Addressing emissions from owner-occupied homes

Findings of a citizens' panel on home energy decarbonisation

September 2022

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Executive summary

A citizens' panel on home energy decarbonisation

This project, a collaboration between Lancaster University and the Climate Change Committee (CCC), brought together a citizens' panel to develop policies to support UK owner-occupiers to decarbonise their homes in line with the UK's statutory target of net zero emissions by 2050.

Preparing residential buildings to be able to meet the UK's net zero target is a major policy challenge. By 2030, the CCC estimates that installation rates for home insulation need to grow by an order of magnitude.[1] Heat pump installation rates need to reach 1 million per year in new and existing homes by 2030, up from around 54,000 in 2021.[1,2]

The CCC has identified significant risks in the government's current approach to scaling up low carbon heat installations and a lack of policy for stimulating energy efficiency improvements amongst homeowners not eligible for existing means tested support.[2,3] If emissions reduction targets for buildings are to be met, it is likely that additional policies will be required to decarbonise owner-occupied homes.

To help address the question of how to fill this policy gap, a citizens' panel was established, facilitated by Shared Future. The panel consisted of 24 individuals, demographically representative of the key characteristics of UK homeowners, including age, ethnicity, income and attitudes to climate change.

The question used to guide the panel's work was:

"What needs to happen to bring home energy use in line with the need to tackle climate change?"

Participants spent 25 hours over seven sessions, both online and in person, learning about the policy area and working with CCC analysts to design solutions they thought would work for owner-occupiers.

About this report

This report contains the formal findings of the citizens' panel (part one), as well as a section by the Lancaster University team, covering the context, method and qualitative analysis of the panel findings, and the evaluation of the process (part two).

Here, we draw out key messages for policy makers, before presenting the panel's findings.

Key messages for policy makers

The outcome of the citizens' panel provides a clear evidence base for policy on home energy decarbonisation for homeowners. The findings are discussed in detail in part two of the report (page 21) and are summarised here:

Concern about climate change is high, but awareness of the changes homeowners need to make is low
The government should ensure that home energy decarbonisation is seen as a priority by homeowners and raise awareness about what it involves. Communication should focus on two ideas: the advantage of home energy retrofit to homeowners, including increased comfort and cost savings, where applicable; and climate benefits. For most people, climate change alone is not a strong enough motivator to make changes in their homes.

Bespoke, trusted information is vital
People should understand what they need to do to their homes, and what the costs and benefits will be. Given the wide variety of housing types and household circumstances, generic advice is of limited use. There is public support for both an independent advice service and an information log connected to each property.

Some financial support will be required even for households not in fuel poverty
It is expected that people will be financially supported to take action, in the form of low interest loans and grants, targeting poorly performing homes.

The stop start approach to home energy decarbonisation has reduced trust
People are aware that previous schemes have come and gone, and have doubts about the potential for the home energy retrofit supply chain and workforce to scale up without longer term support.

Some people have concerns and questions about heat pumps
Concerns about heat pumps is especially high amongst those who live in flats and smaller dwellings. Some say they would prefer to wait, to see if the technology improves or something better comes along.

Support and incentives are needed at important intervention points
Different incentives and financial support packages work for different people. There should be a range of schemes, such as:

- a stamp duty rebate when buying a home if energy improvements are carried out;
- access to mortgage rate discounts for those who have carried out work on their previous home;
- low interest loans for home energy retrofit that can also be used for other home improvements, such as a new kitchen.

Incentives alone will not bring about change
The government needs to bring in regulation to steer the move away from gas boilers. This should be communicated well ahead of when it comes into force and should be accompanied by support for people to make changes.

There is limited understanding of alternative energy tariffs and business models
Interest in alternative models and tariffs focuses on those that reward and provide incentives to reduce energy consumption, bring down electricity costs for appliances, like heat pumps, and help to finance the cost of retrofits on multi-occupancy buildings, such as flats.

The findings

A central output of the citizens' panel was a proposal for a package of measures to support home energy decarbonisation. These measures were first outlined by the panellists and then refined and developed.

The proposal is built around the 'homeowner lifecycle', which consists of three stages: buying and selling, renovating and then living in a home. Panellists designed interventions at each of these lifecycle stages to encourage home energy improvements.

Support is put in place to help homeowners through the life cycle. This includes access to information through a logbook attached to their house and a cycle of five yearly checks, based on an updated version of the current EPC model. Panellists designed financial support packages that would be accessible at any stage of the lifecycle.

Finally, the proposal includes ideas to create an enabling environment to encourage homeowners to undertake home energy improvements. These included government leadership and regulation, awareness raising campaigns and an impartial advice service.

See the following page for a graphic summarising the package of measures.

Education and awareness raising

People are **aware** of the 2035 boiler ban, changes that need to be made, what government is doing and the benefits of changes due to national campaign, a new **curriculum** and **popular media**.

Government leadership and regulation

Government has a long term s**trategy covering all housing types and addressing the need for training and apprenticeships.** It is **leading by example**, and communicates the sense of urgency.

New gas boilers are **banned from 2035 onward**. Support schemes are introduce well ahead of 2035

- Enabling Environment
- Life Cycle Stage
- Support through Life Cycle

Buying and selling a home

Stamp duty determined by how energy efficient the home is.

You could get a **rebate** if you get work done.

Information and advice

There is a **national free and impartial advice** service and contractor accreditation scheme.

The advice service can also provide a list of local suppliers and has **interactive online run-throughs** and **demonstration homes** of key technologies like heat pumps.

Logbook

Every house has a **logbook** showing:

- previous improvements
- changes in energy use over time and other benefits
- what more needs to be done incl. cost + impact of these improvements
- real time info on your energy use

EPC+

Required by law to get a home **EPC+** when selling and every 5 years.

Helps to make sure the **logbook** is up to date and uses traffic light system to signal priority changes.

Loans

Guaranteed **long-term low or no interest loans** are available in a variety of forms. You can use the financing for other home improvements. Even more generous financing available on means tested basis.

Grants

Flexible grants are available that can be used on whatever is suggested by your **logbook**.

Grants are means tested based on the status of your home and ability to pay.

Covering the costs of support

To help cover the costs of grants, the Government looks at a **windfall tax** on fossil fuel companies and p**olluter pays schemes**.

Renovating a home

When you make home improvements, you are **encouraged to make energy efficiency improvements.**

Your **logbook** tells you what needs doing.

There is **0% VAT** on materials for energy related improvements.

Living in a home

You get an **'energy improvement score'** (like a credit rating) if this improves you get **a cheaper mortgage** next time.

You have options for different contracts and tariffs with your energy provider:

1. join a **local community energy co-operative or energy grid** to buy and sell energy with neighbours,
2. have **two-track energy rates** so you pay less for energy used on green products like electric vehicles
3. pay a **tariff where you save for using less energy than expected**.

Introduction and structure of the report

Reducing the climate impact of home energy use, in line with the UK's target of net zero carbon emissions by 2050, is critically important. Yet, government policy in this area has been judged insufficient to deliver the necessary emission reductions. The Climate Change Committee (CCC) has identified a particular gap in policy for decarbonising – the homes of owner-occupiers (in this report the term 'homeowner' is used as a shorthand for owner-occupiers, those who live in the home that they own).

To help inform the CCC's advice to government, this project aimed to determine which types of interventions and support would be acceptable to homeowners and would deliver the necessary pace of change to meet the 2050 target.

The project was a partnership between Lancaster University and the CCC, supported by Shared Future.

We convened a panel of 24 homeowners to work with CCC analysts and expert commentators. The question they were given to answer was:

'What needs to happen to bring home energy use in line with the need to tackle climate change?'

This report is in two parts:

Part one: the citizens' panel's findings. This presents the conclusions that were drawn up, discussed, agreed and voted on by the panel members.

Part two: analysis and discussion. This is written by the Lancaster University team and includes:

- discussion of the policy context surrounding home energy decarbonisation;
- a summary of the methodology;
- detailed qualitative analysis of the panellist's findings, including a summary of their reasoning, as well as dissenting views and areas of disagreement;
- evaluation of the process, including reflections on the process of co-design;
- an annex with further background on the methodology, panel selection and process.

1 Part one: the citizens' panel's findings

This part of the report was developed and agreed by members of the panel, with minimal editing by the process convenors. It includes:

1- **A panel statement** drafted by a group of panellists in the final session, that was then voted on by all panellists. This was drafted with minimal editing by the process conveners. The statement is their message to the policy makers who read the findings.

2- **Criteria for homeowners** regarding what to consider when making decisions about home energy. Early in the process, conveners asked the panellists what they, as homeowners, would consider when making decisions about home energy improvements. The responses were consolidated into ten criteria. The accompanying text for each was drafted by the authors, based on analysis of discussions through the course of the panel, before being voted on by panellists.

3- **The full package of support** that panellists designed in response to the question 'What needs to happen to bring home energy use in line with the need to tackle climate change?' This package was developed, refined and voted on by panellists. The full method is outlined in the second half of this report and the appendix.

4- **The support for the findings** presents the results of panel members' votes on each element. Voting took place at the end of the process. It was done on a five point Likert scale (strongly oppose, oppose, neither support or oppose, support, strongly support). Panellists also gave written comments to accompany their scores. These comments were used in the analysis in part two. A total of 22 fully completed voting booklets were returned.

1.1 Statement from the citizens' panel members

"Our climate is changing, the temperature is rising and it is happening rapidly. The UK needs to take action. There must be no going back. It will get worse if we do not act now. We understand the absolute imperative of addressing household emissions within climate change targets, it is a large part of the overall problem.

Solutions to reduce carbon emissions from our homes are already available and usable. Our work sets out very realistic proposals on how this could be achieved. Sustainable energy is essential for all our futures, we must ensure it is an affordable option for all members of society. We must also make sure we prevent heat loss from our homes and that energy is used efficiently. These technologies must be fully embraced by all of society. For the UK to achieve its carbon neutral goal, they need to be the most affordable options made available to all.

For many of us homeowners our learning has been an eye opener and our work has exposed that there is a gap in everyday knowledge, this must be addressed by us all!

We are very concerned that government must get more serious about climate change and support us to make the changes that are so badly needed.

We have some of the worst insulated homes in Europe.

We need action. We need a national mobilisation now, similar to how we responded to Covid, there should be a 'war effort', led by government.

Leaving homeowners to address this on their own will simply not work - incentives for undertaking work, improving houses, and then the monitoring of improved performance are required. Harder, enforced, targets for house builders, the property owner and buy to let market will also help demonstrate we're all truly in this together, with these sectors needing to be seen to lead. Action is needed now."

1.2 Criteria: what people consider when making energy related changes to their homes

The cost of making changes: understanding what it will cost, whether it is affordable, what the payback might be, and over what time period.

A clear message from government: whether homeowners have received a clear, consistent and compelling message about what changes are needed and why, backed up by information, policy and legislation.

A view that encompasses future generations: consideration of the need to reduce emissions and address climate change, going beyond money and thinking about the impacts of climate change on different groups and future generations.

Support: the availability of loans, grants or other funds; clear, convenient information; communication through different channels including TV, social media and community groups.

Independent advice: whether there is a trusted, independent source of information and advice, including real life examples.

Impact: understanding what the biggest impacts are of different possible changes to home energy use, what changes are most effective, and which are small or insignificant.

A trusted and competent workforce: being able to find trustworthy installers, who are independently certified or regulated and have the right skills; avoiding 'cowboy' builders and installers.

Time: whether there is time to do the research and think about the decisions involved.

The level of disruption to the home: how much 'faff' or disruption there will be.

Effects on the home: impacts on structure, space, comfort, aesthetics and resale value of homes.

1.3 Full package

Education and awareness raising

People are **aware** of the 2035 boiler ban, changes that need to be made, what government is doing and the benefits of changes due to national campaign, a new **curriculum** and **popular media**.

Government leadership and regulation

Government has a long term s**trategy covering all housing types and addressing the need for training and apprenticeships.** It is **leading by example**, and communicates the sense of urgency.

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Grants

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Grants are means tested based on the status of your home and ability to pay.

Covering the costs of support

To help cover the costs of grants, the Government looks at a **windfall tax** on fossil fuel companies and p**olluter pays schemes**.

Renovating a home

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Your **logbook** tells you what needs doing.

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Living in a home

You get an **'energy improvement score'** (like a credit rating) if this improves you get **a cheaper mortgage** next time.

You have options for different contracts and tariffs with your energy provider:

1. join a **local community energy co-operative or energy grid** to buy and sell energy with neighbours,
2. have **two-track energy rates** so you pay less for energy used on green products like electric vehicles
3. pay a **tariff where you save for using less energy than expected**.

Government leadership and regulation

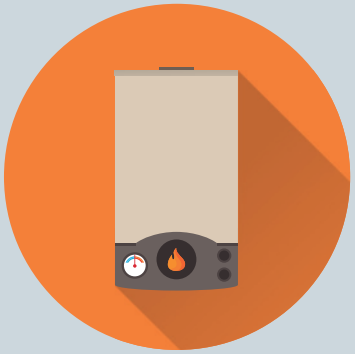
The government **leads by example** with a **long term strategy** for building decarbonisation including concrete action on all housing types, and training and apprenticeship schemes to scale up the workforce.

The government immediately announces that from **2035 no new gas boilers can be sold**. This date is kept under review and brought forward to 2030 if supply chains and the number of trained installers scale up fast enough.

The rest of the support package is rolled out in **plenty of time** to give people an opportunity to make the necessary changes to their homes before 2035 when they can no longer get a gas boiler.

All support schemes run for **at least 15 years** to provide businesses and workers with confidence to invest and retrain.

Education and awareness raising



2035

No new gas boilers can be sold

The government sponsors a **national awareness raising campaign** across traditional and social media. The campaign has a clear sense of **urgency** and explains what is happening, **why** it is happening and **what** the benefits are. The 2035 date for the ban on installing new gas boilers features prominently so people are well aware of it.

More references to home decarbonisation appear in home improvement TV shows and the school curriculum.

Information and advice

There is a national **free and impartial advice service** modelled on Home Energy Scotland that you can go to for additional information on home energy use and retrofit. This includes a **list of local suppliers** and a **website** with interactive sections and videos explaining different technologies and systems. There is also the option to **visit local demonstration homes** to see new technology in action.

You can check that any contractors you work with are part of a **government accreditation scheme** and read reviews of previous work they have done.

Logbook

Each home has a **logbook attached to it** that is passed from owner to owner. This tracks previous improvements, energy use over time in the home, and how changes in energy use impact other outcomes like carbon emissions and air pollution. The information is presented in **easy to read graphs.**

EPC+

When you buy a home you have to get an EPC+ carried out. The EPC+ is an extended version of the Energy Performance Certificate. It assesses the **current performance** of the home and includes a **checklist of changes** the home needs to ensure the logbook is up to date. The changes are organised on a chart showing the **cost versus the impact**. Needed changes are prioritised using a traffic light (red, amber, green) system. The EPC+ is required by law when buying a house, you will **need another EPC+ in 5 years-time.**

Grants

Flexible grants are available to use on the next energy improvements suggested by a home's logbook.

Eligibility for grants is based on **two criteria**:

1. **How energy efficient the home is.** Grants become less generous higher up the home energy improvement ladder, the more loans will be needed
2. **Ability to pay** for a **non-fossil fuel heating system**. For boiler replacements, grants will be means tested at a level that ensures no-one installs a new gas boiler ahead of the 2035 boiler ban date because they cannot afford an alternative.

Covering the cost of support

To help cover the cost of support schemes, the government looks at options, such as a **windfall tax** on fossil fuel companies or changes to **polluter responsibility schemes** that see higher polluting firms pay for energy improvement measures.

Loans

The government backs a number of schemes to make low or no interest loans available for home energy improvements. These follow a number of principles:

- the **payback period is transparent** and there is no possibility of interest rate hikes over the period of the loan;
- there is a **variety of options** available so people can shop around and find something that suits their circumstances;
- there are options for **loans linked to the property**, so they don't stay with you when you move;
- there are options to add repayments to payments households already make each month, eg mortgage, council tax or energy bills;

- when doing home energy improvements, you can use the low or no interest loan to **undertake other non-energy related home improvements**, like fitting a new kitchen.

Separate means tested loan schemes are set up to offer additional support for those that need it. These include the option of **transferring existing high interest debt** onto the low interest loan, or **delayed or conditional payback** schemes where payments are only made if you earn above a certain amount, like student loans.

Buying and selling a home

When you come to buy a home, you are incentivised to think about home energy improvements because you know the **stamp duty** you pay is determined by **how energy efficient** the home is. You also know that you could get a **rebate** if you get energy improvement work done.

Renovating a home

When you go to make **home improvements** (like fitting a new kitchen) the option of carrying out energy efficiency improvements at the same time is made attractive and available to you (eg by **tying it to cheap finance**). You already know what needs to happen to your home because it is stored in your logbook and was updated at the last EPC+. There is **also 0% VAT** on materials for these improvements.

A number of **financing options** are available to you (see 'Grants' and 'Loans' sections).

LIFE CYCLE STAGE

Renovating a home (continued)

Government schemes and market changes support those in **leaseholder properties**, such as flats. These include:

- **obligations on freeholders** to allow leaseholders to make energy related changes to their property;
- a **framework and support package** for leaseholders in flats to gain support and consent from neighbours, or whole blocks of flats, for energy related changes;
- energy companies offer **'heat as a service' contracts** to whole blocks of flats, taking responsibility for installing a centralised heat pump and charging all leaseholders a flat rate for the heat they use.

LIFE CYCLE STAGE

Living in a home

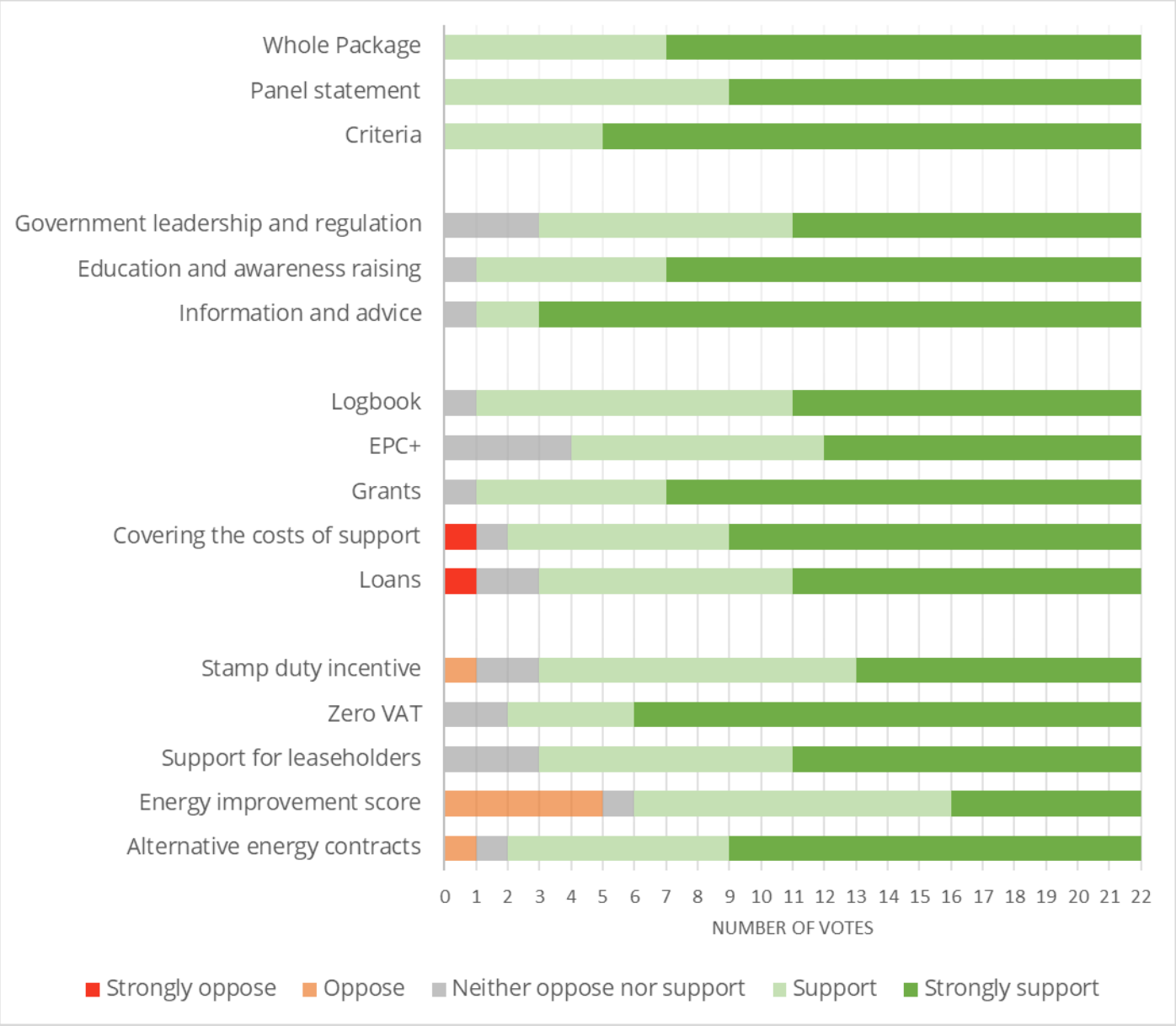
When living in the home you are incentivised to carry out energy improvements to build up your **'energy improvement score'** (like a credit rating) because you know you will get a cheaper mortgage next time if you have a good energy improvement score. All improvements and the impact they have are tracked in your logbook.

You have options for **different contracts and tariffs** with your energy provider.

- You can join **a local energy co-operative or energy grid** to buy and sell energy with neighbours or get help with retrofits.
- You can have **two-track energy rates** so you pay less for energy used on green products like electric vehicles or heat pumps.
- You can pay a tariff where you **save for using less energy** than expected.

You can also check the r**eal-time feed out in your logbook** to look for ways of making changes to your behaviour to save energy.

1.4 Support for findings



2 Part two: analysis and discussion

2.1 The policy context

Approximately 14% of the UK's greenhouse gas emissions come from heating, cooking and electricity use in homes.[4] Bringing down home emissions in line with the UK's target of net zero emissions by 2050 requires a rapid upscaling of home energy retrofits.

By 2030, the CCC estimates that installation rates for home insulation need to grow by an order of magnitude.[1] Heat pump installation rates need to reach 1 million per year in new and existing homes by 2030, up from around 54,000 in 2021.[1,2]

The rate of emissions reductions achieved by the UK's power sector will be much harder to replicate in the buildings sector. Home energy decarbonisation requires changes to nearly every home. Each household is unique, with multiple tenure types, building types, financial situations and motivations. The UK's housing stock also has very poor energy efficiency compared to other countries.[5]

The recently released Heat and Buildings Strategy (HABS) sets the governments approach to reducing emissions from heating buildings and lays out important high-level decisions for the sector.[3] However, the CCC has identified significant risks and policy gaps in the government's current approach to scaling up energy efficiency and low carbon heat installations in homes.[2,3] A major area where delivery is in question is in non-fuel poor owner-occupier households. These accounted for approximately 60% of UK homes in 2020, though estimates of fuel poverty vary and are sensitive to the recent upsurge in energy costs.[6]

On energy efficiency improvements for owner-occupiers, the government's strategy emphasises voluntary targets for mortgage lenders to encourage improvements and includes no mechanism for enforcement oversight.

For low carbon heat installation, the government is relying on installation targets for boiler manufacturers and consumer action in the face of falling costs for low carbon appliances as the market grows. This market-based approach assumes homeowners will switch to low carbon heating if such systems can reach cost parity with traditional systems. But, as the CCC highlights, there is a lack of focus on monitoring progress or on enabling and supportive policy in the related areas of skills, financing, planning and energy pricing.

The recently announced Boiler Upgrade Scheme will cover less than half the installation costs of a heat pump for most households. It has funding for approximately 30,000 installations a year over three years. This is significantly less than the 900,000 a year that will need to be installed annually by 2028, according to the CCC.[2]

Based on the findings of the CCC's independent review, additional policy is required to support non-fuel poor homeowners, if the government is to meet its statutory emissions reduction targets.

2.2 Summary of existing research on public attitudes towards home energy decarbonisation

Current policies suggest an assumption within government that owner-occupiers who are not in fuel poverty will make the necessary energy efficiency upgrades to their homes with limited support, and that they will switch to low carbon heating if this can achieve cost neutrality with fossil fuel systems. This assumption does not seem to have been tested. It also appears to be contradicted by existing research on homeowner's views and preferences. A summary of this research is provided below.

2.2.1 Awareness of energy efficiency and low carbon heating

There is low awareness amongst the UK population that heat from buildings is a major source of greenhouse gas emissions.[7,8] Only a minority have heard of specific low carbon heating systems.[7] Many people see modern gas boilers as efficient and, therefore, do not intend to switch to a different heating system when their boiler breaks down.[8,9] Awareness is higher for some forms of energy efficiency measures, particularly double glazing, cavity wall and loft insulation, although awareness of solid wall insulation is lower.[10]

2.2.2 Barriers to uptake

This lack of awareness, particularly around low carbon heating, is a barrier to uptake of home energy improvement measures. This is especially true for more complex interventions such as heat pumps which can require a home to have a high level of energy efficiency for them to work effectively.[11]

An evidence review from 2020, focused on low carbon heat, found that cost and uncertainty about performance are the biggest barriers to switching systems.[12] Upfront cost is also a major barrier to the uptake of energy efficiency measures.[11,13]

The cost factor plays a bigger role for more expensive interventions where there is less likelihood of recovering costs from lower bills.[8] Availability of finance is a major barrier to uptake of energy efficiency and low carbon heat measures, although this is by no means the only barrier.

Other barriers often cited in research include not having enough space, noise and a lack of trust in installers.[10-12,14] Another hurdle is the amount of time people intend to stay in their homes, particularly for interventions with high upfront costs and long payback times.[10] This is most prevalent amongst younger households who typically move more often.[11]

Beyond these specific barriers, research into non-fuel poor households has found high levels of inertia. People typically prefer the status quo, unless they have a specific reason to change.[7,11]

2.2.3 Motivators and incentives

Overcoming the lack of awareness is likely to be an important prerequisite to motivating people to adopt low carbon heat and energy efficiency measures.[14-17] Awareness raising could take the form of advertising, demonstration events and pilots. These efforts should focus on the benefits to the household rather than just the environment.[8,9] The need for an independent and trusted advice service for those seeking information is a consistent finding from prior research.[7,14,17] However, awareness raising and information provision alone is unlikely to be effective. An evidence review from 2020, focused on low carbon heating, found that increased awareness of low carbon heating systems does not lead to switching.[12] This review also found that only a minority of people who switch to low carbon heating systems were motivated by environmental concerns.

With cost a significant barrier, financial support is an important incentive for both energy efficiency and low carbon heat installation. A number of studies have found that lower bills does not motivate most homeowners to invest in home energy interventions.[11,17] Though an increase in property value could motivate some, there is generally low belief that home energy improvements will affect property values.[8,11]

Therefore, financial support is needed in the form of grants or low interest loans, particularly for interventions with high upfront costs. Research from 2021 suggests that a 100% grant would be the best incentive for increasing the uptake of energy efficiency measures or low carbon heating.[13]

Research has highlighted that people are often unsure if they are eligible for grants and so may need support in applying for them.[8] In terms of structuring grants, there is support for these being paid in the form of council tax relief.[8] A 2017 study of energy efficiency measures for homeowners in Scotland found that a prompt council tax rebate was, by some distance, the most popular and motivating incentive.[16]

Though financial support is important, costs are not the only barriers that people face, so funding help alone will not be enough to drive uptake.[12] Research specifically into non-fuel poor homeowners from 2016 found that comfort and aesthetics, rather than cost, are often the main motivators.[11] This is supported by a wider evidence review on low carbon heat uptake from 2020 that found financial support will persuade some, but is not important for all households.[12] Awareness raising measures and information provision, as described above, focused on experiential benefits, may be more important for this section of the market. Finding ways to increase trust in suppliers and tradespeople will also be essential.[7,14,17]

Other research has focused on segmenting household types to better understand different motivators. For example, if a homeowner is focused on doing work that increases the resale value of their home, they are likely to be open to cost effective finance schemes, but are unlikely to consider technologies with a long payback period, without upfront grants. Someone who wants to renovate their home to live in it long

term may place greater emphasis on aesthetics and comfort. Other owners may lack financial resources or face other pressures, meaning that they are only likely to respond to grants, and potentially not even then.[18]

Finally, a consistent finding across a number of studies is that interventions should target specific trigger points, when people are more likely to make changes to their homes. These include, when a boiler breaks down, when a house sold, when renovation work is being planned or when living situations change (such as due to the birth of a child).[9,10,14]

2.3 The need for a citizens' panel on home energy use

The government has to strengthen policy for owner-occupier home energy decarbonisation. Policy is difficult to develop in this area because it affects so many homeowners, in many different contexts. Governments are often hesitant to mandate what people do in their own homes. Furthermore, no single policy measure can have all the necessary effects. This has two implications.

First, policies need to have public support to succeed. The government needs to be confident that its policy will work for people in different circumstances. Second, the knowledge required to make effective policy is highly dispersed. No policy maker has perfect insight into the variety of living and financial situations of people across the country. Therefore, research needs to bring homeowners into the policy process, to identify what they find acceptable and what would work for them at a practical level.

Deliberative public engagement is well suited to highly complex and normatively loaded policy challenges perceived as risky by policy makers. It brings together a representative group of people who will be impacted by the new policy, provides them with evidence and information on the issues at hand, and allows them time and space to debate the issues and develop recommendations.

Deliberative methods differ from opinion polls or focus groups in that they do not just aim to capture a snapshot of opinion. Instead, they bring together different forms of knowledge – such as technical expertise, practical knowledge and lived experience – to inform solutions.

Evidence from previous deliberative exercises shows they succeed in finding solutions to difficult policy problems that politicians then feel empowered to act on.[19] For example, the citizens' assembly on abortion in Ireland broke the longstanding deadlock on this issue and gave politicians confidence and political cover to develop new approaches.

Though aspects of the home energy decarbonisation problem have been looked at in isolation, there has been limited research which looks at the public acceptability of a full policy mix, spanning financial support, advice provision, co-ordination and regulatory

interventions. Typically, prior research has looked at the acceptability of preformed policy measures. This research sought to go beyond this approach by equipping a group of citizens with knowledge to develop their own proposals, in dialogue with policy analysts from the CCC. Government policy has also evolved since most of the existing research was conducted; and the recent dramatic rise in energy prices has changed the picture considerably.

The idea to convene a citizens' panel on home energy decarbonisation emerged from a collaboration around public engagement on climate change policy between the CCC and Lancaster University. Lancaster University entered into this collaboration because of an interest in studying how deliberative methods can improve the climate policy making process. The CCC is developing work around public engagement on climate policy and has an interest in exploring deliberative methods as part of its evidence gathering to inform its advice to government.

2.4 Methodology summary

A full description of the project's methodology is contained in the appendix and is summarised below.

2.4.1 Stakeholders

The project was a collaboration between the following organisations:

- **Lancaster University's Climate Citizens project:** this seeks to embed deliberative processes into climate policy making.
- **The Climate Change Committee**: an independent, statutory body that advises the UK and devolved governments on emissions targets and reports to Parliament on progress in reducing greenhouse gas emissions, and preparing for and adapting to the impacts of climate change.
- **Shared Future:** a Community Interest Company that specialises in designing and delivering deliberative public engagement processes.

In addition, the **Sortition Foundation** recruited panel participants, and the **UK Energy Research Centre's Public Engagement Observatory** contributed a reflexive evaluation of the citizens' panel in collaboration with project partners. An independent **advisory panel** met four times to provide expert input.

2.4.2 The question

The question the panel was asked to address was:

'What needs to happen to bring home energy use in line with the need to tackle climate change?'

This was phrased to allow a broad range of solutions to be within scope, both in terms of the sector implicated (eg national government, local government and the private sector), and the target of the solutions (eg energy efficiency, demand reduction - technical or behavioural - and heat decarbonisation).

2.4.3 Recruitment

Twenty-seven panellists were recruited, of which 24 continued to the end of the process and took part in at least three sessions. The target population for the research was non-fuel poor homeowners. We aimed to recruit a panel that matched the demographics of UK-wide homeowners, based on the following criteria: gender, age, ethnicity, disability, housing type, heating system fuel, indices of multiple deprivation and opinions on climate change. Though representative of the target population based on these criteria, each participant also carried their own prior experiences into the process. Some participants had prior knowledge of the technologies under discussion or had a professional connection to the sector.

2.4.4 The process

The process followed a principle of co-design, in which technical experts and citizens worked collaboratively to develop solutions, to integrate different forms of knowledge held by the two groups. Such an approach results in solutions grounded in lived experience, acceptable to owner-occupiers, as well as being technically, economically and politically feasible.

External commentators provided information to supplement the input of CCC analysts, where required. There was a reactive approach to policy design, giving participants the opportunity to guide the process, suggest speakers and discussion topics, and control the shape of their final recommendations and findings. The first three sessions were planned by the project team in advance, with sessions four to seven being developed in consultation with the panellists. Formative evaluation meetings with the UKERC Public Engagement Observatory also shaped aspects of the citizens' panel process design. Details of each session are in the appendix (page 71).

2.4.5 Outputs

The panel resulted in:

- a formal set of recommendations from the panellists, including:
    - criteria for decision making,
    - a full package of measures for home energy decarbonisation, and
    - votes on the final package to gauge levels of support.
- Qualitative analysis of the panel's discussions, transcribed and analysed by the Lancaster University team.

- A reflexive evaluation by the UK Energy Research Centre (UKERC) Public Engagement Observatory.

2.4.6 Limitations

Deliberative approaches offer policy makers depth over breadth, in terms of what they can show about public attitudes. Unlike the high sample sizes used for quantitative approaches, deliberative methods typically use small sample sizes (approximately 20-100).

Keeping sample sizes small is necessary to allow learning and debate, and to enable participants to come to considered views that merge their lived experience with other types of expertise. The deep understanding of public attitudes offered by deliberative approaches can help to add detail and nuance to findings from quantitative approaches.

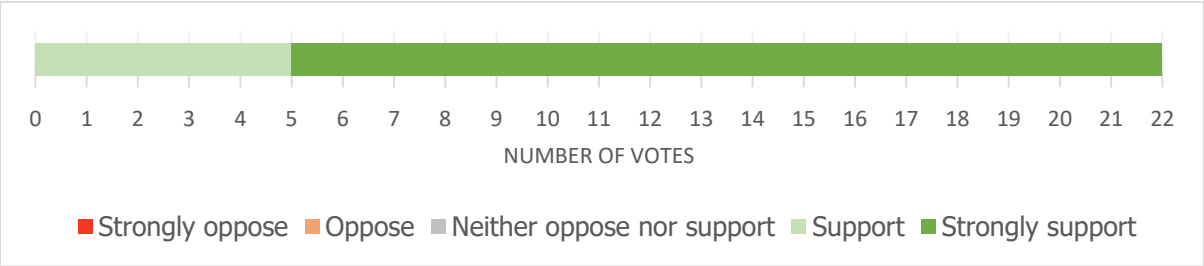
The evaluation approach adopted by the UKERC Public Engagement Observatory contextualised the citizens' panel in relation to other ways in which citizens are engaging with decarbonising energy in homes. As discussed in Section 3.8, this reveals how the citizens' panel was a partial representation of citizens views on decarbonising energy use in homes. However, the formative evaluation approach allowed the Lancaster team to reflect on these exclusions and respond to them in real time, which is an advance on existing practice. This reflexive practice could have been further enhanced if the evaluation team had been involved in earlier discussions on the design of the citizens' panel.

2.4.7 Detailed findings

The rest of this report summarises the discussions that led to the formulation of each of the criteria and each element of the policy package. Each section restates the criteria or policy package element as it appears in part one of this report. The outcome of the voting exercise is then given, followed by a summary of relevant discussion points. Each section ends with direct quotes from the panellists.

2.5 The criteria

Panellists voted on the ten criteria as a block.



1. **The cost of making changes: understanding what it will cost, whether it is affordable, what the payback might be, and over what time period.**

The cost of changes to homes was raised frequently. There was an understanding that costs could be seen as an investment that might payback over time, but this was not a strong motivator.

Most participants expressed reluctance to pay for changes without help in the form of loans or grants. Uncertainty over how long they might live in a house before selling it was also a factor, as it could affect the likelihood of realising the benefits of upfront costs.

Whilst they generally agreed that people in social housing or receiving benefits should have help with costs, they also pointed out that many owner-occupier households did not have spare money to invest, with some struggling to make ends meet. Therefore, it was seen as unfair that people should be expected to find the money themselves.

The rise in energy prices has focused people's minds on the need to save energy. But, for most households, it has also reduced disposable income, making investment in energy efficiency less likely, even though awareness of the need to has increased.

A small minority of panel members had already invested, or would consider investing, in measures like additional insulation or a heat pump, but they were the exception. For most, what they saw as an altruistic motivation, like helping to tackle climate change, was present, but was not enough on its own to prompt action and investment.

> *"...cost would always be the primary driver."*
>
> *"There's a small proportion of people who 'get it', the primary thing is to reduce energy, even if the break-even point is bad. But for the majority of people, it's cost....unless you've got bags of money."*
>
> *"...there's a perception that the cost of insulation far outweighs the benefits, especially if you don't live somewhere very long."*

2. **A clear message from government: whether homeowners have received a clear, consistent, and compelling message about what changes are needed and why, backed up by information, policy and legislation.**

Many panellists emphasised that, prior to joining the panel, they were not aware they were expected to make changes to their homes. They looked to government to provide a clear message.

They identified that action would require government sponsored awareness campaigns or government endorsed information provision.

They also referenced a need for consistent messages. This included making sure that policies and legislation were consistent, across different departments and over time.

> *"…government's not really making it their agenda"*
>
> *"…it would help if there was a common, consistent message from government. That would really, really help."*
>
> *"…a big problem really is that the government isn't consistent in their messaging. They say, we want you to get solar panels, but we've cut the subsidies on them."*

3. **A view that encompasses future generations: a consideration of the need to reduce emissions and address climate change, going beyond money and thinking about the impacts of climate change on different groups and future generations**

There was general support, and little opposition, to the principle that the UK should act on climate, and the specific target of net zero emissions by 2050 (though the panel members were not directly asked for their views on this). They thought that the need for emissions reduction, to tackle climate change, should feature in any policy or messaging about home energy.

However, a large majority of panellists said that this was not a strong enough motivator for them to make changes to their homes. They wanted to see how it was financially viable, and how changes could save energy and money. They thought that, if this was a priority for the government and the country as a whole, it should be signalled through policy and government investment, so that individual homeowners were not expected to do all the heavy lifting. A small number of panellists who were active on climate issues raised concerns most often and were broadly supported by others.

> *"…it's not on people's minds, it really isn't."*
>
> *"…the whole notion that there is a climate change crisis, it is important, we've seen that, there's been a crisis for thirty, forty years. It doesn't have as much traction as it should, by itself it's not a big enough argument for many people."*

" …you feel responsible, don't you, for what you're creating. So if someone came out and said, well if you do this, this and this, it'll make your home more efficient, it'll cost you less money, and as an add-on, this is the benefit that you'll provide to the environment."

4. **Support: the availability of loans, grants or other funds; and clear, convenient information, communication through different channels, including TV, social media and community groups.**

From the start of the process, panellists said that they would need support, in the form of education and information, as well as funding, to make the necessary changes to their homes.

Although some panellists already had experience of retrofitting their homes for energy efficiency, most did not, and needed more confidence and understanding before diving in. They felt that an important part of this was a higher level of awareness about the changes needed.

While general awareness about climate change was high, they did not see a link being made to changes needed within the home. Many placed a premium on information from independent sources, ie organisations that did not stand to profit from the changes. There was a considerable lack of trust in energy companies (despite their role in previous government schemes such as ECO and CERT).

"…people don't always understand how they can save energy properly. There's more education needed."

"…if more of those [shows] like Homes Under The Hammer, or DIY SOS had more of an emphasis on climate change…. If Nick Knowles was talking about heat pumps…"

5. **Independent advice: whether there is a trusted, independent source of information and advice, including real life examples**

Panellists said they would need access to a wide range of information before, during and after making any changes. This includes information on the cost-benefit ratio of different interventions, as discussed, support schemes, financial incentives available, trusted contractors and accessible metrics on how bills, energy use and emissions are responding to changes made.

The importance of trusted information sources, not linked to commercial interests, was widely expressed and came up repeatedly throughout the deliberations. There were no dissenting views expressed on this point.

"I need to know what's best for my house. It's an individual thing, isn't it? But have we got anyone who could come round to your house and my house and say, you need this, and you need that? I don't know anyone."

6. **Impact: understanding what the biggest impacts are of different possible changes to home energy use, what changes would be most effective, and which changes are small or insignificant.**

Panellists recognised that different interventions have different cost-benefit ratios and payback periods, both in terms of cost savings and environmental impacts. Access to house-specific information on the cost-benefit ratio and payback period of different interventions was seen as a crucial enabler of action.

They believed many homeowners may already have undertaken the easy wins, such as switching to energy efficient light bulbs or turning off devices overnight, but might not know what next steps to take. They thought good information on the impacts of high effort or high cost interventions would help homeowners to decide.

The need to have a clear cost versus impact profile of interventions specific to a home was widely held with no explicit dissenting view.

"I don't think the homeowner, until they know the right way forward for their property, can make any kind of sensible decision."

7. **A trusted and competent workforce: being able to find trustworthy installers, who are independently certified or regulated, and have the right skills; avoiding 'cowboy' builders and installers.**

Before spending money on home improvements, panellists would want to know that there are competent workpeople to do it. They believed there should be a high bar for the training requirements for people carrying out home energy retrofits.

As well as having trust in the work, being able to find someone to do it within a reasonable time was also seen as important. Panellists identified that there are not enough installers to meet current demand, let alone potential future demand for home energy retrofits.

There was a concern that many trades are under-regulated and the term 'cowboys' was used regularly to describe tradespeople who do bad work but are unaccountable. These concerns often stemmed from personal or reported stories of having bad work done. Some of these related generally to work by tradespeople, others related specifically to home energy improvements, such as work done under the Green Homes Grant scheme. Some expressed the view that for newer technologies, like heat pumps, it was

even harder to find suitably skilled and qualified tradespeople than it was to replace or repair a gas boiler.

The need for a trusted and competent workforce was voiced frequently by a large number of panellists. Though there was a consensus over this need, there were divergent views over what 'trusted' meant. Some panellists thought an online portal for accredited companies, with customer reviews, could work. Others had bad experiences with such platforms in the past. Some believed that local information, eg advice from neighbours and word of mouth, was important, whereas others believed there needed to be a centralised accreditation scheme with approved contractor lists.

> *"…as heat pumps become the new big thing, all you're going to get for five years is just a sea of people getting ripped off by cowboys… they'll end up in the freezing cold."*
>
> *"Tradesmen. Trusting the tradesmen. That's a big thing for me. If you're going to outlay that money, you want to know that it's not going to be shoddy."*
>
> *"…we've all been burned before by a bad mechanic, a bad whatever, and I don't want to go for that…'*
>
> *"I'm thinking, is this a government scheme, or is this cowboys coming to my house, offering cash only, mate. And some of them, I heard, were putting down just one roll [of insulation] and claiming the money from government…. It's just so risky. And no one gives you the cost benefit. No one says, if you spend £7,000 on double glazing, you will make your money back in five years…"*

8. Time: whether a homeowner has time to do the research and think about the decisions involved.

The panellists reported that a huge amount of information goes into decisions on home energy improvements. This includes information on the right changes for a specific house, availability of financial support and how it can be accessed, consideration of the payback periods for different interventions and finding contacts for trusted installers. Given how busy many people are, panellists identified that having the time necessary to collect and consider all this information was a central criterion for homeowners around making energy improvements.

Though the issue of time did not come up very often, a number of participants mentioned that only particularly committed people would be likely to devote significant time to doing research on home energy changes.

9. The level of disruption to the home: how much 'faff' or disruption there will be.

Participants identified two types of disruption that homeowners may consider. The first was disruption from the actual work being carried out. The second was from changes to the home, such as reduced space or reduced control over temperature.

The issue of the disruption caused was not a major concern that recurred as a theme. However, there were persistent questions about where a heat pump would go, or if energy efficiency measures would cause problems once installed.

There was recognition that this issue would have a different level of salience depending on the intervention type, with smaller interventions being less disruptive. For more disruptive changes, this was seen as the reason for general inertia that needed to be overcome before people would make changes.

10. Effects on the home: impacts on structure, space, comfort, aesthetics and the resale value of homes

Panellists were keen to know whether changes, including insulation measures and heat pump installation, would affect the look, comfort or value of their home. This was not an overriding concern for many, with the exception of heat pumps (see below).

Few expressed worries about insulation measures, though there were some concerns about inappropriate insulation causing damp. There was a lot of support for solar PV. There were uncertainties over phasing out gas heating and cooking. Many said that gas had been their preferred source of energy for heating and cooking, and older participants had memories of electric cooking hobs and storage heaters which were not convenient.

Many panellists were nervous about replacing gas boilers with heat pumps. After an introductory talk about electrification of heating, they asked for more details about how heat pumps work and, as a result, they heard from a commentator who had installed a heat pump. They asked how they work, how their performance differs from gas boilers, whether there would be space outside to install one, whether they would be tampered with if outside the front of the house and about noise levels.

Two panellists passed on experiences of friends or relatives who had problems with heat pumps, and this concerned the rest of the group. Other panellists countered this with reassurance that heat pumps work well if fitted correctly. Given these uncertainties, a small minority of panellists did not want to install a heat pump. Some wanted to wait to see if improvements were made. The majority did not reject them outright, but placed a great deal of emphasis on education, independent information and advice, a trusted workforce and financial support, to give them the confidence to act.

"…when I got my new house, I asked if it was gas heating and cooking. That's what people want"

"Until the first session [of this panel], I had no idea that heat pumps was this accessory. We've talked more about heat pumps in the last two weeks than I ever have in my life."

"…the people I know who had them [heat pumps] have been disappointed."

"I have some concerns about difficulties of actually putting the heat pumps in and if they work well enough in certain situations. It would be really bad if people got massively into heat pumps and they didn't work well. The publicity would kill everything."

2.6 The package

2.6.1 Enabling environment: Government leadership and regulation

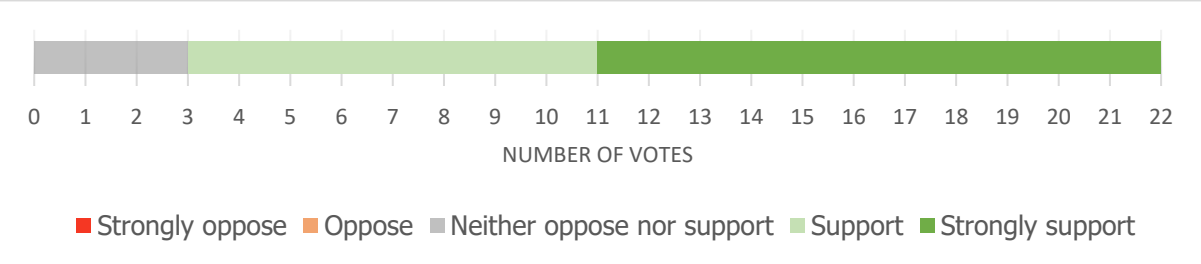
Panel recommendation:

The government leads by example with a long term strategy for building decarbonisation including concrete action on all housing types, and training and apprenticeship schemes to scale up the workforce.

The government immediately announces that from 2035 no new gas boilers can be sold. This date is kept under review and brought forward to 2030 if supply chains and the number of trained installers scale up fast enough.

The rest of the support package is rolled out in plenty of time to give people an opportunity to make the necessary changes to their homes before 2035 when they can no longer get a gas boiler.

All support schemes run for of at least 15 years to provide businesses and workers with confidence to invest and retrain.



Although voted on as one, we have separated government leadership and regulation below for clarity.

2.6.1.1 Government leadership

The need for clear consistent signals from government was raised by many participants and came up constantly throughout. Two reasons were most often cited. The first was to increase general awareness and understanding amongst the population of the changes that need to happen to people's homes. The second was to inspire confidence amongst homeowners and the private sector that the government is committed to supporting the decarbonisation of homes.

Panellists identified several signs that would show the government was committed to the home energy transition. The first was the mobilisation of significant government financial resources towards the transition. The amount spent on the Covid response was mentioned by one participant as being a clear indicator the government was serious about combatting the virus, helping to ensure citizens took the disease seriously. They suggested the need for a similar commitment for climate.

The second thing the government can do to demonstrate commitment is to pass legislation in support of the home energy transition. The third is ensuring a coherent approach is taken across housing and building types. Though focused on owner-occupiers, panellists regularly voiced concern about action taken on other house and tenancy types, and in public buildings.

The issue of homes still being built that will need retrofitting to meet climate change targets was raised repeatedly as a source of incoherence that could undermine efforts in the owner-occupier sector. Representatives from the CCC explained government action in these areas, but some participants thought action should be taken quicker than is currently planned on new build houses and public buildings.

Panellists also wanted politicians to lead by example in their own behaviour. Boris Johnson's flight back from COP26 was seen by some as undermining the government's message on climate change. Other inconsistencies mentioned were the cutting of support for small scale solar, the short termism of prior retrofit support schemes and the fact that climate change seemed to have been dropped from government communications after the 2021 COP26 climate summit.

Scaling up supply chains: Concern about policy running ahead of what the current home retrofit supply chain and workforce is able to deliver was raised constantly.

A clear consistent message from the government was seen as part of the solution, allowing people to retrain and businesses to invest with confidence. Panellists said that two further things are needed from government. The first is dedicated training and apprenticeship schemes for tradespeople. Second, incentive schemes should run for long periods. The short termism of prior schemes was raised as a barrier to industry expansion. The first iteration of the package included a ten year minimum for government support schemes. This was extended to 15 years in the second iteration, and one panellist in the final voting task suggested this should be a minimum time period. The success of the 17 year long KfW loan scheme in Germany was seen as an example of what could be achieved with longer term support.

> *"This is exactly the right time. With fuel bills going through the roof, this is exactly the right time for government to run a campaign about how you can save energy. You could have a 'do your bit' campaign."*

'…if you suddenly saw the government was putting £50 billion behind insulation or whatever, it sends a message to people that this really matters… We had COP26 and all of that… but I have not heard anything since'

"…if the govt could just steady the ship a little bit, give us some guidance, stick with it…. This chopping and changing is not encouraging people to get on with it."

2.6.1.2 Regulation

Through the process, the CCC played a strong role in questioning whether the ideas developed by panellists would be sufficient to drive necessary change. In doing so, they placed more emphasis on the issue of direct government regulation.

As the package developed, a number of panellists expressed concern that just including incentives would not be enough to persuade all homeowners to make changes. Ultimately, panellists settled on an approach that aligns closely to current government intentions: a ban on the installation of new gas boilers from 2035.

Why a boiler ban?: The government has stated its intention to ban new gas boilers from 2035 and this helped to seed this as a proposal. However, other options were discussed. The idea of compelling people to act on recommendations from an EPC+ (an enhanced energy assessment proposed in the package by the panel) was liked by some, but others thought that punishing people for not acting on EPC+ recommendations could potentially punish those who are worse off and would be hard to enforce.

This option was ultimately voted down. The idea of a forced savings scheme at the point of house purchase, or other point of sale regulations, was also discussed. There were concerns about the potential for inequality, that it could be hard to regulate and would not reach the housing stock that was not sold within a given time frame.

The boiler ban had the most support of the regulation options discussed. One panellist suggested it could have a similar effect to the indoor smoking ban, where social norms quickly shifted in the direction suggested by the ban. However, there were dissenting voices due to a distrust of heat pumps. Some expressed the view that no one should be forced to move away from a gas boiler.

Why 2035?: The target date for the gas boiler ban of 2035 reflects current government intentions. One panellist suggested this might be too soon, if people are not given enough notice. Others suggested 2035 could be too late and would not immediately motivate people to act.

Ultimately, it was thought that bringing the date forward any sooner might risk overwhelming the current capacity of the industry to install heat pumps. This led to a qualification: that the 2035 date should be kept under review and brought forward if the capacity to install heat pumps expanded faster than expected.

Differing views over the introduction date were also reflected in voting responses. Some suggested that pushing the date to earlier than 2035 would be unachievable and that

2035 will already be difficult. However, a slightly greater number of panellists suggested that fifteen years from the present day is too far in the future to motivate people to make changes now and the date should be brought forward. Two people suggested that waiting longer to bring in the boiler ban would allow time for new technologies to be developed. This was seen as beneficial, as current heat pumps may not be suitable for all homes.

A compromise on the boiler ban date was suggested by one panellist in their voting book that did not come up during the panel discussion. This was to ban the sale of replacement parts for boilers at an earlier date to encourage people to switch when their boiler needed to be repaired.

Conditionality: Although a 2035 boiler ban had broad support, there were a number of conditions panellist thought should be met if it was introduced.

At a minimum, it must be cost neutral to choose a heat pump over a boiler by 2035. People must also be given plenty of warning that the change is coming. It must be a central to government communications from the moment it is announced. Finally, it is important that the workforce is in place to meet the demand once the ban is in force.

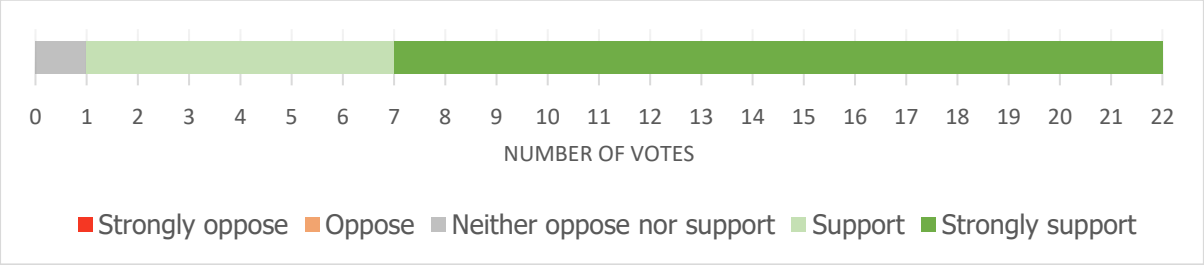
> *"I feel like there has to be some sort of legislation, because nearly all of what we put on the board earlier was incentives, and things to encourage people to do stuff, but there's a lot of inertia, … if, down the track, with good notice, there are some deadlines, then it focuses the mind…. Because otherwise, I just don't think things will move."*
>
> *"…it's going to have to come from the government to say no new gas boilers to the house in a domestic setting after a certain time. But that still means that there has to be considerable government investment, to make sure that heat pumps are basically the same price as a gas boiler."*
>
> *"The incentives and positive sides were really good and I thought yes, you will start to get people doing things to their homes that they're not doing at the minute, and yes there will be a change in culture. And I liked all of that. But I thought that the weakest side was what government needs to do to make sure things are moving fast enough. And having some things which are deadlines where things have to have happened by, otherwise it will be nice but it probably won't move fast enough."*

2.6.2 Enabling environment: Education and awareness raising

Panel recommendation:

The government sponsors a national awareness raising campaign across traditional and social media. The campaign has a clear sense of urgency and explains what is happening, why it is happening and what the benefits are. The 2035 date for the ban on installing new gas boilers features prominently so people are well aware of it.

More references to home decarbonisation appear in home improvement TV shows and the school curriculum.



The need for greater awareness about home decarbonisation was repeated by many panellists. There were two broad reasons for this: first, so people had a better understanding of what changes they could and should make to their homes; and, second, to create a greater sense of urgency and build a social norm, a shared sense of what is expected. Panellists frequently referenced the school curriculum and suggested that children and young people could influence parents through pester power; as well as community initiatives and organisations like the Eden Project, which they thought raised the issue in an entertaining and accessible way. Panellists pointed to the large number of TV programmes about buying or improving homes, saying that this could be a good point of intervention; there were many references to social media too.

Government campaigns: There was a high level of support for a government information campaign on home energy decarbonisation, with older panellists referring to previous campaigns such as Keep Britain Tidy. Many also referenced the government's communications on Covid, saying that, in the early days of the pandemic, there was clear, consistent advice and awareness raising. They thought this was a model that could be followed.

Messaging: A public awareness campaign on building retrofit would need to speak to the different motivations people have for making changes. The impact of energy retrofits on emissions is a motivator for some, but panellists believed it would be

unlikely to encourage many homeowners to act. The campaign should, therefore, also communicate the amount of energy and money that many households are wasting as a result of inefficient buildings. The campaign should be framed positively and should avoid guilt tripping people into action.

The role of energy companies: There were mixed views about whether energy suppliers could play a role in raising awareness. Some pointed to the fact that these businesses had existing relationships with homeowners, so would be in a good position to influence. However, many panellists said that they would not trust messages from a company which might be in a position to profit from householders' decisions. Therefore, this did not form part of the panel's final recommendations.

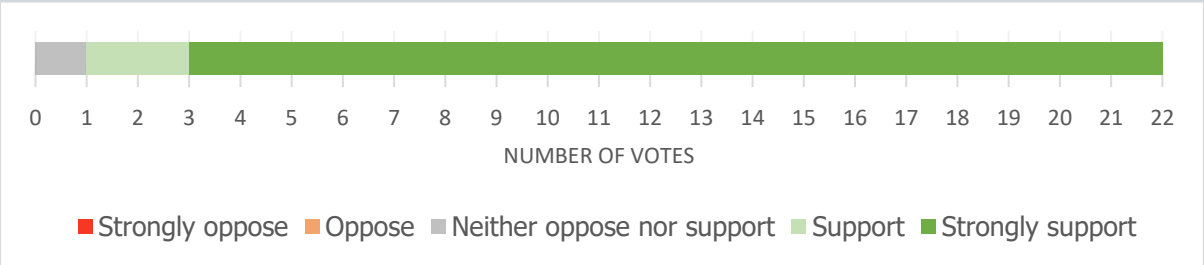
> *"[during the pandemic] I had to turn the radio off because every time I listened it was about Covid, stay at home, do your thing for the country. So they could do this and hammer home about the boilers, it would get people thinking, and make them aware."*
>
> *"Imagine if government made shows like Grand Designs talk about energy efficiency too."*
>
> *"Simon [from the Climate Change Committee] said, by 2035, we shouldn't have gas boilers… but nobody actually knows about that, and actually that seems rather a long way away, because I'm thinking I could be dead by then. It doesn't give me any incentive to do anything.*

2.6.3 Enabling environment: Information and advice

Panel recommendation:

There is a national free and impartial advice service modelled on Home Energy Scotland that you can go to for additional information on home energy use and retrofit. This includes a list of local suppliers and a website with interactive sections and videos explaining different technologies and systems. There is also the option to visit local demonstration homes to see new technology in action.

You can check that any contractors you work with are part of a government accreditation scheme and read reviews of previous work they have done.



Most panellists said that, before joining the panel, they had not understood the changes they could make to their homes. As discussions continued, they developed an understanding and wanted others to have access to the same knowledge, in a trustworthy and straightforward format.

This need for information and advice was a significant issue and was raised as often as issues of cost and finance. In other words, even if people could afford to make changes, or finance was available, they would be unlikely to proceed without access to information and advice.

Independent advice: A constant refrain, during discussions and the voting phase, was the need for impartial advice, not linked directly to companies who would profit from changes.

In an early panel session, a commentator from Home Energy Scotland (a government funded, independent advice service) explained how their service worked. Subsequently, this was seen as a good model to follow, with some panel members championing Home Energy Scotland at every opportunity.

They wanted an organisation that would sort through the mass of information for them, providing a clear and accessible account of what changes should be made to homes,

and what technologies are available. Some panellists also raised the idea of show homes, where people could see options first hand, and this was widely supported.

During discussions, speakers from the CCC said the government had committed (as part of the Heat and Buildings Strategy) to provide an advice service, which participants welcomed. They wanted more detail about how this would work, particularly about whether it would be independent, and whether it would provide easily accessible, trustworthy information.

Contractors' accreditation scheme: Concerns were constantly raised about 'cowboy' contractors, who might cynically benefit from people's lack of understanding of technologies, and fail to carry out work to a good standard.

Although supported by some, there was scepticism about the usefulness of websites which offer reviews of tradespeople, as these were not thought to be properly policed. Many panellists suggested an approved list of contractors, with strict standard setting and monitoring. Some also asked for a redress or compensation mechanism for work that did not meet specified standards.

There was almost no awareness of existing schemes, such as the Microgeneration Certification Scheme (MCS) which currently provides a list of certified contractors for technologies, including solar PV and heat pumps.

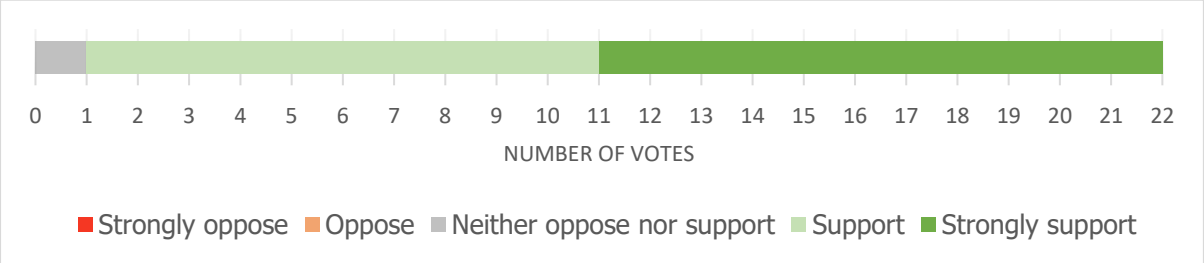
Some concerns were expressed that an accreditation scheme would reduce the number of available contractors or would be too difficult or too bureaucratic to sign up to. Overall, however, there was strong support for this proposal.

> *"The Scottish energy trust [Home Energy Scotland] … I have it written down. It answered so many questions: expert, some you can trust, for everyone, the whole country. I was thrilled about it."*
>
> *"…[advice should be] simplified, so that doesn't feel like going through a minefield."*
>
> *"…there's a lot of nervousness around contractors to go to – so we suggested approved lists for suppliers and installers that have gone through a checking procedure."*

2.6.4 Support through the lifecycle: Logbook

Panel recommendation:

Each home has a logbook attached to it that is passed from owner to owner. This tracks previous improvements, energy use over time in the home, and how changes in energy use impact other outcomes like carbon emissions and air pollution. The information is presented in easy to read graphs.



Most panellists reported limited understanding of their home's energy performance, or the changes they could make. They thought this was a crucial prerequisite before investing in changes. They wanted tailored information about their own homes.

Emma Harvey, from the Green Finance Institute, presented the idea of a logbook, attached to the house, providing information on what work had been done, how the home performs and what improvements could be made in future.

Panellists liked this idea and adopted it. They envisaged the logbook as a living document, linked to the house, and updated through EPC+ assessments (see below), or when work was done (rather than relying on homeowners to update it).

Though the preference was for an online logbook, some participants highlighted the need for a format suitable for people lacking IT skills.

Link to smart meters: Some panellists suggested the logbook could be linked to smart meter data, to provide real time feedback on performance over time. They said that, if they had good data about how much they were using and spending, it would help them to change their behaviour, such as how they used appsliances and heating. However, one panellist had privacy concerns if data about previous occupants was available.

> *"...it's understanding that, if you are likely to stay in your home for the next five years or something, what will give you the best payback? There are some easy wins, there are some that will take longer to payback."*

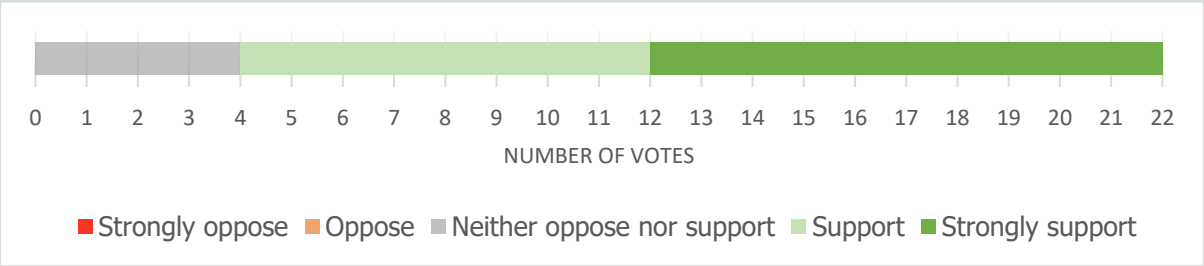
"And then rating and returns on the property, is it nearing to zero emissions? It would be good to see how much benefit you get from it all"

"With Tesco you can see how much you are saving when you go shopping – me and husband now compete about who saves the most. So having easily accessibly visible information, then it gets you to think about it and change your behaviour. Like a smart meter – but breaks it down so you can see it per device."

2.6.5 Support through the lifecycle: EPC+

Panel recommendation:

When you buy a home you have to get an EPC+ carried out. The EPC+ is an extended version of the Energy Performance Certificate. It assesses the current performance of the home and includes a checklist of changes the home needs to ensure the logbook is up to date. The changes are organised on a chart showing the cost versus the impact. Needed changes are prioritised using a traffic light (red, amber, green) system. The EPC+ is required by law when buying a house, you will need another EPC+ in 5 years-time.



From the beginning of the deliberations, the idea of a compulsory, standardised assessment for all homes was discussed. This arose because most panellists thought they lacked good information about their homes and the improvements that could be made. They thought this information would be the first step to making changes.

Link to the current EPC scheme: Before the discussions, many panellists were not aware of the current Energy Performance Certificate (EPC) arrangements (this is an A-G energy efficiency rating for houses, with advice on improvements, and is a legal requirement when houses are sold).

Once made aware of the EPC, they were supportive of the principle, but they thought there was a need to go beyond existing measures.

Panellists did not discuss the protocol behind the EPC or hear from commentators about how EPCs were calculated. The idea to build on the existing EPC was not an endorsement of the methodology used to calculate current EPC scores.

Coverage: Panellists thought that, in contrast to the EPC, the EPC+ should apply constantly to all homes, not just when they are bought and sold. It should provide more detailed information and be updated regularly.

An external commentator presented a graph on the costs and impacts of different possible measures. This resonated with panellists and they incorporated it into their final package. In effect, this would be a more detailed version of the suggested improvements included in current EPCs.

Panellists also thought that, in addition to assessing the building fabric, the EPC+ should show information about the home in use. This would include an assessment of which home energy uses are most significant, such as which appliances are most energy hungry, and what behavioural changes would lead to cost and carbon savings.

Like a car MOT: Throughout much of the discussion, panellists noted that the MOT system for cars could be a model, in that cars require regular checks and owners are advised about the changes they are required to make.

Initially, they suggested using the name 'MOT', before deciding that it might be confusing, settling instead on 'EPC+' to demonstrate that it was a development of the current system. There was agreement that the EPC+ check should be carried out by an independent assessor, who did not stand to gain financially. One suggested the name 'home comfort adviser'.

Differing views on implementation: The EPC+ idea had strong support and there was a consensus around the idea amongst panellists. However, views differed on who should pay for it, whether there should be penalties for failing the rating or not carrying out work (as with a car MOT, where owners are legally obliged to make changes) and how often they should be carried out.

These concerns were reflected in the final voting, with this recommendation getting slightly lower levels of support, and questions raised about how it would be implemented.

> *"…you want an independent assessor to come to your house, and say, right, here are your problems, here are all the options you can do, here's your quick win, here's your expensive fantastic win."*
>
> *"…we were joking that you can get an MOT on your car, but you can't get an MOT on your house."*
>
> *"I like the home MOT idea but [if] it's required by law, how is it policed? Is there a fine? If it is a low income family, how will that affect them if they can't afford to do this MOT?"*

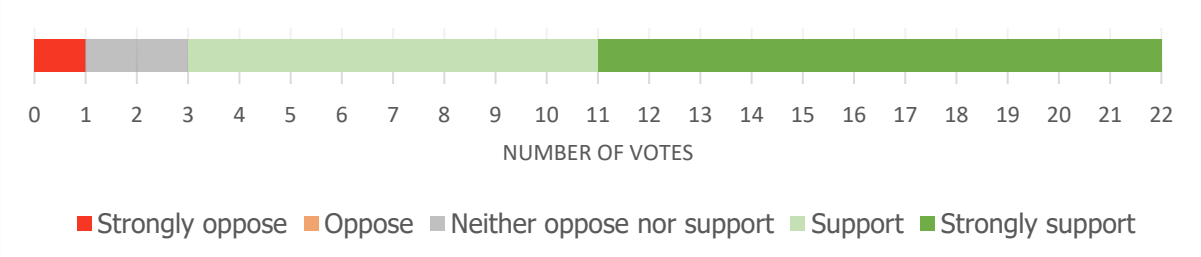
2.6.6 Support through the lifecycle: loans

Panel recommendation:

The government backs a number of schemes to make low or no interest loans available for home energy improvements. These follow a number of principles:

- the payback period is transparent and there is no possibility of interest rate hikes over the period of the loan;
- there is a variety of options available so people can shop around and find something that suits their circumstances;
- there are options for loans linked to the property, so they don't stay with you when you move;
- there are options to add repayments to payments households already make each month, eg mortgage, council tax or energy bills;
- when doing home energy improvements, you can use the low or no interest loan to undertake other non-energy related home improvements, like fitting a new kitchen.

Separate means tested loan schemes are set up to offer additional support for those that need it. These include the option of transferring existing high interest debt onto the low interest loan, or delayed or conditional payback schemes where payments are only made if you earn above a certain amount, like student loans.



On both loans and grants, there was a strong feeling that most homeowners would be unwilling to spend significant amounts of their own money on home energy retrofits without support from government.

A commentator presented the KfW model in Germany, where government support low interest loans linked to home energy improvements. There was strong support for this model and low interest loans formed the centrepiece of non-grant based financial support.

Interest: The words 'low interest' were changed from the first to second iteration to 'low or no interest'. There was no detailed discussion of the practicality of offering zero interest loans, or whether these should be indexed to inflation.

Those supporting no interest loans over low interest loans offered two reasons: that carrying out work on their homes was only necessary due to government targets, and that the payback period would be long if the work was to pay back at all. They thought they should not be made to pay to borrow the money needed to do the work. In their voting booklets, three panellists stated that their support for this part of the package was conditional on interest being set at zero.

It was also suggested that some people will be opposed to taking on debt. One panellist said they would not consider taking out a loan for ten or more years for any reason other than buying a house. No suggestions were made as to how to overcome this issue, beyond making finance very low cost.

The structure of loans: No overall structure for loans was agreed. Instead, what came through from the discussions was the need for a variety of structures to suit different homeowners' needs.

A significant number of panellists liked the idea of hiding payments for the loan within an existing household outgoing. Adding loans to mortgages received significant support, though it was noted that many homeowners do not have mortgages.

One panellist suggested that all mortgages came with two separate pots of finance, one for the house, and a second for any home energy retrofit work that was needed or had been carried out. This suggestion had support from the small group where it was raised. Separating the mortgage into two parts would facilitate having separate interest rates for the two pots. Although it did not appear in the final package, a sub-group which discussed adding loans to mortgages suggested that the capital gains from the home could be used to pay off the loan at the point of sale. It was not voted on or added to the final package, but this idea was supported by the small group that discussed it.

Another way to hide loan payments suggested was to integrate repayment into council tax in the form of a temporary (ten to 15 years) increase in the council tax band of the property.

This formed part of the model for financing retrofits presented by a commentator and had some support, but a small number objected for two reasons.

First, as council tax values have not been reassessed in a long time, there were concerns that shifting council tax bands would change costs for different households in a way that does not necessarily reflect their underlying property value.

Second, using council tax would ensure that the cost of the loan was linked to the property. A small number were strongly opposed to the idea that a future owner would be burdened with a loan for work they had not commissioned.

One panellist objected on principle to the idea of someone else paying for work you have had done. Others were concerned it would harm the value of the house. Though council tax as a vehicle raised some problems, many panellists were in favour of property-linked finance, however it might be structured. It was thought that people would not want to keep paying for something they were no longer using, and personally linked loans might put people off doing work if they did not intend to stay in a house for very long.

At least one participant did not agree with the idea of linking loans to existing payments, as this would restrict options in terms of the source of the finance. They said they would prefer to shop around for options regarding the sources and conditions of the finance. In a comment in the voting booklet, one panellist worried about hiding payments amongst other regular outgoings and stressed that repayments should be transparent.

As this discussion showed, there was a range of views around the best way to structure low or no interest loans. This suggests that making different options available to people may be necessary.

Supporting other work with low cost energy retrofit finance as an incentive: One commentator suggested to panellists that low cost finance for home energy retrofits could also be used for cosmetic renovations to encourage people to make changes. This has two advantages: first, homeowners would have aesthetic home improvements they can enjoy in a way they are unlikely to enjoy energy retrofits, making them more likely to do the work. Second, when someone enquires about cosmetic home improvements is good point to introduce the idea of an energy retrofit.

Panellists liked this idea and incorporated the ability to use low-cost finance for other home improvements into the final package. One panellist raised the point that, if the cost of the loan increased with its size, then people might do the bare minimum energy related work needed to get the low-cost finance for their cosmetic improvements. This would need to be guarded against in the scheme design.

Later in the process, panellists considered the scenario of a homeowner who already had significant personal debts and was unwilling to take on more. They suggested that if undertaking home energy improvements, such a person could be allowed to transfer high interest personal debt to the new low interest loan, as an alternative to using low interest loans for non-energy related home improvements. From this, the idea

developed that everyone could have access to a certain amount of cheap finance over and above the amount needed for the retrofit, to use how they saw fit.

Additional support: However, when considering the case of a 'just about managing' homeowner with significant personal debt, panellists suggested additional support could be put in place, over and above that outlined above. One suggestion was conditional repayment plans such as those used for student loans, where repayments only begin once earnings are above a certain amount.

This idea was raised in the context of someone experiencing financial hardship, and it was suggested it should be trialled before being rolled out more widely.

This suggestion was included in the package as a means tested scheme.

In the voting booklets, one panellist expressed concern that eligibility criteria might be higher for this type of loan, as applicants' potential future earnings would be assessed.

> *"...even if you offer me a loan, people say do I want a loan? It's harder for people to take those steps. They'll do it for a new kitchen, but it's much harder for things they don't feel an immediate benefit."*

> *"On loans, I got the impression that they weren't necessarily going to be very generous. But if you want the work done, you have to make sure the money is there."*

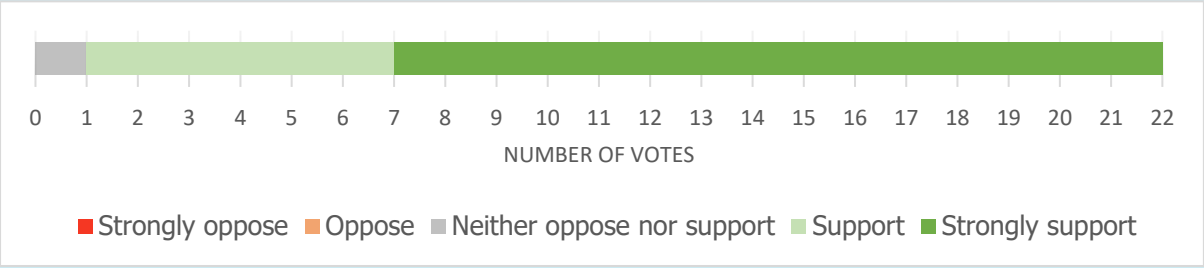
2.6.7 Support through the lifecycle: grants

Panel recommendation:

Flexible grants are available to use on the next energy improvements suggested by a home's logbook.

Eligibility for grants is based on two criteria:

1. How energy efficient the home is. Grants become less generous higher up the home energy improvement ladder, the more loans will be needed
2. Ability to pay for a non-fossil fuel heating system. For boiler replacements, grants will be means tested at a level that ensures no-one installs a new gas boiler ahead of the 2035 boiler ban date because they cannot afford an alternative.



As with the loans scheme, there was a strong feeling that, without financial support, homeowners are unlikely to invest in the scale of energy home improvements needed.

Panellists were made aware that many of the home energy changes required will not payback at all in terms of lower bills, or will only do so over a very long time period.

Alongside low or no interest loans, they developed ideas for direct grants. In the first instance, these grants were designed to target the lowest performing homes, rather than lowest income households.

Later in the process, means testing considerations were added to cover heat pumps in particular. The working assumption of these discussions was that government schemes targeting those in fuel poverty would continue.

'Means tested', in this case, refers to support for those who are struggling financially but who would not meet the current definition of fuel poverty.

Flexible grants: Panellists were concerned that existing grant schemes seem to target only certain types of retrofit, or certain technologies. In response to this, they developed what they called 'flexible grants'. These are pots of money that can be used on whatever

home energy improvements a home requires, linked to the EPC+, in that they can be used to address whatever the EPC+ recommends to be done.

As the grants are targeted at low performing homes, an EPC+ score below a certain threshold would determine eligibility. Only when all homes had reached that threshold would the bar be raised. This idea emerged from a concern that existing grants tend to go only to those on the lowest incomes, or those with the time, energy and inclination to seek them out and apply for them. Support for solar PV was cited as an example where only enthusiasts applied.

The idea of the targeted flexible grants scheme is to raise the level of the whole UK housing stock progressively. The panellist who first proposed this scheme spoke about their street where many houses still lacked even double glazing.

In their voting booklet, one panellist rejected the idea that grants should become less generous as one's home improves. This was, in part, because some of the changes people carry out after the easy wins are achieved are likely to be the most expensive.

Means testing: The issue of whether anyone should be eligible for these flexible grants, regardless of income, was discussed briefly.

After discussing means tests versus universal grants, no argument came out strongly in favour of limiting support based on income. Linking grants to the status of the house, therefore, became the dominant principle, as discussed above.

However, in relation to means tested support in the context of an impending boiler ban, it was decided that it would be counterproductive for people to fit new gas boilers close to 2035, just because it was cheaper than a heat pump.

To address this, panellists added an element of grant means testing specifically for heat pumps. Eligibility criteria would be set at to the level necessary to ensure no one was forced to choose a new gas boiler ahead of the boiler ban for cost reasons.

Designing the grant scheme: Three points were raised on the practicalities of accessing and processing grants. First, there was support for integrating information about grants and how to access them within other parts of the homeowner lifecycle. For example, information about grants could be included in the home logbook. Home energy assessors who carry out EPC+ assessments, or tradespeople, could also be trained to make homeowners aware of grant schemes. Although embedding knowledge about grants into such contact points was supported, some panellists raised concerns about the practicality of tradespeople having up to date knowledge of the latest grant schemes.

The second point, on structuring grants schemes, focused on avoiding abuse of the system, eg a situation where homeowners claim for work they have not done, or claim more money than they are entitled to. A panellist suggested that grants could be paid directly to the contractor, once the customer had signed off the work. This would also

allow an element of quality control, as contractors would only get paid once the customer agreed they were happy with what had been done.

The final point raised about the design of any grant scheme was the need to ensure demand for energy retrofits does not outstrip supply.

Ideas for accelerating the expansion of supply chain capacity are captured elsewhere in the package. However, several panellists noted the importance of matching incentive schemes designed to boost demand with realistic timelines for scaling up supply. Here, as elsewhere, the supply issues that beleaguered previous incentive schemes were repeatedly mentioned.

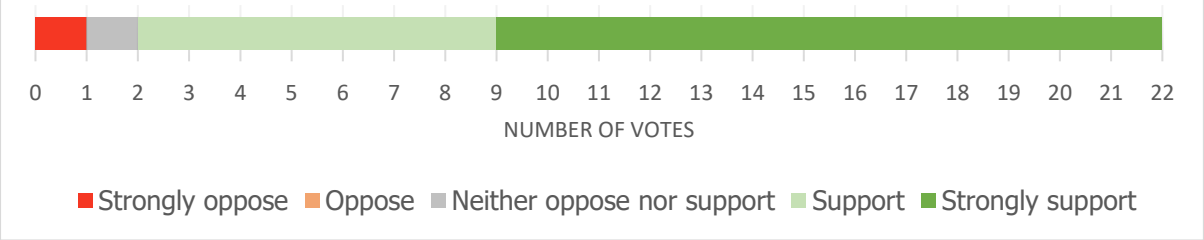
In their voting booklets, three panellists made it clear that grants should be easy to access in practical terms, so those that need them and are eligible find it easy to apply.

> *"I don't see how they are expecting people who are just managing, so you've got your house, you can pay your mortgage, you can cover your bills, but you can't afford the big-ticket items … it's going to have to be a grant or on the mortgage or something like that, some way of financing it, and I think it's probably going to have to be a lot of grants and low-interest loans from the govt if they're serious about it"*
>
> *"…the better educated you are, the more likely you are to get the grant because you can fill the forms in"*
>
> *"…there were massive grants for solar panels a few years ago. The problem is, it goes to people who really probably could already afford it"*
>
> *"Neighbours got solar panels all across their roof – but they could afford it. I thought, 'oh that could be good, but I've got kids I need to put shoes on'…. The people who had the money are now getting the benefits."*
>
> *"I always see this as the consumer who is going to have buy a thing, it always seems to be flash in the pan things, like 'come and get your solar panels and have five grand off', lately it seems to be heat pumps. And I think heat pumps sound good. But choosing which of these I invest in… I don't see why it has to be five grand for solar panels, why can't it be five grand of the thing your MOT [EPC+] says you need to get done to your house?"*

2.6.8 Support through the lifecycle: covering costs of support

Panel recommendation:

To help cover the cost support schemes, the government looks at options, such as a windfall tax on fossil fuel companies or changes to polluter responsibility schemes that see higher polluting firms pay for energy improvement measures.



Panellists heard a presentation from the CCC on the overall cost of the home energy transition, different options for covering costs and the types of trade-offs that the government faces in deciding how to mobilise resources for the transition.

Although it was not a major focus of discussions, ideas were developed around how the government could fund the home energy transition.

One panellist said the government should find ways to cut expenditure elsewhere, but most of the discussion focused on new revenue streams. There was strong, though not universal, support for targeting energy companies and polluting firms as sources of revenue.

There was no consensus on other revenue raising schemes, and the package does not include detailed recommendations on this area. One panellist said it was the government's job to work out how best to fund support schemes.

Raising revenue from energy companies: There was strong support for the idea of an energy company windfall tax to help fund the transition. This was seen as a fair use of excess profits being generated by energy companies (the energy company levy was announced between the first and second full in person sessions).

This suggestion had significant support, but two concerns were raised about it. The first was that it would deter investment and R&D in the sector or that energy companies would simply pass on costs to consumers. The second was that it was a one-off source of funding and not long term or large enough to cover the cost of the transition.

An alternative approach suggested was a polluter pays scheme, where heavily polluting firms automatically pay profits above a certain level into a pot to support the home energy transition. This was seen as a better long term source of funding and, again, as a fair use of the profits of polluting companies. Some were worried that it might hit firms financially when they are facing higher costs as they transition to cleaner technologies or processes.

The divergence of views on raising revenue from energy companies was evident in the voting booklets. Four panellists were explicitly supportive of raising more from energy companies in their comments. Five expressed a view that a windfall tax could just lead to higher prices or reduced investment incentives, and that not enough would be raised anyway. One panellist said the government should stop companies passing on the costs.

Other sources of revenue: When discussing schemes, such as the stamp duty levy, some panellists suggested the excess paid by those buying poor performing homes could be hypothecated to support home energy support schemes. Others did not like the idea of the stamp duty scheme being used to raise government revenue. No reason was explicitly stated for this.

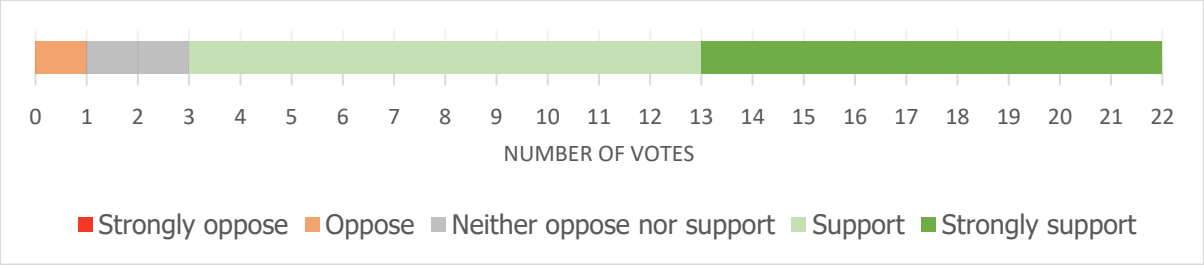
Other tax changes supported by some panellists were changes to inheritance tax and clamping down on tax avoidance. Neither of these ideas were discussed in detail and the inheritance tax idea was stripped out of the package at the second iteration due to significant disagreement from many panellists.

> *"Where the money comes from is fraught with difficulty however you look at it, but we have all these people who pay no tax and they are filthy rich, eg non-doms, and we need it sorting."*

2.6.9 Buying or selling a home: a stamp duty incentive

Panel recommendation:

When you come to buy a home, you are incentivised to think about home energy improvements because you know the stamp duty you pay is determined by how energy efficient the home is. You also know that you could get a rebate if you get energy improvement work done.



The rest of the package was designed around what panellists called the 'lifecycle of home ownership'. This is made up of buying and selling, renovation and living in a home. Panellists identified these as crucial intervention points at which homeowners could be encouraged to make home energy improvements.

Buying a home was seen as a significant point. Yet people felt that they would be less likely to invest in improvements if they sold it before they had benefited from the payback. For these reasons, panellists saw buying and selling as a crucial moment for the government to intervene. Interventions discussed included changes to stamp duty and preferential mortgage rates.

Stamp duty: Panellists spontaneously suggested the idea of using stamp duty differentials as an incentive, to offset the cost of works. They then heard from a commentator from the Energy Efficiency Infrastructure Group, who suggested that stamp duty could differ according to the energy efficiency rating of a home, with the option of a rebate if the buyer implemented recommendations after purchase.

This idea was liked and included in the panellists' recommendations. There was some concern about equity, given that cheaper houses attract less (or no) stamp duty, meaning that the incentive, and potential saving, would be smaller. There was concern that the rebate might not be accessible, if new homeowners did not have the money or time to make changes.

Some also pointed out that it would not encourage those who had lived in their home for a long time, particularly older people who were unlikely to move. For this reason, the

stamp duty differential was seen mainly as a way of raising awareness and as an incentive, rather than as a finance mechanism. It was also seen as one inducement amongst many in the package, and recognised that not all households would be able to benefit from incentive schemes.

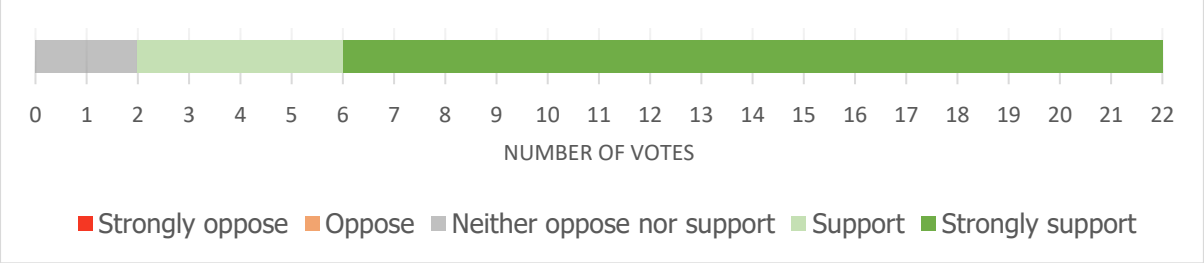
> *"...if you're in the higher bracket, A B or C, you [would] get a significant reduction in stamp duty. But if it's a breezy old house, then you just pay normal stamp duty. So there's an incentive, even if you're going to move in a few years' time, because you know you're going to get it back."*

> *"If you can't afford to do the heat pump yourself, selling [the home] means someone will have to pay slightly more stamp duty. They would still get a rebate if they do it themselves. So they can do it."*

2.6.10 Renovating a home: zero VAT on home improvements

Panel recommendation:

When you go to make home improvements (like fitting a new kitchen) the option of carrying out energy efficiency improvements at the same time is made attractive and available to you (eg by tying it to cheap finance). You already know what needs to happen to your home because it is stored in your logbook and was updated at the last EPC+. There is also 0% VAT on materials for these improvements.



Panellists saw opportunities in linking energy efficiency improvements to other investments in homes, such as new kitchens and bathrooms.

One commentator suggested to the panel that finance for home improvements could be provided at discounted interest rates, if energy efficiency improvements were made at the same time. In other words, homeowners would be able to access good finance deals if they committed to carry out energy improvements too.

This idea was welcomed by panellists, who incorporated it into their final recommendations, with high levels of support.

For this to work, panellists said it would need to be linked to independent advice, the logbook and the EPC+ assessment, so that homeowners had an idea of what changes they could make.

They also suggested that contractors and DIY stores, who provide services and materials for home improvements, could signpost options. For example, if someone orders a new kitchen from a DIY store, they would be informed about the finance offer.

Zero-rated VAT: There was some limited discussion about VAT on products and services for home energy decarbonisation, and strong agreement that it should be zero-rated. At present, most insulation products and zero carbon technologies do not attract VAT, but this exemption is due to expire in 2027.

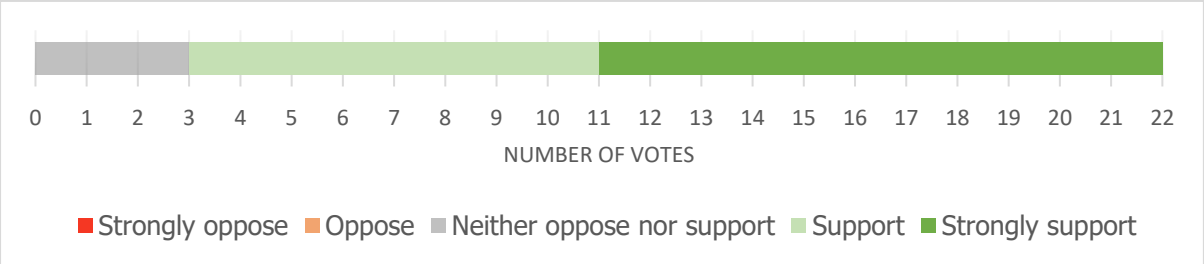
> *"You tie home improvements to energy efficiency requirements – like Steve [Stephen Hall, commentator] suggested. So the supplier has to say 'you can get a rebate/ tax incentives, but you must do something to make your house more energy efficient'."*
>
> *"For most people it isn't front of mind. But people want to do home improvement, they do it all the time. Link it to that."*
>
> *"I had extension done 15 months ago and at no point when doing that did anyone say 'if you put some solar panels with it, you can pay for it over X years'."*

2.6.11 Renovating a home: support for leaseholders

Panel recommendation:

Government schemes and market changes support those in leaseholder properties, such as flats. These include:

- obligations on freeholders to allow leaseholders to make energy related changes to their property;
- a framework and support package for leaseholders in flats to gain support and consent from neighbours, or whole blocks of flats, for energy related changes;
- energy companies offer 'heat as a service' contracts to whole blocks of flats, taking responsibility for installing a centralised heat pump and charging all leaseholders a flat rate for the heat they use.



Some of the panellists lived in leasehold flats. They regularly mentioned issues they had trying to have work carried out on their homes, and problems they might experience with home energy retrofits in particular.

First, the space inside a flat may not allow for an individual heat pump, especially if a hot water tank or larger radiators are needed. Second, it is often necessary to get permission from the freeholder to have significant works carried out on a leasehold property. Finally, in a leasehold flat it is often necessary to gain neighbours' permission to carry out work, or have financial buy-in from neighbours if work will benefit the whole block.

Overcoming barriers for leaseholders: Although the first two iterations of the package did not account for issues faced by leaseholders in general, or flat owners in particular, in the final package review, a panellist suggested that there should be some form of guidance or framework to help flat owners carry out home energy retrofits. This could include a formal framework for gathering the necessary consent and support, and could even extend to an obligation on freeholders to allow energy related retrofits. There was not time to fully explore this idea, but it was widely supported and panellists thought it was worth developing ideas around it.

‘Heat as a service’: Scepticism was expressed about heat pumps in flats. Some panellists believed heat pumps were fundamentally unsuitable, others thought that it would take more years of development and refinement before the technology would be suitable for most flats.

In the final session, when panellists were discussing support for flat leaseholders, a CCC analyst raised the prospect of shared heat pumps for whole blocks, installed by an energy company who has a contract with each flat owner for the heat they use.

Panellists had been introduced to this model earlier, but it was not picked up as an idea in the package. However, in the context of flats, there was support for the model where a centralised heat pump could service several properties. Therefore, it was included in the final package.

Help for leaseholders and flat owners was strongly supported in panellists’ voting. Two people expressed the view that, without this type of initiative, much of the support outlined in the rest of the package would not be available to many homeowners who are leaseholders.

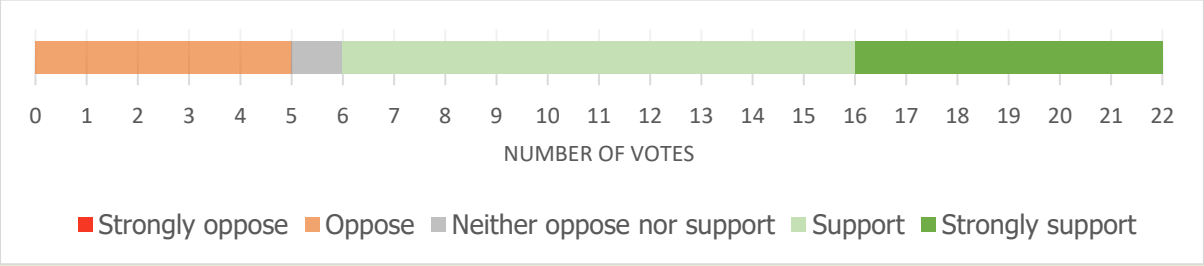
Other concerns were raised: two panellists stressed that getting flat owners to collaborate can be very difficult, and it is not clear they could be forced to. Another panellist who supported the idea thought it would need further development in partnership with leaseholders and property owners, while another thought it should be freeholders who should be responsible for home energy retrofitting, not leaseholders.

Finally, two panellists were specifically concerned about the ‘heat as a service’ model: one was worried about being locked into a bad deal with an energy company, and the other thought paying a flat rate for heat would be a disincentive to reducing energy consumption.

2.6.12 Living in a home: energy improvement score

Panel recommendation:

When living in the home you are incentivised to carry out energy improvements to build up your 'energy improvement score' (like a credit rating) because you know you will get a cheaper mortgage next time if you have a good energy improvement score. All improvements and the impact they have are tracked in your logbook.



Panellists wanted people to be given an incentive to make changes to their home while living in it and considering home improvements, not just when buying a new home. They suggested ways this could be done.

An energy improvement score and mortgage incentives: The final package contained a proposal for an 'energy improvement score', like a credit rating, that would reward people who had made changes, giving them access to preferential mortgage deals when they moved to a new property or remortgaged their house.

However, this was one of the more controversial proposals in the package, with a significant number of panellists expressing concern that a bad score could affect mortgage finance.

There were also questions about who would fund the preferential mortgage deals. Some were worried about fairness, if preferential mortgages for some meant higher costs for others who might not be able to afford to do the work.

Because of these concerns, this proposal received the lowest approval scores of the package, with five panel members opposing it.

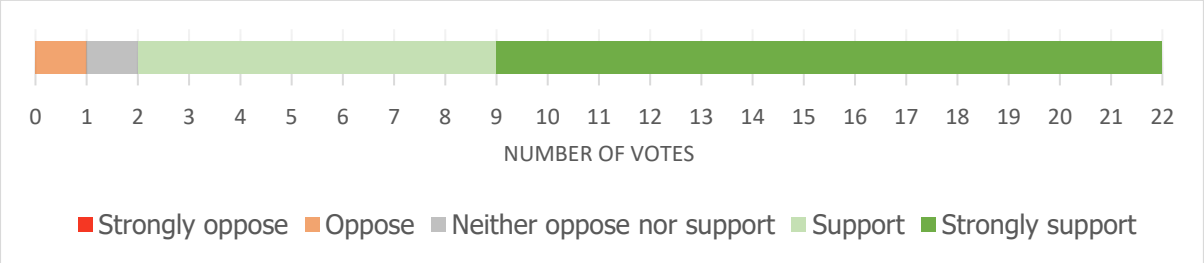
2.6.13 Living in a home: alternative energy contracts

Panel recommendation:

You have options for different contracts and tariffs with your energy provider.

- You can join a local energy co-operative or energy grid to buy and sell energy with neighbours or get help with retrofits.
- You can have two-track energy rates so you pay less for energy used on green products like electric vehicles or heat pumps.
- You can pay a tariff where you save for using less energy than expected.

You can also check the real-time feed out in your logbook to look for ways of making changes to your behaviour to save energy.



Panellists were interested in alternatives to the standard energy supplier model, but these were raised less often than other matters, such as energy efficiency and heat pump installations. There were concerns about how long these new models would take to implement.

Community schemes: There was general support for community-led approaches, including local energy co-operatives, locally owned grids or community retrofit programmes.

Some panellists had heard about community-owned wind farms and thought these provided opportunities to link people together and benefit from 'home grown' energy.

The panellists also heard from Russell Smith, of Retrofit Works, a co-operative offering community level interventions. Although people generally favoured community approaches, some expressed caution, as they thought the UK was not generally fertile ground for interventions at this scale, so they might not be successful.

Two track energy rates: Panellists were told about a range of smart home incentives, including the 'heat as a service' concept and adjusting electricity use according to time of day (demand response).

There was not a high level of interest in these options, although older panel members remembered the Economy 7 tariff which offered cheaper electricity at night.

One idea that was adopted was two track energy rates, providing cheaper prices for electric vehicle charging and heat pumps. For heat pumps, this would make up for the relatively higher price of electricity compared to gas. The idea was suggested by a panellist whose job was fitting heating systems. While this idea was generally supported, it was not widely discussed.

A tariff to reward energy saving: There was general support for energy tariffs that rewarded energy saving. This would involve setting benchmark averages for different housing types and offering rebates for those who used less energy than average. Panellists said this would be an incentive for them to reduce energy consumption.

This idea was generally supported but, perhaps because it was not controversial, there was not a lot of discussion about how it could work in practice.

> *"I like [the idea] that you pay less in fuel if you use less than expected. So if you wear a jersey in winter, and keep your house at 18 degrees, you get rewarded."*
>
> *"...we were hoping that government, instead of just giving grants towards solar panels for example, would not do that but would give the money to local communities and the local council could decide where that money would be best spent, and try to target that money, so it's not just the wealthy people that benefit."*
>
> *"Can you get a massive heat pump at the end of the road to do everyone's houses at once?"*
>
> *[in discussions of the proposed package] "There seemed to be quite a few incentives there for people who are buying and selling houses, but not many for people who are staying put really. Could there be rebates for reduced energy use?"*

2.7 Evaluation and reflections on policy co-design

In this section, we discuss and evaluate the citizens' panel, within the wider context of public engagement on energy and climate change. We also discuss the principle of co-design, which underpinned the process.

2.7.1 Deliberation in context

As part of their reflexive evaluation of the citizens' panel, researchers from the UKERC Public Engagement Observatory held a series of reflective meetings with the Lancaster University team during the citizens' panel process. The evaluation approach went beyond standard criteria for good practice in deliberative design, to consider more reflexive questions and include considerations of how formal deliberation fits into the wider public engagement landscape. Through the reflective meetings, the project team were also able to integrate insights and critiques from the evaluation team in real-time. The meetings were used to reflect on questions of process design and interpretation of results in light of wider forms of public engagement on home energy issues. Ahead of the second of these meetings the Observatory team prepared a mapping of diverse forms of public engagement with decarbonising home energy use, drawn from their wider dataset of case studies of public engagement with energy and climate change in the UK (presented in Figure 1, below). This section draws on this analysis and discussions in the reflective meetings to contextualise the citizens' panel in the wider landscape of public engagement on home energy issues. A fuller reflexive evaluation by the Observatory is forthcoming in a separate report.

Formal deliberation on the future of home energy use is just one way in which people engage on energy and climate issues. Deliberative processes sit within what has been termed wider 'ecologies of participation'.[20,21] This term is used to reflect the diversity of types of engagement, and the fact that different forms of engagement inter-relate and overlap. For example, issues highlighted through protest or activism might go on to form the basis for a formal deliberative process, and some participants in deliberative processes will have adopted new technologies and behaviours in their homes. The ecologies framing also draws attention to the fact that many individuals are simultaneously involved in a number of forms of participation. Participants' engagement in deliberative processes is likely to be shaped by their prior engagement with the topic, for example if they have direct experience with a technology or product that is under discussion.

The UKERC Public Engagement Observatory has developed an approach to mapping the wider ecology of participation around energy and climate change issues.[21] One way in which to make sense of the diverse cases of public engagement identified by this approach is to situate them on two axes: who orchestrates the participation; and what form it takes (see Figure 1). The first axis runs from engagement orchestrated by formal institutions, through to citizen-led activities. The second axis runs from discussion-based engagement through to engagement centred on material practices, such as taking part in trials of new technologies, or everyday energy related activities, such as

using home heating. According to this categorisation, deliberative processes, like this citizens' panel, sit in the top half as they are discussion based.

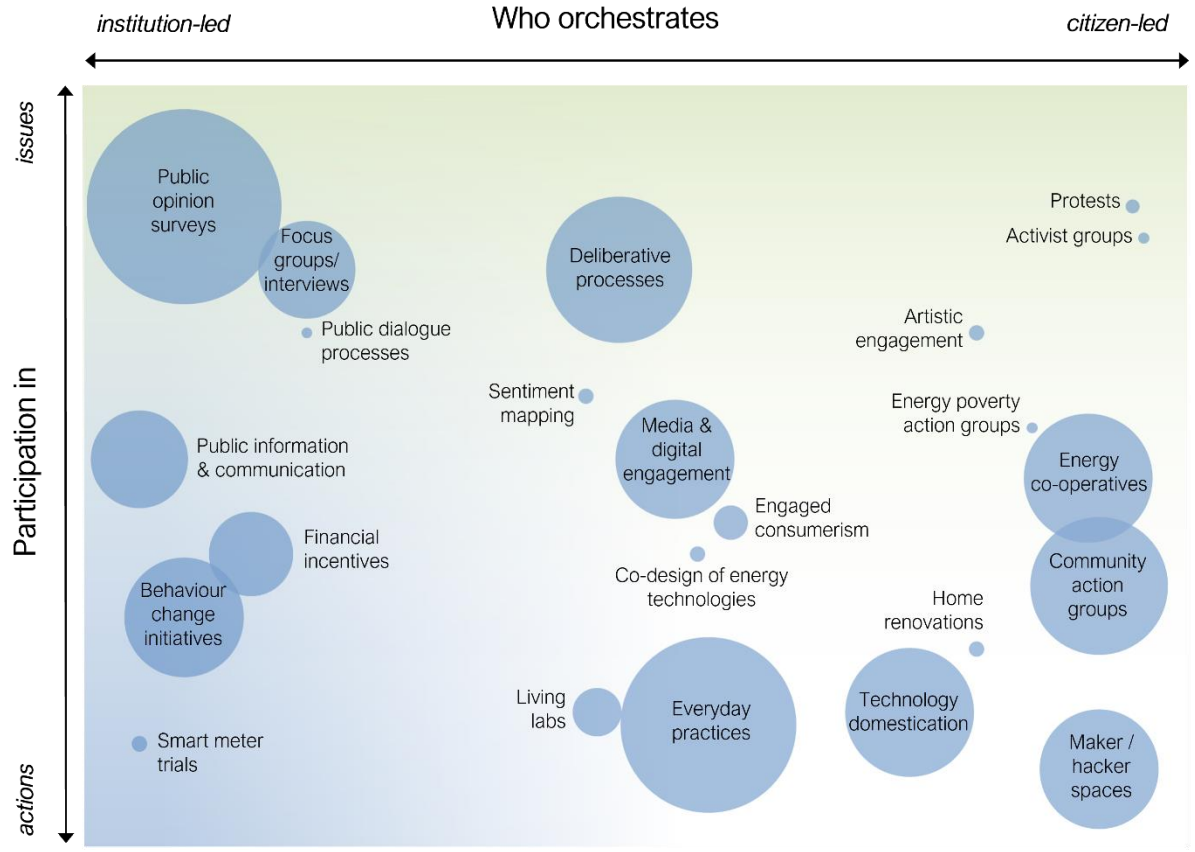


Figure 1. UKERC Public Engagement Observatory mapping of case studies of public engagement with around home energy use and decarbonisation (n= 79 cases in total), based on the results from mapping participation in the UK, 2015-2021. The size of the bubbles relates to the number of cases associated with each form of public engagement identified in the mapping (Chilvers and Stephanides, personal communication).

Although normally organised by formal institutions, deliberative processes can include opportunities for citizens to select topics and guide the discussion. They usually fall near the mid-point of the 'institution-led versus citizen-led' axis.

Situating deliberation within a wider ecology of participation can help to design and frame deliberative processes and can contextualise the findings. The Lancaster University and UKERC Public Engagement Observatory teams collaborated to consider the wider implications of this work.

In the case of this process, the panellists were allowed to dictate the topics they wished to hear more about. However, the instigation, framing and design of the process was led jointly by Lancaster University, the CCC and Shared Future. Therefore, it would sit towards the institution-led end of the horizontal axis in Figure 1.

2.7.1.1 The implications of running an institution-led process

As it was institution led, the process organisers had significant control over the framing of the issues and evidence introduced. The potential for this to introduce bias to deliberative processes is well known and we took the usual precautions of having a range of stakeholders involved in evidence selection, including the CCC and the advisory panel.

However, all of these stakeholders are closely involved in the policy arena and are likely to have internalised political constraints on the policy options available that would not be apparent to those engaged in more citizen-led processes. To guard against this, we invited a commentator whose academic work seeks to fundamentally rethink current policy, to identify solutions to the conjoined problems of home energy decarbonisation and fuel poverty.

Interestingly, the more thorough reforms this commentator presented did not appear in the final package selected by panellists. This raises the possibility that panellists themselves had internalised certain constraints about what would be politically feasible. Indeed, some indicated awareness of such constraints during the process.

This could be seen as a strength of formal deliberation: that it can produce findings which sit close to the consensus position on political possibilities. However, it does mean that our findings should be read with this constraint in mind, and policy makers should consider them alongside the alternative public views and demands for more thorough reform coming from more citizen-led processes. It is also possible that more radically different alternatives were not carried forward as these were still not given enough space in the process design.

By framing the process as about decarbonisation, it seems that alternative frames for thinking about home energy were also side-lined. Though they were discussed, issues such as comfort, wellbeing and inequalities were not given the same level of attention as the need to decarbonise. The Observatory mapping of case studies showed that comfort, wellbeing and inequalities are issues raised in other forms of public engagement with home energy decarbonisation identified in Figure 1.

2.7.1.2 The role of experiential knowledge

The second aspect of this process worthy of reflection is how experiential knowledge, or lack of it, influenced participants engagement with the process. This emerged particularly around the use of technologies such as heat pumps.

Some participants had direct experience of using heat pumps. Whether these were positive or negative experiences was a significant driver of how they engaged with policy to drive heat pump uptake. Those who had negative experiences, or knew people who had, were more inclined to favour a wait and see strategy towards them, in the hope that technology improves in the future. This also put those who had no experience of heat pumps at a disadvantage when discussing their future deployment.

We attempted to bridge this gap by inviting a commentator who had a heat pump to talk about how they installed it and how it runs. This did not shift the positions of those who already had positive or negative experiences, or who had no experience at all.

This raises the prospect that discussion-based engagement could be usefully combined with more experiential forms of engagement. For instance, people involved in a heat pump trial could be enrolled in a citizens' panel style process. In this way, everyone involved would be going into the process with lived experience of the technology under discussion.

2.7.1.3 The issue of self-exclusion

Finally, some individuals may not find an institution-led, discursive process conducive to expressing their views or may not wish to engage in this type of process for other reasons. This can manifest itself in a refusal to register at the outset, or self-exclusion from the process once it starts.

One of the panellists originally recruited in our case was disruptive in the first session and repeatedly spoke over other participants. They then chose to self-exclude from the process. The exact reasons for this were not clear but this is not an unusual occurrence in formal deliberative processes of this type.

It diminishes the degree to which the findings can be said to reflect the reasoned views of a representative group of the wider public. The views of those who will not engage still need to be considered when it comes to enacting policies. Such individuals may well engage in other ways, including in other forms of engagement identified in Figure 1 such as protest or the types of products and services they choose to heat their homes.

To gain a fuller picture, policy makers should read the findings of this citizens' panel alongside messages from other forms of engagement (such as those identified in Figure 1), to ensure decisions made reflect, or at least take account of, the views of citizens who are not included in formal deliberative processes.

2.7.2 Policy co-design

As discussed in the introduction (page 25) this project was devised as a process of co-design. It brought together two broad groups: citizen participants, and policy analysts and practitioners, including CCC staff, who took part in all the discussions.

The panel's output was developed through an iterative process of idea formation, further information and refinement, over several rounds. Although the final package is owned by the citizens who participated, developed it and voted on it, there was input throughout from CCC staff, who offered evidence, ideas and challenge.

2.7.2.1 Co-design in policy formulation

This panel followed earlier deliberative processes such as Climate Assembly UK, the Scottish Climate Assembly and many processes at local level.[22] These processes all contained resulted in recommendations on home energy decarbonisation. However, given the breadth of most of these processes, covering all aspects of climate policy,

there was no attempt to engage in detailed policy design. Instead, most endorsed a general goal, such as 'retrofitting all existing homes', 'make grants available' (Scotland Climate Assembly) or 'all existing houses should be made energy efficient' (Leeds Climate Change Citizens' Jury).

In this citizens' panel, by focusing closely on one policy area, and implementing a co-design methodology, we were able to look in detail at the design of a policy package for home energy decarbonisation and develop it through dialogue between policy analysts and citizens.

The process of co-design in this citizens' panel was effective in developing a detailed, workable set of policy recommendations. Working closely with policy experts, the citizens' panel developed and refined a detailed package of measures to support home energy decarbonisation.

The way in which this package was developed differs markedly from the normal process of policy development, led by technical analysts with no input from users or citizens. As a result, the emphasis is different, such as the focus on trust, and the need to engage people through government leadership and accessible information.

The package also clearly incorporates learning from the process, including from expert commentators and CCC analysts, in the design of proposals for regulation and financing mechanisms. Thus, it serves as a proof of concept that co-design of policy is feasible.

This offers some wider lessons on the use of co-design, specifically:

- It provides more nuanced and contextual information about public attitudes to a policy. Therefore, there is greater likelihood of that policy being supported and working in practice (for example, the package emphasises the importance of independent sources of information and linking that to financial incentives). It also allows consideration of a full package, or interlinked policies. This is a more distinctive picture of public opinion than the snapshots provided by surveys or polls.
- The panel demonstrates how deliberative techniques can supplement standard policy development processes, such as technical analysis and economic modelling. It is not a question of either-or, but how the two approaches can work together to produce outcomes which are both technically and socially robust. This is particularly important in the design of climate policy around areas such as home energy use or transport, where the government uses policy to encourage people to make changes in their lives.

However, it also throws up some challenges:

2.7.2.2 Skillsets

Deliberation, such as this citizens' panel, requires a very different skillset to conventional policy development. Successful co-design requires deliberation experts,

policy analysts and the citizens themselves to bridge different outlooks and levels of knowledge, which can be challenging.

2.7.2.3 Impact

Citizens involved in deliberative processes are understandably concerned about how the findings will be used and whether their recommendations will be implemented. If deliberative methods are used alongside other analysis in formulating policy, it is more difficult to see whether or how findings have been used.

It is important to be transparent about how any deliberative process fits into the wider policy making environment, and to manage expectations. In this panel, some participants wanted to advocate for their findings directly, by speaking to their member of parliament. Whilst reiterating the way in which the panel was designed to feed into the CCC's advice to government, we supported them in their own advocacy, by directing them towards an organisation that could assist them with contacting their MP.

2.7.2.4 Predictive capacity

Co-design processes rely on an element of prediction: 'if this policy was introduced, how would I, as a citizen, respond?' Such predictions are not always accurate. Mobile phone usage, for example, has developed in ways that users and technology companies could not have envisaged. Social norms, policy and technological change interact in ways that can be hard to predict.

This problem is not unique to co-design processes, it affects all prediction. Arguably, by combining social intelligence and technical analysis, co-design processes may be more robust than techniques relying on a single data source.

Deliberative processes can also be usefully combined with other approaches to overcome this issue. For example, technical modelling used during a deliberative process can help to clarify the impact of different options under discussion. As discussed above (see page 65), integrating deliberation with experiential methods, such as living labs and technology trials, could help participants imagine different futures.

2.7.2.5 Resource requirements

Co-design processes involving citizen deliberation are sometimes criticised for being expensive or time consuming. An effective process does require investment of time and resource, to allow all participants to understand the issue at stake and their role in the process, and to interact meaningfully with each other. It can be more time consuming than standard social research, such as surveys or polling. However, it should also be compared with the, often considerable, costs of technical analysis, such as establishing and running economic models, and the potential costs of failed interventions, if policies are not developed properly.

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Appendix. Methodology

This annex provides information about the stakeholders who delivered the citizens' panel and the respective roles they played. It outlines the panel design and the approach to data analysis taken.

Stakeholders

Lancaster University is a research-intensive university in the North of England. This citizens' panel was conducted as part of the university's Climate Citizens project. This seeks to embed deliberative processes into climate policy making in the UK. Work on this citizens' panel was conducted by the Climate Citizens team members, Jacob Ainscough and Rebecca Willis.

The Lancaster team selected the panel topic and scope, in partnership with the CCC. They developed the initial panel design; worked with Shared Future to design sessions as the panel progressed; identified and recruited commentators, with input from the advisory panel; synthesised the findings from session 5, 6 and 7 to feedback to panellists; analysed data from the sessions; and led the writing of this report.

The Climate Change Committee (CCC) is an independent, statutory body that advises the UK and devolved governments on emissions targets and reports to Parliament on progress made in reducing greenhouse gas emissions and preparing for and adapting to the impacts of climate change. The following CCC staff worked on this citizens' panel: Ewa Kmietowicz, Marcus Shepheard, Simon Rayner, Bianca de Farias Letti, Adam Gardiner, Marili Boufounou, Bea Natzler, Sasha Abraham and Chloe Nemo Ramirez.

The CCC team selected the panel topic and scope in partnership with Lancaster University. They provided the subject expertise needed for session design and commentator selection; took part in panel sessions as part of the co-design process; and commented on drafts of this report.

Shared Future is a Community Interest Company specialising in designing and delivering deliberative public engagement processes. The following Shared Future staff and associates worked on this citizens' panel: Peter Bryant, Jayne McFadyen, Alex King, Caroline Tosal-Suprun, Liz Goold, Mara Livermore and Maria Lucien.

The Shared Future team assisted with the development of the initial Panel design. They led the design of panel sessions, with input from the Lancaster team; oversaw the recruitment process and liaised with panellists; facilitated sessions; and commented on package iterations developed by the Lancaster team.

Sortition Foundation specialises in carrying out democratic lotteries (sortition) on behalf of organisations running deliberative processes.

The Sortition Foundation carried out the panellists' recruitment, with input from the Lancaster team and Shared Future.

UK Energy Research Centre (UKERC) conducts world class, interdisciplinary research into sustainable future energy systems. Phedeas Stephanides and Jason Chilvers from UKERC contributed to this citizens' panel.

UKERC ran an reflexive evaluation of the panel based on co-design principles, meeting with the Lancaster University team and other stakeholders throughout the process.[19]

The advisory panel was assembled by the Lancaster team to provide expert input and assist in the scoping and presentation of topic specific materials. Members of the advisory panel met four times over the course of the process and consisted of: Buky Oshatogbe, BEIS; George Day, Energy Systems Catapult; Dhara Vyas, Energy UK; Elizabeth Blakelock, Citizens Advice; Richard Lowes, Regulatory Assistance Project, Juliet Philips, E3G; Simon Rayner, CCC; and Marcus Shepheard, CCC.

The question

The question the panel was asked to address:

'What needs to happen to bring home energy use in line with the need to tackle climate change?'

The question was phrased in this way to allow a broad range of solutions to be within scope, both in terms of the sector implicated (eg national government, local government and the private sector), and the target of solutions (eg energy efficiency, demand reduction - technical or behavioural - and heat decarbonisation).

Recruitment

The target population for the research was non-fuel poor homeowners. We aimed to recruit a panel that matched the demographics of UK-wide homeowners, based on the following criteria: gender, age, ethnicity, disability, housing type, heating system fuel, indices of multiple deprivation and opinions on climate change.

Given the difficulties of determining whether a household is fuel poor, two criteria were used to attempt to recruit only those not considered fuel poor, these were: annual household income (with a cut off threshold of £19,000); and being in receipt of the Cold Weather Payment, Pension Credit or the Warm Home Discount. This strategy does not guarantee that none of the participants were in fuel poverty, especially given the context of rapidly rising fuel costs. Through the process we did not seek to make a hard distinction between support for those who are or are not in fuel poverty. A working assumption throughout the process was that current government schemes for those in fuel poverty would remain in place, and that the support designed by participants would be in addition to these schemes.

Due to the practicalities of hosting in-person sessions, panellists were recruited from a specific locality (Birmingham and the surrounding area) rather than from across the UK.

As is best practice for deliberative processes, recruitment was conducted by sortition. It was carried out by the Sortition Foundation, with input from Lancaster University and Shared Future. Ten thousand letters were sent out to residents in the Birmingham area.

A total of 27 panellists were recruited, of which 24 continued to the end of the process and took part in at least three sessions. Twenty two panellists returned a completed voting booklet at the end of the process.

Participants received a financial incentive for their participation, in line with best practice in deliberative research.

Process design

The principle of co-design

Unlike many previous deliberative processes on climate policy this citizens' panel followed a principle of co-design. This relates to the respective role of technical experts and citizens in the process. It requires technical experts, in this case CCC analysts, and citizens to work together collaboratively to develop solutions. This stands in contrast to processes that position technical experts purely as external participants who provide empirical information to the citizen deliberants. A co-design process aims to achieve a closer integration of the different forms of knowledge and expertise held by homeowners and policy analysts. Such an integration is crucial for developing solutions that are grounded in lived experience and acceptable to owner-occupiers, as well as being technically, economically, and politically feasible.

Use of commentators

We also used external commentators to provide information to panellists on issues that were not within CCC expertise, or where there was a clear need for an external speaker (eg to overcome actual or perceived bias in the information being provided by panel co-conveners). All commentators took part in extensive question and answer sessions with panellists after their presentations. The commentators were identified and recruited by the Lancaster team, with input and guidance from the advisory panel.

Reactive approach to process design

Adopting a co-design approach meant that we did not wish to pre-empt the direction that discussions would take or the form that solutions would take. We gave participants the opportunity to guide the process and have control over how session time was prioritised and which issues were discussed in more detail. Session 1, 2 and the first half of session 3 were designed in advance. These focused on providing panellists with a baseline of knowledge needed to tackle the questions the panel discussed. From the

middle of session 3, we allowed panellists to select which issues they wanted to hear more information about, and to contribute to planning the process.

The form that the solutions would take was not pre-determined. We aimed only to ensure that concrete proposals took shape early enough that they could be refined at least once, following reflection by panellists. For example, the findings could have taken the form of a series of standalone policies, or several different distinct, but internally coherent, policy packages. What emerged was one single, internally coherent policy package. That this was the form the findings would take was only apparent at the end of the fifth session. In this session three sub-groups of panellists designed three different packages. These were similar enough that it was relatively simply to combine them into one. If these three options had been highly distinctive, we would have allowed each to have develop separately in the final sessions.

A synthesis of the three packages was presented back to panellists in session 6. Findings from this session fed into a second iteration of the package, ahead of session 7.

Voting on the final package

Findings from session 7 were used to undertake a final iteration of the package. This was emailed to participants with a voting booklet. This allowed participants to vote individually on each element of the findings, and to provide reasons for their scores.

Session	Activities	Commentators	Outputs
1. 26 April 2022 (2.5 hours)	Commentator session: - Introduction to the science of climate change - Introduction to emissions reductions	- Melissa Seabrook, Met Office - Chris Stark, CCC	None
2. 3 May 2022 (2.5 hours)	Commentator session: - Energy efficiency and reducing energy demand - Replacing gas boilers - The energy market and the home	- Tina Fawcett, University of Oxford - Richard Lowes, Regulatory Assistance Project - Rebecca Willis, Lancaster University	None
3. 7 May 2022 (6 hours)	- Problem tree to analyse causes of home energy emissions - Building the model house of the future and identifying enabling conditions - Identifying key criteria - Reflecting on findings with CCC staff - Identifying topics for future sessions	None	- Problem trees - Model houses and enabling conditions - Criteria - Future session topics
4. 17 May 2022 (2.5 hours)	Commentator session - Current government policy - Personal experience with heat pump installation - Building renovation passport - KfW loan model - 'Heat as a service' - Home Energy Scotland - Energy Efficiency Stamp Duty Incentive - One stop shop whole home retrofit	- Simon Rayner, CCC - Jonathan Waxman, Independent heat pump owner - Juliet Phillips, E3G - Matt Lipson, Energy Systems Catapult - Harry Mayer, Energy Saving Trust	None

		- David Adams, Energy Efficiency Infrastructure group - Emma Harvey, Green Finance Institute - Russell Smith, RetrofitWorks	
5. 21 May 2022 (6 hours)	Commentator session: - Funding the transition - Blue sky thinking for the home energy transition - Initial package design in three separate groups - Presentation and critique of packages - Further package development with CCC staff - Identification and discussion of areas in need of additional thought	- Stephen Hall, University of Leeds - Chloe Nemo Ramirez, CCC	- Three packages, including comments from other groups - Notes on selected areas for further discussion
Synthesis of three packages into one by the Lancaster University team, with input from facilitators			
6. 24 May 2022 (2.5 hours)	- Presentation of the synthesised package - Scoring first iteration of the package - Identifying areas of the package requiring further development - Testing the package in the context of pre-prepared personas	None	- Package scores and reasoning - Suggested improvements to the package
Second iteration of package by the Lancaster University team, based on session 6 discussions, with input from facilitators			

7. 7 June 2022 (2.5 hours)	- Presentation of the second iteration of package - Scoring the second iteration of package - Testing the package in context of pre-prepared scenarios - Writing the panel statement	None	- Package scores and reasoning - Suggested improvements to the package and voting scores - Panel statement
Final iteration of package by Lancaster University team, based on session 7 discussions, with input from facilitators			
Completion of individual voting booklets			

Qualitative analysis of the panel's findings

To supplement the formal findings, presented in part one of this report, the Lancaster University team analysed data from the panel sessions. This focused on the supporting reasoning, level of consensus and dissenting views behind the overall findings.

All materials produced by participants during sessions were photographed. Handwritten outputs were typed up to assist with coding. All panel sessions were audio recorded and transcripts were made. These transcripts captured individual contributions and the flow of conversations, but were not verbatim, except in the case of the direct quotes used in this report.

Transcripts and session outputs were then coded using a combination of inductive and deductive coding. Pre-established codes were selected to match the criteria and package elements presented in part one of the report. Additional codes were then added through the coding process to capture recurring themes not covered by the pre-established codes. This coding formed the basis of detailed findings in Part two of the report.