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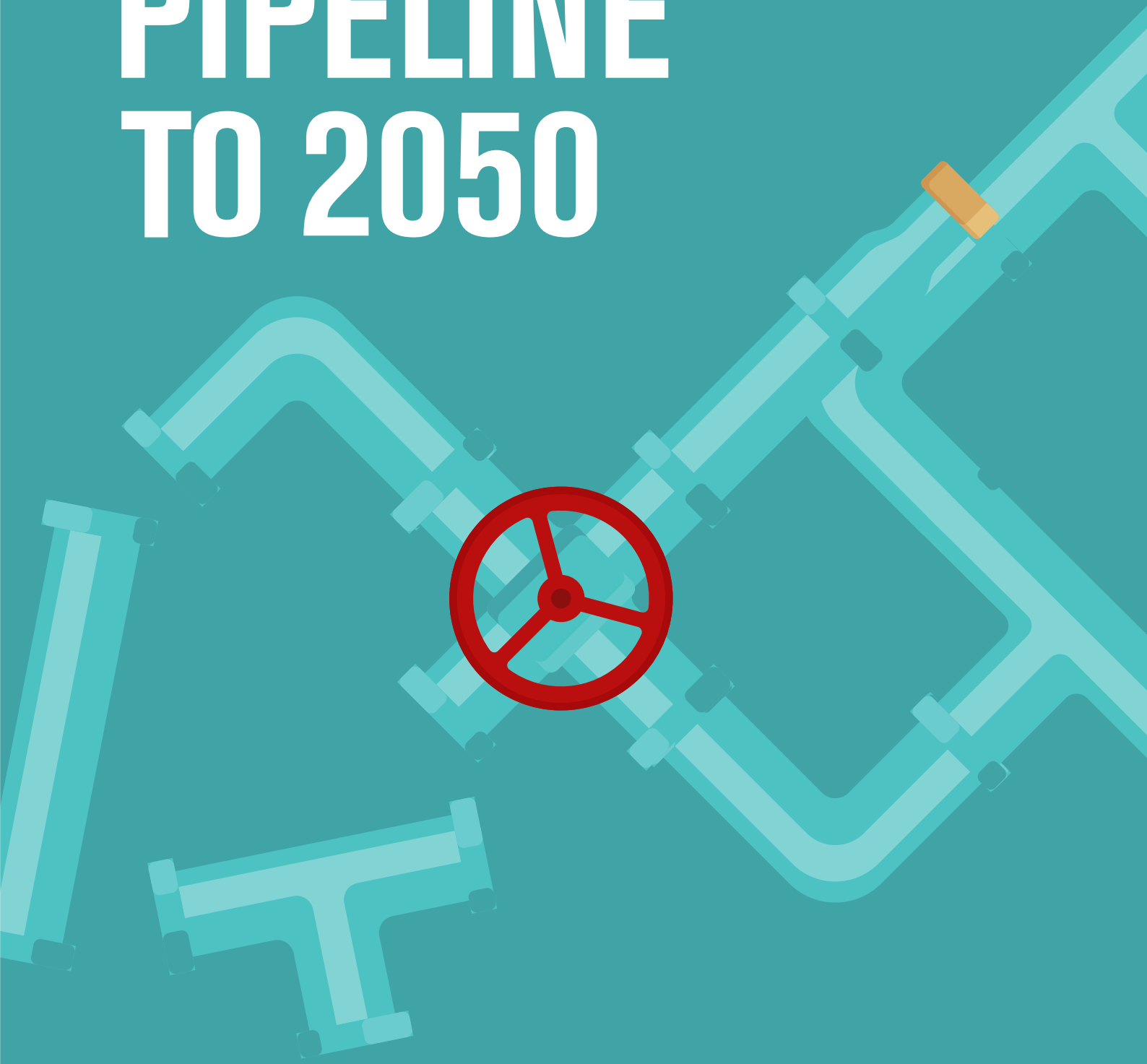
PIPELINE TO 2050



BUILDING THE FOUNDATIONS FOR A HARMONISED HEAT STRATEGY

carbon Connect

> The government's much-anticipated Heat and Buildings Strategy has a fundamental role to play in outlining the long-term trajectory for heat decarbonisation. To be a real catalyst for change, it needs to be underpinned by firm plans that bring together all aspects of existing heat and energy efficiency policies and simultaneously galvanise action from all actors whose participation is required in the transition to low carbon heat.

November 2020

This report follows five impact roundtables Policy Connect held on the Uncomfortable Home Truths report. It was written by Ágnes Szuda at Policy Connect.

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Foreword

Heat decarbonisation is one of the toughest challenges the UK has to cope with on the road to net zero. The transition to low carbon heat will bring major societal implications, together with tricky governance, funding, innovation and public engagement challenges for authorities, industrial stakeholders, researchers and consumers.

These challenges are ones we must face. The transition to low carbon heat is not optional, but rather an essential milestone on the net zero journey. Heating currently accounts for around a third of the UK's annual greenhouse gas emissions and its decarbonisation will take decades. Consequently the UK will not be able to achieve its net zero target without urgently speeding up on low carbon heat.

The government's much-anticipated Heat and Buildings Strategy has a fundamental role to play in outlining the long-term trajectory for heat decarbonisation. To be a real catalyst for change, it needs to be underpinned by firm plans that bring together all aspects of existing heat and energy efficiency policies and simultaneously galvanise action from all actors whose participation is required in the transition to low carbon heat. It also has an important role to play in accelerating action in time for the UK's hosting of the COP26 conference in November 2021, and thereby providing global leadership to build momentum in the international community around climate ambition.

This publication contains a series of policy briefings that put forward recommendations for the forthcoming Heat and Buildings Strategy. The propositions draw on the findings of Carbon Connect's Uncomfortable Home Truths – the final report in the Future Gas Series - as well as from the five action-oriented roundtables Policy Connect held between January and July 2020 to discuss next steps for heat policy. We were delighted to have contributed to these roundtables which brought together cross-party parliamentarians, policy-makers and experts from industry, academia and non-governmental organisations.

As the roundtable discussions highlighted, the transition to low carbon heat will make people's lives more comfortable. Besides environmental improvements, it will deliver health benefits, more cosy homes, and if managed well, reduced levels of fuel poverty. To unlock these co-benefits, the vision for heat decarbonisation we hope to see laid out in the Heat and Buildings Strategy needs to have a well-designed implementation plan. This publication aims to help build the foundations for a harmonised heat strategy and facilitate its implementation.

Lord Duncan of Springbank
Former Climate Change Minister
Conservative Party

Alan Brown MP
Energy and Climate Change
Spokesperson for SNP

Introduction

Heat decarbonisation is one of the toughest challenges the UK faces on the road to net zero. Heating accounts for around a third of the UK's greenhouse gas emissions[1] and only about one million out of the UK's 29 million homes have some form of low carbon heating system installed[2]. The UK therefore must speed up its heat decarbonisation journey immediately to be able to meet the 2050 net zero greenhouse gas emissions target.

The government has a central role to play in this process by both setting the long-term vision for decarbonising heating and designing a policy framework for its implementation. BEIS' forthcoming Heat and Buildings Strategy is the first important element for heat decarbonisation in the UK as it provides long-awaited signals to consumers and industry about the future of heat.

In setting the strategic approach, government needs to consider a number of tough questions. The cost of heat decarbonisation– around £15 billion[3] every year – is one of these. Besides ensuring these costs are met, government also has to guarantee that the low carbon heat transition happens in a fair and equitable way and supports the eradication of fuel poverty.

The transition to net zero in the heating sector also involves a profound deployment and innovation challenge. Since many technologies that are needed to enable the full transition to net zero still have to be trialled and/or scaled up, government needs to incentivise innovation to improve the costs and performance of technologies and business models that help with their deployment.

Heat decarbonisation will have a significant impact on many consumers as well. However, at the moment, public awareness is very low of the contribution heating makes to climate change, with only around five in ten people recognising that their boiler contributes to climate change[4].

In addition to finding solutions to these funding, innovation and public engagement challenges, the government must also decide upon the most effective governance framework for the large-scale roll-out of low carbon heat. There are many questions around the right balance and coordination between central government departments, devolved administrations and local authorities for an effective and well-designed transition to low carbon heat.

Moreover, there is currently a patchwork of heat policy initiatives, in some cases varying across the four UK nations, that reflects the lack of a joined-up approach that simultaneously addresses all aspects of heat decarbonisation (Figure 1). Although the existing policies might incentivise positive change, individually they cannot drive the level of action that is needed given the scale of the heat decarbonisation challenge.

[1] HM Government. 2017. Clean Growth Strategy: Leading the way to a low carbon future.
[2] Committee on Climate Change. 2019. UK housing: Fit for the future?
[3] Committee on Climate Change. 2019. Net Zero: The UK's contribution to stopping global warming.
[4] Energy Systems Catapult. 2020. Understanding Net Zero: A Consumer Perspective.

The disjointed nature of heat policy in the UK

Figure 1: The disjointed nature of heat policy in the UK

Energy efficiency schemes:

Energy Company Obligation (ECO): an energy efficiency scheme in Great Britain for fuel poor households. It is an obligation for gas and electricity companies.

Green Homes Grant Scheme: £2bn funding announced in July 2020 to help those not living in social housing with energy saving home improvements costs.

Public Sector Decarbonisation Scheme: £1bn funding announced in July 2020 to be offered as grants to public sector bodies and help with energy efficiency and low carbon heat upgrades.

Social Housing Decarbonisation Fund: £50 million demonstration project announced in July 2020 to help improve the least energy efficient socially rented homes.

Support for industrial heat decarbonisation:

Industrial Heat Recovery Support Programme: £18m fund to support investment in heat recovery from industrial processes. It runs until March 2022 and it applies to Wales and England.

Industrial Energy Transformation Programme: £315m fund to support business with high energy use to implement energy efficiency measures and decarbonise industrial processes (applies to England, Wales and Northern Ireland). It runs from 2020 to 2024.

Trials, research and innovation:

Energy Innovation Needs Assessment: commissioned by BEIS in 2019 to identify the key innovation needs in the UK energy system.

Home of 2030 Design Competition: announced in 2018 as a design and delivery competition to drive innovation for efficient and affordable homes.

Buildings Mission: as part of the Clean Growth Grand Challenge, it aims to at least halve the energy use of all buildings by 2030, backed by £170 million of public money.

Electrification of Heat Demonstration Project: £16.5 funding allocated to show the feasibility of the largescale transition to heat electrification by installing heat pumps in a representative number of homes in Great Britain

Hy4Heat: a BEIS commissioned project to find out the feasibility of replacing methane (natural gas) with hydrogen for heat decarbonisation

Regulation and standards:

Standard Assessment Procedure: the methodology for evaluating the energy efficiency of homes.

Minimum energy efficiency standards prohibit landlords in the private rented sector to let properties if they are rated below Energy Performance Certificate Band E.

Boiler Plus Standard: introduced in April 2018, it sets the required minimum standards of boiler efficiency.

Condensing boiler roll-out: introduced as part of Building Regulations, mandating that all newly installed boilers need to be condensing boilers above a certain rating.

Awareness raising and public engagement:

Each Home Counts Review: an independent review launched in 2015 on consumer advice and protection on home energy efficiency and renewable energy measures.

Simple energy advice website: giving advice to consumers about energy efficiency and financial support schemes.

Low carbon heat subsidies:

Renewable Heat Incentive: was launched for the non-domestic sector in 2011 and in 2014 for the domestic sector. It will come to an end in March 2021 and March 2022 respectively. It incentivises the uptake of certain low carbon heating technologies (heat pumps, solar thermal and biomass boilers) by providing quarterly payments for seven years for the amount of renewable heat generated by the system.

Clean Heat Grant Scheme: the proposal was announced by BEIS in a consultation in 2020, with £100mn projected funding. It is supposed to provide upfront grants of £4,000 to domestic and non-domestic consumers for heat pump, and in limited circumstances, biomass installations from April 2022 for two years.

Green Gas Levy:

The proposal was announced by BEIS in a consultation in 2020, with £2.2 bn projected funding. It is supposed to increase the level of level of green gas in the grid by supporting biomethane injection via a Green Gas Levy.

Carbon Capture and Storage (CCS):

As the most recent development for CCS, Budget 2020 announced a **Carbon Capture and Storage Infrastructure Fund** of at least £800 million to establish CCS in at least two UK sites, one by the mid-2020s, a second by 2030.

Taxation, levies and obligations:

Energy network prices are controlled by Ofgem via the RIIO price control.

Both electricity and gas are subject to taxation and a reduced VAT rate. However, most obligations and levies are only applied to electricity, including:

- The EU Emissions Trading System (EUT ETS): a carbon market with emissions allowances for respective sectors to deliver greenhouse gas emissions saving. The UK is likely to set up its own emissions systems after the end of the transition period.
- The Carbon Price Floor: the UK government's policy to support the EU ETS in the electricity sector under the Climate Change Levy.
- The Renewable Obligation: supports large-scale renewable electricity generation in the UK by obligating electricity suppliers to provide an increasing proportion of their electricity from renewable sources.
- Contracts for Difference: a government-initiated support scheme to support low carbon electricity generation.
- The Warm Home Discount Scheme (under which suppliers have to support customers in fuel poverty or the fuel poverty risk group with their energy bills) and the Energy Company Obligation is shared between gas and electricity.

Incentives for heat networks:

Heat Networks Investment Project: £320m capital project to fund heat networks in England and Wales.

Heat Networks Delivery Unit: provide grant funding and guidance to local authorities in Wales and England for heat network developments.

Most recent policy developments in DEVOLVED ADMINISTRATIONS:

Numerous areas of heat policy are reserved for Whitehall-Westminster, such as regulation, licensing and taxation programmes, as well as consumer protection frameworks. However, certain elements of heat policy, including its areas related to housing and planning, are devolved to Wales and Scotland, while Northern Ireland has a fully devolved energy system.

Scotland:

In 2015, energy efficiency was defined in Scotland as an infrastructure priority. This formed the basis of the Energy Efficient Scotland Programme and its 2018 route map which in principle provides a wholly systematic route for a national, locally coordinated energy efficiency and retrofit for all buildings. One of the key mechanisms there is a proposed new statutory power for local authorities who will be required to develop a comprehensive local heat and energy efficiency strategy. Moreover, there is currently a Heat Networks Bill in front of the Scottish Parliament to encourage the greater deployment of heat networks.

Wales:

The Warm Homes Programme, including the Arbed and Nest schemes aim to eradicate fuel poverty. Wales has a national has an Energy Efficiency Strategy running from 2016 to 2026.

Northern Ireland:

The Northern Ireland Boiler Replacement Scheme helps owner occupiers whose total gross income is less than £40,000 to replace inefficient boilers that are over 15 years old. There is currently no specific mechanism to incentivise low carbon heating in residential homes, the the Renewable Heat Premium Payment (RHPP) and Renewable Heat Incentive (RHI) schemes were closed. The Affordable Warmth Scheme is targetted to improve the energy efficiency of fuel poor households. Through the Northern Ireland Sustainable Energy Programme (NISEP), energy companies have to deliver energy saving measures to low income households. The Energy Efficiency Loan Fund provides interest-free loans to help businesses install energy saving appliances. The Building Regulations 2012 set enhanced thermal standards for all new buildings, and the ones undergoing renovation.

We expect the forthcoming Heat and Buildings Strategy to show a step change in terms of ambition for heat decarbonisation and establish a strategic framework that enables the joining up of all policy aspects and principles needed for the transition to low carbon heat (Figure 2).

Given the cross-sectoral engagement needed between consumers, industry, research and various levels of the government, the Heat and Buildings Strategy must incentivise all stakeholders that are needed to take action for effective heat decarbonisation.

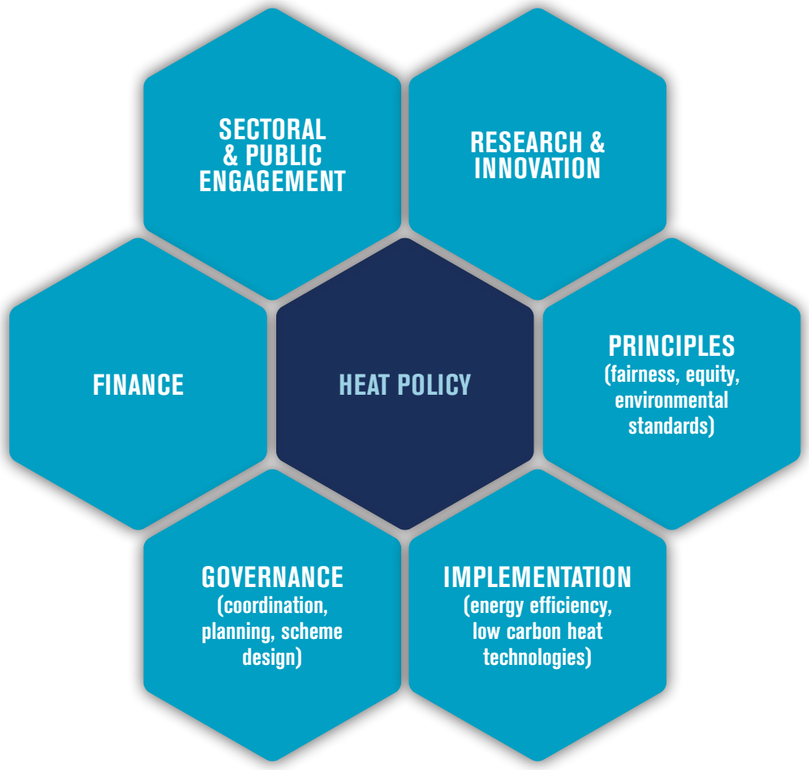


Figure 2: Going forward: a systematic long-term heat policy trajectory

Following on from the report Uncomfortable Home Truths, which called for a bold new national heat roadmap by 2020, we now make a number of recommendations to government to underpin the welcome long-term vision we hope to see in the Heat and Buildings Strategy with a joined-up heat policy approach.

Based on five roundtables Policy Connect held between January and July 2020, we developed strategic tests to guide the implementation of the Heat and Buildings Strategy (Figure 3). These tests are further underpinned by recommendations in the four key areas which must be reflected in the Strategy and systematically integrated into its implementation, including governance, finance, innovation and public engagement.

Tests for the heat and buildings strategy

A JOINED-UP APPROACH

- Set out a systematic approach that joins up all policy aspects and principles needed for the low carbon heat transition.
- Simultaneously drive the actions of all stakeholders – including industrial actors, consumers, local, regional and devolved governments – whose participation is required in the low carbon heat transition.
- Set long-term policy signals and clear milestones to industry and consumers about what steps need to be taken.
- Ensure that heat and energy efficiency policy go hand in hand.

URGENT, AT-SCALE ACTION

- Set the long-term net zero emissions target for heat in buildings.
- Put forward an action plan for the immediate at-scale roll-out of low regret options, including the decarbonisation of heat in new build and off-gas grid properties, the roll-out of district heat networks, heat pumps and hybrid heat pumps in appropriate buildings, as well as energy efficiency upgrades.
- Set clear timelines for phasing out high carbon technologies and mandating low carbon alternatives.
- Ensure the reskilling of installers so that they can drive the low carbon heat transition.

GOVERNANCE

- Adopt a consultative and collaborative approach to local, regional and devolved governments, as well as industry, academic and non-governmental stakeholders.
- Set up a central delivery authority to coordinate the low carbon heat transition.
- Clarify the role that local and regional authorities will play in heat decarbonisation, recognising their importance in the low carbon heat transition, as the most effective solutions are likely to differ regionally. Outline steps to equip them with the necessary statutory powers and resources.
- Put forward a vision for Local Area Energy Planning.

FINANCE

- Integrate the financial aspects of heat decarbonisation in the strategic approach to low carbon heat.
- Tackle the upfront cost barriers for the households installing low carbon heating technologies.
- Address the ongoing operational cost barriers by tackling the current imbalances in electricity and gas price signals to incentivise households to use low carbon heating technologies.
- Clarify the long-term approach to financing the uptake of low carbon heating systems.
- Ensure that fuel poverty is addressed as part of the low carbon heat transition.
- Incorporate the principles of fairness and equity into the Heat and Buildings Strategy to ensure a just transition to low carbon heat.

DEPLOYMENT, DEVELOPMENT AND INNOVATION

- Fund pilot and demonstration projects for low carbon heat homes across the UK.
- Incorporate innovation and deployment into the overall strategic framework of heat decarbonisation.
- Set out a coordinated, long-term policy approach to innovation and deployment.
- Increase innovation funding in the low carbon heat sector.
- Drive investment in low carbon heating technologies, new business models and consumer propositions.

PUBLIC ENGAGEMENT

- Make public engagement a vital part of the Heat and Buildings Strategy to ensure that the issues of heat decarbonisation are properly understood.
- Where appropriate and desired, give people a voice in making decisions on low carbon heating and ensure a participatory low carbon heat transition.
- Provide consumers with impartial, localised, visible and free advice from trained advisors.
- Put forward an update of consumer protections: ensure that the rights of consumers are the same regardless of the technologies they use to obtain their heat and energy.
- Provide high-level guidelines regarding the net zero consistent level of choice for households, the required engagement with communities and ground rules around disruption to households.

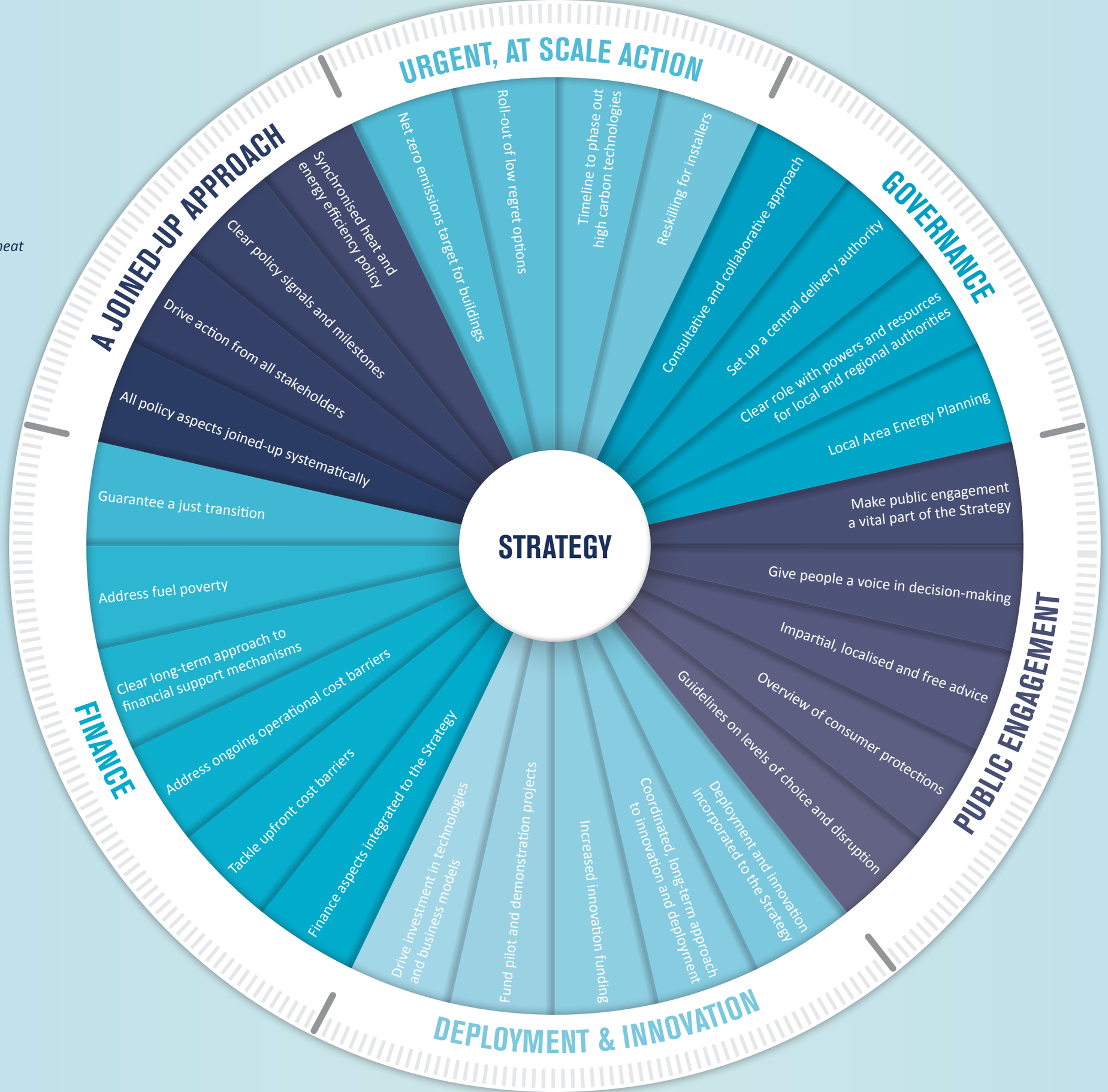


Figure 3: Tests for the heat and buildings strategy

Running the low carbon heat transition

The governance of heat decarbonisation in the UK

THE GOVERNMENT MUST…

…achieve the long-term heat policy trajectory via cross-party consensus.

As the challenge of heat decarbonisation will persist for the next three decades, it is important that government achieves a long-term heat decarbonisation policy trajectory via a cross-party consensus to guarantee long-term policy credibility and security for all actors involved in the transition. Government's policy framework should ensure low carbon technologies are competitive via a mix of policies and incentives.

While the market cannot deliver change on its own, it is capable of delivering on heat decarbonisation if government sets out a clear long-term framework of incentives and regulatory mechanisms, so that policy interventions can be factored into business decisions in a stable and consistent manner.

…drive action from all key stakeholders.

As no single actor can achieve heat decarbonisation alone, government must set heat policy in a way that drives action from all key stakeholders, making heat decarbonisation a shared responsibility.

…urgently deliver the Heat and Buildings Strategy to give policy signals to industry and consumers.

It is thus important that government delivers the Heat and Buildings Strategy in 2020 to set long-term policy signals and clear milestones to industry and consumers about what steps need to be taken to catalyse action.

As demonstrated by international experience, the combination of policy and market forces can drive transitions.

…deliver efficient coordination and carefully set the balance between various levels of government.

There is currently a very disjointed and uncomprehensive approach to heat policy which also varies across the four UK nations. But to ensure the efficient transition to low carbon heat, it is important to carefully set the balance between local, regional, devolved and central government, as well as deliver efficient coordination between various government levels.

CENTRAL GOVERNMENT MUST…

…urgently set the long-term trajectory for heat decarbonisation.

There are many actors involved in the low carbon heat transition, however, it is Whitehall-Westminster that holds the keys to heat decarbonisation in the UK. Regulation, taxation, the design of subsidies, tariffs and obligations play a central part in this, dedicating a key role to central government in setting consistent targets and trajectories for heat decarbonisation.

… set out the long-term target for net zero emissions in buildings and a timeline for the delivery of a complete, detailed decarbonisation strategy before 2025.

Therefore, it is crucial that BEIS publishes the Heat and Buildings Strategy 2020 which, in collaboration with MHCLG, sets out a long-term target of reaching net zero emissions in buildings and associated milestones, as well as a timeline for delivery before 2025 for a complete heat decarbonisation strategy. The government should set a long-term net zero emissions target for the heat sector – with tighter targets for new-build, private-rented and social housing buildings. This can help raise awareness amongst consumers and catalyse action from a wide range of relevant actors.

…include an action plan for the immediate at-scale roll-out of 'low regret' options.

The Heat and Buildings Strategy should also outline an action plan for the immediate at-scale deployment of 'low regret' options. This should include the decarbonisation of heat in new build and off-gas grid properties. Although these represent a relatively smaller proportion of the overall housing stock, they are very important opportunities to encourage visibility and trust in low carbon heat, as well as build up skills amongst installers, therefore, it is crucial to ensure that low carbon heating solutions work well and provide good consumer experience in off grid and new build properties. Moreover, low regret options include the roll-out of district heat networks, heat pumps and hybrid heat pumps in appropriate buildings, as well as a nationwide energy efficiency programme.

…formalise milestones and interim targets for already announced goals.

Besides this long-term target for net zero emissions in the buildings sector, it is also important that government sets more detailed milestones regarding previously set targets in the upcoming Heat and Buildings Strategy. The recent consultation proposal to bring forward the targets for private-rented properties to reach Energy Performance Certificate (EPC) banc C level by 2025 and 2028 for new and all tenancies respectively is a welcome step[5]. However, the previous Clean Growth Strategy set a target of reaching EPC band C level for energy efficiency upgrades by 2035 (where practical, cost-effective and affordable, and 2030 for fuel poor households in general), which, while provides a positive direction of travel, sets a the target is in 15 years for a large number of homes. Using a whole-house approach to avoid double spend, the Heat and Buildings Strategy should set interim milestones to catalyse continuous action.

…set a coordinated framework for heat and energy efficiency policy.

Since energy efficiency is a crucial component of the net zero transition, as it reduces the amount of heat decarbonisation needed, it is important that the Heat and Buildings Strategy sets out a coordinated approach which ensures that energy efficiency and low carbon heat policy go hand in hand.

…review and set technical standards, consumer protections, as well as accountability and transparency frameworks.

Government also has a key role in setting the technical standards, the accountability and transparency frameworks, as well as the necessary consumer protections, as these form the basis of effective local delivery of low carbon heating and ensure that consumers have a good experience as part of the heat transition.

…include targets for phasing out high carbon technologies and mandating low carbon alternatives.

Government must play a key role in mandating and ruling out particular solutions to ensure the UK meets the 2050 target. As the successful roll-out of condensing boilers showed, the regulatory introduction of low regret options is well accepted by the public if households are supported appropriately in the process and the right public engagement approach is used with honest and clear messaging.

The government thus needs to set a target to phase out the installation of carbon emitting boilers that cannot be adapted to low carbon fuels from 2025 in all property types, potentially combining this with an obligation to fit hydrogen-ready boilers once they are available at little or no cost penalty where no alternative zero-carbon solution is practicable or economic[6].

[5] BEIS. 2020. Improving the Energy Performance of Privately Rented Homes in England and Wales.
[6] Although the question was phrased slightly differently, the recent Climate Assembly also demonstrated that 86% of assembly members would support the phase out of new gas boilers. Climate Assembly UK. 2020. The path to net zero. Chapter 5: In the Home

While it falls under the remit of the MHCLG, government must also bring forward the introduction of the Future Homes Standard. This currently outlines that all new homes will have low carbon heating and excellent levels of energy efficiency from 2025. By bringing this forward, government could ensure that new homes that are built between now and 2025 will not have to be retrofitted. Furthermore, government should set a target to phase out high carbon heating technologies in off-grid areas from the mid-2020s.

…adopt a consultative and collaborative approach.

Central government has the power to determine the future of heat. But for legitimacy and for public engagement, decisions need to be made based on a consultative approach. Besides effectively collaborating with local and regional governments, Westminster needs to work with the devolved administrations on the division of powers and resources to decarbonise heat in the UK.

DEVOLVED ADMINISTRATIONS…

Numerous areas of heat policy are reserved for Whitehall-Westminster, such as regulation, licensing and taxation programmes, as well as consumer protection frameworks. However, certain elements of heat policy, including its areas related to housing and planning, are devolved to Wales and Scotland, while Northern Ireland has a fully devolved energy system.

… and central government must share lessons across administrations from current and previous initiatives and policies.

Scotland and Wales are already working on delivering energy efficiency and low carbon heat. Therefore, it is important that England and Northern Ireland work collaboratively with them to share policy experience, considering what learnings we can take from current and previous policy initiatives.

Important lessons should be learnt from the delivery of Energy Efficient Scotland Programme which has revealed significant practical and management challenges in at-scale energy efficiency retrofits. As it has been shown, lining up property owners takes time, especially in multi-owner and multi-use buildings. Moreover, the Scottish example also shows how important supply chain development, skills and innovation are for large-scale transitions and it demonstrated the immediate need for skilled professionals for energy efficiency and heat decarbonisation.

The failure of the Northern Ireland Renewable Heat Incentive demonstrates the importance of understanding the necessary resources and expertise required, including the crucial need to have the people with specialist skills for effective design, delivery and monitoring of the project[7].

[7] Coghlin, P., O'Brien, U. and MacLean, K. 2020. The Report of the Independent Public Inquiry into the Non-domestic Renewable Heat Incentive (RHI) Scheme.

…and central government must work together closely and strategically.

It is also important to highlight the increasing divergence between the England and Scotland approaches to heat and energy efficiency policy. Devolution is a sensitive issue and it is important to allow for a dynamic relationship between devolved and central government, in which Westminster supports devolved administrations in devolved areas and ensures strong coordination in areas that are not. However, as achieving the net zero target in each of the UK's nations is contingent on all the others, devolved administrations and central government need to work more closely and more strategically together to best capitalise on devolved and reserved policy levers.

LOCAL AND REGIONAL GOVERNMENT MUST…

…be involved in delivery to ensure successful implementation of the national Heat and Buildings Strategy.

Although the long-term policy trajectory has to be set by central government, local and regional authorities need to be engaged in heat decarbonisation as well, since the most effective solutions are likely to differ regionally due to geography, industrial activity, building types, political economy and demographics. Heat policy cannot be delivered via centrally-taken technocratic rules; rather, there is a critical need for local knowledge planning, as well as local civic engagement. As the results of the recent Climate Assembly showed as well, 94% of assembly members agreed or strongly agreed with the statement that '[p]eople in different parts of the country should be offered different solutions to zero carbon heating'[8]. Moreover, 89% of assembly members supported 'local plans for zero carbon homes' and this would 'involve central government giving local authorities the powers and resources to develop an area-wide plan for moving to zero carbon homes'[9].

Place-based decarbonisation programmes have been recognised as central tools to allow local and regional governments to drive the local deployment of low carbon heating systems. Having the most granular knowledge of local conditions and priorities, local and regional leadership must ensure that local strategic objectives are met. Local and regional authorities are also the best placed actors to combine locally appropriate solutions for heating, transport, power generation and storage, and consider synergies and efficiencies between them to drive decarbonisation in a cost effective manner[10].

Moreover, they must make sure that all areas related to heat decarbonisation (low carbon heat, energy efficiency, fuel poverty, climate and environmental objectives, job creation and economic imperatives) are joined up, while simultaneously contributing to national targets. In addition, adopting a place-based approach is crucial to the targeted deployment of certain low carbon technologies, such as heat networks, where zoning – the process in which local authorities strategically define the locality of e.g. heat network developments – helps maximise the potential of low carbon systems.

[8] Climate Assembly UK. 2020. The path to net zero. Chapter 5: In the Home.
[9] Ibid.
[10] Tingey, M., and Webb, J. 2020. Net zero localities: ambition and value in UK local authority investment. Energy Revolution Research Centre, Strathclyde, UK. University of Strathclyde Publishing.

Therefore, we recommend Local Area Energy Planning as a structured, data-driven approach to enable local authorities to find the locally most appropriate, cost-effective low carbon heating options that bring together all locally relevant stakeholders and build up regional supply chains and skills[11]. To avoid the potential problems arising from local authorities needing to plan in a vacuum, as well the tension that might arise between a centralised approach and locally-specific solutions, it is important to support local authorities with a standardised planning framework which can be flexibly deployed for planning and implementation at each local area. Local authorities must be supported in developing the appropriate skills as well as being able to access expertise and experience from designated support services to assist in planning and delivering local transitions. While BEIS should set national guidelines and quality controls to ensure a nationally coordinated approach and support local authorities with an overall planning framework, local and regional leadership must ensure that the national effort of heat decarbonisation is carried out in a way that corresponds best to the needs of each local area.

…be given a clear direction about the exact role they will play in heat decarbonisation and be equipped with the necessary statutory powers and resources.

While most actors agree that the transition to low carbon heat requires locally specific planning, there is dissent regarding in what capacity, to what extent and with what resources local and regional authorities should take part in the heat transition process. This includes the risk of potential regional variation in the success of the heat transition which brings up questions of fairness to residents living in various areas of the country. Moreover, there are dangers arising if central government does not provide local/regional authorities with the necessary powers and resources which have already become apparent: while some regions and devolved governments have ambitious plans for heat decarbonisation, they lack the means and powers to implement them, as they do not have the necessary room for manoeuvre to secure the necessary cross-sectoral engagement for these plan.

Therefore, it is important that central government makes a decision about the exact role local and regional authorities are expected to play in the low carbon heat transition, and communicates the strategic direction regarding this in the upcoming Heat and Buildings Strategy. Once their role is defined, it is crucial that Westminster provides local and regional authorities with sufficient powers and resources to act as efficient actors in the process. BEIS should thus review the necessary statutory powers, technical capacities, data access and resources required for strategic planning for low carbon heat and energy efficiency.

To take part efficiently in the process, local and regional governments need to have robust data on energy performance, energy sources and demand, as well as patterns of fuel poverty; and they need appropriate tools and skills to carry out smart modelling of solutions best suited to the local area. In addition, local governments must pay attention to understand local needs in a consultative way, running effective consultations with local people, and they need to have the capacity and power to bring together the necessary cross-sectoral engagement needed for the deployment of low carbon heat.

[11] Energy Systems Catapult. 2018. Local Area Energy Planning: Supporting clean growth and low carbon transition.

THE NEED FOR A CENTRAL DELIVERY AUTHORITY

Given the complex governance structure of heat policy in the UK, there is a need for strong coordination between central government, devolved administrations, local authorities, as well as local industry, business and community groups. While local and regional planning can be a powerful tool to deliver area-specific pathways that best suit each region, central government must provide support and oversight, including decisions about taxation, pricing, infrastructure and standards. In addition, government must coordinate the delivery of programmes and policies across BEIS, MHCLG, HMT, DfE and Ofgem.

It was for this reason that in our Uncomfortable Home Truths report we recommended a Central Delivery Authority to coordinate the transition to low carbon heat, ensuring that heat policy planning and implementation is sequenced in the right way and at the right time[12]. Such central authorities have played an important role in delivering large-scale transition projects before, such as Digital UK, a single purpose organisation created specifically to deliver the digital television switchover, or the Olympic Delivery Authority which was established by the government as a non-departmental public body.

Others, including the CBI and the Institute for Government in their 2020 reports, have also since then suggested similar recommendations with slightly varying outlines of the exact role the central delivery body should play in the low carbon heat transition[13,14].

Thus, while further work needs to be carried out to determine the exact role the proposed Central Delivery Authority should play in the low carbon heat transition, it could:

- coordinate the delivery of low carbon heat in different areas,
- serve as a central point for data, expertise and information,
- monitor and evaluate standards and their implementation,
- coordinate upskilling programmes for installers and engineers, and
- manage public awareness raising and engagement programmes.

[12] Policy Connect – Carbon Connect. 2019. Uncomfortable Home Truths.
[13] CBI. 2020. Net-zero: the road to low-carbon heat.
[14] Institute for Government. 2020. Net zero: How government can meet its climate change target.

Funding the low carbon heat transition

Heat decarbonsiation – the finance challenge

THE GOVERNMENT MUST…

…recognise that decarbonising heat will be challenging and expensive.

Many currently available low carbon heating options have higher upfront and/or operational cost than the now prevalent natural gas heating systems and are financially uneconomic for many consumers without government support. Addressing these costs is therefore a crucial aspect of the low carbon heat transition, as regardless of what new policy schemes are introduced or awareness raising campaigns held, heat decarbonisation will not be successful without low carbon heating options being financially viable for consumers.

HM Treasury is currently conducting a Net Zero Review which must set out a clear and credible long-term framework for what is needed for decarbonisation and how it will be paid for. Working with HMT, BEIS must build in the financial and commercial aspects of decarbonisation in the forthcoming Heat and Buildings Strategy.

…remove the ongoing operational cost barrier for low carbon heating technologies.

One of the biggest challenges to (heat) decarbonisation is presented by the varying effective carbon prices across different sectors[15]. The UK has a complex array of policies, comprised of incentives, obligations, taxes, regulations and standards. This policy mix gives ground to an uneven playing field across the economy and leads to incomplete incentives that cannot reduce the level of greenhouse gas emissions substantially across the economy as a whole. Effective carbon prices across most of the economy are therefore 'too low to bring forward sufficient investment and innovation to reduce emissions'[16].

The impacts of this uneven policy landscape also present significant barriers to the decarbonisation of the heat sector due to the pricing disparity between electricity and natural gas for comparable units of energy. While carbon pricing has been levied on electricity, the price of natural gas for domestic and commercial consumers includes neither the cost of carbon nor many of the other costs associated with decarbonisation policies. This makes electricity more expensive per unit of energy than natural gas. Moreover, there is no carbon pricing on oil and liquefied petroleum gas (LPG) either.

Electricity consumers, in contrast, pay carbon costs and substantial policy costs associated with a wide range of decarbonisation schemes. Consequently, the average consumer today has little incentive to switch from fossil gas heating to electrified heating systems, because if they switch to heat pumps from gas, they need to pay higher bills.

Therefore, government must address the cost imbalance between gas and electricity as a crucial first step to incentivise the market to move away from natural gas, but must be wary of the impacts of additional costs on the fuel poor and take appropriate remedial steps to protect them while still taking the appropriate decarbonisation policy actions.

This can be achieved via various potential routes, including the options that exist for the introduction of an economy-wide carbon tax, as well as potential sector-related measures that could even the playing field between gas and electricity.

As the implementation of these potential solutions are not without immense challenges, the upcoming HMT Review of Net Zero should provide a comprehensive analysis of the impact of various policy routes.

[15] Effective carbon price means the price of carbon emissions that arise from the sum of taxes, obligations and emissions trading systems.
[16] Day, G. and Sturge, D. 2019. Rethinking Decarbonisation Incentives: Future Carbon Policy for Clean Growth.

…address the upfront cost barrier for the installation of low carbon heating systems.

Besides high operational costs, the equipment and installation costs of most low carbon solutions are currently higher than their conventional counterparts which creates a barrier for their large-scale deployment when they compete with high volume and high efficiency gas boilers in the supply chain.

Government must ensure sufficient scale of early deployment in order to grow the low carbon heat market and drive down costs of low carbon installations through the economies of scale in supply chain development. Furthermore, developing a low carbon heat market can also increase investment which can reduce costs as well.

Previous examples show that initial government support can greatly increase the cost-effectiveness of new technologies. For example, condensing gas boilers were initially significantly more expensive than those they replaced, but the price dropped quickly as part of their mass roll-out. The cost of photovoltaic panels has reduced significantly in the past 10 years, and their efficiency has improved – and is likely to increase again with the recent announcement of a UK photovoltaics breakthrough by Oxford PV. The consequential commercial trade opportunities are also significant of investing in at-scale refit programmes.

…provide clarity on the long-term approach to financial support mechanism to support the uptake of low carbon heating systems post-RHI and increase ambition to meet the net zero target.

The Renewable Heat Incentive (RHI) is currently the major government-backed financial support mechanism designated to boost the uptake of specific low carbon technologies. As the RHI is coming to an end[17], government must set the long-term policy approach through which it aims to financially support the uptake of low carbon heat.

When designing the new policy approach, it is important that government learns lessons from the RHI. While the RHI did facilitate the uptake of low carbon installations, it was often criticised for slower-than-expected uptake. Further concerns were raised around monitoring and compliance with the scheme, its cost-effectiveness, as well as the fact that the scheme was dominated by biomass installations. Moreover, it favoured those consumers who are able to afford the high upfront costs of low carbon heating installations.

BEIS announced in a consultation document in 2020 the Clean Heat Grant scheme that will offer an upfront grant of £4,000 from exchequer funding to support the uptake of heat pumps, and in limited circumstances, biomass installations, addressing some of these concerns[18]. Moreover, the consultation contained details of the proposed Green Gas Support Scheme to increase the proportion of green gas in the grid by supporting biomethane injection via a Green Gas Levy.

While these proposals are welcome developments providing clarity on the details of immediate financial support provided post-RHI, they only set out short-term plans (for two and four years respectively). In addition, the ambition demonstrated by the proposals are not in line with the level of ambition needed for reaching net zero in the heating sector, since the funding announced for the Clean Heat Grant is forecasted to support the installation of only 12,500 heat pumps a year[19]. Furthermore, it is risky to rely exclusively on individual subsidies to boost the installation of low carbon heating systems, because the uncoordinated deployment they can lead to will likely fail to consider local characteristics and to harness the economies of scale from coordinated investment[20].

[17] The non-domestic RHI will close to new applicants in March 2021 and the domestic RHI will come to an end in March 2022 after a year-long extension was announced in 2020.
[18] BEIS. 2020. Future support for low carbon heat.
[19] The CCC. 2020. Reducing UK Emissions Progress Report to Parliament.
[20] Energy Systems Catapult. 2020. Six Steps to Zero Carbon Buildings – Step 1: A new wave of place-based programmes to drive early deployment at scale.

Therefore, accompanying the Heat and Buildings Strategy, government needs to set out a longer-term financial approach to boost the deployment of low carbon heating and provide financial support to consumers to install low carbon heating technologies. The government should also provide incentives to drive wide-scale rather than individual adoption.

Besides subsidies, government must also encourage the provision of appropriate financial products and schemes to consumers and thus enable them to carry out energy efficiency retrofits and install low carbon heating systems.

…harness consumer power and ensure a participatory low carbon heat transition.

Besides policy schemes and regulation, it is important to reduce barriers and increase support amongst consumers for the low carbon heat transition. This may involve changing consumer behaviour and new business models, as well as simple measures like the installation of smart control systems that give them better tools to control their energy use.

In addition to recognising households for the installation of low carbon systems, energy efficiency measures can also help drive the decarbonisation of the heat sector. Therefore, the government should change the Energy Performance Certificate (EPC), as energy savings associated with low carbon heat sources should be better promoted within the EPC and credits awarded as part of the Standard Assessment Procedure (SAP) methodology should reflect the benefits of these schemes. (Currently, switching from a highly energy efficient gas boiler to an electricity-powered heat pump would worsen the Energy Efficiency Rating of the property, since the SAP methodology used for calculating the EPC does not reflect the decreasing carbon emissions of electricity production). Moreover, using variable stamp duty could also play an encouraging role in this by giving people the incentive to install low carbon systems when they sell and move homes.

…ensure that fuel poverty is addressed as part of the low carbon heat transition.

2.4 million (10.3%) households in England, 0.619 million (25%) households in Scotland, 0.155 million (12%) of households in Wales and 0.133 million (18%) household in Northern Ireland are in fuel poverty[21]. While fuel poverty is the result of a set of complex factors that can change dynamically over time, fuel poverty is a key aspect to consider as part of the low carbon heat transition due to its close interlinkages with energy prices and energy efficiency.

As modelling carried out for the implementation of the fourth carbon budget found, if programmes are properly targeted towards supporting fuel poor households together with energy efficiency upgrades, the required emissions reductions from domestic heating to meet the fourth carbon budget could lift 74% of those who are currently fuel poor out of fuel poverty by 2030[22]. However, the study has also demonstrated that in the absence of policy measures helping fuel poor households throughout the implementation of carbon reduction measures, fuel poverty levels are likely to increase[23].

BEIS thus needs to design the upcoming Heat and Buildings Strategy in a way that ensures that fuel poverty is addressed as part of the low carbon heat transition.

[21] Effective Fuel poverty statistics for England, Scotland, Wales and Northern Ireland (2018 data). Please note that definitions of fuel poverty differ across the four UK nations.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/882404/annual-fuel-poverty-statistics-report-2020-2018-data.pdf
https://www.gov.scot/publications/scottish-house-condition-survey-2018-key-findings/
https://gov.wales/fuel-poverty-estimates-wales-2018
https://www.nihe.gov.uk/getmedia/1f9e55a1-66c2-46b7-bf92-9ee192ce355f/estimates-of-fuel-poverty-northern-ireland-2017-and-2018-revised.pdf.aspx?ext=.pdf
accessed in August 2020.
[22] Thumim, J. White, V., Bridgeman, T., Searby, G., Hinton, T., Tiffin, R. and Roberts, S. 2014. Research on fuel poverty. The implications of meeting the fourth carbon budget.
[23] Ibid.

…ensure BEIS collaborates on fuel poverty with other departments.

Besides addressing fuel poverty as an integral part of heat policy and its incorporation in the Heat and Buildings Strategy, it is also important that BEIS collaborates with other government departments, including the MHCLG and the DWP to tackle the issue, as fuel poverty is interlinked with several other policy areas as well.

…build in the principles of fairness and equity into the Heat and Buildings Strategy to ensure a just transition to low carbon heat.

To ensure a just transition to low carbon heat, fairness and equity must be built in as key principles in the Heat and Buildings Strategy. Furthermore, they must guide all aspects related to the design and the implementation of the strategy.

…consider the distributional impact of the financial methods chosen to fund the low carbon heat transition.

The government must consider the distributional impact of financial mechanisms when deciding about the ways in which the low carbon heat transition should be funded. The forthcoming Net Zero Review by HMT should thus dedicate special attention to this question, as well as explore which methods are the best to ensure the fair and equitable sharing of costs. Working together, BEIS and HMT must ensure that heat decarbonisation policy creates a just transition.

…ensure that future funding mechanisms learn from the mistakes of past schemes.

When deciding about future funding mechanisms for heat decarbonisation schemes, government must learn from the mistakes of past schemes. Previous funding mechanism have not always been designed in a way that had positive outcomes for the least well-off.

For both the RHI and the Feed-in Tariff, experience demonstrated that higher income households were more able to use the schemes, due to their ability to afford the upfront costs, as well as the fact that their property and tenure types were more likely to enable them to participate in such schemes[24]. However, the cost of the Feed in Tariff (FiT) was spread across all energy consumers, causing an increase of £20 on energy bills per year for non-FiT users[25]. As poorer households pay a higher percentage of their income on bills and it was mostly richer households who took advantage of the scheme, poorer households have contributed proportionately more to the funding of the scheme without receiving any direct benefit. This is because there was no mechanism in place to support less well-off households to access the FiT.

[24] The Frerk, M. and Maclean, K. 2017. Heat Decarbonisation: Potential impacts on social equity and fuel poverty.
[25] Ibid.

Learning from these mistakes, a number of principles should be considered upon designing new financial schemes for heat decarbonisation:

- Government should fund future schemes from general taxation. If it is designed well, taxation takes into account households' ability to pay.

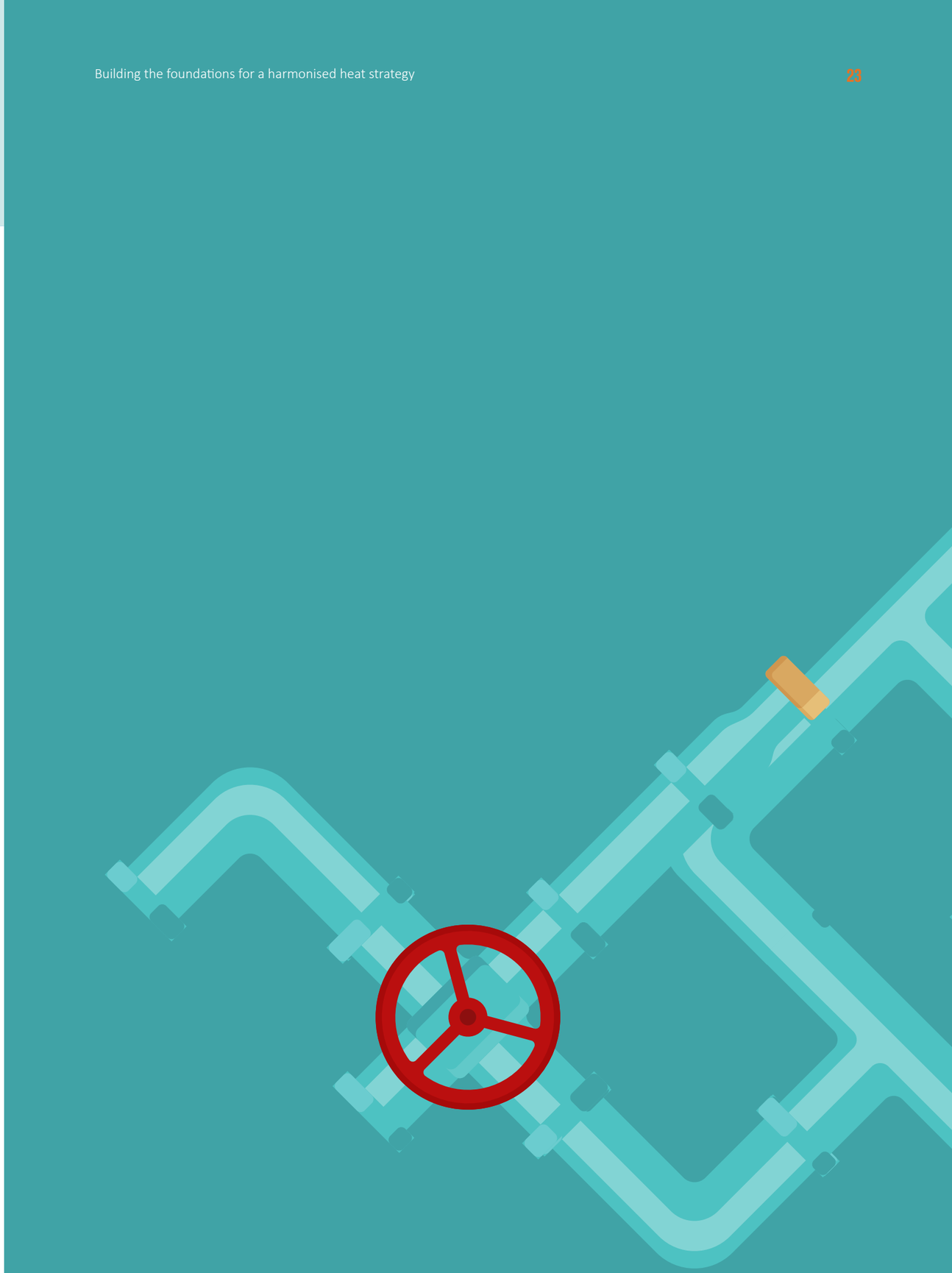
The poorest households pay proportionately more for policy costs levelled through bills than the richest. As a UKERC study highlighted, while the poorest households spend 10% of their income on heat and power, the richest households only spend 3%, which means that any general increase in energy prices levelled equitably across bills is likely to affect the poor disproportionatel[26] . Moreover, research also found that if recovered evenly across levies on energy bills, heat decarbonisation could create an extra 0.6 million fuel poor households in Great Britain[27]. While raising taxes can be a contentious political issue (similar to paying bills), covering the cost of heat decarbonisation via general taxation is a better solution to support a just transition.

- If government introduces schemes driving the uptake of a specific technology, they should be based on an upfront grant, rather than ongoing payments.

If ongoing payments are chosen, low income households should be provided with extra support to meet the upfront costs.

- Government should provide additional support for those in or at risk of fuel poverty to help with the general increase in energy prices due to decarbonisation.

[26] Barrett, J. Taylor, P. and Owen, A. 2018. Funding a Low Carbon Energy System: a fairer approach?
[27] Frerk, M. and Maclean, K. 2017. Heat Decarbonisation: Potential impacts on social equity and fuel poverty.



Deployment, development and innovation

Illuminating the way to the low carbon heat transition

GOVERNMENT MUST…

…recognise the important role of deployment, development and innovation.

Historically, it has taken new technologies around 30-40 years between discovery and the commercialisation necessary to be deployed at scale[28]. If the UK would like to make the transition towards low carbon heat soon, it is important that government directs funding towards technologies and propositions which already exist but are not deployed at scale yet, or which are close to commercialisation.

These technologies are needed to enable the full transition to net zero and innovation is essential to develop and upscale them in time for the 2050 target. Besides the technological aspect of innovation (referring both to new ways of deploying existing technologies and developing new technologies), it is important to emphasise that innovation also means the development of new market designs and business models.

Alongside developing and improving the technological solutions needed for net zero, innovation has a central role to play in reducing the cost of low carbon heat technologies and thus lower the cost barrier that currently hinders the deployment of low carbon heat. Furthermore, innovation can help to ensure that new, low carbon heating technologies bring additional benefits to consumers compared to traditional heating systems and provide consumer centric solutions, facilitating the consumer uptake of low carbon heating. Although not a panacea, innovation can thus help tackle political barriers to the low carbon heat transition (related to costs and low public engagement) and facilitate progress to the net zero target.

While the UK has been the first major economy to adopt a net zero greenhouse gas emissions target, many countries have already followed, or are expected to follow suit. Alongside the fact that innovation is crucial for the UK to meet the 2050 target, the competitive advantages that can be gained through the early development and deployment of these technologies, as well as the accompanying supply chain development, can create significant export opportunities for the UK.

However, to unlock the potential of innovation, it is vital that it is paired with the right policy approach. All aspects of innovation are strongly related to policy design and regulation which need to provide a coordinated, long-term trajectory. Therefore, the upcoming Heat and Buildings Strategy should incorporate innovation, development and deployment to the overall strategic framework for the low carbon heat transition and provide a strategic approach regarding how innovation will be used to meet net zero in the heat sector.

…set out a coordinated, long-term policy approach to innovation in the low carbon heat sector and incorporate innovation into the overall strategic framework of heat decarbonisation through the Heat and Buildings Strategy.

In recent years the UK government has provided innovation funding which indicates that it recognises that innovation is needed to achieve the transition to low carbon heat. But compared to other Western European countries, the UK has so far lacked continuous and coordinated policies for the promotion of low carbon heating solutions. Furthermore, while innovation funding tends to be provided on a short-term basis, supply chains need longer term policy directions in the transition to low carbon heat. To ensure the decarbonisation of the UK heat system, the government must lay out a consistent and coordinated policy framework to support the development of low carbon supply chains and help investors with long-term planning. Since this requires a whole systems approach with a thorough understanding of how different elements of the heat (and wider energy) system interact with each other, the forthcoming Heat and Buildings Strategy must incorporate deployment, development and innovation into the strategic framework for decarbonisation in the heat sector.

[28] Hanna, R., Gross, R., Speirs, J. Heptonstall, P. and Gambhir, A. 2015. Innovation timelines from invention to maturity.

This is of great importance for the large scale transition to low carbon heat, as long-term policy signals from government are needed to catalyse and unlock private sector investment, by ensuring credibility and security. Moreover, policy plays a critical role in shaping and developing markets, and thus directing capital into the development of technologies, infrastructure and business models that are strategically important to decarbonise heating. Additionally, in the case of market failures government intervention and government-launched innovation funding supports the transition to heat decarbonisation.

…facilitate partnerships between government and industry for innovation.

Evidence from other countries –such as Norway, Sweden and Denmark– shows that well-working partnerships between government and industrial actors, as well as other market forces are crucial for the success of innovation in national network transformation projects.

…increase investment in pilot projects.

Pilot projects and demonstrations play an important role in the deployment of low carbon heat technologies. Furthermore, they help making low carbon heat more visible and acceptable to the public.

In addition, they contribute to building the evidence base on how the UK should completely decarbonise its heating system. Therefore, upon the delivery of pilot projects, it is important to dedicate time to reflect on the lessons learnt from the project, as well as ensure that learnings are shared. It is important to catalyse such knowledge sharing from trial projects, which in the UK has not been substantial enough so far. The proposed Central Delivery Authority (discussed in detail on page 17) should be given a central role in coordinating these knowledge sharing efforts.

The Heat and Buildings Strategy must therefore commit new funding for at-scale pilot projects and provide information on the safety, economic, technical and public engagement aspects of different long-term options for the decarbonisation of heat, serving as an important evidence base for consequent heat decarbonisation strategies.

…provide appropriate scrutiny procedures, tackle fake claims and negative images, and protect consumers.

The potential failure of large-scale innovation projects funded from public resources can be a hurdle to committing government investment for low carbon heat innovation. Therefore, it is important that government tests innovation projects on a small scale before their larger scale roll-out to ensure that the project will be successful and public support for low carbon heat innovation does not diminish. Moreover, central government needs to make sure that sufficient consumer protections are put in place to guarantee that even if things go wrong in the trial, consumers are protected.

It is also important that government challenges fake claims about what a certain newly developed product or technology is capable of. Consequently, central government should put appropriate scrutiny procedures in place to sustain consumer confidence in low carbon heat and protect legitimate operators.

…run innovation competitions for low carbon heat.

BEIS should run innovation competitions. Besides catalysing the deployment of new solutions for heat decarbonisation, such nationally funded and advertised competitions can help make low carbon heat more attractive to consumers as well.

…introduce new financial schemes to facilitate innovation.

Government must encourage the introduction of new financial schemes to help finance innovation in the low carbon heat sector.

AREAS TO WHICH GOVERNMENT SHOULD DIRECT INNOVATION FUNDS TO SUPPORT HEAT DECARBONISATION:

Focus on technologies which are readily available or close to commercialisation

Historically, it has taken new technologies around 30-40 years of time to be deployed at scale between discovery and commercialisation. If the UK would like to make the transition towards low carbon heat soon, it is important that government directs innovation funding towards technologies and propositions which already exist but not deployed at scale yet, or which are close to commercialisation.

Provide innovation funding for already existing commercial propositions

Besides investment in new technology, government should also provide innovation funding for existing consumer propositions across the entire value chain to find ways in which the efficiency of current technologies can be increased.

Encourage research and innovation to repurpose the existing infrastructure

As 84% of UK homes are heated by natural gas, it is important that government directs innovation and research funding to projects which aim to find out how the currently existing gas grid could be repurposed for low carbon technologies. While at this point it cannot be pre-empted what role existing infrastructure will play in the low carbon heating systems of the future, it is important to investigate what its role could be as one of the potential routes to decarbonise the heating sector.

Invest in energy efficiency innovation

Since energy efficiency plays a crucial role in the low carbon heat transition by helping to reduce the scale of the decarbonisation challenge, it is one of the 'low regrets' options that should be deployed early on the road to net zero. Therefore, government must dedicate more funding to innovation in energy efficiency, as well as smart control systems.

Invest innovation funding to developing storage capacities

There is currently a lack of storage capacity which is crucial for facilitating the use of renewables. Government should direct funding for innovation on energy storage.

Support innovation for the development of the hydrogen economy

Although there are currently several ongoing hydrogen pilots, including H21, H100, HyNet, Hy4Heat, and HyDeploy, government needs to make further innovation funding and policy support available to understand the exact role hydrogen can play in heat decarbonisation.

It is important that this increased innovation funding forms part of a coordinated policy approach to hydrogen. Therefore, as part of the policy planning on heat decarbonisation, government should set out and publish its long-term, strategic approach to hydrogen as a Hydrogen Strategy.

Give innovation funding to biofuel production

Biofuels (such as biomethane, Bio Synthetic Natural Gas (SNG)), especially if combined with Carbon Capture and Storage (CCS), can make a contribution to decarbonising the existing gas grid, and bioLPG can contribute to decarbonising off-gas grid areas. Government should provide policy, research and innovation support to bioenergy sourced from waste feedstock to enable the better understanding of the role bioenergy can play in decarbonising the UK as well as help bioenergy to 'take off' as a potential solution[29].

Provide innovation funding for CCS

As the Committee on Climate Change underlined on many occasions, CCS is a necessity, not an option for reaching the 2050 target. Moreover, it can play a central role in enabling the use of hydrogen and biomethane as low carbon fuels. Funding announced this year for the development of CCS clusters is a welcome step in this direction, however, to meet the net zero target, it is important that government ensures that CCS stays high on the innovation policy agenda.

Encourage the development of new business models and market designs

Alongside dedicating innovation funding to technological solutions, government must encourage and fund the search for alternative business models, such as Heat as a Service. New business models might provide better basis for the large scale roll-out of low carbon heat than currently existing propositions.

[26] As there are concerns around how sustainable the use of energy crops as feedstock for bioenergy production is, government policy should incentivise the use of waste feedstock over energy crops, especially, as waste sources tend to be less carbon intensive than energy crops.

Engaging the public in the low carbon heat transition

Consumers, public engagement and low carbon heat

GOVERNMENT MUST…

…recognise the lack of public awareness and engagement with heating in general, as well as its carbon implications, as one of the major barriers to the deployment of low carbon heat.

As a recent UK survey conducted by the Energy Systems Catapult found (2020), only 49% of respondents identified gas boilers as a contributor to climate change[30].

Furthermore, polling commissioned by Policy Connect in 2019 showed that only 14% of respondents from the general UK public placed heat decarbonisation as a top priority to tackle climate change, putting it below other areas, such as greener transport, renewable electricity or waste reduction[31]. In a similar vein, only 5% of MPs polled included natural gas boilers in their top three sources of emissions to tackle.

This is coupled with low awareness among the public about specific low carbon heat technologies. As a survey conducted by Madano in 2018 indicated, around half (51%) of respondents had never heard of hydrogen fuel boilers and 42% had not heard of either air or ground source heat pumps[32]. Moreover, the research indicated that most consumers think that hydrogen boilers or heat pumps provide no or limited additional benefits compared to current natural gas heating technologies[33].

Therefore, while the general public has become more engaged with the issue of climate change, there is not much evidence that this has spilled into the area of heat. As a Citizens Advice survey demonstrated in 2019, while 82% of respondents were supportive of the net zero target, only over a third (38%) of them were aware that this requires changes to household heating.

…help consumers understand and carry out their role in the low carbon heat transition.

While other transformations, such as phasing out coal from the grid, can be carried out with no or little consumer engagement, a comprehensive low carbon heat transition will require change in almost all UK households. This makes the willing participation of consumers in the process essential. There is currently no overarching strategy to understand and integrate public attitudes into policy on heat decarbonisation. Government must therefore make public engagement and awareness raising a core part of its policy framework for the transition to low carbon heat.

…make public engagement a vital part of the upcoming Heat and Building Strategy.

It is essential that BEIS defines its approach to raising public awareness and engagement in the upcoming Heat and Buildings Strategy in order to help the public understand what the low carbon heat transition involves and why it is important.

As the awareness of low carbon heat is currently very low, it is also very important that a nationwide awareness raising and information strategy engages people from all parts of society. As not everyone will seek to engage in the same way and to the same extent, it is important that government develops and applies creative approaches and uses various different channels to reach the maximum amount of people possible. Thus, overall, government's public engagement strategy should be centred on a multi-level engagement process, including the national and local levels and deliver a range of different activities, from citizen-led, grassroots and community engagement to more traditional communications and consultative processes, conducted by multiple actors.

[30] As Energy Systems Catapult. 2020. Understanding Net Zero: A Consumer Perspective.
[31] Policy Connect – Carbon Connect. 2019. Uncomfortable Home Truths.
[32] Williams, H., Lohmann, T., Foster, S. and Morrell, G. 2018. Public acceptability of the use of hydrogen for heating and cooking in the home.
[33] Ibid.

Moreover, to ensure a lasting impact, it is important that the Heat and Buildings Strategy combines these public engagement activities with other interventions, such as financial incentives, regulations and consumers protection frameworks which facilitate the switch to 'lower carbon behaviours' and increase consumers' trust in these technologies.

…run a nationwide information campaign.

Government should run a nationwide information campaign on low carbon heat. This should be related to the Heat and Buildings Strategy, informing the public about what is the government's long-term vision on low carbon heat. The campaign should also explain why the transition is needed, how it fits in with wider decarbonisation work and climate goals, the benefits switching to low carbon heat brings, as well as the role consumers will need to play in this transition. This should involve media campaigns run at various platforms, as well as several types of demonstration and trial projects. Besides a nationwide information campaign, government must also run regional information campaigns with area-specific messages once regional approaches for the low carbon heat transition have been determined.

…make heating more visible and attractive to engage with.

The low public awareness of heating issues is partly caused by the fact that heat provision is mostly invisible to consumers and unattractive to engage with. Learning from previous large-scale transformations, such as the adoption of natural gas heating or cars, when significant sums of money were spent on making consumers enthusiastic about the change happening, it is important to invest in making low carbon heating options more visible and attractive for customers to engage with.

Therefore, government, working together with industrial and third sector stakeholders, needs to bring heat – which is currently mostly absent from everyday conversations on climate change – to the forefront of climate change messaging. More innovative and creative methods have to be used to add the 'sparkle' and encourage the public to engage with heat by making it a more attractive topic.

…fund pilot and demonstration projects for low carbon heat homes across the UK.

Demonstration projects, showrooms, roadshows, as well as community-owned heat projects play an important role in engaging the public in the low carbon heat transition, as they can help households and communities accept the move to low carbon heat. Furthermore, they can help understand the public acceptability of disruption that the installation of low carbon heating systems involve.

The forthcoming Heat and Buildings Strategy should set a target to increase the number of pilot and trial projects besides already existing ones to increase buy-in for low carbon heat and build consumer trust in the reliability of low carbon technologies. Government must ensure that pilots are carried out in a safe way and work is done to the highest standard, with excellent customer service and trouble-shooting if things go wrong to ensure consumers have a good experience.

…trial alternative business models that can facilitate the roll-out of low carbon heat.

Besides demonstration projects, trials and media campaigns, introducing new business models help make low carbon heat more attractive. For example, Heat as a Service re-imagines the current business model of heat supply, moving to a system in which customers pay for an outcome (having a warm home), rather than the electricity/gas used. The Living Lab project of Energy Systems Catapult found that participants paying for heat as a service are more open to low carbon heating solutions, since they knew that for a predictable price they could get the same level of comfort as they would with their gas boiler[34]. In the scheme, consumers could buy 'Heat Plans', which meant that instead of kilowatt hours, they could buy 'warm hours', and the heating system, as well as its service and maintenance was also inclusive in the price, thus, the replacement of the heating system to a low carbon alternative was not their responsibility and direct cost.

Although such alternative business models will not, in themselves, drive the low carbon heat transition, they have the potential to create an environment in which people become more open to learning about and engaging with low carbon heating. Therefore, it is important that government considers alternative business models when thinking about the future strategy for low carbon heating and conduct further trials in this area.

…choose the right framing.

When raising public awareness of heating, government must choose the right framing to ensure it communicates in an honest and easy-to-understand way.

Government should learn from the failure of previous schemes, such as the case of the Green Deal, which was framed as a financial case, rather than a scheme improving comfort or health[35]. As low carbon heating systems are generally more expensive than their conventional counterparts and research found that there are significant concerns about the costs and efforts required to install low carbon heating technologies, trying to sell the transition exclusively as an economic case or purely based on environmental benefits will be difficult[36].

Therefore, it is important for government to break out of silo thinking and emphasise the co-benefits low carbon heating systems and energy efficiency retrofits can bring to consumers, including increased levels of comfort, air quality and health benefits.

Besides a multiple benefits-focused narrative, highlighting the community angle of heat projects can be an effective frame to low carbon heating projects. While the community aspects of energy projects (e.g. community-owned wind or solar farms) is often emphasised, this is rarely replicated for the framing of heat projects despite the fact that in many cases these also connect people (e.g. heat networks).

Moreover, as recent social science research found, highlighting personal responsibility, the responsibility to neighbours, family and future generations are important aspects that engage people in discussions on low carbon heat[37].

[34] Energy Systems Catapult. 2020. Using the Living Lab to sell consumer centric heat services that encourage adoption of low carbon heating. Accessed at https://es.catapult.org.uk/reports/using-the-living-lab-to-sell-consumer-centric-heat-services-that-encourage-adoption-of-low-carbon-heating/ in September 2020.
[35] Rosenow, J. and Eyre, N. 2016. A post mortem of the Green deal: austerity, energy efficiency and failure in British energy policy. Energy Research & Social Science, 21. pp. 141-144.
[36] Williams, H., Lohmann, T., Foster, S. and Morrell, G. 2018. Public acceptability of the use of hydrogen for heating and cooking in the home.
[37] Fylan, F., Fletcher, M. and Christmas, S. 2020. H21: Public perceptions of converting the gas network to hydrogen. Social Sciences Study.

…use messages that are easy to understand and free of jargon.

Government must get rid of jargon and technical acronyms when communicating with consumers about the low carbon heat transition and use messages that are easy to understand, although not oversimplified.

...ensure a good quality public discourse.

Misinformation and negative perceptions easily distort the discussion and the public's views. Therefore, it is crucial to maintain a good quality public discourse on low carbon heat over time with a well-designed public engagement campaign and make sure that policy is responsive to how public views evolve on low carbon heat over time.

…give people a voice in making decisions on low carbon heating.

It is also important to give consumers a voice in the decisions that are being made nationally, regionally and locally. Citizen assemblies have an important role in engaging the public in the low carbon heat transition and helping policy-makers navigate a publicly acceptable path to decarbonised heat, with the Climate Assembly being a notable example in this area. Government should consider and build on the findings of the Climate Assembly in the forthcoming Heat and Buildings Strategy.

Although such deliberative processes can be resource intensive, it is important that government enables more of these initiatives both nationally and regionally/locally over time. Furthermore, government needs to ensure that the process is carefully designed to guarantee transparency and the proper consideration of recommendations in policy-making[38].

...invest in research to understand public perceptions.

It is important that constructing the Heat and Buildings Strategy, government considers and builds on already exiting research on public engagement. Moreover, government must continuously map and monitor existing and emerging consumer perceptions on low carbon heat and build it into heat policy. Going forward, more social science research is needed to understand consumer perceptions and these research results need to be used to design communication and public awareness campaigns.

...empower consumers to make an informed choice from the range of options available to them.

It is important that, rather than trying to sell people different 'ideologies', customers are provided with impartial information about the low carbon options available to them based on which they can make their own choices about what is best for them. The Climate Assembly report also underlined the importance of reliable and clear information for consumers[39].

…provide impartial and locally tailored advice and support.

Consequently, government must ensure that consumers get impartial, localised, visible and free advice. The public needs to have access to advice from trusted sources to give them the confidence to engage in the low carbon transition and empower them to make informed choices from the range of options available to them.

[38] Climate Assembly UK. 2020. The path to net zero. Full report.
[39] Climate Assembly UK. 2020. The path to net zero. Chapter 5: In the Home.

Currently, Wales, Scotland and Northern Ireland provide free energy advice from trained advisors on how households can improve energy efficiency. England used to have a nationally coordinated, locally delivered energy advice service until 2012, which was followed by a national call centre that removed the local aspect of advice. This was also replaced by the current 'Simple Energy Advice' website which does not offer access to a trained adviser. It is now Citizens Advice and other organisations, such as the Energy Saving Trust that deliver energy advice.

To effectively catalyse and enable the transition to low carbon heat, central government should immediately take action to provide trusted, publicly funded advice services with regional centres to give households impartial and locally tailored advice on how they can start their decarbonisation journey. Besides setting up these services, it is important that government ensures their visibility as well. Scotland's regional energy advice services, which offer free home visits, provide a gold standard the rest of the UK should follow.

…run regionally specific training and upskilling programmes for engineers and installers.

Engineers and installers are a trusted source of advice and households often consult them on heating systems. They play a very important role in advising consumers, especially as many consumers only replace heating systems as part of a 'distress purchase' when the existing system breaks or needs major repairs and a new system has to be installed immediately. Since there is little time in such cases to find alternatives, consumers often rely on installers to inform them about alternatives to natural gas boilers. However, as a 2019 survey of industry member organisations found, 74% of responding installers do not consider themselves very confident to recommend or choose the best low carbon options to their clients[40].

Government must guarantee the provision of training courses to upskill engineers and installers to ensure they become confident working with low carbon technologies and incentivise their enrolment in such courses, so as to make sure that they can provide trusted and impartial advice to consumers regarding these. As the best fitting low carbon heating programmes are likely to differ regionally, these training programmes should be developed and delivered in a regionally specific way. As an important incentive to re-train, government should announce the deadline for mandating low carbon heating sources which would be a significant encouraging factor for installers to re-skill.

…see trust as a crucial ingredient of the low carbon heat transition.

Consumers will not start decarbonising their heating systems if they do not trust all the actors involved in the low carbon heat transition, including installers, engineers and suppliers. Building trust is an important two-way process, as the government and industry also need to trust consumers and their engagement in the transition.

Safety is an important part of trust. Thus, appropriate regulations and standards set by BEIS are crucial as we progress on all areas of the low carbon heat transition to maintain trust. To ensure high public acceptance, new heating systems need to be as safe as or even safer than current heating systems.

…review and update consumer protections.

One of the most important prerequisites for the low carbon heat transition is the need for adequate consumer protection systems, especially as they play a role in shaping consumer perceptions of and trust in low carbon heating technologies.

[40] Accessed at https://www.installeronline.co.uk/heating-engineers-say-future-industry/ in October 2020.

Setting up consumer protection frameworks for low carbon heat/energy efficiency schemes and technologies, it is important to learn lessons from of previous schemes. As the failure of the Green Deal highlighted, the quality assurance framework of the scheme was found to be overly complex, yet did not guarantee high quality work[41]. The scheme demonstrated that energy efficiency and low carbon measures can have a complex nature and especially in the case of new schemes, products and technologies, consumers are likely to have limited understanding of how they work and potential risks.

This highlights that a key element of consumer protection strategies is to set adequate quality assurance frameworks and standards. Furthermore, government must guarantee sufficient installer and supplier standards to help both consumers and industry actors throughout the low carbon heat transition.

BEIS' recent work on building a market framework for heat networks is an important step in ensuring that consumer protection frameworks are adequate. However, central government needs to take further steps to review existing consumer protections and create new ones in sectors where they do not exist or are incomplete, as it has to be ensured that the rights of consumers are the same regardless of the technologies they use to obtain their heat and energy. Under the principle of fairness, the outcome should be the same even if the specific protections for technologies differ.

It is also important to highlight that there is currently no low carbon heat market. Some elements of heat are regulated through the electricity and natural gas market by Ofgem. However new systems and services are currently unregulated. Therefore, Ofgem's statutory remit needs to be reviewed to enable it to set up a regulatory framework for this market and protections need to be guaranteed for these heat consumers as well. The Competitions and Markets Authority (CMA) proposals would extend Ofgem's remit to cover heat networks, but a more comprehensive review is needed of Ofgem's role in heat[42].

…start Local Area Energy Planning.

As different areas with different characteristics will need different low carbon heating solutions, the implementation of the national heat decarbonisation strategy will need highly localised delivery. Therefore, it is important that government bodies start local energy planning and develop area plans which can be used to raise awareness among people about the specific low carbon heating scenarios they need to prepare for, as well as linked to local consultations, communications campaigns and citizens assemblies.

…develop guidelines about the net zero consistent level of choice for households.

Related to this, one of the most complicated questions is how much choice consumers and market forces should be allowed to have versus local or national government mandating certain technologies, especially for low carbon technologies that require zoning. A balance has to be found between offering attractive choices for households – over costs, aesthetics, disruption, the model of low carbon heating system installed (e.g. premium or basic model), etc. – but still allowing government bodies to lead the low carbon heat transition in an efficient way for meeting climate targets.

Therefore, more thinking and discussion are needed to find the right balance between offering attractive choices to households and allowing government to lead an efficient and fast transition to net zero consistent. The government will need to provide guidelines regarding the acceptable net zero consistent level of choice for households, the required engagement with communities and ground rules around disruption to households.

[41] Citizens Advice. 2017. Green Deal Framework. Citizens Advice response to BEIS Call for evidence, November 2017.
[42] Competition and Markets Authority. 2018. Heat networks market study.

Acknowledgements

Between January and July 2020, following up on the Uncomfortable Home Truths report, Policy Connect ran a series of five roundtables to discuss the strategic direction of heat policy in the UK.

This report is based on findings of the roundtable sessions, as well as desk-based research carried out by Policy Connect.

Roundtables sessions:

Next Steps in Heat Policy – 22nd January 2020 – Chair: Dr Keith MacLean OBE

Innovation, Technology and Low Carbon Heat – 10th March 2020 – Chair: Sarah Deasley

Running the Low Carbon Heat Transition – 5th May 2020 – Chair: Dr Keith MacLean OBE

Funding the Low Carbon Heat Transition – 25th June 2020 – Chair: Maxine Frerk

Consumers, Public Engagement and Low Carbon Heat – 14th July 2020 – Chair: Prof Jim Watson

We are grateful for participation of over 80 individuals, representing 53 organisations who have contributed to the roundtable series. Present at the roundtables were cross-party parliamentarians, experts from academia, industry and non-government organisations, representatives of central government departments, as well as local and regional authorities.

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About Carbon Connect

Carbon Connect is the independent, cross-party forum that seeks to inform and guide a low carbon transformation underpinned by sustainable energy.

In 2009 the Rt Hon Ed Miliband MP, then Secretary of State for Energy and Climate Change, delivered a keynote address at the Westminster launch of Carbon Connect. Since then Carbon Connect has been at the forefront of policy debate, parliamentary engagement and research related to sustainable energy.

Over a number of years, Carbon Connect has built up an unrivalled portfolio of parliamentary roundtables and conferences, detailed policy briefings and highly respected reports. This has been achieved by drawing on the expertise of Carbon Connect members and working with a wide range of parliamentarians, civil servants, business leaders and experts who give their time and expertise to support our work.

Carbon Connect's main activities comprise facilitating discussion between industry, academia and policymakers on low carbon energy and producing its own research and briefings in this area. We do this by:

- Holding regular events and seminars in Parliament
- Producing concise briefing papers on energy and climate change policy
- Publishing research reports with evidence-based recommendations for policymakers
- Disseminating updates to parliamentarians and our members, with summaries of relevant stories, industry news, and other political developments

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Policy Connect is a cross-party think tank improving people's lives by influencing public policy. We collaborate with government and Parliament, through our APPGs, and across the public, private and third sectors to develop our policy ideas. We work in health; education & skills; industry, technology & innovation and sustainability policy.

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