

UNLOCKING WIDESCALE HEAT PUMP DEPLOYMENT IN THE UK

November 2023



TABLE OF CONTENTS

INTRODUCTION TO THE HEAT PUMP ASSOCIATION	4
FOREWORD BY CHARLOTTE LEE, CEO	6
HEAT PUMP CAPABILITIES	28
ADDRESSING THE BARRIERS TO WIDESCALE HEAT PUMP DEPLOYMENT	40
THE UPFRONT COST OF HEAT PUMPS	40
1. RECOMMENDATIONS TO REDUCE THE UPFRONT COST OF HEAT PUMPS	47
THE RUNNING COST OF HEAT PUMPS	49
2. RECOMMENDATIONS TO LOWER THE RUNNING COST OF HEAT PUMPS	59
THE INSTALLER WORKFORCE	63
3. RECOMMENDATIONS FOR GROWING THE INSTALLER WORKFORCE	67
4. RECOMMENDATIONS FOR ENCOURAGING NEW ENTRANTS INTO THE INSTALLER WORKFORCE	71
CONSUMER AND INSTALLER CONFIDENCE	72
5. RECOMMENDATIONS TO INCREASE CONSUMER AND INSTALLER CONFIDENCE	75
HEAT NETWORKS	76
6. RECOMMENDATIONS ON SUPPORTING THE DEVELOPMENT OF HEAT NETWORKS AND HEAT PUMP NETWORKS	79



HEAT PUMP MARKET DRIVERS	80
7. RECOMMENDATIONS FOR MARKET DRIVERS	82
INVESTMENT IN INNOVATION	83
8. RECOMMENDATIONS ON INVESTMENT IN INNOVATION	84
SUMMARY OF RECOMMENDATIONS	85
CASE STUDIES	86
GLOSSARY	88
BIBLIOGRAPHY	89



INTRODUCTION TO THE HEAT PUMP ASSOCIATION

The Heat Pump Association is a dedicated voice for the UK heat pump sector and works to drive widespread deployment of heat pump technology throughout the UK. Our membership comprises a broad range of stakeholders, including the UK's leading manufacturers of heat pumps, components and associated equipment, utility companies, installers, certification bodies, awarding organisations, training providers, and others with an interest in heat pumps.¹

The Association supports policymakers in the development of effective heat decarbonisation policy and other matters that affect the interests of end users, wider stakeholders, and the industry. In addition, the HPA coordinates technical and market research into areas of mutual interest identified by members, the aim of which is to improve market opportunities and help markets transform to low carbon heating solutions and technologies.



¹ Members - Heat Pumps

HEAT PUMP ASSOCIATION DELIVERABLES:

- **Advocacy and Policy:** Provide informed, well-constructed, evidence-based policy advice to support heat pump market growth within the UK. Lobbying and advocating for favourable government policies, incentives, and regulations that promote the adoption and deployment of heat pumps in the UK, including incentives for consumers and businesses to switch to heat pump technology.
- **Quality, Training and Standards:** Through establishing training standards and feeding into certification standards, the HPA works to improve the quality and safety of heat pump installations whilst promoting best practice amongst our members and the wider industry.
- **Sector growth:** Developing strategies and initiatives to expand the market for heat pumps including consumer awareness initiatives, industry collaborations and efforts to increase adoption rates.
- **Unity:** Provide a united industry voice, collaborating with key stakeholders to align policy proposals, calls for action and be representative of the heat pump supply chain.
- **Data and Analysis:** Develop thought provoking, workable policy proposals underpinned by detailed analysis, create unique market updates, and undertake analysis created to suit member needs.



FOREWORD




Charlotte Lee, CEO

The road ahead for the heat pump sector is filled with opportunities for our industry, consumers, and society overall. Heat pumps remain the most cost-effective option to reduce carbon emissions from domestic and commercial heating, enhance our energy security by reducing reliance on imported fossil fuels, and reduce fuel bills in the long term. Heat pumps are an established technology and demand for them is booming across Europe, and they are set to become a more dominant heating technology in the UK over the next few years, with radical change expected to the way we provide heating and hot water in all our buildings.


The UK heat pump industry is ready for the most radical transformation in the heating sector since the mass rollout of central heating took place around half a century ago. We are playing our part in making the changes needed. In the last few years:

- **We have increased manufacturing and supply chain capability.** Several manufacturers have announced the scaling up or first-time introduction of UK heat pump manufacturing, and others have made significant investments to scale up to a state of readiness in neighbouring countries to meet anticipated increased UK demand. We have a secure supply chain, with many manufacturers serving the entirety of the European market for heat pumps, some doing so with support from UK manufacturing.
- **We have improved the quality of training.** We now have several high-quality Level 3 Ofqual regulated or equivalent, training courses and UKAS accredited certificates of competence training offerings available for installers to obtain the necessary skills to specify and install heat pumps in a way that optimises their efficiency and minimises running costs. Delivering the Low Carbon Technician Apprenticeship is a fantastic achievement – with up to £22,000 of funding now confirmed for each apprentice, and the industry has worked closely with Government to introduce the new Heat Training Grant² and produced an open, standardised commissioning process available for all to use³.

² DESNZ (2023) Training Providers: Register to Offer the Heat Training Grant for Heat Pumps
³ <https://www.heatpumps.org.uk/resources/technical-resources/>

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- **We have scaled up training capacity to meet the anticipated demand.** We forecast that 33,700 trained installers will be needed to meet the Government's ambition of 600,000 heat pumps being installed annually by 2028⁴. The Heat Pump Association manufacturing members alone have the capacity to train up to 40,000 installers per year. With the right policy enablers to stimulate demand for training among installers and consumer demand for heat pumps, we are confident the necessary skill base can be developed in time.
 - **Standards are improving.** The industry has worked closely with Government to improve the Minimum Technical Competencies (MTCs) which underpin the requirements for certification under Competent Person Schemes (CPS) for the installation of heating systems. Once the Government introduces these, this should improve further the quality of heat pump installations. Certification bodies, manufacturers and installers have also co-operated closely on the proposed changes to the Microgeneration Certification Scheme (MCS) to streamline the consumer journey and tackle any problems efficiently and quickly.
 - **We have engaged positively and constructively with Government.** The industry has an excellent working relationship with Government, supporting policy development to promote heat pump deployment underpinned by high quality data and analysis. Frequent engagement with Ministers, civil servants and interested politicians means Government has a clear understanding of our views of the policy enablers that will allow our industry to deliver the challenging, but achievable, transformation ahead.


⁴ HPA (2020) Building the installer base for net zero heating



But despite this optimistic future and the work done so far, we must acknowledge consumers are having a hard time transitioning to heat pumps and although they are the most cost-effective option to deliver decarbonised heat, it is difficult to ask for people to bear short-term increases in cost at any time, but especially now. However, as the Climate Change Committee recognises⁵, the alternatives to achieve decarbonisation and greater energy independence objectives are all more costly in the long run. Our industry therefore needs to build on the positive changes already made to find both a narrative and a policy pathway that achieves consumer and installer buy-in to heat pumps, as well as the policy changes needed. It is clear we need to lower costs and reduce hassle to consumers – both of installing and running heat pumps as well as convey the clear message that the alternatives will cost more and doing nothing is not an option. This means being acutely aware, and addressing, the following factors:

- 1. Cost of living is uppermost in consumers' minds.** As people struggle with energy crisis-driven inflation, causing rises in food and other commodity prices, the interest rate rises designed to curb inflation are adding more cost to those already struggling to make ends meet. It is therefore imperative we find and effectively communicate how the running costs of heat pumps can be made increasingly more competitive compared to gas boilers alongside ensuring that to consumers heat pumps cost no more than a gas boiler. Correcting distortions in the relative prices of gas and electricity caused by current policy is much needed, but on its own may not be enough. As an industry, we also have a responsibility to improve the quality of the design and installation of heating systems so our customers' heat pumps are properly specified to operate at their best efficiencies, and are well integrated with the wider energy system, which will additionally lower running costs.
- 2. We must play catch-up in the heating industry.** As condensing boilers have replaced their less efficient predecessors over the last 18 years, it is increasingly clear the opportunity has not always been taken to ensure consumers' heating systems have been modified where needed to ensure operating temperatures have been lowered to achieve the most efficient performance. As we move into a phase where heat pumps become the norm, some wider heating system upgrades may be needed which will come at additional cost. Regulation and additional financial support are needed to ensure this happens.
- 3. We face political uncertainty.** The political discourse is changing as we approach a General Election. Until recently both main political parties have

⁵ CCC (2023) Insights: Determining a Pathway to Net Zero



held a solid narrative on net zero and that bold changes will be needed to achieve it, and this is also mostly supported by the smaller parties and the electorate. However, a clear narrative has emerged in the second part of 2023 – with the Prime Minister’s Net Zero announcements on the 20th of September firmly putting net zero policies on a political footing. Having used the announcement to delay the ban on installing new fossil fuel boilers in properties off the gas grid from 2026 to 2035- in line with the proposed on gas grid phase out, introduce a 20% exemption for unsuitable homes and scrap policies to force landlords to upgrade the energy efficiency of their properties, the confidence in the market has been damaged. This comes after a significant delay in announcing implementation details for long anticipated policies on zero carbon ready new homes and other buildings from 2025. It is vital for maintaining investor and supply chain confidence that in the coming months, the path to net zero does not lose further momentum by policy progress falling victim to political expediency.

4. We need to bust the myths. There is a lot of misleading media content about heat pumps, with misinformed claims that they are only suitable in highly insulated buildings, that they do not work in older buildings, or that expensive measures need to be taken that are unnecessary if we just carry on with fossil fuel heating, to name but a few examples. None of these are true if a system is designed, sized, and installed correctly so its heat distribution system (in homes, this is most frequently radiators or underfloor heating) can provide the necessary heat at the lower temperatures, leading to best performance from most heat pumps. Where problems are experienced, they mainly arise from insufficient skills training. Industry is tackling this with enhanced installer training and tightening up standards and are working collaboratively to support the creation of a consumer facing, factual ‘heat pump’ website.

Whatever the next few months and the period after the election hold, all our politicians must hold firm and introduce the long-awaited policy changes needed to maintain investor confidence and transform the heating industry in the coming years. Doing so will certainly be in the long-term interests of society– decarbonising in the lowest cost way, as well as reducing both consumer bills and dependency on imported fossil fuels.

In turn, we, the industry, have a responsibility to build on the excellent progress we have made in the last few years and play our part in building consumer confidence, busting myths, reducing hassle and cost, taking pride in excellence, and growing our industry to the benefit of everyone.

This report provides a roundup of the Heat Pump Association's research, analysis, and policy views on how we bring about this important heating transformation and address some of the challenges ahead. Our industry is optimistic about the path ahead, but change is not happening quickly enough, so we address some of the policy challenges preventing this. I hope readers find it to be a helpful contribution to the many necessary discussions about how we revolutionise the heating sector in the coming years.



EXECUTIVE SUMMARY

The UK Government has set a legally binding target to achieve net zero by 2050. As the heating sector contributes almost a third of the UK's carbon emissions^{6,7}, to reduce this significantly, the Government has set an ambition to install 600,000 heat pumps per year by 2028, and to phase out the sale of most new fossil fuel boilers from 2035 with exemptions for unsuitable homes, which it estimates to be around 20%. However, in 2023, the size of the heat pump market is expected to be around 60,000-unit sales, 10% of the 2028 target figure. A 10-fold acceleration in deployment is needed in the next five years if the 600,000 ambition is to be met, and the key success factor in doing so will be the policy framework.

This report summarises the Heat Pump Association's views on why heat pumps remain a core option for the impending revolution in how buildings are heated. It uses evidence, research, and analysis to demonstrate that heat pumps remain the most cost-effective heating option for the UK to reach net zero. It tracks recent progress and the performance of key policies and sets out the Heat Pump Association's views and recommendations on what is still to be done.

WHY HEAT PUMPS?

To meet the legally binding target of net zero by 2050, over 30 million homes and businesses across the UK will need to decarbonise in just over 25 years.⁸ As a low carbon solution, heat pumps can be more than three times more efficient than fossil fuel boilers⁹ and switching to heat pumps in the UK can reduce heating emissions by up to 75%, equivalent to all the territorial emissions of Denmark in 2021¹⁰. Our analysis of the Marginal Abatement cost of heat pumps, shown in the section of this report on Heat Pump Capabilities, has evidenced that they are the cheapest most scalable solution to decarbonising heat in buildings in the UK. However, this is also time-dependent, the longer we take, the faster the acceleration necessary, and the deeper, more costly, and more severe policy interventions will be needed to install the heat pumps required to decarbonise UK buildings in time to meet net zero.

6 DESNZ (2022) Energy Security Bill Factsheet

7 15% of this figure comes from homes, with less than 5% currently heated by low carbon sources.

8 HM Government (2023) Heat Pump Investment Roadmap

9 Energy Systems Catapult, Electrification of Heat UK demonstration project, Accessed 2023

10 Ritchie, Hannah & Roser, Max (2020) CO₂ emissions

WHERE ARE WE COMPARED TO WHAT IS NEEDED?

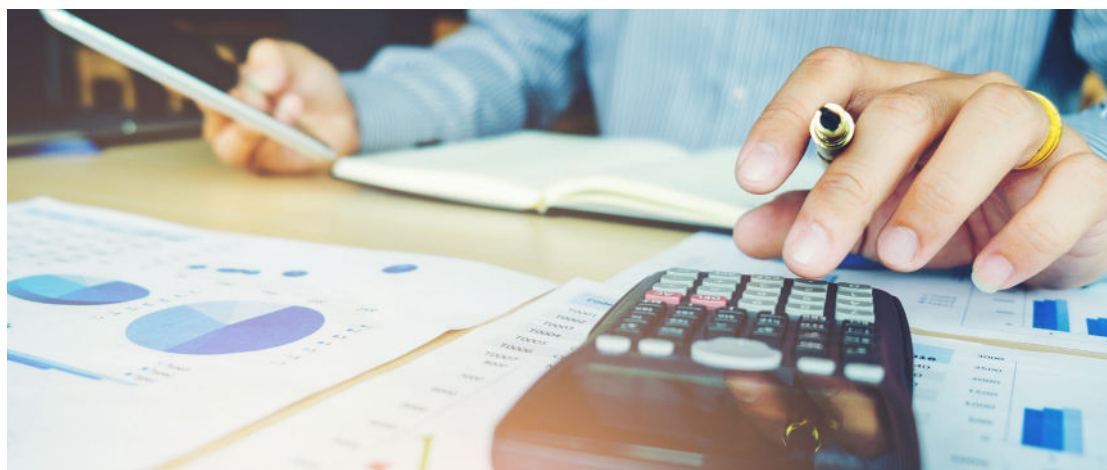
Compared to the rest of the heat pump market in Europe where countries such as Belgium, the Czech Republic, Slovakia, and Poland, doubled in growth in 2022¹¹, the UK has remained in the category of dormant markets. According to the Climate Change Committee (CCC), the UK is not currently on track to hit its 600,000 annual installations ambition by 2028, and heat pump installations across the UK must rise ten-fold in six years to reach stated Government ambitions.¹² There has been a range of proposed policies to support the deployment of heat pumps. However, much more needs to be done to meet the target.

BARRIERS TO GROWTH AND HOW TO REMOVE THEM.

This report identifies the key barriers preventing the significant growth in heat pump installations in the UK and offers policy solutions to help achieve the Government's ambition. In turn, achieving this will build the industry's capability to achieve the final phase-out of new fossil fuel boilers.

1. REDUCING UPFRONT COSTS.

The UK Government has rolled out a package of policies to support the upfront cost of heat pumps. This report provides an overview of these policies and a discussion with supporting analysis. Despite these policies, upfront cost remains a barrier for both the domestic and the non-domestic sector. Due to the unfamiliarity of heat pumps in the UK, one of the most significant barriers for consumers in 2020 had been a lack of awareness. Consumer awareness remains low with only 18% of people having a fair amount or a lot of knowledge of an Air Source Heat Pump (ASHP) and 17% for a Ground Source Heat Pump (GSHP), according to the latest government Public Attitudes Tracker from Spring 2023¹³. Analysis shows that cost and convenience are key factors in unlocking demand.¹⁴



11 EHPA (2023) European Heat Pump Market Statistics Report 2023 Executive Summary

12 CCC (2023) 2023 Progress Report to Parliament

13 DESNZ (2023) DESNZ Public Attitudes Tracker: Summer 2023 - GOV.UK (www.gov.uk)

14 BIT (2022) How much are we willing to pay for a heat pump

RECOMMENDATIONS TO REDUCE UPFRONT COSTS:

1.1 Optimise the Boiler Upgrade Scheme by:

- Improving the promotion of available help to consumers
- Considering how support for groundworks associated with the installation of GSHPs can be optimised
- Providing a rural uplift, akin to Scotland¹⁵
- Committing to budgets for the scheme during 2025-2028
- Removing the 45kWth limit for shared ground loop systems
- Differentiated grant levels depending on owner and property type to stimulate growth where needed.

1.2 Clarify and extend the zero rate VAT relief for all heat pump systems by extending it beyond 2027, clarifying its applicability to all installations of heat pumps and work needed to optimise their efficiency, and allow it to apply to situations where, particularly for Ground Source Heat Pumps, more than one party is contracted by the customer. In addition, consideration should be given to apply zero rate VAT relief to items which support future heat pump installations, such as heat pump ready cylinders.

1.3 Introduce Government-backed interest-free loans in England, Wales, and Northern Ireland to cover the remaining cost of installing a heat pump and other energy saving measures, akin to the scheme in Scotland.

¹⁵ Home Energy Scotland Grants and Funding for Heat Pumps · Home Energy Scotland

2. REDUCING RUNNING COSTS.

The running cost of heat pumps, due to the cost of electricity, does not necessarily incentivise consumers to switch from fossil fuel boilers. There is currently no sufficient policy support to help reduce the running cost of heat pumps and this remains a significant gap which requires a regulatory intervention.

At current electricity and gas prices, the usable heat delivered into a domestic property by a heat pump across a year needs to be over 3.2 times¹⁶ the amount of electricity consumed (known as the Seasonal Coefficient of Performance, or SCOP) for a typical consumer to enjoy lower running costs than a gas boiler. A distortion in the relative retail gas and electricity prices is partly responsible for high electricity prices because 18% of a typical electricity bill pays for Environmental and Social Obligations (ESOs), whereas this is only 5% for typical gas bills. Additionally, there is a hefty carbon tax embedded within electricity wholesale prices that does not apply to gas. Driving up the performance of heat pumps will also be an important factor in reducing running costs.



¹⁶ Part L of the Building Regulations requires a minimum of 2.8 for space heating, and 2.0 for hot water.

RECOMMENDATIONS TO REDUCE RUNNING COSTS:

- 2.1 Re-balance policy costs** - Our analysis has shown that if policy costs were equal per unit of energy used on gas and electricity bills, fuel costs from heating a home using an air source heat pump with a seasonal performance factor¹⁷ (SPF) of 2.8¹⁸ would be £95 lower than compared to a gas boiler operating at 84% efficiency, and £264 lower with a ground source heat pump, assuming a SPF of 3.34¹⁹. We recommend Government therefore expedite work already under way to rebalance these policy costs with the aim of making electricity bills cheaper and speeding up electrification for households and businesses.
- 2.2 Introduce an interim heat pump electricity tariff** to further support a reduction in electricity prices relative to decarbonising heat and encourage consumers to cut their emissions from heating and switch to a heat pump.
- 2.3 Introduce Mandatory Routine Practices for Heating System Installations and Servicing** of both boilers and heat pumps, aimed at reducing operating temperatures and ensuring systems are otherwise properly maintained.
- 2.4 Develop and introduce appropriate policy to support investment in large scale, long-duration electricity storage solutions in line with the commitments set out in the British Energy Security Strategy.**²⁰ We encourage government and grid operators to increase investment in energy storage to allow a smooth transition to low carbon technologies and to prevent curtailment costs from being passed onto electricity users.

¹⁷ Seasonal performance factor: Defined as the ratio of heat output over the heating season to electricity input and therefore accounts for seasonal variations in performance.

¹⁸ ESC (2023) Electrification of Heat UK demonstration project

¹⁹ Assuming a ratio of air-to-water heat pump efficiency to ground-to-water heat pump efficiency according to average ratio from the following trials: Energy Saving Trust 1, Energy Saving Trust 2, Renewable Heat Premium Payment

²⁰ <https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy#networks-storage-and-flexibility>

3. GROWING THE INSTALLER WORKFORCE.

To install 600,000 heat pumps per year by 2028, it is equally necessary to have enough qualified and competent heat pump installers. The HPA's analysis suggests that a minimum of 50,200 installers (FTE) will be required by 2030 to meet the demand necessary.²¹ This is of concern as, according to Government figures, there are currently approximately 4,500 qualified and competent individuals working for MCS certified businesses.²² Preparing this heat pump installer workforce is challenging for several reasons: uncertainty of the long-term need for the qualification,²³ certification costs, course costs and lost income from attending courses²⁴ as well as the effort required to organise attendance, studying time and travel all play a part. The industry has already made a strong start by obtaining Ofqual approval for Level 3 courses for heat pump installers, and by developing the Low Carbon Heating Technician Apprenticeship, for which up to £22,000 of funding per apprentice has now been confirmed.



21 HPA (2020) Building the Installer Base for Net Zero Heating

22 DESNZ (2023) Clean Heat Market Mechanism

23 Nesta (2022) Helping mid-career gas boiler engineers to retrain in heat pumps

24 Nesta (2022) Helping mid-career gas boiler engineers to retrain in heat pumps

RECOMMENDATIONS TO GROW THE INSTALLER WORKFORCE:

3.1 Closely monitor the Heat Training Grant. Immediate action must be taken if there is a less than anticipated uptake of the scheme or signs that the grant needs to be increased.

3.2 Low Temperature Heating Training as mandatory. Standards across the whole of the heating industry should move to low temperature heating. This could be achieved through the introduction of a low temperature training pre-requisite prior to the completion of a five-yearly ACS renewal for those installing wet heating systems, and equivalent for oil boiler engineers. This requirement should be incorporated into the soon to be published updated Minimum Technical Competencies (MTCs)²⁵ that installers will need to meet if they wish to self-certify their heating installations in compliance with the Building Regulations.

3.3 New support for the future/current installer workforce. The HPA would urge England, Wales, and Northern Ireland to introduce similar support for current or potential future installers such as the MCS certification fund or the Green Heat Installer Engagement programme, currently available in Scotland²⁶.

²⁵ Minimum Technical Competencies will be renamed Mandatory Technical Competencies when updates are published.

²⁶ Support for green heat installers - Energy Saving Trust

4. ENCOURAGING NEW ENTRANTS INTO THE INSTALLER WORKFORCE.

While there is a need to reskill the current workforce, industry faces another challenge of the ageing demographic of the heating installer base and low rates of new entrants. To avoid a gap in the required number of heating installers by 2030, a 78% increase in the take-up of heating apprenticeships is required. The announcement of a funding band of £22,000 per apprentice for the Low Carbon Heating Technician Apprenticeship is welcome and it should continue to be promoted, with consideration given to enhancing and monitoring the diversity of those undertaking the apprenticeship. One of the biggest challenges facing the industry is that uncertainty is created in the market due to a lack of commitment to clear policy frameworks and timelines, causing installers to view the heat pump market as a risk to enter. Individuals need to have the confidence to spend time and money on retraining and this uncertainty makes investment to train a bigger risk. Although often simpler to retrain an existing heating engineer to install heat pumps, with an ageing demographic it will be vital to encourage new entrants into the sector.



RECOMMENDATION TO ENCOURAGE NEW ENTRANTS INTO THE INSTALLER WORKFORCE:

4.1 The **Low Carbon Heating Technician Apprenticeship** should continue to be promoted, with consideration given to enhancing and monitoring the diversity of those undertaking the apprenticeship.

5. INCREASING EASE OF HEAT PUMP INSTALLS AND IMPROVING CONSUMER AND INSTALLER CONFIDENCE.

Although a globally mature technology, compared to traditional boilers, heat pumps remain less familiar to consumers and installers. There are currently administrative processes which are either unclear or lengthy which delay the installation of heat pumps. It is necessary to obtain planning consent to install an air source heat pump where the scope falls outside of the Permitted Development Rights (PDR) legislation. Requirements for permitted development and planning consent currently vary between devolved nations, with different requirements around the approved size of the ASHP unit, proximity to neighbouring properties, and the approach to regulating noise limits, making it unclear for installers and consumers.

It is also currently required to register the asset with the Distribution Network Operator (DNO) via the “Connect and Notify” process, or to seek prior approval via the “Apply to Connect” process²⁷. The ENA is working on a new process due to be launched in Winter 2023, which will require prior notification for every heat pump connection. It is intended that the new “Digitalisation of Connections” (DOC) app will replace the existing “Connect and Notify” process and will require all heat pump installations to apply for a connection via an app and wait for the DNO to approve before they are installed. This could add additional complexity and delays for installers in securing new projects.

Consumers need clear information about the benefits of installing a heat pump²⁸. Currently, RdSAP, the algorithm that underpins Energy Performance Certificates (EPCs) in existing homes undervalues the high energy efficiency and low carbon nature of a heat pump, giving consumers an inaccurate representation of the benefits of switching. RdSAP 2012 is the current version and is considerably out of date. It uses decade-old carbon emission factors for electricity which unfairly score heat pumps’ carbon savings because they do not reflect the true extent of electricity grid decarbonisation over the last 10 plus years. The Government is in the process of reviewing this and intends to publish an updated RdSAP- RdSAP 10.2, in **Spring 2024** to reflect the changes to the Buildings Regulations Part L which came into effect

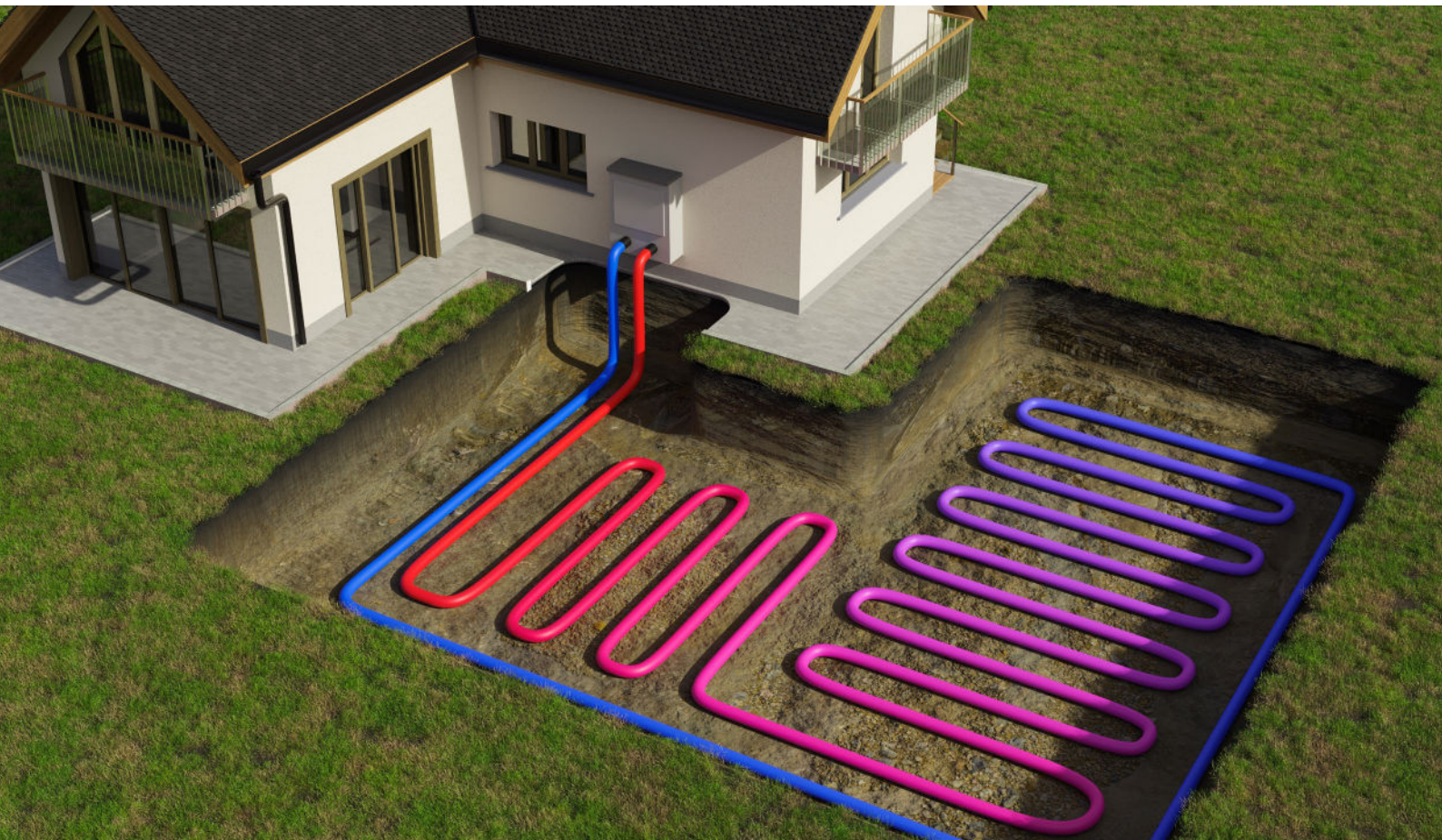
²⁷ ENA (2021) Connecting Electric Vehicles and Heat Pumps to the Networks

²⁸ Nesta (2023) Heat Pumps: A User Survey

in June 2022. Further changes to the SAP/RdSAP methodology and Energy Performance Certificate (EPC) design are expected with the Future Homes Standard currently planned to be introduced in 2025.

Additionally, consideration of redesigning the EPC to better promote the merits of installing low carbon heating systems which may improve and enhance the overall deployment of heat pumps within the UK would be welcomed. Possible considerations include:

- The addition of metrics that display the benefits of low carbon technologies more prominently to householders to aid their understanding of the positive environmental impact of heat pumps
- Reconsidering how the cost rating is displayed to ensure that consumer confusion is avoided
- Adding a description of whether a home is 'heat pump ready'.



RECOMMENDATIONS TO INCREASE THE EASE OF HEAT PUMP INSTALLS AND IMPROVE CONSUMER AND INSTALLER CONFIDENCE:

- 5.1 **RdSAP 10.2 should be implemented without further delay** to ensure heat pumps' contributions to EPC ratings properly reflect carbon savings.
- 5.2 **Permitted Development Rights (PDR) for ASHPs must be urgently reviewed** to ensure that the requirements across the devolved nations in relation to noise levels, size of the unit and proximity to the property boundary are proportionate, consistent, and clear for installers and consumers, and are based on the latest evidence.
- 5.3 **Streamlining and simplifying grid connections.** The process for heat pumps to seek grid connection must be streamlined and simplified which would be supported by enhanced investment into the grid.
- 5.4 **Ensure SAP 11 is ready before the legislation to implement the Future Homes Standard takes effect.**
- 5.5 **Consider an EPC redesign to better promote the merits of installing low carbon heating systems.**

6. HEAT NETWORKS AND HEAT PUMP NETWORKS.

Heat networks are recognised by the Government as a crucial, low-cost, low carbon solution for offering heat in high density urban areas.²⁹ To support the upfront cost of improving or building heating networks, the UK Government has rolled out several schemes across the UK such as the Heat Network Investment Programme (HNIP), the Green Heat Network Fund (GHNF) and the Heat Network Efficiency Scheme. Additionally, the government is introducing a comprehensive heat network zoning policy that will underpin the rapid deployment of low carbon heat networks across the UK. The HPA welcomes these policies as significant steps towards decarbonising the UK building stock and improving energy efficiency which plays a large role in achieving the UK's net zero target. In addition to this traditional form of a heat network, ambient heat networks which include heat pumps, are likely to play a growing role in heat decarbonisation.

Ensuring the right market conditions develop for networked heat pumps within the private retrofit market will depend on the industry's ability to reduce costs and introduce new financing models. However, in common with traditional heat networks, heat pump network developers require a degree of certainty of connection from homes to support the investment case for the installation of infrastructure. Local Area Energy Plans will play a key role in building heat network zoning and identifying the most appropriate heating technologies for different areas of towns and cities and in incentivising/encouraging their uptake to ensure the successful delivery of the plan. Some local authorities in England and Wales are developing Local Area Energy Plans voluntarily, whilst the Scottish Government has already made the development of these plans' compulsory for all local authorities.



29 DESNZ (2016) Heat Networks

RECOMMENDATIONS ON SUPPORTING THE DEVELOPMENT OF HEAT NETWORKS AND HEAT PUMP NETWORKS:

- 6.1 Continued and expanded funding for heat network decarbonisation.** The HPA supports the progress so far on the capital schemes to encourage heat networks to adopt heat pumps and believes these schemes need to continue for the foreseeable future.
- 6.2 Reform of the Social Housing Decarbonisation Fund to deliver clean heat projects.** Wave 3 of the SHDF should provide a ring-fenced or priority funding pot for clean heat projects to ensure a minimum number of installations go ahead. Additionally, reflecting the known flaws in the EPC assessments, EPC eligibility criteria for those properties seeking to replace old direct electric heating should be relaxed to Band C.
- 6.3 Reform of ECO4 to ensure delivery of clean heat projects in social housing.** The requirement for social housing providers to be at Band E or below before qualifying for ECO4 excludes virtually all potential heat pump network projects in social housing from receiving funding. Eligibility criteria for ECO EPCs should be relaxed to Band C projects at least for projects which currently have direct electric heating.
- 6.4 More research into policy to support funding arrangements for Ground Source Heat Pump infrastructure.** The HPA would like to see the Government undertake more research into maximising the opportunities and addressing any regulatory barriers, to new, utility-style funding options for shared ground source infrastructure.
- 6.5 Local Area Energy Plans.** Development of Local Area Energy Plans, centrally coordinated by the Future Systems Operator to support, alongside other aims, the deployment of heat pump networks on an area-wide basis.
- 6.6 Licensing for the installations of shared ground loops.** Regulations made under the provisions of the Energy Act 2023³⁰ must allow for developers of heat pump networks to obtain licenses to install and maintain shared ground loops, without the need for obtaining planning permission.

³⁰ <https://bills.parliament.uk/bills/3311>

7. IMPROVING MARKET DRIVERS.

Wider regulatory support is crucial to heat pump deployment. Three key proposed regulatory measures are the Clean Heat Market Mechanism due to launch in 2024, the Future Homes and Building Standard in 2025 and the phase out of the sale of most new fossil fuel boilers from 2035 with exemptions for 'unsuitable homes', which is estimated to be around 20%. This report provides recommendations for each of these essential regulatory measures so that they best support heat pump deployment.

The principles of the Clean Heat Market Mechanism (CHMM) and the timeframe set out for its introduction are likely to have a negative impact on the wider roll-out of heat pumps if the scheme goes ahead as proposed in the Summer 2023 Consultation. We are aware that the Government is further considering the design of the policy in response to the consultation. We await with interest the final policy proposals, to be set out in due course in the publication of the Government response to the consultation.

The UK Government has proposed an ambition to phase out the sale of most new fossil fuel boilers from 2035 with exemptions for unsuitable homes, which it estimates to be around 20%. The absence of firm decisions on this date, and the lack of clarity over what criteria will result in an exemption is creating uncertainty for investors and other parts of the supply chain.

The new build sector is critical to enhancing the market. Not only are newly built homes trailblazers for the retrofit market, but the Government's stated objective that all homes built after 2025 should be zero carbon ready is an essential next step in meeting net zero. Delays to the planned timetable of Spring 2023 for technical consultations for the Future Homes and Buildings Standard are causing concern in the supply chain, stifling demand, and creating investor uncertainty.

In addition to these key regulatory measures, consideration should be given to providing preferential Council Tax³¹ and/or Stamp Duty³² rates to those homes that already have a heat pump installed to boost consumer acceptance and demand.

³¹ https://www.energysavingtrust.org.uk/sites/default/files/Paper%20for%20Commission%20on%20Local%20Tax%20Reform_11August15.pdf

³² <https://www.theeig.co.uk/stamp-duty/>

RECOMMENDATIONS TO IMPROVE MARKET DRIVERS:

- 7.1 Introduce the other market enablers recommended in this report in advance of a more balanced and workable Clean Heat Market Mechanism to allow it to work effectively.
- 7.2 Confirm and legislate for the dates to end new sales of fossil fuel boilers – both on and off the gas grid and swiftly define the exemption criteria for unsuitable homes.
- 7.3 Expedite the technical consultations for the Future Homes / Buildings Standard to allow implementation as planned in 2025.
- 7.4 Provide preferential Council Tax and/or Stamp Duty rates to those homes that have a heat pump installed to boost consumer acceptance and demand.

8. INVESTMENT IN INNOVATION.

The Government has provided several innovation grants to encourage innovative models for heat pump deployment and encourage investment in UK manufacturing. These have been welcomed by the industry.

It is important for product innovation to be encouraged and for performance requirements to be steadily improved over time and for testing to be done on a consistent and reliable basis, such as the methods already in place through Heat Pump Keymark³³.

Heat pumps will also, in future, become an increasingly important part of a flexible grid, and consumers may be able to benefit from revenue streams emerging from electricity suppliers' or grid operators' desire to move the timing of demand. The technical capability for flexible control is therefore set to become increasingly important.



33 Heat Pump KEYMARK

RECOMMENDATIONS FOR INVESTMENT IN INNOVATION:

8.1 The UK Government should not relax the current strict testing criteria already in place via Heat Pump Keymark or equivalent schemes. In addition, heat pumps should also continue to be tested to the current ErP requirement of SCOP 3.0 (average climate, 55°C flow).

8.2 Introduce the Smart Heat Pumps Mandate as soon as practicable, providing sufficient time is allowed to prepare (minimum 2 years notice).

The HPA supports formalising the requirement for heat pumps to operate flexibly to allow access to additional consumer benefits from lower running costs or additional revenue streams in response to changing electricity prices or network conditions. However, standards, guidelines, governance arrangements and interoperability requirements need to be in place and stable sufficiently in advance.

8.3 Increase funding to support Heat Pump Supply Chain Investment. The HPA would strongly urge more investment in the development of UK based manufacturing facilities via additional funding of the Heat Pump Investment Accelerator Competition. The HPA are calling for more innovation funding via the Heat Pump Ready Programme to support the development of new mass-market solutions for high-density heat pump deployment, tools that simplify and speed-up installation processes, learning aids to support installers, and mechanisms that support knowledge transfer between innovative parties.

HEAT PUMP CAPABILITIES

The UK's net zero emissions target will not be met unless we change the way we heat our homes and buildings. The heating sector contributes almost a third of the UK's carbon emissions,^{34,35} and the Government has identified that to meet the legally binding target of net zero by 2050, over 30 million homes and businesses across the UK will need to be decarbonised in just over 25 years.³⁶ The key to decarbonising heat is electrification, and with 87% of households on the national gas grid, switching to low carbon alternatives through the adoption of an electric heating system will play a significant role.³⁷ This reliance on gas explains why over three quarters of domestic heating emissions come from natural gas, as shown in Figure 1. While this signifies the magnitude at which we need to decarbonise buildings, it also presents an opportunity, as the UK is yet to unlock the widescale deployment of an integral low carbon technology, heat pumps.

Domestic heating emissions in the UK split by on/off grid

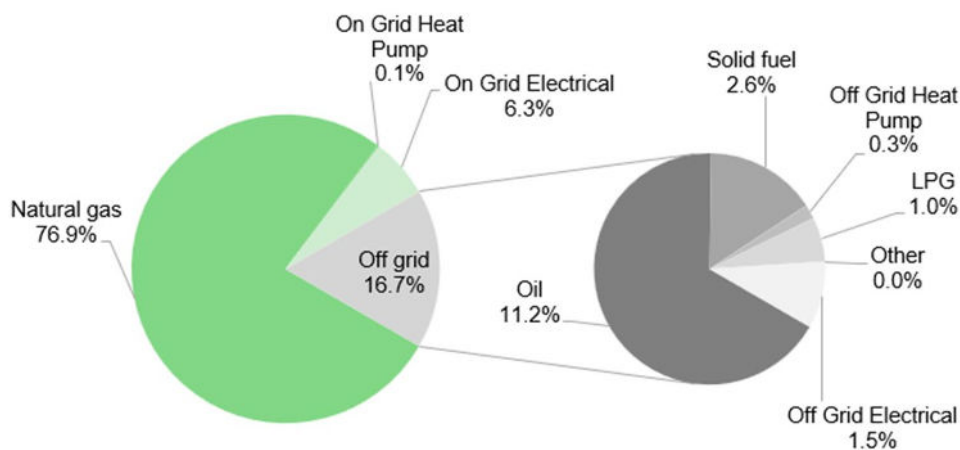


Figure 1 - Domestic heating emissions in the UK split by on/off grid³⁸

³⁴ DESNZ (2022) Energy Security Bill Factsheet

³⁵ 15% of this figure comes from homes, with less than 5% currently heated by low carbon sources.

³⁶ HM Government (2023) Heat Pump Investment Roadmap

³⁷ Energy Systems Catapult, Electrification of Heat UK Demonstration Project, accessed July 2023

³⁸ Gemserv analysis of various sources, including BEIS (2021) Energy consumption in the UK, ONS (2021) Energy use: Fossil fuels by fuel type, BEIS (2021) Digest of UK energy statistics.

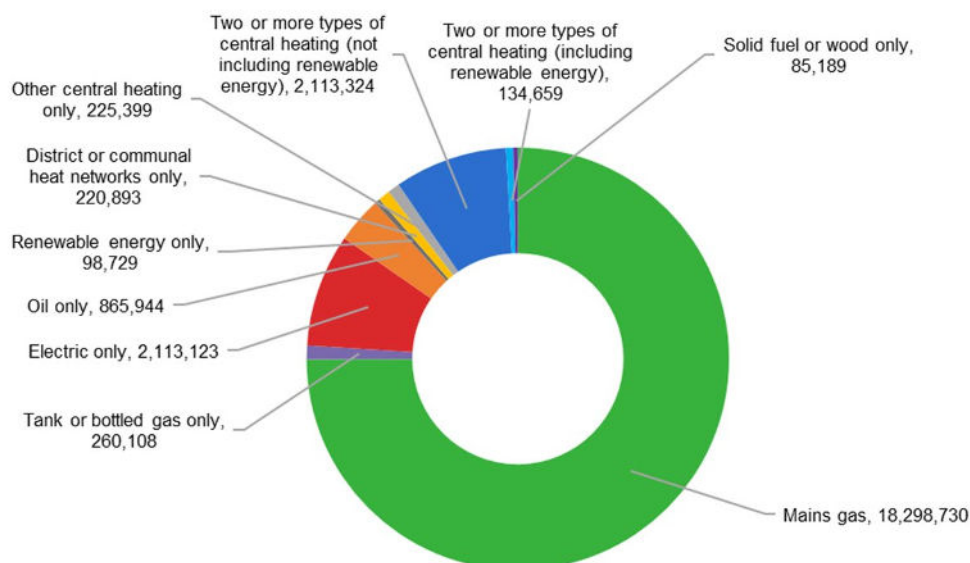


Figure 2 - Number of households by central heating type in England and Wales
(number of households with system)³⁹

Heat pumps have been globally recognised as a key low carbon technology to aid the shift away from fossil fuel heating systems. The technology is far from new, having been first invented in the 1850s⁴⁰. Commonly referred to as a fridge in reverse, the primary heat pump technologies are:

- Air-to-water heat pumps (AWHP) provide heating, cooling, and hot water via a radiator⁴¹ or underfloor heating system and a hot water cylinder.
- Air-to-air heat pumps (AAHP) which heat and cool the air inside the building via a fan unit.
- Ground or water source heat pumps (GSHP) (WSHP) where heat is absorbed from the ground or water and provides heating, cooling, and hot water via a radiator⁴² or underfloor heating system and a hot water cylinder.

Both air-to-water and air-to-air are often included in the generic term “Air source heat pump” (ASHP). Air-to-air heat pumps are less common in UK housing (though much more common in non-domestic buildings as part of a heating, ventilation and cooling system). The Government’s ambition for 600,000 heat pumps per year to be installed by 2028 excludes air-to-air heat pumps. In continental Europe, particularly southern Europe where hydronic central heating systems are less common, reported heat pump statistics normally include air-to-air heat pumps, whereas these are not commonly included in UK sales statistics, these are additionally common in the Nordic countries. It is therefore important to be aware of this when making international comparisons.

³⁹ ONS (2023) Central heating: Census 2021

⁴⁰ Klima-Therm (2020) Heat pump technology: A brief history

⁴¹ Radiators are not suitable for cooling applications due to condensation formation.

⁴² Radiators are not suitable for cooling applications due to condensation formation.

Within a heat pump, the heat from the air or ground is used to heat the building's interior and to heat water, producing no emissions at the point of use⁴³, and a high efficiency. As an effective, mature, and widely adopted solution, the International Energy Agency (IEA) flags the need for 1.8bn heat pumps in buildings in 2050, highlighting the important role that heat pumps will play in achieving net zero by 2050.⁴⁴

HIGH EFFICIENCY

Interim measured real-world performance of AWHPs taken from the Electrification of Heat Demonstration Project commissioned by the Department for Energy Security and Net Zero (DESNZ) showed that there is potential for heat pumps to be at least three times more efficient than fossil fuel boilers⁴⁵. Heat pump installations in the project across a range of property types aged from pre-1900 to post-2010 were producing Seasonal Performance Factors (SPFs) of around 2.8 for air-to-water units, indicating that the technology is producing almost 3 times as much heat output as the electricity it requires as an input. The analysis produced from the project also demonstrated that heat pumps operate efficiently in older, less energy efficient homes and are therefore suitable for most buildings in the UK. No significant variation in performance based on house age was shown, with homes built pre-1919 achieving median SPF levels of 2.94, much greater than the minimum performance requirements under UK building regulations, 2.5 SPF⁴⁶.

The minimum SPF is important as the SPF is an indicator used for heat pumps to evaluate their efficiency expressed as a ratio of the total (year-round) heat supplied to a building to the electricity used by the heat pump to drive its compressor and other components of the heating system such as pumps and active valves. A SPF of 2.5 means the heat received into the property across a year is 2.5 times the amount of electricity consumed by the heat pump and its associated ancillary components. The higher the SPF, the more efficient the system is operating. Properly designed ground source heat pump systems generally achieve higher SPFs than equivalent air source systems⁴⁷ because the seasonal fluctuation in temperature is less in the ground than in the air. Interim results from the most recent heat pump efficiency trial, the Electrification of Heat Demonstration Project⁴⁸, did not have a sufficiently large sample to determine the efficiency of ground source heat pumps, however, prior trials⁴⁹ have shown that ground-to-water heat pumps are on average 19% more efficient than air-to-water heat pumps.

43 Assuming no leakage of refrigerants.

44 Rosenow, Jan & Gibb, Duncan (2022) Guest post: How heat pump sales are starting to take off around the world - Carbon Brief

45 Energy Systems Catapult (2023) Electrification of Heat UK demonstration project

46 Energy Performance of Buildings (England and Wales) Regulations, 2012

47 Energy Saving Trust (2021) Air Source Heat Pumps vs Ground Source Heat Pumps

48 Energy Systems Catapult (2023) Electrification of Heat UK demonstration project

49 Energy Saving Trust 1, Energy Saving Trust 2, Renewable Heat Premium Payment

SIGNIFICANT EMISSIONS AND ENERGY CONSUMPTION REDUCTION POTENTIAL.

With such high levels of efficiency, switching from a gas boiler to an AWP could reduce a property’s emissions by up to 75%, and potentially more for switching to a GSHP as shown by Figure 3 for the reasons outlined above. Whilst heat pumps are already a much lower carbon heat source because they run on electricity, they are likely to deliver increased carbon savings over time as more renewable energy sources are fed into the electricity grid. The current government’s ambition is a net zero grid by 2035.⁵⁰ The increasing deployment of renewables is explored further in the next section.

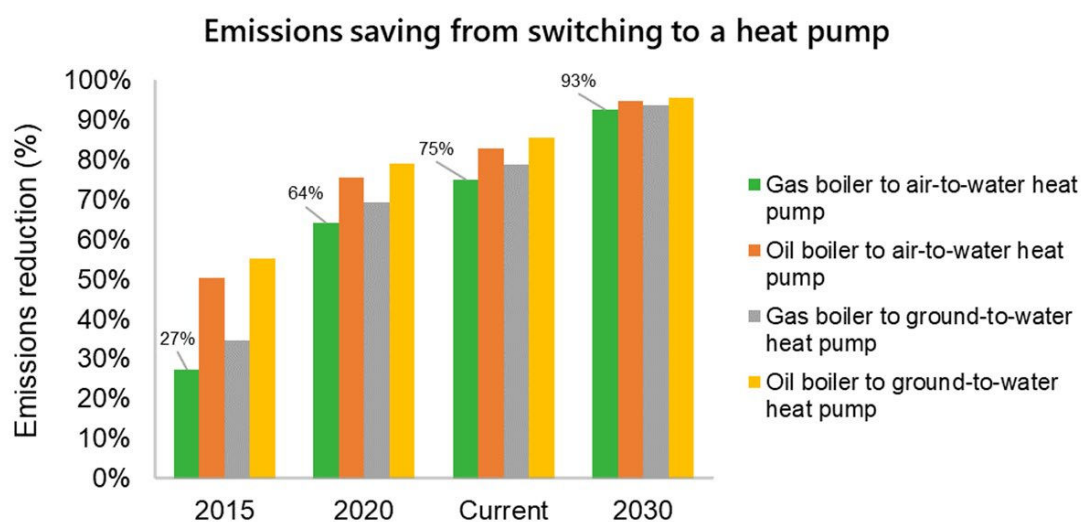


Figure 3 - Emissions savings from switching to a heat pump^{51,52}

With such significant carbon saving potential from switching from fossil fuel heating systems to heat pumps, it is not surprising that heat pumps feature so prevalently in almost all scenarios for transitioning to low carbon heating⁵³. Our analysis of the CCC’s Balanced Pathway scenario shows that between 2023 and 2040, heat pumps could reduce annual emissions produced by current UK domestic properties by 29 Mt CO₂e, roughly equivalent to all the territorial emissions of Denmark in 2021⁵⁴.

⁵⁰ BEIS (2021), Plans Unveiled to Decarbonise UK Power System by 2035 Please note that the Labour party have a 2030 target for a decarbonised grid according to their Plan for Energy.

⁵¹ Historical heat pump efficiencies taken from the following trials and extrapolated: DECC (2012) Detailed analysis from the first phase of the Energy Saving Trust’s heat pump field trial, DECC (2013) Detailed analysis from the second phase of the Energy Saving Trust’s heat pump field trial, UCL (2017) FINAL REPORT ON ANALYSIS OF HEAT PUMP DATA FROM THE RENEWABLE HEAT PREMIUM PAYMENT (RHPP) SCHEME, ESC (2023) Electrification of Heat - Interim Heat Pump Performance Data Analysis Report. Future efficiency increases according to CCC (2020) Sixth Carbon Budget. Emissions factors according to DESNZ (2023) Green Book.

⁵² Air-to-water heat pump efficiencies (SPF): 2015 = 2.44, 2020 = 2.67, Current = 2.80, 2030 = 3.31. Ground-to-water heat pump efficiencies (SPF): 2015 = 2.71, 2020 = 3.10, Current = 3.34, 2030 = 3.89.

⁵³ Forecasted scenarios including those given in the following, all give a substantial role for heat pumps in decarbonising heating National Grid’s Future Energy Scenarios, CCC Sixth Carbon Budget, and the UK’s Heating and Buildings Strategy

⁵⁴ Ritchie, Hannah & Roser, Max (2020) CO₂ emissions

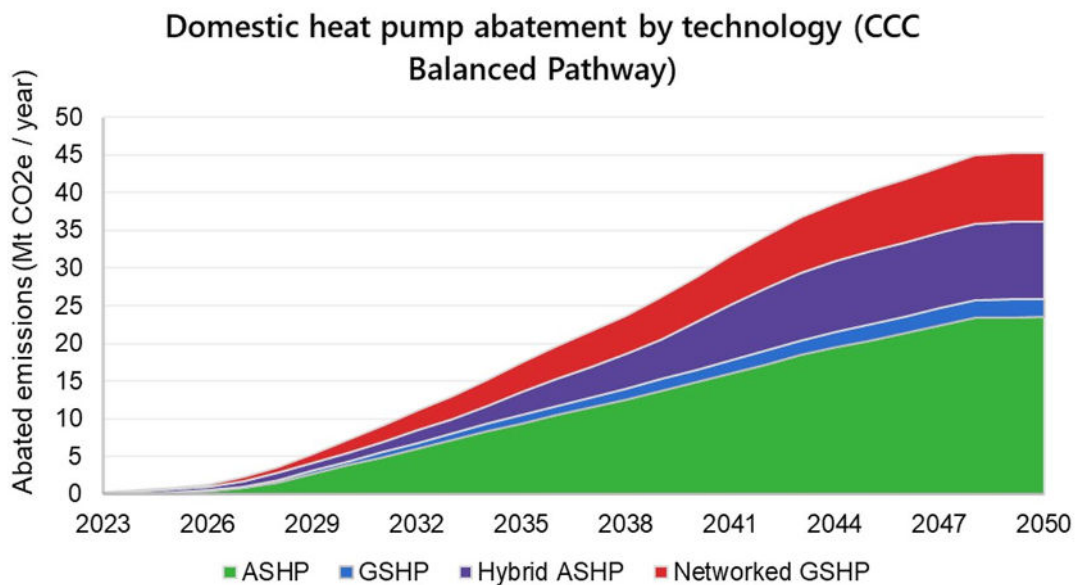


Figure 4 - Domestic heat pump abatement by technology across the UK (CCC Balanced Pathway)⁵⁵

The high efficiency levels also mean that heat pumps can deliver significant energy consumption reductions, supporting the Government’s push for greater energy security. The UK has a target to reduce energy consumption from buildings and industry by 15% compared to 2021 levels by 2030⁵⁶. HPA analysis shows that retrofitting 400,000 properties per annum with heat pumps, in line with the UK’s ambition of installing 600,000 heat pumps a year by 2028 (200,000 of which are implicitly expected in new build)⁵⁷, can reduce annual energy consumption by 32 TWh by 2030, equating to 45% of the domestic energy consumption reduction target, or more than twice the annual energy output of Europe’s largest power station, Drax – enough to power over 8 million homes⁵⁸. This is a significant energy saving and is greater than the entire primary energy consumption of Cyprus in 2021. With increasing heat pump efficiencies expected over time and increased heat pump deployment in the retrofit heating market, these energy savings increase up to 2050. By 2050, retrofit heat pump installations could reduce net energy consumption by 191 TWh per year – roughly equal to the entire energy consumption in Bulgaria in 2021⁵⁹.

55 HPA analysis of the CCC’s Balanced Pathway Scenario, available here. Please note that this analysis only focuses on retrofit heat pump installations. Assuming average household heat demand of 11,500kWh. Efficiencies taken from CCC assumptions log and adjusted according to latest evidence of heat pump performance, e.g. EOH trial. Replaced heating systems estimated using total change in heating systems per year in CCC Balanced Pathway. Emissions factors taken from DESNZ Green Book assumptions and emissions factor assumptions. Total emissions decrease based on heating system changing matrix which maps emissions savings from moving from one heating system to the individual heat pump technology based on the year of the switch.

56 BEIS (2022) UK Government Takes Major Steps Forward to Secure Britain’s Energy Independence

57 DESNZ (2023) Clean Heat Market Mechanism Consultation

58 Drax, The UK’s Largest Renewable Power Station, Accessed 2023

59 Ritchie, Hannah & Roser, Max (2022) Energy Production and Consumption

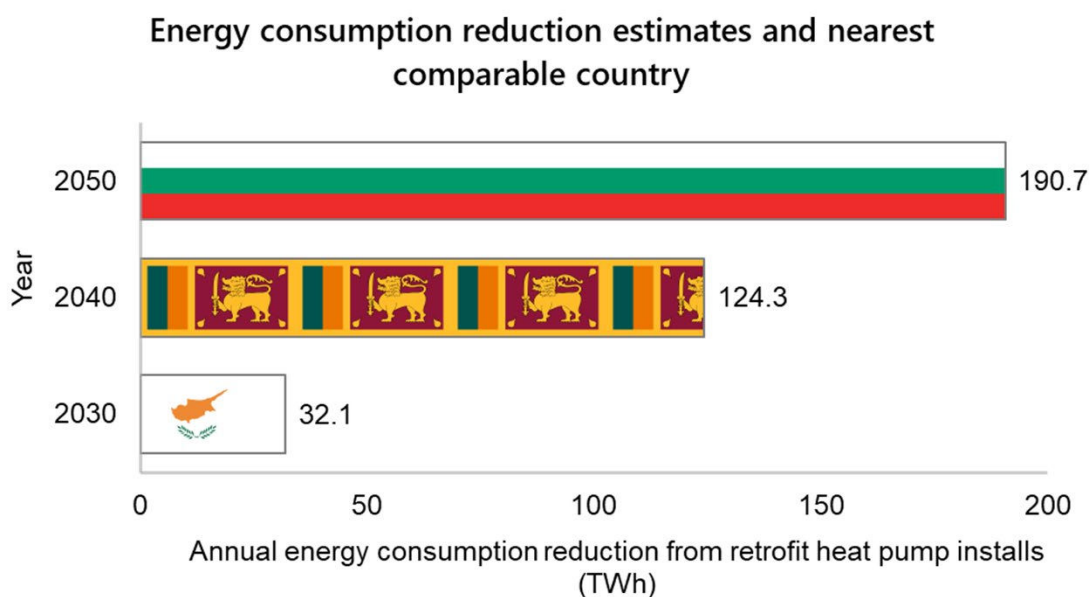


Figure 5 – Annual energy consumption reduction estimates from domestic retrofit installs of heat pumps in the UK relative to the baseline year of 2022. The nearest comparable country in terms of total energy consumption is shown by flag of country⁶⁰. Flags are as follows: 2030 - Cyprus. 2040 - Sri Lanka. 2050 - Bulgaria. E.g the energy consumption reduction from heat pumps in 2050 is comparable to the total energy consumption in Bulgaria in 2022.

In addition, the transition to low carbon heat will also help to reduce air pollution caused by the release of Nitrogen Oxide (NO_x) – a by-product of gas-fired central heating boilers. This is a significant issue in cities like London, where 12% of emissions are linked to the burning of fossil fuel gas in domestic boilers, making them the second highest source of NO_x emissions in the city after transport. Air pollution can lead to short-term impacts such as the exacerbation of asthma or more serious long-term impacts and lower life expectancy⁶¹. The health benefits of switching from an oil boiler to a heat pump are especially relevant when you consider that 866,000 households rely on oil central heating in England and Wales⁶². In less densely populated areas, these benefits are lower but still significant, as shown in Figure 6.

⁶⁰ UK installation projections according to CCC (2020) **Sixth Carbon Budget** Balanced Pathway scenario and adjusted according to target of 400,000 retrofit heat pump installs a year within the UK by 2028. Base year of 2021 according to UK energy consumption reduction target. 2021 national primary energy consumption estimates for non-UK nations according to Ritchie, Hannah & Roser, Max (2022) **Energy Production and Consumption**. Current UK energy consumption courtesy of **Energy Consumption in the UK** BEIS, 2022. Flag images courtesy of **Vecteezy.com**. Full assumptions and methodology available on request.

⁶¹ Public Health England (2018) Health matters: air pollution

⁶² ONS (2023) Central Heating: Census 2021

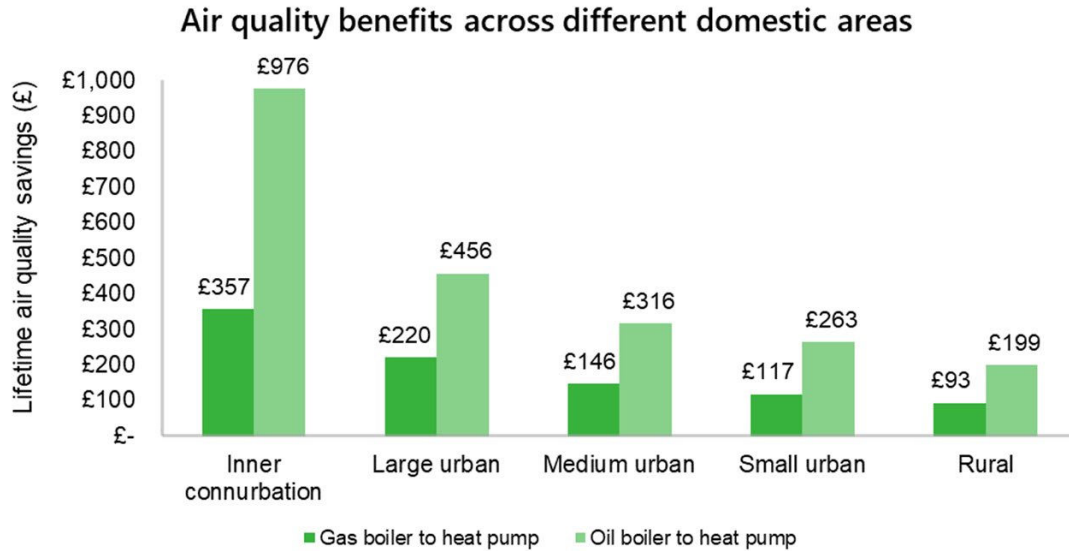


Figure 6 - Air quality benefits across different domestic areas⁶³

ENERGY SECURITY

Widescale deployment of heat pumps is also key to help realise the UK’s energy security. HPAs analysis of the CCC’s Balanced Pathway scenario, which is broadly in line with government targets, shows that retrofitting existing homes with heat pumps can reduce net consumption of natural gas by 32 TWh by 2030 and net consumption of oil by 8 TWh by the same date (see Figure 7). By 2050, heat pumps could reduce the consumption of gas in homes by 252 TWh, equivalent to 45% of the UK’s total imports of natural gas in 2021⁶⁴. The push for energy security was re-affirmed in the UK’s Energy Security Plan which stated a need for “our energy to be cheap, clean and British”⁶⁵.

⁶³ Total savings over 15-year system lifetime. Savings discounted according to health discount rate used in DESNZ (2023) Green Book

⁶⁴ DESNZ (2023) Energy Trends

⁶⁵ HMG (2023) Powering up Britain: Energy Security Plan

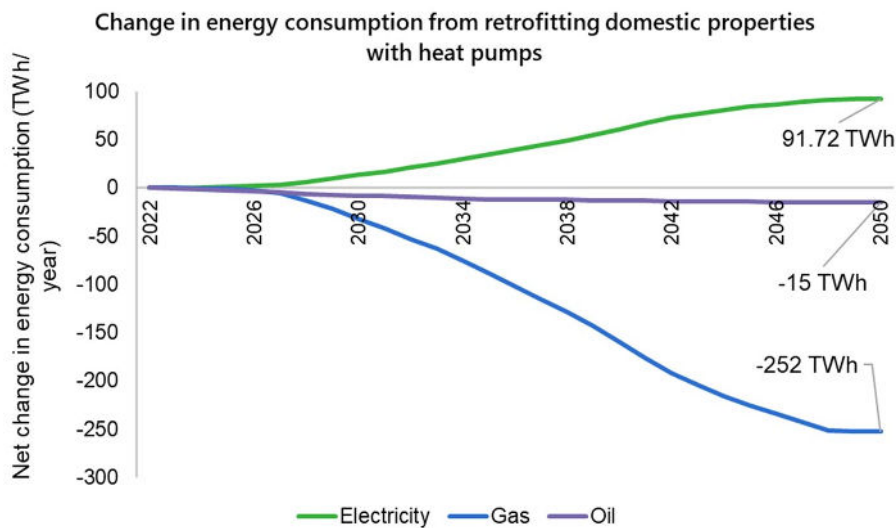


Figure 7 - Change in energy consumption from retrofitting domestic properties with heat pumps⁶⁶

Switching from imported fossil fuels to domestically produced electricity is especially attractive when considering both the push for energy security and the increased deployment of renewable power. In May 2023, the UK produced its trillionth kWh of electricity from renewable sources. This milestone took 50 years of progress to reach, although with current trends it will take just 5 years to reach two trillion kWh of renewable electricity produced.⁶⁷ This progress is shown in Figure 8 which demonstrates the evolution of Britain’s generation mix. In the first quarter of 2023, 53% of Great Britain’s electricity was produced through low carbon sources, compared to just 26% in the same quarter ten years prior. Not all low carbon sources are intermittent, for example nuclear, however, 34% of electricity generated in the first quarter of 2023 came from wind and solar⁶⁸.

The rollout of renewable electricity generation, such as solar and wind, will significantly lower grid carbon intensity and allow consumers to access increasingly low-cost “as-available” electricity, if electricity markets evolve to allow this⁶⁹. In fact, between 2010 and 2020, contracts-for-difference (CfD) prices for offshore wind nearly halved and producing electricity via wind is now nine times cheaper than generating electricity via a gas fired power station⁷⁰. However, although renewable power comes with huge opportunities, it also comes with challenges to overcome.

66 HPA analysis of the CCC’s Balanced Pathway Scenario, available here Deployment not adjusted according to government targets like in figure 5.
 67 National Grid (2023) Energy explained
 68 National Grid ESO (2023) Carbon Intensity
 69 DESNZ (2022) Review of electricity market arrangements
 70 Carbon Brief (2022) Analysis: Record-low price for UK offshore wind is nine times cheaper than gas

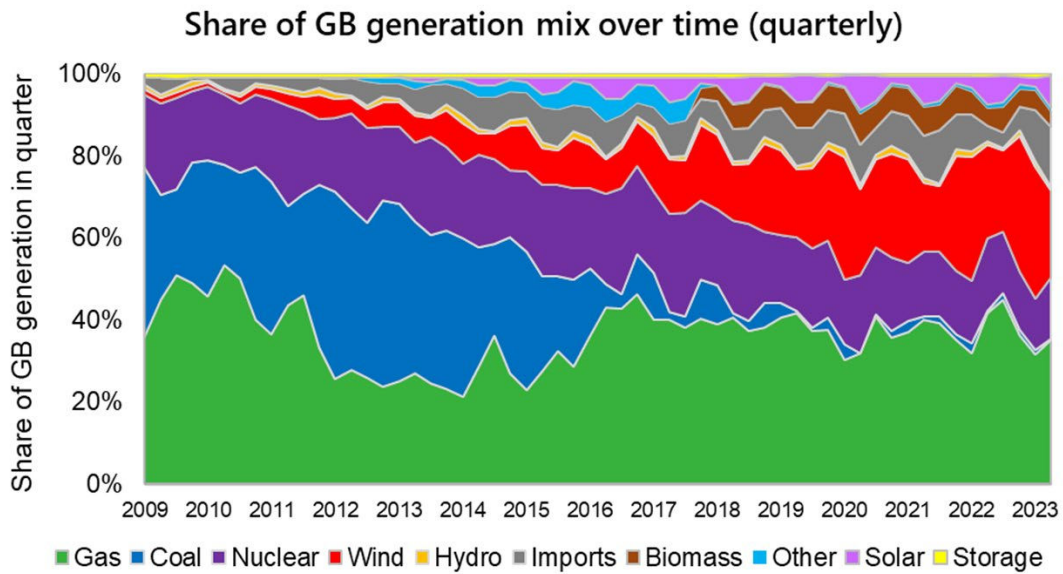


Figure 8 - Share of Great Britain's generation mix over time⁷¹

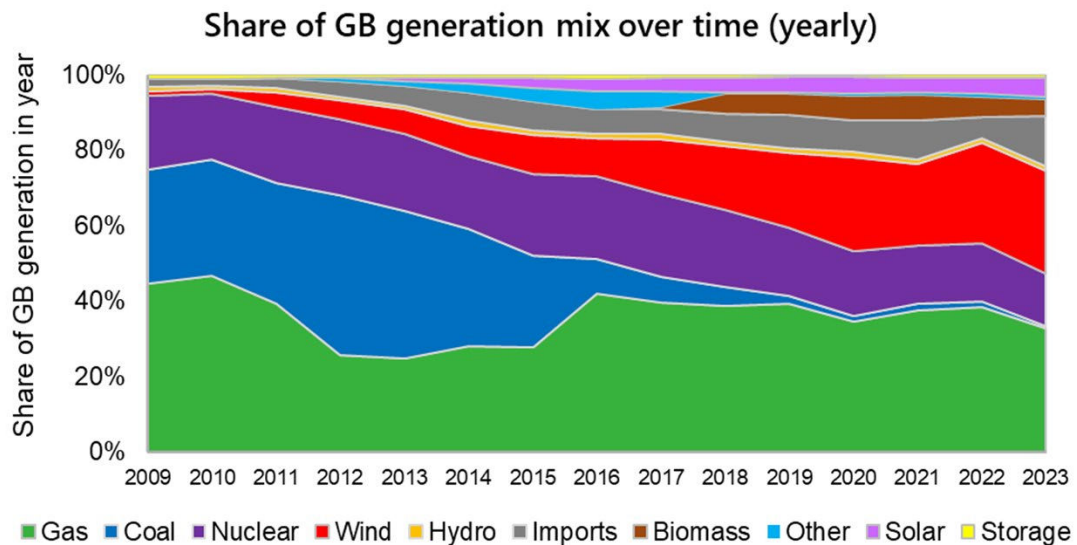


Figure 9 - Annual Share of Great Britain generation mix over time⁷²

Wind power, being a renewable energy source, is characterised by intermittent generation, meaning it produces electricity at different levels of output over time. Similarly, the electrical demand in the UK also fluctuates, resulting in periods of high and low demand. When the amount of renewable energy generated exceeds the peak demand, a process called curtailment takes place. Curtailment involves compensating renewable energy operators for shutting down their generation assets.

⁷¹ National Grid ESO (2023) Carbon Intensity

⁷² National Grid ESO (2023) Carbon Intensity

Unfortunately, this not only leads to a waste of low carbon renewable energy but also results in passing on the associated curtailment costs to consumers through their bills. In the year 2021, approximately 2.3 TWh of electricity generated by wind farms had to be curtailed, enough to heat 608,000 homes with a heat pump⁷³. Furthermore, waste curtailed electricity led to significant curtailment costs of £200 million in November 2021 alone⁷⁴. As the deployment of intermittent renewable power continues to grow, there is an increasing need for demand side response and energy storage to prevent curtailment costs and ensure grid stability. As shown by Figure 10, the National Grid's Future Energy Scenario estimates that there could be as much as 53 TWh of curtailed electricity in 2035, equivalent to 14% of total wind and solar generation⁷⁵.

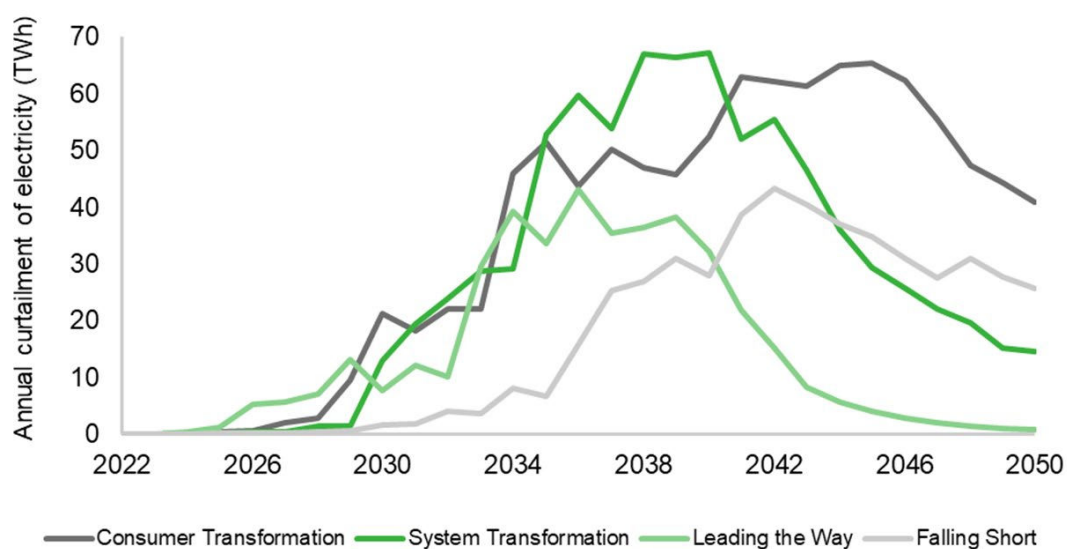


Figure 10 - Estimates for curtailed electricity under National Grid's Future Energy Scenarios⁷⁶

73 Assuming average household heat demand of 10,080 kWh.
 74 Drax (2022) Renewable curtailment and the role of long duration storage
 75 National Grid ESO (2023) Future Energy Scenarios
 76 National Grid ESO (2023) Future Energy Scenarios

A combination of storage and flexible demand side response can help balance the grid and alleviate constraints, avoiding curtailment costs being passed onto consumers. Heat pumps can operate flexibly which can smooth heating loads, making energy demand more manageable in combination with intermittent renewables. This heating behaviour can be enabled by the deployment of smart meters and encouraged by improving access to flexible time-of-use tariffs. By allowing consumers to have access to discounted electricity when there is a surplus supply of renewable energy, they are encouraged to shift their heating load away from times of electricity constraints. Estimates from flexibility trials suggest that by operating a heat pump flexibly, households can reduce their annual bills by £200 whilst also providing important balancing services to the grid⁷⁷. Ofgem estimate that moving to half hourly electricity market settlement periods and the flexibility potential this could unlock could deliver up to £4.6 billion in benefits to British consumers between 2021 and 2045⁷⁸.

Our analysis of the marginal abatement cost of carbon (MACC) associated with residential properties switching to heat pumps from gas boilers also suggests that heat pumps are the cheapest scalable solution to decarbonising heat in buildings in the UK. The carbon cost of switching is £221 per tCO₂e and is expected to reduce significantly over time with the potential eventually to entirely negate the higher upfront cost of heat pumps. Our analysis showed that any significant reduction of MACC over time, however, can only be achieved if heat pumps are rolled out now.

The deployment of heat pumps has continued to be successful across several markets in the EU. According to the EHPA report, 19.79 million heat pumps (including multiple heat pump technologies⁷⁹) have been installed in the EU, providing heating and cooling to around 16% of Europe's residential and commercial buildings. This has been estimated to amount to saving 52.52Mt of CO₂, which is roughly equivalent to 6.2% of all emissions from buildings in the EU⁸⁰ or the equivalent to the annual emissions of Greece.⁸¹ The EHPA highlights that growth was significant in Belgium, the Czech Republic, Slovakia, and Poland, all of which have nearly doubled in 2022. The market volume has continued to be dominated by the largest markets including France (621,776 units +15.8% growth compared to 2021), Italy (513,535 +51.3%) Germany (275,697 +59.0%), Sweden (215,313 +61.3%) and Poland (207, 992 +112.0%). The EHPA identifies that the key high level Government drivers to this growth have been a combination of the recognition of the need for heat pumps by the IEA, focus on increasing heat pump demand, the global energy crisis caused by Russia's invasion of Ukraine, and the announcement of the EU target of 60 million additional heat pumps by 2030.

In comparison, the UK has remained in the category of dormant markets.

77 National Grid (2022) Save money while helping the grid: Equinox heat pump flexibility trial kicks off

78 Ofgem (2020) Electricity retail market-wide half hourly settlement: draft IA

79 Air-to-water, water-to-water, brine-to-water, dir. expansion/water or dir. condensation, exhaust air HP, sanitary hot water HP, reservable HP (air-to-air), reversible heat pump (air-to-water).

80 European Environment Agency (2022) Greenhouse gas emissions from energy use in buildings in Europe

81 EHPA (2023) European Heat Pump Market Statistics Report



According to the CCC, the UK is not currently on track to hit the ambition of 600,000 installed heat pumps per year by 2028, and heat pump installations across the UK must rise ninefold in six years to catch up with the rest of the world⁸². There has been a range of policies rolled out to support the deployment of heat pumps. However, pressing obstacles remain, and these are discussed in the following sections of this report.



82 CCC (2023) 2023 Progress Report to Parliament

ADDRESSING THE BARRIERS TO WIDESCALE HEAT PUMP DEPLOYMENT

The political landscape has shifted since the publication of our roadmap in 2019⁸³ with more support around low carbon heating solutions, however, the uptake of heat pumps in the UK has been low. The former Prime Minister's ten-point plan (2020) for a green industrial revolution saw the introduction of an ambition for annual heat pump installations to reach 600,000 by 2028. Whilst this target falls short of the 900,000 annual installations recommended by the CCC, it is an ambitious target that has been welcomed by the heat pump industry as an important milestone to work towards. In the past couple of years, the UK Government has rolled out a large policy package to support the widescale deployment of heat pumps. However, key enablers such as supporting the installer workforce and increasing consumer demand are yet to be fully addressed.

THE UPFRONT COST OF HEAT PUMPS.

Heat pumps are currently more expensive to install than boilers and this is a significant barrier to uptake, whilst research has shown that the lack of awareness of low carbon technologies has become less of an issue. Consumer awareness still however remains low with only 18% of people having a fair amount or a lot of knowledge of an ASHP and 17% for a GSHP, according to the latest government Public Attitudes Tracker from Spring 2023⁸⁴. There is industry-wide consensus that reducing upfront costs, providing running cost savings and increasing comfort, familiarity, and property value adds are the key ingredients to increasing demand. Analysis conducted by the UK Government funded behavioural insights team found that 44% of respondents would choose a heat pump over a £2,000 gas boiler if the heat pump installation cost was between £200 - £3,999. 25% of respondents said that they would still choose a heat pump over a gas boiler if it cost between £10,000 - £12,000.⁸⁵

83 HPA (2019) Delivering Net Zero: A Roadmap For the Role of Heat Pumps

84 DESNZ (2023) DESNZ Public Attitudes Tracker: Summer 2023 - GOV.UK (www.gov.uk)

85 BIT (2022) How much are we willing to pay for a heat pump

Whilst the awareness and appeal of heat pumps continue to improve, installation costs are still a major barrier. The median reported cost for an air source heat pump under the Boiler Upgrade Scheme is £13,000⁸⁶. However, evidence suggests that this cost is based on larger homes⁸⁷, inflating data on average install costs. The mean capacity of installs under the Boiler Upgrade Scheme is 10.6 kW, which is the heat pump capacity as self-reported by installers and assumed to be at A7/W35. This is 22% higher than what HPA analysis suggests is the average capacity required for the UK housing stock, 8.7kW⁸⁸. Taking this into consideration, the average install cost is closer to £10,700, roughly in line with UK Government estimates. When considering the 20% cost down expected by 2028, due to economies of scale and supply chain development, the average install cost by 2028 would be closer to £8,700⁸⁹.

Innovative green financing instruments can help tackle the upfront cost barrier, for example, some mortgage providers are offering up to £2,000⁹⁰ in rewards to households that install heat pumps⁹¹, and interest free loans, akin to those available in Scotland along with a rural uplift, can help mutualise upfront costs across multiple years⁹².

Of the upfront cost, roughly 60% is due to equipment, including the cost of the heat pump unit, and ancillaries, such as buffer tanks, hot water tanks, heat emitters, piping, and valves⁹³. Between 5% and 26% of the installation cost is due to heat distribution system upgrades, such as radiators and piping, with this varying depending on the requirements of the property⁹⁴. Some heat pumps that use low GWP refrigerants, can run efficiently at higher temperatures, which can be useful for short periods of very cold weather and may mean fewer radiator changes are required. It should be noted that radiator costs are often not considered when analysing the installation costs of a fossil fuel boiler, however, heat emitter upgrades are also beneficial to homes with fossil fuel heating systems because as well as making the home heat pump ready, the upgrades will raise the efficiency of the heating system, improve running costs, improve control capabilities, and potentially improve the aesthetics and space utilisation of the system. Therefore, it may be argued that these costs are not specific to heat pump installs. Of the remaining non-equipment costs (40%), roughly 60% is due to labour costs, with retrofit heat pumps taking longer than the counterfactual of replacing a fossil fuel boiler. Other non-equipment costs include design, commissioning, distribution, and overheads⁹⁵.

86 DESNZ (2023) Boiler Upgrade Scheme statistics

87 Nesta (2023) Heat pump user survey report

88 Based on capacity sizing analysis for 18 archetypes of the UK housing stocks. Heat pumps assumed to be sized according to peak heating load.

89 Based on unreleased report by Eunomia referred to in DESNZ (2023) Clean Heat Market Mechanism consultation impact assessment

90 Greener Home Reward | Barclays

91 Halifax (2023) Green Living Reward

92 Home Energy Scotland (2023) Home Energy Scotland Grant and Loan

93 UKERC (2023) Decarbonising Home Heating: An Evidence Review of Domestic Heat Pump Installed Costs

94 Nesta (2022) How to reduce the cost of heat pumps

95 Delta EE (2016) Potential cost reductions for air source heat pumps

It is no surprise that countries that have shown large growth in the heat pump market have introduced subsidy programmes that focus on upfront-cost support and reducing operating costs through preferential electricity tariffs. In May 2020, Italy launched a 110% tax deduction, also referred to as the Superbonus, to cover the heat pump's upfront cost. This has cost the Italian Government approximately €9 billion in 2021 alone yet has resulted in the sale of nearly 500,000 heat pump units in 2022, just shy of the UK ambition of 600,000 units per year.

The HPA acknowledges and welcomes the UK Government's package of measures that contributes to reducing the upfront cost of heat pumps for consumers in various types of properties. Over the period 2021-2025, the Government has committed £6.6bn towards installing energy efficiency and low carbon heating measures. This includes legacy funding for things like the Green Homes Grant Voucher Scheme and Renewable Heat Incentive, as well as:

Domestic

- **Boiler Upgrade Scheme (BUS)** has significantly helped to reduce the upfront cost and support the uptake of heat pumps within English and Welsh homes. With £450 million of grant funding available over three years from 2022 to 2025, installers have been applying on behalf of property owners for £7,500 towards the cost of both air source and ground source heat pumps. According to Nesta, this policy itself has saved a total of 17,000 tonnes of CO₂ emissions, equivalent to the emissions of 55,000 people flying from London to New York⁹⁶. The UK Government has committed to extending the scheme to 2028, but no budget commitment has yet accompanied the 3-year extension to the scheme.
- **Home Upgrade Grant (Phase 1 and 2)** is a £950 million Heat and Building Strategy commitment for English homes, providing £15,000 - £25,000 of funding to install energy efficiency measures in homes that are of low income, off the gas grid and with an EPC rating between D and G.
- **Green Homes Grant Local Authority Delivery (Phases 1,2 and 3)** aims to raise the energy efficiency of low income and low energy performance homes with a focus on EPC rating of E, F or G.
- **The Energy Company Obligation (ECO)** places obligations on energy suppliers to fund and carry out energy efficiency measures in households across England, Scotland, and

⁹⁶ Nesta (2023) Boiler Upgrade Scheme saves 17,000 tonnes of carbon emissions in first year, new analysis finds

Wales. The primary objective of the ECO scheme is to assist low-income and vulnerable households, as well as those living in hard-to-treat properties, in reducing their energy consumption and lowering their energy bills. The current phase, ECO 4, has seen a significant uplift in installations due to a change in the project scoring matrix. With proposed changes to EPC scoring incoming, installations under ECO could increase further.

- **The Social Housing Decarbonisation Fund (SHDF)** provides energy efficiency measures to help decarbonise social housing. Wave 1 which was launched in 2021 had a funding allowance of £160 million, Wave 2, launched in 2022, with a value of £800 million, with Wave 2.2. launching in 2023 with a further £80 million of funding.
- **Home Energy Scotland Grant and Loan** offers homeowners in Scotland both loan and grant support towards home energy efficiency upgrades. Homeowners can access up to £7,500 in grant support towards a heat pump and up to £9,000 in rural areas, with the additional option of taking out an interest free loan up to the value of £7,500⁹⁷. These greater support levels go some way to explain to greater heat pump penetration rates in Scotland compared to other nations in the UK. Per 10,000 people, 9.4 MCS accredited heat pumps were installed in Scotland in 2022, nearly twice as high as the average for the UK⁹⁸.

Non-Domestic

- **The Public Sector Decarbonisation Scheme (PSDS)** is a scheme open to public sector bodies in England, including central government departments and non-departmental public bodies, the NHS, schools, emergency services, further education, and local authorities. To reduce emissions from the public sector by 75% by 2037 (from the 2017 baseline), a large amount of funding, including £1.4 billion for Phase 3 of the scheme (2022-2025) has been rolled out, with Phase 3c now open.
- **Heat Network Grants** – There are several schemes to support the development and improvement of heat networks across the UK. All these programmes support networks with ASHPs and/or GSHPs of ASHP and/or GSHP.
 - **Heat Networks Investment Project (HNIP)** was a £320 million fund that provided capital funding to gap fund heat network projects in England and Wales. HNIP is now closed for applications.
 - **Green Heat Network Fund (GHNF)** is a £288 million fund that supports the commercialisation and construction of new low and zero carbon (LZC) heat networks and retrofitting and expansion open to organisations in public or private sectors in England.
 - **Heat Network Efficiency Scheme (HNES)** provides £32 million (from 2023 – 2025) to public, private and third sector applicants in England and Wales to support improvements to existing district heating or communal heating projects.

⁹⁷ Home Energy Scotland (2023) Home Energy Scotland Grant and Loan: overview · Home Energy Scotland

⁹⁸ MCS (2023) The MCS Data Dashboard

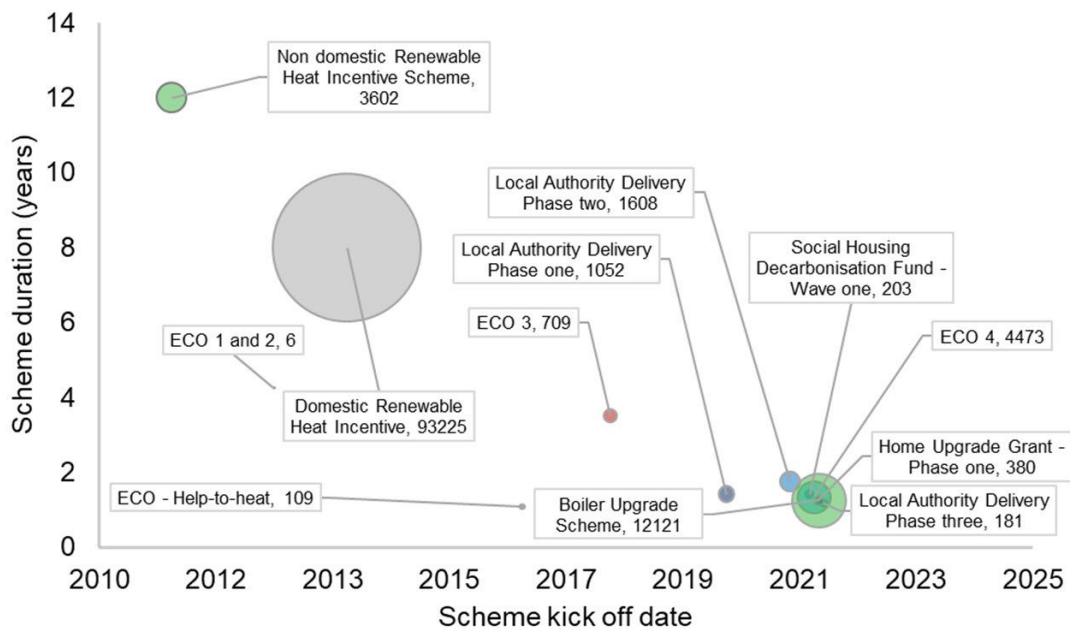


Figure 11 - Summary of different funding schemes sized by total heat pump installations.

Although the UK heat pump market has grown slowly in recent years, HPA sales data suggests just over 55,000 AWHPs and GSHPs were sold in the UK in 2022. In isolation, the current package of policies and grants is not enough to bring the upfront cost down sufficiently to stimulate large-scale deployment of heat pumps across different housing and consumer profiles in the short term. Different households are eligible for different funding schemes based on income level and location. The Boiler Upgrade Scheme has the largest pool of eligible households with all homeowners in England and Wales eligible for grant support, as long as their home has an eligible EPC. Even with a £7,500 grant and VAT exemption, heat pumps are typically more expensive than a gas boiler, though this varies by housing type. More needs to be done to allow consumers to overcome the one-off installation cost associated with retrofitting homes with low carbon heating systems.

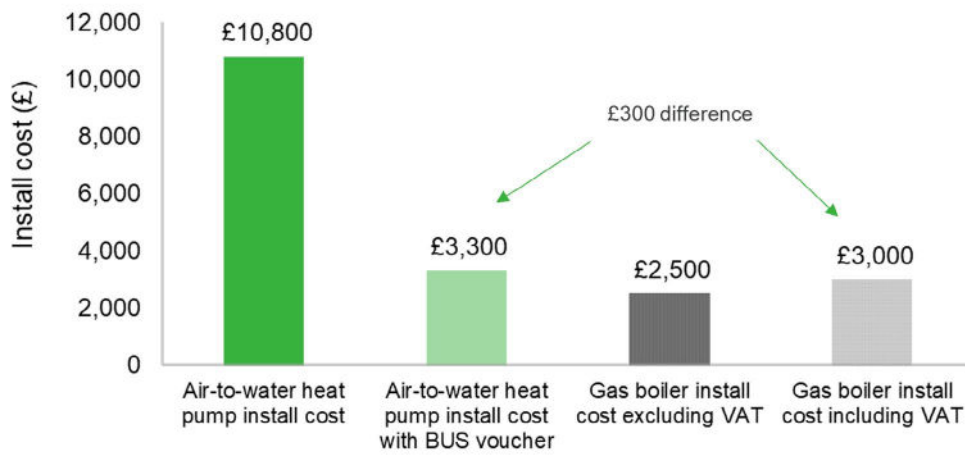


Figure 12 – Air source heat pump and gas boiler install costs.⁹⁹

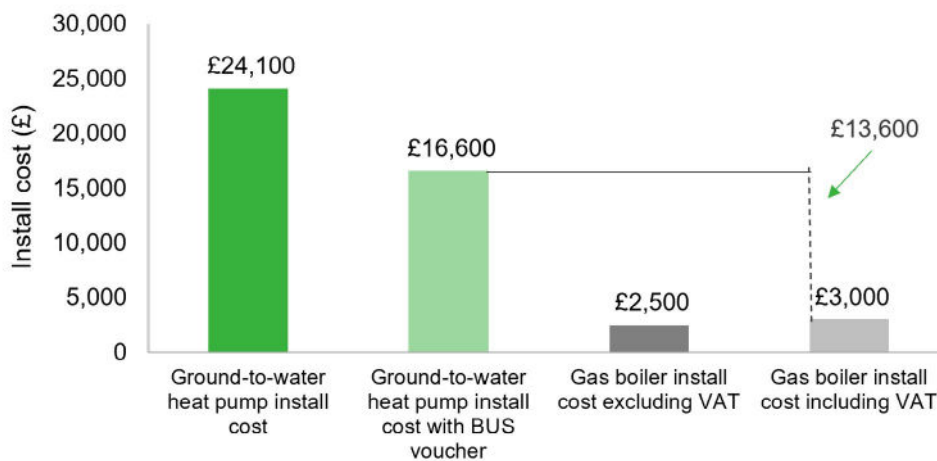


Figure 13 - Ground source heat pump and gas boiler install costs.¹⁰⁰

⁹⁹ DESNZ, **Clean Heat Market Mechanism: Impact Assessment**. Heat pumps install cost is exempt from VAT. 20% VAT rate applied to boiler install. Note that value is for on gas grid homes.

¹⁰⁰ HPA analysis using data from DESNZ (2023) **Clean Heat Market Mechanism: Impact Assessment** and DESNZ (2023) **Boiler Upgrade Scheme Statistics**. Ground source heat pump install cost collected in August 2023. Heat pumps install cost is exempt from VAT. 20% VAT rate applied to boiler install.

Additionally, in relation to the Boiler Upgrade Scheme, we would advise the removal of the current 45kWth threshold specifically for shared ground loop (SGL) systems which restricts their deployment. We believe the Government's principal intention was to prevent large individual installations from accessing the scheme. This is sensible and the HPA supports maintaining this threshold for individual installations to ensure the best use of public money. However, the scheme rules also impose this limit on SGLs which is contradictory as SGL installations meet the same aim as individual installations, i.e., decarbonisation of heat in typical domestic properties, only differing in achieving economies of scale through deploying ground loops for several properties at once. The 45kWth limit effectively restricts SGL to between 5-10 properties, far smaller than a typical SGL project and less than the ideal size for significantly reducing costs. SGLs already face several additional barriers to deployment compared to individual heat pump installations due to greater infrastructure needs and would benefit from this change.

Regarding our recommendation to improve the promotion of available help to consumers. We welcome the Government's recently launched 'Welcome home to energy efficiency' campaign.¹⁰¹ Launched on the 23rd October 2023 to coincide with the uplift in the Boiler Upgrade Scheme grant, the campaign aims to provide clear, government approved information about the benefits of home improvements in relation to energy efficiency. The campaign drives people to the Boiler Upgrade Scheme as an option for heat pump installation and also focused on heat pump enabling measure such a loft and cavity wall insulation.

¹⁰¹ <https://energy-efficient-home.campaign.gov.uk/>

1. RECOMMENDATIONS TO REDUCE THE UPFRONT COST OF HEAT PUMPS.

The HPA welcomes the UK Government's policy package that aims to lower the upfront cost of heat pumps. However, in 2022 HPA sales data suggests just over 55,000 AWHPs and GSHPs were sold in the UK – less than 10% of that required to meet the Government's 2028 annual installation ambition. We have identified elements of the policy packages that can be improved, as well as additional support that can be rolled out.

1.1 Optimising the Boiler Upgrade Scheme.

The HPA recognises the Government's efforts to subsidise heat pump installation costs through the Boiler Upgrade Scheme, welcomes the grant increase for ASHPs and GSHPs to £7,500 from 23rd October 2023 and notes a steady increase in the number of applications since its inception. The HPA welcomes the Government's response¹⁰² to the recent findings by the Lords Environment and Climate Change Committee, particularly around improving the marketing of BUS to consumers so that better promotion of available help and independent advice for homeowners will further begin to encourage uptake of the scheme and help to educate consumers on the benefits of heat pump technology. It is imperative, however, that additional funding is allocated in future years to both prevent the scheme from capping the market. The HPA therefore urges the Government to optimise the Boiler Upgrade Scheme by:

- Improving the promotion of available help to consumers
- Considering how support for groundworks associated with the installation of GSHPs can be optimised
- Providing a rural uplift, akin to Scotland
- Committing to budgets for the scheme during 2025-2028
- Removing the 45kWth limit for shared ground loop systems
- Differentiated grant levels depending on owner and property type to stimulate growth where needed.

102 DESNZ (2023) Government Response to BUS House of Lords Inquiry Report

1.2 Clarify and extend the zero rate VAT treatment for all heat pump systems.

The zero-VAT treatment for heat pumps for the period 2022-2027 is welcome. However, we believe it should be extended considerably beyond this period if installations are to ramp up to levels consistent with the Government's ambition. Current HMRC guidance is also ambiguous because of the full 20% rate applied to a central heating system, and its juxtaposition with the zero rating for heat pumps and their ancillary supply. In addition, the relief does not apply to water source heat pumps, nor to situations where the customer contracts more than one supplier – for example with ground source heat pumps where both a separate groundworks company and one installing the heat pump are involved.

Therefore, the HPA recommends in respect of VAT the Government should update the relevant HMRC guidance to ensure:

- Full central heating systems that include a heat pump are eligible for the zero rate, in addition to the current provisions for ancillary works
- Extension of the zero rate beyond 2027
- The inclusion of water source heat pumps
- Applicability of zero rates to co-contracting
- Consideration should be given to apply zero rate VAT relief to items which support future heat pump installation, such as heat pump ready cylinders.

1.3 Introduce Government-backed interest-free loans in England, Wales, and Northern Ireland.

In Scotland, some householders can apply for funding of up to £15,000 (£7,500 grant plus £7,500 optional 0% interest loan, or £9,000 grant plus £7,500 optional 0% interest loan if the household qualifies for the rural uplift of £1,500) to assist with the costs of a heat pump and additional energy efficiency measures. The HPA recommends the Government consider a similar Government-backed interest free loan scheme for heat pumps for England, Wales, and Northern Ireland.

THE RUNNING COST OF HEAT PUMPS

EFFECT OF RELATIVE PRICES OF GAS AND ELECTRICITY.

The most recent Ofgem price cap announcement for the period October – December 2023 saw gas and electricity prices continue to fall from the historically high prices during the Energy Crisis. Before that, the price cap announcement for the period July – September 2023 saw regulated prices fall below the subsidised prices set under the Energy Price Guarantee (EPG). This is the first time since the subsidy was put in place back in October 2022 in a bid to protect households against rising energy costs. Moving away from subsidised prices has widened the gap between electricity and gas prices. Under the EPG, electricity prices were 3.2 times higher than gas prices whereas now they are 4 times higher¹⁰³. Due to this price gap, even when considering that heat pumps are three times more efficient than gas boilers, a household switching to an air-to-water source heat pump (2.8 SPF (H4) ^{104,105}) from a gas boiler (0.84 COP¹⁰⁶) could see their annual fuel bills to rise by £119 per annum¹⁰⁷. However, heat pumps have also demonstrated they can perform at higher efficiencies with heat pumps operating at 3.1 SPF or higher delivering running cost savings compared to a gas boiler. Under the same assumptions, a heat pump operating at 3.1 SPF would deliver £204 in annual savings under EPG prices.

103 Ofgem (2023) Energy Price Cap

104 The terms Seasonal Coefficient of Performance (SCOP) and Seasonal Performance Factor (SPF) are used interchangeably in the heating industry. Both represent the ratio of useful heat supplied into the building to the energy required to drive that heating system. In this report we refer to both, according to which is used by any relevant external referenced at respective points in the report.

105 The median SPF (H4) observed for ASHP systems during the Electrification of Heat Demonstration Project was 2.80 (280%). The SPF (H4) system boundary includes electricity consumption for the heat pump, immersion and back-up heaters, and external auxiliary equipment such as the circulation pump. Note that the Median ASHP SPF (H2) observed in the trial was 2.94 (294%), which excludes energy consumption for immersion and back-up heaters – this is more aligned to measurements for gas boilers. For more detail, see the description of SPF H4 in the insights report, available here.

106 In-situ boiler efficiency does not include electricity consumption required to run the boiler.

107 Based on July 2023 Ofgem price cap prices and assuming ASHP efficiency of 2.8 SPF, gas boiler efficiency of 0.84COP and 5% uplift to space heating demand from switching to a heat pump.

Annual saving of switching from a gas boiler to a heat pump across efficiencies (October 2023)

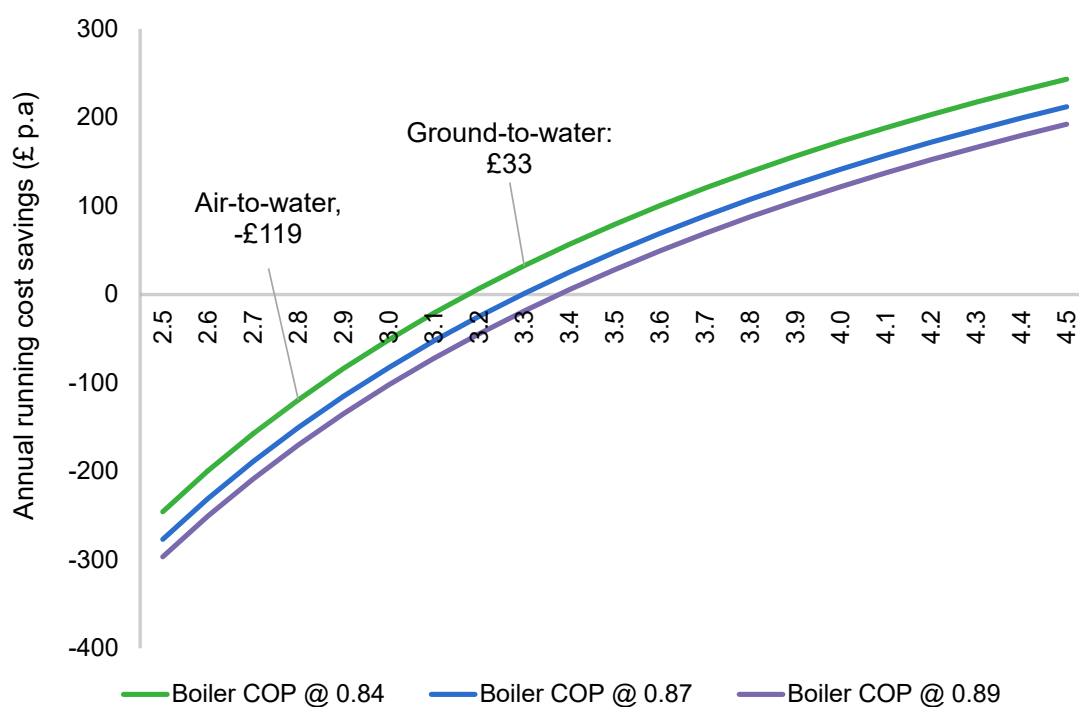


Figure 14 - Potential savings from switching to heat pump across different efficiencies¹⁰⁸

To support the widespread deployment of heat pumps and to offset upfront costs of installations, consumers must be confident in long-term running cost savings. However, under current economic conditions, higher operating and capital costs of heat pumps compared to gas boilers are hindering organic growth in the industry and ultimately, slowing down the decarbonisation of heating. In countries such as France, which had the highest number of heat pump sales out of all EU countries in 2021, running costs were lowered by removing the carbon tax element in energy bills from electricity.¹⁰⁹ In addition, they have a competitive low electricity retail price (19p/kWh for October 2022¹¹⁰) compared to the EU average (25p/kWh). Therefore, the ratio of electricity to gas prices in France has historically been far lower than in the UK, as shown in Figure 15. It was therefore welcome to see a commitment from the UK Government in March this year, to outline a clear approach to balancing gas and electricity prices.

¹⁰⁸ Assuming that heat pump owner does not pay gas standing charge and assuming a 5% uplift to space heating demand when switching to a heat pump. ASHP assumed efficiency according to <https://es.catapult.org.uk/project/electrification-of-heat-demonstration/>. GSHP uses ASHP efficiency adjusted according to ratio of ASHP:GSHP efficiencies in historical trials. Note that 0.89 COP gas boiler assumption added as this is the suggested minimum performance standard for boilers from 2025 under the 2022 consultation to improve boiler standards.

¹⁰⁹ Hanafi, O. Et al., (2019) Carbon Pricing in France & Germany: Differences, Similarities and Perspectives f

¹¹⁰ Prices according to Eurostat (2023) Electricity prices for household consumers – bi-annual data (from 2007 onwards) Conversion rates according to XE (2023) Euro to British Pound Exchange Rate Chart

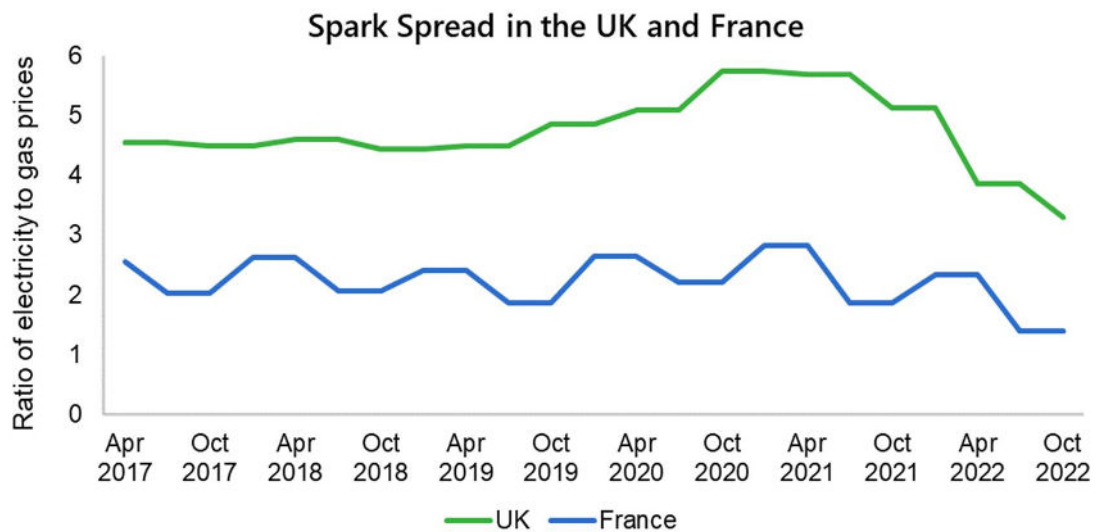


Figure 15 - Spark Spread in the UK and France¹¹¹

The HPA considers the UK Government’s commitment to balance gas and electricity prices a key component for supporting the uptake of heat pumps and encourages the Government to expedite its timeline for implementation. Currently, Environmental, and Social Obligations (ESOs), such as the renewable obligation, are balanced disproportionately on the price of electricity as opposed to the price of natural gas. Before the start of 2022 and high prices caused by the Energy Crisis, for the average household, according to Ofgem assumptions, 18% of their electricity bills were made up of policy costs compared to just 5% of their gas bills (Figure 16). In addition to direct policy costs, electricity consumers also pay towards the Contracts for Difference scheme. Payments to this vary based on the electricity wholesale price, however, as of the October price cap, the average electricity consumer pays £16 per year in CfD payments. Furthermore, since April 2015, electricity levies have increased by 104%, whereas gas levies have only increased by 55%. Additionally, there is a hefty carbon tax embedded within electricity wholesale prices, via the UK ETS, that does not apply to domestic gas consumption.

¹¹¹ UK prices courtesy of Ofgem. French prices courtesy of Eurostat. Please note that UK prices in October 2022 were set by the Energy Price Guarantee.

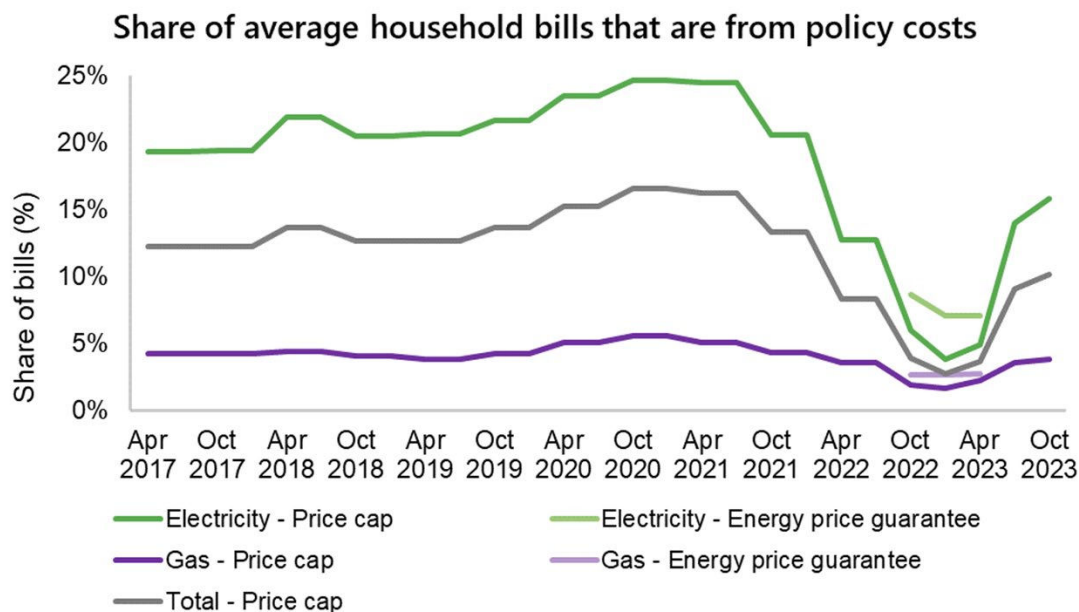


Figure 16 - Share of bills that are from policy costs¹¹²

In the long term, reform to the electricity market may be able to realise lower electricity prices. Currently, the price of electricity in the wholesale market is set by the marginal cost of the last generating unit used to meet demand. This is problematic because the last generating unit is often supplied via a gas combined cycle gas turbine (CCGT), meaning that after considering thermal efficiency losses from generation and transmission, under this model electricity prices will always be considerably greater than gas prices. This system has suited a market that historically was dominated by generation using coal and then later natural gas, however as the penetration of intermittent renewable power with low operating costs grows, this system is increasingly not fit for purpose. In 2022, it was demonstrated that offshore wind, via contracts-for-differences, produced energy that is nine times cheaper than electricity produced via gas¹¹³. Only with reform to the electricity market will consumers be able to benefit from these low prices, whilst also providing demand side response and balancing benefits to the grid.

The degree to which heat pump rollout is hindered by electricity pricing is demonstrated by the stagnant growth in heat pump running cost competitiveness compared to gas boilers, which is ultimately driven by the price gap between gas and electricity. The below graph demonstrates that the current heat pump running cost competitiveness compared to gas boilers is only marginally higher than it was 6 years ago and compared to oil boilers is far lower than 6 years prior, due to price increases from the Energy Crisis. The graph below uses a metric for cost competitiveness based on the efficiency required for a heat pump to deliver running cost

¹¹² Assuming a household with annual gas consumption of 12,000 kWh and electricity consumption of 3,100 kWh in line with Ofgem assumptions.

¹¹³ Carbon Brief (2022) Analysis: Record-low price for UK offshore wind is nine times cheaper than gas

savings compared to a gas boiler. For example, if the required efficiency were 5% lower, then the cost competitiveness factor would be 5% higher. However, the HPA recognises that these changes may take time and would like to see alternative efforts in the interim.

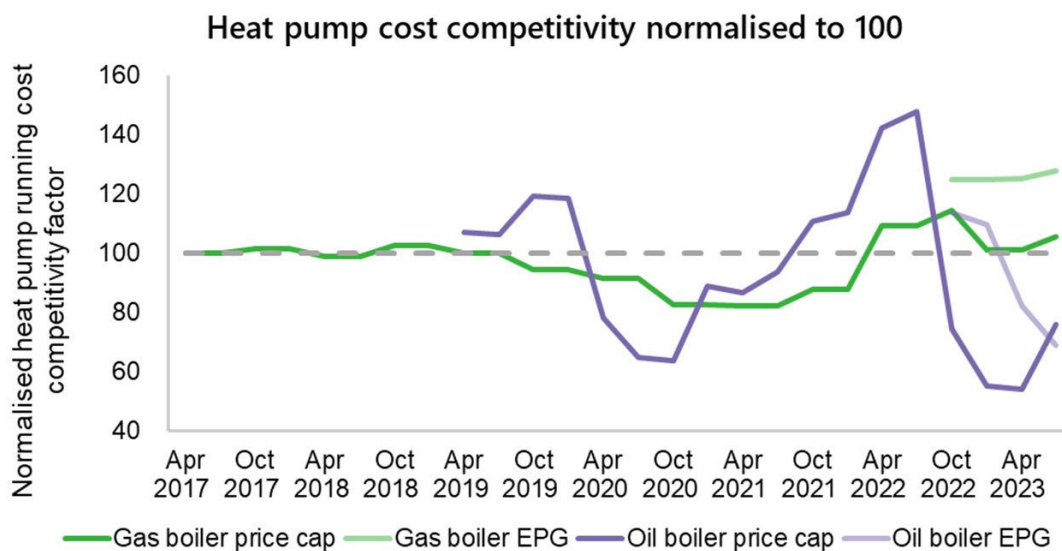


Figure 17 - Heat pump cost competitiveness compared to fossil fuel boilers normalised to 100¹¹⁴

The need for efforts to improve the financial incentive to install a heat pump are reflected by the marginal abatement cost – with the balance of high installation costs and low relative running cost savings suppressing consumer demand.

Marginal Abatement Cost of Carbon (MACC) refers to the cost of reducing each unit of carbon emissions. Here, the unit is a tonne of Carbon Dioxide equivalent (tCO₂e) which takes into consideration other greenhouse gasses and their relative impact on global warming compared to CO₂.

The MACC for the UK’s housing stock has been calculated by dividing the UK’s housing stock into different archetypes based on two characteristics:

- Property type: detached, semi-detached, bungalow, terraced, converted flats and purpose-built flats.
- Property age: pre-1944, 1945-1964 and post-1965.

¹¹⁴ Cost competitiveness modelled as an inverse factor of the heat pump efficiency required for an air source heat pump to deliver running cost savings compared to the alternative heating system. Results are normalised according to the efficiency required for a heat pump to deliver savings against a gas boiler under the price cap in Apr 2017, 3.33 sCOP.

First, the annual heating demand associated with each archetype is determined via an analysis of fabric efficiency and property size. Then, technology efficiencies, fuel price projections and upfront costs are applied to the heat demand to calculate the lifetime ownership cost of a heat pump and a gas boiler for each archetype. Next, the difference in the lifetime cost of ownership between a heat pump and a gas boiler for each archetype is divided by the associated difference in CO₂e emissions to establish the MACC per archetype. Finally, the MACC per archetype is weighted by the proportion of that archetype in the UK's housing stock (determined using the English Housing Survey 2019¹¹⁵) to estimate the overall MACC of residential properties in the UK associated with switching to heat pumps from gas boilers.

Upon using The Green Book¹¹⁶ fuel price projections (central scenario) and emissions factors in the above discussed methodology, we find that as of 2022, the marginal abatement cost of carbon associated with residential properties switching to heat pumps from gas boilers is £221 per tCO₂e.

The analysis also suggests that the MACC is expected to reduce over time. This is a result of several factors interacting with each other such as the increasing efficiency of heat pumps expected over time coupled with a projected reduction in upfront costs of heat pumps compared to a slight increase in that of a gas boiler. However, the most important factor influencing MACC is the difference in fuel prices between gas and electricity over time. For instance, in a central price scenario, the average price ratio between electricity and gas over a ten-year period of 2025-2035 is around 5:1. This results in an approximately 40% reduction in MACC between 2025 and 2035 (see Figure 18). On the other hand, in a price scenario where the average price ratio in the same period is reduced by 60% to 2:1, the MACC falls by 100% between 2025 and 2035 (as depicted in Figure 19). This indicates that there is no cost associated to carbon abatement using heat pumps in residential buildings. In other words, the bill savings due to the decreased fuel ratio gap entirely negates the higher upfront costs of heat pumps.

115 BEIS (2021) English Housing Survey (EHS) 2019 fuel poverty dataset

116 <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government/the-green-book-2020>

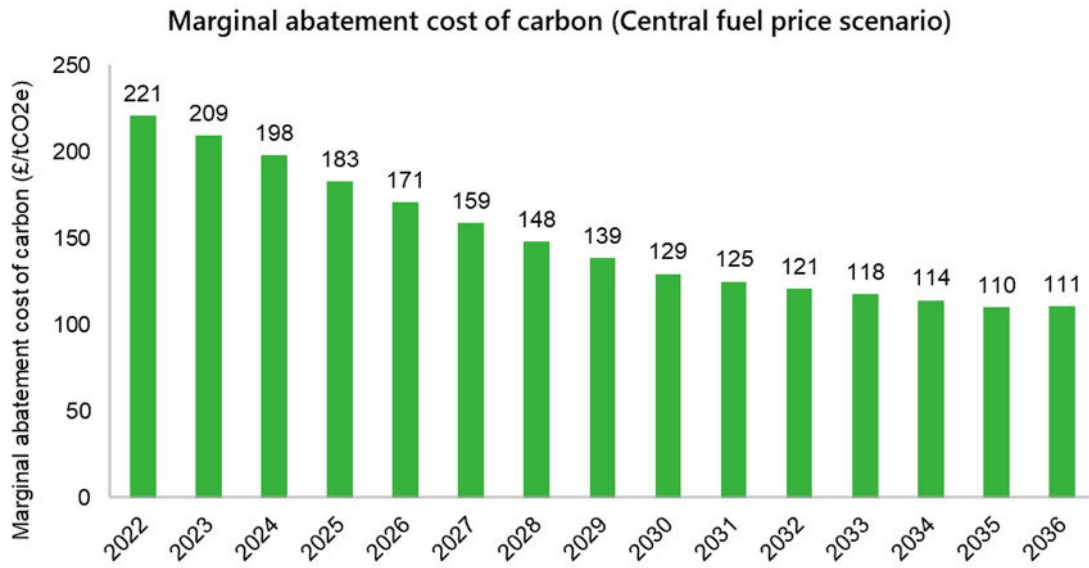


Figure 18 - Marginal abatement cost of carbon (central fuel price scenario)¹¹⁷

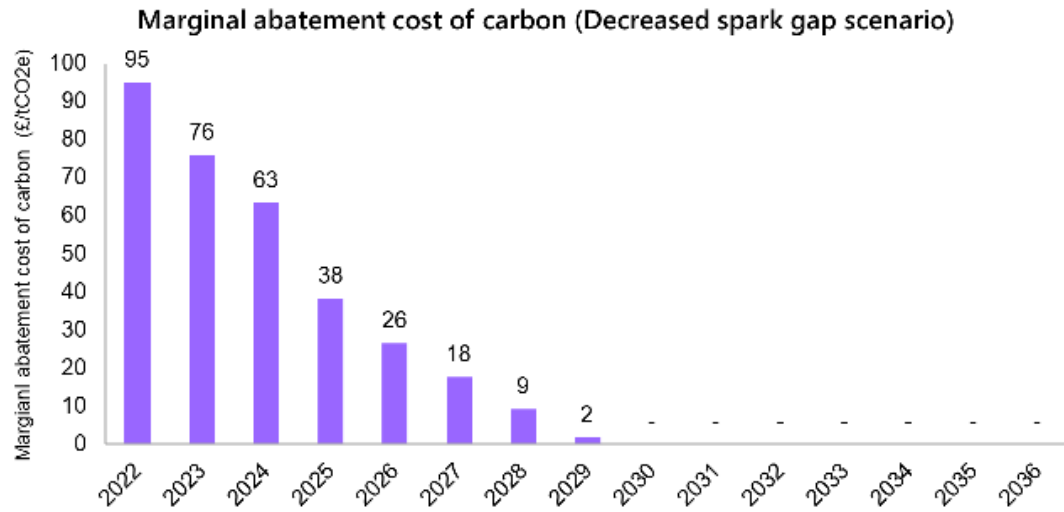


Figure 19 - Marginal abatement cost of carbon (Decreased fuel price gap scenario)

117 BEIS (2022) The Green Book Data Tables

However, it is important to note that in either of the price scenarios, there is an accelerative effect on reductions in MACC of rolling out heat pumps sooner. Conversely, it will become harder, and more expensive, to achieve the faster acceleration needed if their rollout is delayed. This is evident from an intertemporal analysis of marginal abatement costs over two lifetimes of the technology. In a scenario where households install a heat pump today (the first lifetime) and re-install a heat pump again in the second lifetime of the technology, the MACC reduces by 83% between the two periods because of decreased installation costs of refitting heat pumps compared to retrofit installations. On the other hand, if households do not install a heat pump now and switch to heat pumps only in the second lifetime (late 2030s), the MACC will fall by only 20%. This result emphasises the importance of early heat pump rollout by incentivising the demand and supply side sooner rather than later.



EFFECT OF HEATING SYSTEM DESIGN, INSTALLATION, AND COMMISSIONING.

The running cost of heat pumps also increases if heat pumps do not perform as designed. This happens when heat pumps are not correctly specified, or installed, and particularly where the heat distribution system (typically radiators, pipework, sometimes underfloor heating) does not allow sufficient heat transfer into the building at operating temperatures where the heat pump can work most efficiently. Therefore, high quality installs play a significant role in the running cost of heat pumps.

This applies to boilers as well as heat pumps. In its recent consultation in Spring 2023 on Improving Boiler Standards and Efficiency, the Government set out proposals to increase the in-situ operating efficiency of gas boilers and acknowledged the benefit of steps that lower central heating operating temperatures on improving efficiency. As the industry increasingly moves to low temperature heating systems in general, heating installers will need familiarisation training to explain the changes reflected within the recent Part L update which came into effect in June 2023. The Approved Documents provide guidance for new and full replacement heating systems to operate at a maximum flow temperature of $\leq 55^{\circ}\text{C}$, such as room-by-room heat loss calculations, radiator sizing, hydraulic balancing, system filter installation and the flushing out of systems. While the room-by-room heat loss calculation is included in Part L, the other measures that should be common practice are not always undertaken.

There is presently no requirement when boilers are changed for an installer to perform any additional assessment as to whether a consumer's heating system will provide sufficient heating year-round whilst still operating in high efficiency (condensing) mode, nor for the installer to ensure the heating system itself is otherwise properly maintained – for example by checking hydraulic balancing, taking steps to remove the build-up of debris in the system or ensure corrosion inhibitor levels remain appropriate.

Whilst Approved Document L provides guidance on how to meet the Building Regulations by ensuring a 55 °C maximum flow temperature design on new and full replacement heating systems under all operating conditions, the guidance does not extend to existing systems where a simple boiler change is taking place and there is no wider replacement of the central heating system itself. This means it is possible that when boilers are changed, consumers, may not be getting the most efficient performance from their new boiler. In turn, it also means consumers are not routinely upgrading components of their heating systems (for example a single radiator's insufficient surface area may mean the entire system has to operate at non-condensing temperatures to allow sufficient heating, whilst all other radiators could be capable of doing so at < 55 °C). Consequently, the opportunity to lower flow temperatures at the point of a major heating system intervention, such as a boiler change, is being missed. This means when a consumer eventually comes to install a heat pump, they will be incurring greater costs because those system upgrades cannot be masked by inefficient heat pump operation in the same way a boiler will mask them by operating in non-condensing mode.



2. RECOMMENDATIONS TO LOWER THE RUNNING COST OF HEAT PUMPS.

Currently, in the UK, there is insufficient policy support to help reduce the running cost of heat pumps. While the absence of support is a significant policy gap, there is also a clear imbalance in the cost of gas vs. electricity.

2.1 Re-balance environmental and social obligations (ESOs) in energy bills.

Re-balancing policy costs with the aim of making electricity cheaper would be a major step towards creating an attractive financial case for consumers to switch to a heat pump. Our analysis has shown that if direct policy costs were equal per unit of energy used on gas and electricity bills, fuel costs from heating a home using an air-to-water source heat pump would be £95 lower than compared to a gas boiler and £264 lower with a ground source heat pump. This represents a net difference in the relative running cost savings compared to a gas boiler of £251 compared to the current levy structure for air-to-water source heat pumps and £230 for ground source heat pumps. Adjusting these taxes to reflect the carbon content of these energy vectors is key to providing fairer conditions for low carbon heating. If policy costs were weighted by emissions intensity, an air-to-water source heat pump would deliver running cost savings of £100 compared to a gas boiler and a ground source heat pump would deliver £267 in annual savings. This recommendation is supported by the National Infrastructure Commission (NIC) who call for the removal of policy costs on electricity bills to ensure the cost of running a heat pump is lower than the cost of running a gas boiler.¹¹⁸

¹¹⁸ National Infrastructure Commission (2023) Second National Infrastructure Assessment - NIC

METHODS TO REBALANCE ESOs IN ENERGY BILLS

Remove the policy costs and place a carbon tax on the fuels to recoup the tax revenue.

To ensure consideration of the impacts that this change can have on those subjected to fuel poverty, lessons in how to approach this can be taken from Canada, where carbon tax raised is being provided through a carbon tax rebate to lower-income members of society who would otherwise be hit the hardest¹¹⁹.

Impact in the UK. This approach would decrease the cost of running an AWHP by £145 per annum and the running cost of a GWHP by £124 p. a. However, the average gas boiler running costs would increase by £109 and the average oil boiler running costs would increase by £197. Bills for electricity for non-heating uses, such as lights and appliances, would decrease by £126 for the average household, no matter what heating system they have.

Offer an exemption from policy costs for those using a heat pump. This is a more targeted approach based on what has been introduced in Denmark. In Denmark, consumers using an electric heat pump are given an exemption from environmental levies on a certain share of their electricity usage that makes up an average household's electricity consumption for heating with a heat pump, which in the UK would correspond to roughly 4,000 kWh of electricity a year¹²⁰.

Impact in the UK. This approach would decrease the cost of running an AWHP by £145 per annum and the running cost of a GWHP by £124 p. a. However, the average gas boiler running costs would increase by £109 and the average oil boiler running costs would increase by £197. Bills for electricity for non-heating uses, such as lights and appliances, would decrease by £126 for the average household, no matter what heating system they have.

Carbon reflective pricing through a carbon tax would ensure incentives in the market are aligned with net zero. The lowest carbon heat should be the lowest cost heat. The setting up of the UK Emissions Trading Scheme also presents the Government with an opportunity to extend the industries covered by the scheme, which could include heating in the future¹²¹.

119 Conservatives (2019) Conservative Manifesto

120 Energy post (2021) Redesigning UK Electricity Taxes to Boost Heat Pump Sales

121 DESNZ (2023) Participating in the UK ETS

2.2 Introduce an interim Heat pump electricity tariff.

Currently, in the UK, there are very few flexible or dynamic tariffs available that are designed to incentivise the flexible use of electricity and access to these tariffs is not widespread.¹²² As outlined by BEAMA, off-peak rates do not provide adequate support to consumers as they do not reflect the lower cost of wholesale electricity at night and create a lottery across suppliers that flexibly set day and night rates¹²³.

The HPA advises that a specialised heat pump tariff, like those offered in European countries such as Italy¹²⁴ where over 500,000 heat pumps were installed last year¹²⁵ should be introduced as an interim measure to encourage consumers to cut their emissions from heating and switch to a heat pump, whilst steps are being taken to permanently reduce electricity prices.

The HPA would also like to note their support for the continued development of time-of-use and other flexible tariffs. Even without shifting heating loads, consumers can expect to reduce their average heat pump running costs by 2% by using a flexible tariff, although, this figure can be increased significantly by shifting heating loads to times of low electricity prices¹²⁶. For flexible tariffs to be successful, investments in distribution within the power sector and smart grids will need to be made. However, well-designed flexible electricity tariffs can also encourage consumers to shift heating loads in beneficial ways to the grid.

2.3 Installation and Servicing of Heating Systems – Mandatory Routine Practice.

During routine change or installation of any major central heating system component (particularly a boiler or a heat pump), the installer should be required to undertake the following:

- Heat loss calculations – Room-by-room heat loss calculations should be mandated and carried out for all retrofit boiler installations. This will help refine the quality of installs and prepare installers for the requirements for installing heat pumps. There are several surveying apps available which can provide a full room by room heat loss calculation within 1 hour, so heat loss calculations will add little time and cost to installations and deliver significant benefits.

¹²² BEAMA (2023) BEAMA Policy Paper -Putting 'the Customer' at the heart of a future smart and secure electricity system

¹²³ BEAMA (2023) BEAMA Policy Paper -Putting 'the Customer' at the heart of a future smart and secure electricity system

¹²⁴ Rossato (2014) The D1 electricity tariff for heat pumps

¹²⁵ Carbon Brief (2023) Guest post: How the energy crisis is boosting heat pumps in Europe

¹²⁶ Based on average annual heating load distribution according to Watson (2019) and Octopus Cosy Heating Tariff.

- Low carbon quotes - Customers should be offered a quote which includes CO₂ savings, an estimate of running costs and bi-valent points for moving to a low temperature system. This can cover Boiler/Hybrid and heat pump options.
- Mandating hydraulic balancing - Hydraulic balancing should also be mandated on installations and servicing. Automatic balancing valves are widely available, and research shows that customers can save around 8.8% on their fuel bills¹²⁷. Auto balancing valves will not add any more time to an installation as these replace standard radiator valves.
- System filter installation and flushing out of systems should also be mandated.

2.4 Develop and introduce appropriate policy to support investment in large scale, long-duration electricity storage solutions in line with the commitments set out in the British Energy Security Strategy.¹²⁸ We encourage government and grid operators to increase investment in energy storage to allow a smooth transition to low carbon technologies and to prevent curtailment costs from being passed onto electricity users.

A combination of storage and flexible demand side response can help balance the grid and alleviate constraints, avoiding curtailment costs being passed onto consumers. Flexibility from technologies such as electricity storage could save up to £10 billion per year by 2050 by reducing the amount of generation and network needed to decarbonise and create 24,000 jobs.¹²⁹ Heat pumps can operate flexibly which can smooth heating loads and make energy demand more manageable in combination with intermittent renewables. We particularly welcome the Government's aim to ensure the deployment of large scale, long duration electricity storage¹³⁰. Additional investment is needed to support the grid and avoid congestion during the necessary scale up of low carbon technologies such as heat pumps to meet net zero. Furthermore, curtailment often relies on generators such as natural gas to meet demand which could result in 5.5 million metric tonnes of additional greenhouse gas emissions per year by 2025¹³¹. We would encourage grid operators and government to continue to invest in energy storage to allow a smooth transition to low carbon technologies.

¹²⁷ Drayton (2023) Auto-balancing TRV's

¹²⁸ <https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy#networks-storage-and-flexibility>

¹²⁹ <https://www.gov.uk/government/publications/energy-security-bill-factsheets/energy-security-bill-factsheet-defining-electricity-storage>

¹³⁰ <https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy#networks-storage-and-flexibility>

¹³¹ <https://formenergy.com/insights/energy-storage-to-support-the-uk-transmission-grid/>

THE INSTALLER WORKFORCE

The UK is playing catch up with its European neighbours in terms of the development of their heat pump market. Not only are the number of installations per home far behind that of many countries in Europe¹³², but the level of heat pump training is also lagging with less than 4% of heating installers trained to install heat pumps¹³³ compared to 10% in Germany and Poland¹³⁴. Assuming that on average retrained engineers will still spend a third of their time installing fossil fuel boilers, by 2030, 52% of the heating engineer workforce will need to be retrained to install heat pumps¹³⁵. There are three installer related challenges at play: (i) standardising the quality of installs to optimise the performance of heat pumps (ii) the need to reskill the workforce to be qualified and competent to install heat pumps, and (iii) the need for newcomers in the workforce as the heating industry is ageing and decreasing in size with installers retiring at a faster rate than they are currently being replaced¹³⁶.

GROWING THE WORKFORCE.

To meet the ambition of 600,000 heat pump installs per year by 2028, there needs to be at least 33,700 installers (FTE) who are competent to perform these installations. HPA analysis suggests that a minimum of 50,200 installers (FTE) will be required by 2030¹³⁷. As it stands, according to Government figures, there are approximately 4,500 qualified and competent heat pump installers working for MCS-certified businesses¹³⁸. Reskilling a large workforce remains challenging for several reasons: uncertainty of the long-term need for the qualification, certification costs, course costs and lost income from attending the course¹³⁹ as well as the effort required to organise attendance, studying time and travel.

132 New Scientist (2021) UK's slow heat pump efforts will take 600 years to meet 2050 target.

133 DESNZ (2023) Clean Heat Market Mechanism. Gas Safe Register (2019) Ten years of keeping people gas safe.

134 European Heating Industry (2021) Rolling out heat pumps: Barriers and how to overcome them.

135 Based on required installer estimates from Building the Installer Base for Net Zero Heating Total heating and ventilation engineer workforce according to <https://www.smf.co.uk/publications/installing-for-time/>. Note that this analysis does not consider potential new entrants to the market via apprenticeships as it is assumed that these new entrants are offset by retiring installers.

136 HPA analysis of training and retirement rates suggested by industry age profile.

137 HPA (2020) Building the Installer Base for Net Zero Heating

138 DESNZ (2023) Clean Heat Market Mechanism

139 Nesta (2022) Helping Mid-Career Gas Boiler Engineers to Retrain in Heat Pumps

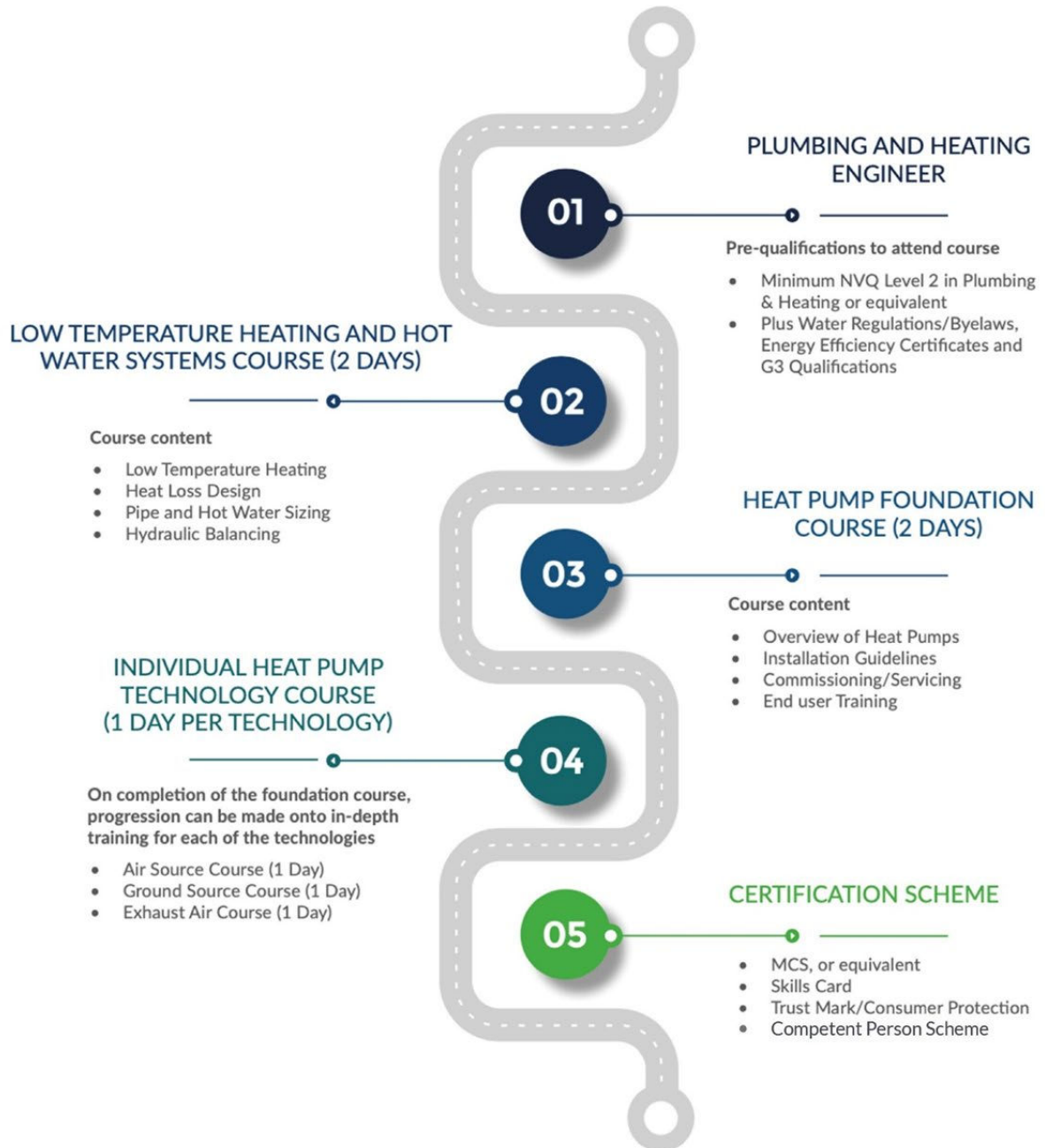
In a survey conducted by the HPA with 182 installers in May 2021, over 60% of respondents had less than 5 years of experience installing low temperature heating systems, with over 90% of heating systems installed to operate at temperatures above 55°C.¹⁴⁰ In anticipation of the transition to widescale low carbon heating systems and with clear targets to decarbonise buildings, it is critical that all installers have a low temperature heating qualification to ensure any new or replacement systems are correctly installed according to current Building Regulations.

The HPA has long held the view that the existing population of heating engineers, mostly Gas Safe registered, will be key in supporting the transition to decarbonising domestic heating. To support the wide-scale deployment of heat pumps in line with the Government's targets, the design of any heat distribution system, and particularly its ability to deliver sufficient heat at low operating temperatures, is essential to a heat pump working efficiently, irrespective of the scale of the heat loss. Currently, registered heating engineers are not required to possess a low temperature heating system design qualification, yet this is fundamental to support the transition to heat pumps, and we propose that low temperature heating training is introduced as a pre-requisite to complete the 5 yearly Accredited Certification Scheme (ACS) assessment and equivalent assessment for oil heating engineers.

The HPA believe that the 5-yearly requirement for re-certification for Gas Safe engineers could prove to be a key opportunity to deliver the retraining, upskilling, or refreshment of installer skills on low temperature heating. The compulsory nature of ACS for Gas Safe would make it a particularly effective option – indeed retraining or refreshing the skills of the entire mass market of heating installers within a 5-year period. Moreover, easily accessible Level 3 courses exist which now carry Ofqual approval are available.

140 HPA (2020) Building the Installer Base for Net Zero Heating

This upskilling pathway for a plumbing and heating engineer was discussed in the HPA's 2020 report on Building the Installer Base ¹⁴⁰.



The Route to Becoming a Heat Pump Installer

Input from HPA members suggests that combined low temperature and heat pump training course costs tend to be around £1,000 and take 5 days. As an estimated 77% of gas industry workers are self-employed¹⁴¹, losing five days of business is a significant loss for the sole trader. HPA member input suggests heating installers can expect annual earnings of £65,000 (although this varies with experience and qualifications) meaning installers lose out on roughly £1,160 of net income by attending the course. This means the average installer is faced with a short-term financial loss of £3,010 when also factoring in potential certification costs. As many installers are self-employed, they are used to bearing the cost of training, but many have raised concerns about the loss of regular income.

We welcome the UK Government's supporting mechanisms to encourage heat pump installer training and raise standards:

- **Heat Pump Training Grant** – In March this year, the Government announced a training grant via a rebate of up to £500. Training providers can offer trainees a discount, rebate, or payment on completion of training.¹⁴²
- **Revision of Minimum Technical Competencies (MTCs)** – The Minimum Technical Competencies (MTCs) that installers are required to meet if they wish to self-certify their heating installations in compliance with the Building Regulations under Competent Person Schemes are being updated to reflect advancements in the sector and are due to be published imminently. (note- the MTCs are due to be re-named 'Mandatory Technical Competencies').
- **Changes to MCS** – If changes within the recent MCS Scheme Development consultation¹⁴³ [June 2023] are implemented as proposed, we anticipate that the administrative burden for installers to interact with funding schemes will decrease and more installers may be encouraged to retrain.

Additionally, we welcome schemes in Scotland such as:

- **The MCS certification fund**¹⁴⁴ – The Scottish Government's MCS Certification fund provides qualified heating installers with a grant to pay 75% of the certification and consumer code fees up to a maximum of £1,000 for their first-year fees to become MCS certified for heat pumps (either ASHP, GSHP or WSHP).
- **Green Heat Installer Engagement programme**¹⁴⁵ – This programme helps installers discover funding opportunities, navigate current legislation and access free resources to help customers.

141 Social Market Foundation (2022) Installing for time? New evidence on the attitudes of home heat installers towards decarbonisation and heat pumps

142 DESNZ (2023) Heat Training Grant: Heat Pumps Heat Training Grant

143 Microgeneration Certification Scheme: MCS Scheme Redevelopment Consultation, June 2023

144 <https://energysavingtrust.org.uk/grants-and-loans/mcs-certification-fund/>

145 <https://findbusinesssupport.gov.scot/service/programmes/green-heat-installer-engagement-programme>

3. RECOMMENDATIONS FOR GROWING THE INSTALLER WORKFORCE.

3.1 Closely monitor the Heat Training Grant.

The HPA welcomes the Heat Training Grant which was rolled out this year. This will be a crucial support for installers and is expected to significantly contribute to the growth of the UK heat pump installer workforce. It is equally important, however, that the uptake of this voucher is closely monitored, and that any shortfall in the uptake should be followed by a careful revision of the value of the grant.

3.2 Low Temperature Heating Training as Mandatory.

Standards across the whole of the heating industry should move to low temperature heating. This could be achieved through the introduction of a low temperature training pre-requisite prior to the completion of a five-yearly ACS renewal for those installing wet heating systems, and equivalent for oil boiler engineers. This requirement should be incorporated into the soon to be published updated Minimum Technical Competencies (MTCs)¹⁴⁶ that installers will need to meet if they wish to self-certify their heating installations in compliance with the Building Regulations.

3.3 New support for the future/current installer workforce.

The HPA would urge England, Wales, and Northern Ireland to provide similar support for current and future installers such as the MCS certification fund or the Green Heat Installer Engagement programme, currently available in Scotland.



146 Minimum Technical Competencies will be renamed Mandatory Technical Competencies when updates are published.

ENCOURAGING NEW ENTRANTS INTO THE INSTALLER WORKFORCE.

The heating industry is ageing and decreasing in size with installers retiring at a faster rate than they are currently being replaced. The current median age of Gas Safe registered installers is 55¹⁴⁷. This is problematic for two key reasons. The heating industry labour market will have to grow to accommodate the fact that first time heat pumps require more working days per install than a gas or oil boiler. In addition, with fewer years remaining in their career, older installers have less incentive to retrain as they will have less time to use any new skills. A Government survey of heating and cooling installers showed that for respondents who were planning to leave in the next 10 years, there was very little motivation to retrain and therefore, they were very unlikely to do so¹⁴⁸.

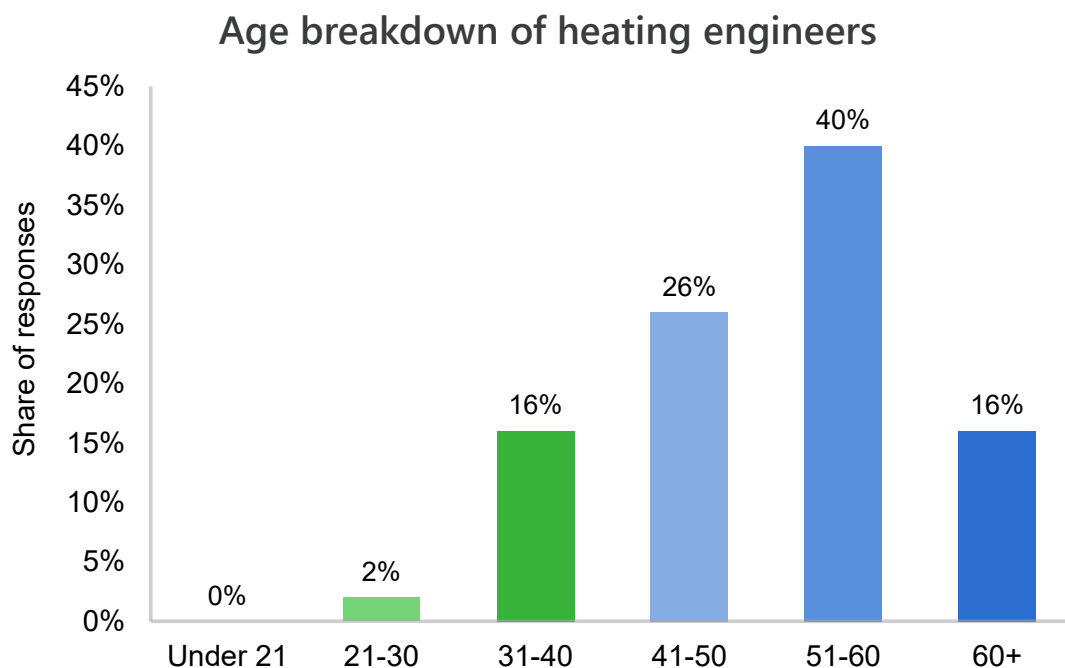


Figure 20 – Age breakdown of heating engineers who responded to the Gemserv survey completed on behalf of the HPA¹⁴⁹

147 Gas Safe Register (2019) The Decade Review

148 BEIS (2023) Heating and Cooling Installer Study

149 Gemserv (2022) Heating system installers share their views on the opportunities and risks they face in the transition to low carbon

It is also important to improve the number and access to plumbing and heating apprenticeships. The ageing demographic of the current heating installer base and low rates of new entrants mean that the industry is at risk of suffering from a significant skills gap in the long term. Two fifths of heating and cooling installer survey respondents indicated they were planning to leave the industry within the next ten years (although these figures are likely affected by selection bias)¹⁵⁰.

The high share of sole traders in the industry may also explain why insufficient apprentices are being taken on, with 77% of installers being sole traders¹⁵¹. If a sole trader takes on an apprentice, they may be inadvertently creating competition for themselves once the apprentice has been trained¹⁵². Additionally, sole traders and SMEs may run into other challenges with retraining and taking on apprentices, such as requiring a larger van to move heat pump units, not having enough time to take on an installer, and struggling to finance certification costs¹⁵³.

One of the biggest challenges facing the industry is that uncertainty is created in the market due to a lack of commitment to clear policy frameworks and timelines, causing installers to view the heat pump market as an uncertain one to enter. Individuals need to have the confidence to spend time and money on retraining and this uncertainty makes investment to train a bigger risk. Although often simpler to retrain an existing heating engineer to install heat pumps, with an ageing demographic it will be vital to encourage new entrants into the sector.

HPA analysis suggests that to avoid a gap in the required number of heating installers by 2030, a 78% increase in the take-up of heating apprenticeships is required, as shown by the below graph. Growth in the overall heating installer labour market is required as, on average, heat pumps have longer install times than fossil fuel boilers.

150 BEIS (2023) Heating and Cooling Installer Study

151 SMF (2022) Installing for time? New evidence on the attitudes of home heat installer towards decarbonisation and heat pumps

152 Gas Safe Register (2019) The Decade Review

153 BEIS (2023) Heating and Cooling Installer Study

The Government has now launched a new low carbon heating technician apprenticeship which was also marked with the Coronation emblem in May 2023.¹⁵⁴

- **Low carbon heating technician apprenticeship scheme** – This apprenticeship allows anyone with at least an Entry Level 3 in English and maths qualification to join the installer workforce. This covers installation, commission, servicing, and maintenance of zero carbon central heating and hot water systems. This includes GSHP, AWP and solar thermal collectors.¹⁵⁵ Funding has now been confirmed at up to £22,000 per apprentice.
- **T-Levels** – The Government has worked alongside hundreds of employers to design T-Level courses and skills. Each T-Level is equivalent in size to 3 A levels and helps younger people develop knowledge and skills. Every T-Level student has to complete an industry placement that lasts a minimum of 315 hours (approximately 45 days).¹⁵⁶

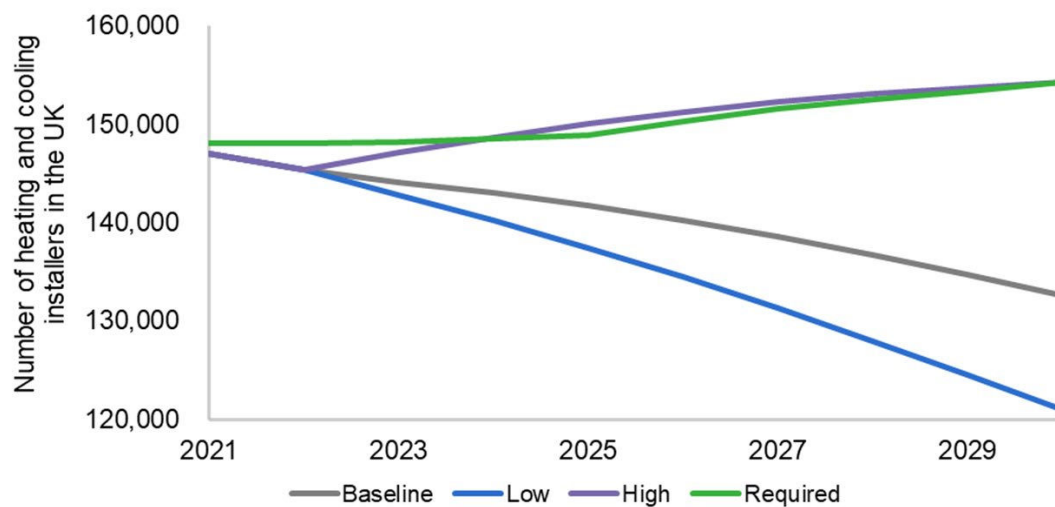


Figure 21 – Heating installer industry size forecasts. Includes all heating, ventilation, and cooling installers. Increase in total labour requirement due to longer install times of heat pumps compared to fossil fuel boilers¹⁵⁷

154 DESNZ (2023) £14 Million Cash Boost to Accelerate Rollout of Low Carbon Heating

155 Institute for Apprenticeships & Technical Education (2023) Low Carbon Heating Technician

156 DoE (2023) Introduction of T Levels

157 Required labour market size in line with government ambition of installing 600,000 heat pumps a year by 2028. Baseline scenario is if current rate of training continues, low is with 50% reduction in training, high is with 78% increase in training as this is what is required to avoid a skills gap by 2030. Analysis completed in 2022.

4. RECOMMENDATIONS FOR ENCOURAGING NEW ENTRANTS INTO THE INSTALLER WORKFORCE.

4.1 The Low Carbon Heating Technician Apprenticeship should continue to be promoted, with consideration given to enhancing and monitoring the diversity of those undertaking the apprenticeship.

The HPA welcomes the new Low Carbon Heating Technician Apprenticeship, however, there are some final steps to take following the confirmation of the funding band of up to £22,000 per apprentice.

For example, more effort is required to encourage young women to take on heating apprenticeships, with only 0.5% of heating engineers being female¹⁵⁸. Specifically, we would urge the Government to commission further sector wide research as to why there is an insufficient number of younger women and ethnic minorities taking up roles within the heating sector.

By using the East Framework,¹⁵⁹ we can assess how to make heating apprenticeships more accessible. Firstly, by encouraging experienced heating engineers to retrain to install heat pumps, the capacity of the industry to take on apprentices will be increased, encouraging more young people to pursue low carbon heating apprenticeships. Messaging designed to appeal to younger people's wish to reduce climate impact could encourage them to enter low carbon heating careers, and referral schemes could result in a social pull, encouraging groups of young people to take on low carbon heating apprenticeships. Finally, marketing efforts to encourage young people into low carbon apprenticeships should be timed when they are deciding their chosen route for key stage 4 studies, highlighting low carbon heating installation as a prosperous and rewarding career.

158 Mr Central Heating (2021) Women in the Trades Industry

159 The BIT (2014) Easy, attractive, social, and timely (EAST)

CONSUMER AND INSTALLER CONFIDENCE

Although heat pumps are a mature technology and widely deployed across the world, they are relatively new for UK residents and installers. This means that there are still administrative aspects of installing heat pumps that need to be ironed out for installers, and information for consumers to understand what it is like to physically have a heat pump in the house.

CHANGES TO SAP AND RdSAP.

The Government is redesigning how a home's energy performance is calculated using the Standard Assessment Procedure (SAP) methodology which underpins the Energy Performance Certificate (EPC). For new build, the most recent version of SAP 10 (10.2) came into force with the updated Part L Building Regulations in June 2022. Further changes are expected (SAP 11) to be introduced in 2025 to support the Future Homes Standard.

For existing dwellings, a simplified version of SAP called Reduced Data SAP (RdSAP) is used to assess their energy performance. RdSAP 2012 is the current version and is considerably out of date. Importantly, it uses decade-old carbon emission factors for electricity which unfairly score heat pumps' carbon savings because they do not reflect the true extent of electricity grid decarbonisation over the last 10 plus years.

The Government is now working on an RdSAP update (RdSAP 10.2), which was originally scheduled for release in summer 2023, and now is expected in Spring 2024. Scoring under RdSAP currently undervalues the high energy efficiency and low carbon nature of a heat pump. This means that the incentive to install heat pumps in schemes such as ECO 4, where RdSAP band improvements are required to gain funding, is reduced. Additionally, it undervalues the EPC rating of properties with heat pumps. An increase of an EPC rating from G to A/B improves a property's value by 14%, and an improvement from D to A/B by around 6%¹⁶⁰. Therefore, not only would improve heat pump scoring under SAP improve the incentive for energy companies to install heat pumps under retrofit energy efficiency schemes, but it would encourage homeowners to install a heat pump to raise the value of their home. This would also allow any property-based financial inducements such as Council Tax¹⁶¹ and Stamp Duty¹⁶² incentives to be linked to a property's improvement in EPC because of having a heat pump.

¹⁶⁰ Money Supermarket (2022) How energy efficiency impacts property value

¹⁶¹ Energy Saving Trust (2015) Energy Efficiency and Local Taxation

¹⁶² Energy Efficiency Infrastructure Group (2022) Energy Saving Stamp Duty Incentive (ESSD)

PLANNING CONSENT.

Air source heat pump installations that comply with a list of permitted development criteria do not require planning permission. It is only necessary to obtain planning consent to install a heat pump where the scope falls outside of the Permitted Development Rights (PDR) legislation. However, the criteria that this is based on currently differ between the devolved nations. This makes it unclear to both installers and customers.¹⁶³ Ground source and water source heat pumps do not normally require planning permission and are generally considered to be permitted development unless in a conservation area or where other special circumstances apply¹⁶⁴.

The regulations around noise constraints, such as the siting requirements and maximum noise level at the neighbour's nearest habitable room, are currently onerous and risk hindering heat pump deployment, particularly in densely populated areas. A review should be undertaken to reduce the ease of the permitted development criteria in line with the latest evidence.

DISTRIBUTION NETWORK OPERATOR (DNO) APPROVAL.

When installing a heat pump today, most heat pumps can be connected under the "Connect and Notify" scheme. However, it is sometimes necessary for the installer to obtain prior permission from the Distribution Network Operator (DNO), under the "Apply to Connect" as they may need to check whether the local network has sufficient capacity and is adequate for the additional load from a new heat pump. However, these approvals can take several months which delays the process of installing a heat pump. In addition, some of the costs of network reinforcement can often be passed onto the householder, for example where a three-phase supply of electricity is deemed necessary. Whilst the network charging and access reform was implemented in April this year, we still see examples where some of the costs of network reinforcement are being requested of the householder, for example where a three-phase supply of electricity is deemed necessary. The HPA will continue to highlight examples to Ofgem and call on them to ensure that DNOs are following the relevant obligations.

¹⁶³ Evergreen Energy, Do I Need Planning Permission for a Heat Pump, Accessed 2023

¹⁶⁴ Planning Portal: Ground Source or Water Source Heat Pumps.

In certain situations, including where the total heat pump system demand is less than 32 Amps, and where the specific heat pump model is listed on the ENA's Heat Pump Database as "Connect & Notify", it is possible for the installer to proceed with the installation without having to first "Apply to Connect". This process is in urgent need of streamlining and simplifying. The ENA is working on a new process due to be launched in Winter 2023, which will require prior notification for every heat pump connection. It is intended that the new "Digitalisation of Connections" (DOC) app will replace the existing "Connect and Notify" process and will require all heat pump installations to apply for a connection via an app and wait for the DNO to approve before they are installed. This could add additional complexity and delays for installers in securing new projects.

One significant issue is the inconsistency in the approach taken by the DNOs with regards to costs for the fuse supply. Some will offer a 100A fuse free of charge, while others will only offer an 80A fuse free of charge. Another inconsistency between DNOs is the methodology for calculating diversity and maximum demand which causes major issues for installers. The HPA is calling for Ofgem and the ENA to encourage and work with the DNOs to simplify these processes, eliminate inconsistencies in the approach, and improve guidance for installers.

REDESIGN EPCs.

The current design layout of domestic EPCs shows the running cost rating on a coloured A-G scale at the top of the certificate in a prominent position, whilst the environmental impact rating is given lower in the certificate. Changes that could be made to improve the property's energy cost rating are suggested within the EPC. However, no suggestions are given as to the measures that would improve the carbon rating of the property. For householders that are keen to explore low carbon alternatives, this is a lost opportunity to explain and promote low carbon heating solutions, such as heat pumps.

The Scottish Government have recently consulted on improving the design of Scottish EPCs¹⁶⁵ and sought views on possible headline metrics, such as "heating system type", which considers a way of rating heating systems according to their carbon emissions. Whilst more work is required on the design of such a heating system rating, this idea may be one way of helping householders understand the environmental impact rating of their heating system. Another consideration is that the cost rating can be confusing to consumers due to differing tariffs and energy use which are not fully covered in the design of the EPC. In addition, one possible suggestion would be to consider a description within the EPC showing if a home is "heat pump ready" and use this to explain to householders some of the key information on the EPC and which types of low carbon measures they could consider.

¹⁶⁵ <https://consult.gov.scot/energy-and-climate-change-directorate/energy-performance-certificate-reform-consultation/>

5. RECOMMENDATIONS TO INCREASE CONSUMER AND INSTALLER CONFIDENCE.

5.1 RdSAP 10.2 should be implemented without further delay to ensure heat pump contributions to EPC rating properly reflect carbon savings.

5.2 Permitted Development Rights (PDR) for ASHPs must be urgently reviewed to ensure that the requirements across the devolved nations in relation to noise levels, size of the unit and proximity to the property boundary are proportionate, consistent, and clear for installers and consumers, and are based on the latest evidence.

5.3 Streamlining and simplifying grid connections.

Electricity networks are regularly updated whilst also streamlining the process of registering a heat pump installation with the Energy Networks Association as DNO approvals for load checks and reinforcement works can often take several months.

5.4 Ensure SAP 11 is ready before the legislation to implement the Future Homes Standard takes effect.

The SAP 10.2 software was not available when the June 2022 update to Part L of a 31% reduction in CO₂ emissions from new homes took effect. It is essential for the successful on-time implementation of the Future Homes Standard that the necessary developments to SAP and its software are ready on time.

5.5 Consider an EPC redesign to better promote the merits of installing low carbon heating systems.

Possible considerations include:

- The addition of metrics that display the benefits of low carbon technologies more prominently to householders to aid their understanding of the positive environmental impact of heat pumps
- Reconsidering how the cost rating is displayed to ensure that consumer confusion is avoided
- Adding a description of whether a home is 'heat pump ready'.

HEAT NETWORKS

Heat networks are recognised by the Government as a crucial, low-cost, low carbon solution for offering heat in high density urban areas.¹⁶⁶ Heat networks typically produce or recover high-temperature heat in one location and transport it to another in the form of hot water. Some heat networks can also provide cooling by distributing cold water. Heat networks can use waste heat from factories and the environment, such as from the ground or river, as a source of heat. Large-scale heat pumps, air source heat pumps (ASHP) and/or ground source heat pumps (GSHP) are important technologies involved in these networks.

To support the upfront cost of improving or building heating networks, the UK Government has rolled out several schemes across the UK such as the Heat Network Investment Programme (HNIP), The Green Heat Network Fund (GHNF) and the Heat Network Efficiency Scheme. Additionally, the government is introducing a comprehensive heat network zoning policy that will underpin the rapid deployment of low-carbon heat networks across the UK. The HPA welcomes these policies as significant steps towards decarbonising the UK building stock and improving energy efficiency which plays a large role in achieving the UK's Net Zero target.

HEAT PUMP NETWORKS.

In addition to this traditional form of a heat network, heat pump networks (sometimes called ambient heat networks) are likely to play a growing role in heat decarbonisation. These are included within the UK's legal definition of heat networks but differ in important ways. Heat pump networks operate exactly like an individual ground source heat pump system, supplying heat naturally stored in the ground to a heat pump in a home, except that multiple heat pumps in multiple buildings, are all connected to the same shared ground loop installed under the street. This approach removes the need for individual homes to have the space for their own ground loop and allows for the shared ground loop to be funded, owned, and maintained, by a third party thus removing the upfront cost to consumers. This type of network also eliminates heat distribution and associated heat losses that can make traditional heat networks unsuitable in less heat-dense areas. Heat pump networks are likely to fill an important gap in low-carbon heat provision in buildings and homes that may be less suitable for either traditional heat networks or individual heat pumps such as tower blocks or small terraced homes.

¹⁶⁶ DESNZ (2016) Heat Networks

The Climate Change Committee and National Grid forecast the need for 5-8 million ground-source heat pumps by 2050¹⁶⁷ and the vast majority of these, for reasons of economic and practical considerations, will be part of heat pump networks. However, there is a notable policy gap in relation to this form of heat network¹⁶⁸ which must be addressed to allow the unique elements of the GSHP supply chain to develop, such as more borehole drilling companies, and for the industry to scale-up and reduce costs. At scale, the industry estimates it can achieve a 60% reduction in upfront installation costs compared to an individual GSHP installation.¹⁶⁹ In the short to medium term, this scale will evolve from the new build and social housing sectors. The new build market will be viable following the introduction of the planned Future Homes Standard, and social housing providers are obliged to decarbonise and improve the energy efficiency of their stock, meaning that the right market conditions already exist to connect large numbers of homes to a heat pump network once installed.

However, social housing providers lack sufficient capital to install insulation measures and clean heating solutions without support from Government. Clean heat in social housing was previously supported by the domestic and non-domestic RHI as well as ECO. Momentum had been building, particularly within the non-domestic RHI, for shared ground loops in social housing with almost 800 small GSHPs installed in the final full year of the RHI¹⁷⁰. Following the closure of the RHI and changes to ECO, the social housing sector relies heavily on the Social Housing Decarbonisation Fund (SHDF), a generalised energy efficiency scheme where just 3% of measures installed to date have been heat pumps since the scheme's launch in 2021. SHDF Wave 2.1 funding awarded earlier this year, may result in some more projects but with no new funding available until 2025, the scheme is unlikely to support more than a few hundred heat pump installations in its first 4 years of operation. We must see key reforms to both the SHDF and ECO to ensure that heat pumps are properly supported in social housing and to start to build the supply chain for heat pump networks.

167 Climate Change Committee (2023) Development of trajectories for residential heat decarbonisation to inform sixth carbon budget and National Grid (23023) Future Energy Scenarios

168 <https://www.leeds.ac.uk/policy-leeds/doc/shared-ground-heat-exchange-decarbonisation-heat>

169 Element Energy (2023) Low Carbon Heat Study

170 Ofgem (March 2023) Monthly Official Statistics

Ensuring the right market conditions develop for networked heat pumps within the private retrofit market will depend on the industry's ability to reduce costs and introduce new financing models. However, in common with traditional heat networks, heat pump network developers require a degree of certainty of connection from homes to support the investment case for the installation of infrastructure. Local Area Energy Plans will play a key role in building heat network zoning and identifying the most appropriate heating technologies for different areas of towns and cities and in incentivising/encouraging their uptake to ensure the successful delivery of the plan. Some local authorities in England and Wales are developing Local Area Energy Plans voluntarily, whilst the Scottish Government has made the development of these plans' compulsory for all local authorities.



6. RECOMMENDATIONS ON SUPPORTING THE DEVELOPMENT OF HEAT NETWORKS AND HEAT PUMP NETWORKS.

6.1 Continued and expanded funding for heat network decarbonisation.

The HPA supports the progress so far on the capital schemes to encourage heat networks to adopt heat pumps and believes these schemes need to continue for the foreseeable future.

6.2 Reform of the Social Housing Decarbonisation Fund to deliver clean heat projects.

Wave 3 of the SHDF should provide a ring-fenced or priority pot for clean heat projects to ensure a minimum number of installations go ahead. Additionally, reflecting the known flaws in the EPC assessments, EPC eligibility criteria for those properties seeking to replace old direct electric heating should be relaxed to band C.

6.3 Reform of ECO4 to ensure delivery of clean heat projects in social housing.

The requirement for social housing providers to be at band E or below before qualifying for ECO4 excludes virtually all potential heat pump network projects in social housing from receiving funding. As with proposed reforms to SHDF, ECO EPC eligibility criteria should be relaxed to band C at least for those projects which currently have direct electric heating.

6.4 More Research into Policy to Support Funding Arrangements for Ground Source Heat Pump Infrastructure.

The HPA would like to see the Government undertake more research into maximising the opportunities and addressing any regulatory barriers, to new, utility-style funding options for shared ground source infrastructure.

6.5 Local Area Energy Plans.

Development of Local Area Energy Plans, centrally coordinated by the Future Systems Operator to support, alongside other aims, the deployment of heat pump networks on an area wide basis.

6.6 Licensing for the installations of shared ground loops.

Regulations made under the provisions of the Energy Act 2023¹⁷¹ must allow for developers of heat pump networks to obtain licenses to install and maintain shared ground loops, without the need for obtaining planning permission.

171 <https://bills.parliament.uk/bills/3311>

HEAT PUMP MARKET DRIVERS

RETROFIT MARKET.

Since the UK Government announced its ambition in 2020 to install 600,000 heat pumps per year by 2028, they have proposed two policies that are set to have a significant impact on the retrofit heating market:

Clean Heat Market Mechanism – The UK Government has consulted on the detailed design of the Clean Heat Market Mechanism (CHMM), to be introduced in 2024¹⁷². This aims to transform the heating market by placing a requirement on manufacturers of oil and gas boilers up to 70 kW capacity to ensure minimum quotas of heat pumps are installed. Under current proposals, the obligation can be met by ensuring a certain number of their own heat pumps are installed, by trading credits with other manufacturers, or by paying £5,000 for each missing credit. However, the principles of the CHMM and the timeframe set out for its introduction are likely to have a negative impact on the wider roll-out of heat pumps if the scheme goes ahead as proposed in the Summer 2023 Consultation. We are aware that the Government is further considering the design of the policy in response to the consultation. We await with interest the final policy proposals, to be set out in due course in the publication of the Government response to the consultation.

Ending the sale of new fossil fuel boilers – The UK Government has proposed an ambition to phase out the sale of most new fossil fuel boilers from 2035 with exemptions for unsuitable homes, which it estimates to be around 20%.¹⁷³ However, there has not yet been a firm commitment to this ambition. The absence of firm decisions on this date, and the lack of clarity over what criteria will result in an exemption is creating uncertainty for investors and other parts of the supply chain.

¹⁷² DESNZ (2023) Clean Heat Market Mechanism

¹⁷³ GOV.UK (2023) PM speech on Net Zero: 20 September 2023 - GOV.UK (www.gov.uk)

NEW BUILD MARKET.

In 2019 and 2021, the Government consulted on the Future Homes Standard and Future Buildings Standard respectively, and confirmed during 2021^{174, 175} its intent to implement them both in 2025. The stated ambition for both was to make all buildings built from 2025 net-zero ready by building to a much higher standard of fabric energy efficiency and equipping them with low carbon heating from the start. Through the implementation of the New Build Heat Standard¹⁷⁶, Scotland have regulated to prohibit the use of direct emissions heating systems in new buildings from April 2024.

The Government's implementation timetable for both the Future Homes Standard and Future Buildings Standard included a technical consultation in Spring 2023 to pass the necessary secondary legislation in 2024 to allow on-time implementation in 2025. These consultations are now overdue. The content of the technical consultations will be important in determining the precise role heat pumps play in providing net zero ready new buildings from 2025, and it is important for confidence in the industry that the timetable does not slip further if the implementation is to take place in 2025 as planned.

In addition to these key regulatory measures, consideration should be given to providing preferential Council Tax¹⁷⁷ and/or Stamp Duty¹⁷⁸ rates to those homes that have a heat pump installed to boost consumer acceptance and demand.



174 DLUHC (2019) The Future Homes Standard Government Response

175 DLUHC (2021) The Future Buildings Standard Government Response

176 Scottish Government (2023) New Build Heat Standard 2024: fairer Scotland duty assessment - gov.scot (www.gov.scot)

177 https://www.energysavingtrust.org.uk/sites/default/files/Paper%20for%20Commission%20on%20Local%20Tax%20Reform_11August15.pdf

178 <https://www.theeig.co.uk/stamp-duty/>

7. RECOMMENDATIONS FOR MARKET DRIVERS.

7.1 Introduce other market enablers in advance of a more balanced and workable Clean Heat Market Mechanism to allow it to work effectively.

The HPA believes the other recommendations contained in this report are essential prerequisites if the Clean Heat Market Mechanism is to work effectively, and therefore urges the Government to reconsider the mechanism considering industry feedback. Key heat pump enablers must be enacted before the introduction of obligations to prime the market for organic growth outside of subsidised installations and new builds. With these enablers in place, industry can meet rising ambition whilst protecting UK manufacturing and jobs. These enablers include a meaningful reduction in the price of electricity relative to gas and a review of planning consent barriers along with others described in this report. We are aware that the Government is further considering the design of the policy in response to the consultation. We await with interest the final policy proposals, to be set out in due course in the publication of the Government response to the consultation.

7.2 Confirm and legislate for the dates to end new sales of fossil fuel boilers and swiftly define the exemption criteria for unsuitable homes.

The HPA believes certainty over the dates for phasing out new sales of fossil fuel boilers is essential to stimulate investment and confidence from the supply chain. One observation of other countries such as France¹⁷⁹, is that early clarity of a date for the full phase out of 100% fossil fuel boilers has had a significant impact on turbocharging investor interest, manufacturer confidence, consumer, and installer engagement. Investors respond best to a long-term, predictable policy framework. Some policy changes have already attracted capital to UK manufacturing and training. Providing long term certainty over the phase out timeline will also encourage participants in the heat pump supply chain to prepare for the transition to low carbon heating.

7.3 Expedite the technical consultations for the Future Homes / Buildings Standard to allow implementation as planned in 2025.

The HPA supports the Future Homes / Buildings Standards in 2025 in the form the Government confirmed in 2021. The technical consultations on both these standards were expected in Spring 2023 and are now overdue. These must be issued without further delay if the legislation is to be enacted in 2024 in time for implementation in 2025.

7.4 Provide preferential Council Tax and/or Stamp Duty rates to those homes that have a heat pump installed to boost consumer acceptance and demand.

179 Natura Sciences (2020) Un « coup de pouce chauffage » pour les chaudières et les radiateurs Following the French Government's commitment to phase out all oil boilers within 10 years, and the provision of a scrappage scheme grant alongside this, there was a surge in heat pump installer training. As a result, the number of installers trained in the first half of 2019 surged by 264% for heat pumps compared to the same period in 2018.

INVESTMENT IN INNOVATION

The Government has announced a target to be one of the largest markets in Europe for heat pumps by the end of the decade.¹⁸⁰ To make this happen, it is important to encourage heat pump manufacturers to expand their businesses in the UK and create new investment opportunities, and has taken three specific steps to encourage this:

HEAT PUMP INVESTMENT ACCELERATOR.

This competition opened in July 2023, closing for applications in October 2023, and provides grant funding of up to £15 million per project for major investments in the manufacture of heat pumps and strategically important components. The Competition is worth £30 million in total and aims to bring forward investment in the UK heat pump manufacturing supply chain. This funding is expected to leverage £270 million of private investment in the heat pump industry.¹⁸¹ The HPA welcomes this announcement and supports growth in investment in UK based manufacturing.

HEAT PUMP READY.

The Heat Pump Ready Programme¹⁸² supports the development of innovative solutions across the heat pump sector. It is split into 3 separate delivery streams:

- Stream 1: solutions for high-density heat pump deployment £12 million of funding provided.
- Stream 2: developing tools and technology. Up to £25 million of grant funding for projects to overcome barriers to heat pump deployment, beginning spring 2022.
- Stream 3: trial support and learning. Up to £5 million contract from spring 2022.

Smart and Secure Electricity System – In March 2023 the Government responded to its 2022 consultation: Delivering a Smart and Secure Electricity System.¹⁸³ It has been proposed that the Government will introduce the ‘smart mandate’ to heat technologies in 2023 (primary legislation) with further details of the proposal to be consulted on. Following this, the secondary legislation is to be developed between 2024 and 2025. The proposals are set to become operational from 2026 onwards. For industry to meet this deadline, it will be essential to put in place the right arrangements for stable guidance and standards sufficiently in advance to allow industry to prepare.

¹⁸⁰ HM Government (2023) Heat Pump Investment Roadmap

¹⁸¹ DESNZ (2023) Apply for the Heat Pump Investment Accelerator Competition

¹⁸² Heat Pump Ready Programme: successful projects - GOV.UK (www.gov.uk)

¹⁸³ DESNZ (2022) Delivering a Smart and Secure Electricity System Government Response

8. RECOMMENDATIONS ON INVESTMENT IN INNOVATION.

8.1 Maintain the requirement for testing of heat pumps.

The HPA believes that as the demand for heat pumps increases, the UK Government should not relax the current strict testing criteria already in place via Heat Pump Keymark or equivalent schemes. In addition, heat pumps should also continue to be tested to the current ErP requirement of SCOP 3.0 (average climate, 55°C flow). Heat pumps that do not perform in line with agreed standards can cause long-term reputational damage to the heat pump industry as well as not deliver expected benefits to support the UK's net-zero target.

8.2 Introduce the Smart Heat Pumps Mandate as soon as practicable, providing sufficient time is allowed to prepare (minimum of 2-year notice).

The HPA supports formalising the requirement for heat pumps to operate flexibly from 2026 to allow access to additional consumer benefits from lower running costs or additional revenue streams in response to changing electricity prices or network conditions. However, standards, guidelines, governance arrangements and interoperability requirements need to be in place in advance (minimum 2 years) to allow the market sufficient time to prepare.

8.3 Increased funding to support Heat Pump Supply Chain Investment.

The HPA would strongly urge more investment in the development of UK based manufacturing facilities via additional funding of the Heat Pump Investment Accelerator Competition to ensure that a greater number of projects can be supported. The UK must massively increase local production of heat pumps and critical system components if equipment cost reduction targets are to be fulfilled.

In addition, the HPA are calling for more innovation funding via the Heat Pump Ready Programme to support the development of new mass-market solutions for high-density heat pump deployment, tools that simplify and speed-up installation processes, learning aids to support installers, and mechanisms that support knowledge transfer between innovative parties. The development of tools, technology and processes are urgently required to overcome specific barriers to domestic heat pump deployment.

KEY POLICY RECOMMENDATIONS FOR UNLOCKING THE DEPLOYMENT OF HEAT PUMPS IN THE UK



REDUCING UPFRONT COSTS

Optimise the Boiler Upgrade Scheme

Clarify and extend the zero rate VAT relief for all heat pump systems

Introduce Government-backed interest-free loans



REDUCING RUNNING COSTS

Re-balance policy costs on domestic energy bills

Introduce an interim heat pump electricity tariff

Introduce Mandatory Routine Practices for Heating System Installations and Servicing

Develop appropriate policy to support investment in electricity storage solutions



GROWING THE INSTALLER WORKFORCE

Monitor Heat Training Grant and take action if underspend likely

Mandate Low Temperature Heating Training for all heating engineers

Provide additional support to grow the installer workforce



ENCOURAGING NEW ENTRANTS INTO THE INSTALLER WORKFORCE

Continue to support and promote Low Carbon Heating Technician Apprenticeship



INCREASING EASE OF HEAT PUMP INSTALLS AND IMPROVING CONSUMER AND INSTALLER CONFIDENCE

Implement RdSAP 10.2 without further delay

Streamline Permitted Development Rights (PDR) for ASHPs

Ensure SAP 11 is ready before Future Homes Standard takes effect

Redesign EPCs to better promote the merits of installing low carbon heating systems

Streamline and simplify grid connections



SUPPORTING THE DEVELOPMENT OF HEAT NETWORKS AND HEAT PUMP NETWORKS

Expand funding for heat network decarbonisation

Reform the SHDF to deliver clean heat projects

Reform ECO4 to ensure delivery of clean heat projects in social housing

Fund research into policy to support Ground Source Heat Pump infrastructure

Introduce Local Area Energy Plans

License the installations of shared ground loops



IMPROVING MARKET DRIVERS

Introduce the other market enablers recommended in this report in advance of a more balanced and workable Clean Heat Market Mechanism to allow it to work effectively

Confirm and legislate the end of new fossil fuel boilers sales

Expedite the release of technical consultations for the Future Homes / Buildings Standard

Provide preferential Council Tax and/or Stamp Duty rates for homes that have heat pumps



INVESTING IN INNOVATION

Maintain current strict testing criteria via Heat Pump Keymark or equivalent schemes

Introduce the Smart Heat Pumps Mandate as soon as practicable

Increase funding to support heat pump supply chain investment

CASE STUDIES

Geography	Market/Growth	Policy
France	621,776 units (+15.8% 2022 compared to 2021) ¹⁸⁴ Electricity to gas price ratio of 1.4 ¹⁸⁵	<ul style="list-style-type: none"> • March 2023 – French government announced they will award 5,000 euros rebate to anyone at any income level who is replacing an old heating system with a new energy efficient heat pump¹⁸⁶ • Reduced VAT at 5.5% (instead of 20%) on renovation and improvement work on old housing. The dwelling must have been completed more than two years ago. • Zero rate eco-loan – owners or SCI benefit from a loan with 0% interest for works that represent an effective action to improve energy performance. The loan is up to 10,000 euros for an efficient isolated action such as the installation of a heat pump. Or 30,000 euros if you improve the overall energy performance of the home. • MaPrimeRenov – An aid from the French State to finance renovation projects which include insulation, heating, ventilation, and energy audits. This is for houses that are more than 15 years old and that costs at least 1,500 of work. This is Air-to-Water of up to 9,000euros and GSHP of up to 15,000.¹⁸⁷ • Habiter mieux Serenite de L'Anah – support for an energy renovation of a house for those with very low income, a variant of a heat pump subsidy. This can offer from 50% of the amount of work with a limit of 15,000 euros. There is also a bonus called Habiter Mieux of 10% with a maximum of 3,000 euros. • Energy Boost Bonus – for the replacement of a fossil energy by an air/water or water/water heat pump, average low-income households with receive 4000 euros and some 2500.

184 EHPA (2023) European Heat Pump Market and Statistics Report 2023 Executive Summary

185 EuroStat (2023) Electricity prices for household consumers - bi-annual data (from 2007 onwards). Prices as of second half of 2022 and include all levies and taxes on energy prices.

186 Service Public Francaise (2023) Installation d'une pompe à chaleur géothermique

187 EHPA (2023) Subsidies for residential heat pumps in Europe

Belgium	<p>+118% growth in total installations in 2022 compared to 2021 160. Electricity to gas price ratio of 3.9161</p>	<ul style="list-style-type: none"> • Belgium has been coal-free since 2016 and is the first EU member state to phase out the technology. In the National Energy and Climate Plan (NECP), Belgium declared it will gradually discontinue financial investment in, and support for, fossil fuels. • Belgium federal government is aiming for 4GW of offshore wind capacity to be installed by 2030, to help reach target of renewables comprising of 40% of electricity generation by 2030. • Tax and grid tariff exemptions for rooftop solar and energy storage. For example, a rooftop solar has a reduced VAT rate of 6%. • Market for 'Prosumers' make it that retailers have started to develop specific products and tariffs where electricity is prices throughout the day at a cheaper night tariff. • The Belgium government uses subsidies, taxes, and carbon prices, to influence the wholesale price of fossil fuel. • Belgium is aiming for a 15% reduction in primary energy consumption and 12% saving in final energy consumption by 2030 compared to BAU. • The Brussels region is aiming to improve energy efficiency of its housing stock (average primary energy consumption reaches 100kWh per square meter by year by 2050. • Energy performance of buildings (EPB) certification to become mandatory for all homes and owners¹⁸⁹. • Grants for renovation from 1 October 2022: Air-to-Water 3,000 to 4,800 euros (1,000 to 6,000 in Wallonia).
Sweden	<p>215,373 (+61.3% 2022 compared to 2021) representing absolute growth of 81,875 units.</p>	<ul style="list-style-type: none"> • ROT deduction for labour costs - Tax deductions of 30% on labour costs up to 5,000 euros/year. • GSHP tax reduction of 35% of total costs for installation. 30% of that is rebated. • The Swedish Tax Agency - Incorporation of carbon price.

¹⁸⁹ ClimateScope (2022) Belgium

GLOSSARY

AAHP	Air-to-Air Heat Pumps
ASHP	Air Source Heat Pumps
AWHP	Air-to-Water Heat Pumps
BEIS	Department for Business, Energy, and Industrial Strategy
BUS	The Boiler Upgrade Scheme
CCC	Committee on Climate Change
CCGT	Combined cycle gas turbine
CfD	Contracts-for-Difference
CHMM	Clean Heat Market Mechanism
CO ₂	Carbon Dioxide
CPS	Competent Persons Scheme
DESNZ	Department for Energy Security and Net Zero
DLUHC	Department for Levelling Up, Housing and Communities
DNO	Distribution Network Operator
EAST Framework	Easy Attractive Social or Timely Framework
ECO	The Energy Company Obligation
EPC	Energy Performance Certificates
EPG	Energy Price Guarantee
ErP	Energy Related Products Policy
ESO's	Environmental and Social Obligations
FBS	Future Buildings Standard
FHS	Future Homes Standard
FTE	Full Time Equivalent
GAAP	Green Apprenticeship Advisory Panel
GHNF	Green Heat Network Fund
GSHP	Ground Source Heat Pumps
HNES	Heat Network Efficiency Scheme
HNIP	Heat Networks Investment Project
HUG	The Home Upgrade Grant
IEA	International Energy Agency
kWh	Kilowatt hour
MACC	Marginal Abatement Cost of Carbon
MCS	Microgeneration Certification Scheme
Mt CO ₂	Metric Tonnes of Carbon Dioxide

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107. Based on July 2023 Ofgem price cap prices and assuming ASHP efficiency of 2.8 SPF, gas boiler efficiency of 0.84COP and 5% uplift to space heating demand from switching to a heat pump.
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