

# **BAXI**

## **AFFORDABLE HEAT DECARBONISATION: IS IT TIME FOR A GREEN HEATING CREDIT?**

**October 2021**



## EXECUTIVE SUMMARY

### Green Heating Credits could drive affordable heat decarbonisation

Regardless, of age, tenure, income, geography or political persuasion, the need for heat to keep our homes and workplaces warm is universal. As we have seen recently in the news, the affordability of heat is a key issue as we seek to switch heating away from fossil fuels to greener alternatives.

Heating is also responsible for around one-third of the UK’s greenhouse gas emissions.

We all have our part to play in the drive towards the UK’s target of net zero carbon by 2050. At Baxi, we intend to ensure that our own business is ready for the future; not only in terms of the heating and hot water solutions we provide, but in the way in which we operate and communicate as we educate and inform consumers, suppliers, specifiers, contractors and installers. Our commitment is summed up as follows:

*Future generations will judge us by our actions. Our pledge is to be carbon neutral in all our operations by 2030, and to lead the phase-out of carbon intensive heating by ensuring every product we make from 2025 will work with low carbon energy.*

We believe that a number of solutions including hydrogen boilers, heat pumps and hybrids can play their part in the journey towards net zero.

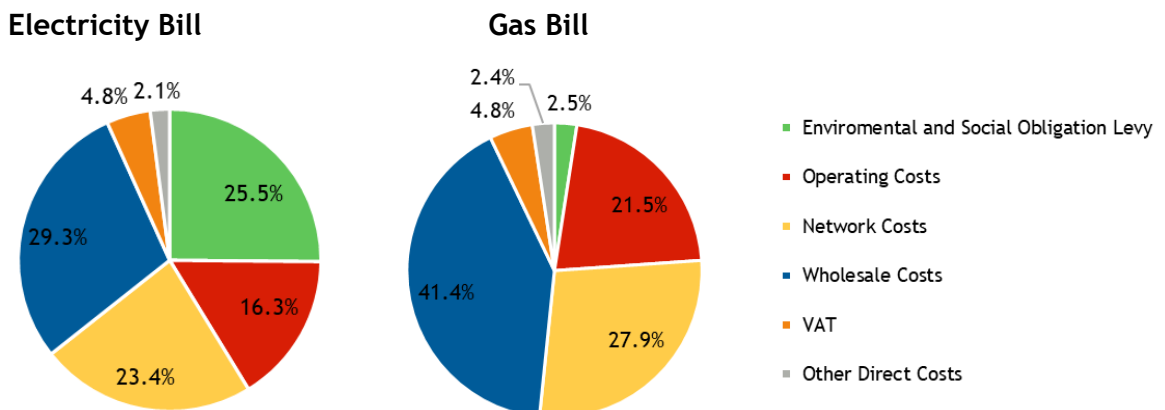
In this paper we set out to quantify the affordability obstacle that is impeding progress towards low carbon heat in the UK. We highlight how households switching to an Air Source Heat Pump are penalised for doing so through higher running costs. By quantifying the challenge, we aim to inform the debate over what to do next. We also outline an exciting solution in the form of Green Heating Credits for heat pump owners which could remove the energy bill penalty without inhibiting growth of alternative low carbon heating technology and maintaining fairness for households not yet ready or able to transition.

### The electricity bill penalty for heat pumps

**At the heart of the low carbon heat affordability crisis lies a paradox that penalises customers who move to heat pump technology. Families switching to a heat pump today are set to pay an extra £250 per year towards environmental and social policies.**

25.5% of the household electricity bill is constituted by a levy which pays for environmental and social obligations. How much each billpayer contributes is directly linked to the amount of electricity consumed. There is currently a much lower levy of 2.5% charged on gas bills.

Figure 1 - Energy Bill Breakdown<sup>1</sup>





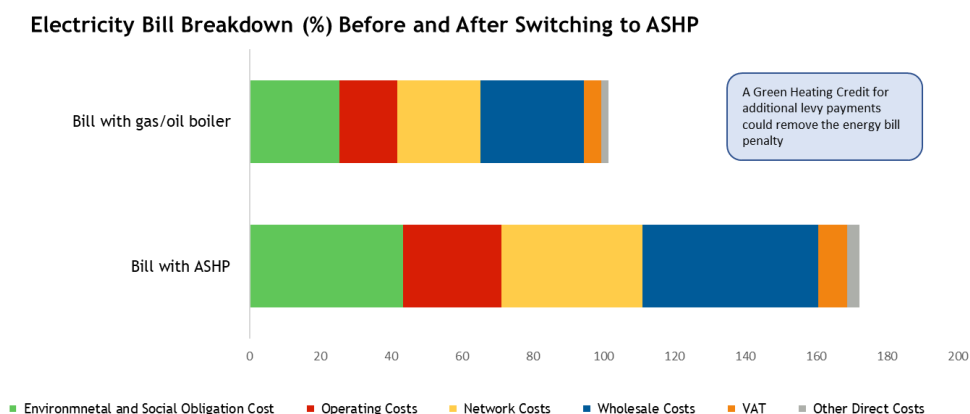
Levy payments have been a great success in helping to fund cleaner electricity generation and alleviation of fuel poverty, yet it is also a significant cost for the average consumer.

Customers who switch from gas or oil heating to an electrically driven Air Source Heat Pump will inevitably be driving up their electricity consumption and as a result will see their contribution to the levy framework rise accordingly. There is a fundamental unfairness in this outcome as consumers participating in the switch to low carbon heating will pay a larger share of levy costs than those who remain with fossil fuel heating.

## A Green Heating Credit for heat pump owners.

It is clearly not fair that consumers who switch from fossil fuel heating to a heat pump should pay additional levy costs on their electricity bill. Yet unlike some recent proposals, we also disagree with shifting levy costs wholly onto gas bills due to the effect on heating affordability for gas customers. There is an alternative solution to remove the penalty for heat pump owners whilst maintaining fairness for those yet to switch.

Figure 2 - Green Heating Credit for electricity bills



Households heated by heat pumps could reclaim levy costs paid on their electricity bill (for the heat used in heating), via a Green Heating Credit. Establishing this as a “reclaim” or credit on the energy bill which must be applied for would keep administration simple.

In September 2021 we approached a representative sample of 1,277 households. Saving money was seen as the most attractive reason (by 66% of respondents) for switching to a heat pump. Our survey found that a Green Heating Credit of £250 per annum would increase interest in a heat pump for three quarters of surveyed consumers whereas the prospect of increased running costs is a major disincentive.

Finally, a Green Heating Credit is compatible with a Just Transition as follows:

- It is fair to adopters of heat pump technology as it means they do not pay twice towards wider social and environment goals.
- It is fair to electricity billpayers as their share of levy costs will remain the same.
- It is fair to consumers using traditional forms of heating as heating bills will not increase as proposed in some quarters.
- It leaves room for alternative low carbon heating technologies such as hydrogen heating to emerge and be funded as deemed appropriate by government.

## INTRODUCTION

### Playing our part

Baxi Heating has always been at the cutting edge of innovation, and this approach has never been more important than it is today. We are working on ground-breaking technologies that will have a real impact reducing carbon emissions and will also provide best value to our customers. Our homes, businesses and industries all need cleaner, affordable heating and hot water solutions, supported by comprehensive services that make life better and easier for all.

We must also play our part by working with stakeholders in our industry and beyond. We intend to share the insights we have gained as part of our journey to low carbon, helping to inform future policy and industry transformation. This paper represents our current thinking on how we can overcome an affordability crisis at the heart of the heat decarbonisation agenda.

### The climate crisis

In November this year, the UK hosts one of the most important conferences in recent memory, with the United Nations Climate Change Conference (COP26) to be held in Glasgow.

The stakes are huge. Countries from across the world will come together to set out plans to drastically cut carbon emissions to avoid the devastating impacts of a changing climate. Ahead of the conference all countries attending COP26 will be required to submit reduction targets for 2030 that will hopefully put them on track to net zero by 2050.

Research has highlighted that even if the world's major emitters match the UK plan to achieve net zero by 2050, this may not be enough to hold back devastating climate change effects. This was highlighted in the recent report released by the Intergovernmental Panel on Climate Change (IPCC). The report<sup>2</sup>, 'Climate Change 2021: The Physical Science Basis', confirms beyond reasonable doubt that humans are responsible for climate change and this change is happening at an alarming rate. It outlines that the world's governments must make drastic emission cuts to hold back a dangerous rise in global temperatures.

Looking closer to home, the UK has paved the way in some aspects of the climate race. We were the first major economy to enshrine net zero by 2050 into law, we have a renewable wind energy sector that provides around a quarter of our electricity and the Prime Minister announced in his 10 Point Plan the banning of petrol and diesel cars by 2030. However there is one area where progress has not been nearly as sustained, and where the future direction remains uncertain.

### UK heat and buildings challenge

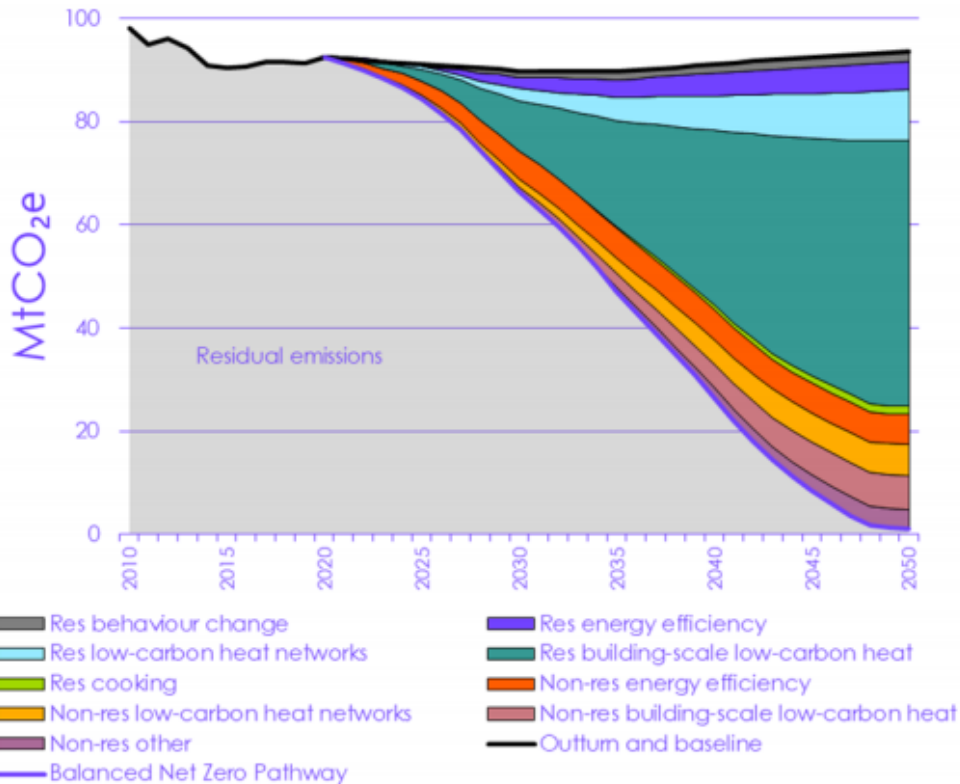
The future of heat has become one of the central issues for policymakers in the context of the pathway to net zero. In other key sectors of power and transport, the biggest questions over technology and who pays are largely answered or in the process of being answered. The challenge to government is characterised as how far and how fast should change occur. Whereas major questions remain over which heat decarbonisation pathways to pursue, how large will the cost be and who should pay.

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<sup>2</sup> Climate Change 2021: The Physical Science Basis', IPCC

Emissions associated with heating buildings were responsible for 1/5th of the UK’s greenhouse gas emissions last year. The Committee on Climate Change has stated that “the 2020s must be the decisive decade of progress and action.”

Figure 3: Sources of abatement in the Balanced Net Zero Pathway for Buildings<sup>3</sup>



The Government’s Heat and Buildings Strategy (likely to be published ahead of COP26) represents a crucial point for the UK if we are to achieve domestic climate targets. A range of technological solutions are being proposed alongside new policy interventions to encourage consumers to make the switch.

**At the heart of the debate however is an affordability crisis. Low carbon heating solutions available today typically cost considerably more than a gas or oil boiler to install and in some cases also to run.**

## Technology options - a mass market for low carbon heat

A range of technologies exist which could be deployed to tackle the heat decarbonisation challenge including heat networks, biomass boilers, heat pumps and hydrogen. The diversity of building types in the UK means that there can be no silver bullet to decarbonisation.

Two options stand out as having potential applicability across the widest range of house types and locations; Hydrogen Boilers and Air Source Heat Pumps. Baxi is determined to lead the way in the development and scaling of both technologies.

<sup>3</sup> Source: 6<sup>th</sup> Carbon Budget Report, Committee on Climate Change

## Hydrogen Heating

Baxi Heating supports the transformation of the UK gas network to deliver hydrogen heating. Gas boiler manufacturing centres could transition to hydrogen boilers whilst existing installer networks have the necessary expertise and experience to install and service hydrogen boilers with the minimum amount of additional training.

Baxi Heating has this year demonstrated its 100% hydrogen boiler to customers and colleagues in the UK's first hydrogen house. Hydrogen represents an opportunity as it is carbon-free at the point of use and enables families to use their heating and hot water in the same way they do today, without major changes to their central heating systems or homes. A high uptake of hydrogen heating is possible, however the main challenge is developing sufficient, affordable and sustainable sources of hydrogen. Success will also depend on key infrastructure decisions being made at the right time.



## Air Source Heat Pumps (ASHPs)

The Prime Minister has set a target of 600,000 heat pump sales per annum by 2028<sup>4</sup> and the market is expected to experience significant growth in the coming years.

ASHPs work by taking the available heat from the air and transferring it to a refrigerant. This is then compressed to increase the temperature and the resulting useful heat is circulated through the home for heating and hot water.



ASHPs are well suited to a wide range of properties and whilst energy efficiency measures such as insulation are recommended, can be adapted to most UK properties. Baxi has launched its own ASHP product in anticipation of market expansion and we are delighted with the response from our customers and partners to date. However, there are some challenges.

The main challenge is the affordability of heat pumps and how to incentivise customers to switch from fossil fuels to this low carbon option. As we demonstrate overleaf, getting the economics right will be key to creation of a mass market.

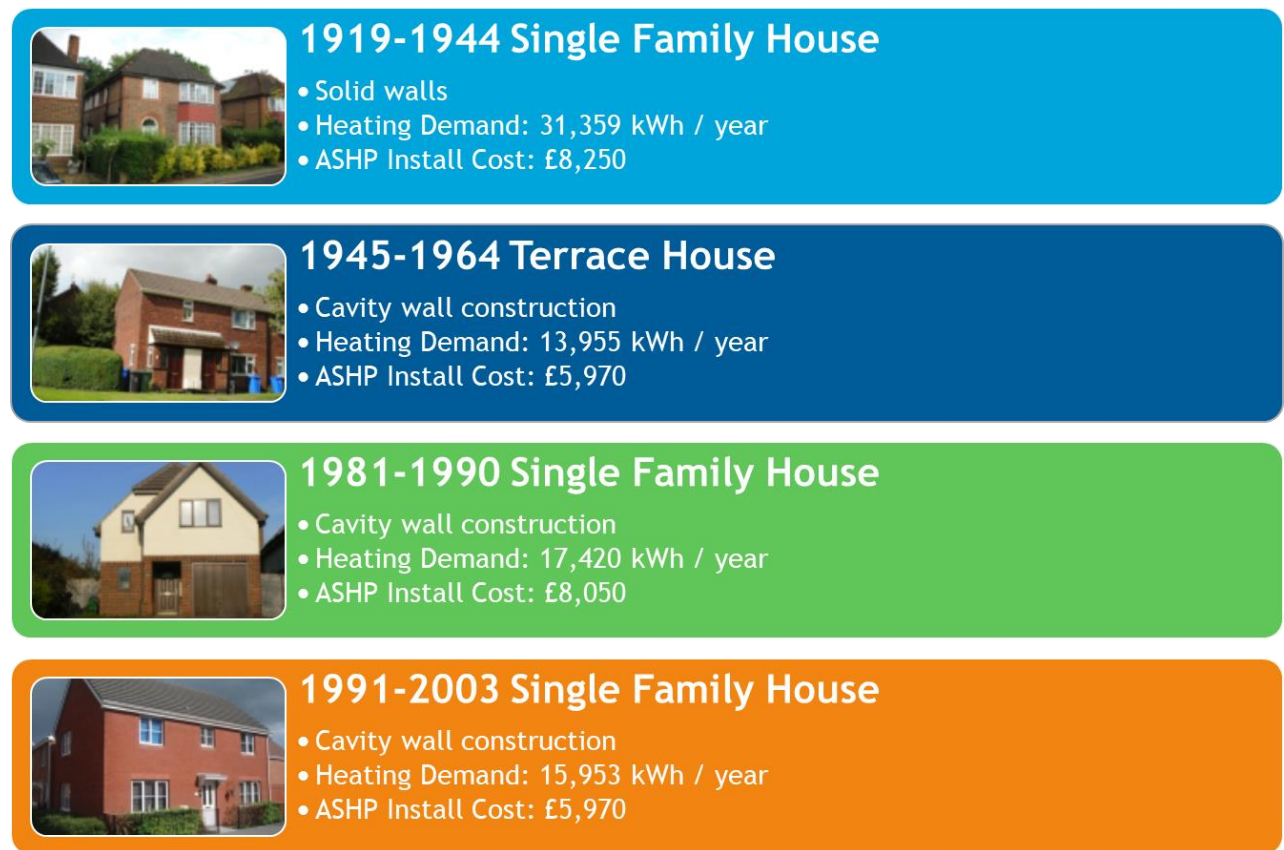
<sup>4</sup> 10 Point Green Industrial Plan, November 2020

## ECONOMICS OF LOW CARBON HEAT

### Installation Cost

One of the most important challenges when considering alternatives to fossil fuelled heating systems is the upfront cost compared to a gas or oil boiler. We have considered the costs of ASHPs for four property types, each representing hundreds of thousands across the UK:

Figure 4 - Property Archetypes<sup>5</sup>



The mean fully installed cost across our four property archetypes of £7,060 for an ASHP compares to £1,500 for a gas boiler and £3,350 for an oil boiler.

A higher upfront cost is not a surprise and it is for this very reason that the Government has announced the Clean Heat Grant that will support householders with up to £4,000 towards the installation of a heat pump from May 2022. In each of our property types a grant of this size makes a big difference to the relative affordability of an Air Source Heat Pump.

<sup>5</sup> [TABULA WebTool \(building-typology.eu\)](https://www.tabula.eu/webtool/)

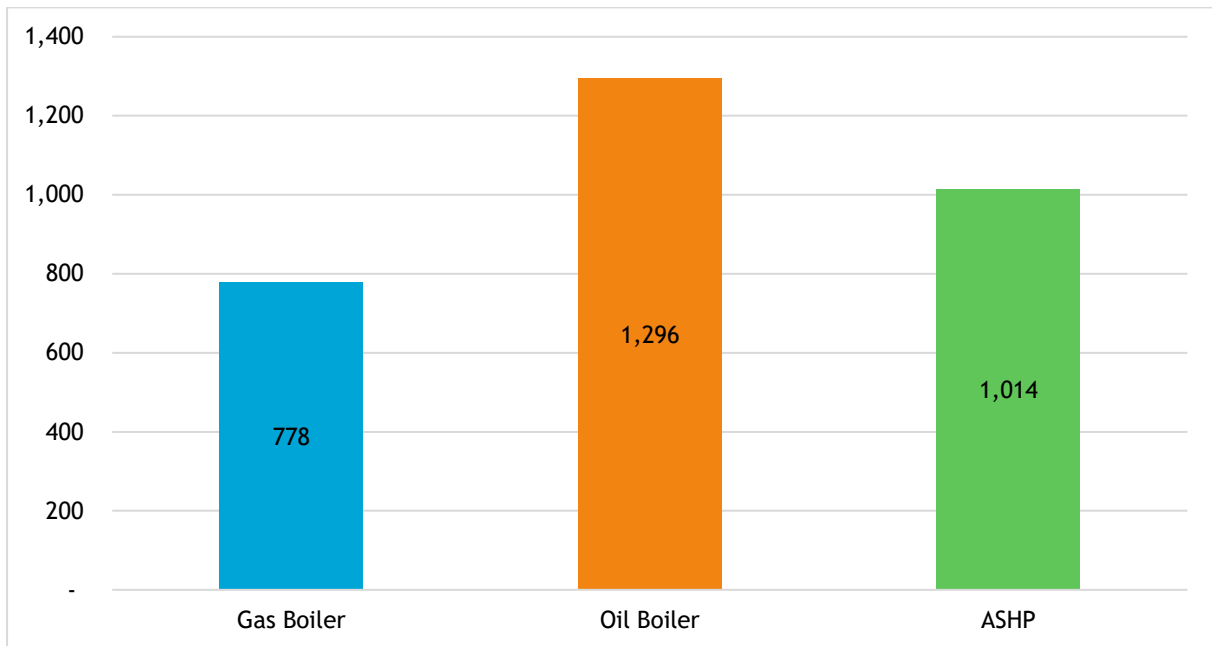
## Heating bills

The running cost of any heating system is just as, if not more important than the upfront cost as it directly affects the energy bill. In times of price volatility this element of the cost profile becomes increasingly important.

Maintenance costs represent a third element of the overall cost of a heating system, however these are broadly similar across heat pumps and boilers with an annual service by a qualified engineer recommended for both technologies.

The cost to run the heating system is an important variable and our research has uncovered significant differences across the four housing archetypes set out in Figure 4 as follows:

**Figure 5 Mean Annual Running Cost (£)**



Average running costs were generally highest for consumers in rural areas operating oil boilers. Installation of an ASHP could deliver significant running cost savings for oil heated homes. However, in the case of a gas boiler, the typical costs of running the Heat Pump are significantly higher compared to running an equivalent gas boiler

The higher running costs of an ASHP are likely to be a significant barrier to uptake of heat pumps by gas consumers. With around four fifths of homes on the gas grid this is a major obstacle that must be overcome.

## A £4,000 Clean Heat Grant

Homeowners considering an investment in an ASHP will need to consider a wide range of factors including technical viability, practical concerns such as available space and the financial implications. As such, there is no perfect metric for assessing the viability or specific financial point at which a heat pump will be attractive to consumers.

As a substitute for this complex and individual calculation, we have considered the upfront investment and discounted<sup>6</sup> operating costs of heating systems over the first seven years of their operational life (“a seven year NPV”). This is considered a reasonable consumer

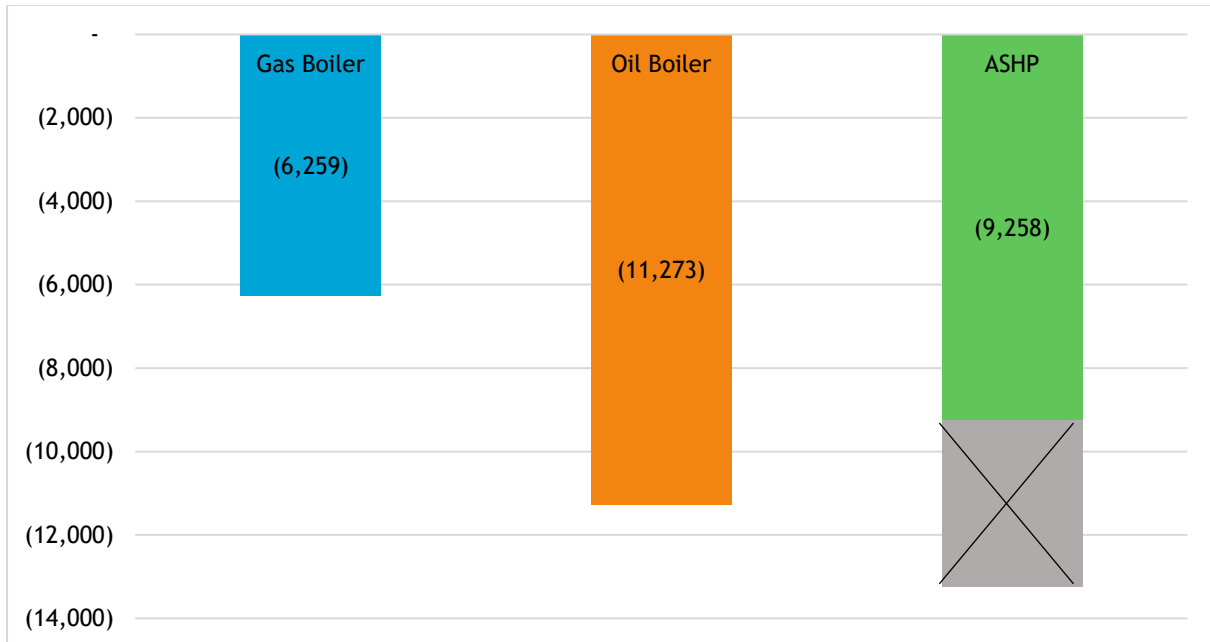
<sup>6</sup> Future costs and benefits discounted according to HM Treasury Green Book Methodology



time horizon. We have included the Government’s clean heat grant of £4,000 per property to provide a realistic view of the likely choice facing consumers from April 2022.

The results are stark. For an oil heated property, the Clean Heat Grant makes a significant difference to the financial proposition when considering an Air Source Heat Pump.

**Figure 6 Total Heating Costs (£) over seven years including £4,000 Clean Heat Grant**



Running costs around £250 per year higher for an air source heat pump compared to a gas boiler undermine the economics of a switch over. They are also likely to prove a significant barrier.

### Our proposal for a green heating credit on electricity bills.

As noted earlier in this paper, families switching to a heat pump could be set to pay an extra £250 per year towards environmental and social policies.

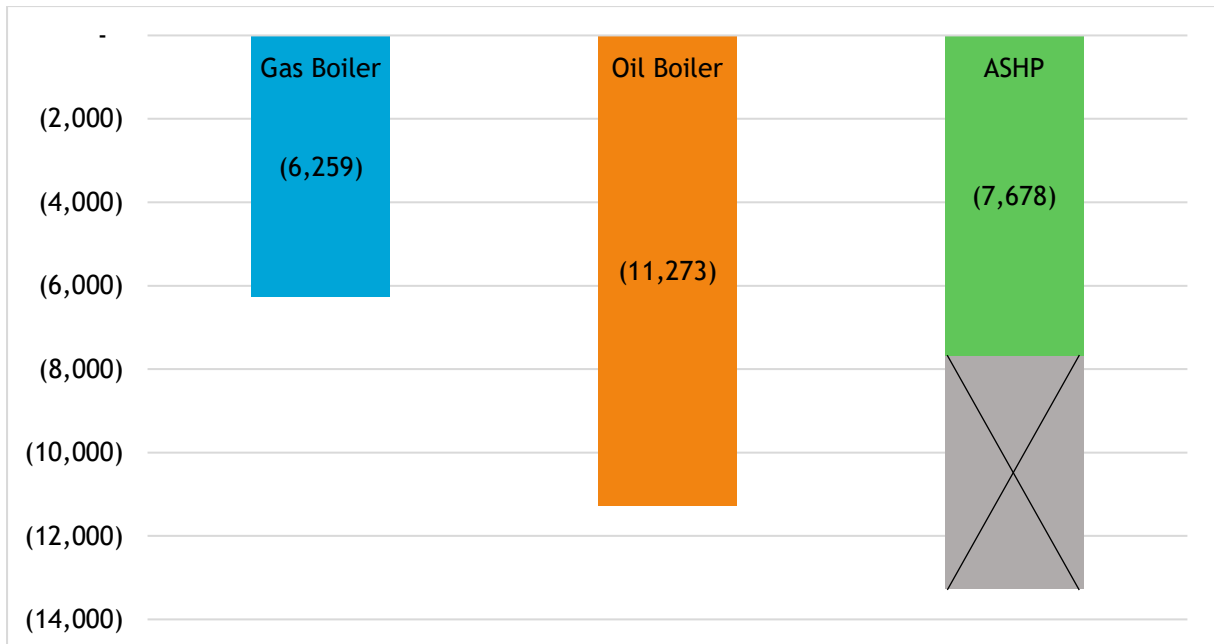
There is a fundamental unfairness in this outcome, as households participating in the switch to low carbon heating will pay a larger share of environmental and social levy costs than those who remain with fossil fuel heating. Addressing this issue could unlock the economics of heat pump technology.

Co-incidentally, the extra levy payments are broadly equivalent to the difference in running costs between a gas boiler and an ASHP.

We consider that households who switch from fossil fuel heating to an approved low carbon heating system should have the option not to pay additional social and environmental levy costs resulting from a green choice. These consumers should of course, continue to pay levy costs on their general electricity usage for lighting, appliances etc.

Rebalancing the environmental and social levy penalty with a Green Heating Credit would not remove the need for grant support, but it could provide an enduring support mechanism which could transform the economics of investment into ASHPs by households on the gas grid, as shown by the seven year NPV total heating cost figures overleaf.

**Figure 7: Total Heating Costs (£) (seven year NPV) including Green Heating Credit and Clean Heat Grant**



As the figure above shows, ASHPs remain more expensive than gas boilers even with the addition of a green heating credit and we would therefore suggest a small uplift (c£1,000) is provided to the Clean Heat Grant for financial year 22/23. As the costs of heat pumps reduce with scale, the Clean Heat Grant could then be reduced whilst the Green Heating Credit would provide an enduring benefit.

We must give careful consideration to the imposition of the cost of decarbonisation on those less able to pay. It is also important to ensure to keep options open and to provide support alternative low carbon heating technology. However we note that a Green Heating Credit is compatible with a Just Transition as follows:

- It is fair to early adopters of ASHP as it means they do not pay twice towards wider social and environment goals.
- It is fair to electricity billpayers as their share of levy costs will remain the same
- It is fair to consumers using traditional forms of heating as heating bills will not increase as proposed in some quarters.
- It leaves room for alternative low carbon heating technologies such as hydrogen heating to emerge and be funded as deemed appropriate by government.

## CONSUMER PERSPECTIVE

Awareness of the need to act on home heating is building and so is the attractiveness of low carbon heating technology.

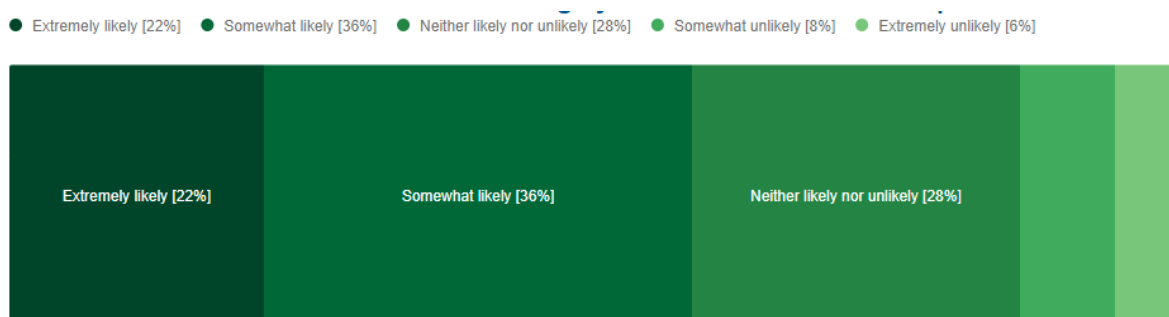
In September 2021 we approached a representative sample 1,277 households to seek their views on ASHPs and the idea of a Green Heating Credit.

### Awareness and Affordability

We found a majority of respondents are willing to consider installing a heat pump and over half would now at least look into the option at the point of replacing their heating system.

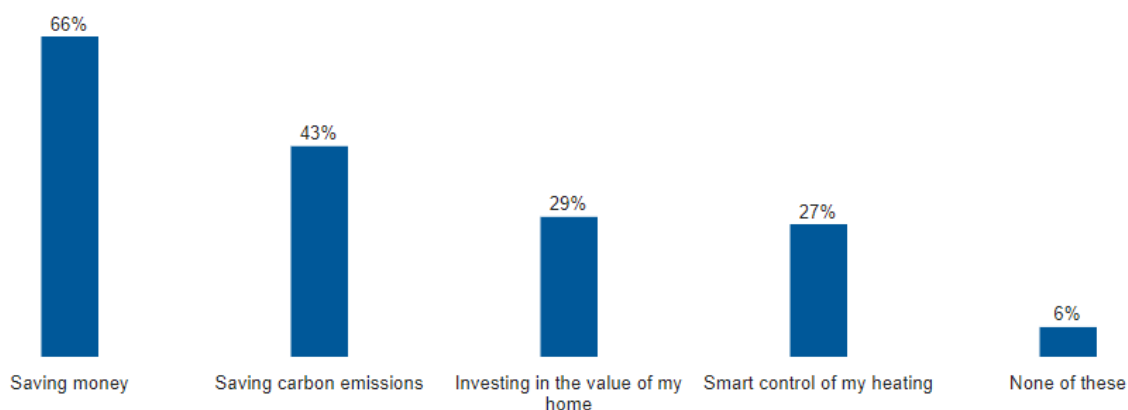
As shown in Figure 9, saving money is seen as the most attractive reason (by 66% of respondents) for considering a switch to a heat pump.

**Figure 8 - Likelihood to consider a low carbon heating system such as a Heat Pump**



*Thinking more closely about your own home, if your heating system needed replacing, how likely is it that you would consider a low carbon heating system such as a Heat Pump?*

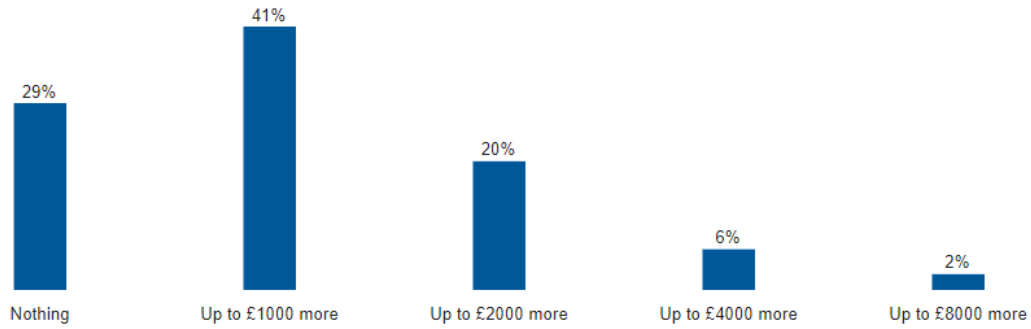
**Figure 9 - Features attracting you towards heat pump installation**



*Which of the following features would most attract you to installing a heat pump?  
You can select more than one option if appropriate.*

However responses indicated an unwillingness to spend a great deal more on the installation of a heat pump compared to a gas boiler (shown overleaf)

**Figure 10 - Maximum additional amount willing to pay to have a heat pump install**



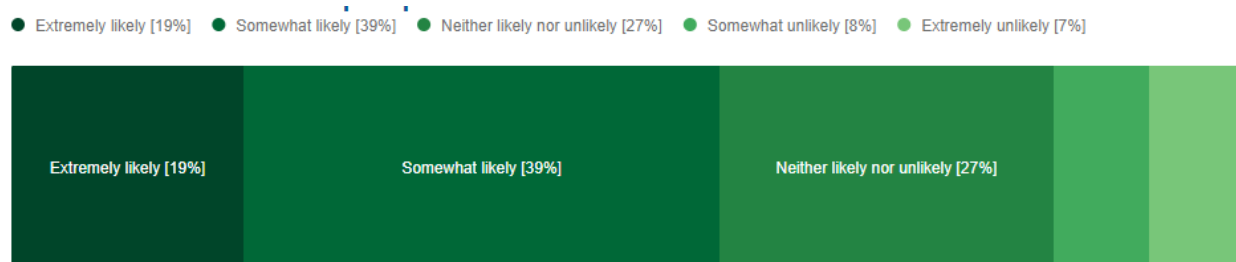
*Assuming that a heat pump costs more than a gas boiler to install, what is the maximum additional amount you would be willing to pay upfront to have one installed?*

Affordability clearly sits at the heart of the heat decarbonisation challenge and it is vital that policymakers address this issue in a way that provides the right incentives whilst maintaining fairness for other customers.

## Government Interventions

We tested the idea of grants for upfront installation and the linkage with higher electricity bills as follows:

**Figure 11 - Likelihood of installing heat pump with Clean Heat Grant of £4,000**



**Figure 12 - Change to likelihood if heating costs increase by £250 per annum**



*If despite an upfront grant to cover the cost, running a heat pump meant an increase in your energy bills of up to £250 per year how likely would you be to install a heat pump?*

As the above figure shows, grants are attractive however the extra running costs of an ASHP compared to a gas boiler are a disincentive to for many of the respondents. Considered alongside our economic analysis of the costs of running an ASHP, it can be considered that the ongoing running costs for homes on the gas grid may be enough to put off all but the keenest green adopters.



## CONCLUSION

### Beyond grants: time for a Green Heating Credit

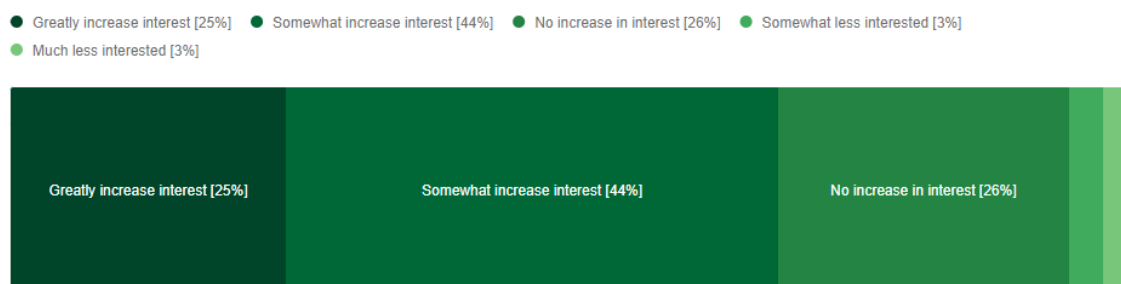
It has been reported that the Government is considering shifting environmental and social levies away from electricity bills and onto gas bills.

Ensuring a just transition for all customers will be key to the successful decarbonisation of home heating. A one-size-fits all approach will not work and consumers will need choice and access to a range of net zero compatible technologies including hydrogen boilers, district heating, hybrid heating systems, and heat pumps. It is important to ensure that customers are protected, so that no one ends up paying more and being inconvenienced by a product that may not work best for them.

As we have discovered, a £4,000 Clean Heat Grant could make all the difference encouraging low carbon heat to be deployed in off-grid homes, however it will not be sufficient to encourage on-gas grid homes to make the switch over. A more permanent solution is necessary.

Finally, we tested out the idea of a £250 annual Green Heating Credit to offset the levy cost, finding that it would have a positive impact for nearly three quarters of all households. This combined with our findings on the importance of overall affordability and running costs clearly demonstrate the need for intervention.

**Figure 13 - Interest in installing a heat pump with Green Heating Credit**



*If heat pump owners were able to get an annual energy bill discount of up to £250 (known as a Green Heating credit) on top of a £4,000 grant to support upfront costs from their energy supplier, how would this affect your interest in installing a heat pump?*

Levy payments been a great success in helping to fund cleaner electricity generation and alleviation of fuel poverty over many years. We support the continuation of the levy to maintain necessary investment in key areas of low carbon energy and vulnerable households.

Customers who switch from gas or oil heating to an electrically driven Air Source Heat Pump will inevitably be driving up their electricity consumption and as a result will see their contribution to the levy framework rise accordingly. Redressing this balance could be key to unlocking the potential of Air Source Heat Pumps and we look forward to discussing the contents of this paper with all who wish to join the conversation.

## MODELLING INPUT ASSUMPTIONS

### Fuel Prices

Electricity

Mains Gas

Heating Oil

### Input Value/Source

16.5 pence per kWh

3.6 pence per kWh

5 pence per kWh

All values taken from SAP 10.2 (30-08-21)

### Installation Costs

Air Source Heat Pump

Gas Boiler

Oil Boiler

BEIS - "Non-Domestic RHI and Domestic RHI Monthly Deployment Data" report June 2018

BEIS - ECO3 Impact Assessment, October 2018

BEIS - ECO3 Impact Assessment, October 2018

### Heating System Efficiency

Air Source Heat Pump

Gas Boiler

Oil Boiler

COP of 3.2

COP of 0.92

COP of 0.89