

DG CITIES
RESEARCH
COMMUNITY
REPORT

Heat pumps: the future of home heating or all hot air?

EXECUTIVE SUMMARY

When it comes to reducing the carbon emissions of housing, a key government policy is replacing gas boilers with more efficient electric heat pumps. This is supported by a significant grant investment through the Boiler Upgrade Scheme. The target is the installation of 600,000 heat pumps per year by 2028. However, take-up under the previous Renewal Heat Incentive scheme was low – in 2021, only 67,000 units were sold.

To understand the public's reticence, DG Cities put the question to the DG Cities Research Community, an independent voluntary panel of engaged citizens, and analysed more than 500 responses. In total, 70% of those surveyed said that they were 'very unlikely' to purchase a heat pump in the coming year. Only half (46%) of respondents knew about the grant and the majority (60%) would not use it when presented with cost information. What are their reasons?

COST, CONVENIENCE AND TRUST

The key barriers to heat pump uptake were cost, convenience and trust in heat pumps as an effective energy system. Over half (53%) believe purchase and installation costs are too high and over a third 34% think that a heat pump would not be as effective as their current heating system. The report also highlights a lack of knowledge, even in sections of the population that would be typically be 'early adopters' of other advances in consumer technology. People still don't feel they know enough about heat pumps to buy one. 82% had heard of them, but almost half (46%) only 'knew a little' about them. Almost 1 in 5 (15%) had heard of them but don't know what they are.

As replacing a gas boiler with an air source pump is not generally a like-for-like fix, consumers are wary of additional expense. As one respondent says, "It's not just about the cost of the pump and installation. It would require major replumbing and redecoration... I would never recoup the outlay even if I had the money available, even over a 20-year period."

HEAT PUMPS AND THE COST-OF-LIVING CRISIS

The survey collected responses between January and March 2022. Viewed in the context of the current cost of living crisis, rising gas prices haven't precipitated greater appetite for heat pumps. 56% didn't see the crisis as a reason to switch to a renewable home energy source, nor did they (46%) see heat pumps as a viable alternative if gas gets too expensive. Furthermore, while the report evaluates more than 500 good-quality responses, engagement with the topic was lower than with a previous survey on e-scooters, for instance, suggesting that heat pumps are simply not seen as relevant to many people's lives.

Where people understood the technology, its benefits and limitations, some expressed concerns about the suitability of heat pumps for the UK's varied housing stock and climate. One respondent with direct experience of a heat pump in Spain, for example, didn't feel it would give sufficient heating in the UK. The performance, compared to a conventional gas boiler differs. Because the heat pump relies on more ambient rather than 'on-demand' heating, many consumers see the system as a downgrade. Participants also expressed concern about grid stability, reliability and questioned the renewable credentials of electricity, highlighting other methods of reducing our reliance on gas, including nuclear power and fracking.

FURTHER RESEARCH AND A ROADMAP FOR ADOPTION

Following analysis of these results, DG Cities has made several policy recommendations. For example, more research is needed to understand the level of public willingness to adopt the government's decarbonisation strategies. The deployment of heat pumps expects the public to go from 'tried and tested' gas boilers to a relatively new technology. In policy terms, there is a case for a roadmap that addresses the steps in between, maps policy interventions, and coherently articulates the relative benefits of different solutions; for example, answering 'what's the difference between a heat pump and electric heater?' The report also highlights the need for a clear, impartial and trusted source of information that gives consumers the evidence they need to make an informed choice.





BACKGROUND AND PUBLIC POLICY

UK CLIMATE GOALS & POLICIES

In 2019, the UK government committed to achieving net-zero by 2050, a key part of which is to decarbonise home heating by installing low-carbon heating technologies and improving home insulation. The government has focused on heat pumps as the technology of choice for reducing home heating carbon emissions, and has set a target to install 600,000 heat pumps per year by 2028. This is considered to be the minimum number for the UK to achieve net-zero by 2050. In London, the Greater London Authority's (GLA) 1.5C Compatible Action Plan (2018) states that at least 300,000 heat pumps need to be installed by 2030¹.

However, heat pump uptake in the UK has been low compared to the outlined commitment – in 2021, only 67,000 units were sold so far for use in new and existing buildings². In comparison, 674,063 gas boilers were sold in the first four months of 2021³.

The Heat and Buildings Strategy (2021)⁴ sets out the UK government's plan to cut carbon emissions from existing homes and workplaces – one of the ways outlined to do this is through the implementation of low carbon technologies. Heating buildings contributes nearly a quarter of the UK's total carbon emissions; this strategy sets out a direction to decarbonise heating from buildings from 2020 onwards in order to meet net-zero carbon commitments by 2050. Key commitments include:

- Phase out the installation of new gas boilers from 2035.
- Reduce the costs of installing heat pumps and ensure heat pumps are as cost effective over their lifetime compared to gas boilers by 2030.

¹ Mayor of London (2018) *Zero Carbon London: a 1.5 degrees centigrade compatible plan*. Accessed online: https://www.london.gov.uk/sites/default/files/1.5_action_plan_amended.pdf

² Carbon Brief (2021) *In depth Q&A: how will the UK's 'heat and buildings strategy' help achieve net-zero*. Accessed online: <https://www.carbonbrief.org/in-depth-qa-how-will-the-uks-heat-and-buildings-strategy-help-achieve-net-zero>

³ PHAMNews (2021) *Boiler sales bounce back*. Accessed online: <https://www.phamnews.co.uk/boiler-sales-bounce-back/>

⁴ HM Government (2021) *Heat and Buildings Strategy*. Accessed online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1032119/heat-buildings-strategy.pdf

- Explore options to rebalance energy levies and obligations away from electricity to gas within this decade, with decisions being made in 2022.
- By 2025, all new buildings in England will be net-zero ready (i.e., be fitted with low carbon heating systems and high energy efficiency measures).
- End the installation of high carbon fossil fuels (i.e., oil) for heating homes that are not connected to the grid in England from 2026.
- Upgrade inefficient homes to EPC C by 2030, by investing £1.75 billion in the Home Upgrade Grant and the Social Housing Decarbonisation Fund.

To encourage the uptake of heat pumps in existing dwellings, the UK government set up the Boiler Upgrade Scheme, a grant fund to provide financial support to consumers in existing buildings to replace their gas boilers and to install a heat pump. The scheme offers £5,000 or £6,000 grants for households switching to an air source or ground source heat pump respectively.

WHY HEAT PUMPS?

A key objective of the UK government's Heat and Buildings Strategy is to improve the efficiency of home heating systems. Heat pumps have been shown to be more efficient than many other existing or emerging home heating technologies. For example, the amount of heat generated using a heat pump is higher than the amount of electricity used to provide this heat. The ratio of heat to energy is described in industry as the Coefficient of Performance (COP), and a standard heat pump-based heating system with a COP of 3.0, is capable of delivering 3kW of heat per 1kW of consumed electricity. This compares favourably to a traditional gas boiler system which, when new, has a COP of 0.935, meaning heat pumps are 3 to 4 times more efficient than recently fitted gas boilers.⁶

However, the efficiency of heat pumps has been shown to vary. The Chartered Institute of Building Services Engineers (CIBIS) and Northumbria University conducted a comparative study of air source heat pump performance in the UK and Germany, finding that heat pumps installed in Germany were more effective and efficient. CIBIS

⁵ Soleco (2022) *Coefficient of performance*. Accessed online: <https://www.solecoheatpumps.co.uk/coefficient-of-performance.html#:~:text=A%20standard%20gas%20boiler%20typical,y,BS%20EN%2014511%3A2001>

⁶ Energy Saving Trust (2020) *Setting the record straight on heat*. Accessed online: <https://energysavingtrust.org.uk/setting-the-record-straight-on-heat-pumps/#:~:text=A%20properly%20installed%20air%20source,electricity%20they%20use%20to%20run.>

noted several possible reasons for this, including incorrect installation of the heat pump and lack of weather compensating controls.⁷

It's important to caveat that heat pumps are not zero carbon technologies, but they may become net-zero if the carbon intensity of electricity generation decreases. With this in mind, heat pumps can deliver up to 65% and 70% CO₂ savings compared to A-rated gas boilers and conventional electric heating systems, respectively. As the national grid continues to decarbonise, CO₂ savings from heat have been projected to increase up to 90-100% by 2050.⁸

UK HOUSING READINESS

As of March 2020, there were 24.7 million homes in the UK, with 92.6% of dwellings in England relying on gas for their heating. Homes within the UK are some of the oldest in Europe, with 23% of private sector dwellings built before 1919, and 72% of social housing stock built between 1945 and 1980 this means that much of the existing house stock is inefficient.⁹ The average SAP rating of homes in England was 65 points in 2019, equivalent to an EPC Band rating D. For reference, buildings are assessed on their efficiency with an EPC Rating A (most efficient) to EPC rating G (least energy efficient). Research suggests that to maximise the effectiveness of heat pumps they should be used in buildings with a minimum EPC rating of C.¹⁰

Heating homes and buildings in the UK accounts for 21% of the country's total emissions. For this reason, the decarbonisation of heating is vital in the UK meeting its net-zero carbon commitments.

⁷ Green Business Watch (2020) *Do air source heat pumps work in the UK?* Accessed online: <https://greenbusinesswatch.co.uk/do-air-source-heat-pumps-work-in-the-uk>

⁸ Carbon Trust (2020) *Heat Pump Retrofit in London*. Accessed online: <https://www.carbontrust.com/news-and-events/news/heat-pumps-key-to-londons-net-zero-ambition-says-new-report-from-the-carbon>

⁹ Ministry of Housing, Communities & Local Government (2020) *English Housing Survey: Headline Report 2019-2020*. Accessed online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945013/2019-20_EHS_Headline_Report.pdf

¹⁰ Ministry of Housing, Communities & Local Government (2020) *Energy Certificate Performance Data on Open Data Communities*. Accessed online: <https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/energyefficiencyofhousinginenglandandwales/2020-09-23#main-fuel-type-and-methods-of-heating-used-in-central-heating>

BRINGING THE PUBLIC TO THE FOREFRONT OF NEW HEATING SERVICE DESIGN

Products and services work best when designed around the needs of their users. Heat pumps are a new innovation to the majority of the public and whilst they have been on the market for some years their adoption has been limited. We therefore undertook this survey to explore public perceptions and attitudes towards heat pumps, and to draw out recommendations and insights for policy makers, local authorities, and technology developers to inform the ongoing development and rollout of heat pump technologies.





Methodology

An online survey was distributed to UK residents throughout January and February 2022. Links to the survey were promoted across social media and directly to the DG Research Community.

The heat pump section of the survey was split into four sections:

- Awareness of heat pumps and their associated grants
- Attitudes and perceptions of heat pumps
- Perceptions of current affairs like the current gas prices crisis
- Demographics questions

In total, 569 good quality responses were analysed.

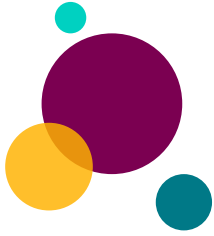
About the DG Research Community

Innovations are only successful if they're developed with those who are intended to benefit from them. Yet citizens are often excluded from new urban technologies that directly affect their lives. For those who are particularly disenfranchised or excluded this can often mean that they feel that their voices are not included or being heard by decision makers.

Maintaining regular and meaningful communication with residents, citizens and potential service users for research activity can be challenging however - especially when you need to do this in a way that is both timely and cost effective.

DG Cities believes in a people-first approach to implementing new technology; one that acknowledges and prioritises residents' experiences and preferences, and looks to learn from them. That's why we have established the DG Cities Research Community: a diverse and actively engaged community made up of members of the UK public and business owners. They are willing and incentivised to commit to regularly sharing their views and opinions by participating in surveys, focus groups and other simple and accessible qualitative and quantitative research activities.

Our goal? To enable public and private organisations to meaningfully engage with the public, leading to the development of more appropriate and positive innovation.



Findings

Although the public has some awareness of heat pumps, very few feel knowledgeable about them: while awareness of heat pumps is high (82% had heard of them before taking the survey), general knowledge about them is low: almost half (46%) only know a little about them. Almost 1 in 5 (15%) had heard of them but have no knowledge about them.

Cost and perceived effectiveness are barriers to uptake: high purchase and installation costs was the most cited barrier to adoption, chosen by 53% of respondents. Over a third (34%) do not believe a heat pump would be as effective as their current heating system.

Grant uptake is low – 3-in-5 would not use the Government’s Boiler Upgrade Scheme to purchase a heat pump: only half (46%) of respondents knew about the government heat pump grant and the majority (60%) would not use it.

Although the cost of living is increasing, the public isn’t looking to renewables as a solution: the majority of respondents (56%) did not see the gas crisis as a reason to switch to a renewable home energy source, nor did they (46%) see heat pumps as a viable alternative if their gas prices get too expensive.

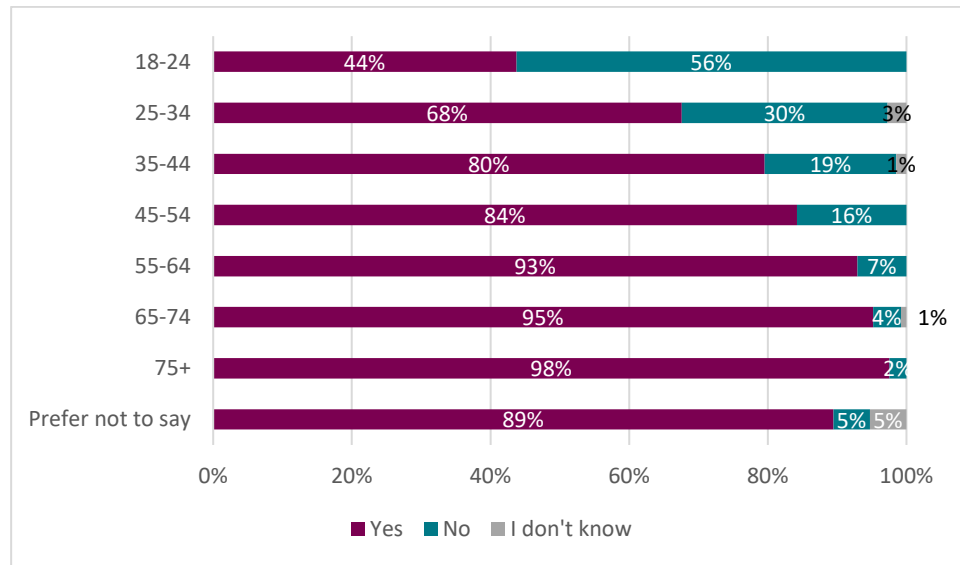
ANALYSIS

In the next section we will explore research findings in the following themes: (1) awareness and knowledge; (2) barriers to adoption; (3) perceived effectiveness; and, (4) drivers of uptake.

AWARENESS AND KNOWLEDGE: PUBLIC AWARENESS OF HEAT PUMPS IS HIGH, BUT KNOWLEDGE IS LIMITED

Our analysis showed that the majority (82%) of respondents were aware of heat pumps before completing the survey. Further analysis showed that awareness of heat pumps differed according to age, with over half of respondents (56%) aged 18-24 having limited awareness compared to those 25 and over (Figure 1).

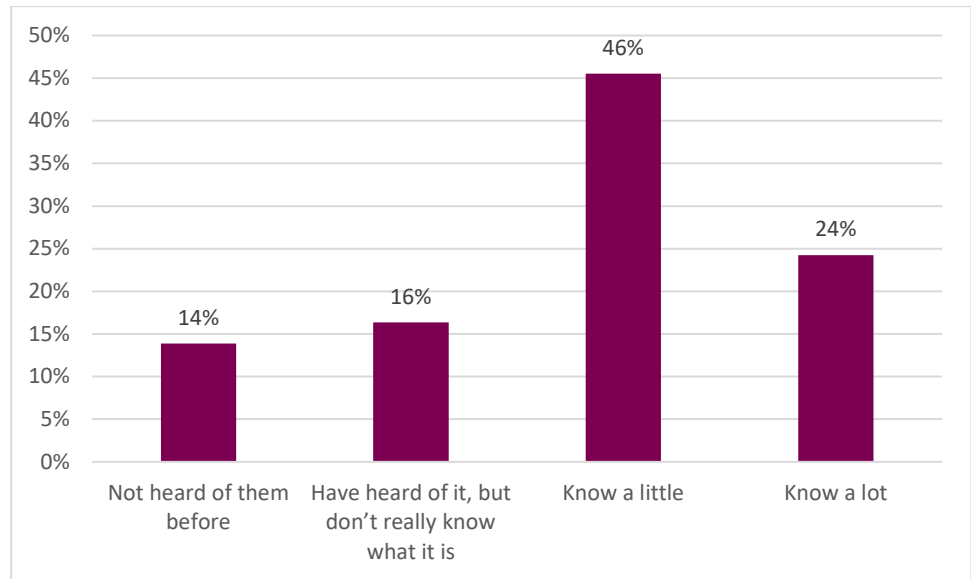
Figure 1: Awareness of heat pumps, by age



Base: N(unweighted)= 569

We asked respondents how much they felt they knew about heat pumps. Almost half (46%) felt they know a little about heat pumps, and a third (30%) of respondents had little or no prior knowledge of heat pumps.

Figure 2: Self-reported knowledge of heat pumps



Base: N(weighted)= 569

Several respondents felt they needed more information to feel informed, including the suitability of different heat pumps for their home, how to access trusted installers, and how to use a heat pump once it is installed:

“More marketing information on effectiveness is needed - how much do they cost to run? Should you have it on all day or can you use timers etc?”

“Reliable/trustworthy guidance / testing / rating in the style of a “star” system used for other appliances in “Which?” style ratings would help. It’s a big investment, you don’t want it to fail because you accidentally chose a dodgy supplier.”

“...the advice available (should be) bespoke to the type of home people live in ... not generic. Some model homes in each neighbourhood would be good.”

However, some respondents feel they are uninformed about heat pumps:

“... I do not know how (heat pumps) work or what it actually involves! Once I know more about it, I will hopefully be able to have more of an opinion.”

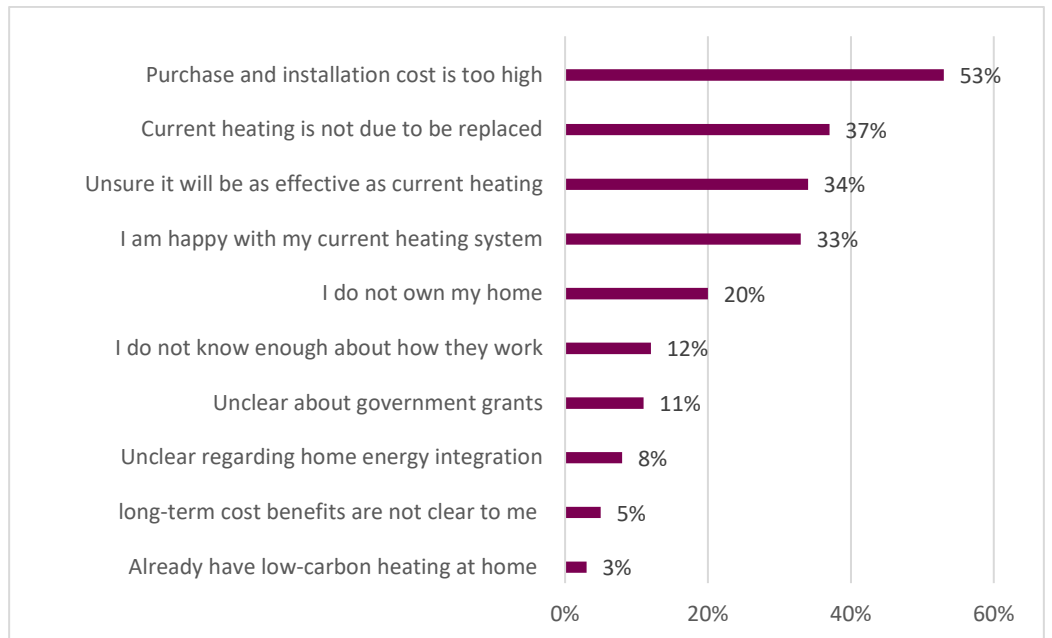
Our data highlights a lack of heat pump knowledge amongst the public. These findings echoed findings by others that people require tailored, actionable information about heat pumps, not just ‘information for information’s sake’.¹¹ Heat pump manufacturers and suppliers may be able to build consumer trust if they provide free, tailored advice which addresses consumer pain points, including which heat pump is most appropriate for their home. The government also has a key role to play in terms of information campaigns.

BARRIERS TO ADOPTION: COST IS A KEY BARRIER TO HEAT PUMP UPTAKE

The key barriers to heat pump uptake were cost, convenience and trust in their effectiveness (figure 3). High purchase and installation costs was the most cited barrier to adoption, chosen by 53% of respondents, whilst a third (34%) stated that they unsure that heat pumps will be as effective as their current heating system.

Figure 3: Barriers to heat pump uptake (select all that apply)

¹¹ NESTA (2021) *Heat pumps: improving information for householders*. Accessed online <https://www.nesta.org.uk/project-updates/heat-pumps-user-journey>



Base: N(unweighted)= 569

Heat pump costs in comparison to other sources of heat were cited by respondents. One stated their belief that there are other low-carbon alternatives which are more cost effective:

“Electric is 5 times more expensive than gas per KW. Heat pumps run at average 3 to 1. So, it's far more expensive to run a heat pump, let alone the install cost. If gas prices rise so do electric, so stop fear mongering people into renewables. Solar thermal or solar are the only renewables that make sense domestically. Push them instead!”

The upfront costs of heat pumps are further compounded by the need to upgrade existing heating systems (e.g., radiators, cylinders), and in some cases by the presence of inefficient building materials which may require retrofits to optimise heat pump efficiency and to lower their operational costs. Extensive retrofit measures can cost between £40k to £80k per dwelling, depending on the level of retrofits required. Homes within the UK are some of the oldest in Europe, with 23% of private sector dwellings built before 1919, and 72% of social housing stock built between 1945 and 1980. With this in mind, much of the existing house stock is inefficient.

Unfortunately, current electricity and gas pricing encourages the use of gas as the primary fuel for home heating. This imbalance is a major barrier to the uptake of heat pumps, as at present it is cheaper for consumers to use gas than electricity. In addition to the price of electricity, which is 3.7 times higher than gas, the present Environmental and Social tax of £153 per year is currently affecting electricity consumers. To facilitate the uptake of heat pumps, the government plans to rebalance these levies by moving them from electricity to gas (i.e., customers with gas boilers). However, with the current energy crisis, this decision has been put on hold, but will likely come into effect within the next 8 years.

Whilst this shift could make heat pump fuel bills lower than gas our data indicates that consumers do not currently see heat pumps as an alternative that will make their bills cheaper. The current energy crises will increase gas fuel bills by 69% and electricity by 42%, pushing many into fuel poverty.^{12 13} The least efficient homes, i.e., EPC band D and lower will be most affected.

Other respondents felt that the costs are not clear, and were concerned about additional costs that they would incur if they chose to transition to a heat pump:

“It's not just about the cost of the pump & installation. It would require major replumbing and redecoration. Cost for my house would be £30k in all - and lead to less effective heating. I would never recoup the outlay even if I had the money available, even over a 20-year period.”

And;

“They need to be affordable with well documented evidence of how they work in order to encourage people to switch. A new boiler is currently about 1/5 price according to your data and even with a grant a gas boiler is still far cheaper”

Respondents were also concerned about the number of changes that may need to be made to their properties to accommodate a heat pump. Retrofitting properties, redecorating, and changing home layout were cited by several respondents:

“It seems that they can't easily replace a conventional boiler and radiator system without changes to the radiators and/or pipework. This is potentially a major obstacle to simple boiler replacement that has yet to be overcome.”

¹² The Guardian (2022) *How the UK can cut carbon emissions and reduce household energy bills*. Accessed online:
<https://www.theguardian.com/business/2022/feb/13/how-the-uk-can-cut-carbon-emissions-and-reduce-household-energy-bills>

¹³ The Telegraph (2022) *How to avoid the green levies that add £153 on to energy bills in 2022*. Accessed online:
<https://www.telegraph.co.uk/money/consumer-affairs/how-avoid-paying-new-taxes-green-levies-social-environmental-2022/>

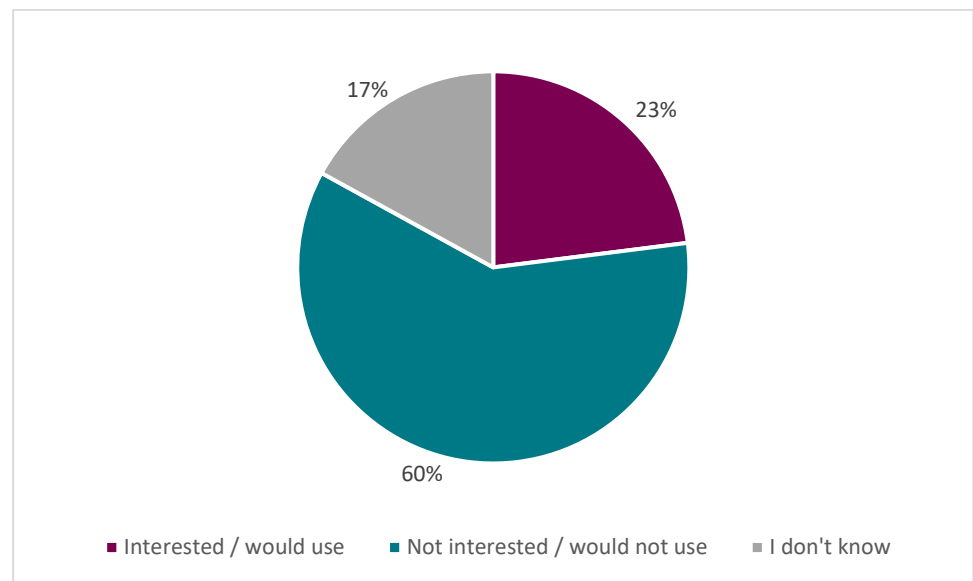
COULD THE COST BARRIER BE OVERCOME BY GOVERNMENT'S BOILER UPGRADE SCHEME?

The government's Boiler Upgrade Scheme is designed to reduce the cost barrier for new heat pump installations. When asked about whether they were aware of the Government's Boiler Upgrade Scheme, around half (54%) of respondents said that they had some awareness of it, whilst 46% did not.

We shared average heat pump installation cost information with respondents, and the size of the Boiler Upgrade Scheme grant that they could use if they chose to. However, when asked if respondents would use the scheme, six-in-ten (60%) responded that they would not. (figure 4).

Our data shows that heat pump knowledge is correlated with public interest in using the Boiler Upgrade Scheme: whilst a fifth (21%) of those with no knowledge showed an interest in the grant, over a third (34%) of those who said they "know a lot" about heat pumps showed interest. This suggests improving public knowledge may help to improve uptake of the grant.

Figure 4: Interest in using the scheme.



Base: N(unweighted)= 569

As illustrated above, cost is perceived to be the biggest barrier for consumers and is clearly acting as a major inhibitor uptake, even though the Boiler Upgrade Scheme grant is currently available to consumers. Our study echoes findings from other studies which demonstrate that the upfront cost difference between an ASHP heat pump and gas boiler is on average £9,498 (much higher for GSHP).¹⁴ The current Boiler Upgrade

¹⁴ Carbon Trust (2020) *Heat Pump Retrofit in London*. Accessed online: <https://www.carbontrust.com/news-and-events/news/heat-pumps-key-to-londons-net-zero-ambition-says-new-report-from-the-carbon>

Scheme grant, of £5,000 for ASHP and £6,000 for GSHP, does not bridge this capital gap, reducing the incentive to make the switch to a heat pump.

PERCEIVED EFFECTIVENESS: CONCERNS OVER THE SUITABILITY OF HEAT PUMPS TO THE UK CLIMATE

In addition to perceived high costs of heat pump purchase and installation, our results suggest that consumers doubt the effectiveness of heat pumps as an alternative to gas boilers. When asked why they would not purchase a heat pump 34% stated that they believed that a heat pump would not be as effective as their current heating system (Figure 3). Some respondents had concerns about the efficiency and reliability heat pumps in different conditions:

“How much heat can you get during the winter from air? What happens if the power goes off? For older houses that aren't perfectly insulated, how warm can they make the house?”

And;

“Having had experience of heat pumps in our property in Spain I do not think it will give sufficient heat to satisfy our needs. We would then pay for extra energy from other sources defeating the object of the exercise.”

For others, the reliance on a single energy source, in this case electricity, means that there is additional risk to their property. One cited recent flooding as a source of concern, whilst another cited general power cuts as a potential issue:

“If they use electric then forget it, any power cut will stop them working just look at recent times where people have been without electric and heating for over a week”

Our data highlights public concerns over the reliability of the heat pump and an uncertainty over their suitability for the UK market. Moreover, conflicting messages online and in the media means that it may be difficult for consumers to feel fully informed. Thus, addressing costs and providing information may not be enough to encourage uptake if reliability concerns are not addressed.

DRIVERS OF UPTAKE: COULD THE CURRENT ENERGY CRISIS RESULT IN INCREASED HEAT PUMP ADOPTION?

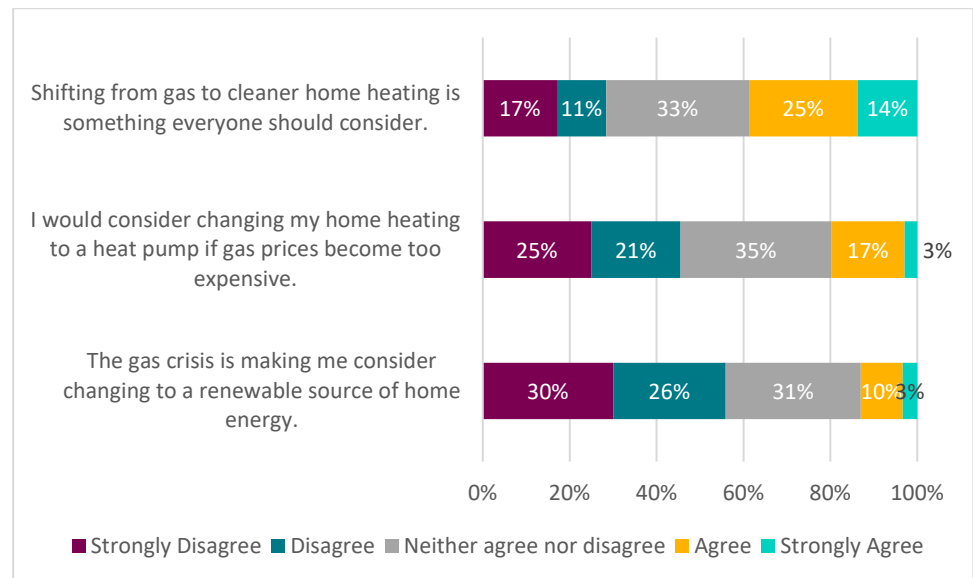
This study also explored potential drivers of heat-pump adoption related to the ongoing energy crisis (figure 5). Our data shows that half of



respondents (56%) do not think the current energy crisis would make them consider changing to a source of renewable energy, and just under half (46%) of respondents indicated that they would not switch to a heat pump if gas prices become too expensive.

Almost two in five (39%) of respondents think that everyone should shift to cleaner home heating highlighting the potential value of messaging related to environmental sustainability. However, it is unclear whether consumers believe heat pumps are the “cleaner home heating” solution.

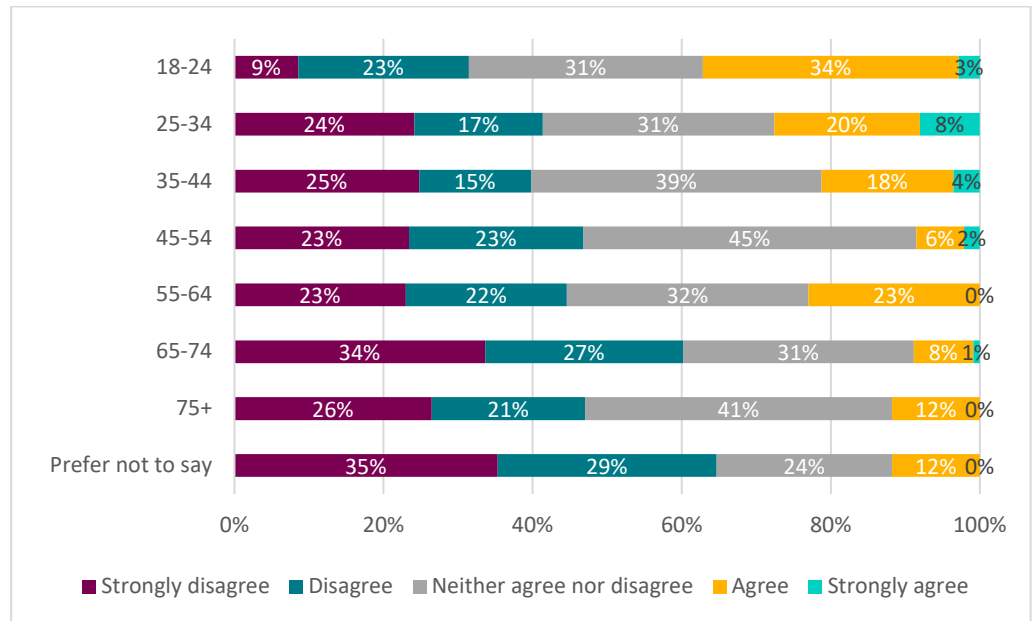
Figure 5: Attitudes towards the gas crisis



Base: N(unweighted)= 569

We also explored differences across age groups with regards to the importance of gas prices as a driver to increasing the shift to renewable home heating (Figure 6).

Figure 6: Responses to “I would consider changing my home heating to a heat pump if gas prices become too expensive”, split by age.



Base: N(unweighted)= 569

Over a third (37%) of respondents aged 18-24 agreed to some degree that they would install a heat pump if gas prices were too expensive, while only 8% of respondents aged 45-54 agreed. This could suggest that younger people are more inclined to take up new renewable technology, like a heat pump, than older people. In contrast, the older age groups are more likely to be homeowners and may be responding based on their current circumstances, meaning they do not see heat pumps as feasible alternatives.

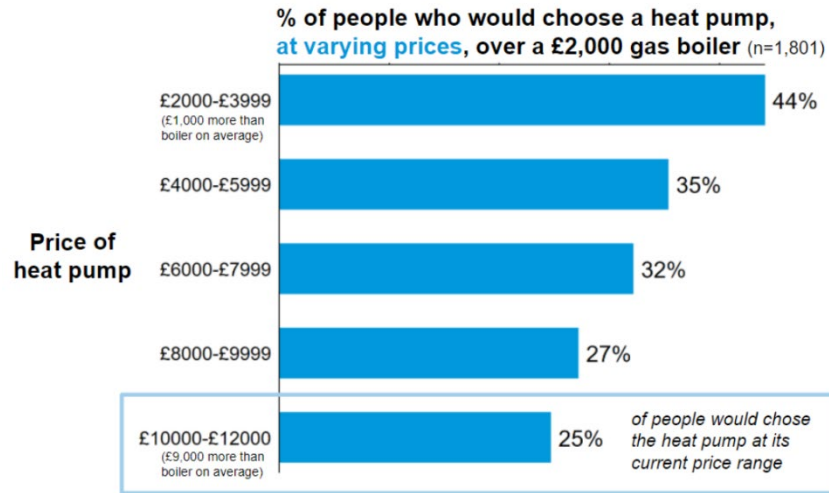
Driving uptake: evidence from behaviour change research

Our findings support the results of other studies that have explored perceptions and attitudes towards heat pumps. To understand the role of price in informing the purchase decision, the Behavioural Insights Team (BIT) ran a choice experiment where respondents selected either a heat pump, of a varied price between £2000 and £12,000 or a new boiler costing £2000. BIT found that more respondents (44%) were likely to choose a heat pump when priced similarly to the gas boiler, supporting our finding that cost is a key barrier to uptake. However, the BIT study suggested that up to 25% of individuals, who BIT termed early adopters, would be willing to pay up to £12,000 for a heat pump (Figure 7). However, BIT notes this may be due to the hypothetical nature of the choice experiment.

BIT found that knowledge of heat pumps remains limited, with the majority of respondents aware of heat pumps but only 50% having basic

understanding of how they work. Furthermore, half of respondents did not believe heat pumps benefit the environment, further corroborating the findings in this study.¹⁵

Figure 7: Uptake of heat pumps from online choice experiment



Ref: Behavioural Insights Team conditional logit model, data collected 9-14 December 2021.¹⁵

SURVEY LIMITATIONS

There are some limitations to consider with regards to this study:

Sampling strategy: This study makes use of a convenience-based non-probability sampling strategy whereby social media advertising and direct advertising to the DG Cities Research Community means that the sample may be subject to bias. Therefore, the results may not be generalisable to the general UK population.

Accessibility: This study was publicised online on social media and distributed directly to the DG Cities Research Community. However, this means that any of the general population who do not have access to social media or a digital device would not be able to access this study.

Perceptions of the gas crisis: This survey was first distributed in January 2022 before wide acknowledgement of the present energy crisis. This could suggest that some of the respondents were not aware of the breadth or implications of the crisis. This could explain why a third of respondents responded 'neither agree nor disagree' to all three of the attitudinal questions. This could suggest that they did not feel like they had enough information to answer the question or that they do not have a strong opinion on the subject.

¹⁵ Behavioural Insights Team (2022) *How much are we willing to pay to make home heating greener?* Accessed online: <https://www.bi.team/blogs/how-much-are-we-willing-to-pay-to-make-home-heating-greener/>



RECOMMENDATIONS

Our analysis highlights that there are several persistent barriers related to consumer knowledge, attitudes and awareness that are limiting heat pump adoption rates. Below we outline several key recommendations we believe will help reduce or remove these barriers:

IMPROVE THE EVIDENCE BASE OF PUBLIC KNOWLEDGE AND ATTITUDES TOWARDS HEAT PUMPS AND OTHER HEATING TECHNOLOGIES

The outcomes of this survey highlight that there is a low level of knowledge and awareness of the benefits of heat pumps, compared to other heating technologies. Various barriers were outlined by respondents in installing heat pumps, demonstrating that there may be a gap between political drivers towards installing heat pumps, and consumer needs (and means), hesitations and overall understanding of the technology.

The survey also demonstrated that the public does not have sufficient guidance, and means, to install heat pumps in their homes. Limitations of current housing stock, and lack of understanding to the physical suitability of heat pumps across different housing types is a major limiting factor to their uptake. Further work is required to translate academic and policy research on the limitations of existing housing stock, in terms of efficiency, location and type (i.e., apartment versus detached dwelling), into practical information for the public.

EXPLORE HOW TO IMPROVE THE GOVERNMENT'S BOILER UPGRADE SCHEME TO SUPPORT INCREASED UPTAKE AND EXPLORE OTHER POLICY OPTIONS

Our data highlights that the government's Boiler Upgrade Scheme grant does not appear to be overcoming the cost barrier for respondents, given that three-fifths (60%) stated that they would not make use of it. More evidence is needed as to why this may be the case. Whilst monetary value may be key, there may also be other characteristics of the grant that are preventing uptake which need to be better understood.

Given that mass uptake appears to be lagging long-term projections, additional research should be undertaken to support the development of a road map that clearly outlines potential policy interventions, both financial and non-financial. A clear roadmap of options for interventions, coupled with actions to accelerate heat pump uptake, and alternative low carbon solutions would support greater collaboration across industries and sectors which could further lead to increased capacity for innovation and public engagement.

BUILD GREATER UNDERSTANDING OF PUBLIC WILLINGNESS AND CAPABILITY TO ACHIEVE NET-ZERO

Our study highlights that heat pump deployment may be better supported if policy makers and industry had a deeper understanding of consumer perspectives on the steps that individuals and communities must take to achieve net-zero. Respondents expressed concern about grid stability and questioned the renewable credentials of grid electricity, as well as highlighting other methods of reducing the UK's reliance on gas, including nuclear power and fracking.

Further quantitative studies could also focus on establishing public knowledge and awareness of energy efficiency measures for decarbonising homes and explore how these methods could be enhanced and improved on a large scale.

PROVIDE CONSUMERS WITH A SINGLE, TRUST-WORTHY SOURCE OF INFORMATION ABOUT HEAT PUMPS

Our respondents displayed some knowledge of heat pumps but many had questions about their suitability to the UK climate. Our data highlights that consumers may be receiving conflicting information (e.g. from the media, versus from the government) regarding benefits and disadvantages of heat pumps, meaning that consumers still might not take advantage of a heat pump due to limited understanding of the evidence. Thus, creating a single trusted evidence base to provide consumers with information that is designed to describe if and how heat pumps work in different UK building contexts (e.g., Edwardian terraced housing versus modern council estates) will help to confidence and understanding in their value and effectiveness.

Conclusion

To reach net zero, the UK must decarbonise home heating. Beyond heat pumps and hydrogen fuel there are few alternatives that have the potential to reduce carbon emissions, with heat pumps clearly the technology of choice given the relative infancy of hydrogen fuel-based heating system. Evidence appears to highlight that over time, heat pumps could provide a promising long-term solution, but for consumers, heat pumps in their current form are far from ‘universal acceptance’ – this means that they are not being installed at the rate required to achieve the government’s stretching net-zero aspirations. This study of public attitudes highlights several key challenges that must therefore be overcome.

It is clear that consumer knowledge and behaviour is some distance from that which is required to hit the government’s net zero targets for heat pump adoption. We find that knowledge of heat pumps is limited, and consumers perceive cost as a major barrier to adopting the technology. But even if costs are reduced, concerns over a perceived “downgrade” from current gas boilers which provide “on-demand” and higher temperature heat means that unfortunately many consumers see heat pumps as a step backwards. To counter this, policy makers and industry need to focus on working with the public to build consumer knowledge of heat pumps, as well as trust in their effectiveness and reliability. More evidence is needed to enable consumers to willingly take the step towards transitioning to heat pumps to heat their homes. It’s clear that the current government grant alone is not enough to do this.

Decarbonising home heating is a significant challenge for policymakers and industry which must be overcome if the UK is to achieve net-zero status. Heat pumps are clearly an important part of the solution, but at present the public is unconvinced. Tackling this issue holistically must be the focus of future research and engagement with consumers.



About the authors

DG CITIES

DG Cities is an innovation consultancy that helps clients harness the power of technology and data to transform the places we live and work. We undertake research with industry, policy makers, academics and the community to ensure that innovations are sustainable, safe and work for the people they are designed to serve.



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Isobel's academic specialty is behavioural science, and she has applied this insight to business and communications problems for private and third sector clients. At DG Cities, Isobel uses research to develop behaviour change interventions for our clients, from reducing fly-tipping to encouraging the up-take of autonomous vehicles.



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