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Business, Energy
& Industrial Strategy

The Future of Heat

Findings from deliberative workshops with the GB public on the transition to low-carbon heating

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Executive Summary

This report presents findings from a series of deliberative workshops [1] exploring public awareness and perceptions of a transition to low carbon heating. A particular focus was placed on people's attitudes towards different approaches for implementing a low-carbon heating transition and of the technologies involved.

The findings are based on four workshops with 134 participants across England, Scotland and Wales held in January and February 2020. Two of these workshops involved participants that were predominantly living in homes on the gas grid, and two with people living in homes that were entirely off the gas grid and predominantly using high carbon heating technologies (e.g. oil, liquified petroleum gas (LPG) and coal heating).

Workshops were designed to provide and facilitate discussion on a common set of introductory information on carbon emissions and climate change, the contribution of domestic heating to carbon emissions and details of various low-carbon heating technologies and what switching to these might entail. The on-gas grid workshops then focused on discussing a range of possible approaches to, and implications of, a transition to low-carbon heat.[2] The off-gas grid workshops focused on four hypothetical regulatory approaches that could be introduced to help phase out high-carbon off-grid heating[3]. Where relevant, findings therefore vary accordingly to this difference in emphasis.

Qualitative findings are derived from methods designed to explore issues in depth in targeted populations or places and make use of non-numerical data. We have used purposive sampling to achieve range and diversity amongst those in our workshops which means findings represent the specific views of these participants and cannot be taken to be the views of the public at large. Whilst we deliberately avoid giving numerical values, the data included helps us identify trends in the meanings and explanations behind people's attitudes and verbatim quotes are selected to illustrate salient points. This makes these findings helpful for understanding where there were high levels of acceptance or agreement on the points discussed that can be suggestive of similar attitudes amongst the public as a whole. These findings can also be used to facilitate deeper insight into why there might be a relationship between variables that are traditionally be established through survey methods.

There was a high level of acceptance on the need for a heating transition

Participants across workshops responded positively to the idea that targets were set to reduce carbon emissions and help mitigate the effects of global warming. People were less aware of the contribution domestic heating makes to carbon emissions and about low-carbon technology in general. However, whilst initially having some reservations about how achievable meeting targets would be, participants were largely supportive of and understood the urgency of the need to address how they heat their homes through using new technology and associated policy change. Throughout the discussions, people quite commonly identified

[1] Deliberative workshops are a form of facilitated group discussions that provide participants with the opportunity to consider an issue in depth, challenge each other's opinions and develop their views to reach an informed position.
[2] Specifically, we asked participants what they thought about making changes to their home, the timing and planning of any transition, and choice of low-carbon heating system.
[3] These were: (i) a ban on the sale of new fossil fuelled heating systems, (ii) mandatory change of heating system during other major renovations, (iii) mandatory change of heating system prior to selling a property, and (iv) an outright ban on the continued use of fossil fuel heating systems.

an environmental and societal imperative to make change as most important in driving their views.

People thought UK Government leadership would be necessary

When invited to discuss their views on how any large-scale approach to transition should be managed, participants in all four workshops thought UK government leadership would be necessary. However, they wanted to see citizens engaged with the government's work to ensure local contexts and public views are incorporated Participants felt less certain that local authorities would have the resources or capacity to oversee something at scale and also believed that some centrally driven arrangements would be needed to ensure everyone took appropriate action. In those workshops in devolved nations some concerns were raised that UK government were potentially too distant to understand the specific contexts of people living in some parts of Scotland and Wales. However, these views were also relevant when people discussed rural communities, so it was not clear whether the main driver of these views related to devolved powers per se or were bound up in broader concerns about geography. However, there was a general sense that all UK nations should be acting in parallel on this agenda and indeed that societally people were (or should be) in it together in their responsibility to reduce carbon emissions.

Analysis of people's views however suggests some tension between their preferences towards a centrally planned approach through which associated decision making might be government led and retaining personal choice and freedoms on anything from the choice of technology to how the transition might happen for them. This ranged from aversion among some individuals to what they saw as the government interfering in personal decisions about their home to slightly broader concerns about how individual citizens could have a voice in such major change. Despite this, through considering levels of disruption or particular regulatory scenarios, participants appeared to converge in their view that they would defer a degree of personal choice and freedom as necessary to enable government to take big decisions.

Views on low-carbon technology varied in on- and off-gas grid workshops

In on-gas grid workshops people were quite occupied with the familiarity and usability they attributed to their current heating system, viewing specific alternatives as more alien or unusual. People were therefore concerned with the unfamiliar and were in some instances looking for reassurances to increase their confidence that any transition would work for them. They also gave less attention generally to weighing up the pros and cons of different options – citing a preference that rather than have choice over technology, they would just want the system that was most efficient and environmentally friendly. In contrast, participants in the off-gas grid workshops spent more time deliberating on the merits of different technologies and were more generally in favour of heat pumps rather than biomass boilers. These reservations were due to the size and the challenges of fuel storage. Respondents also expressed concern about whether biomass systems could be considered carbon neutral, sharing their thoughts that a lack of trees in the UK means having to import from overseas as well as issues about flues being easily blocked.

Participants also more broadly discussed their views on other implications of a transition. On-gas grid participants had a preference for limiting disruption to the home caused by the transition and participants demonstrated greater willingness to lose choice on when any changes would be made if that allowed for lower disruption.

In off-gas grid discussions, participants agreed that legislation would be necessary to ensure a transition happened and felt that changes should only be imposed when individuals have the

finances to do so. There was also convergence on the idea that financial support from the government should be available. People diverged in their views on the timetable for any policy-led changes and whether enforcement would be effective.

People's preferences for a transition

Participants were asked to consider whether their attitudes and preferences to the different aspects of a transition they were discussing would change or become stronger when asked to consider how they interact. For example, would people accept a greater degree of disruption to their home if they could choose when that disruption would happen.

For those in on-gas grid properties:

- People were more concerned with the day to day changes implied with any new technology than with the disruption related to installation. For example, people who currently had gas appliances indicated they would accept a level of disruption to their homes if they could keep a cooker that was similar to their existing appliance
- Being able to limit the level and length of disruption to the home was seen as more acceptable than having a choice over timing of when they are disrupted
- People thought it was more important to have a centrally planned transition than have a personal choice on what low-carbon technology they might use. Participants just wanted the most efficient technology available and thought that without central planning some individuals might not act, which would be detrimental to the purpose of transition.

For those in off-gas grid properties, preferences were linked people's priorities when faced with the introduction of potential policy scenarios. These were:

- Having choice over which policy scenarios they would be subject to, for example replacement of heating system on sale of the home, was more important than the costs they would be subject to as a result
- Choice on the timing of any actions they would have to take to change heating systems was also considered more important than the costs involved of that change
- Financial support for changes in technology being available to all, with no cap on earnings

Overall, participants thought there should be a fair distribution of risks and benefits for everyone

A theme that appeared at a range of points across workshops were people wanting to see a fair distribution of benefits and risks in any transition. This was seen when discussing financial implications, the timing of any transition and in terms of the impact on personal circumstances or particular groups.

In off-gas grid workshops, the timing implications of the range of policy scenarios considered was a particular point for discussion. Participants were clear in their views on acceptable timescales on for example, the banning of fossil fuels, and these views were based on what they thought would be fair to residents in terms of time to plan and save for the associated costs. For on- and off-gas grid workshops respectively, people were also concerned that benefits of moving to more energy efficient systems should be available to all and processes would need to ensure that no one was left behind. A phased roll out was considered to confer

benefits for the majority of people in terms of time to prepare or save up for costs of works as well as ensuring that learning from early adopters could be incorporated for others.

Advice from trusted and independent sources is favoured

Trust and trusted figures, particularly those deemed independent of government or business, featured across workshops in terms of who people would want advice from on their options. Participants also identified a role for independent experts in any local advice giving or supporting local consultations. People also generally thought there was a need for greater awareness raising of both government targets on carbon emissions and the contribution of domestic heating.

Overall, the deliberative workshops demonstrated that, whilst people are largely supportive of the need for a heating transition, the public have important views on how a transition should be implemented. For example, they think leadership from UK government will be necessary, but they would like to see citizens engaged with the government's work to ensure local contexts and public views are incorporated. People were also clear on the importance to them of independent and expert advice, to help people understand and make good choices about new technologies. For those on the gas grid, we heard that people understand that disruption is necessary, but they would rather be able to limit how much they experience than have a choice on when it had to happen. For those off the gas grid, choice on the timing of changes was in fact more important for participants, even more so than the upfront costs of installing new technology.

Using a deliberative format was a useful way to share technical information with participants and allowed us to generate insight as to what people think after they have had the chance to consider this new information and discuss and exchange their views about it.

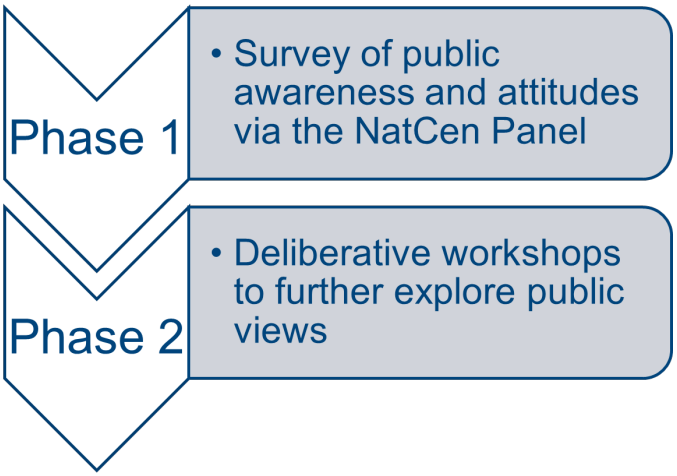
Introduction

In January 2019, the Department for Business, Energy and Industrial Strategy (BEIS) appointed the National Centre for Social Research (NatCen) and Eunomia to undertake research exploring public views on a future transition to low-carbon heating. This exploration involved:

- gauging levels of awareness about the need to transition;
- exploring current level of understanding about the need to transition and some of the technologies available to do so; and
- investigating attitudes to various possible elements of such a transition.

The research was undertaken in two distinct phases as shown in Figure 1 below. Phase 2 was conducted jointly for BEIS and the Scottish Government.

Figure 1. Phases of Research



The results of Phase 1 have been reported and published separately.

This report presents findings from a series of deliberative workshops, conducted for BEIS and the Scottish Government, exploring awareness and acceptability of a transition to low carbon heating amongst the general public.

The findings that follow are generated from four workshops with 134 participants across England, Scotland and Wales held in early 2020. Two of these workshops involved those living predominately in homes on the gas grid, and two with people living in homes off the gas grid and using high carbon heating technologies. A full glossary of terms used in the report is included in Appendix B.

Background to the research

In June 2019, following advice from the Committee on Climate Change, the UK Government set a legally binding target to achieve net zero greenhouse gas emissions from across the UK economy by 2050. In doing so, the UK became the first major economy to legislate for a net zero target. Reaching this target by 2050 will allow the UK to respond to the latest climate science which tells us that a 1.5°C increase in temperature is the absolute limit for a liveable future. It should be noted that the Scottish Government's target is for Scotland to reach net zero emissions five years earlier, by 2045.

For over 40 years, the UK has relied primarily on natural gas supplied through the national grid to heat buildings. Heating and hot water in buildings account for around a third of the UK's

energy consumption, and just less than a quarter of greenhouse gas emissions. With such a large portion of our country's emissions coming from heating, delivering low carbon heat is a very important part of UK climate and energy policy. With 85% of UK homes currently on the gas network[4] (and a further 5% relying on oil, liquefied petroleum gas, or coal as their primary source of heat), decarbonising heating requires a fundamental change to enable a transition away from a reliance on fossil fuels towards low-carbon energy sources.

There is likely to be no single technological solution for this transition. There are a range of different transition pathways available, both in terms of the mix of technologies and how the transition is implemented. However, it is not yet clear which combination of technologies and routes to decarbonisation will work best at scale, cost-effectively or with the widest overall benefits. The decarbonisation of heat is expected to have considerable impacts on much of the population. This includes making some homes and other buildings more energy efficient and installing new technologies such as, potentially, hydrogen boilers, heat pumps and biomass boilers. The transition to low carbon heating could also require people to change how they engage with their heating system.

In December 2018, BEIS released a report entitled *'Clean Growth – Transforming Heating: Overview of Current Evidence'* which presented a review of the evidence on the options to decarbonise heat[5]. The report identified the need to increase wider public awareness of low carbon heating and its importance for wider UK climate commitments. The report committed BEIS to explore options for engaging with stakeholders and the wider public in the development of heat policy. This need for public engagement is further highlighted in the 2019 Committee on Climate Change's (CCC) *Progress Report to Parliament* which also identified it as a key issue in decarbonising buildings[6]. The report highlighted low levels of public awareness of the need to move away from natural gas heating and what the alternatives might be. It also highlighted a limited window to engage with people over future heating choices, to understand their preferences, and to factor these into strategic decisions on energy infrastructure. Recent research for BEIS[7] and for the CCC[8] that has attempted to understand public awareness and knowledge of this topic has also indicated low awareness of low-carbon heating technologies and heat decarbonisation's role in reducing emissions.

Both phases of this research have therefore responded to the need to engage the public on their awareness and the necessity to transition to low carbon heat.

Workshop Aims

Our Phase 1 survey explored current public awareness, understanding, and attitudes towards a future heating transition, as well as preferences and perceptions of specific elements of possible transition pathways. The workshops addressed similar themes by gathering in-depth evidence on public attitudes and the acceptability of specific elements of a transition, and explored the reasoning and values underpinning these.

[4] Department for Business, Energy and Industrial Strategy (2018) *Clean Growth - Transforming Heating*
[5] As above
[6] Climate Change Commission (2019) *Reducing UK emissions: 2019 Progress Report to Parliament*, July 2019
[7] Department for Business, Energy and Industrial Strategy (2018) BEIS Public Attitudes Tracker: Wave 28 Key Findings
[8] Madano (2018) *Public acceptability of the use of hydrogen for heating and cooking in the home*, November 2018,

In this context, we were interested in two main research questions (adapted from the aims and questions set in Phase I which can be found in Appendix A)

1. What are people's attitudes towards different possible approaches of implementing a low-carbon heating transition and the technologies involved?

2. What factors have an impact on people's potential support for these transition options and technologies involved?

The workshops were designed to provide a common set of information relating to different possible approaches to implementing a heating transition (outlined in the section on Methodology) and support discussions between participants on:

- what people thought about possible features of a heating transition (e.g. changes to their home);
- what trade-offs people might be prepared to accept between different aspects presented (e.g. changes to their home and choice on when these changes might happen); and
- what people thought was important in making decisions about and supporting the management of any transition.

Methodology

To generate insight from the general public about awareness and acceptability of a transition to low-carbon heating, deliberative workshops were held in four locations across the country. Deliberative workshops are a form of facilitated group discussions that provide participants with the opportunity to consider an issue in depth, challenge each other's opinions and develop their views to reach an informed position. This approach was selected to allow researchers to facilitate discussion on the underlying drivers or values that might inform people's positions and perspectives.

The fundamental changes associated with a move to low-carbon technologies will have different impacts for people currently on (around 85% of the UK population) and off (around 15%) the gas grid. We held four workshops in early 2020; two were with people living in properties on the gas grid (within one hour's travel of central London & Edinburgh), and two with people living in properties off the gas grid[9] (within one hour's travel of central Aberystwyth and Aberdeen). The areas were chosen to ensure some variation in geographical region and rurality.

Each workshop had 35 participants and quotas were used to obtain a diverse sample of ages, levels of educational achievement and tenure type of participants (see Appendix D).

Workshop Design[10]

Workshops were four hours long and involved a mixture of plenary sessions and small group discussions (See Appendix C). Whilst all participants received the same information in the opening plenary on the overall context and rationale for a transition in heating, the workshops nevertheless had distinct aims in order to reflect the different considerations that on and off gas grid participants would have, and subsequent plenary sessions were tailored to reflect the following aims:

On-Gas Grid: Explore people's views and priorities for a transition to low carbon heating and the features and implications of the potential low carbon technologies.

Off-Gas Grid: Explore people's views and priorities for a transition to low carbon heating and the features and implications of a number of rules and regulations that can be introduced to phase out high-carbon off-grid heating.

Group discussions were audio recorded with participants' permission and table facilitators kept detailed notes.

[9] Our recruitment strategy was to sample participants who were using high-carbon heating systems such as oil, LPG or coal and all potential participants were asked a question about this. In some cases, participants also had multiple heating systems (e.g. electric as a back-up). During the workshops it became clear that one or two participants were not using high-carbon systems suggesting they had not answered the recruitment question accurately. Most in the workshops were using high-carbon heating systems.

[10] NatCen were responsible for the overall design and delivery of the workshops, with input and reviewing carried out by the Department for Business, Energy and Industrial Strategy (BEIS) at all stages. Eunomia brought their expertise in energy policy and understanding of public engagement to design the workshop inputs and brief NatCen staff on the technical content delivered.

The section below summarises the key content participants received or were asked to discuss.

Presentation 1: All participants saw an introductory presentation outlining the impacts of climate change; the need to limit the impact of carbon emissions; and current UK legislation (including commitments devolved in Scotland) and high-level international agreements designed to do so, e.g. the Paris Agreement 2015. Participants were also told about the UK's net-zero targets.

Presentation 2: In all workshops, select low-carbon technologies were introduced (see Table 1 below). For each, a brief overview was given:

- Main features of the technology
- Changes required to energy networks (e.g. replacing pipework)
- Anticipated impacts on the home (e.g. changing radiators, new insulation)
- User experience
- The benefits and sustainability aspects of the technology

Participants were not given any explicit timeframes for transition implied by these different energy futures. However, in the off-gas grid workshop, the UK government's intention to phase out the installation of high carbon technologies in off-gas grid properties during the 2020s was mentioned.

Participants were not given any specific information on costs. This was due to difficulties in being specific about the costs of different options but also to encourage participants to focus their views on other aspects of energy transition. The exception to this was a statement in the off-gas grid workshop that suggested that homeowners may be likely to pay the majority of costs associated with the transition, with potential support from loans or grants[11].

[11] As with all hypothetical policy scenarios introduced in the workshops, (discussed further below), this statement did not necessarily reflect a confirmed government policy approach, but rather introduced a theoretical policy option for the sake of stimulating discussion.

Table 1: Low-carbon technologies for consideration

Workshop Type	Technology	Key elements presented [12]
On-gas grid only	Hydrogen Gas	Hydrogen gas could in future be used as a fuel in condensing boilers to generate heat. It is produced using industrial processes and is a zero-emission fuel at the point of combustion, with water as the output. Introducing hydrogen gas to the UK would involve significant disruption during the transition period, potentially including road works to replace existing gas pipes, and requiring homes to be disconnected from the gas mains for several days while pipes are purged, and gas-burning equipment is replaced or adapted. It is expected that hydrogen gas would function very similarly to natural gas from a consumer perspective and would not necessarily require significant home renovations.
	District Heat Networks	District heating is a system where multiple homes are networked together to share heat energy. One or more central heat sources, e.g. a large boiler or heat pump, heats water which is circulated through a network of well-insulated pipes buried underneath the streets into each home. Homes would be required to install a heat exchanger where the network enters the home, to capture the heat from the network. This would work similarly to an existing boiler through the customer perspective, though might be smaller in size. Individual homes on a district heating network would be unable to switch provider.
Both	Heat Pumps	Heat pumps are pumps that use electricity to extract heat from either the ground or air. 'Air-to-water' heat pumps generally comprise an outdoor unit, and an indoor unit, which connects to the central heating system in the same way a boiler does. Ground source heat pumps consist of a buried ground loop, connected to an indoor or outdoor heat pump unit. In both cases, a hot water tank is generally required. Heat pumps are zero-emissions if the electricity used to operate the heat pump is decarbonised. There would be a few days of disruption to install a heat pump, but people may need to upgrade their homes to add insulation, larger radiators or underfloor heating in readiness, in order for a heat pump to be able to operate efficiently.
Off-gas grid only	Biomass Boilers	Biomass boilers are boilers which burn sustainably grown wood and crops; as the amount of carbon dioxide emitted when wood is burned is the same amount that was absorbed over the months and years that the plant was growing; this fuel is carbon-neutral if new plants continue to grow in place of those used for fuel. Although there are some carbon emissions caused by the cultivation, manufacture and transportation of the fuel, as long as the fuel is sourced locally, these are much lower than the emissions from fossil fuels. Biomass boilers can be used in a similar way to existing boilers (such as LPG or oil) but require space for storage of (e.g.) wood pellets and property accessibility for deliveries.

Participants in all workshops were asked to share and discuss their initial thoughts on the information in Table 1 in their small groups. They were also asked to reflect on what messages they thought would be helpful and what sources of evidence or advice they would most trust in the future in this area. Respective workshops then concentrated on two different aims, further described below.

[12] These descriptions were produced by Eunomia with NatCen for use in the workshops. They do not necessarily reflect the reality of energy futures which are still undecided.

People who live in On-Gas Grid properties: features of a heating transition

The main discussion in these workshops explored people's views on specific areas of a heating transition. These were:

- what people thought about the potential changes to their homes
- how a transition should be planned and managed and;
- levels and nature of choice on low-carbon technology

To support deliberations, participants were given a short presentation that described the different features of possible transition approaches and were invited to discuss the pros and cons as well as features they would be more or less supportive of. Participants were also invited to consider whether there was a particular combination of aspects they would be more or less supportive of.

People who live in Off-Gas Grid properties: policy scenarios

The main discussion in these workshops was focused on four hypothetical policy scenarios that the UK or Scottish governments could in theory adopt in order to move towards reducing carbon emissions from domestic heating. These were:

Scenario One: A ban on the sale of fossil fuelled heating systems Under this scenario, fossil fuel heating systems would not be permitted for sale for properties off the gas grid in the UK from a certain date. This would include banning the sale of oil, coal and LPG boilers. Manufacturers would stop making these sorts of systems for the UK market, and installers would be unable to install these systems in UK homes.	**Scenario Two: Renovation and replacement** Regulations would outline that households carrying out notifiable building or renovation works within their property would be legally obliged to upgrade to low carbon heating after a specific date. Notifiable works include those that require full plans application, building notice procedure, approved inspector procedure, demolition notices, and civil engineering projects requiring planning permission.
Scenario Three: Selling the property Under this scenario, after a certain date, before a property can be sold, it would be required to have a low-carbon heating system installed.	**Scenario Four: Fossil fuel use ban** By a certain year in the longer-term future, fossil fuel would not be permitted for use throughout the UK for heating properties off the gas grid, and coal, LPG and heating oil would be banned. Respondents were informed that this option would likely take place alongside the other scenario options.

These discussions therefore focused on people's attitudes and thoughts towards these theoretical possibilities as well as what each might imply in practice, for example in relation to the changes to people's homes or the timescales for policy implementation. They were also asked to discuss the pros and cons of different approaches and any challenges they foresaw (and for whom). Participants were then invited to consider whether there was a particular combination or sequencing of policy they would be more supportive of and why.

Analysis

Notes taken during the workshops were transcribed and spot checked for accuracy against the audio recordings. These data were organised into a thematic framework which broadly

followed workshop protocols. Data were then further categorised into higher level themes across the pairs of workshops from which the detail of findings has been developed. Audio recordings were also revisited to confirm verbatim quotes.

Workshop Overviews

This short section descriptively summarises the general points covered in each workshop, labelled by the location in which the workshop was held. It offers a brief overview of the discussion and stated priorities of participants. More detailed analysis can be found in the chapters that follow. Across all four workshops, participants had mixed levels of awareness of the need to transition and the role of domestic heating in carbon emissions. The evidence presented on the context for legislative targets and the options for new heating systems was generally well received and participants engaged positively with the information presented.

London | 32 participants

Overall awareness of low carbon heating technologies was relatively low. However, being in an urban centre, some participants were particularly conscious of pollution and its negative impacts on residents' health. Perhaps due to being in a city with a huge range of property types, attendees of the London workshop expressed concern around the impact of different building and tenancy types on the transition process. For example, questions were asked around how individuals in council or housing association properties would fare in a transition, in terms of their levels of choice and control in the process. Those who lived in flats expressed concern about the amount of space some new technologies would require, and that lack of space may rule out certain options. There was some interest in the existing use of district heating in London, and a desire to know more about this. Many stated a preference for central planning through government or an independent body to ensure that changes were implemented. Certain key priorities for a transition were shared across the groups, including efficiency, disruption and cost. The efficiency of technology was felt to be a key consideration in terms of both carbon emissions and cost, whilst financial support for individuals through a transition was felt to be vital to allow people to make a switch. Groups discussed disruption in relation to how a transition would impact local infrastructure, individual homes, and might create the need for people to temporarily move out of their homes or take time off work, all of which were major concerns.

Edinburgh | 32 participants

In the Edinburgh workshop, overall levels of engagement amongst participants were high and the briefing materials were well received. As in the London workshop, whilst people had a strong awareness of climate change in general, there was less awareness of low carbon heating technologies. There was some scepticism around the dates set out by the UK Government to meet certain targets to reduce carbon emissions, and the government's ability to implement such huge changes. Indeed, this lack of faith in the government to deliver public projects and initiatives was also reflected in people's experiences of local governments' management of projects. A number of local initiatives were cited as being unsuccessful, and some respondents pointed to a lack of meaningful consultation with local residents. There was some concern about the overall cost of a transition, and how it would be funded. Despite this, there was consensus across those who attended the Edinburgh group that central planning was the only feasible way of getting a transition 'done', and that if people were given a lot of choice, it wouldn't happen. In general, participants weren't very concerned about disruption. Instead, they felt that if the public was informed of the changes in a timely and effective manner, it would generate public support and facilitate a smooth transition process. People stated

that they would need to be provided with more information about the different technologies than they had during the workshop and would also like to have a clear timeline. Good management of the transition, along with use of the most efficient technology, would make disruption more acceptable. Finally, participants across the groups raised a number of practical considerations in regard to low carbon technologies, including their safety, reliability and upkeep.

Aberystwyth | 34 participants

Compared with the on-grid workshops, overall awareness of low carbon heating technologies was quite high amongst participants at the Aberystwyth workshop. Attendees felt it important for decisions to be taken at a local level as local people have a better understanding of their area's needs. For this reason, some felt that it would be most appropriate for local councils to lead the implementation of new policies, which would allow flexibility to implement policies most appropriate to individual areas. However, others expressed a lack of faith in local government to do so effectively. Some participants also had concerns around 'Westminster' potentially leading a transition and referred to difficulties with government-planned environmental projects in Wales, such as the rejection of subsidies for the Swansea barrage tidal lagoon power plant. Overall, it was felt that rural communities could often be ignored in policy decision making. There was a desire to use the transition as an opportunity to revitalise UK industry and produce new technologies locally and to generate new jobs. However, some were concerned that specialists who would carry out the work of upgrading heating systems may be primarily based in cities like London and less available in places like Aberystwyth. The policies in general, however, tended to be viewed more positively when they affected the industry as a whole, and not just individuals. In terms of individual decision making, personal recommendations and word of mouth were highly valued, and the input of independent experts was also seen as important, though the need to be truly independent of the government was stressed.

Aberdeen | 36 participants

In the Aberdeen workshop, there were mixed levels of awareness about heating in relation to climate change. Participants felt that a ban on using fossil fuels would make it very difficult for people to live in certain rural areas (such as the highlands and island areas of Scotland) and may encourage a move to more urban areas. Some suggested that people living in very remote areas should be exempt from a switch because of the difficulties involved in planning the transition. Otherwise, a staggered roll out, prioritising urban areas first, would give rural regions more time to prepare and plan for a transition. As in the Aberystwyth workshop, participants felt that rural areas tended to be forgotten in decision making. Some felt strongly that any new policies should not be implemented in Scotland and rural areas first but should be a UK wide policy. This was based on a lack of trust in the government and the view that Scotland was often used as a 'testing ground'. Some felt local councils would understand local environments better, though there were also concerns about the funding available to them, and how that could affect the quality of transitions in different areas. A community approach to a transition was generally popular, and similarly to the Aberystwyth workshop, word-of-mouth was highly valued as a means of gathering information and supporting individual decision making. In terms of levels of individual choice, there were mixed views. Some felt that people would be more amenable to change if they were given some choice, whilst others suggested that the

only way to make change would be to remove choice and enforce a switch. In general, people felt that individuals would need more information than was provided in the workshops, along with a clear timeframe, in order to plan effectively.

On-gas grid workshops

This chapter introduces findings from deliberations with respondents who live on the gas grid in proximity to London and Edinburgh. The focus of these workshops was to explore participants existing awareness about the need to transition to low-carbon heating systems and introduce three new technologies for consideration; hydrogen gas, heat pumps and district heating. Participants were also asked to consider specific areas of an energy transition that the government were currently thinking about and wanted workshop participants to explore. These were:

- what people thought about the potential changes to their homes
- how a transition should be planned (including questions of timing) and;
- levels and nature of choice on low-carbon technology

Throughout their discussions, participants generally agreed on the need for a heating transition as well as the importance for the needs of specific groups (e.g. older people) to be better understood. There was a preference for limiting disruption to the home during the transition and participants demonstrated greater willingness to lose choice on when any changes would be made in order to do so. Participants were also keen to limit the influence or benefit to business that would seek to make profit specifically out of a transition. They agreed on the positive role of evidence and impartial experts helping people make good choices. They also converged in their view that the type of low-carbon technology they might switch to was less important than it being the most efficient in order to maximise the effect on reduced emissions.

Participants were more divergent in their views on the role for government in a transition – at once agreeing government should take a lead role, whilst also expressing a preference for degrees of local control and with no overall agreement on the best forms this might take.

Understanding the need to transition

Respondents came to the workshops with an existing awareness on the evidence for climate change and a varying level of understanding about the need to change the way we need to heat our homes. A few people had already heard about the necessity to transition to low-carbon domestic heating, mostly through items watched on TV or through what children were learning about at school. There were also a few examples of where people thought the problem of high emissions was primarily caused by industry, vehicles or using too much electricity and hadn't particularly considered their home heat as a source of emissions.

People were broadly in agreement and accepting of the evidence about the need to transition. However, they had questions about the economics of a project at such a scale and the feasibility of UK government achieving the targets they had just heard about. There was also some ambivalence about how trusted the government were to deliver an initiative like this or how it would be enforced. For example, one person raised the idea that through targeting change in domestic heating, it felt like the government were putting the onus on the public to 'sort out our energy'. This was accompanied by a less positive feeling across a few groups that people would have no choice but to make a transition.

There were low levels of pre-existing knowledge of low-carbon technologies and some people's immediate thoughts were related to the cost, disruption, longevity of different systems and the skills gaps (for industry as well as in terms of domestic use) that would arise. However, participants appeared to agree that there was a clear case for the government legislating to ensure people made big changes to tackle climate change. There was also broad agreement across both workshops that tackling climate change should be the most important consideration in any choices or changes that would arise.

Who was or should be responsible for taking steps to tackle climate change was a related theme with many agreeing a global effort was necessary and '*all countries need to act for it [reducing emissions] to be successful'*. Some participants thought the problem lay with other countries – citing China, the USA and India. There was also a view that the UK is only a small island and so 'can only do so much' in terms of climate change. Scandinavia was given as an example of an area 'way ahead' of the UK in terms of low-carbon technologies.

Whilst people didn't initially agree in their views on the role for UK government and other parts of the world, different groups talked about the moral argument for acting to reduce emissions even if other countries are not and thought the UK could set an example in these efforts.

Changes to people's homes

Impact on home and space

Unsurprisingly, people expressed reluctance to make major changes to their property, and this view was stronger in examples where works such as the laying of wooden flooring throughout had recently been completed. Another aspect of change was the physical space that might be taken up by new technology (e.g. a heat pump) and accommodating modifications such as larger radiators. There was some discussion that people living in relatively smaller properties might not have the space required and some concern about the impact to the home if people would still have to adopt such technology in these cases. Some participants drew on experience of having seen/used heat pumps before in holiday accommodation and thought they had taken up a lot of room.

Perceptions about the impact of changes on their home also varied across different groups and types of tenure. For example, there was a view that younger homeowners were likely to move so would prefer not to make extensive changes on properties they were not going to stay in longer term. Equally, people raised questions about how easy it would be and how great a change would be required to retrofit older homes, flats and tenements. There was also a more limited discussion about how changes could impact the value of a home for owners. This related to scenarios where people could select different systems (as opposed to a uniform solution), and a belief that preferences would be a consideration when buying homes. People also had longer term concerns that should a system be chosen which subsequently 'fell out of favour' as new or different technologies emerged, this could impact the ability to sell a home.

Whilst these concerns were mostly due to changes to the physical fabric of the home, there was also a clear sense that people were also thinking about change in terms of 'user experience' related to the familiarity of existing systems and technology. People largely expressed a preference for their existing heating systems and technology, such as gas cookers and found it hard to imagine having an alternative.

> *"Trouble is a lot of people love a gas hob because it's so easy to control. You know I mean a lot of the new houses have all got these induction, but I don't think you can beat a gas hob… [someone else speaks, agreeing] … Gas is just brilliant, you turn it off and that's it, it's done… Couldn't imagine not having one."*

Heat pumps in particular were described as 'alien' and contrasted with what is currently 'normal' in terms of heating systems. Whilst one more minority view was that people would resist accepting changes such as electric cookers, there was also a belief people might be more inclined to accept a change to any type of technology on the understanding it was a necessary requirement in mitigating climate change. Drawing on the presented information about the changes to the existing gas network and the general feeling of wanting to stick with what was familiar, a system like hydrogen, which most closely mirrored this was discussed in favourable terms.

Participants speculated about what it would be like on a day-to-day basis to live with a different technology. They agreed it would be useful to have a more concrete sense of what the impact on daily lives would be. The changes implied also raised questions across workshops about the reliability of technology and whether new systems could provide for everyone. For example, whether upgrades to the infrastructure needed for heat pumps could leave a period where there was a risk the system couldn't meet peaks in heating demand, or the heat supply would be vulnerable to power cuts. One person raised their concern this could lead to heat rationing or limiting energy use in the home to ensure enough supply for everyone.

Disruption

The disruption associated with changes to heating systems, including additional works elicited a varied discussion. Participants talked about the mess and inconvenience that would result from material and installation works as well as more practical aspects such as who would carry out the works. There were also some concerns raised about the potential for residents to be scammed by independent or private (i.e. non-government supplied or approved) contractors.

Participants reflected on whether the disruption caused by the transition would require personal changes, such as moving out of their homes for a period or taking time off work. Whilst on this point they felt they lacked detail – and to a degree, some understanding of why this would be necessary – there was some discussion that if properly supported this would be something people could manage. Suggestions included employers giving people time off work, as is done for jury service or possibly a compensation scheme that government would oversee.

> *"Well you'd have to square that at government for something like jury service where, you know, you can get paid for - or it's the employer's obligation to pay you for taking time off."*

Another point made on practicalities was whether moving out of the home (to install the new technology), for example, might be enforced, with some concerns about how heavy handed this would have to be and some scepticism about how this might be managed at scale. Beneath this was some inference that disruption might not be experienced 'fairly', and people would be frustrated if they were making efforts to change if others were not.

For all participants, disruption for vulnerable groups was a key concern and an important area for the government to consider specifically. This included carers and people with caring responsibilities (one participant had a disabled child) as well as families and older people. Participants had questions around how vulnerable groups would be supported during periods

of disruption, especially in a transition to hydrogen gas. Having to physically move out of the home as well as the possibility of not having heating/hot water for extended periods were particular concerns. Staggering the transition for vulnerable groups so it could happen over the summer was suggested. Participants thought that more practical and social support would be required for these groups to avoid 'heavy stress'.

There was some disagreement across the workshops around how acceptable it was that people were disrupted during a transition. Whilst discussion included the views that disruption would cause 'carnage' and was to some extent unlikely to be fair to everyone, many people seemed clear and committed to the need for the transition. This included the view that:

> *"The next decade is what counts ... if we don't make major changes in the next decade it'll be irreversible"*

As part of this discussion, respondents distinguished between *length* and *degree* of disruption, which in some cases opened up some contradictory views. For example, in one workshop participants favoured being less disrupted even if that meant they installed a less efficient technology. This was despite efficiency also being cited as the underlying rationale for change. In the same workshop, limited disruption was also preferred over the choice of when the work might take place. As discussed in the preceding section, people were generally keen to limit anticipated changes to appliances and aspects like existing pipework as this correlates with a lower degree of disruption. There was a view held by a few respondents that overall, 'more than a week' would be an unacceptable length of time for being disrupted.

A more positive view on acceptability of disruption emerged when participants were thinking more explicitly about the need for change. Participants correlated the climate emergency with needing to act urgently and felt that giving the public information about what is happening, and raising awareness, could lead to greater acceptability of disruption. They also believed that new systems were likely to be more energy efficient and had the potential to reduce costs in the long term, which on the whole they agreed justified disruption in the short term. In the context of reducing emissions, a few participants felt the length or degree of disruption shouldn't be an important consideration in transition, but it was important that people had enough time to plan and manage it.

Control over timing and planning

Following these discussions, participants were invited to consider what they thought about the timing of any possible transition as well as their views on how it should be planned and managed. This discussion included both individual considerations as well as those at a wider scale. Changes and decisions at scale were very much framed implicitly by participants as being the remit of government(s) whether that be in terms of setting (or enforcing) a legislative agenda or a more direct role in implementation.

Timing

The most distinct themes with respect to the timing of the transition were communication and potential issues of fairness, which people associated with a staggered roll out of new technology. On the first of these, participants were clear that they would need to know as soon as possible if a transition is going to happen and this should be accompanied by government sharing a long-term timetable. Participants assumed transition would be led by the UK government; this was based on the legislative commitments outlined at the start of the

workshop. There was no real counterview about other actors driving or having overall oversight of a change at this scale.

Some groups were however sceptical that government could keep to a promised timetable and there was some belief that these changes would take longer than people were told. This was raised in the context of a discussion about the government's overall targets for reducing emissions being unrealistic.

There was limited discussion about what participants thought about having control or choice over the timing of changes, although one group felt most people would want to transition over a summer period to avoid disruption over colder periods, something they acknowledged would be difficult to achieve. On the whole people felt the scale and nature of the transition meant they were not realistically likely to have much personal choice and there were some citizens, such as council tenants, who they assumed would have even less of a say. As indicated in the section above, choice over timing was seen as less important than disruption associated with transition. People generally agreed that if they could limit the duration of disruption, they would be happier to trade off choice of when it happened.

A discussion on the sequencing of any transition raised some points about fairness. One option participants were supportive of was that higher emitting areas could have new systems rolled out sooner, to save money and contribute to energy efficiency at the same time. Another option perceived as sensible was transitioning region by region. This was thought to be particularly logical in the case of systems like hydrogen gas or district heating where people, whether in council or private homes, would need to be switched at the same time.

There was a limited (and inconclusive) discussion on whether some groups would be disadvantaged by a staggered roll out – for example, viewing early adopters as somehow being able to benefit sooner from saving money on their heating bills by using more efficient energy systems.

> *"If it's sold as saving money, or financially beneficial, if you're the last to get it, you feel like ... you're going to be the last to benefit"*

> *"Be interesting if they could phase the bill, like the billing, so that everyone has the same from the start of the phasing to the end, so that no body is missing out in terms of getting a more economical [deal]"*

Similarly, a few people were suspicious that based on ability to pay – those more comfortably off might get ahead and install a new system which they thought would mean they could spend less money on their heating. There was a general sense of 'no one left behind' with participants indicating that they thought it important that everyone could take advantage of the new energy futures transition. One group suggested incentives might be offered to homes to go 'first' or 'last' based on the perception that there were benefits and disadvantages to transition.

Despite the lack of agreement on the benefits or disadvantages of a staggered roll out, people were in agreement that if this approach was taken, it could act as a piloting model so that subsequent areas might benefit from more developed systems or possibly reduced disruption as installation and systems become smoother.

Planning

The majority of deliberations on the topic of planning concerned whether this should be led centrally or locally. Whilst there were no immediately clear conclusions at the start of discussions, people were generally in agreement that local areas would all require different solutions and planning should not be left to individuals, as people would be very unlikely to make change if they had a choice. Despite this, participants themselves felt it was important that 'normal people' (i.e. ordinary members of the public) should be included in some way in planning processes.

In their deliberations, respondents settled on central government making decisions for everyone as the potentially better choice to manage transition as they thought this would result in quicker decisions and directions for change. However, respondents were almost equally as uncertain about how this role for government could reflect local variations and choices which they thought were important. Participants in Scotland were concerned that any decisions taken 'in Westminster' would not always take account of their local circumstances – a situation they thought might results in less of a say on choices on how a transition would happen.

The preference for a centrally led change was also reflective of some respondents being generally mistrustful of local councils to deliver a big policy change and involve the public in doing so:

> *"They have these consultations, you tell them [what] you want and then they just do what they want anyway"*

Participants recommended that local engagement in whichever approach was taken would be important and could include anything from consultation on aspects of planning to 'jargon free' advice clinics which would help people plan and make personal choices. People were unclear on whether existing forms of consultation such as community meetings would be useful to develop consensus on any decisions available as they felt many people wouldn't attend. There was one suggestion that local voting could be put in place for something like choice of system if that was available in an area.

In England and Scotland, on the assumption that UK government would be in the lead, people also thought that planning would need to contend with how these changes could be integrated into current legislation, such as standards for rental properties and there was a suggestion that carbon efficiency standards should be added to energy performance certificates when selling homes.

One further consideration was that planning processes needed a long lead-in time, of potentially at least a year. Participants also agreed on the importance of being financially prepared for a switch and a longer lead-in period would help people save money for the changes as well as helping individuals and employers plan.

As participants were discussing the role of government, both workshops (independent of facilitator prompts) identified the possibility that an independent body – like the Committee on Climate Change – could be established to hold the government to account, particularly on any promised timetables, to oversee legislation and protect the interests of individuals[13]. People were keen to know and understand who would be responsible for these changes and wanted to see accountability in the process. People generally thought this change should be cross party and the issue not treated like a 'political football'. Participants also disliked the idea of

[13] The CCC was mentioned as part of the plenary presentation participants were given.

businesses finding ways to profit from what they clearly saw as an environmental necessity. It was also acknowledged however that a process of public consultation and setting up new independent bodies risked slowing down the process of transition overall.

One workshop also raised a few ad hoc points on their concerns for particular groups/tenure types in planning processes. For example, participants saw new builds as a priority for enforcement of using new systems and that it should be a principle that renters did not have to pay for changes.

The other main source of debate with respect to planning related to the readiness, skills and trust in the construction and gas engineering industries. Respondents discussed the likelihood that planning would need to include developing new skills for transition and had questions about whether there would be a focus on new apprentices or retraining people. Related to this, a few participants raised examples they knew of where building regulations don't currently get enforced properly and they were worried that 'cowboy builders' might not uphold the safety standards required with new systems.

The variety of considerations people gave to how a transition could be planned or managed rested on a combination of practical and value considerations. Whilst there was not strong agreement on an ideal approach, people's preference was that central planning (led by government) should be the priority, and with it accepting this was likely to overtake some individual choices and decisions.

Choices in the context of transition

Participants discussed the idea of choice in the context of transition in three main ways:

- personal choice vs collective decision making
- practically in terms of what technology they might prefer
- how much and what choices they thought individuals would have

People's discussions about choice were subject to internal contradiction. For example, whilst there was a clear area of convergence that government should take the lead on planning and decision making, people also held the firm conviction that the public need to have a say and be able to express their preferences for choices that deliver minimal disruption and cost saving benefits. There was also some confusion in views about the acceptability of restricting personal choice to support a more common approach to transition at scale. To begin with, people were split between a view that 'nothing would ever get done' if too much choice were devolved to individuals making transitions subsequently slower and a feeling that people might object, or the government risk a 'major rebellion' if people are effectively told what to do.

Respondents were also clear that the concept of choice of low-carbon technology could not be equally applied across the public and it was their view that only homeowners would really end up with choice over systems. Social housing tenants and renters were viewed as likely to feel no control over both the technology and other aspects of a transition and that their 'hands are tied' as the decisions will be taken by providers and landlords. It was their view this would solely be done based on costs.

Choosing technology

Respondents discussed the general principle that when people have access to the right information they can make good choices. However, participants identified the reality that 'ordinary people' are not experts on low-carbon heating technology and so in this case they would need additional support or input in order to do so. Local advisory groups were mentioned for example.

Respondents generally saw heat pumps as the only option in which individual choice on specific technology could be particularly exercised, as both hydrogen gas and district heating imply a more standardised requirement.

One technology discussed in less favourable terms was district heating. Participants were less certain it was as desirable as hydrogen gas or heat pumps and appeared to assume it would only be used on council/social housing estates[14]. This perception was not explored in any great detail but indicates the groups somehow thought it to be lower quality as they imagined housing providers and landlords would be most interested in whatever was cheapest. This finding is interesting as it contrasts slightly with the more general consensus that combatting emissions required change at a societal level where distinctions between technology and users were less differentiated.

Whilst participants shared some views on the merit or acceptability of different types of technology, the overall view was the type was not as important as moving forward with the 'best' and most efficient technology as soon as possible to ensure that the transition is worthwhile. This suggests that time put into informing or consulting on these routes in a public debate was considered less of a priority by workshop participants.

Restricting Individual Choice

Respondents agreed that different heating options were going to be needed in different areas and for example that heat pumps were most likely to be appropriate for rural areas. Based on the principle expressed in workshops that efficiency of system was more of a priority than individual choice, participants were supportive of the idea that the best option should be chosen at local levels, and to some degree would be supportive of them being pre-selected for them. In the words of one participant:

> *"This is where you live, so this is what you'll get".*

Whilst not directly comparable to the changes implied by new heating systems, one group used the idea of having to install smoke alarms to illustrate the principle that some things should be legislated for as they are necessary for the common good.

Accepting a potential lack of choice on technology was reasoned by scenarios such as having an expert speak to local people, hear their concerns and then decide on what is best, based on the majority of residents' views and knowledge of the area itself. People thought something like this could work if it was based on national policy, devolved to local areas. However, people revisited concerns outlined in the planning section above that this would also then be dependent on the quality of the local authority.

There was a degree of consensus on the preference for area-based decisions, but a few people discussed the possible impacts on something like desirability of places to live if one

[14] The description on district heating at the beginning of the workshop did give an example of its use in council housing

area ended up with a system that was deemed more favourable which could for example affect the property market. This raised a tension for some participants about what a more universal approach might mean for people in restricted circumstances, for example, living in a conservation area limiting the type of technology you can use, or not having the financial ability to choose where you live.

Despite this, people were generally supportive of an approach where experts made decisions based on the assumption that everyone felt 'properly' consulted. The parameters for what constitute proper consultation were only touched on and outlined in the planning section above. The section on messaging and trust below also indicates some preferences.

Issues of cost

Cost was part of the discussion on choice and people's initial preferences for technology in all cases were somewhat mediated by expense. However, as illustrated above, people's more considered thoughts on choices of technology were more strongly mediated by selecting or being given the most energy efficient options.

Cost was otherwise discussed in a number of other ways. One of those was fairness, particularly in identifying the potential uneven impact on homeowners who would have to pay for technology and associated works. This was also considered in terms of some properties needing more work than others. One group also discussed how people who might not be able to afford to pay for new heating could get financial assistance.

People also talked about choice and cost with respect to energy suppliers. Whilst these were actors not specifically introduced into the discussion by facilitators, on the whole people raised liking the fact they currently have a choice of providers predominantly as it allowed them to shop around for the right deal. They had concerns about a lack of choice dependent on the technology they would end up with and were worried that a potential monopoly on provision (and therefore prices) might develop. There was a clear need to know who suppliers would be and how they would be regulated, and one further suggestion was that nationalising energy supply under a transition could be a way to mitigate these concerns.

Other related points included the potential for 'hidden' costs as a result of transition – such as having to buy extra pots or pans for use in new cooking systems, concerns more broadly that variance in council funding means some councils may not be able to afford the cost of certain transitions, and the potential economic impact on the oil and gas industry.

Conclusion - conditions for support of a heating transition

Workshop deliberations identified a number of key factors influencing people's views on the four aspects of a switch they were asked to consider. Based on a predominantly shared agreement that a heating transition is necessary to mitigate the effects of climate change, people had a strong preference for the technology deemed most efficient by experts in terms of cost, energy and environmental impact. In line with the overriding importance of addressing carbon emissions, whilst some felt this should lessen the issue of whether people were disrupted in the switch to new technologies, particular concerns about the circumstances of vulnerable groups were raised suggesting these need tailored attention.

The points below relate to the most significant aspects that influenced people's views on acceptability of the transition to low-carbon technologies once interaction of the different aspects of changes to the home, planning, timing and choice of system were considered.

Usability

Although people had reservations about disruption, the impact on day-to-day lives of using new technology was a pressing consideration. Whilst people were also concerned about changes to the physical fabric or space available in their home, these issues were more practical in nature and focused on cost, mess and inconvenience. Many people seemed affectively attached to their current heating system and the choice and usability they associated with it. Potentially quite small things, for example, liking their gas cooker were issues which in some cases people felt very strongly about changing. There was some view that new technologies were not 'normal' and were therefore implicitly measured against traditional systems in terms of acceptability. People were also concerned that these new technologies should be sufficiently well tested, and they wanted assurances they wouldn't just have to change them again in the near future if problems were found, or something better became available.

Differentiation and Fairness

It was clear that considering the different needs of the public both by social situation and tenure was a key concern. With respect to disruption for example, there were particular issues raised in relation to vulnerable groups; and related to choice of technology, people felt it more likely that any real choice would only be available to homeowners.

Whilst these were areas in which people thought there should be differentiation, choice of technology was broadly considered to be something that should be selected on the basis of efficiency, with some ambivalence about whether the public should be given individual decisions.

Ideas of fairness were implicit in much of these discussions; raised for example related to the reality that some people would experience much greater disruption than others or that people who were wealthier would be able to afford 'better' technology or greater choice over which to use. Ideas of fairness were much more explicit when discussing the timing of any change. A staggered roll out received broad support but who might go first and for example start to benefit from cost savings was a point of contention.

Some of this discussion suggests the potential remains for people to agree with the bigger picture but consciously or otherwise have some resistance to taking the necessary action. For example, whilst people were initially concerned that efficiency of system should be the driving factor, there was also some view that new build homes should go first as they would be 'easier' to adapt and in some senses delay the disruption for others (of which the workshop participants were a majority).

Locus of control – Government in the lead

Whilst people were subscribed to the need for transition, people were less confident in their views about who should lead, and plan, change and there were contradictions in where and who should take major decisions. However, the strong message from participants was that transition of this scale must be worth it in terms of the change, disruption and costs incurred, as well as in support of the goal of reducing carbon emissions.

Given the scale of the challenge, people thought clear direction and the legislative weight government brings would be required. People in some circumstances also shared concerns about the ability and budgets of local councils to be effective. Participants however had some preference to temper too top down an approach with some forms of citizen engagement and involvement and the contribution of experts and/or independent bodies to support decision making.

Acceptability

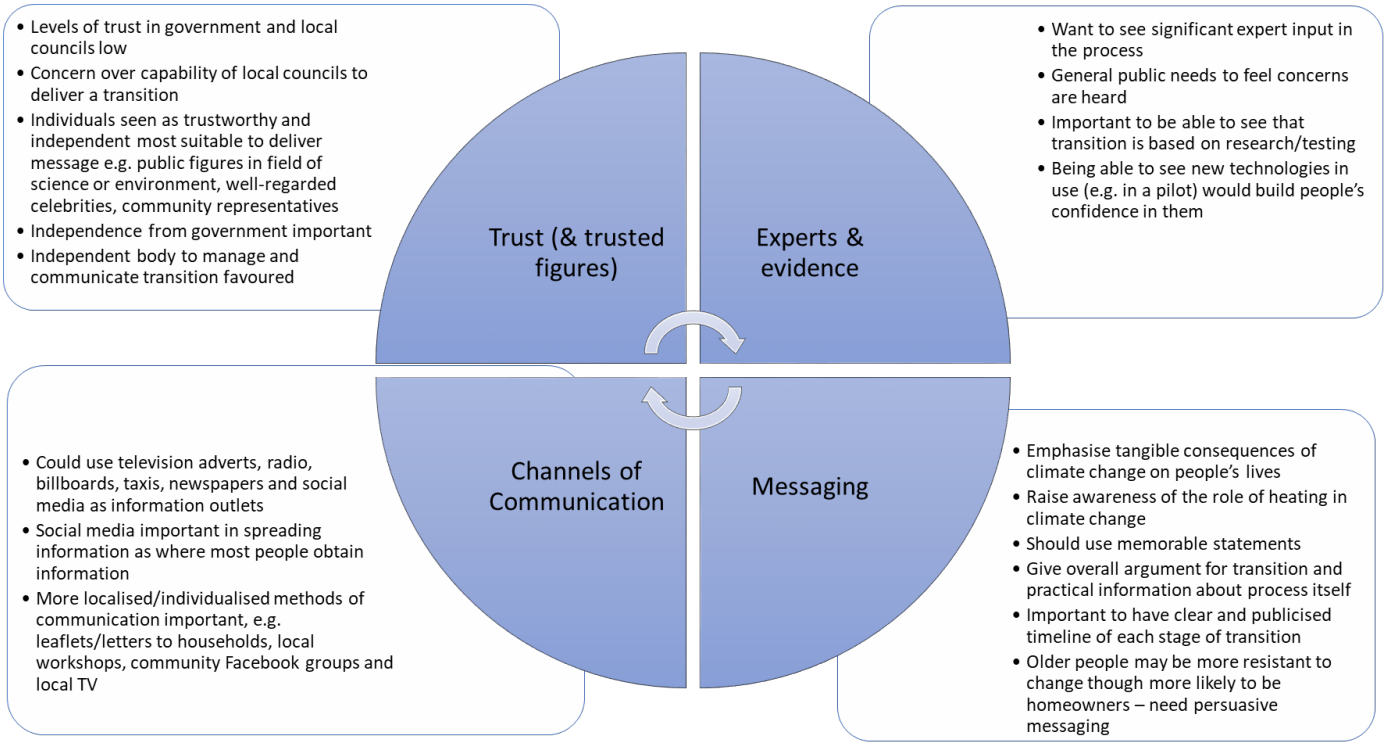
Once participants had explored the four aspects of the transition under consideration, they were also invited to test the acceptability of different implications by considering trade-offs between them. These discussions indicate that in order of importance in relation to acceptability:

- People were more concerned with the day to day changes implied with any new technology than with the disruption related to installation. For example, people who currently had gas appliances indicated they would accept a level of disruption to their homes if they could keep a cooker that was similar to their existing appliance
- Being able to limit the level and length of disruption to the home was seen as more acceptable than having a choice over timing of when they are disrupted
- People thought it was more important to have a centrally planned transition than have a personal choice on what low-carbon technology they might use. Participants just wanted the most efficient technology available and thought that without central planning some individuals might not act, which would be detrimental to the purpose of transition.

Messaging and trust

Respondents provided a range of suggestions regarding how a potential transition to low-carbon heating technologies should be communicated to the public, and by whom. These are summarised in Figure 2 below.

Figure 2: Participant comments on messaging and trust in on-gas grid workshops



Off-Gas Grid Workshops

Two deliberative workshops took place in Aberystwyth and Aberdeen with respondents living in surrounding off-gas grid properties. These workshops were designed to capture respondents' views and priorities for a transition to low carbon heating and discuss the features and acceptability of a number of policy scenarios that in theory could be introduced to phase out high-carbon off-grid heating. In contrast to the on-gas grid workshops, these workshops did not focus predominately on particular technologies or views on their acceptability in the context of a transition, but instead explored a range of policy or regulatory scenarios that might guide transition for off-gas grid homes. To assist with the discussions, four policy scenarios were presented, described in the report introduction.

The following chapter presents findings from these two workshops, focusing on respondents' understanding of the need for change; their support for a low-carbon transition; and the key factors that influence their views on the scenarios presented.

Throughout their discussions participants generally agreed with the need for transition but thought the specific impacts on people in rural contexts would benefit from greater attention. Participants were in agreement that legislation would be necessary to ensure a transition was implemented. But as it had been suggested to participants that under the scenarios presented homeowners would be likely to be required to self-fund changes, there was a perception among them that changes should only be imposed when individuals have the finances to do so. There was also convergence of views on the idea that financial support from the government should be available.

People diverged in their views on the timetable for any policy-led changes and on whether enforcement would be effective.

Understanding the need for change

Participants demonstrated mixed awareness of the need to transition to low carbon-heating, and whilst terms such as climate change were familiar, the link between tackling climate change and home heating was not uniformly understood. Some participants, for example, assumed industrial heating would be a larger issue. Participants also expressed surprise at the scale of emissions from heating, the impact of these emissions on global warming, and the importance of the 1.5ºC of warming limit for a sustainable future.

Apart from instances where participants were already familiar with the need to transition, clarity on these points from the workshop presentation prompted greater support within the groups for a 'hard deadline' to encourage people to transition quickly. This was accompanied by a recognition that the destruction caused by climate change may be costlier in the long run than replacing heating systems. There was also recognition that pre-emptive changes to heating systems now could save money spent on tackling climate change in the long run, by reducing the need for spending on items such as flood defences.

Whilst specifics varied, participants acknowledged that the policy scenarios presented could guarantee changes would be made.

> *"It's the only way ... no one's going to do it otherwise."*

However, support on whether such legislation should be implemented varied. Whilst one view was that these policies were 'dictatorial', other participants had a lack of trust in the commercial market to voluntarily lead a transition. There was an underlying assumption that commercial organisations would primarily focus on profits, and therefore were more accepting of forms of government intervention. There was also some discussion that the general public would not make these changes without external pressure such as legislation and previous interventions, such as the smoking ban, were acknowledged as being effective in changing behaviours:

> *"Bans traditionally work, don't they? You think of smoking bans, no one smokes in pubs anymore."*

Participants also cited the opportunity that new heating technology presented to revitalising industry in the UK. There was support for the prospect of producing new technologies such as heat pumps in the UK, which could both reduce people's carbon footprint and improve local employment – such as through the creation of carbon-neutral factories. This idea was viewed as addressing concerns regarding the carbon impact of current technologies. Participants also thought changes to the home implied by new technology would lead to an increased need for builders – a further boost for local employment.

Support for a transition to low-carbon heating

As participants discussed areas of support and concern on the four policy scenarios, consistency and perceived equity of action was a framing theme. For example, a number of participants were concerned about how the proposed policies fitted with existing government policies, including the use of fossil fuel systems to generate electricity, and the grants believed to exist for installing LPG systems in rural homes. The four policy scenarios were described as "*contradictory*" to the existing schemes perceived to be promoting the use of LPG and high-carbon heating. Legislation was therefore viewed as unpredictable and subject to change, leading to concerns that a new system may be recommended and then required to change again.

While awareness of the need for transition varied, a number of participants who were aware of the issue expressed concern about the CO_2 emissions released by other countries, with Poland, China and the USA all mentioned as high-emitting countries. This concern was used to deflect from engagement with the policy scenarios under discussion, with some suggesting that there was 'no point' making changes if other countries did not. However, this was countered with the feeling that the UK should set an effective climate policy, which could also encourage other countries to reduce their emissions.

> *"It's unfair that we [do] all this but nobody else [does]. Although we're doing our bit for the climate change, it's costing us money to do it, and no one else is bothering ... but really everybody should be doing it, not just the UK ... at the end of the day it's all their planet."*

Participants also felt it was important for everyone across the UK to use the same policy to ensure fairness, as "*everyone has a responsibility*" to prevent climate change. However, in Aberdeen, there was an acknowledgement that Scotland may make policy changes sooner, due to the earlier target date (2045) for net-zero. There were concerns that with this earlier date, Scotland may act as a "*guinea pig*" for the rest of the UK on the effectiveness of the technology and changes that are required for the transition.

Equity of action was also discussed at an individual level, particularly in relation to costs. The need for off-gas grid properties to self-fund new heating systems was viewed as unfair. Participants holding this view felt that while some policies include an element of individual choice (for example, scenario three, which requires owners to change heating systems when selling the home), the policy is determined by the state and therefore should include financial support. This view was related to the government's perceived lack of understanding of rural communities, with one participant commenting that the government thinks *"We've got loads of cash under the floorboards".* Instead, financial assistance without 'means-testing' was supported, although the need for people on the lowest incomes to receive financial support was also commonly expressed.

Time frame

Participants recognised that some policies would mean it took a long time for everyone to switch systems – for example, under scenario two (transitioning when home renovations take place) and three (transitioning when homes are sold) – they thought it could take 20-30 years to capture all houses off-gas grid. For some respondents, this was too long a period to address climate change and there were concerns that actions would not move quickly.

However, the need to move quickly was contrasted with individual needs to save up and plan for a transition. While it was recognised that scenarios with less individual choice (i.e. scenario one, a ban on heating systems, or scenario four a ban on fuels) could be enacted more quickly, participants felt that a swift ban would cause hardship, and it would be "*unethical*" to do this until all those affected could obtain a new system.

Respondents converged on support for a preferred lead-in time of 10-15 years before any policy scenarios were fully in effect. However, they discussed a preference for scenario one to happen first if changes were made sooner and thought a minimum lead-in time of 5 years would be needed. Participants thought this policy (and timescale) would have the least immediate impact by allowing people to maintain and keep existing systems for a number of years. Lead-in times would allow people to save money for new technology, while a hard deadline would remind people to make changes. In addition, a staggered roll-out, in which people would not have to replace their heating systems at the same time, was preferred to allow time for testing and because the price of new technology may reduce over a period of two to three years.

There was also broad agreement that new builds should be the first to begin using new low-carbon heating technologies. Participants felt that this would be easier than converting pre-existing properties and would also provide an opportunity for companies to demonstrate that the new technology could be used successfully, helping to convince people of its merits. The conversion of existing buildings, in comparison, was described as a "*never-ending task*" due to their complexity.

> *"Why aren't they saying all new builds have to have renewable [energy]?"*

This focus on new builds appeared to act as something of a deflection of the discussion of existing heating systems, with the ease of building new properties directly compared to the difficulty of converting existing buildings. Participants used these discussions to turn attention

away from the need to transition existing off-gas grid properties by focusing on 'other buildings' as the source of CO_2 emissions and where solutions should be targeted.

Roles and responsibilities

In a related discussion, there were concerns that the policy scenarios presented placed the 'onus' on individuals to tackle climate change, without addressing emissions caused by industry. One group noted a preference for policies affecting both individuals and energy industries, as this was felt to be more equitable.

> *"I find [it] quite heartening to hear about companies moving forward, making themselves carbon neutral, so perhaps if there was legislation passed making it mandatory for all the companies to be carbon neutral, and then, you know, us regular folk after that, it would make it a little easier to swallow."*

There was some scepticism across the workshops that government policy on energy use could put in place and enforce the actions needed to reduce emissions. With respect to the acceptability of government intervention in home heating that the theoretical regulatory scenarios represented, there were two distinct groups of opinions. For a small number of participants, these policies were seen as invasive – described as "*big brother*" and fundamentally "*wrong*". This group felt that the choice of a new system should remain with the public and that the policies were "*underhanded*" or "*blackmail*" in their approach. Others felt that the government needed more consultation with the public, rather than determining policy from "*behind a desk*".

However, a counterargument with greater consensus framed government intervention as a positive step towards preventing climate change. This group favoured government intervention over individual choice, as they felt that individuals would make choices that would provide individual benefits but not address the overall issue of global warming. This was also reflected in broad support for the need for transition that participants had articulated at the start of the workshop. And so government intervention was generally accepted as a necessary step.

In addition to discussing the acceptability of government intervention overall, there was some sense of distrust of 'the government'. This did not differ significantly when discussing the UK government in comparison to the devolved administrations, although respondents in Wales had particular concerns about the UK government based on a recent decision regarding the Swansea Bay Tidal Lagoon[15]. This suggests these comments perhaps reflect relatively 'generalised' concerns about politicians.

Areas of support and concern

The four policy scenarios presented were described in both workshops as quite vague. A few groups questioned why only a limited number of technologies – biomass boilers and heat pumps – had been presented during the workshop and not others.

There was a shared sense that the policies ignored the particular perspective of rural communities and in some groups a scepticism about the government's intentions to genuinely listen to people's views. A few people also raised some discontent that the government subsidised nuclear power, but not renewable energy (in their understanding), which may relate

[15] This refers to a decision made by the UK government to not subsidise the creation of a tidal lagoon in Swansea Bay in July 2018: see BBC News, '£1.3bn Swansea Bay tidal lagoon project thrown out'.

to concerns about the perceived 'hypocrisy' of the government's previous support for LPG systems.

Three further aspects of support and concern on the policies presented were:

- equipment and technical questions;
- changes to the home; and
- the impacts (intended and unanticipated) of a transition.

Equipment and technical questions

A number of participants were familiar with the two systems that were discussed, with some owning, or having friends and family who own, a biomass boiler or heat pump. Biomass boilers were predominantly discussed in negative terms and most people considered heat pumps to be a better option.

Biomass boilers were described as "*full of toxins*" and fast burning, giving out less heat than current technologies, and incurring frequent blockages. This meant that some participants considered them unreliable as a heat source. Participants also disagreed that biomass boilers could be considered carbon-neutral due to cutting down trees in order to supply them, and the transportation of pellets from overseas. The space required for pellets was also considered an issue.

Heat pumps were viewed more positively in some regards – for example, they were described as "*normal*" in the way that water is heated – but concerns about noise, cost and space were raised. However, concerns were also raised regarding the technological capabilities of heat pumps. Participants in rural properties were concerned that having only one energy source (electricity) for heating and power could cause problems, for example, if there was disruption to the electricity supply. Participants were also concerned that scenario one, where a broken boiler would be replaced at the end of its life with a low-carbon heating system, could leave them without heating at vulnerable times, for example, during the winter, particularly if other technologies (such as underfloor heating) are required. Concerns about the efficiency of any new heating systems to meet the heating required for rural living particularly emerged in these groups, reflecting the specific needs of rural properties.

Changes to the home

People across the workshops shared concerns about the changes required to properties before new heating systems could be installed, about the case of listed or historic properties in particular, and about the size of space required. Examples were given of buildings which could not be insulated to modern standards due to the age of the property or construction methods used (such as a 'floating' floor or thick walls). This fed into a larger conversation about the reasons for moving to rural areas, with participants feeling that the 'charm' of rural living included homes that used traditional heating such as woodburning stoves. Examples were also given of current home coal use as a "back-up" heating system in rural homes. Some participants also raised concerns about the capacity of new heating technologies to respond to coastal weather and the potential of being 'cut off' due to weather events such as storms or heavy snow, which would prevent access for wood fuel pellet deliveries.

Participants were concerned that the move to low-carbon heating systems would affect the population size and value of rural areas.

"People will only buy new builds, and there'll be less country and more estates."

It is important to note that not all participants in off-gas grid workshops lived in rural areas and/or in detached properties, some lived closer to town and city centres and in flats. This highlights the need to reflect both rural and urban/suburban perspectives in messaging to this group.

Separately, under scenario two, where changing the heating system would be dependent on applying for renovation work at home, people felt that the threshold for this policy should be major structural changes only or any change to an existing heating system, rather than small projects, which would give people most control over when to make home renovations.

The impacts of a transition on …

Local businesses and workforce

The workforce required to support the transition was a common thread throughout both workshops. People in Aberystwyth for example raised a particular view that technology requiring changes in the home – such as with heat pumps – would be more feasible in cities like London due to the greater availability of specialists to upgrade heating. They raised related concerns that if a specialist engineer had to drive some distance this could lead to more carbon emissions.

People also discussed the impact on businesses such as those supplying fossil fuel heating systems and fuels, as well as the ability of older people to re-train. A number of participants also suggested that smaller businesses might close.

Both groups suggested recruitment for engineering apprentices and engineers (as well as re-training existing gas engineers) would need to take place soon, due to concerns about the number of people who would be qualified to install heat pumps and/or biomass boilers during the transition period.

The housing market

Respondents discussed the impact that the four policy scenarios would have on the housing market, both for housing sales and rentals.

There was consensus that the impact of scenario three, where homes would transition to low-carbon heating when sold, would have the greatest impact. For sellers, this policy could add additional pressure during an already 'stressful' time, and some would choose not to sell their property to avoid paying extra for the new heating system. There was a view that sellers may also choose to install lower-quality heating systems due to time or financial pressures, while buyers may prefer new builds (with systems already installed) over older properties, or prefer to purchase their own system in line with their own needs once moved in. A few people raised questions about how the policy would work for homes which are being purchased with a view to be demolished.

A second area of discussion was around the ability of landlords to pay for making changes to multiple properties. Landlords present in the group suggested this would be an additional burden to other renovations and maintenance. Under scenario two, where a transition would take place when the owner makes certain renovations, a few different groups suggested

landlords may avoid repairs to properties. One group thought landlords may end up finding it too difficult to continue to rent properties under all of the policy scenarios presented.

> *"Are the landlords going to say yes, or [say] I'm not going to have new central heating, or whatever … just because I'm doing the pipes? ... They're not going to do things like that, which is going to affect other people who actually rent."*

From a tenant perspective, there were reports of 'rogue' landlords who do not currently follow regulations or arrange maintenance. There was a shared view across different groups that private landlords should have earlier deadlines for any transition as this would ensure timely completion. There were also concerns that rents would increase to effectively cover the costs of replacing a heating system, although this was countered by the fact that the increase may be offset by cheaper heating bills. One positive impact noted was that so-called "rogue" landlords may be better regulated and therefore unable to operate.

Some groups thought wider implications of the changes could be a decrease in privately owned rental properties, due to landlords selling properties rather than updating the heating system, which might lead to an increase in demand for council properties. However, in this case, the same people imagined positive impacts on housing sales, including greater affordability, especially for young people. A range of participants also agreed it could be cost-effective to invest in a good heating system if used for a long period of time, which could offset some of the costs of installation. There was also some acceptance that the regulations related to selling homes often change. In this context, upgrading the heating system could be normalised – for example, in Scotland, this was compared to the introduction of Home Report.[16]

… Vulnerable groups

In addition to discussing their own personal circumstances and views, respondents in the deliberative workshops identified a number of groups in the community for whom these policy scenarios may have a more substantial impact. These were grouped together as 'vulnerable' due to the need for additional support and included older people, single parents, and those with mental or physical health needs. In these cases, participants were imagining what the potential impact of policy scenarios would be on these groups and in doing so tended to discuss them in quite a homogenous way.

> *"I'm [worried] the standard of living for people if they can't afford to do these things ... older people will be freezing, single parents with kids ... [who] can't afford these types of heating."*

There were broad concerns about the transition management for people who are older, living in poverty, and people with disabilities. One support worker gave examples of people with mental health conditions who require support to pay bills, and who may find it difficult to understand the need and scale of the transition. It was felt that older people may find it more difficult to manage a change of suppliers, with many group members expressing concern about their elderly family members who currently use fossil fuel heating systems. It was suggested that scenario four, a ban on using fossil fuels, should have exceptions on a case-by-case

[16] The Home Report was launched in Scotland in 2008 and is designed to be a single survey of a property, which sellers must provide to anyone interested in purchasing a property: see Housing Act (Scotland) 2006; http://www.legislation.gov.uk/asp/2006/1/contents.

basis, for example, so that people living with special needs or disabilities, who were unable to manage a transition, would not be required to make the change.

The Traveller community was also discussed as a group which may require tailored adjustments, as many caravans use gas heating. It was felt that further community consultation was required to ensure any policy changes could be met.

Participants also discussed groups for whom scenario three, where a new heating system would be required to be installed before a sale, could create an unfair burden for individuals selling their homes for challenging reasons, including (collated across workshops):

- Financial difficulties, including unemployment;
- Family break-up and divorce;
- Inheritance;
- Moving into the social care system, and;
- Domestic violence or other safety issues.

Policy enforcement and unintended consequences

The ability of the government to enforce policy was a key point of discussion. A number of different participants suggested that people might seek to avoid compliance due to a lack of finances or preference for existing systems.

In a few specific cases, respondents gave examples of how they would plan to avoid enforcement of policies they disagreed with, ranging from buying boiler parts overseas online to using alternative fuels (such as red diesel, rapeseed oil and cooking oil) and to purchasing and storing boilers prior to a ban deadline. A ban on fossil fuel heating systems (scenario four) in particular was seen as unenforceable unless all other forms of oils and petrol were banned.

However, respondents noted that a ban on fossil fuel heating systems may have short-term positive impacts, such as people taking better care of existing boilers to give them a longer life before replacement. Concerns about wastage – and in particular, the recycling or destruction of a working boiler – meant that policies which did not require the replacement of working systems (such as a ban on installing fossil fuel systems at the end of life for existing boilers, scenario one) were viewed as more generally acceptable.

There were broader questions about the enforcement of policies. For example, some respondents thought that people may choose not to apply for permission for renovations under such a scenario, in order to avoid changing their heating.

Overall, respondents agreed it was counter-productive to fine people for being unable to change the heating system if they were struggling to pay for those changes. Additionally, some groups thought people may prefer to face penalties (such as fines) if these are cheaper than the cost of replacements. There was general consensus that fines were judged to reduce the acceptability of a particular policy, suggesting that enforcement needs to be carefully determined. In the workshop in Aberdeen, enforcement was also viewed as more difficult in remote areas such as the west coast of Scotland.

Costs

In general, respondents agreed that it should not be compulsory to change heating systems until individuals have finances available to do so. If new heating systems are required, then people would like to be able to replace like-for-like (a heating system as good as their old one) without costing more. There were also concerns about which costs would be covered, including items such as underfloor heating and new radiators for use with heat pumps. Across groups, respondents felt that it was acceptable to pay a similar amount for their new system as they currently pay for upgrades to boilers.

Some groups raised questions about the level of support for people living on benefits or in poverty. Additionally, respondents working in community settings noted that many individuals on low incomes are not receiving benefit payments, and therefore it may be more difficult to identify those who need additional financial support. Finally, there were concerns that the costs of transition will leave people living in sub-standard accommodation as they may be unable to afford to move.

Different mechanisms for funding the change had different levels of acceptability with participants most in favour of government grants. Loans were the next most favoured option, while individual responsibility for high sums of money upfront for transition costs was the least acceptable across groups.

Whilst government grants were thought to lead to increased acceptability of policies, a number of people thought this could also lead to an increase in price of goods and services as companies ensure they can benefit from grants. Concerns raised with respect to loans included some views that they could be difficult to obtain dependent on credit rating. A group of participants in one workshop thought spreading out loans over longer repayment periods could be beneficial, but others felt that this would be overly complicated, as people would ‘half-own’ their heating systems.

The concerns raised across groups about finances were offset to an extent by the belief amongst most participants that heating bills would decrease over time. Other suggestions made for managing costs included adding extra costs to energy bills each month; offsetting carbon using a carbon tax, rather than changing any heating systems; increasing council tax payments; and using housing related taxes (such as income from stamp duty) to pay for the changes.

Finally, an ombudsman was recommended, to ensure that companies do not increase the costs of fuel after switching.

Key factors influencing views on transition

This section summarises the key factors that influenced the perceptions and acceptability of the transition scenarios explored in the discussions above. Unless otherwise indicated, these were areas of convergence for participants. In addition, across these factors, ideas of equity were important, with most participants supportive of broad financial support and the creation of UK-wide policies.

Choice

Respondents felt that the policies presented were more acceptable when individuals were able to make choices about aspects of them and being able to choose the timing of change was the most important of these. Policy scenarios two and three (transition heating at the time of renovation and selling) were therefore more widely viewed positively.

In policy scenarios where individual control on timing would be less likely - a ban on installing fossil fuel heating systems was seen as the most 'gradual' solution for individuals, which would also encourage people to act.

To support people being able to make choices over timing under a range of policy scenarios and to allow people to plan effectively there was broad support for releasing policy deadlines in advance of policy implementation. Respondents supported a staggered roll-out approach to the transition, to prevent a "*national cliff edge*" being reached.

Financial support

For a few respondents, cost was still the most important factor and where they assumed costs would be covered (through financial assistance) they were less concerned about the choice of timing on a transition.

A key area of acceptability across policies was financial support for changing technology being available to all, with no cap on earnings. As discussed previously, there were concerns that only those who currently claim benefits or other forms of support would receive financial assistance, but respondents were keen to stress that:

> *"It's not just vulnerable people who are struggling".*

Financial support through loans had a mixed reception, with some respondents accepting the need to pay for heating systems over a long period of time, while others concerned about loans for the most vulnerable and those without good credit ratings.

Role of UK Government

There was broad acceptability of a centrally planned transition. The UK government was seen to benefit from economies of scale and could purchase systems more cheaply than private suppliers. Having government involvement would support a joined-up approach: the transition could cost the same; people would buy into it as a national project; and training could be developed to ensure that more engineers are available. Both workshops suggested a new heating system could be produced by national company, similar to BT Openreach or Welsh Water. However, groups shared concerns about allowing companies to make profit from the transition, and it was recommended that energy companies should have a limit on their charges. The crucial element of acceptability here was that energy companies are not seen to be profiting from any transition plans.

Respondents also agreed that a new regime of property standards and inspections which government would legislate for would be required, regardless of which policy scenario is enacted. A register of skilled and vetted suppliers of new heating systems would help to improve scenario two, where transition would take place when renovations are completed at home. In addition, proper inspections of the work should be required.

New government departments and independent regulatory bodies were both suggested to manage the transition. However, for some this would be caveated by the fact that an independent body would need to be entirely independent of the government and free of an agenda in order to be trusted. A body such as Ofgem, to act independently for consumers, was recommended.

Respondents in the Aberystwyth workshop expected the Welsh government to lead on a transition, with a transition becoming more people-led over time. In the Aberdeen workshop, one respondent commented that the Scottish government may initiate a transition sooner due to the earlier net-zero target (2045) but the majority of respondents did not differentiate between the UK and Scottish government when discussing the planning of the transition.

Localised Planning

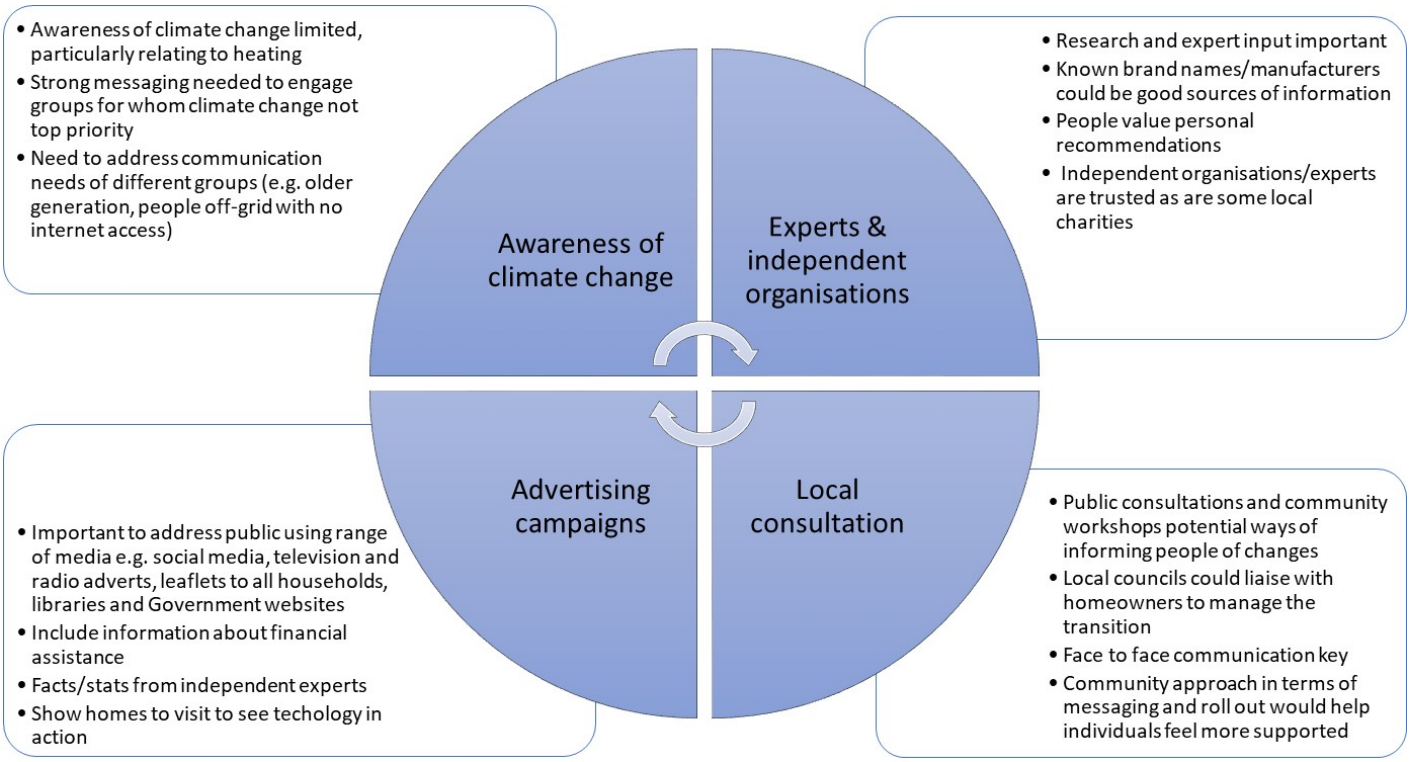
There was no clear view that local councils were considered the most appropriate actors to implement centrally-led change due to concerns about the ability of local government to manage this level of transition. This was based on both skill availability and a lack of funding for council budgets.

However, on the whole, participants wanted policies flexible enough to be implemented in the best way for a local area. For the planning of the transition to be acceptable, therefore, it is likely that local consultation will be required and there was strong support for those in rural areas to have their needs considered more specifically. Participants agreed they would want to see support for individuals to plan their own transition, and meetings with local government officials, architects or independent experts would be recommended.

Messaging and trust

In addition to the different aspects of acceptability in a transition to low-carbon heating, respondents discussed the different types of messaging that would encourage them to make the transition and reflected on trusted sources of information. These are summarised in Figure 3 below.

Figure 3: Participant comments on messaging and trust in off-gas grid workshops



Conclusion

The aim of these four deliberative workshops was to provide insight from the general public about awareness and acceptability of a transition to low-carbon heating. In particular, we sought to gather detailed qualitative evidence on the conditions in which the general public might support heating transitions as well the trade-offs and decision-making routes they might accept. Alongside this, we were interested to see what lay behind the public's views.

In this section we summarise people's attitudes towards the need for transition as well as draw out the key themes across groups that indicate what factors were important to people when considering a transition. We also show what would matter to them most when considering the interrelationship between different implications of a transition. Whilst the emphasis of discussions was different in the two types of workshop, in the main this section reports on common findings across groups distinguishing where they differ due to specific context.

Support for heating transitions

At the beginning of the workshops participants had low levels of awareness on the need for domestic heat transition and in the on-gas grid workshops in particular this also extended to low awareness of low-carbon technologies. The evidence presented on the context for legislative targets and the options for a heat transition were generally well received and participants engaged positively with the information presented.

People quite commonly identified the environmental and societal imperative to make change as most important in driving their views. Concerns about aspects that would affect them personally, such as disruption to the home, were frequently weighed up against these macro ideals. This suggests that participants understood the urgency of the need to reduce carbon emissions through using new technology and associated policy change. Whether these larger ideals would continue to win out as policy choice or mandatory action approach in time is worth further consideration. There was some evidence for example that in considering the possible roll out of technology or legislation for both on- and off-gas grid homes respondents across workshops thought this should start with new builds (i.e. someone else). Further, in the off-gas grid examples, a sense of attachment to a rural way of life was closely corelated to the use of wood or oil burning stoves and a view that this should be protected. There was some discussion of how people might avoid or subvert legislation, despite acknowledging the connection with emissions.

What people did also agree on was the principle that any transition should be planned centrally with UK government in the lead. People thought this would be necessary and the only option to achieve UK-wide change. Whilst people in devolved nations shared some concern that government decisions made in 'Westminster' were seen as 'too distant' to understand the specifics of an area, this was also at the same time about rurality and so it is more difficult to distinguish which of these was the main driver of these views. It was also the case in the English workshop for example that there was some mistrust of government to represent and protect the interests of the public. There was a general sense that despite these concerns, the transition needed to involve all nations of the UK acting in parallel.

Whether there were other key actors (separate to government) that should play roles in the transition did not receive much discussion. What was clear was people would be unhappy with

businesses (including energy suppliers) seeking to make profit from what people understood as a necessary societal change. At least one table in each of the four workshops also identified a preference for an organisation or external body to act as an independent guide to any regulation or advice in this domain.

Trust and trusted figures, particularly those deemed independent of government or business also featured across workshops in terms of who people would want advice from on their options.

Specific factors influencing acceptability of transitions

Within this general context of support, there were a few specific factors that impacted (positively or negatively) on the acceptability of transition options. This suggests that once given information, the public are generally supportive of the need to transition – but the question of *how* is much less certain.

Here, not surprisingly there were areas of greater distinction between the two workshop types as they were invited to primarily consider different things. People in on-gas grid workshops were invited to discuss more general considerations of a potential transition. In contrast, those in off-gas grid sessions were given specific regulatory scenarios that implied a more direct or immediate connection to their views and choices and potentially to near-term change in their lives.

Choice of low-carbon technology

In on-gas grid workshops people were quite occupied with the familiarity and usability they attributed to their current system, viewing specific alternatives as more alien or unusual. They also gave less attention generally to weighing up the pros and cons of different options – citing a preference that rather than have choice over technology, they would just want the system that was most efficient and environmentally friendly. The importance placed on efficiency in these discussions was somewhat at odds with a view also generally held that high levels of disruption were less acceptable overall.

In contrast, participants in the off-gas grid workshops spent a bit more time deliberating the merits of different technologies and were more generally in favour of heat pumps rather than biomass boilers. Reservations on biomass boilers were due to the size and the challenges of fuel storage. Respondents also expressed concern about whether they could be considered carbon neutral, sharing their thoughts that a lack of trees in the UK means having to import from overseas as well as issues about flues being easily blocked.

Fair distribution of benefits and risks

A theme that appeared at a range of points across workshops was people wanting to see a fair distribution of benefits and risks in any transition. This was the case when discussing financial implications, the timing of any transition and in terms of the impact on personal circumstances or particular groups.

In off-gas grid workshops, the timing implications of the range of policy scenarios considered was a particular point for discussion. Participants had clear views on acceptable timescales on for example, the banning of fossil fuels, and these views were based on what they thought would be fair to residents in terms of time to plan and save for the associated costs.

Participants thought a minimum lead-in time of 5 years before any policy came into force would be needed.

For on- and off-gas grid workshops, people were also concerned that the benefits of moving to more energy efficient systems should be available to all and processes would need to ensure that no one was left behind.

Locus of control for planning and management

As demonstrated above, there was broad support for the UK government to lead and plan the changes implied in transition. Although participants in on- and off-gas grid workshops discussed different considerations, across workshops, participants appear to converge in their view that they would defer a degree of personal choice and freedom as necessary to enable government to take big decisions.

However, our analysis suggests something of a conflict between people's attitudes on deferring responsibilities on the one hand to a top down approach and yet on the other retaining personal choice and freedoms on anything from the choice of technology to how the transition might happen for them. This ranged from aversion among some individuals to what they saw as the government interfering in personal decisions about their home to slightly broader concerns about how individual citizens could have a voice in such major change.

Participants did however express a preference for including some forms of citizen engagement and involvement and the contribution of experts and/or independent bodies even where an otherwise broadly top down approach to decision making is taken.

People's preferences for a transition

In terms of assessing acceptability of different aspects of a transition, participants across workshops were invited to consider how their views and preferences on the things they had been discussing might change or become stronger depending on how they might interact. For example, would people be more willing to make changes to their home if they could choose when those changes would happen; or would people be more accepting of a policy requiring a change or heating system when they sold their house if this legislation was brought in after a range of other measures had been tried first.

- People were more concerned with the day to day changes implied with any new technology than with the disruption related to installation. For example, people who currently had gas appliances indicated they would accept a level of disruption to their homes if they could keep a cooker that was similar to their existing appliance
- Being able to limit the level and length of disruption to the home was seen as more acceptable than having a choice over timing of when they are disrupted
- People thought it was more important to have a centrally planned transition than have a personal choice on what low-carbon technology they might use. Participants just wanted the most efficient technology available and thought that without central planning some individuals might not act, which would be detrimental to the purpose of transition.

For those in off-gas grid properties, preferences were linked people's priorities when faced with the introduction of potential policy scenarios. These were:

- Having choice over which policy scenarios they would be subject to, for example replacement of heating system on sale of the home, was more important than the costs they would be subject to as a result
- Choice on the timing of any actions they would have to take to change heating systems was also considered more important than the costs involved of that change
- Financial support for changes in technology being available to all, with no cap on earnings

Summarising the Deliberative Workshops

Overall the deliberative workshops demonstrated that, whilst people are largely supportive of the need for a heating transition in principle, the public have important views on how a transition should be implemented. For example, they think leadership from UK government will be necessary, but they would like to see citizens engaged with the government's work to ensure local contexts and public views are incorporated. People were also clear on the importance to them of independent and expert advice, to help people understand and make good choices about new technologies. For those on the gas grid, we heard that people understand disruption is necessary, but they would rather be able to limit how much they experience than have a choice on when it had to happen. For those off the gas grid, choice on the timing of changes was in fact more important for participants, even more so than the upfront costs envisaged for installing a new technology.

Using a deliberative format was a useful way to share technical information with participants and allowed us to generate insight as to what people think after they have had the chance to consider this new information and discuss and exchange their views about it.

Appendix A – Research Questions

The Phase I survey had the following research aims and objectives:

Aim a) To provide a clear understanding of current public awareness, attitudes, understanding and preferences for different low-carbon transition options and the technologies involved.

RQ1: What is the current level of public awareness and understanding regarding the need and rationale for a heating transition?

RQ2: What are current attitudes towards a future transition to low-carbon heating?

Aim b) To identify and assess plausible and realistic aims and options for engaging the public with the future of heat and provide related strategic advice and expertise.

RQ3: What are the different dimensions and options for engaging the public with low-carbon heat?

RQ4: What are the strengths and weaknesses of the different options, approaches and framings for engaging the public with low-carbon heat?

These questions were adapted for Phase II using qualitative methods.

Appendix B – Glossary of key terms

Deliberative workshops – A form of facilitated group discussion that provides participants with the opportunity to consider an issue in depth, challenge each other's opinions and develop their views to reach an informed position.

District heating/Heat networks – A heating system that uses a high-powered central boiler fuelled by one or more fuels (e.g. biomass, waste or geothermal energy) to supply a network of pipes which carries hot water into each home within an area.

Heat pump – A technology that converts thermal energy in the ground or air outside into heat to use in homes.

Heating transition – The process of decarbonising almost all heating systems in buildings across the UK.

High-carbon off-grid heating – Sources of heating used in households which are not connected to the national gas network that emit high levels of greenhouse gases (such as oil boilers, Liquefied Petroleum Gas, propane and coal).

Hydrogen gas – A non-polluting gas that can be used as a fuel in condensing boilers to produce heat.

Low-carbon heating – Sources of heating which minimise greenhouse gas emissions.

Off-gas grid – A household which is not connected to the national gas network.

On-gas grid – A household which is connected to the national gas network.

Appendix C – Workshop Outlines

BEIS Future of Heat

Facilitation Outline | On-Gas Grid (OnGG),

London and Edinburgh

Aim: Explore people's views and priorities for a transition to low carbon heating and the features and implications of the new technologies available.

- Focused on three technologies: hydrogen, electrification and district heating.
- With an emphasis on technology awareness and acceptance rather than policy or legislation.

Agenda:
1:00 – 1:10 Welcome and introductions
1:10 – 1:45: Plenary Section 1 – The current context
1:45 – 2:25: Plenary Section 2 – Low Carbon heating technologies
2:25 – 2:30: Comfort Break
2:30 – 3:25: A note on cost, Discussion Session 1 – implications of a switch
3:25 – 3:40 Break
3:40 – 4:45: Discussion Session 2 – trade-offs and decision making
4:45 – 515: Summary and Close

Timing	Session	Facilitation Notes
1300	**Welcome & Introductions**	Participants pre-allocated to tables in groups of 8-10. Group ice breaker.
1310 - 1345	**Plenary Section 1: The Current Context** A 15-minute presentation which covers: - The status quo with regards to off gas grid heating systems; - The rationale for a transition (role of heat in GHG emissions; net zero target).	Prompt questions/starters: - What do people think about what they've just heard? - Which bits were most/least important to you? Why? - Did you already know much about heating transitions/tech? If yes – where had you heard about it - Had you already considered making changes to your heating system given the current context? - What difference they think a transition might make to them/their local area?
1345 - 1425	**Plenary Section 2: Low-Carbon Heating Technologies** A 20 minute presentation which covers: - intro to low-carbon heating: range of main types of technologies (hydrogen, heat pumps, heat network); - some of the key aspects/implications/benefits of each;	Prompt questions/starters: - What do people think about what they've just heard about heating technologies? - Did you already know much about any of these technologies? - Which of these sounded most/least attractive to you (if any)? Why?

Timing	Session	Facilitation Notes
	- places/situations where or reasons why each might be considered especially suitable or not; - some description of the infrastructure and ancillary works that service gas and would be needed to service alternatives.	
	Comfort Break	
1430	**Presentation: a note on Cost and framing the rest of the afternoon** Notes presented: - We will assume for this workshop that a transition will happen at some point in the future; - Like all major infrastructure investments, and like other parts of the energy transition, there will be a significant cost to society to invest *in* the heat transition; - Cost is not one of the points we are explicitly asking you to consider today, because whilst we know this will be important, costs and payment schemes may vary.	
1430-1525	**Discussion 1: introducing 'aspects of a switch'** This section will focus on six features of possible transitions to understand what people think of them and under what conditions people would give support for them.	*Copies of the presentation will be on participants table so we can refer back to the stories at this point.* The aspects for discussion are: - Changes to people's homes - Timing of the transition - Planning the transition - Choosing the system Prompts should focus on the 'why' of people's thoughts and will also include: - Which do you support/don't support/what would help you support? - What do they think might be the challenges associated with these features and for who? - How do they feel about these challenges/how would they want to address them?
1525-1540	Break	
1540-1645	**Discussion 2: exploring trade-offs and decisions in more detail** This section explores further how people view the features of transition when they interact – and to understand what is taken into consideration when doing so. E.g. if someone is presented with a choice of controlling the timing of installation of new technology, would they accept a higher level of disruption.	*Cards on table with different aspects on them, as well as the different technology. Participants can visually pair/combine to prompt discussion.* We are particularly interested in: - what beliefs, attitudes and circumstances underpin people's stated preferences and consideration of trade-offs. - How/whether conditions for support change through discussion on trade-offs

Timing	Session	Facilitation Notes
		Prompts: - What are the key aspects of these features that you are focused on? Why? How does this relate to your particular circumstances? - Who would need to act and in what way to develop/meet your requirements to achieve support or address concerns? Facilitator to note any priorities identified and make a note of the top three talking points from the table.
1645 - 1715	Summary and Close	Groups return to plenary and offer feedback from across their discussions. Convenor to check understanding and ensure that the group is broadly in agreement about the points shared.

END

BEIS Future of Heat

Facilitation Outline | Off-Gas Grid (OffGG)

Aberystwyth and Aberdeen

Aim: Explore people's views and priorities for a transition to low carbon heating and the features and implications of a number of rules and regulations that can be introduced to phase out high-carbon off-grid heating.

- Focused on a range of policy or regulatory scenarios that might guide OffGG transition
- In particular to consider the issue of home retrofit in these scenarios

Agenda:
1:00 – 1.10 Welcome and introductions
1:10 – 1:45: Plenary Section 1 – The current context
1:45 – 2:00: Plenary Section 2(a) – Low Carbon heating technologies
2:00 – 2:05: Comfort Break
2:05 – 2:20: Plenary Section 2(b) – Regulatory scenarios, intro discussion sessions and a note on cost
2:25 – 3:30: Discussion Session 1 – Regulatory scenarios
3:30 – 3:45: Break
3:45 – 4:45: Discussion Session 2 – combining scenarios and accessing information
4:45 – 515: Summary and Close

Timing	Session	Facilitation Notes
1300	**Welcome & Introductions**	Participants pre-allocated to tables in groups of 8-10. Group ice breaker.
1310 - 1340	**Plenary Section 1: The Current Context** A 15-minute presentation which covers:	Prompt questions/starters: - What do people think about what they've just heard?

Timing	Session	Facilitation Notes
	- The status quo with regards to off gas grid heating systems; - The rationale for a transition (role of heat in GHG emissions; net zero target).	- Which bits were most/least important to you? Why? - Did you already know much about heating transitions/tech? If yes – where had you heard about it? - Had you already considered making changes to your heating system given the current context? - What difference they think a transition might make to them/their local area?
1340 - 1400	**Plenary Section 2(a): Low-Carbon Heating Technologies** A 10-minute presentation which covers: - An intro to low-carbon heating; - A range of main types of technologies (heat pumps/biomass boilers); - Some of the key aspects/implications/benefits of each.	10 minutes to talk to your neighbour in small group on thoughts/responses. Prompt questions/starters: - What do people think about what they've just heard? - Did you already know much about any of these technologies? - Which of these sounded most/least attractive to you (if any)? Why?
Comfort break		
1405 - 1420	**Plenary Section 2(b): Regulatory Scenarios** A 10-minute presentation which introduces the regulatory scenarios for discussion for the rest of the afternoon. **A note on cost and framing the rest of the afternoon:** - We will assume for this workshop that a transition will happen at some point in the future. - There will be a significant cost to society to invest in the heat transition. - There may be some taxpayer-funded support for the least able-to-pay households to transition to make the changes to their homes. - For others, (probably the majority of homeowners), the financial sector might be expected to bring forward loans – sometimes referred to a green finance or green mortgages – to help people meet the upfront cost of installations and related home improvements and then pay those back over time. - Cost is not one of the points we are explicitly asking you to consider today because while we know this will be important, costs may vary.	
1425-1530	**Discussion 1: Regulatory scenarios** This section will focus on four broad regulatory scenarios to understand what people think of them as well as key concerns or issues they raise. The scenarios are: 1. Ban sale of fossil fuelled heating systems 2. Renovation and replacement 3. Selling the home 4. Fossil fuel ban	*The four scenario slides will be printed out and available on small group tables* Facilitator asks if anyone would like to select a scenario to start. Test reactions as well as key concerns or issues being raised. This could include: - Changes to people's homes: level of disruption - Timing of the transition: whether people have choice over when things occur

Timing	Session	Facilitation Notes
		- Planning the transition: who makes decisions? central government, local authority, separate non-governmental body, something else? - Choosing the system: should everyone have the same equipment, or should they be able to choose from a selection? What if some selections are more expensive than others? Facilitator to map any issues identified beyond the features discussed that the group think are important. Facilitator to make a note of the top three talking points from the table.
1530-1545	Break	
1545-1645	**Discussion 2: Combining Scenarios and accessing information** This section starts by exploring what people think of these scenarios interacting and how people feel about the timing of different policy scenarios. It will go on to explore - assuming one or more of these scenarios becomes a reality - who they would trust for advice on their heating system; what information they'd need and who participants would expect to get it from.	We are particularly interested what beliefs, attitudes and circumstances underpin people's thoughts here. The discussion should begin with the following: i. How would people feel about having a date in the future by which all homes have to use low carbon heating sources? ii. What changes would people make now if a date in the future was set up? iii. Would it be helpful or unhelpful to have a rule like this introduced? iv. Are there any policy scenarios which they see as more feasible in the short-term versus long-term? v. Is there a particular chronology to introducing these policy scenarios? Facilitator asking group to discuss - Who they would trust for advice on changing their heating system? - What information they think they would need under one or more of the scenarios discussed (and why)? - Who they would expect to get this info from? And if it mattered – why? - Do people agree on the sources of 'trusted' information?

Timing	Session	Facilitation Notes
	Summary and Close	Groups return to plenary and offer feedback from across their discussions. Convenor to check understanding and ensure that the group is broadly in agreement about the points shared.

Appendix D – Recruitment quotas by location

Tenure	Owner-occupiers	Private rent	Social rent
London	17	9	9
Edinburgh	17	9	9
Aberystwyth	27	4	4
Aberdeen	27	4	4
Total	*88*	*26*	*26*
Age	**18-34 years**	**35-50 years**	**51+ years**
London	7	11	17
Edinburgh	7	11	17
Aberystwyth	3	11	21
Aberdeen	3	11	21
Total	*20*	*44*	*76*
Education	**University-educated**	**Non-university educated**	
London	17	18	
Edinburgh	17	18	
Aberystwyth	17	18	
Aberdeen	17	18	
Total	*68*	*72*	
Gas type	**Connected to gas grid**	**Off gas grid**	
London	28-35	0-7	
Edinburgh	28-35	0-7	
Aberystwyth	0	35	
Aberdeen	0	35	
Total	*56-70*	*35-49*	

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