impact of information gaps

This gap around reliable and tailored information did undermine confidence in low carbon technology for some participants. Participants felt that it would be difficult to feel reassured when making a hugely significant decision in an information environment without feeling confident in the work required to fit a solution to their home. Participants rarely said this would directly put them off choosing low carbon heating, but contributed to a sense that they might be better off waiting for the industry to become more mature and widespread.

“I’d feel better waiting until there are examples – something which shows a house this age, this space, this kind of layout, plumbing this old – here’s a video of where they put it, here’s a testimonial. At the moment they’re asking you to take the plunge without that” On gas grid, male, 55+

Some participants also voiced that having a clearer sense of a national ‘plan’ would give them more confidence in their own contribution to this.

“You’d want something to give you that reassurance, this is the big plan [for Net Zero] and this is your little part of it where you can make a difference” Off gas grid, female, 35-54

Desired messaging from government and others

Participants acknowledged potential advantages and downsides to the timing of widespread government communications around low carbon heating. Starting communications as soon as possible was preferred overall to delaying, in order to provide the public with as much notice as possible and tackle the idea that households should ‘wait and see’ how technology develops while sticking with fossil fuel heating for the foreseeable future. Participants did acknowledge that there will be some unavoidable uncertainty in communications in the short term, for example until a decision is made over hydrogen in 2026, but did not see this as sufficient rationale to delay.

Potential messages for government campaigns, or other communication methods, were not directly tested in the research. Themes emerging from the discussions indicated that the most important messages participants wanted to hear in the short term were:

1. Increased awareness about insulation grants and the support available. Participants felt that widely publicising information they had learned through the research about grants and support should be the highest priority.
2. Providing clarity on the steps required to get homes 'ready' for the transition, and encouraging more people to take these steps. Some participants felt that most households would not yet be ready to invest in low carbon heating, but incremental steps could make the transition less overwhelming and simpler at the point of eventually making a decision.
3. Reassurance that in some cases low carbon heating will already reduce running costs, and is therefore a positive option when the current system needs replacing (rather than waiting for the replacement after next).

Other messages were also seen as important, including: increasing awareness of the transition timeframes, the performance benefits of individual technologies above fossil fuel systems, and addressing concerns about the technology not being 'ready yet'.

In the longer term, participants felt that the most important messages to be communicated by government will be: greater reassurance or detail on which homes will be exempt, the timing (and cut-off dates) for grants after 2028, and keeping the public up to date with progress made already as the transition gathers momentum in order to bolster the case for individual households to act. More broadly, participants needed to be reassured that the public were not the only group being asked to make changes to reach Net Zero.

"Are we the low hanging fruit, easy to make us change but harder to make a big factory change" – *On gas grid, female, 55+*

Potential messengers

Participants felt that a combination of central government and other messengers would be needed for communications. Central government was seen as important to be the 'lead messenger', as the driving force behind the transition and responsible for making the key decisions. However, this was balanced by a lack of trust in government and a degree of scepticism that there would be consistency if the government changed.

Participants felt that there was a gap between government and businesses for a trusted but independent source of guidance. They were cautious about having to rely too extensively for information on businesses which have a strong financial incentive to encourage them to transition to low carbon heating. Some participants mentioned the Energy Savings Trust and Citizens Advice as potential sources of advice and guidance, but questioned if these organisations would have the resources available to advise every household requiring

assistance with low carbon heating. This led some participants to consider that a new agency or body would be needed to fill this gap.

“Ideally someone expert, trusted but impartial, who can say this is all the options, what grants are available, and here’s what’s best for your home. I’m wracking my brains for who [the right messenger is] but I don’t know if they really exist” On gas grid, female, 35-54

“I’m not going to an energy company for trustworthy advice, after the last few years” On gas grid, male, 18-34

The role of local government was divisive. Participants acknowledged that local authorities would have better knowledge to localise a low carbon heating strategy by leveraging in-depth knowledge of the local housing stock. Local authorities were also expected to have a better understanding of vulnerable households in the area and could therefore assist with deploying additional targeted support. However, there were significant doubts from some participants over the capacity of local authorities to help due to ongoing resource constraints. Ultimately no consensus was reached in this research on the role of local authorities as a messenger to encourage low carbon heating, although this was potentially caused by the limited time available to cover this topic.

Potential tensions around communications

Participants were divided about the importance and potential efficacy of ‘myth busting’ messaging to tackle misconceptions about low carbon heating. In particular, some participants felt that it will be important for communications to tackle the perception that heat pumps are noisy for households installing them and their neighbours. Other participants, particularly with personal experience living near a home with a heat pump, felt that this is a significant and legitimate concern with the technology. These participants were sceptical of any messages which minimised or dismissed concerns about noise as these were felt to directly contradict their own experiences. For some, this undermined trust in Government communications on the topic of low carbon heating.

“But they are noisy! I walk past them every morning, I’m not a liar” Off gas grid, female, 35-54

Participants were also divided on the extent to which communications should focus predominantly on heat pumps, versus on the broader range of technologies available. Overall, most felt that as the only viable current technology for most homes, heat pumps should be prioritised in campaigns. Some felt that too much emphasis on other technologies could distract or encourage people (including some of our participants themselves) to wait for more clarity before taking action, risking inertia. However, participants were also keen for the government to acknowledge the importance of choosing the best low carbon option for each type of home where necessary.

“I think it [a potential campaign] should be saying, look it’s probably a heat pump for you. If you’re this other kind of house it’s something else. Don’t worry, we’ve

got a plan that recognises this is complicated and difficult. But it's probably a heat pump." On gas grid, male, 35-54

5. Conclusions

Overall, participants were broadly supportive of the UK's ambitions to achieve Net Zero, and over the course of the research came to understand the crucial role for low carbon heating in this. However, participants were daunted by the scale the challenge of the transition, both at a national level but more pertinently for their own home. Additional concerns were mentioned relating to the success of the transition, including the cost-of-living crisis, low trust in government and low trust in energy companies. Having said that, participants generally became open to considering low carbon heating before a scenario where regulations might come into place in 2035.

Some participants saw considerable challenges with the low carbon options currently available to them (heat pumps, and biomass boilers for some). These challenges were most significant around the cost and disruption of installation, as well as uncertainty over running costs, a lack of control, a lack of installers, and efficacy of these technologies in certain homes. Timing also presented a significant challenge. Some participants had a sense that current low carbon technologies, particularly heat pumps, were 'still evolving' and not yet at a threshold where they can feel comfortable making the significant decision to invest. This related to the development of the technology itself and the supporting infrastructure such as technicians.

Government was seen as needing to take a lead role in shaping policy directions and creating a comprehensive joined-up plan, as well as regulating business and providing support and direction to the public. Most participants felt that the government should maintain and increase support and communications to facilitate households choosing low carbon heating for their next replacement.

However, many did not consider the available technology or themselves to be 'ready yet' to transition ahead of possible 2035 regulations. These participants wanted to see government providing clarity on incremental steps required, included the extent to which upgrades to insulation are required. As well as providing this clarity, government should then be encouraging and supporting incremental steps framed specifically around getting homes ready for low carbon heating. As well as having tangible benefits now, these incremental steps could reduce barriers to low carbon heating for a future replacement by making the retrofit less expensive and less daunting.

Participants acknowledged there are trade-offs around the timing of communications, ultimately concluded that mass government communications should begin as soon as possible. This was seen as necessary to maximise the time the public has to get ready for the transition.

Participants also identified the potential need for a new body or agency, to fill a perceived gap relating to advice and guidance: currently none were aware of any organisation which could provide sufficiently relevant (tailored to their home) and independent (no financial incentive) advice and guidance for consumers about the transition. Participants felt this should be broader in focus than just low carbon heating, covering insulation and other potential energy-related upgrades to homes as well.

Participants struggled to predict their future decisions when considering the potential mix of currently existing and future options. Some raised that government should be cautious about the potential for creating inertia as consumers delay to 'see what happens' in their local area. When considering future behaviours, most participants anchored their expected decision-making around the question of whether they are replacing their current heating system with low carbon heating, or the one after that. Participants also considered moving into a home with low carbon heating already, which was seen as highly appealing to avoid the disruption.

Some participants also expected to delay installing low carbon heating for as long as possible. Some were more passive in their intentions, intending to delay making a decision such as installing a heat pump and hoping another alternative would turn up. However, a small minority expected to engage in active steps to extend the length of time they could use a fossil fuel system, such as timing their replacement just before possible regulations. These participants were confident others would do the same, highlighting the need to create strong social norms around transitioning.

Value of deliberative research

When asked to reflect on the research, participants were consistently positive about the process. They stressed the importance of government engaging with and listening to members of the public in forums like this one, and were positive about the timing of this research (i.e. conducting research over 10 years before possible regulations come into play). This was felt to indicate long-term thinking and a willingness to consider the views of the public early in the decision-making process. While the research highlighted many issues and challenges with the low carbon heating options currently available, participants hoped that these issues would be known and addressed by government and industry in time, with research like this playing a contributing role.

Participants also consistently expressed that taking part in deliberative research had been hugely valuable to them personally, in allowing them to understand the transition and how this will impact them in the future. Participants suggested that more of this research should be done closer to possible regulations, in particular with a range of vulnerable audiences who might face additional barriers and may not be engaged by mass communications from government. Some also highlighted the importance of similar public engagement on the topic of hydrogen specifically, in relation to decisions being made on its use in the UK.

“Definitely feel like I’ve had the opportunity to give my views, now I hope they are taking them into account” Off gas grid, female, 35-54

“This kind of process is essential. Obviously you can’t do it with everyone in the country, but it’s so important to make sure people feel heard. And I think we’ve had really good suggestions just from this group” On gas grid, male, 55+

6. Annexes

6.1 Full methodology

Scoping

Evidence review and stakeholder interviews

The initial scoping stage consisted of a brief review of recent research reports and policy documents to ensure that this research built on an understanding of previous research and a detailed understanding of the current and potential policy environment. Following this, a series of interviews and small group sessions with relevant DESNZ stakeholders were conducted. These discussions allowed the project team to further develop its understanding of the policy environment and the potential trade-offs between different options.

Materials development and cognitive interviews

The purpose of the deliberative process is to provide a space for individuals to understand, engage and reflect on issues, to ensure that views expressed are considered and nuanced. It is therefore also important that deliberation is supported by effective engagement materials. Both of the previous activities fed into the development of the materials for the deliberative workshops.

Following the development of the materials, eight cognitive interviews were conducted to ensure that the materials communicated ideas clearly and encouraged engagement. The interviews took place online and lasted one hour. Although it was not possible to fully replicate the workshop approach in these interviews, the majority of the materials were presented to participants to assess their effectiveness. Participants for these interviews were recruited to represent a range of views, including those who self-reported having low levels of concern towards climate change.

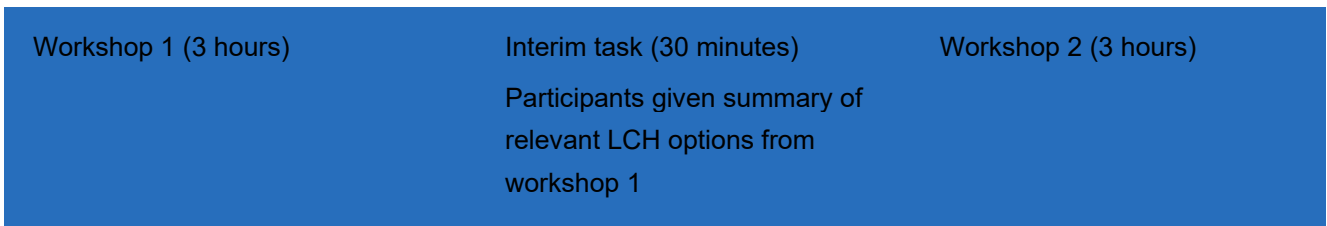
Deliberative workshops

This main stage of the research consisted of five reconvened online workshops conducted with on gas grid and off gas grid homeowners and landlords. All groups were conducted online via Zoom in October and November 2023 and moderated by Verian. DESNZ representatives also attended the workshops to observe discussions. Topic guides and stimulus materials based on the findings from the initial scoping stage were developed by Verian and agreed with DESNZ.

All participants were also asked to complete an interim activity in their own time between workshops.

Each workshop was a mixture of plenary sessions and breakout groups. Three moderators each led a breakout group of six to seven participants (two groups with either four or five participants for landlords). Workshop 1 introduced the low carbon heating context and started discussions of the options available. The flow of the workshops was designed to introduce scenarios on possible regulations and low-carbon heating technologies, for context around the transition rather than to capture specific views on each technology. The interim task gave participants time to reflect on workshop 1 and conduct their own research to try and find the answers to any questions they may have had. Workshop 2 took place two weeks after workshop 1. It involved discussions on the role of government, industry and the public in the transition and introduced hypothetical scenarios to gauge feelings towards the transition and to understand how people may behave in specific situations. The workshop topic guides and interim task structure are summarised in figure 2 below.

Figure 1 Workshops structure



Introduction Icebreaker - participant introductions in breakout group, discussed how they heat their home Set context - Net Zero definition and targets, 17% emissions figure Discussion of LCH options Timelines - grants, affordability of heat pumps Advantages & barriers Reflections - final poll, introduced interim task	Part one: Reflections on workshop 1 What was most surprising? Have you changed your mind on anything from before the workshop? Any questions? After workshop 1, did you discuss anything related to LCH? Who with and what did they think? Part two: Low carbon heating in your home Respondents conducted their own research to try to find the answers to their questions Feelings about switching to LCH, pros and cons	Introduction – recap, poll Reflections on interim task – answers to questions from workshop 1, feelings on switching to LCH, comparison of heating sources Transition challenge - motivators and barriers, how to overcome them, roles of government, business and public Supporting the transition - policies, grants, guidance, industry upskilling Thinking through changes – scenarios Feelings towards switching to LCH across different timeframes, government communications Final reflections – final poll
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Sample and recruitment

The total target sample was ninety participants across the workshops - the final number achieved was eighty-four (see Table 1). The sample included a range of heat sources, income, region, age, and attitudes towards the environment and technology. One to two participants in each workshop had a heat pump installed. The workshops were split into on gas grid and off gas grid homeowners to enable discussions and supporting materials and low-carbon heating options to be tailored to each group.

The research aimed to recruit a small sample of landlords (n=10) and achieve nine, who took part in a separate workshop. Landlords were split into breakout groups of on gas grid property owners and off gas grid property owners. Due to this sample size, findings relating to landlords should be taken as indicative with more research needed into the specific considerations of this group.

A decision was made to include a small number of participants who used direct electric to heat their homes within the off gas grid workshops. Although this group is not considered to be

using fossil fuel heating and therefore in scope of a possible fossil fuel phase out, it was decided that it was still important to hear their views on the transition given they may change the source of their heating in future or consider moving to a new property.

Table 1: Summary of the sample achieved

Type of group	Region	Quota characteristics	
Off gas grid home-owners 2x groups, n=37 total	England – Mix of North and South	Primarily heating oil – also some using liquified petroleum gas, direct electric heating, n=2 with heat pumps, primarily rural	Mix of income – including some in fuel poverty Mix of age / lifestage – (including vulnerable older) Mix of attitudes to the environment Mix of attitudes to technology (incl. early adopters) 1-2 in each group with heat pump installed
On gas grid home-owners 2x groups, n=38 total	England – Mix of North and South	Mix of rural and urban, n=2 with heat pumps	Mix of income – including some in fuel poverty Mix of age / lifestage – (including vulnerable older) Mix of attitudes to the environment Mix of attitudes to technology (incl. early adopters) 1-2 in each group with heat pump installed
Landlords 1x group, n=9: 5 on gas grid, 4 off gas grid	England	Half on gas grid Half off gas grid	Mix of attitudes to the environment Mix of attitudes to technology (incl. early adopters)

Analysis and reporting

Following the workshops, a thematic analysis was carried out by Verian researchers. This analysis involved research teams extracting key themes from the notes taken by each moderator during and after each workshop, workshop recordings, and analysis discussions with members of the research team. These data were organised into an analysis framework and evidenced with verbatim quotes from participants. Researchers then conducted further analysis to synthesise the findings across the five participant groups and interim tasks, which were categorised and analysed using a similar framework. This analysis was able to highlight

commonalities and variations between groups, both pre-defined groups (used to structure the sample) and group characteristics derived from findings emerging from the research.

Findings were organised into interim and then full presentations for DESNZ colleagues, with ongoing input from DESNZ researchers throughout the process.

6.2 Technology specific detail

Heat pumps

Initial perceptions of heat pumps were mixed, with some participants having heard something about the technology.

Some participants had already heard about efficiency benefits of heat pumps, however many found this hard to conceptualise without specific examples of the financial savings. Providing constant heat without extra running costs was initially counterintuitive, with participants assuming that this must cost more. With additional detail and hearing directly from participants with direct experience, constant heat was seen by some participants as a benefit. Some participants then saw heat pumps as significant upgrade from fossil fuel boilers, as long as other concerns (detailed below) could be addressed.

“I think if it actually works as described it sounds great, I can see how it’s an upgrade compared to rationing out the heating for a few hours a night” - On gas grid participant, male, 35-54

Some participants also mentioned high, potentially uncertain installation costs, raising concerns about potential requirements for new radiators and piping as well as the cost of redecoration. Several participants had heard anecdotal evidence that heat pumps were noisy, or lived near heat pumps and found them to be a disturbance. Several participants raised aesthetic concerns, feeling heat pumps would look ‘industrial’ and make outdoor areas less pleasant to spend time in. This was a particular issue for some participants with limited outdoor space who felt they would effectively lose the ability to use this.

“a lot of people prioritise the aesthetics and a giant noisy heat pump outside, however energy efficient it is, it isn’t necessarily that attractive, and the work that you then have to do inside your house... It would be all my problem and therefore I don’t have any interest.” – Off gas grid, female, 35-54

A similar concern around space was raised by those with smaller properties with limited storage who were concerned about finding space for a water tank. Some participants had heard from friends or neighbours with heat pumps that theirs were unable to heat the house and hot water to the extent they would prefer. Concerns about working in cold temperatures and damage from extreme weather were addressed through information provided between workshops and participants’ own research.

“My husband's a refrigeration engineer. We've spoke about heat pumps, and he's been a fridge engineer for 30 years and he will not touch, would not touch a heat pump because he says they are inefficient, they're not reliable” – On gas grid, female, 55+

However, for those participants who did not have these concerns, this was often due to the combination of awareness of the ongoing improvements in heat pump technology and information around the benefits of making their properties heat pump ready in advance of the transition. In particular, participants hoped their concerns around aesthetics and noise could be addressed by developments in the technology. Participants also assumed that performance and efficiency would improve over the next generation of heat pumps.

However, this sense that heat pump technology is still improving was linked to the idea that it does not necessarily have all the desired support infrastructure yet and was taken as a reason to delay switching to low carbon heating. Participants felt that it will be important for the government (and other messengers communicating about heat pumps) to emphasise how much progress has been made already in developing the technology.

Another major issue participants raised around heat pumps, when initially introduced to the technology, was the issue of trusted, qualified installers. Participants initially highlighted the perceived lack of a well-known mark of confidence for heat pump technicians (an equivalent to gas-safe). Importantly, this was down to a lack of general awareness of MCS rather than participants thinking that there was no accreditation at all for installers. Some participants did find MCS-accredited lists of suppliers when completing the interim task, which did provide reassurance.

There were concerns about current availability of technicians, although some were positive about training schemes shown in the research. Some participants had been quoted for heat pumps and were surprised at the variation in quotes (in cost and different installers disagreeing what works were required). There were also concerns that households installing heat pumps will be left ‘on the hook’ for poor quality work with no further subsidy to correct this.

“When I looked into it [during the interim task], I had so many calls every day pressurising me into getting the consultation and signing up. They've called me about 5 times today” – Off gas grid [direct electric], female, 35-54.

There were further concerns about bottlenecks in the supply chains, with some participants reporting pushy sales tactics aiming to secure deposits but then no availability for consultations for several months. This created a sense of an overheated market as installers try to take advantage of the BUS. When discussing improvements, several participants drew parallels with electric cars ‘a few years ago’: improving rapidly, but not yet mainstream enough to take advantage of economies of scale or have a robust supporting infrastructure.

Hydrogen (seen by on gas grid participants only)

Hydrogen technology was largely an unknown for participants. With few concrete examples to draw on, participants often struggled to consider it as an option for their next heating system. It

was, however, seen by some as the next generation beyond fossil fuels and heat pumps, with some participants drawing parallels with certain vehicles moving on to hydrogen as the next generation after electric vehicles.

Several potential advantages were identified. Participants saw hydrogen as relatively simpler for households to install and valued limited disruption:

“If it’s new appliances but I don’t have to rip my house up, that’s great – that’s me sold” – On gas grid, female, 18-34

Participants also felt that a transition to hydrogen would shift the emphasis onto government and industry and lighten the burden on individual households.

However, there were several concerns and additional challenges around hydrogen. Participants felt that they had less reassurance on cost than with other technologies, even when moderators explained that cost-effectiveness is a factor informing the decision around the viability of hydrogen. The environmental benefits were also less clearly understood than other low carbon heating technologies, particularly the potential inclusion of carbon capture and storage.

There were also concerns about the ability of government to implement hydrogen, with several participants expressing scepticism over the Government’s ability to achieve large scale public infrastructure projects, even if they were desirable, often HS2 was given to evidence this point. Some participants therefore described themselves as ‘torn’, seeing hydrogen as potentially the most desirable technology from their own point of view due to minimal disruption but also the least likely to be implemented successfully.

Some participants also raised safety concerns, even after moderators provided reassurances, that ensuring safety is a key pillar of the decisions to be made, there were doubts over the ability to prove long term safety. Several participants drew on examples of hydrogen bombs or the Hindenburg, although for some participants, that the decision over hydrogen was not being ‘rushed’ alleviated these concerns. While acknowledging that decisions about safety and economic viability would ultimately be made by the Government, participants felt that it will be crucial for the public to be engaged throughout as part of the decision-making process.

“When I hear the word hydrogen I automatically put the word bomb next to it, really scary stuff... I also don’t like the idea of burying carbon dioxide, sounds like a disaster waiting to happen” – Landlord, on gas grid, female, 35-54

Heat networks (seen by on gas grid participants only)

Participants had low levels of awareness of heat networks, with few indicating any interaction with the technology prior to the research. Initial perceptions of heat networks varied considerably by property type with participants expressing positive attitudes when thinking about flats or new build developments, but being more reluctant to consider heat networks for already existing homes.

A key benefit for some participants was the idea that they would ‘not have to think about it’, that a centralised heating system took some of the responsibility, especially over maintenance and repairs, away from them:

“There is something appealing about the simplicity, you just pay every month and don’t have to worry about a sudden bombshell that it’s broken and you have to pay to fix it” – *On gas grid, female, 18-34*

Others identified the ability for the network to switch to a different (potentially lower carbon) energy source as another benefit which would allow for future transitions to greener energy with minimal disruption. Participants understood they would have limited control over this.

However, there were several areas in which participants expressed concerns over heat networks. Numerous participants articulated concerns about disruption if their area transitioned over to a heat network, highlighting that this would lead to disruption both inside their home and in the surrounding area. Several participants expressed cynical attitudes over the ability of local councils, who were assumed to be responsible, to deal with this process, citing persistent inabilities to keep roads in good repair. As with other low carbon technologies, participants expressed concerns over cost and being unable to switch energy provider leaving them vulnerable to price hikes. Participants were reluctant to lose agency and control, and felt the only ‘control’ would be to choose whether or not to move into the property with a heat network, at which point they would no longer have any say.

“I’d really worry about being on the hook to one company and not being able to switch” – *On gas grid, male, 18-34*

These fears were partially addressed by additional information provided in the second workshop, where moderators clarified that new regulations were currently being developed but did not as yet have a timeframe. While encouraged to learn that regulation was being developed, participants felt that they would ideally want to see additional detail on this in an easy-to-understand format before feeling confident in moving to a property with a heat network.

Biomass boilers (seen by off gas grid participants only)

Some participants had experience with a biomass boiler, with a few knowing someone with one or having looked at buying a house with one installed, whilst others had read about them or knew about other types of buildings (predominantly non-domestic such as schools and village halls) which used them. This sense that it was already a fairly established technology mitigated concerns about the availability of qualified technicians which had been raised around other low carbon heating technologies.

For some participants, biomass boilers shared positive associations with log burners. These participants indicated that biomass boilers seemed ‘cosy’ and more ‘natural’ or ‘organic’ than a heat pump. This was linked to ‘romantic’ notions of ‘fetching wood’ for the heating system:

“Something quite romantic about it, old fashioned but not in a bad way. It feels back to nature more than the other one [heat pump]” – Off gas grid (direct electric), female, 35-54

However, some participants had reservations around biomass boilers, most significantly around the space required and associated disruption to the home. Participants in smaller properties were concerned that the biomass boiler would take up too much room, especially given the storage requirements. Many participants with LPG or oil boilers had homes with rooms specifically designed to house these systems and associated storage, or had converted rooms themselves for this purpose. This caused concern that larger biomass systems would be impractical or impossible to fit into homes.

In contrast to those participants with romantic associations, some felt that biomass boilers were ‘going back a step’ to older, less advanced technology, drawing comparison between the storage requirements and those historically required for coal. Participants were concerned about the effort required to load, arrange deliveries of fuel and move this from storage. There were also related concerns about a lack of control when compared to LPG or oil boilers, with participants saying they felt biomass boilers may be more vulnerable to supply chain problems. Some participants said that they currently timed their yearly purchase of heating fuel to coincide with dips in the price, suggesting that they would be unable to do this with biomass and so become more vulnerable to fluctuations in price.

“We try to time it to buy oil at the time of year when it’s cheaper, with this you wouldn’t have any control if there’s a shortage or the price rockets up” – Off gas gridt, female, 55+

Additionally, some participants were doubtful about the environmental benefits, feeling that burning wood is counterintuitive when considering low carbon methods of heating their home. There were related concerns about the transportation and packaging of pellets with a few participants citing anecdotal evidence that some pellets were imported from abroad.

Off gas grid participants had concerns about whether the availability of biomass boilers would prevent their homes from securing an exemption (more detail in section 4.2 in ‘Suitability of different homes’).

6.3 Detail from interim tasks

Interim task summary

During the interim task, participants were asked to conduct their own research to try to find answers to the questions they had around low carbon heating following workshop 1. Almost all participants focused this search on heat pumps, considering this to be the most likely technology they would install in their home. Some participants also conducted their own

research into hydrogen, but due to uncertainty around the decision did not get far in researching what this would mean for their own home.

Some spoke to people they knew who already had low carbon heating and some contacted their energy supplier for quotes, but most conducted an internet search to find their answers. Most questions people had were cost-related (upfront costs, running costs, costs of additional work required to property etc.) and some wanted to know more about the environmental impact of switching to low carbon heating. Specific internet searches included:

“Cost of low carbon heating”

“Heat pump boiler [name of location]”

“Is every home suitable for a heat pump”

“Air source versus ground source”

“Is a heat pump consultation free of charge”

Participants easily found information around low carbon heating online but found it difficult to know which sources to trust. They were surprised by how much information was available, but the number of different sources could sometimes be difficult to navigate and conflicting information between sites lead to confusion around which to believe. The most mentioned source was the ‘Energy Saving Trust’ website, but many other websites were also mentioned including a mix of comparison sites and hubs, energy companies websites, gov.uk and others:

- Octopus
- YouTube
- Green Match
- Gov.uk
- Greenbuildingrenewables.co.uk
- EDF
- Renewableenergyhub.com
- iheat.co.uk
- International Energy Agency
- The Green Age
- Uswitch
- Checkatrade.com
- Which?
- Valliant
- Green Peace

Despite the abundance of information available, participants were still left with unanswered questions after the research task.

Upfront costs were easily found by some, either online or from their supplier, but costs of additional work needed to their homes and running costs were more difficult for people to figure out. This left participants unsure that running costs would in fact be reduced in the near future.

After the self-guided research task, some participants said they would still stick with their current heat source, primarily because they believe it to be the more cost-effective option for them right now. There was generally a feeling that 'now is not the right time'. However, there was an openness to switching to low carbon heating in the future with the expectation that the technology would get better and cheaper. Landlords were less open to switching than others and more likely to want to stick with a gas boiler in their rental properties. Those who did say they would switch to a heat pump or other low carbon heating source were motivated by environmental benefits as well as a desire for 'future proofing'.

"Not changed mind but more informed" - Off gas grid, male, 35-54

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