UK Energy Research Centre

Mapping the Landscape of Public Attitudes Towards Low-Carbon Heating Technologies

William Smith, Nick Pidgeon, Christina Demski & Sarah Becker

https://doi.org/10.5286/UKERC.EDC.000969

January 2024

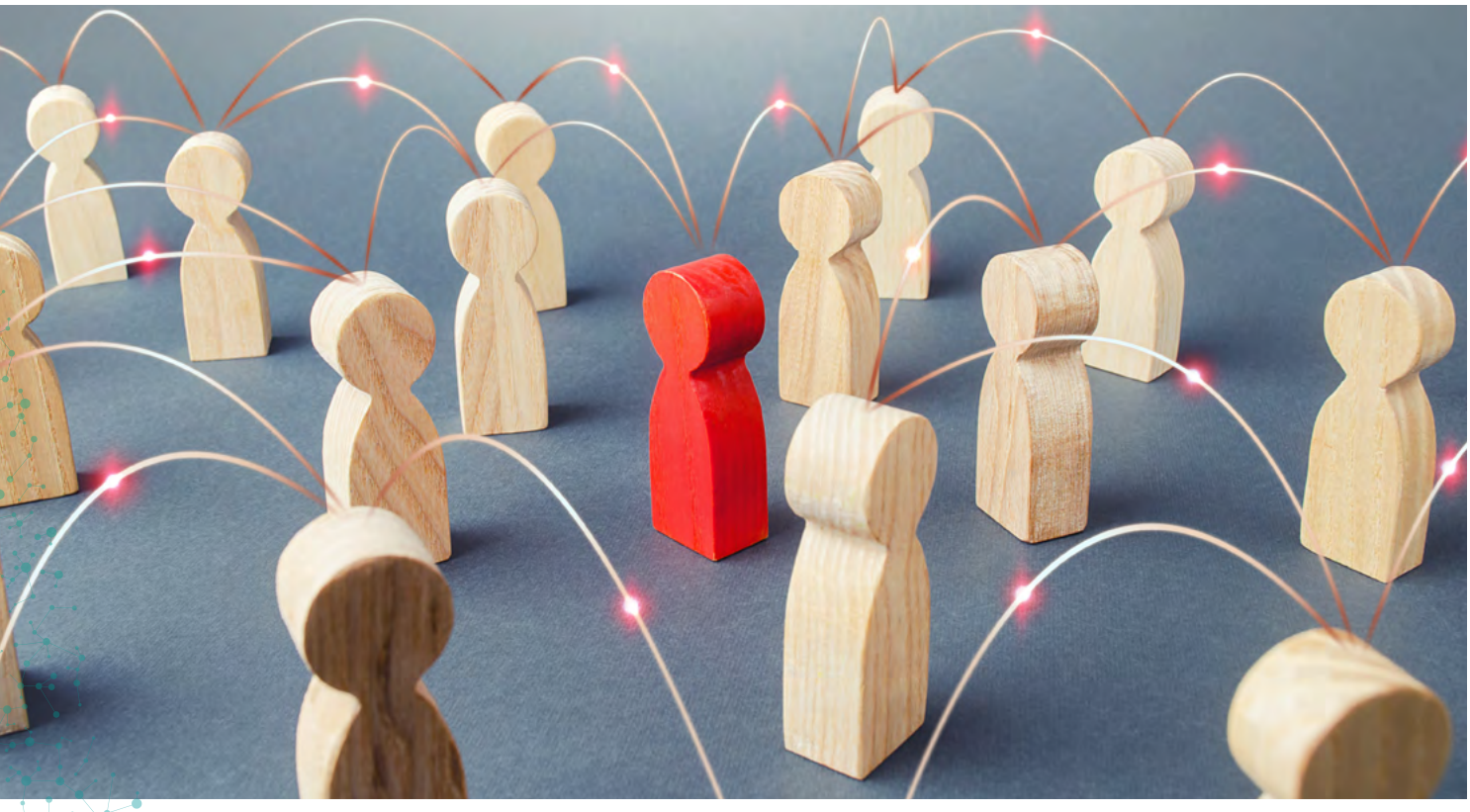
Contents

1. Introduction

With the heating of homes and workspaces estimated to contribute a third of all UK carbon emissions, the decarbonization of domestic heating is a vital step on the pathway to net zero in the UK[1]. Like Italy, Germany, the Netherlands, France, and parts of the USA, the UK relies heavily on established natural gas infrastructure for domestic heating, and as clean energy supply becomes increasingly available at scale, the transition to low-carbon heating relies on significant changes to this infrastructure at demand side. However, achieving this change is not straightforward[2]. With multiple low-carbon heating technologies currently entering the market, so too are there multiple potential pathways for the transition. In the UK, the strategy of the current government emphasises an approach dictated by a mix of market and regulatory forces, with the shape of the transition depending largely on "maximizing consumer choice" between a limited set of low-carbon technologies supported by the government[3].

In the absence of other policy interventions, this means that the transition to low-carbon domestic heating will follow a trajectory set in part by market forces. The outcome will therefore ultimately reflect the particular combination of technologies that best conform to people's preferences, and public attitudes and awareness are likely to be highly influential in determining whether this approach to system change is successful. In this briefing, we explore the landscape of public knowledge, beliefs, and perceptions towards low-carbon heating technologies.

The extent to which citizens feel informed and have access to relevant technical and economic facts regarding specific heating technologies is likely to be influential, both in directly shaping their attitudes towards technologies, and providing them with the knowledge necessary for their expected participation in system transition. However, public attitudes towards domestic heating technology are not only shaped by top-down information provision, but also through the bottom-up influence of established behavioural dynamics and beliefs, and the social practices and relationships which lead to particular patterns of domestic heat use[4].



Relationships with heating may be highly personalised, with practical knowledge being situated in a broader context of how the technology conforms to an individual's prior expectations, and behaviours and practices relating to heat use[4]. Similarly, any consideration of behaviour change and technology uptake for domestic heating must take into account situational traits, such as financial vulnerability, living arrangements and demographic factors, all of which may act as barriers or facilitators to an individual's capability to engage with new heating technologies[5,6].

Finally, attitudes towards heat use in the context of whole system transition are also necessarily influenced by socio-technological beliefs, such as the perceived responsibility of government and other actors, or broader beliefs regarding climate concern, energy security and fairness. Previous UKERC research has highlighted the importance of these socio-technological factors in mediating the relationship between more apparently straightforward motivators (i.e., reduced cost to the public) and public engagement, with trust in government and private sector actors influencing the extent to which the public views themselves as responsible for an energy system transition[7,8].

The following briefing summarises the initial findings from a nationally representative survey conducted between February and March of 2023 (see Appendix A1 for methodological details) examining the following broad questions:

- **To what extent does the GB public[i] support low-carbon heating technologies, are they willing to adopt low-carbon heating if given the opportunity, and why?**
- **How much awareness is there of low-carbon heating technologies, which aspects of low-carbon heating systems are considered most important, and what trade-offs are people willing to make?**
- **Who is trusted to make decisions and provide information about low-carbon heating? Is the energy system transition perceived as fair?**

i We acknowledge that there is no such thing as a homogenous group making up the "general public"– in perceptions of technologies and the environment multiple publics exist each with different histories, agendas, and cultural backgrounds. We also use this term to describe members of the general public, as opposed to people who have a particular background or stake in heat decarbonization.

2. Key findings

2.1 Awareness and Knowledge

People do not view domestic heating as a key target for reducing emissions.

We presented respondents with a series of questions assessing their perceptions of the relative importance and necessity of reducing emissions at both an individual and national level. Specifically, respondents were asked to select three carbon-reducing behaviours they believed would have the greatest impact if adopted by the public, and to consider the emissions contribution of a selection of high-carbon UK economic sectors. Respondents were also asked to consider the necessity of adopting several potential ways to limit climate change[9,10]. Overall, respondents viewed using low-carbon heating (LCH) as *probably necessary* but did not view using LCH as important relative to other behaviours, in particular limiting use of personal transport and more generally reducing domestic energy consumption. Similarly, the transport and industry sectors were viewed as contributing more to national carbon emissions than the heating and cooling of buildings.

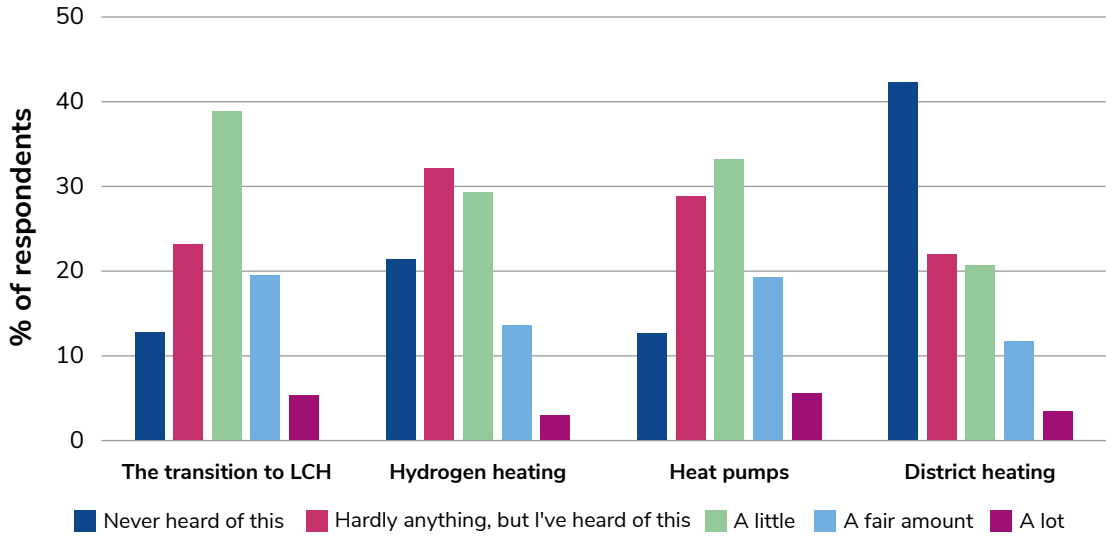
We conclude that whilst the public recognises using LCH is a potentially important target for reducing emissions, it is currently not viewed as particularly important relative to other sectors.

The public are aware of low-carbon heating but detailed knowledge of specific technologies remains low.

Prior to any specific information provision regarding LCH technologies, respondents were informed about the UK government's commitment to achieve net-zero and the necessary role of heating system transition in achieving this goal. Respondents were asked how much they had heard about each of the specific LCH technologies featured in the survey, and about the need to transition to LCH in general. Respondents were largely aware of the general need to transition, with 87% of respondents knowing at least something relating to this. Respondents reported a similar level of familiarity for heat pumps, with 87% of respondents having at least heard of the technology. Levels of awareness for hydrogen heating were slightly lower (78%), whereas respondents reported much lower awareness when asked about district heating, with 42% never having heard of it (Figure 1).

We conclude that the majority of the public are aware of LCH technologies, but that people still know relatively little about them, and clear differences in awareness are present between LCH technologies. This may contribute to the public's limited perceived importance of adopting LCH, however awareness of the overall need to transition to LCH is relatively high.

Figure 1. The extent to which respondents were aware of specific low-carbon heating (LCH) technologies and LCH in general, prior to receiving any further information.



2.2 Support

Public support for low-carbon heating is clear, but cautious.

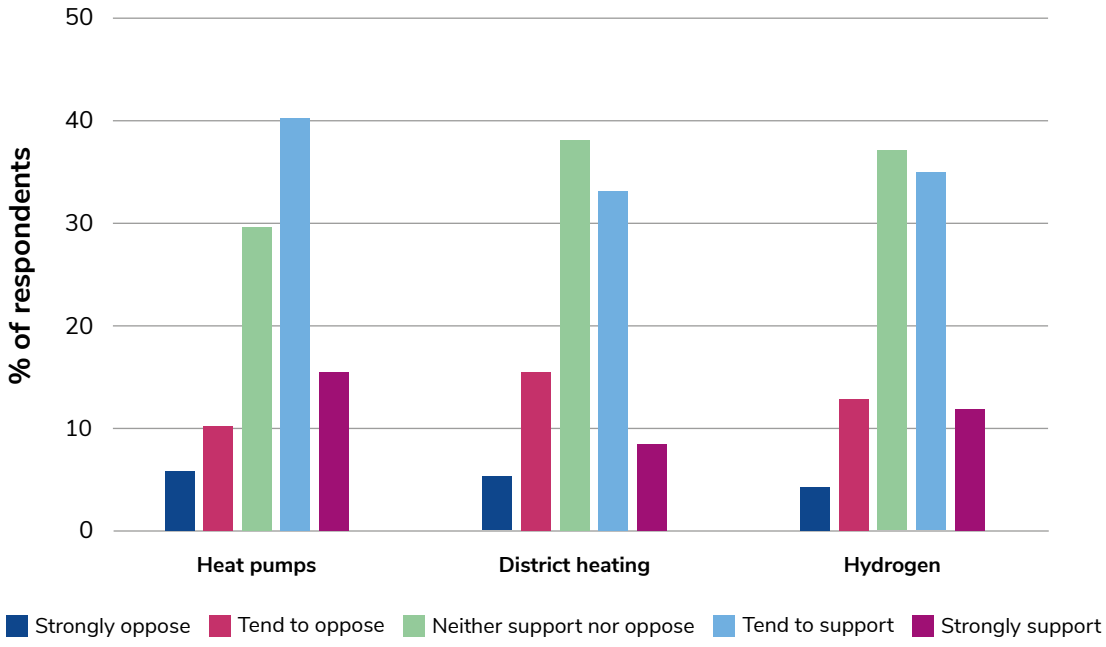
Respondents viewed information cards[ii] describing each of the LCH technologies featured in the survey, describing aspects related to costs, technological readiness, environmental friendliness, control, installation disruption, and installation costs. We then asked respondents how positive or negative they felt towards each technology (i.e., their affective response - a documented driver of risk perception and acceptability)[11], to what extent they supported the use of each technology across the UK, and whether they would adopt each technology in their own homes given a hypothetical opportunity (see Appendix A2). Respondents were also asked to consider the magnitude of benefits and risks they perceived to be associated with each technology.

Overall, respondents felt somewhat positive towards each technology, with installation and running costs featuring as the most influential factors. Respondents more frequently supported than opposed each technology (Figure 2). Heat pumps received the most support, with 54% of respondents supporting and 15.9% opposed. However, a large percentage of respondents remained unsure about their position.

> **"Until the benefits are proven, I have no intention of opting-in to disruption and costs that could end up costing me more in the long run." – A respondent unwilling to adopt hydrogen heating.**

Consistent with this attitude of reserved support, respondents perceived each technology as being associated with both risks and benefits, although perceived benefits were slightly greater than perceived risks. Respondents were, on the whole, somewhat willing to adopt each technology in their own homes given an appropriate opportunity. Nonetheless responses were variable and many participants were less willing.

Figure 2. The extent to which respondents expressed opposition or support for each LCH technology, after receiving information about each technology.



ii These information cards are available upon request from the authors.

When queried, those who were unwilling typically expressed concerns of limited technological readiness and uncertain costs, which together made the prospect of being an early adopter unattractive. For hydrogen heating specifically, concerns of safety were more prominent, whereas for heat pumps respondents more frequently expressed concerns over installation costs and additional hidden costs associated with energy efficiency improvements. For district heating, respondents were unclear whether there were sufficient incentives versus their current heating system, and concerns about loss of control were prominent.

In contrast, when those who were willing to adopt LCH were queried, responses across all technologies were more uniform, with environmental friendliness, progressiveness and long-term benefits commonly featuring as incentives for adoption.

We conclude that there is cautious support for the LCH options currently being trialled or entering the market in the UK, but that this support is hindered by lingering concerns and uncertainties that have yet to be addressed.

Adoption of low-carbon heating is limited by established beliefs.

After being asked whether they would be willing or unwilling to adopt each technology in their own homes given an opportunity (e.g., boiler breakdown, local trial), respondents were asked to re-evaluate their decision in the context of several further hypothetical scenarios (see Appendix A2).

Each scenario presented a negative or positive outcome that may feasibly occur for each technology in practice: for example, the option would have higher costs than expected (negative) or would attract extended government support (positive). This exercise invited respondents to challenge any expectations underlying their willingness to adopt each technology, and consider what trade-offs and incentives matter most to them. For hydrogen, lower running costs were associated with the most positive change in attitudes, whereas higher running costs and safety concerns were viewed most negatively.

Similarly, for heat pumps, lower running costs and the availability of grants were viewed most positively, whilst a lack of grant support was viewed most negatively. For district heating, contract lock-in and the possibility of other properties on the network disrupting shared heating supply were viewed as markedly negative.

Overall, respondents who were initially willing to adopt a technology were then more likely to view positive scenarios as increasing their willingness, with negative scenarios being less influential. The opposite was true for those respondents who were initially *not* willing to adopt a technology: these respondents were then more likely to view negative scenarios as decreasing their willingness, and positive scenarios as being less consequential. The degree of attitude change in each case is shown in Figures 3 – 5.

We conclude that, currently, both support and opposition among the public is relatively inflexible, with the influence of incentives or deterrents apparently determined by initial attitudes towards adopting each LCH technology[12].

Figure 3. Mean change in attitude towards adopting hydrogen as a domestic heating system, given each hypothetical scenario (Appendix A2). Error bars represent 95% CI for the mean.

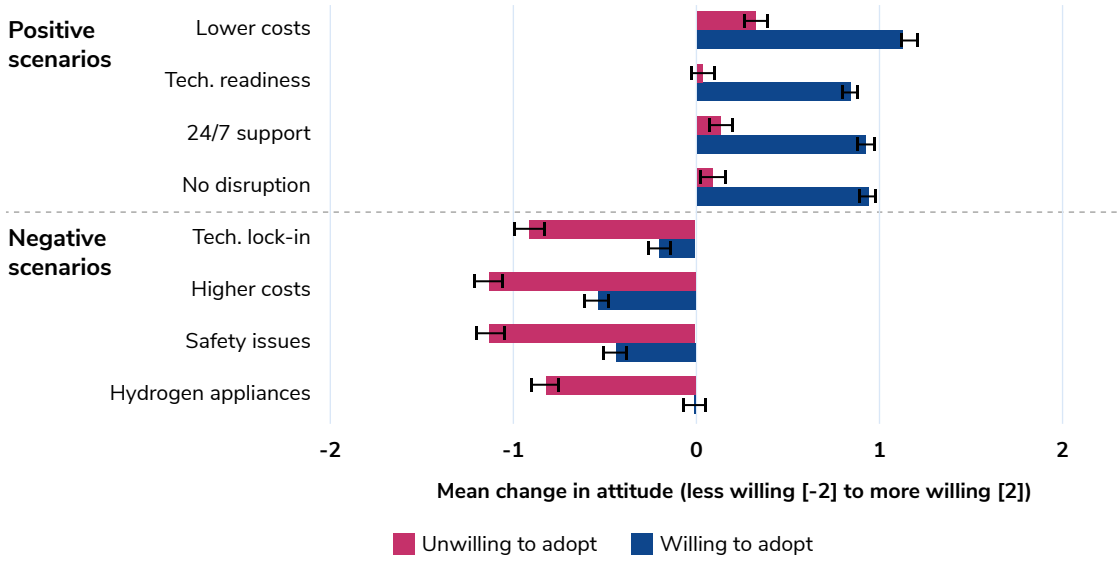


Figure 4. Mean change in attitude towards adopting heat pumps as a domestic heating system, given each hypothetical scenario (Appendix A2). Error bars represent 95% CI for the mean.

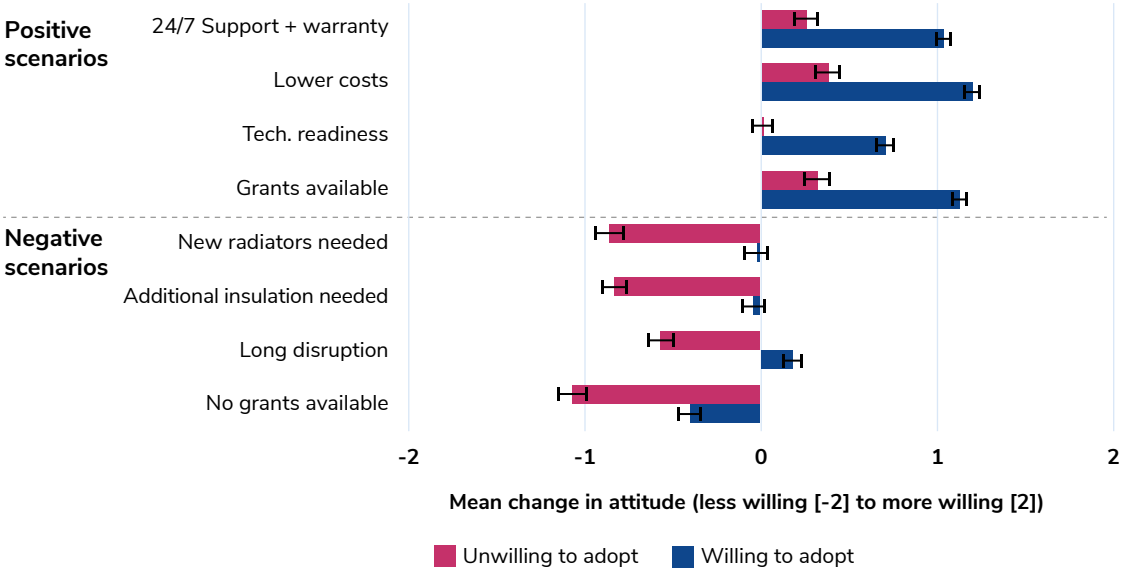
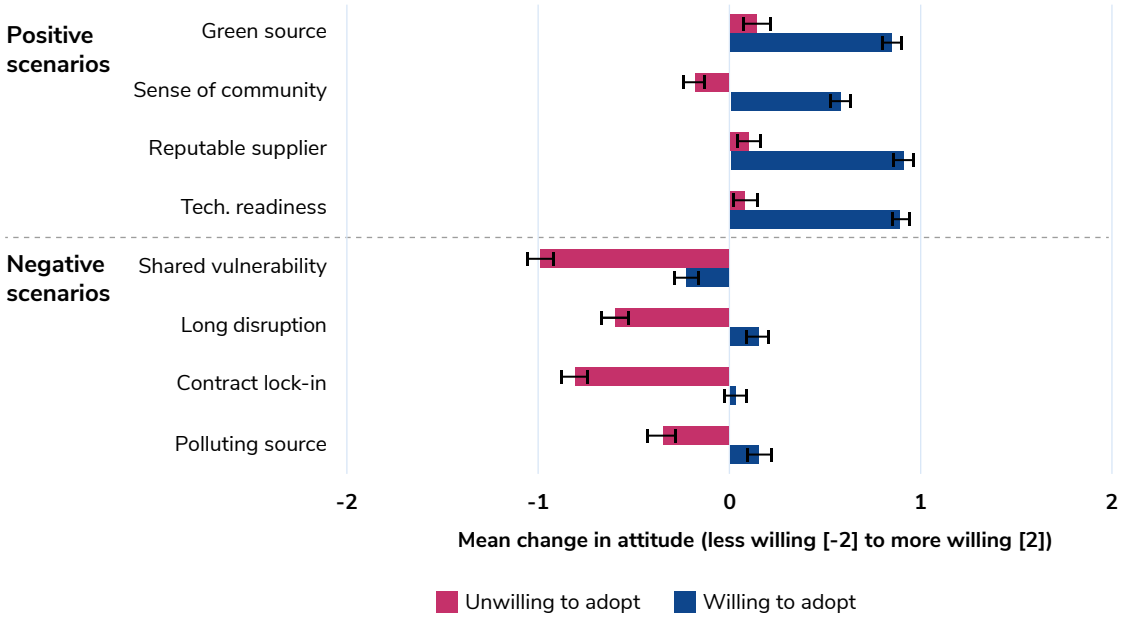


Figure 5. Mean change in attitude towards adopting district heating as a domestic heating system, given each hypothetical scenario (Appendix A2). Error bars represent 95% CI for the mean.



2.3 Trust and fairness

Government and energy suppliers are seen as untrustworthy, and people are concerned about the fairness of a transition to LCH.

We asked respondents a series of questions assessing their socio-technological beliefs concerning the transition to LCH. Respondents were asked about who they felt was responsible for paying for the transition, how fair they felt the transition would be, and who they trusted to provide information and make decisions regarding which LCH technologies are used in the future. Respondents were also asked whether they supported a series of real policies suggested by the government to facilitate the transition. When asked about fairness, respondents believed that the public should be involved in the decision to choose which LCH technologies are used in the future, and that lower income households should receive support from the government to transition.

However, participants were less likely to believe that they would be involved in the decision in practice, and less likely to believe that the decision-making process would be fair and transparent. Respondents were overall unsure about who to trust to make decisions about which LCH technology to use but expressed markedly lower trust for government and energy suppliers. Experts such as researchers, scientists and engineers were perceived as more trustworthy, but the most trustworthy actors were seen to be the respondents themselves and their families.

Similarly, respondents were overall unsure about who to trust for information about LCH technologies, but expressed low trust for government, energy suppliers, and both traditional and social media, with social media viewed as the least trustworthy. The most trustworthy source of information was again seen to be the respondents themselves, along with their families, and researchers and scientists. Independent advice services were viewed as being neither trustworthy nor untrustworthy, perhaps reflecting some ambiguity about the nature and role of these organisations.

We conclude that the public emphasize the importance of autonomy in learning about and making decisions regarding LCH technologies, but across our data this appears to be rooted in a general distrust in institutional sources of information, and an expectation that the transition to LCH may not be fair or transparent.

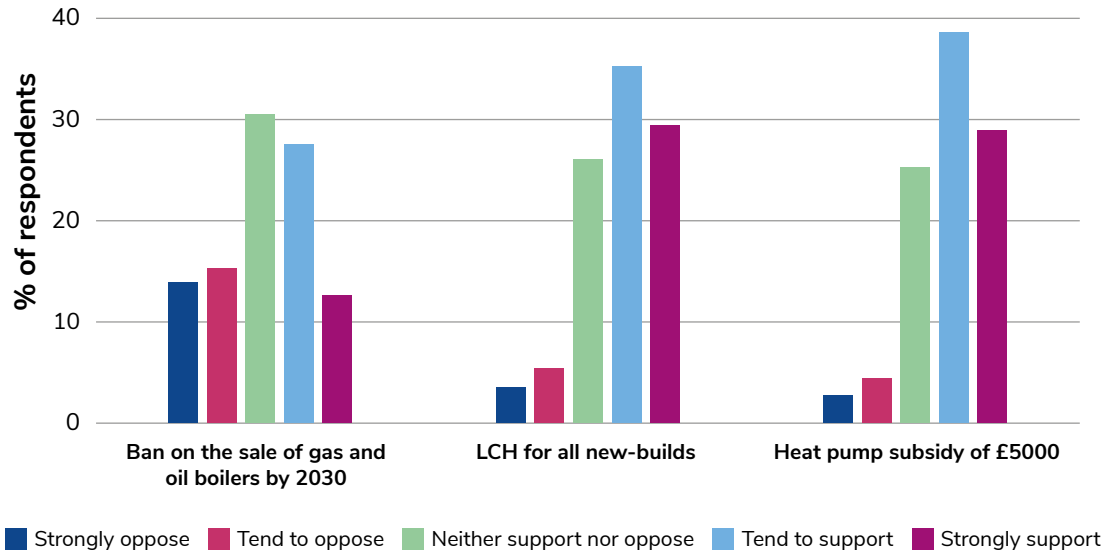
The public supports government-led policy for facilitating the transition to LCH, and views government and energy suppliers as bearing more responsibility.

Overall, the majority of respondents viewed all actors involved in the transition to LCH as bearing some responsibility for paying for the transition. Consumers were most frequently viewed as bearing little or no responsibility, and least frequently viewed as bearing most or all of the responsibility. In contrast, government and energy companies were most frequently viewed as bearing most or all of the responsibility.

In accordance with this perceived distribution of responsibility, respondents supported all policy options for facilitating the transition to LCH (Figure 6). However, the policy scenarios that received most support were those that implied strong involvement and financial support from government. Specifically, 65% of respondents supported (9% opposed) the provision of subsidies for the installation of heat pumps, and 67% supported (7% opposed) legislating the installation of LCH systems in all new-build properties. Consistent with this, the policy scenario involving a ban on the sale of gas and oil boilers (which implies passing responsibility to the consumer to find an alternative heating system) was supported by only 40% of respondents (29% opposed).

We conclude that the public view the transition to LCH as a collaborative effort, but perceive government as bearing more responsibility to pay for the transition than others. The public strongly support policy options with clear government leadership and financial support[7,13].

Figure 6. The extent to which respondents expressed opposition or support for each policy for facilitating the transition to low-carbon heating.



2.4 What predicts people's initial attitudes?

The findings presented in section **2.2** suggest that the extent to which the public are influenced by incentives or deterrents depends largely on their initial willingness to adopt LCH technologies, with additional information primarily serving to reinforce established positive or negative attitudes towards LCH. Understanding the background, or 'upstream' contextual factors that influence these existing and relatively inflexible initial attitudes towards LCH will be a key target for facilitating acceptance and engagement.

We performed a series of statistical analyses to estimate the extent to which upstream factors were associated with the initial judgements of willingness to adopt each of the three LCH technologies. These included the effect of socio-demographic characteristics (gender, age etc.), living situation (home ownership, duration of occupation etc.), reported interest and investment in heating technology (the extent to which respondents were engaged with specific technical and social aspects of heating) and impact of financial context (income, degree of financial vulnerability etc.) on initial willingness to adopt the three LCH technologies.

These statistical analyses also included respondents' beliefs about energy security, climate change and their environmental values – generic variables which are known to be associated with more specific beliefs about other energy technologies and sustainability[14].

Statistical modelling indicated that the drivers of personal willingness to adopt LCH technologies fell into 5 distinct categories. Most important were: (a) general attitudes and values regarding energy and environment and (b) interest in domestic heating. By contrast, the following factors have a weaker influence on support and initial willingness to adopt LHC: (c) an individual's living situation, (d) sociodemographic variables and (e) financial circumstances.

Within each of these categories there were specific factors driving effects, as follows:

(a) Attitudes and values towards energy and environment...

- Concerns relating to energy security were associated with greater willingness to adopt all LCH technologies. In particular dependence on fossil fuels and fear of power cuts predicted willingness to adopt hydrogen and district heating, whereas adopting heat pumps was additionally associated with concerns over foreign energy import dependence. Environmental values relating to preventing pollution and protecting natural resources were similarly associated with greater willingness to adopt all LCH technologies. Both concern for the climate and perceived urgency of addressing climate change were also associated with greater willingness to adopt all technologies.

(b) Interest and motivation for using heating technologies...

- The extent to which aspects of a domestic heating system (e.g. user friendliness, running cost) were seen as important was associated with greater willingness to adopt all LCH technologies, as was the extent to which respondents were motivated to use their domestic heating system for specific routine purposes such as avoiding damp. Similarly, the extent to which respondents felt their attitudes were influenced by the information cards was associated with greater willingness to adopt all LCH technologies. Taken together, these results suggest an overall interest and motivation for using heating technologies in general is associated with greater willingness to adopt LCH more specifically.

- Respondent satisfaction with their current heating system was associated with less willingness to adopt heat pumps specifically.

- Strikingly, knowing just one other individual who used a LCH technology was associated with increased willingness to adopt all LCH technologies, suggesting a strong social influence on attitudes.

(c) Living situation...

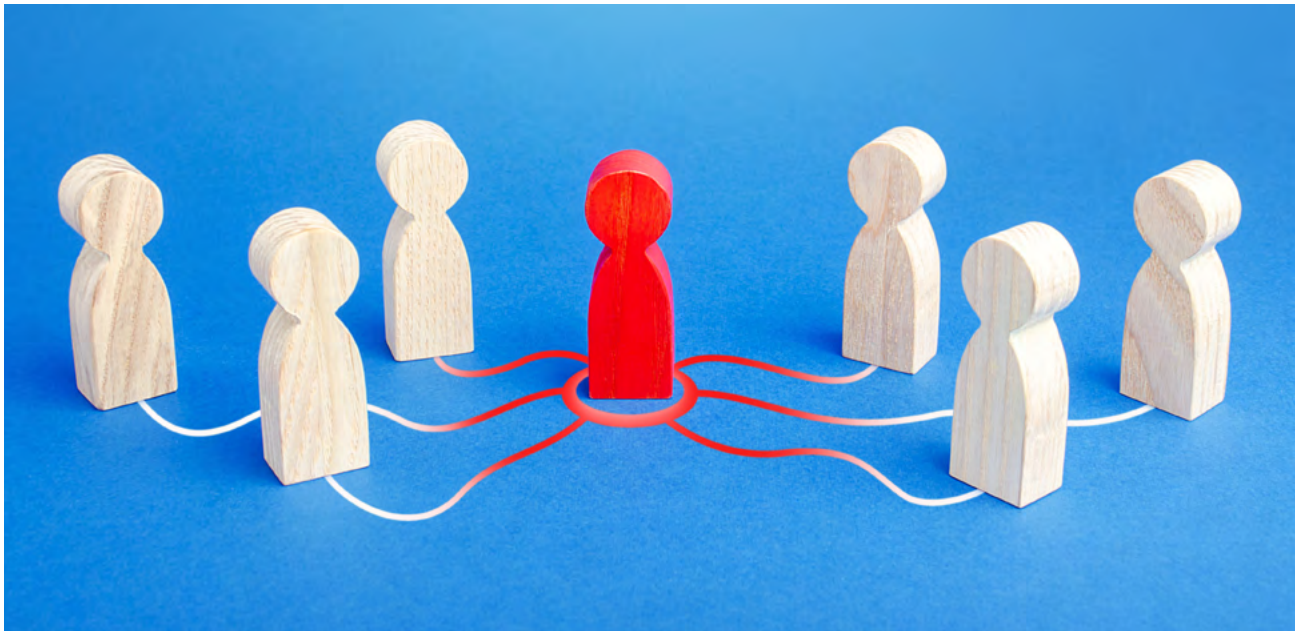
- Respondents who owned their home were less willing to adopt heat pumps than all other types of ownership and occupation.
- Respondents who lived in terraced homes or bungalows were less willing to adopt district heating than respondents who lived in flats.
- Increasing duration of home occupation, and the increasing expected duration of ongoing home occupation, were both associated with less willingness to adopt district heating, whereas only the former was associated with less willingness to adopt heat pumps.
- Increasing number of occupants was associated with greater willingness to adopt all LCH technologies.

(d) Individual characteristics...

- Increasing age was associated with less willingness to adopt all LCH technologies.
- Women were less willing than men to adopt hydrogen heating specifically.
- Increasing number of children in the household was associated with greater willingness to adopt hydrogen heating and heat pumps.

(e) Financial circumstances...

- Increasing income was associated with greater willingness to adopt hydrogen or heat pumps if given the opportunity. Conversely, increasing financial vulnerability was also associated with greater willingness to adopt heat pumps or district heating specifically. These otherwise contradictory findings may reflect parallel and independent effects of opportunity and motivation respectively.



3. Recommendations

The public expect clear involvement from the government.

Our research shows the public support policies for transitioning to LCH that feature a strong investment of strategic and financial resources from the government, and that the public largely views the government along with energy companies as being responsible for paying for the transition to LCH. Consistent with previous research[15], our study illustrates the potential for a 'governance trap' where the public and the government view one another as responsible and thereby arrive at an impasse limiting rapid transition. To avert this, the government should prioritize taking a clearer and more active stance, and balance a bottom-up policy of consumer choice with stronger top-down involvement and financial support.

A foundation of trust will facilitate public engagement.

An emphasis on government responsibility for financing the transition may be rooted in feelings of disenfranchisement among the public, that could threaten to stall any coordinated approach to system transition. Our respondents felt that decision making processes will not be transparent, fair or inclusive, and did not trust government or energy sector actors to make decisions concerning LCH that are fully in the public's interests. In the light of this, hesitance amongst the public to make a financial commitment is understandable. Tackling this fundamental lack of trust through establishing credible, independent and reliable sources of information is essential to creating the conditions necessary for meaningful public engagement and support. Furthermore, as our respondents expressed greater trust for scientists, experts, and their family and peers, it will be important to capitalize on leveraging support through actors who are already perceived as trustworthy, by empowering these actors as decision makers and sources of information where possible.

A successful transition must be driven by strong financial support.

In our sample, 33% of respondents viewed themselves as being financially unstable, closely mirroring national estimates[16]. Costs featured prominently in how respondents viewed LCH, and higher income was statistically linked with greater willingness to engage with LCH technologies. Similarly, the public strongly supported government subsidies, and believed that low-income households in particular should receive financial support. It therefore seems a successful transition will necessarily feature a serious spending commitment from the government, that is receptive to inequality in income and financial stability.

Broad socio-technological narratives are important upstream attitudes.

Concerns and commitments relating to specific energy security and environmental issues were both strong predictors of willingness to adopt LCH technologies. This suggests a communication strategy focused on increasing the salience of these issues may be effective at leveraging support of LCH downstream. However, the relatively specific nature of these values may imply limited awareness of other closely related co-benefits, such as reduced dependence on foreign imports or lower national energy bills. Communicating about these associated aspects of LCH may therefore require a different strategy.

Awareness is present but limited, and lack of interest generates inertia.

The majority of the public are at least somewhat aware of LCH technologies, but scope remains for increasing the degree of awareness, and the public do not appear fully informed about the extent to which the heating and cooling of buildings currently contributes to national carbon emissions. This presents an obvious barrier to engagement, hence greater effort on the part of all stakeholders involved across government, industry, third sector and academia is warranted to further raise awareness of LCH and its benefits. In addition, this research suggests that a lack of interest and investment in domestic heating *reduces* the likelihood of adopting LCH even when an individual is made aware of the pertinent information regarding LCH, indicating inertia is likely to be a barrier alongside limited awareness. We therefore recommend that communication concerning the transition to LCH should also focus on empowering the public as actors, and stress the importance of heating technologies for energy security and both household and national climate action.

The public show clear support for the transition to low-carbon heating.

Despite the presence of apparent barriers and conditions limiting support, our findings are fully consistent with other UKERC research showing strong support for the low carbon energy transition[17]. Our respondents hold clearly favourable attitudes towards all LCH technologies, and are supportive of policies that facilitate the national transition to LCH, such as the mandatory inclusion of LCH in new homes. In particular, heat pumps emerge as the technology with the strongest support and highest awareness, presenting an early indication of the direction of public interest, that may align with emerging concerns regarding the feasibility of hydrogen as a low-carbon solution at scale[18,19]. This perhaps represents the public having a current mental model with fewer substantive objections to heat pumps as a technology, whereas other options have more ingrained negative associations and perceptions (e.g., relating to safety).

4. Summary

Public attitudes towards the transition to low-carbon domestic heating are mixed, with clear and widespread support accompanied by ambiguity, distrust, and a distribution of perceived responsibility at odds with government strategy. Public willingness to adopt LCH technologies appears to be contingent on established perceptions and attitudes. Specifically, we find that willingness is most strongly leveraged by socio-technological and environmental values, more so than financial and sociodemographic factors.

Appendix

A1. Methodology and data.

The project consisted of a nationally representative online survey of the general public in Great Britain (N=2223). Respondents were selected via quota sampling. Data collection for the survey took place during early 2023, following a winter characterised by unprecedentedly high gas and electricity costs, and substantial increases in heating and utility bills for the average UK consumer. The data presented in this report represents key findings from a larger dataset, which will be published in subsequent reports and peer-reviewed literature. All statistical analyses reported in this briefing (section 2.4) were calculated using multiple regression, with post-hoc linear regression analyses used where necessary to pick apart effects relating to ordinal variables. All statistical results reported were statistically significant at a threshold of $p < 0.01$.

A2. Informed choice elements

The following describes the full text of the abbreviated items presented in Figures 3 – 5.

Imagine you receive a letter stating that there is a plan for a neighbourhood-wide trial to use hydrogen for heating in your area. How willing would you be to be part of this trial?

Would you change your willingness if you found out any of the following information?

Positive[iii] *scenarios:*

- Running costs are cheaper than your current heating system.
- Other neighbourhoods have already completed trials successfully.
- A 24 hour support team is available to help with any issues.
- Your home could be made compatible with hydrogen with only minimal disruption.

Negative scenarios:

- You are not able to switch back to your old heating system after the trial finishes.
- Running costs are NOT cheaper than your current system.
- A previous trial found some safety issues.
- All heating appliances in your home have to be switched to hydrogen ready appliances.

iii Respondents were not shown scenarios labelled as positive or negative – scenarios are categorised here for clarity.

Imagine your existing boiler or heating system breaks, how willing would you be to install a heat pump?

Would you change your willingness if you found out any of the following information?

Positive scenarios:

- The government would help with some of the installation costs.
- Many people in your neighbourhood already have a heat pump.
- The heat pump is cheaper to run than your current system.
- Full warranty and a 24 hour support team is provided to help with any issues.

Negative scenarios:

- There are no grants available to help with installation costs.
- The heat pump will take 5 days to install.
- You find out your home needs additional insulation and/or a water tank installed to make the heat pump efficient.
- It is necessary to change radiators to underfloor heating or change radiators to larger ones.

Imagine you got a letter stating that low-carbon district heating is being set up in your area, how willing would you be to take part?

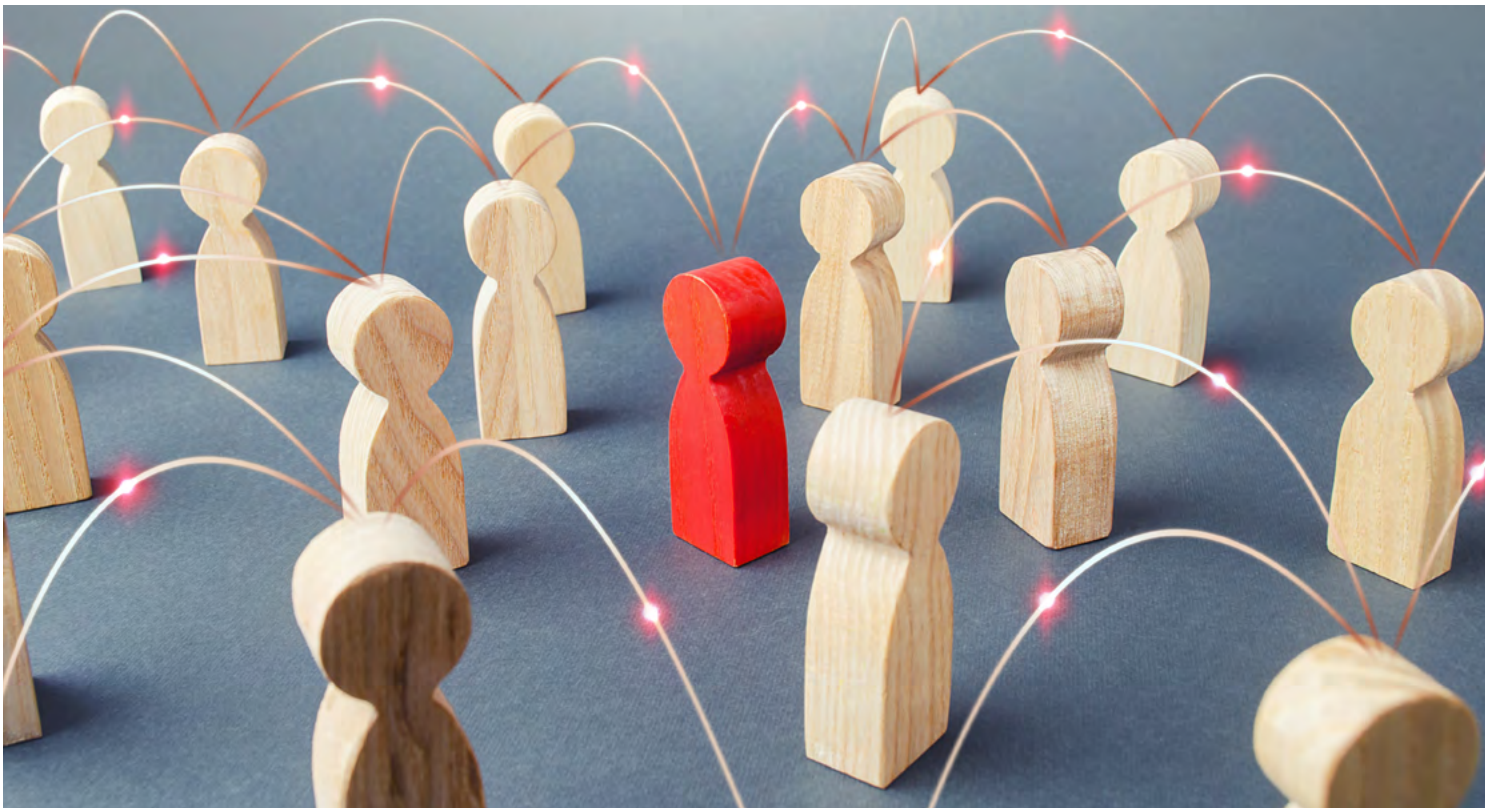
Would you change your willingness if you found out any of the following information?

Positive scenarios:

- New heat networks have been successfully set up in many other neighbourhoods.
- The supplier providing your heat network has an excellent reputation amongst their customers.
- Joining the heat network would noticeably increase the sense of community between you and your neighbours.
- The heat supplied to the network is waste heat provided by an environmentally friendly industry.

Negative scenarios:

- The heat supplied to the network is waste heat from an environmentally damaging industry.
- You have to sign up to a 24 months contract with the heat supplier.
- Setting up the heat network would cause a few days of disruption to you and your neighbours.
- A maintenance issue in a neighbouring property could cause disruption to your heating.



References

1. Climate Change Committee (2023). 2023 Progress Report to Parliament. 1-128. Retrieved from https://www.theccc.org.uk/publication/2023-progress-report-to-parliament/

2. Lowe, R., and Oreszczyn, T. (2020). Building decarbonisation transition pathways: Initial reflections. CREDS Policy brief 013. Oxford, UK: Centre for Research into Energy Demand Solutions. Retrieved from https://www.creds.ac.uk/wp-content/uploads/CREDS-decarb-transitions-brief2020.pdf

3. Department of Business Energy and Industrial Strategy (2021). Net zero strategy: Build back greener. Retrieved from https://www.gov.uk/government/publications/net-zero-strategy

4. Henwood, K.L., Pidgeon, N.F., Groves, C., Shirani, F., Butler, C. and Parkhill, K.A. (2016) Energy Biographies. Research Report. Cardiff University https://orca.cardiff.ac.uk/id/eprint/87333/

5. Shirani, F., Groves, C., Henwood, K., Pidgeon, N.F. and Roberts, E. 2020. 'I'm the smart meter': Perceptions and experiences of smart technology amongst vulnerable consumers. Energy Policy 144, article number: 111637. DOI: 10.1016/j.enpol.2020.111637

6. Monica, G. and Burlinson, A. (2023). We're on the Road to Net Zero? Socioeconomic Inequality in Low-Carbon Technology Adoption. UK Energy Research Centre. https://ukerc.ac.uk/publications/socioeconomic-inequality-in-low-carbon-technology-adoption/

7. Demski, C., Pidgeon, N.F., Evensen, D., Becker, S. (2019). Of profits, transparency, and responsibility: Public views on financing energy system change in the United Kingdom. Energy Research and Social Science, 55, 236-246. https://doi.org/10.1016/j.erss.2019.05.013

8. Evensen, D., Demski, C., Becker, S., and Pidgeon., N.F. (2018). The relationship between justice and acceptance of energy transition costs in the UK. Applied Energy, 222, 451-459

9. Department of Business Energy and Industrial Strategy (2021). Climate change and net zero: Public awareness and perceptions. Retrieved from https://www.gov.uk/government/publications/climate-change-and-net-zero-public-awarenessand-perceptions

10. Steentjes, K., Poortinga, W., Demski, C., and Whitmarsh, L., (2021). UK perceptions of climate change and lifestyle changes. CAST Briefing Paper 08. Retrieved from https://cast.ac.uk/wp-content/uploads/2021/03/CAST-Briefing-08.pdf

11. Slovic, P. (2010). The Feeling of Risk. London: Earthscan

12. Addario, G., Jessop, C., Mezzanzanica, M., and Wood, M. (2020). Transforming Heat – Public Attitudes Research. A survey of the GB public on the transition to a low-carbon heating future. Report for BEIS by NatCen. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_dat a/file/913541/transforming-heat-public-attitudes-research-report.pdf

13. Phillips, A., and Seaford, C. (2021). The climate consensus: The public's views on how to cut emissions. DEMOS. Retrieved from https://demos.co.uk/project/the-climate-consensus-the-publicsviews-on-how-to-cut-emissions/

14. Corner, A., Venables, D., Spence, A., Poortinga, W., Demski, C. and Pidgeon, N.F. (2011) Nuclear power, climate change and energy security: exploring British public attitudes. Energy Policy, 39, 4823-4833. DOI: 10.1016/j.enpol.2011.06.037

15. Pidgeon, N.F. (2012). Public understanding of, and attitudes to, climate change: UK and international perspectives and policy. Climate Policy, 12, 185-106

16. National Energy Action (2023). UK Fuel Poverty Monitor 2021-2022. Retrieved from https://www.nea.org.uk/publications/uk-fuel-poverty-monitor-2021-22/

17. Pidgeon, N.F., Demski, C.C, Butler, C., Parkhill, K.A. and Spence, A. (2014) Creating a national citizen engagement process for energy policy. Proceedings of the National Academy of Sciences of the USA, 111 (Sup 4), 13606-13613. DOI: 10.1073/pnas.1317512111.

18. Lowes, R., Rosenow, J. (2023). Regulatory Assistance Project: How much would hydrogen for heating cost in the UK?. Retrieved from https://www.raponline.org/wp-content/uploads/2023/04/rap-rl-jr-hydrogen-heating-costs-uk-2023-april-21.pdf

19. Thomas, G., Pidgeon, N.F and Henwood, K.L. (2023) Hydrogen, a less disruptive pathway for domestic heat? Exploratory findings from public perceptions research. Cleaner Production Letters, Volume 5, December 2023, 100047.

Authors

William Smith, Understanding Risk Group, School of Psychology, Cardiff University
Nick Pidgeon, Understanding Risk Group, School of Psychology, Cardiff University
Christina Demski, School of Psychology, University of Bath
Sarah Becker, Understanding Risk Group, School of Psychology, Cardiff University

This briefing can be referenced as:
Smith, W., Pidgeon, N., Demski, C. & Becker. S. (2024) Mapping the Landscape of Public Attitudes Towards Low-Carbon Heating Technologies. London: UK Energy Research Centre.

For more information and a comprehensive review of the existing literature on public attitudes to low-carbon heating, read our publication:
Becker, S., Demski, C., Smith, W., Pidgeon, N.F. (2023). Public perceptions of heat decarbonisation in Great Britain. WIRES Energy and Environment, e492, 10.1002/wene.492.

DOI: https://doi.org/10.5286/UKERC.EDC.000969

Acknowledgements

This study was supported by the Phase 4 UKRI grant (EP/S029575/1) to the UK Energy Research Centre. We thank Dr Richard Lowes and Professor Keith Bell for peer-review of this briefing. Sarah Becker is now associated with Global Witness.

About UKERC

The UK Energy Research Centre (UKERC) carries out world-class, interdisciplinary research into sustainable future energy systems. Our whole systems research informs UK policy development and research strategy. UKERC is funded by the UK Research and Innovation, Energy Programme.

UKERC is committed to making all of its publications accessible. We're always looking to improve the accessibility of our publications. If you find any problems or would like further assistance please get in touch.

UK Energy Research Centre,
Central House,
14 Upper Woburn Place,
London, WC1H 0NN
Website: www.ukerc.ac.uk
Email: UKERC@ucl.ac.uk