Heat in Buildings Strategy

Achieving Net Zero Emissions in Scotland's Buildings

Scottish Government
Riaghaltas na h-Alba
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Contents

A stand-alone Heat in Buildings Strategy Summary Document has been published alongside this Strategy: https://www.gov.scot/isbn/9781802014464

Ministerial Foreword

Reducing emissions from our homes and buildings is one of the most important things we can do to help end Scotland's contribution to climate change. Over the next 24 years Scotland's homes and workplaces must transform, so they are warmer, greener and more efficient. This Heat in Buildings Strategy, which updates both the Energy Efficient Scotland Route Map and the Heat Policy Statement, sets out how we will achieve that ambition.

Our homes and workplaces account for around a fifth of Scotland's total greenhouse gas emissions. We can and must make very significant progress towards eliminating these emissions over the next decade and reduce them to zero by 2045. Transforming our homes and workplaces will be immensely challenging, requiring action from all of us, right across society and the economy.

I was pleased the draft of this strategy received so many supportive responses, and that a broad range of stakeholders welcomed the scale and pace of the ambition laid out in the draft. This final strategy reflects much of the insight generated through the consultation. We know that, as we progress through the heat transition, there will be more issues to resolve. We will continue to build on the new ideas proposed by consultation respondents as we work our way through this important and unprecedented challenge.

This Strategy sets out the significant actions we are taking, but we do not have all the powers necessary to deliver the transformational change required. The delayed UK Heat and Buildings Strategy must set out how the UK will use its regulatory and policy levers to incentivise rapid deployment of zero emissions heat technologies. We urgently need a stronger commitment and clear action plan on heat from the UK Government. Recent volatility in global natural gas markets further underscores the urgency of UK Government action in reserved policy areas to maintain security of energy supplies and to support consumers.

As we address the damaging climate change impact of heating our homes and buildings with unabated fossil fuels, we must also continue to tackle the social inequalities that are all too prevalent in our housing sector, and deliver a just transition. In particular, we must redouble our efforts to end fuel poverty and the blight of unaffordable heating. This is challenging as many zero emissions heating systems are more costly to install and can be more expensive to run than high emissions alternatives. We need to work together across sectors and jurisdictions to overcome these issues, and to deliver a just

transition. We remain steadfast in our commitment to supporting those least able to pay in this transition, and in protecting those who are most vulnerable to any increase in costs.

Decarbonising our homes and workplaces means a fundamental shift for almost all of us. Poor energy efficiency can lead to high energy costs which can push households into fuel poverty and present unnecessary financial burdens for businesses and the public sector. Many of us have already taken steps to improve the energy efficiency of our homes and workplaces. 45% of homes now achieve EPC C or better. We need to continue to prioritise improvement to the fabric of our homes and buildings, to accelerate our efforts and deliver a very significant reduction in our demand for energy as a society.

By 2030 we want to see a large majority of building achieving a good level of energy efficiency, which for homes is at least equivalent to an EPC band C, with all homes meeting at least this standard by 2033 where feasible and cost-effective. This will help ensure energy costs in future are affordable and that our actions continue to lift people out of fuel poverty. In this strategy we set out the guiding principles we will use to ensure our actions do not have detrimental impact on fuel poverty rates.

At the same time, we must rapidly scale up deployment of zero emissions heating systems so that by 2030 over 1 million homes and the equivalent of 50,000 non-domestic buildings are converted to zero emissions heat. We must do so in a manner that protects those in or at risk of fuel poverty from increased energy bills and that avoids placing a burden on those least able to pay for the transition.

The heat technologies identified in this Strategy as near term priorities – heat pumps and heat networks – are not new. They are widely used in other European countries and are now gaining a growing share of the market here in Scotland. But for many of us, they remain unfamiliar. As we deliver this Strategy, we will increase public engagement, building on our existing advice services and taking steps to raise awareness and understanding of these new technologies. We are establishing a National Public Energy Agency to provide leadership and harness the potential of scaled up programmes to decarbonise heat – with a virtual agency established within the coming year and a dedicated physical agency by September 2025.

We will work with local government to put in place Local Heat & Energy Efficiency Strategies, setting out a plan for all areas of Scotland, and work with local communities to design tailored solutions, matched to local circumstances.

Over this Parliament we will make available at least £1.8 billion for heat and energy efficiency projects across Scotland, helping to secure delivery against

our targets, providing a much-needed stimulus to the heat and energy efficiency sector, and contributing toward a longer-term green recovery. We remain committed to working with the social housing sector and encourage the sector to take full advantage of the support available, including through our Social Housing Net Zero Fund through which we are committed to investing at least £200 million of capital funding to support decarbonisation of social housing over the course of this parliamentary term. Over this Parliament, we will also invest at least £200 million in the Scottish public sector estate to improve and reduce energy use and install zero emissions heating systems.

Our investment will generate significant opportunities for communities across Scotland. We will continue to flex our delivery programmes to support local jobs and create opportunities for young people. We will also expand our work with the supply chain, for example co-producing with the sector a Supply Chain Delivery Plan, to create new investment opportunities and create and support high value, local jobs.

We estimate that the total investment required to transform our homes and buildings is likely to be in excess of £33 billion. Clearly, this cost cannot be borne by the public sector alone. We are establishing a new Green Heat Finance Task Force to identify innovative solutions to maximise private sector investment, and find new ways to help individuals and organisations spread the upfront cost of investing in making their properties warmer, greener and more efficient.

To underpin and provide the certainty and assurance to secure this investment we will bring forward a framework of regulations setting clear standards for property owners across all tenures and buildings types. We will build on existing standards already in place, extending them to cover all properties and requiring action on both energy efficiency and zero emissions heating. This will support our commitment to phasing out the need to install new or replacement fossil fuel boilers in off gas properties from 2025, and in on-gas areas from 2030. We have already begun developing critical components of this framework, including our consultations on a 2024 Zero Emissions Heat Standard for new buildings and on the future reform of domestic EPCs.

There are no silver bullets or easy solutions to the heat in buildings challenge. We must use all the tools available to increase awareness, secure delivery and provide the certainty that individuals and the sector need to take action.

Patrick Harvie MSP
Minister for Zero Carbon Buildings, Active Travel and Tenants' Rights

Chapter 1 Introduction

This Strategy outlines the steps we will take to reduce greenhouse gas emissions from Scotland's homes, workplaces and community buildings and to ensure that we remove poor energy performance as a driver of fuel poverty. The focus of this Strategy is on energy demand for space and water heating in homes, workplaces and community buildings.

Building on the policies and actions set out in the Climate Change Plan Update[i], this Strategy sets out a pathway to zero emissions buildings by 2045 and details a series of near-term actions to put us on a clear path towards this, as well as a range of further, longer-term commitments to accelerate the transformation of the nation's building stock. It sets out the principles we will apply to ensure our zero emissions heat delivery programmes support our fuel poverty objectives.

This Strategy provides an update to the 2018 Energy Efficient Scotland Route Map[ii] and the 2015 Heat Policy Statement[iii], and brings together our ambitions on energy efficiency and heat decarbonisation into a single framework. It is aligned with wider Scottish Government policy on housing, energy and climate change. The actions it sets out are reflected in our Housing to 2040 Strategy[iv], which also presents further details on how our housing can support achievement of our net zero ambitions, whilst also delivering against wider objectives.

Vision

Our vision is that by 2045 our homes and buildings are cleaner, greener and easy to heat, with our homes and buildings no longer contributing to climate change, as part of the wider just transition to net zero.

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 set legally binding targets for us to achieve net zero greenhouse gas emissions by 2045, with interim targets requiring a 75% reduction by 2030, and 90% by 2040.

Our statutory fuel poverty targets are similarly ambitious requiring that in 2040 no more than 5% of households are fuel poor, no more than 1% are in extreme fuel poverty and the fuel poverty gap is no more than £250 (in 2015 prices)[1]. It

[1] A household is defined as being in fuel poverty if, in order to maintain a satisfactory heating regime, total fuel costs necessary for the home are more than 10% of the household's adjusted net income (i.e. after housing costs), and if after deducting those fuel costs, benefits received for a care need or disability and childcare costs, the household's remaining adjusted net income is insufficient to maintain an acceptable standard of living. The remaining adjusted net income must be at least 90% of the UK Minimum Income Standard to be considered an acceptable standard of living with an additional amount added for households in remote rural, remote small town and island areas. If more than 20% of net income is needed, the household is defined as being in extreme fuel poverty.

is critical to a just transition that, as we take action to cut emissions from Scotland's homes, we do so in a way that supports and enables the eradication of fuel poverty.

Our established fabric first approach is critical to the transition, reducing demand for energy, making homes warmer and easier to heat, and preparing them for zero emissions technologies. However, fabric improvement alone will not get us close to our targets for net zero. We need a strong focus on heating system change as set out in Chapter 2 and throughout this Strategy.

Developing the Heat in Buildings Strategy

The Shared Policy Programme[v] between the Scottish Government and the Scottish Green Party strengthens our ambition and commitment to transitioning to zero emissions heat, going faster and mobilising more resources. This Heat in Buildings Strategy consolidates this ambitious approach, finalising the draft published in February and providing a firm foundation for the heat transition in Scotland.

We consulted on a draft of this Strategy in February 2021. 178 individuals and organisations responded, providing an invaluable resource to support ongoing policy development. We are publishing analysis of the consultation alongside this Strategy[vi].

Respondents generally supported the vision and actions set out in the draft Strategy. Responses largely agreed with Scottish Government's commitments, which were widely regarded as a welcome step forward. Respondents also agreed with the challenges identified in the draft, in many cases presenting more detail or specific examples.

We are working to incorporate this wealth of insight into our approach to the heat transition. This Strategy is an opportunity to reflect much of this insight, but we will continue to build the new ideas generated through the consultation into our policies and programmes. We also continue to be responsive to the fast changing landscape, including the decisions urgently needed from the UK Government.

In addition to the consultation, we welcome the input from Scotland's Climate Assembly, which reported in June 2021[vii]. A cross-Government response to the full recommendations will follow, in-line with the requirements of the Climate Change (Scotland) Act.

We also welcome the recent report of the Zero Emissions Social Housing Taskforce, and will give the recommendations careful consideration.

This Strategy forms the foundation of our ongoing work, which will build on the insight and evidence generated by the consultation and wider input. Our next steps include:

- We have committed to publish a refreshed Energy Strategy and have also committed to an Energy Just Transition Plan in Spring 2022. This will allow us to further refine our approach to heat in buildings, ensuring a coherent whole-system view and further embedding our evolving policies within our wider approach to delivering on a just transition.
- We will set out our approach to eradicating fuel poverty in the Fuel Poverty Strategy by the end of 2021.
- We will develop a bespoke Public Engagement Strategy for heat in buildings to raise awareness of the support and advisory services available and to encourage home upgrades.
- We will develop our approach to heat in islands and remote rural contexts in our forthcoming Islands Energy Strategy.
- We will co-produce with the sector a Supply Chain Delivery Plan focussed on the development of energy efficiency and zero emissions heat in the buildings supply chain in Scotland.
- We will establish a Green Heat Finance Taskforce by the end of this year.

Delivery

Central to delivering our vision is an ambitious programme of at least £1.8 billion investment over the course of this Parliament to make our homes easier and greener to heat – progressing our commitments both to decarbonise the heating in 1 million homes by 2030 and to remove poor energy efficiency as a driver of fuel poverty. As set out in the Programme for Government, we will provide increased funding this year for home energy programmes and measures to reduce poor energy efficiency as a driver of fuel poverty. We will allocate £200 million for heat and energy efficiency projects in social housing over this parliamentary term.

Additional private investment will be required to secure delivery over the longer term and will require innovative approaches to securing the necessary investment, which cannot be met by public funding alone. Respondents to the consultation also highlighted this issue. This Strategy considers the funding and finance routes already available and where further work is needed – with a new Green Heat Finance Taskforce to support this established by the end of this year.

Transforming Scotland's building stock will create numerous opportunities for investment, regeneration as well as the realisation of wider social, environmental and health outcomes. As we accelerate our efforts to make our homes and non-domestic properties warmer, greener and more energy

efficient, we must lock-in and secure a wider set of outcomes that will benefit Scotland's people and places. These Heat in Buildings outcomes (see following page), aligned with our National Performance Framework, will guide our decision making and support the development of a holistic, people-centred approach to the transition ahead.

Outcomes

National Performance Framework

Economy
We have a globally competitive, entrepreneurial, inclusive and sustainable economy

Environment
We value, enjoy, protect and enhance our environment

Poverty
We tackle poverty by sharing opportunities, wealth and power more equally

Health
We are healthy and active

Fair work and business
We have thriving and innovative businesses, with quality jobs and fair work for everyone

Communities
We live in communities that are inclusive, empowered, resilient and safe

Heat in Buildings Strategy

- Heating our buildings no longer contributes to climate change
- The cost of heating our homes and businesses is affordable and those occupying them have a high comfort level.
- We have reduced our demand for heat and poor energy efficiency is no longer a driver of fuel poverty.
- The systems we use are smart and resilient and provide us with a reliable source of heat.
- We have a secure supply chain with high value, local, sustainable jobs across Scotland and people have been helped to transition to new, secure jobs as part of a just transition.
- Our indoor and outdoor spaces are filled with cleaner air.
- Our heating systems enable and efficiently use Scotland's renewable energy resources
- Electricity and non-electrical fuels are produced from sustainable sources in a way which is consistent with net zero emissions and biodiversity targets
- Our heating systems enable the flexible and stable operation of our energy networks

UK Government action

While we are taking action in areas where we can, we do not have all the powers necessary to deliver the transformational change required in our homes and buildings. The delayed UK Heat and Buildings Strategy must set out how the UK will use its regulatory and policy levers to incentivise rapid deployment of zero emissions heat technologies. Industry, businesses and consumers need certainty about how and when regulation will apply to them, and how and when the energy markets will be reformed to make zero emissions heat the cost-effective choice.

This year we will continue to press the UK Government to urgently set out a route map to a net zero heat sector that is crystal clear on these points, whilst doing everything we can within our powers to accelerate progress in a way that is just and fair.

In the absence of certainty from the UK Government, we continue to press ahead with the heat sector to support their efforts to bring costs down; we are helping to train installers to ensure a high-quality service for customers; and we are working with Scotland's public sector bodies and developers to facilitate investment in new infrastructure.

We urgently need a stronger commitment and clear action plan on heat from the UK Government, and we need private investors and the financial sector to develop the products and services that help consumers make the right choice and spread the upfront costs of investing in improving their properties where they are able.

Structure of this strategy

- **A 2045 Pathway for Scotland's Homes and Buildings** – the trajectory we must take to meet our net zero ambitions
- **People** – a people-centred transition, ensuring that we address fuel poverty and that the most vulnerable in society are protected as heating systems are replaced
- **Place** – ensuring our actions are tailored to Scotland's communities, resources, built environment and designated places
- **Preparing Scotland's Energy Infrastructure for Decarbonised Heat** – ensuring our energy networks are robust and fit for the future
- **Kick-starting Investment in the Transition** – how we will invest to stimulate the transition

- **Working Towards a Long-Term Market Framework** – taking action to ensure that the heat transition can be enabled by a stable, long term market framework
- **Developing a Regulatory Framework for Zero Emissions Buildings** – to underpin our delivery and provide certainty
- **The Economic Opportunity** – growing supply chains to meet rising demand, and ensuring that Scotland maximises the economic benefits of the transition
- **Working with the UK Government** – agreeing the steps the UK Government must take to ensure and enable delivery
- Monitoring, Evaluation and Future Decision Making – monitoring our progress

Alongside consultation on the draft Strategy we have been working with stakeholders to develop a series of impact assessments:

- Equality impact assessment
- Islands impact assessment
- Fairer Scotland Duty
- Child rights and wellbeing impact assessment
- Business and Regulatory Impact Assessment (BRIA)

We will publish these impact assessments following Strategy publication and they will be taken into account as we continue to develop our programmes and specific policies.

We conducted a Strategic Environmental Assessment to identify the likelihood of significant environmental impacts – positive or negative – that could arise from the policies and programmes covered by the Strategy. This included the production of an Environmental Report which was published during the consultation phase. We will publish a Post Adoption Statement, setting out how the findings of the Environmental Report and consultees' views on both the Environmental Report and draft Strategy, have been taken into account in the finalisation process. This will be published as soon as possible, and made available through the SEA Database[viii].

Chapter 2 A 2045 Pathway for Scotland's Homes and Buildings

To meet our net zero target, by 2045 all homes and buildings in Scotland must have significantly reduced their energy use, and almost all must be using a zero emissions heating system. As set out in the Climate Change Plan Update[ix], emissions for homes and non-domestic buildings combined will have to fall by 68% by 2030 as compared to 2020.

Today there are around 2.5 million occupied dwellings in Scotland and we expect the vast majority of them still to be occupied in 2045[x]. They account for 13% of Scotland's total greenhouse gas emissions[xi] and account for around 30% of Scotland's total energy consumptions (44 TWh).

The vast majority of our homes use mains gas as their primary heating fuel (approx. 2 million). Over 450,000 homes do not use gas as their primary heating fuel and of these, just over 260,000 use electric heating, such as storage heaters, with around 170,000 using high emission fuels including heating oil, LPG or high carbon solid mineral fuels such as coal[xii].

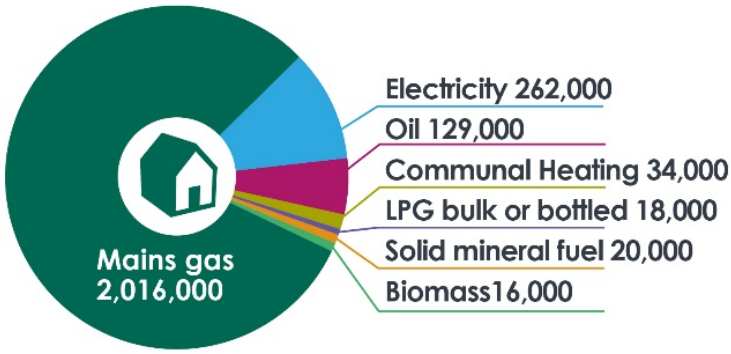


Figure 1: Breakdown of primary heating fuel vs number of homes (source Scottish House Condition Survey, 2019)

Only around 11% of households (approx. 278,000) have a renewable or very low emissions heating system, such as a heat pump, biomass boiler or electric storage heating[xiii]. This does not include those currently connected to a heat network, as these are predominately fuelled by gas. An estimated 34,000 homes are connected to heat networks[xiv].

The energy efficiency of Scotland's homes is improving. Since 2010, the share of the most energy efficient dwellings (rated EPC C or better) has increased by 27 percentage points[xv]. In 2019, 45% of Scotland's homes were rated EPC C or better, with social housing generally more energy efficient (56% EPC C or better) than the private sector (41%)[xvi].

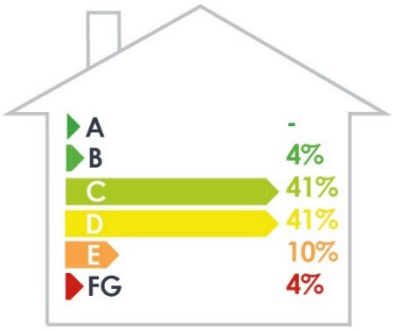


Figure 2: Energy efficiency of Scotland's homes by EPC rating (source Scottish House Condition Survey, 2019)

There are approximately 220,000 non-domestic buildings in Scotland[xvii], including around 23,000 buildings in public ownership[xviii] and 12% percent of Scotland's final energy consumption (17 TWh). They account for 7% of Scotland's total greenhouse gas emissions[xix]. Our non-domestic properties are hugely diverse and analysis of energy efficiency levels shows that almost three in four of all non-domestic premises have a current EPC of E or worse with only 5 percent EPC B or better[xx]. However Scottish non-domestic EPCs are derived on a different basis to domestic EPCs (and English non-domestic EPCs), and so are not comparable. These statistics serve mainly to underline that a large number of Scottish non-domestic buildings are heavy users of energy – the metric is not a reliable indicator of fabric energy efficiency.

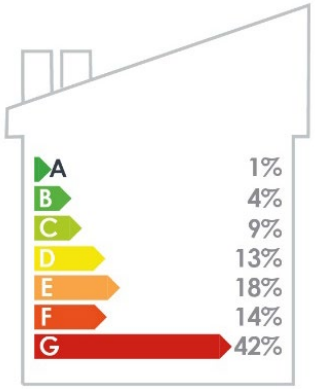


Figure 3: Energy efficiency of Scotland's non domestic properties by EPC rating (source Scotland's Non Domestic Energy Efficiency Baseline, 2018)

We know that over half of our non-domestic properties are already heated using low or zero emissions sources, but also that they vary significantly in floor area and energy use and some of the largest non-domestic buildings are more likely to have gas heating systems[xxi]. For non-domestic buildings not

using gas heating, electric heating (either direct or through Heating Ventilation and Air Conditioning (HVAC) systems) and oil are common alternatives.

The Journey to Net Zero

Scale of the Challenge

By 2045, emissions of greenhouse gases from heating our homes and buildings will have all but disappeared, with demand for energy reduced and space and water heating provided by zero emissions alternatives.

It is essential that homes and buildings achieve a good standard of energy efficiency, and that poor energy efficiency is removed as a driver of fuel poverty. Where technically and legally feasible and cost-effective, by 2030 a large majority of buildings should achieve a good level of energy efficiency, which for homes is at least equivalent to an EPC Band C, with all homes meeting at least this standard by 2033.

There will be some circumstances where this is not possible.[2] In such cases, we would expect these properties to achieve the highest standard possible, installing those measures recommended by the EPC assessment as being technically feasible and cost-effective for that building.

Energy Performance Rating – Aligning with Net Zero

To ensure that the energy performance rating included on Energy Performance Certificates (EPCs) aligns with our net zero objectives we will reform the EPC assessment process before using it as the standard by which properties will be measured.
Our consultation on a revised metric to be included on the EPC[xxii] considers how best to provide information to building owners on:

- measures needed to improve energy efficiency,
- an appropriate zero emissions heating supply,
- and the cost of heating following these improvements.

[2] There may be occasions when the measures needed to improve a buildings energy performance to the standard required are not possible. This include, but are not limited to, the method of construction, the cost of measures required, the measures having an unacceptable negative impact on the fabric or structure, or the need for 3rd party permissions (where this is not forthcoming).

We also want these reforms to remove anomalies within the current metrics (as advised by the CCC[xxiii]), which at present in some circumstances can

Improving the energy performance of buildings is essential to unlock the rollout of zero emissions heating. Energy efficiency measures alone will not reduce emissions enough to meet our emission reduction targets, but they are a critical precursor to deployment of many zero emissions systems and are vital to supporting households and businesses to reduce their energy costs today. Energy efficiency remains at the core of our heat in buildings policies and programmes, and a fabric first approach continues to be the mainstay of all our fuel poverty interventions.

In order to meet our interim climate targets and ensure long-term delivery of our net zero objectives, by 2030 the vast majority of the 170,000 off-gas homes that currently use high emissions oil, LPG, and solid fuels, as well as at least 1 million homes currently using mains gas, must convert to zero emissions heating. By 2030, we will also need to convert the equivalent of 50,000 of Scotland's non-domestic properties[3]. In energy terms, we will need to reduce fossil fuel consumption for heat in buildings by at least an estimated 28 TWh, of which at least 21 TWh will be natural gas[4].

Respondents to the consultation expressed support for the use of these 2030 milestones, which were seen to reflect the scale of the challenge and will support progress monitoring.

To meet the ambition for energy efficiency and zero emissions heat deployment set out above, we need to quickly ramp up the number of installations of low and zero emissions heating systems being installed per annum. Recent years have seen around 3,000 renewable heating systems installed in Scotland's homes annually. As set out in the 2021 Programme for Government, to maintain progress towards our statutory emission reduction

[3] In practice, this number will depend on the sequencing of non-domestic conversion due to the significant variation in size and energy consumption of our non-domestic buildings.

[4] These illustrative estimates assume virtually all non-gas fossil fuel consumption for heat in buildings is displaced by 2030. Should a lower volume of non-gas fossil fuel be displaced, a higher volume of gas and of total fossil fuel would need to be displaced to meet the emissions target. This is due to differences in emissions intensities. Note that the average fuel consumption of domestic properties using fossil fuels such as oil, LPG and coal is higher than that of gas heated properties. This is a result of these homes having, on average, a higher demand for heat (reflecting factors such as property size, type and levels of insulation) and lower heating system efficiencies. Therefore the proportion of homes needing to convert that are off-gas and the proportion of displaced fossil fuel that is not gas are not directly comparable.

targets, zero emissions heat installations must scale up to provide a total of at least 124,000 systems installed between 2021 and 2026. The installation rate will need to peak at over 200,000 new systems per annum in the late-2020s – which is above the natural replacement rate for boilers.

While new buildings represent only a small part of the decarbonisation challenge, it is important to ensure that they do not add any new emissions (because of the rapid decarbonisation efforts needed to reach net zero).

We will require new buildings to use zero direct emissions heating, and also to feature high levels of fabric energy efficiency to reduce overall heat demand so that they do not need to be retrofitted in the future. This requirement will apply from 2024 for building warrant applications for new homes.

Low and Zero Emissions Heating Systems

In this Strategy, by "low and zero emissions heating systems" we mean systems that have zero direct greenhouse gas emissions, such as individual electric heat pumps and connection to heat networks, or electric systems such as storage heaters, and systems that have very low emissions such as those that use hydrogen.[5]

Buildings connected to existing heat networks, powered using natural gas, will be considered to be future proofed and net zero ready. However, these heat networks will need to decarbonise by 2040-45 and, once the consenting regime is in place, new heat networks will need to use heat from low or zero emissions sources, such as surplus or waste heat or heat pumps, or be powered using hydrogen, including via the latest "fifth generation" heat networks.

Bioenergy, for example in the form of biomass, bio-heating oil, bio-propane, where they come from sustainable sources, are included as low emissions systems, but likely to have a more limited role.

This list of low and zero emissions heating systems will be kept under review.

[5] The shared policy programme agreed between the Scottish Government and Scottish Green Party noted that any strategy for the deployment of hydrogen and carbon capture, utilisation and storage "must enable decarbonisation at pace and cannot be used to justify unsustainable levels of fossil fuel extraction or impede Scotland's just transition to net zero."

We also need to see increased use of biomethane and hydrogen in the mains gas network in order to reduce the emissions intensity of the gas network. Whilst the long-term future of gas remains uncertain, emissions reductions can be achieved today with gas blending. By 2030, we would like at least 20% of the volume of the gas in the GB gas grid to be alternatives to natural gas. Delivering blended gas to customers in Scotland will directly support decarbonisation of both heat and industrial demand still supplied by the gas network in Scotland in 2030. In line with our Hydrogen Policy Statement and forthcoming Hydrogen Action Plan, blending across the GB network will provide significant opportunities for Scotland's hydrogen sector to support decarbonisation across the UK. To ensure compatibility with our net zero targets and wider sustainability objectives, it will be important that biomethane is sourced from sustainable and net zero sources.

The UK Government is launching the Green Gas Support Scheme this autumn, supporting biomethane injection into the gas grid. Similarly, as hydrogen becomes available, it will need to come from low carbon or renewable sources and be compatible with longer term plans for the gas network.

Strategic Technologies to 2030

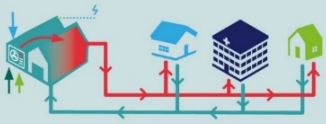
Research[xxiv] for the Scottish Government found that there are low and zero emissions heating options available for all domestic dwellings. In order to make progress now against our net zero ambitions, we must begin accelerating and scaling up the deployment of already tried and tested measures such as energy efficiency, and primary heating system technologies where they are known to be no or low regrets. Therefore, over the coming years we propose a focus on the no and low-regrets strategic technologies on the following page:

No and Low Regrets Strategic Technologies

We will continue to prioritise action on energy efficiency. To deliver regulations to support the installation of cost-effective energy efficiency first improvements in all buildings (e.g. roof, windows, wall and floor insulation); both the retrofit of existing buildings and increased energy performance of new buildings.

Deployment of individual building heat pumps in buildings off the gas network which currently use high carbon heating fuels.

Deployment of heat pumps in certain buildings currently using mains gas particularly in buildings for which initial assessments suggest heat pumps are likely to be cost effective in the short-term and areas least likely to receive a mains hydrogen supply in the future.



The development of low and zero emissions heat networks (district heating and communal heating systems) in areas deemed suitable.

These are the technological solutions where cost uncertainty is low and we already understand (a) the costs of installation and (b) running costs for consumers. They are no and low-regrets as, across all plausible pathways to net zero, they are likely the most cost effective zero emissions options in the buildings identified. A focus on no and low-regrets interventions, deployed according to the guiding principles set out in chapter 3, will also help to tackle poverty by improving energy performance.

We welcome the broad support expressed in the consultation for the strategic technologies set out in this Strategy, prioritising deployment of energy efficiency, heat pumps and heat networks.

We have commissioned further research to consolidate the evidence on heat pump performance in Scotland, which we are publishing alongside this Strategy. The review found no evidence to suggest that heat pumps could not operate effectively in Scotland. The review also found that correct specification and sizing of heat pumps and heat emitters are critical determinants of heat pump performance.

Subject to the safety and commercial case being established we expect to see blending of hydrogen with natural gas develop across all areas of the GB gas network and may also see the conversion of parts of that network to deliver 100% hydrogen towards the end of the decade.

Blending hydrogen into the gas network can help to reduce emissions from buildings heated from the gas network. We want to see as much renewable hydrogen in the energy system as quickly as possible. Hydrogen blending can make good practical use of the existing gas grid infrastructure to support the expansion of a national market for hydrogen which can be supplied by Scotland's developing hydrogen sector, helping to support a key sector for our wider net zero energy transition. However, blending of hydrogen will, on its own, only deliver small emissions savings and it is also important that we consider the potential for conversion and repurposing of parts of the network to 100% hydrogen. In the short term this means understanding which actions can ensure this option remains open for Scotland. This may be particularly appropriate in certain locations, where there is local supply (for example from abundant renewable electricity) or where industrial demand creates economies of scale. For example, SGN have been exploring the potential for 100% conversion or repurposing of large parts of their network. Increased availability of hydrogen for heat will have positive implications for the suitability of hybrid heat pump systems, which may be cost-effective solutions in conjunction with hydrogen, and we will keep this under review.

However, under any scenario, decarbonised gas is unlikely to play a large part in reducing emissions before the late 2020s. We will set out more detail on the pathways to decarbonised gas and options for hydrogen for heat in our Energy Strategy and Just Transition Plan.

We agree with the UK Committee on Climate Change's recommendation that bioenergy resources should only be used in those applications across the economy where their carbon reduction impact is maximised or where alternative options are not available. There may be a small number of buildings for which bioenergy, for example in the form of biomass, bio-heating oil, or bio-propane (a replacement for LPG) may play a role for home heating if displacing fossil fuels in off-gas-grid areas where electric heating or heat pumps are unsuitable. Biomethane injection into the gas grid will also play a role. As set out in the Bioenergy Update[xxv] in March 2021, we have established an internal Bioenergy Working Group, and will set up an Expert Panel to support this group, to consider and identify the most

appropriate and sustainable use of bioenergy resources within Scotland. This will inform a Bioenergy Action Plan which we will publish in 2023.

Hybrid systems combine two or more heating technologies, often a heat pump and a boiler, both of which need eventually to have zero emissions to meet our emissions targets. Hybrids may afford system-level flexibility advantages and lower building-level costs in certain circumstances. At present, however, uncertainties in the scale and distribution of these potential advantages, as well as the need for further evidence on the availability and role of decarbonised fuels for heating, mean it is too early to prioritise deployment of hybrids. We continue to keep this position under active review as the evidence base develops.

Other technologies such as deep geothermal are less well developed in Scotland but could have a role to play in particular communities and areas. We will continue to explore the potential for such solutions.

Solar thermal technologies tend to be most appropriate as a complement to a primary zero emissions heating technology such as a heat pump. Solar thermal is discussed below.

Initial analysis indicates that low and zero emissions heating technologies are applicable to a large proportion of the non-domestic building stock, however enabling works such as upgrading distribution systems (installing larger-sized pipes and new heat emitters to accommodate lower flow temperatures) and increasing site electricity capacity may often be needed.

To ensure that we tailor forthcoming policies and support to our diverse non-domestic building stock we are taking action to further improve the evidence base including work to develop a database of the non-domestic buildings stock in Scotland.

Overall, we recognise some properties may be more constrained in terms of technology options available, limited by location and property type, proximity to the gas network, impact on the fabric of historic buildings, space constraints, and capacity of the electricity grid.

Scotland's traditional buildings

Scotland has a high proportion of traditional buildings, with around a fifth of Scotland's homes built before 1919[xxvi]. Scotland has over 650 designated conservation areas and around 47,000 listed buildings . Around 10% of the Scottish housing stock is listed or located in conservation areas .

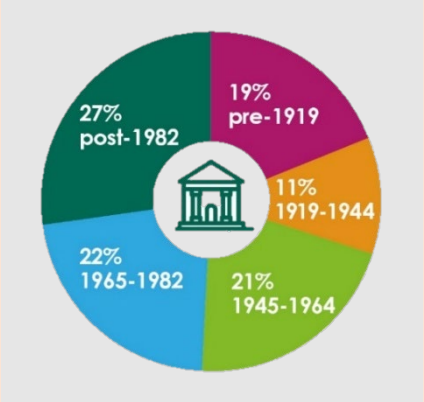


Figure 4: Breakdown of Scotland's building stock by age (source Scottish House Condition Survey, 2019)

For traditional and heritage buildings, we recognise that bespoke approaches, including skilled design and construction, may be required. We are working with stakeholders, including Historic Environment Scotland, to develop more solutions to transition Scotland's historic buildings to zero emissions heating while respecting and preserving the special characteristics of our buildings and places, and where needed continue to build our evidence base and the guidance available for the heat transition in these buildings and areas, including in our approach to regulation (see Chapter 8).

We know that a minimum level of energy efficiency is an important prerequisite and is needed to underpin the rollout of zero emissions heating across all technology scenarios. To better understand the role of energy efficiency levels in unlocking the deployment of zero emissions heating systems in different types of building stock, we are undertaking further modelling and analysis which will inform future delivery and regulatory programmes. This will be underpinned by reforms to Energy Performance Certificates, and the wider EPC assessment framework, taking into account our fuel poverty and climate objectives, as set out in Chapter 8.

Cooling

Some buildings also require energy for cooling. At present, this is more relevant for non-domestic properties, such as hospitals, larger open plan offices, hotels and retail units. As our climate changes we are likely to experience increased temperatures, with warmer winters and hotter summers

becoming more common. As a result, we are likely to see an increased demand for cooling in the future. We recognise that it will be important to understand the need for passive measures, such as ventilation and shading, that could be applied to buildings during the course of improving their fabric efficiency. It will also be important to understand the need for, and role of, zero emissions heat systems that are capable of also providing cooling, such as reversible heat pumps.

We have been working with BEIS to look at cooling needs of our building stock, and this will inform future policy development in this area.

Cooking

Many buildings use the same fuel for heating and cooking, particularly natural gas. When buildings switch away from using fossil fuel boilers, decisions on cooking appliances may also need to be made. As we accelerate deployment of strategic heating technologies, we will ensure our programmes support households and non-domestic building users to also transition to new cooking appliances, where appropriate.

Secondary technologies

A range of secondary technologies work well in conjunction with a primary zero emissions heating system to increase operational effectiveness in certain scenarios. These include solar thermal, micro wind and photovoltaic (PV) electricity generation as well as a variety of storage technologies such as electric batteries, thermal water stores or, more recently developed technology such as heat batteries. Solar thermal can supplement hot water supply during summer months whilst solar photovoltaic panels can contribute towards electrical requirements for zero emissions heating.

We are undertaking analysis to better understand the extent to which building-level storage technologies (including heat batteries, electric batteries and thermal storage cylinders) could help to support the widespread deployment of zero emissions heating in domestic properties by reducing household energy costs when installed alongside zero emissions heat systems.

Thermal storage

For many zero emission heating systems thermal storage is required to ensure efficient operation, particularly for hot water supply. Heating system thermal storage typically comes in two forms: hot water storage tanks of various sizes; and newer more compact heat batteries that may be

particularly suitable where space is limited. Thermal storage can allow for multiple heat inputs from a range of zero emissions technologies, help consumers access cheaper off-peak tariffs and maximise the impact of on-site generation.

The popularity of combi-boilers that provide instantaneous hot water has led to the removal of thermal storage in many homes and buildings. Retrofitting thermal storage is likely to be challenging as the space once occupied has now often been repurposed. More compact heat batteries have real potential to support retrofit thermal storage.

Thermal storage is also likely to have an important role in the operation of heat networks, helping to optimise operation and potentially reduce running costs. This can be either thermal storage in individual buildings or larger scale installations integrated with the heat production associated with networks.

Overall, be it thermal storage in individual properties or larger scale thermal storage connected to a heat network, thermal storage systems can enable the decoupling of heat production and heat use. They can support the flexible operation of smart energy networks and can help to maximise benefits, including helping to reduce the need for electricity network upgrades (see Chapter 5) with potential to reduce bills.

Heat in Buildings Research Programme

1. We are undertaking analysis to better understand the extent to which building-level storage technologies (including heat batteries, electric batteries and thermal storage cylinders) could help to support the widespread deployment of zero emissions heating in domestic properties by reducing household energy costs when installed alongside zero emissions heat systems.
2. We will publish a review of evidence on heat pumps in Scotland alongside this Strategy. The review found no evidence to suggest that heat pumps could not operate effectively in Scotland, but also found that correct specification and sizing of heat pumps and heat emitters are critical determinants of heat pump performance.
3. We will further improve the non-domestic buildings evidence base, including work to develop a database of this part of the building stock in Scotland.

4. We are undertaking further modelling and analysis to better understand the role of energy efficiency in unlocking the deployment of zero emission heating systems, which will inform future delivery and regulatory programmes.
5. We are keeping the role of hybrid systems under active review as the evidence base develops.
6. We have been working with BEIS to understand the cooling needs of our building stock, and this will inform future policy development in this area.

Our emissions reduction target: 68% greenhouse gas emissions reduction for buildings by 2030 against 2020 levels

Consultation responses to the draft of this Strategy offered a range of views on the function a new heat target should serve. These included ensuring progress in delivering emissions reductions, and articulating the heat transition in meaningful terms. Comments also drew out a tension between the role of targets for specific measures in providing certainty to industry, set against the risk that such targets could constrain flexibility.

The buildings emissions envelope set out in the Climate Change Plan update[xxix] is the target for emissions reduction we must deliver: 68% reduction in emissions by 2030 against a 2020 baseline. This target reflects directly the contribution buildings must make to meet our economy wide climate change targets.

As set out above, realising the 2030 emissions envelope will require both energy efficiency upgrades and deployment of zero emissions heating across a large number of buildings. Our monitoring and evaluation process will report progress against these outcomes, affording more concrete insight into our progress through the heat transition.

The Heat Networks (Scotland) Act has set new statutory targets for heat supplied by heat networks. As set out in Chapter 5, these require the combined supply of thermal energy by heat networks to reach 2.6 TWh of output by 2027 and 6 TWh of output by 2030.

Responses to the consultation also expressed support for technology-specific milestones to give certainty to specific industries beyond the targets above. We recognise the value in technology specific milestones, but to be effective in mobilising investment along supply chains these milestones need to be robust to uncertainties and to take into account a whole systems view. We will therefore continue exploring how best to set technology-specific milestones that account for the needs of industry and whole systems issues, and will consider them alongside the Energy Strategy and Just Transition Plan.

New Renewable Heat Target

To comply with statutory requirements, we are setting a new provisional renewable heat target for the proportion of non-electrical heat demand in buildings supplied by renewable sources either directly or via a heat network. These sources include ambient heat supplied by heat pumps, the renewable heat supplied by heat networks, and bioenergy. The new target is for at least 22% of non-electrical heat in buildings to be directly supplied by these sources by 2030, up from the current estimated level of 4%. As set out in the draft Strategy, the scope of this target differs from the previous target by not including industrial heat, a proposal that was generally supported by consultation respondents.

This target is provisional. We know that more than 22% of heat in buildings must be decarbonised in order to deliver our 2030 emissions reduction target. However, the amount of this heat that must be supplied by *renewable* sources depends on the whole systems pathway and other forms of low carbon heat provision. For this reason the provisional renewable heat target has been set as a minimum level, and will be reviewed as part of the Energy Strategy and Just Transition Plan in 2022.

Summary of heat targets

- **Principal emissions reduction target**: 68% reduction in emissions from buildings by 2030 against a 2020 baseline as set out in the Climate Change Plan Update.
- **Heat networks target:** the combined supply of thermal energy by heat networks to reach 2.6 TWh of output by 2027 and 6 TWh of output by 2030.
- **New Renewable heat target (provisional):** at least 22% of heat in buildings to be directly supplied from renewable sources by 2030.

Respondents to the consultation generally agreed with the draft Strategy's intention to simultaneously deliver our climate change and fuel poverty commitments, and agreed that any new heat target should be compatible with this position. Chapter 3 sets out the principles we will adopt in our delivery programmes and policy to support those in fuel poverty through the transition.

Chapter 3 People

Transforming how we heat our homes and buildings will touch the lives of almost everyone in Scotland. It will involve changes in our homes, places of work and community buildings as we upgrade and roll out new heating technologies and energy efficiency measures.

There was a broad consensus among respondents to the consultation on the importance of ensuring that the transition to zero emissions is just and will not have an adverse impact on those in, or at risk of, fuel poverty.

People must be at the heart of this transition. We are committed to a just transition to net zero, which means working with people, businesses and communities across Scotland to ensure they have a clear role in decision making, can access support and advice, and to help ensure that the costs and benefits of the transition are spread fairly. We will also take action, within our powers, to protect our most vulnerable citizens and to ensure that there are clear routes for redress when things go wrong.

Just Transition

The transition to net zero emissions will transform our society and economy, therefore the manner of our transition will be crucial. If we plan and prepare, building consensus about our collective future through dialogue and engagement, then we can ensure Scotland benefits from the opportunities of net zero. The transition can realise green jobs, a better environment and a healthy economy that supports our wellbeing. Failure to plan risks abrupt shifts, the loss of key industries and jobs, and deepening inequalities. This is why Scotland has committed to a just transition to net zero.

A just transition puts people and communities at the heart of our approach to climate change action. It ensures we work together in order to capture opportunities, tackle existing inequalities and exclusion, whilst anticipating and mitigating risks to those worst impacted so no one is left behind. As the pace of the transformation increases, the need for a collaborative just transition becomes ever more important. This approach is at the heart of Scotland's ambitions to move to a wellbeing economy that prioritises society's wellbeing as the core aim of our economy.

A people-centred transition

The transition to decarbonised heat will affect us all. So, it will be important that we are all involved in the decisions about how our homes and buildings are to be transformed and how the transition is managed. This will need to be underpinned by increasing awareness of energy efficiency and zero emissions heating systems, open and transparent decision making and an inclusive, people-centred approach. We know that public understanding of the role of heating in causing greenhouse gas emissions is low. Research suggests that only 49% of people identified gas central heating as contributing to emissions, and fewer than 20% of people said they would consider switching to a zero emissions heating system, with fewer than 2% having done so already[xxx].

The crucial role of public engagement to facilitate the heat transition in Scotland was stressed by many respondents to the consultation, who highlighted the importance of both early engagement and engagement activity sustained over a long period.

We are developing a bespoke public engagement strategy for heat in buildings. This builds on the objectives and guiding principles of our Public Engagement Strategy for Climate Change[xxxi], as well as our existing support and advice programmes, and focuses on:

- raising the profile of energy efficiency and zero emissions heating options so that people are aware of the benefits and begin to see them as a positive choice;
- enabling people to actively participate in shaping the development of Scottish Government policy and incentives as well as local level heat and energy efficiency planning; and
- raising awareness of the support and advisory services available in order to maximise uptake of the support available.

Over the next year, we will work to establish a virtual National Public Energy Agency to accelerate the transformational change required in how we heat and use energy in homes and buildings. The Agency will bring new coordination and leadership to our existing advice and delivery programmes. This will include informing the public on the changes needed and providing expert advice. We will then scale up this approach within a single dedicated physical Agency by September 2025.

We will take steps to ensure that everyone, including owner occupiers, tenants, private and social landlords, SMEs and communities, has the opportunity to help shape the decisions we take at a national and local level on how we heat our homes and buildings in the future. We will consult

extensively with stakeholders and citizens as we develop the regulations and delivery programmes proposed in this Strategy. We will also learn from the practices used as part of Scotland's Climate Assembly[xxxii], and more broadly welcome the common direction of travel between the Assembly's recommendations, published in June 2021, and this Strategy. A cross-Government response to the full recommendations will follow, in-line with the requirements of the Climate Change (Scotland) Act.

To support public engagement, we will continue to ensure our schemes are easy to identify and navigate, helping to build trust and awareness. The National Public Energy Agency will be given a role to further ensure users can easily access the support and advice they require. To ensure that we take an inclusive approach, we will identify and support disengaged and vulnerable groups, ensuring that support is available to all of society. We will give due regard to equalities, and will not unfairly discriminate based on any protected characteristics.

Let's do Net Zero

The *Let's do Net Zero* national marketing campaign was launched in June 2021 to inform people about the climate emergency, help them understand the need for action and what Scotland is doing in response. Spanning across three different phases, the campaign has been shown across television, radio, out-of-home media, print media, social media and other digital forms.

The first phase of content – the Climate Emergency – aimed to raise awareness of the climate emergency amongst the Scottish public and the consequences of inaction. The second phase – Scotland's Taking Action – showcased the range of actions that the Scottish Government is taking to tackle the climate emergency and promoted the need for collective action across all aspects of society. The third and final phase will take place in October 2021 ahead of COP26 and combined the elements of the previous phases that have been most engaged with.

Developing the marketing campaign has been a cross-government effort, drawing on areas such as transport, waste, energy and food and drink. The campaign content is rooted in evidence. In developing the activity we drew on credible existing research and carried out a series of focus groups to test concepts.

We will deliver a public communications programme to raise awareness of the support and advisory services available and to encourage home

upgrades, in order to maximise uptake of these schemes. We will ensure that the most up-to-date information and support for individuals to carry out these actions are provided on the NetZeroNation.scot website.

Heat Pump Heroes

Energy Saving Trust's Scottish Home Renewables Service, which delivers the specialist renewables advice from Home Energy Scotland on behalf of the Scottish Government, carried out a survey to establish the levels of awareness of heat pumps across Scotland. This research found that 51% of people in Scotland had already heard of heat pumps and that 6% are currently very likely to consider installing[xxxiii].

New webpages were created with information about heat pumps including new videos explaining what air source and ground source heat pumps are and how they work, and new articles looking at how heat pumps works, heat pump myths explored, grants and funding for installation, and an installation checklist and guide.

Case studies were developed for Scotland's Heat Pump Heroes – members of the Green Homes Network that have installed heat pumps and want to encourage others to do the same. This campaign will run until March 2022.

Figure 5: Image from Heat Pump Heroes Campaign

Summary of action we are taking:

7. Building on the Climate Change Public Engagement Strategy, we are developing a bespoke public engagement strategy for heat in buildings.
8. Over the next year, we will establish a virtual National Public Energy Agency to bring new coordination and leadership to our existing advice and delivery programmes, including informing the public on the changes needed and providing expert advice. We will then scale up this approach within a single dedicated physical Agency by September 2025.
9. We will respond to the Climate Assembly's recommendations and take action on them.
10. We will continue to ensure our schemes easy to identify and navigate, helping to build trust and awareness.
11. We will identify and support disengaged and vulnerable groups, ensuring that support is available to all of society. We will give due regard to equalities, and will not unfairly discriminate based on any protected characteristics.

Helping people make informed choices

Ultimately, the transition will require individuals and organisations to make a range of interventions in their properties. We want individuals and organisations to see energy efficiency and low and zero emissions heating as a positive choice, understand the options available, and know where they can get help and trusted advice. Respondents to the consultation on the draft Strategy highlighted this continuing need to provide information and support to help consumers make informed choices.

Respondents to the consultation were largely supportive of the Scottish Government's commitment to providing high quality information, advice and support through established and trusted organisations, such as Home Energy Scotland and Zero Waste Scotland, and by working with local partners or community groups to enable public engagement. Some respondents called for improved quality of advice and customer journey.

We will retain the support and advice services currently operating as Home Energy Scotland and Energy Efficiency Business Support (to become Business Energy Scotland from April 2022) at the core of our delivery schemes. Together they provide free and impartial advice on energy efficiency, energy saving and zero emissions heating to households, businesses and

other organisations across Scotland. The public sector can access similar support via the Public Sector Project Support Unit. Third sector and community organisations can access support via the Community and Renewable Energy Scheme (CARES).

As we accelerate the transformation of Scotland's homes and workplaces, as well as creating the National Public Energy Agency, we are investing in growing our advice services and continuously adapt and improve them so that they continue to meet people's needs. As an initial step, we are working to improve our digital presence and the advice and support that can be accessed online. We will continue via Home Energy Scotland and Business Energy Scotland to provide in-depth and targeted support for households and SME businesses installing zero emissions heating systems. Our delivery programmes are discussed in more detail in Chapter 6.

We will embed lessons from and build upon successful marketing campaigns such as Greener Scotland and existing programmes, such as Home Energy Scotland and Business Energy Scotland. We will also expand our Green Homes and Business Networks so that people can learn from households, businesses and organisations who have already taken action to make their property warmer, greener and more efficient.

Summary of action we are taking:

12. We are investing in growing our advice services so that they continue to meet people's needs. This includes improving our digital presence and continuing to provide in-depth support for installing zero emissions heating systems.
13. We will expand our Green Homes and Business Networks so that people can learn from other householders, businesses and organisations who have already made the transition to warmer, greener and more efficient buildings.

Addressing Fuel Poverty

Today in Scotland, a quarter of households are in fuel poverty with around half of these living in extreme fuel poverty. The median fuel poverty gap in 2019 was £700 in 2015 prices. The Fuel Poverty (Targets, Definition and Strategy) (Scotland) Act 2019 requires that by 2040, as far as reasonably possible no household in Scotland is in fuel poverty and no more than 5% of households in Scotland are in fuel poverty and no more than 1% of households in Scotland are in extreme fuel poverty, and the median fuel

poverty gap is no more than £250 adjusted for 2015 prices (see figure overleaf).

Consultation respondents highlighted the importance of the just transition and fuel poverty. Issues raised were mainly linked to the financial impact of the net zero transition on consumers as heating costs – capital and running – can be higher for zero emissions heating in some settings than the fossil fuel incumbents, underscoring the importance of appropriate support being available for consumers, particularly those in fuel poverty. As we scale up deployment of energy efficiency measures and zero emissions heating systems, we need to support people through the heat transition, and continue to work more widely to tackle fuel poverty. We will set out our approach to eradicating fuel poverty in the Fuel Poverty Strategy by the end of 2021.

We know that the prevalence of fuel poverty is higher in remote rural (43%) and remote small towns (34%)[xxxiv]. One important reason for this is that not all of these households have access to the gas network, since the fuel poverty rate for homes with electricity as their primary heating fuel is 43% compared to 22% for gas[xxxv]. The majority of households using electricity in Scotland, whether in urban or rural settings, currently rely on traditional emitters such as storage heaters[xxxvi].

Zero emissions heat running costs

The running costs for zero emissions heat systems depend on a variety of factors, including how well insulated and how large the building is, the efficiency of the heating system, and the price of energy offered by energy suppliers.

Heat pumps are a key zero emissions technology, and a very efficient way of using electricity to provide heat[6]. Although one kWh of electricity is currently more expensive than one kWh of gas (by a factor of about 4-5), the higher efficiency of a heat pump means the amount of energy needed can be less than a third the amount of energy needed by a gas boiler to produce an equivalent amount of heat.

This means that for some properties, heat pumps can help reduce bills where they are replacing older, more inefficient oil and gas heating

[6] A typical modern condensing gas boiler has an efficiency of 0.9, compared to 2.4 for an air source heat pump and 3.4 for a ground source heat pump.

systems, or where they are combined with upgrades to the efficiency of the building's fabric. Increasingly there is also the option to deploy heat pumps alongside other measures such as solar PV or battery storage to help further reduce electricity bills.

However, when a heat pump replaces a modern, efficient gas boiler, the greater efficiency of the heat pump may be insufficient to offset the higher price of electricity and the household's running costs may therefore increase. This is why, as set out in Chapter 10, we continue to urge the UK Government to rebalance energy prices to reduce the difference in unit costs between gas and electricity.

Heat networks are also a key strategic zero emissions heat technology. The Competition and Markets Authority found that up to 90% of heat network customers enjoy similar, or lower, bills than those with standard gas boilers[xxxvii] and heat networks can cut both emissions and bills.

High standards of energy efficiency are essential to reduce the overall demand for energy. Alongside energy saving behaviours these measures can help to ensure running costs remain affordable. We will continue to take a fabric first approach as it underpins the successful roll-out of low and zero emissions heating, as well as being an important aspect of tackling fuel poverty.

Fuel Poverty Targets

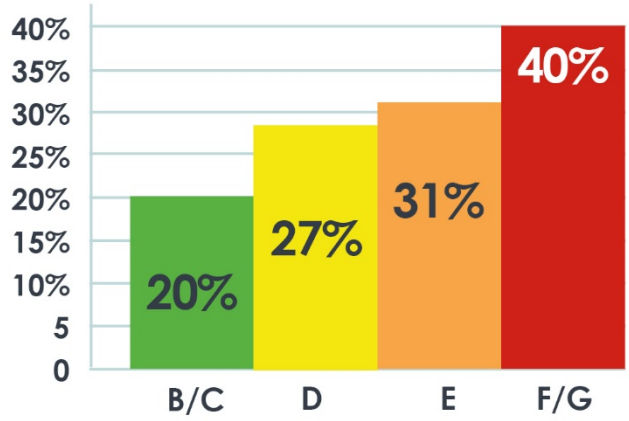


Figure 6: Fuel poverty rates in Scotland's homes in all tenures, broken down by EPC band of dwelling (Source, Scottish Government House Condition Survey, 2019)

Improving the energy efficiency of our homes helps to reduce fuel poverty (See figure above)[xxxviii].This does not guarantee that a household will be removed from fuel poverty owing to other drivers of fuel poverty, namely low income and high fuel prices. However, even where a household remains in fuel poverty after extensive retrofit, the enhanced energy efficiency will often reduce the depth of fuel poverty and provide them with improved levels of comfort.

As set out in the 2018 Energy Efficient Scotland Route Map, we believe that homes with households in fuel poverty should reach higher levels of energy efficiency. We want all fuel poor households to benefit from an energy efficiency rating equivalent to EPC C by 2030 and equivalent to EPC B by 2040.

These targets for fuel poor homes will guide our national and area-based Heat in Buildings domestic delivery programmes. This will mean maximising the level of improvement possible in each home in line with overall cost-effectiveness principles.

As we transform our homes and buildings over the next two decades it will be imperative that we do so in a way that continues to help eradicate fuel poverty and protect our most vulnerable citizens. It will also be important that we protect, and wherever possible, enhance the competitiveness of Scottish businesses.

We will continue to build the evidence base on the interactions between our fuel poverty and climate commitments, and apply that knowledge to our policy design and to our programmes: mitigating any risk of unintended consequences, tracking progress, and learning by doing in order to adjust immediately where unintended consequences nevertheless arise. Where the

actions within this strategy have the potential to impact on fuel poverty we will undertake an assessment to understand what those impacts will be. We will only take forward actions where they are found to have no detrimental impact on fuel poverty rates, unless additional mitigating measures can also be put in place. To do this, we will be guided by the following principles.

Guiding principles to ensure alignment with fuel poverty objectives

1. We are committed to ensuring that poor energy efficiency is removed as a driver of fuel poverty. As such, improving the fabric of buildings will be central to how we decarbonise heat.

2. We recognise that heat decarbonisation is essential to address the climate emergency, and that in decarbonising our homes we must not make fuel poverty worse. We commit to delivering measures to help those in fuel poverty to manage their running costs. As such, it is essential that, whenever possible, measures that both promote decarbonisation and lower fuel costs are supported.

3. We will assess our heat in buildings capital delivery programmes for their impact on those households experiencing fuel poverty– both at installation and throughout their lifespan. This assessment should be proportionate to the expected impacts.

4. Where an intervention can lower running costs, fuel poor consumers should be targeted for support as soon as possible, including support for the up-front installation costs of these measures. Factors affecting the ability of consumers experiencing fuel poverty to take up these measures should be considered as part of this process, as should the provision of advice and support to ensure that households in fuel poverty derive the maximum benefit from new measures.

5. We will develop mitigation measures to be deployed across our capital funding programmes where there are demonstrable cost increases on those in or at risk of fuel poverty. Success of these measures should be regularly assessed and, if appropriate, these measures should be adjusted to better meet the needs of these households.

6. In cases when zero emissions heat interventions are assessed as likely to increase energy costs even after mitigation measures are put in place,

government supported measures should be focused on consumers who are not at risk of fuel poverty.

7. In some cases, wider change will be needed for decarbonisation measures to become suitable for those in fuel poverty, including areas that are reserved to the UK Government. We will continue to urge the UK Government to take necessary action in reserved areas and will use the research and practical experience gained through our decarbonisation schemes to support us in building appropriate evidence and pushing for systemic improvements.

8. Communications should be presented in formats accessible to a wide range of consumers, taking into account differing circumstances and accessibility needs.

These principles give a direction for programme and policy development recognising the twin challenges of decarbonising and tackling fuel poverty. Much of the real impact felt by people will, however, come down to the specifics of how we design, assess and target interventions, including in any regulation for energy efficiency and zero emissions heating, and the mitigations that we are able to put in place in cases where our aims for fuel poverty and decarbonising buildings don't naturally align.

We will work quickly to develop more detailed, and where necessary programme or policy specific, guidance in these areas in accordance with these guiding principles. We are currently establishing a statutory Scottish Fuel Poverty Advisory Panel alongside the development of our upcoming fuel poverty strategy and as part of its role in overseeing the Scottish Government's progress in reaching the fuel poverty targets, the panel will provide expert advice on how to ensure those in or at risk of fuel poverty are not adversely impacted by our decarbonisation efforts.

We will reshape and target our energy efficiency and heat programmes. We will continue to use our delivery programmes to target support to fuel poor households, to maximise the number of households in fuel poverty achieving a level of energy efficiency equivalent to EPC C by 2030 and EPC B by 2040. We will take a zero emissions first approach (see below), where it is technically feasible and will not increase fuel poverty.

Case Study: Heat Pump installation in Orkney

There are examples of projects delivered through our existing energy efficiency and heat schemes, that have provided zero emission heating systems and improved insulation that reduced both carbon emissions and fuel bills. For example, an increasing number of heat pumps are being installed to address fuel poverty through our Warmer Homes Scotland programme. Feedback received from households suggests many are benefiting from consistently warmer homes, and in some cases cheaper bills, when switching from predominantly old electric storage heaters to air source heat pumps.

An example is Mr K from Orkney. Mr K was living with an inefficient heating system that was very expensive to run despite it not even heating the whole house. Mr K knew he could not afford to keep paying the bills every month. With help from Home Energy Scotland, Mr K accessed support for installing a heat pump.

Mr K has already noticed a difference in his bills and quality of life:

"Our bills have decreased by half since we installed the air source heat pump and this will save us around £1000 a year, maybe even more. We are also warmer and we are living in a comfortable home where you don't have to wear coats in the house to keep warm. People actually come to our house to visit us now because it's so warm and their home is cold, so they visit us to keep warm and have a cup of tea. It's a magical system, more people should know about this and the impact it could have on older people's lives."

We remain committed to phasing out funding for fossil fuel heating systems by 2024 across our programmes except where this does not align with our fuel poverty principles, or in exceptional circumstances where extremely vulnerable people might require urgent solutions.

From Monday 6 September 2021 new applications for oil and LPG boilers have no longer been available through Warmer Homes Scotland, Area Based Schemes or Home Energy Scotland Loans. We are adopting a "low and zero emissions heating system first" approach (see Chapter 6) and have increased our investment in whole house retrofits benefitting fuel poor households. We also intend to target those households who can benefit most from installing a heat pump or connecting to a heat network.

Our advice and support programmes will continue to support energy efficiency measures, and for those households requiring additional support these services will continue to provide help on tariff switching, energy behaviours and make onward referrals to ensure that all households receive the support for which they are eligible. Being on the right energy tariff can have a significant impact on bills.

Taking a 'Low and zero emissions heating system first' approach

Households will be offered a low or zero emissions heating systems in the first instance, but we will avoid installing these systems in households where it would push them into fuel poverty or worsen the depth of fuel poverty. Where installing a zero emissions heating system would have a detrimental effect on fuel poverty we will support the household to install energy efficiency measures and in the short term will continue to support the installation of replacement gas boilers under our Warmer Homes Scotland scheme. We are extending our support for fuel poor households to include secondary technologies, such as solar PV and battery storage, to help reduce running costs and peak demand for electricity. We will undertake further research to assess the scope to scale up this approach and evaluate impact.

We continue to engage with Ofgem and energy retailers, encouraging the development of new tariffs tailored to zero emissions heating systems. This is particularly important for all forms of electrified heat. We will continue to press for reforms so that customers with pre-payment meters are able to access similar tariffs to direct debit customers. We continue to engage with Smart Energy GB, Energy UK, BEIS and the wider energy market to push for more households to be able to benefit from smart meters in order to access the low and zero carbon technologies that these can unlock.

We will work with network companies to ensure vulnerable households moving to heat pumps are identified in distribution network operators' vulnerable customer strategies. These customers' needs can then be prioritised in the event of any loss of service.

We are conducting analysis to consider the distributional impacts of decarbonising our homes and buildings and to further quantify the impact of making our homes and buildings warmer, greener and more efficient for those on lower incomes and those in or at risk of fuel poverty. This work is also considering options to mitigate any negative impacts which can be implemented over the longer term.

Small-scale renewable generation and storage, including solar thermal and photovoltaic (PVs), thermal and battery storage could potentially provide a source of energy and flexibility for consumers, helping to reduce bills and tackle fuel poverty. We have supported a number of projects which have set out to demonstrate the role of domestic scale renewable generation and storage in alleviating fuel poverty. We will evaluate these projects to understand further the impact of this system-based approach. We will use our findings to assess the benefits of investing further in micro-generation and storage measures, alongside energy efficiency and zero emissions heating measures.

Summary of action we are taking:

14. We have published here a set of guiding principles to underpin our commitment that no one is left behind in the heat transition, ensuring we only take forward actions where they are found to have no detrimental impact on fuel poverty rates, unless additional mitigating measures can also be put in place.
15. We continue to build the evidence base on the interactions between our fuel poverty and climate commitments, and are applying that knowledge to our policy design and to our programmes, mitigating any risk of unintended consequences, and tracking progress and learning by doing in order to adjust immediately where unintended consequences nevertheless arise.
16. We continue to prioritise energy efficiency measures through our delivery programmes, as this will enable the roll-out of zero emissions heating, as well as help to tackle fuel poverty.
17. We are taking action through our delivery programmes to maximise the number of homes with households in fuel poverty achieving a level of energy efficiency equivalent to EPC C by 2030 and EPC B by 2040.
18. We are taking a zero emissions first approach in our delivery programmes and will phase out funding for fossil fuel heating systems by 2024, where it is not detrimental to our fuel poverty objectives. We have already phased out oil and LPG boilers from Warmer Homes Scotland, Area Based Schemes or Home Energy Scotland Loans.
19. We will continue to work with energy retailers to ensure households have access to the right tariffs, that tariffs tailored to zero emissions heating systems are available, and continue to press for customers with pre-payment meters to access similar tariffs to direct debit customers.

20. We are conducting analysis to consider the distributional impacts of decarbonising our homes and buildings and to further quantify the impact of making our homes and buildings warmer, greener and more efficient for those on lower incomes and those in or at risk of fuel poverty.

Consumer Protection

Consumer organisations have highlighted consumer protection and mis-selling in the zero emissions and energy efficiency sector as an area of current and growing concern as the rate of installations increases, and have highlighted the opportunity to improve reporting and redress systems for consumers. In the worst cases, consumers have been victims of scammers who actively set out to deceive them; they have incurred significant costs and ended up with measures that are poor quality or dangerous.

Consumer protection is reserved to the UK Government, with only powers over consumer advocacy and advice devolved to Scottish Ministers. We are therefore currently unable to create a statutory consumer protection framework for heat and energy efficiency. However, positive steps have been taken by Home Energy Scotland, Trading Standards Scotland and others to raise awareness of scams, and support consumers to find reputable installers. We are committed to ongoing monitoring and to addressing the identified issues to mitigate the risk of harm to households.

As set out in Chapter 9, we are taking a proactive approach to ensuring consumers have access to high quality work. We plan to publish a separate policy statement covering quality assurance for our Heat in Buildings Strategy later in 2021.

More generally, we published our Scams Prevention, Awareness and Enforcement Strategy in March 2021[xxxix], which will facilitate a more coordinated approach to tackling scams in Scotland. This establishes a new Strategic Partnership that will provide leadership through overseeing implementation of the new strategic framework and delivery of the key actions set out between 2021 and 2024.

As we continue to develop our heat and energy efficiency policies, regulations and delivery schemes, we will create the necessary environment to allow exemplary practice to become the norm and to ensure that confidence in energy efficiency and zero emissions heat measures is not undermined by poor or illegal practice. We will work closely with consumer groups to continuously monitor and identify potential issues and take mitigating action where they arise.

Respondents to the consultation on the draft Strategy emphasised the importance of third sector and local community groups (discussed in more detail in chapter 4). The potential of these groups to share the experiences of consumers across Scotland is invaluable. The independent Energy Consumers Commission, largely made up of representatives from third sector and grassroots organisations, could have an important role in monitoring the consumer impacts of the rollout of energy efficiency and zero emissions heating and representing energy consumer interests. This body will be incorporated into Consumer Scotland once it is established.

We will work with the Energy Consumers Commission, Consumer Scotland and a range of Scottish consumer representative organisations to ensure that issues of consumer detriment are identified and addressed, focussing on consumer understanding, accessibility, costs, redress, and support for vulnerable consumers. We will work across the energy sector to explore how best to help energy consumers understand their energy needs and the longer-term benefits of different heating technologies.

The Heat Networks (Scotland) Act introduced powers to regulate the heat networks market for the first time. Secondary legislation will include the introduction of a licensing system which will place conditions on operators to provide this essential service in line with the interests of network users. The UK Government has also confirmed that it intends to legislate in 2022 to introduce minimum consumer standards across the heat networks market, including in Scotland. We support the UK Government's intention to legislate in this area and introduction of Ofgem as a regulator of the sector. To enable alignment of regulatory regimes we have written to the UK Government to request that its legislation provides powers for Scottish Ministers to amend the functions of Ofgem so that it may act as the licensing authority for Scotland under the provisions of the Bill. This would only be used should that be the consensus view following consultation.

Summary of action we are taking:

21. We are working closely with consumer groups to continuously monitor and identify potential issues and take mitigating action where they arise.
22. We are working with the Energy Consumers Commission, Consumer Scotland and a range of Scottish consumer representative organisations to ensure that issues of consumer detriment are identified and addressed, focussing on consumer understanding, accessibility, costs, redress, and support for vulnerable consumers.

Chapter 4 Place

As we transform our homes and buildings by making them more energy efficient and installing low and zero emissions heating, we will need to consider our local surroundings and resources, whether in dense urban or suburban areas or smaller rural towns and villages or in our remote and island communities. As such, the transition to zero emissions buildings may look different in different communities and require approaches tailored to place.

It will be important for local communities to shape and be involved in decisions about solutions that are most appropriate for their local area. Our Local Energy Policy Statement[xl] sets out clear principles to guide local energy planning and community engagement.

Communities

Communities in Scotland have a strong legacy of engagement in, and ownership of, energy projects, much of which has been based on a strong desire to improve local circumstances by utilising these positive business models to support community led development projects, whilst also championing the climate change agenda.

Respondents to the consultation expressed broad support for a place-based and community-oriented approach, which many believe is the key to meeting heat targets. Some focussed on the challenges for island and other remote communities. The draft Strategy acknowledged that there is no single solution for the diverse building stock found across Scotland. We will publish an Islands Impact Assessment shortly and will provide more information on the actions we are taking to boost zero emissions heating and energy efficiency in our island communities in the Islands Energy Strategy (which will complement the existing National Islands Plan[xli]) due in 2022.

We remain committed to continue to work with trusted local partners and established community groups and provide support for the development of low and zero emissions projects.

We believe that communities, large and small, will play an important role in driving forward the transformation of the nation's building stock, not only

working to solve local energy challenges but being powerful advocates for local change, motivating volunteers and local champions to take action.

Communities can play an important role in planning, identifying and delivering projects on heat and energy efficiency. This may include decarbonising community assets such as halls and community centres, or community ownership or co-ownership of communal heating solutions, such as heat networks. Our new CARES programme focuses on supporting communities to work together to address and champion heat decarbonisation on a local level (see chapter 6 for more details). Through CARES we are working to understand further the models and solutions most appropriate for communities in Scotland.

Case Study: Community Heat – The Coalburn One Stop Shop.

The Coalburn One Stop Shop in Lanarkshire is the hub of the local community, providing a Post Office, cash machine, cafe, function rooms, local food and second-hand shops. It hosts a range of activities such as councillor surgeries, committee meetings, parties, flower arranging and dance classes. It is owned and run by the Coalburn Miners' Welfare Charitable Society and has provided a service to the Coalburn community since 1925, used by approximately 3,500 people per month. They decided to look into lower running costs to help the centre to become more self-sufficient in managing finances. With support from the Scottish Government CARES programme, they replaced an existing oil boiler and wet heating system with a new air to air heat pump, saving them £1,419 on their annual fuel bills.

Image of Coalburn One Stop Shop – Community Heat- Provided by Local Energy Scotland – Energy Savings Trust (January 2021)

Alongside our CARES support, we are exploring how to integrate heat decarbonisation into community climate action initiatives such as Climate Action Towns and Community Climate Action Hubs, where there are real

opportunities for citizens to shape the future development of their communities.

We are also working in collaboration with the Scottish Cities Alliance and the seven cities on the opportunities to accelerate activity at pace to ensure the Scottish cities cumulatively play their role in meeting our heat decarbonisation and energy efficiency ambitions whilst maximising the economic and well-being outcomes across cities.

Summary of action we are taking:

23. We are exploring how to integrate heat decarbonisation into community climate action initiatives such as Climate Action Towns and Community Climate Action Hubs.
24. We are supporting communities to work together to address, and champion, heat decarbonisation through the new CARES programme and are working to understand further the models and solutions most appropriate for communities in Scotland.
25. We are also working in collaboration with the Scottish Cities Alliance and the seven cities on the opportunities to accelerate activity at pace to ensure the Scottish cities cumulatively play their role in meeting our heat decarbonisation and energy efficiency ambitions whilst maximising the economic and well-being outcomes across cities.

Local Heat & Energy Efficiency Strategies

Local Heat & Energy Efficiency Strategies (LHEES) are at the heart of a place based, locally-led and tailored approach to the heat transition. These local Strategies will underpin an area-based approach to heat and energy efficiency planning and delivery.

In the consultation draft, we asked respondents for their views on the timeline and approach we set out for LHEES. We welcome the support offered by a clear majority for our proposals.

In partnership with local authorities and Zero Waste Scotland, we have developed a methodology and guidance for the production of Local Heat & Energy Efficiency Strategies and Delivery Plans. The consistent, data-driven methodology and guidance build on and take into account learning from an extensive programme of LHEES pilots, which involved all Scottish local authorities.

LHEES Strategies will set out the long-term plan for decarbonising heat in buildings and improving their energy efficiency across an entire local authority area. For each local authority area, the Strategies will draw on the standardised methodology to:

- set out how each segment of the building stock needs to change to meet national objectives, including achieving zero greenhouse gas emissions in the building sector, and the removal of poor energy efficiency as a driver of fuel poverty;
- identify strategic heat decarbonisation zones, and set out the principal measures for reducing buildings emissions within each zone; and
- prioritise areas for delivery, against national and local priorities.

Accompanying the Strategies will be LHEES Delivery Plans, which will be developed in partnership with key stakeholders, and provide a strong basis for action for local communities, government, investors, developers and wider stakeholders, pinpointing areas for targeted intervention and early, low-regrets measures.

LHEES is an important platform to consider both local community and wider national infrastructure issues. Local Strategies and Delivery Plans will act as an investment prospectus at national and local level, guiding delivery programmes, and signalling potential areas of investment to market actors.

LHEES will support planning for the energy networks and over time will become an important evidence base for both the electricity Distribution Network Operators (DNOs) and Gas Distribution Network (GDN), and will support the Local Area Energy Planning approach being considered by the regulated energy networks sector and the UK regulator.

The Strategies will form a basis for local public engagement, awareness raising and involvement in decision making at the local level, and will facilitate extensive engagement with local communities. We recognise that this needs to be flexible, to allow engagement to be adapted and tailored to the local context.

LHEES could also potentially play a role supporting area-based regulation. This is discussed in Chapter 8.

The Heat Networks (Scotland) Act 2021 places a duty on local authorities to conduct a review of areas likely to be particularly suitable for heat networks within its area. In addition, local authorities must publish a statement in relation to each area considered as part of the review explaining the reasons for their view. We propose that the LHEES methodology should be the means by which this review will be conducted, as LHEES is the main vehicle for heat planning for all technologies on an area basis. The Act makes provisions for

this duty to be exercised by the Scottish Ministers on behalf of local authorities to ensure widespread identification of zones across Scotland.

The LHEES pilot programme was completed in April 2021 and an evaluation is underway, synthesising learning across three phases. We are also undertaking a National Assessment, using the LHEES methodology together with relevant national datasets, to carry out a Scotland-wide assessment of the building stock and identify initial strategic heat decarbonisation zones. As well as informing national decarbonisation planning, the National Assessment will create a central resource that local authorities can draw on to support access to the data and analysis needed to underpin their LHEES. In parallel with the National Assessment, we are also providing funding to 14 local authorities to take the first steps in developing a full, local authority-wide strategy, testing the LHEES methodology and building on the National Assessment outputs.

Case studies: Local Authority LHEES Resource Funding

Local authorities are accessing support to undertake early LHEES development. Examples include:

Aberdeenshire Council – Completing the first three stages of the LHEES methodology to provide an understanding of the national and local policy environment, as well as developing strategic zones for heat decarbonisation. They also plan to provide training across the local authority to build capacity on LHEES.

Glasgow City Council – Completing the first three stages of the LHEES methodology and conducting a gap analysis against their existing draft LHEES.

Orkney Council – Completing the first three stages of the LHEES methodology with a strong emphasis on data gathering, accuracy and quality to help improve the datasets required to complete the full LHEES.

Perth and Kinross Council – Reviewing the first three stages of the LHEES methodology and completing stages 4-6. A key focus is a deeper dive into the guidance for LHEES Delivery Plans to establish a replicable process for developing heat decarbonisation projects.

We want Local Heat & Energy Efficiency Strategies and Delivery Plans to be published for all local authority areas by the end of 2023. We believe that

LHEES should be developed on a statutory basis and are committed to resourcing their development accordingly, and will continue to work with local authorities to deliver this.

We see huge potential from the consistent and comprehensive LHEES coverage across Scotland that will be delivered by putting LHEES on a statutory footing. We are continuing to work in partnership with COSLA and local authorities to test the LHEES methodology and to drive LHEES forward.

Summary of action we are taking:

26. We have commissioned a full evaluation of the LHEES pilot programme.
27. We are working with local authority partners and wider stakeholders to finalise the LHEES methodology and guidance, with a view to introducing legislation to establish LHEES on a statutory basis so that Strategies and Delivery Plans are in place for all local authority areas by the end of 2023.
28. We will use LHEES Delivery Plans to pinpoint areas for targeted intervention and early, low-regrets measures.

Scotland's Planning System

In the past, the planning system has helped determine the spatial pattern of our heat supply, largely linked to proximity to the gas network. In more recent years it has helped to encourage low carbon development. In the future we will ensure planning policies support the significant reductions in emissions from buildings that we need to see. This is not just about new development – our existing buildings and places will need retrofit solutions and we will enable and encourage deployment of energy efficiency measures and low and zero emissions heating, including by facilitating the development of the networks they require.

National Planning Framework and Scottish Planning Policy

Currently, Scottish Planning Policy (SPP) (2014) states that development plans should seek to ensure that an area's full potential for electricity and heat from renewable sources is achieved in line with national climate change targets, giving due regard to relevant environmental, community and cumulative impact considerations.

As we revise our National Planning Framework, which in future will incorporate the Scottish Planning Policy, we will look to provide stronger support for sustainable, low and zero carbon developments including ways to actively facilitate decarbonised heating and electricity generation and distribution. Potential policy changes set out in the NPF4 Position Statement published last year include:

- Introducing new policies that address a wider range of energy generation technologies, for example for electrical and thermal storage, and hydrogen.
- Setting out a more practical and outcome-focused approach to accelerating a transition to low and zero emissions heating in buildings, including by linking with wider policies for green and blue[7] infrastructure and vacant and derelict land and properties and ensuring that Local Heat and Energy Efficiency Strategies inform local development planning to ensure a single coherent approach to heat planning across Scotland.
- Encourage new buildings to connect to existing heat networks, where located in a Heat Network Zone, wherever feasible; and encouraging applications for energy from waste facilities to provide a connection to a heat network, taking into account the practical considerations involved.

Permitted Development Rights

The Planning system covers a wide range of development, however minor and uncontroversial developments are often granted Permitted Development Rights. This allows small alterations to be carried out without the need to submit an application for planning permission. For homes, Permitted Development Rights are already granted, to some extent at least, for a range of technologies including:

- Biomass heating systems
- Ground and water source heat pumps
- Air source heat pumps

For non-domestic properties Permitted Development Rights[xlii] are in place and allow in many instances for the installation of a range of low and zero

[7] Green and blue infrastructure is to be understood as all natural and semi-natural landscape elements such as parks, rivers, gardens, streams and sustainable urban drainage ponds (SUDS).

emissions heating technologies, including solar panels and ground and water source heat pumps.

We are in the process of reviewing Permitted Development Rights, though the phasing of that programme has been affected by COVID-19. Potential Permitted Development Rights for heat networks and extending existing ones for micro-renewable technologies are part of that programme.

While Permitted Development Rights do allow for the installation of zero emissions systems in many cases, there are circumstances where the size and scale of installation may still require planning permission, as well as within designated places such as conservation areas, World Heritage Sites, or where limitations or conditions attached to Permitted Development Rights for the particular technology cannot be met. Listed building consent is required for any external and internal works to a listed building which affect its historic fabric.

Listed Buildings, Conservation Areas and World Heritage Sites

Scottish Planning Policy also seeks to promote the care and protection of the designated historic environment and ensure change is sensitively managed to avoid adverse impacts on the fabric and setting of these assets.

As set out in Chapter 2, we will work with stakeholders, including Historic Environment Scotland, to develop approaches and solutions to transition Scotland's historic buildings to low and zero emissions heating while respecting and preserving the special characteristics of our buildings and places, including in our proposals for regulation (as set out in Chapter 8).

Summary of action we are taking:

29. Through National Planning Framework 4 we will look for opportunities to strengthen planning policy to enable and encourage energy efficiency and low and zero emissions heating.
30. We have included low and zero emissions heat networks and micro-renewable technologies in the review programme for Permitted Development Rights.
31. We will work with stakeholders, including Historic Environment Scotland, to develop approaches and solutions to transition Scotland's historic buildings to low and zero emissions heating while respecting and preserving the special characteristics of our buildings and places

Chapter 5 Preparing Scotland's Energy Infrastructure for Decarbonised Heat

Decarbonising heat will substantially change the way we use our existing energy infrastructure and influence where we develop new infrastructure such as heat networks, energy network upgrades and additional electricity generation capacity.

We know that our energy networks will need upgrading to support the net zero transition. For many parts of Scotland, energy network upgrades are already underway or being planned. We need to ensure this investment is targeted to support the decarbonisation of heat in buildings, and is paid for in a way that is fair and does not place the burden on those least able to afford it. We will be transforming the way we heat our homes and non-domestic buildings at the same time as we decarbonise transport and industry. It will be important that we can consider and manage these impacts in the round. We will publish an Energy Strategy and Just Transition Plan for consultation in Spring 2022, taking into account the whole system issues raised by our net zero climate targets and the wider infrastructure and investment needs of our energy system.

The Electricity System

By 2030, a much larger proportion of heat demand will be electrified compared to today. As set out in Chapter 2, electric heating systems will likely be predominantly either individual heat pumps within buildings or larger heat pumps providing heat to heat networks. Transitioning such a large number of properties to electric heating systems will substantially increase the demand on our electricity system. This will bring both challenges and opportunities with new technologies and potential to change patterns of demand as well as a new set of stakeholders who will be interacting with electricity networks for the first time or in new ways.

Delivering this change in a way that is resilient, affordable and low carbon means ensuring that we have sufficient low carbon generation in Scotland, that our electricity networks are capable of delivering that electricity to where it is needed, and there is sufficient flexibly – for example from energy storage – to balance supply and demand.

It will be critical to ensure that we have the right infrastructure to ensure sufficient renewable electricity is available, at the right times and in the right places. Wider policy initiatives to decarbonise other sectors, including transport and industry, will increase electricity demand still further. Although Scotland's electricity generation is already largely decarbonised, we need to understand the generation capacity necessary to meet future demand, as well as an indication of where in Scotland renewable generation will be located and how it will be delivered to consumers.

As noted in Chapter 2, meeting our ambition for decarbonised heat is likely to require fossil fuel consumption to reduce by 28 TWh in 2030 compared to today. Taking account of the impact of increased energy efficiency of our building stock, initial estimates indicate that if heat decarbonisation is largely delivered through electrification, relying primarily on heat pumps and with limited contribution from hydrogen, the level of renewable electricity required is equivalent to the output of an additional 3GW of onshore wind or 2GW of offshore wind. We continue to develop our understanding in this area, particularly in terms of the need to ensure a secure supply at all times and to balance supply and demand at all times.

A majority of respondents to the consultation highlighted the need for further action that can be taken to create resilient networks ready for heat decarbonisation. Respondents stressed the need for infrastructure upgrades across the electricity system, the need for an appropriate regulatory approach that will enable network investment and growth in capacity, alongside the Scottish Government's role in facilitating public and private investment.

As electricity policy and regulation is reserved to the UK Government, action from the UK Government and Ofgem to ensure that renewable electricity generation is properly supported and enabled will be crucial. We continue to seek assurances from the UK Government and energy regulator on the measures that they will take to ensure that this need is met.

Electrifying a significant proportion of our heat over the course of this decade will substantially increase the amount of energy that our local electricity distribution networks need to deliver to buildings. There will be places right across Scotland where network owners will need to reinforce cables and upgrade the substations that serve our neighbourhoods and buildings, and do so in a way that coordinates with plans for conversion to electric heat pumps. As set out in our Principles for the Development of Scotland's Gas and Electricity[xliii] networks, this means ensuring an integrated approach to planning electricity network investment linking the Scottish Government, Ofgem and Scotland's network owners. These principles were developed in partnership with Ofgem and Scotland's gas and electricity network companies, and we continue to work with all those involved in planning and

delivering our energy networks to ensure the principles underpin decision making.

The cost of this investment could be significant, especially when coupled with the impact on electricity networks of increased electrification of transport. We have worked closely with Scottish DNOs, SPEN and SSEN, to support business planning for the RIIO ED2 price control. Investments made over the RIIO ED2 period (2023 – 2028) will be critical for the Scottish 2030 interim targets as set out in the Climate Change Plan update. The proposed investments from both DNOs, if approved by Ofgem, would support as many as 500,000 heat pumps on the electricity system in Scotland. 'Uncertainty mechanisms' will allow networks to seek additional allowances where the need for investment becomes clear, potentially allowing greater numbers of low carbon technologies to connect. In addition to ensuring investment is delivered appropriately during the ED2 period, it will be important that we continue to work closely with DNOs throughout the 2020s so that ED3 business plans, which will cover the period 2028 – 2033 reflect progress made and developing ambition.

We will continue to work with DNOs as they prepare to submit final business plans in December this year. We have set up a new Heat Electrification Strategic Partnership with the Scottish DNOs as a forum for working together to understand the scale, pace and location of network investment needed, build the evidence for the right investment decisions for Scotland and ensure compatibility with strategic policy direction, and delivery plans.

As well as gathering evidence on areas such as the cost profile of network investments, through this new partnership we will investigate and invite demonstration projects which allow us to model the real time network impact of heat pump deployment, energy storage and demand management.

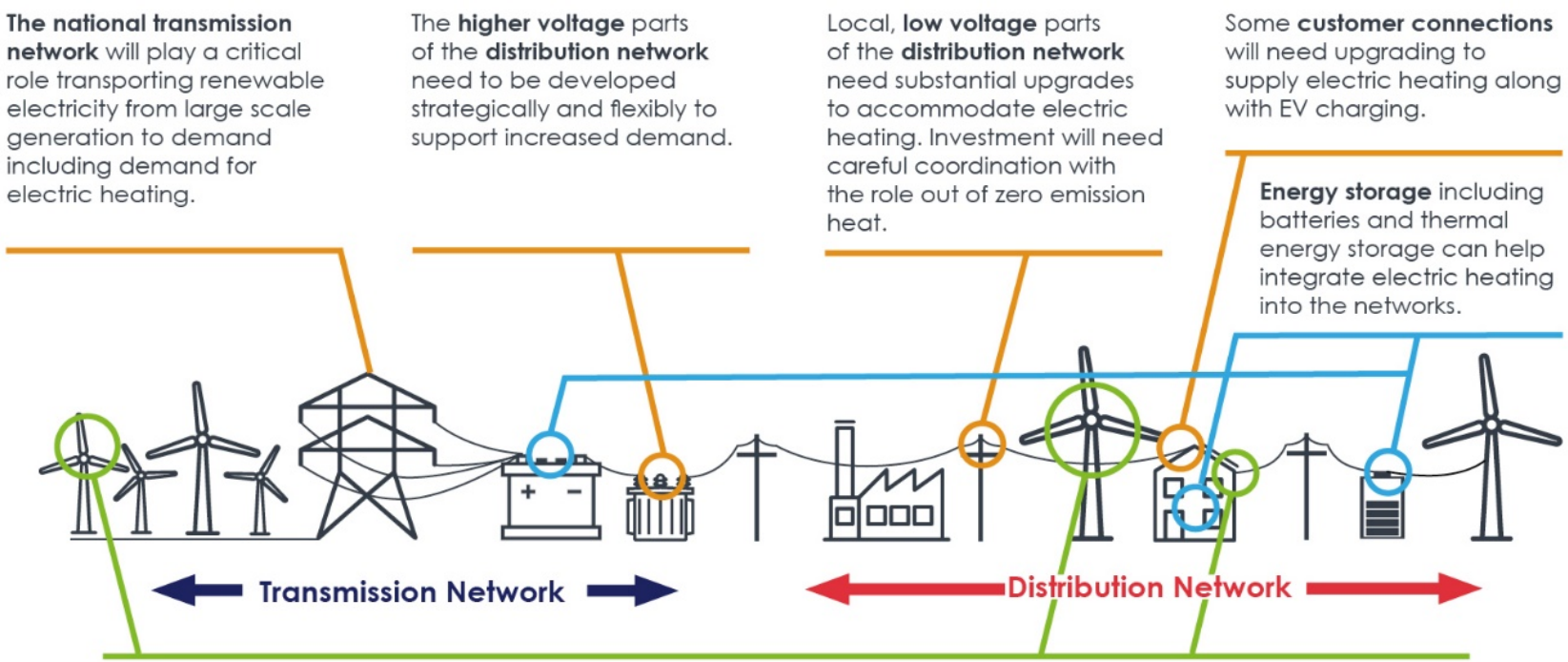
We recognise that there is a great deal of uncertainty on the scale of costs, as well as on understanding how these costs will be met, who will pay and what the impact may be on consumer bills. We are commissioning work to explore the potential network investment costs of the heat transition for Scotland, to provide greater clarity on the likely range of costs, and likely impacts on consumers, to help inform further decision making.

There will also be increasing value in energy storage. This includes large scale energy storage such as pumped hydro systems and large-scale battery storage but also heat storage in heat networks, building-scale batteries and thermal storage. These tools could help balance the use of electricity for heat in buildings ensuring that networks are not overloaded and help to keep consumer bills affordable. We are undertaking research into the role of energy storage in supporting the electrification of heat. In particular we will consider the role of energy storage in buildings and heat networks.

LHEES will be rolled out for local authority areas across Scotland, providing a strategic plan for network companies to draw on in targeting their investment.

Summary of action we are taking:

32. We will publish an Energy Strategy and Just Transition Plan for consultation in Spring 2022, taking into account the whole system issues raised by our net zero climate targets and the wider needs of our energy system.
33. We will continue to conduct analysis to understand generation and network requirements, in terms of the scale and location of the demand that heat electrification could bring.
34. We continue to press the UK Government to continue to provide the support needed to develop Scotland's renewable electricity pipeline needed to meet a decarbonised future for heat.
35. We are commissioning work to explore the potential network investment costs of the heat transition for Scotland, to provide greater clarity on the likely range of costs, and likely impacts on consumers, including those in, or at risk of, fuel poverty and help inform further decision-making.
36. We will conduct research into the role of energy storage in buildings in reducing consumer costs.
37. We will continue our Heat Electrification Strategic Partnership with Scotland's electricity network operators, and use this forum to ensure that the upgrades required are delivered when and where they are needed and that the LHEES framework can inform this.
38. We will investigate demonstration projects through our delivery programmes strategic priorities to allow us to model real time network impact of heat pump deployment, smart-enablement, energy storage and demand management.
39. We continue to engage Ofgem and work with them in line with the Principles we agreed for development of Scotland's Gas and Electricity Networks to ensure that Scottish Government targets and ambitions as set out in this final Strategy are fully considered as part of decisions on network investment.



Renewable electricity generation will need to continue to grow to meet the additional demand created by electric heating. This will include large scale renewable generation such as offshore wind along with local generation connected to the distribution network.

Gas networks

Scotland's mains gas network currently delivers a secure supply of energy to domestic consumers and businesses. Around 81%[xliv] of homes and approximately 30%[8] of non-domestic buildings use mains gas for heating. Currently, the gas supplied via the mains gas network is predominantly natural gas, a fossil fuel composed mainly of methane.

To meet our emissions targets, we must reduce significantly - and eventually phase out entirely - our use of natural gas in domestic heating systems. By 2030 at least 1 million homes will have to have switched to zero emissions heat.

Alongside implementing energy efficiency measures, there are two main ways to achieving this reduction: replacing the natural gas provided in the network with decarbonised alternatives; or switching to alternative heating systems in buildings, such as heat pumps and heat networks.

Many respondents to the consultation supported our recognition that decarbonised gas is unlikely to play a significant role in emissions reduction before the late 2020s and agreed that there is a need to continue to gather evidence. Some respondents expressed concern that this may introduce further uncertainty around policy support for gas decarbonisation, delaying investment decisions.

Green Gas Support Scheme

The UK Government is launching the Green Gas Support Scheme, which will run for 4 years from autumn 2021. Under UK Government proposals, the scheme will support biomethane injection in to the gas grid - expected to contribute 21.6MtCO2e of carbon savings over the lifetime of the scheme. The scheme will be funded via a Green Gas Levy.

Gas blending

At GB-level, the gas network sector is working to blend alternatives to natural gas – currently biomethane but in future also hydrogen – into the gas network. This delivers near-term emissions reductions and helps to build supply systems that over time may be able to fully displace natural gas. In 2019, an estimated 1.5% of Scottish gas consumption was accounted for by

[8] Based on provisional modelling of the non-domestic building stock.

biomethane blended into the gas grid[xlv], up from 0.3% in 2015. This is estimated to reduce emissions by around 130 $kTCO_2e$ per year. Over this decade we need to see an increasing blend of biomethane used in our gas networks. We will work with the UK Government and project partners in Scotland to maximise investment under the UK's Green Gas Support Scheme.

The gas industry is testing options for blending hydrogen into the gas network up to the limit that can be safely used in existing appliances. Using a blend of hydrogen (up to 20% by volume) has the potential to reduce carbon emissions from gas use by up to 8%. We are working with the gas network sector and the UK Government to explore opportunities for blending hydrogen in the gas network. We continue to keep under review the benefits and cost-effectiveness of increased hydrogen blending at GB-level, including in terms of the wider energy system and supply chains. The Scottish Government's Hydrogen Policy Statement[xlvi] sets out our wider vision for the role of hydrogen in Scotland.

Regulation of the gas network is a matter for the UK Government. We are urging the UK Government and regulator to expedite changes to regulation to facilitate greater levels of gas blending, and will continue to engage with industry to encourage supply chain growth as part of our green industrial strategy.

100% hydrogen for heat

Our overarching objective is to ensure Scottish consumers are able to access low-cost hydrogen in the gas grid, should that become available in the late 2020s and early 2030s, and to maximise the volume, and accelerate the deployment, of hydrogen from renewable sources.

In the longer term, should demonstration and safety case trials prove successful, conversion and repurposing of parts of the gas network to carry 100% hydrogen could play an important role in reducing emissions from buildings. Hydrogen may be particularly appropriate in certain locations, where there is local supply or where industrial demand creates economies of scale. It will be important that the heat transition happens in a planned way so that piecemeal deployment of heat pumps and heat networks does not undermine the socio-economic case for converting parts of the gas network to 100% hydrogen in the longer-term. We are actively exploring where in Scotland hydrogen might ultimately be most appropriate for heating homes and buildings and we are using this evolving understanding to guide our approach. We will set out more detail on the pathways to decarbonised gas and options for hydrogen in the net zero transition in our Energy Strategy and Just Transition Plan.

As above, SGN are exploring the potential for eventual 100% conversion of large parts of their network. This work is being taken into consideration at GB

and Scottish levels, and we are working in partnership with the sector to ensure the evidence base on the future of Scotland's gas networks is robust and can inform policy development. We expect this work to be published soon and to highlight the near term actions that would be needed for 100% hydrogen conversion of parts of our gas network to remain open as an option for the longer term.

Our work with the sector will inform our Energy Strategy and Just Transition Plan, where we will set out in more detail the options and timescales for deployment.

Case Study: H100 Fife Neighbourhood Trial

SGN is partnering with other UK gas operators on a world-first demonstration of a 100% hydrogen energy system, to evidence the role that hydrogen can play in decarbonising heat. The project is constructing and will operate a hydrogen network in Fife able to service around 300 houses. This will be of UK-wide significance, offering validation of the evidence base carried out by the UKG in their Hy4Heat Programme[xlvii].

The project will connect with the existing 7MW wind turbine situated off the coast of Leven in Fife to directly supply power to the electrolyser for hydrogen production, evaluating the opportunity for grid integration systems between renewables and hydrogen production, and demonstrating the business case that offshore wind can offer for production of hydrogen at scale.

The Scottish Government provided £6.9 million support towards the cost of this £27.7 million project. The bulk of remaining funding has been awarded by Ofgem with other funders including, SGN, Cadent, Northern Gas Networks, and Wales and West Utilities. H100 Fife is recognised as a key building block in the strategic 'Gas Quality Decarbonisation Pathway' set out by UK gas distribution network operators and adopted by the Energy Networks Association.

Over the next decade we need to see increased demonstration of hydrogen for heat including the testing of appliances in homes and businesses, and trials of increased blends of hydrogen in the existing gas distribution network (through recently upgraded polyethylene pipes). The UK Government is also supporting industry to conduct first-of-a-kind hydrogen heating trials, including a neighbourhood trial by 2023 and a village scale trial by 2025. We

urge the UK Government to increase the pace of these trials and ensure they are delivered soon enough to provide the critical underpinning needed to keep options open for mass conversion to hydrogen in Scotland. In addition, to unlock delivery at scale and to meet our climate targets, key strategic decisions on the future of the gas network are required as soon as possible to drive investment planning for delivery.

It is essential that UK Government launch its Call for Evidence and accelerates decisions on the future of the gas network, and rapidly develops regulations to support these.

The trialling of 'hydrogen-ready' boilers and appliances designed to run on hydrogen is underway through the Hy4Heat programme.

We urge the UK Government to progress the consultation on enabling or requiring hydrogen-ready boilers by 2026 as announced in the Energy White Paper and UK Hydrogen Strategy.

We look forward to working with the UK Government to ensure the boiler market can develop rapidly in readiness for a future decarbonised gas grid.

Summary of action we are taking:

40. We will continue to work with SGN and National Grid Gas Transmission to provide evidence on the role gas decarbonisation can play in meeting our targets, and a timeline for resolving uncertainties.
41. In cooperation with stakeholders, including network companies, local authority and delivery partners, we are working to identify strategic areas most likely to have access to hydrogen in the future, and high-potential areas for the use of hydrogen for heat in Scotland
42. We will work with the UK Government to ensure that the Green Gas Support Scheme meets the needs of Scotland. We will monitor the impact of the Green Gas Levy on end user costs, especially in relation to fuel poverty levels, and we will continue to urge the UK Government to make progress on the transition to a volumetric mechanism for the levy.
43. We will work with the Gas Network Operators and the UK Government to explore opportunities for increasing the blend of hydrogen in the gas network.
44. We will urge the UK Government to expedite progress on amending regulations and legislation to support hydrogen blending, accelerate decisions on the role of 100% hydrogen in the gas grid and to enable

our ambition to maximise volumes of renewable hydrogen in our energy system as quickly as possible.

45. We will continue to support the development of evidence on the potential role of hydrogen in decarbonising heat including demonstration projects such as H100.
46. We will continue to press the UK Government to progress the consultation on enabling and requiring hydrogen-ready boilers.
47. We will support initial action by SGN on their pathway to converting large segments of their network to 100% hydrogen, wherever those actions are commensurate with keeping options open and limiting consumer costs.

Creating the conditions to secure growth of Heat Networks in Scotland

Heat networks are a tried and tested technology used extensively across Europe. Currently heat networks supply only 1.5% of heat in Scotland[9], but are a key strategic technology for reducing emissions from heating our homes and buildings. Heat networks are a low regret option as they are agnostic of fuel sources and are capable of being changed over time. For example, some heat networks are powered by high emissions Combined Heat and Power (CHP) systems but in the future could be switched to water source or ground source heat pumps should this prove cost-effective.

As part of the Heat Networks (Scotland) Act we have new targets for the amount of heat to be supplied by heat networks. These require the combined supply of thermal energy by heat networks to reach 2.6 TWh of output by 2027 and 6 TWh of output by 2030. This is 3% and 8% respectively of current heat supply. The Act requires Scottish Ministers to set a target for 2035, in addition to the 2027 and 2030 targets.

The "Opportunity Areas for District Heating Networks in the UK" report[xlviii] published in August, used geospatial modelling to identify areas where there may be economic potential for heat networks. This analysis estimates that heat networks could provide around 15TWh of heat per year in Scotland by 2050. This is likely to be the maximum potential.

[9] Unpublished statistics from the Department for Business, Energy and Industrial Strategy (BEIS) heat metering and billing collection.

To further develop our understanding of the suitability of heat networks in Scotland we are undertaking the First Nationwide Assessment for potential heat network zones. This and work carried out to develop Local Heat & Energy Efficiency Strategies will inform a proposed 2035 heat networks target, which we will consult on in early 2023.

We continue to support the deployment of heat networks in Scotland. The centrepiece of our efforts is our Heat Networks (Scotland) Act[xlix] which, was unanimously agreed by the Scottish Parliament. The Act and secondary legislation to be developed will:

- regulate the market through a licensing system so that homes and businesses are supplied by solvent, fit and proper operators, while requiring networks to be developed and maintained to high standards;
- create a bespoke system of scrutiny for new networks, to ensure that they can contribute to climate change and fuel poverty objectives, before they are consented for development;
- require heat networks to have a scheme in place to transfer operational rights to a third party to ensure sustained supply, if and when needed;
- require the identification of particularly suitable areas for heat network development and operation across Scotland – Heat Network Zones – including by drawing on information obtained through a new requirement on the public sector to assess the suitability of its non-domestic buildings to connect to heat networks (this may be applied to other non-domestic buildings beyond the public sector);
- attract new, and lower cost investment in the sector by awarding long-term Heat Network Permits to develop and operate in the most opportune areas. This will provide assurances over the customer base available, and enable borrowing to be repaid in line with the long-lived nature of the heat networks infrastructure; and
- grant new rights for heat network operators – such as wayleaves, compulsory purchase, road works and surveying rights – to reduce the costs and time involved in construction and maintenance.

The full regulatory regime will take time to establish and a phased approach may be needed to enable the heat networks industry to adjust to new requirements. We remain committed to working with the heat networks sector as we develop detailed regulations and aim to put in place a functioning regulatory system, subject to public consultation by 2024. As with the Bill, we will work with our Heat Networks Working Group in preparing the Regulations. The working group's membership may be refreshed to ensure we have the necessary skills and expertise to inform what will be detailed secondary legislation.

Consultation respondents expressed their support for the Act and the clear targets in it, though some highlighted specific challenges to heat network deployment. We will take these into account as we develop and publish a Heat Networks Delivery Plan by April 2022. This will set out how the Heat Networks Act and wider policy will increase the use of heat networks in Scotland by 2021.

In addition, we are committed to working with the UK Government to develop technical standards for the heat networks sector that build on existing good practice and apply across the UK. We are jointly investigating options for developing a common set of standards following an initial scoping project.

We will continue to support the development of heat networks in communities across Scotland through our funding and delivery programmes such as the successor to the Low Carbon Infrastructure Transition Programme (LCITP) and the refocused District Heating Loan Fund (DHLF) (see Chapter 6).

To help support and encourage investment in heat networks, the Non-Domestic Rates (District Heating Relief and Renewable Energy Generation Relief) (Scotland) Amendment Regulations 2021 introduced a 90% relief from non-domestic rates until 31 March 2024 for new networks run from renewable sources. This goes beyond the existing 50% relief that is in place for heat networks. These regulations also provide for the 50% relief to continue until 2032; responding to calls to from the sector to provide this certainty. These rate reliefs help to support the business case for new networks by reducing their operational costs at the same time that revenue support for new schemes under the UK Government's non-domestic Renewable Heat Incentive (RHI) came to an end.

We cannot rely on public investment alone to fund the development of heat networks in Scotland. It is imperative that we create a sustainable and investible market for heat networks. The Heat Networks (Scotland) Act, along with our proposed 2024 New Build Heat Standard (see Chapter 8), already includes many of the key ingredients to make heat networks an attractive proposition for investors. We know that investors need confidence in future revenues and in order to create this demand assurance securing key anchor buildings[10] is vital. Later this year we will consult on detailed proposals to:

- require anchor buildings in the non-domestic sector to make adaptations to become 'heat network ready' to connect, and

[10] A building can be described as an "anchor load" if its heating need is both substantial and steady to ensure basic heat demand which, in turn, will stabilise the heat network and provide stable income stream for the business.

- use the non-domestic rates system to encourage such buildings to go on to use a local heat network.

These changes would provide the substantial, long-term and secure customer bases needed, and along with wider sector regulation will enable commercially viable heat networks to develop at the scale needed to meaningfully contribute to Scotland's climate change targets.

Case study: Glenrothes Energy Network

Fife Council and RWE received financial support of £8.6 million through the Scottish Government's Low Carbon Infrastructure Transition Programme (LCITP) to develop and deploy a low carbon heat network in Glenrothes. The project uses heat produced from the RWE-owned Markinch biomass combined heat and power plant and comprises an energy centre, thermal storage and a distribution network.

The award-winning project, which officially opened on 24 April 2019, is supplying reliable, low carbon heat to a range of customers in Glenrothes town centre including the Fife House Complex, Rothes Halls and the sheltered housing accommodation at Jubilee Grove. The £24 million scheme is an exemplar of partnership working to achieve emissions reductions and has potential for expansion in the future.

Figure 7: Image of Markinch Biomass combines Heat and Power plant provided by Fife Council (January 2021)

New heat networks will need to be powered using low and zero emissions sources of heat, for example from heat pumps or surplus or waste heat.

When regulation of the heat network sector is implemented we will only consent heat networks with low and zero emission heat sources. This will mean that gas CHP may not be used in new heat networks in Scotland, unless new, credible evidence emerges that such systems can provide the needed emissions savings from the point that the consenting regime is in place[l]. From the time the licensing regime is in place, existing, fossil fuel powered heat networks will be required to decarbonise upon replacing their heat generation assets. Further details are set out in our draft Heat Networks Delivery Plan. The remainder of our fossil fuel based existing networks will be required to decarbonise by 2045 at the latest as required by our climate change targets.

There are two significant examples in Scotland of heat being used from energy from waste (EfW) plants, with Shetland Heat Energy & Power being one of the largest networks in Scotland and a new network being developed to provide heat to Shawfair Town from Millerhill in Midlothian[li]

Energy from Waste projects have been instrumental in the growth of heat networks in Norway. It is important that we learn from this, given the scale of the challenge in Scotland's buildings sector. We have already set out in Scotland's Fourth National Planning Framework: Position Statement[lii] that a potential change to planning policy will be to encourage applications for energy from waste facilities to provide a connection to a heat network. Alongside this, in 2021-22 we will engage with stakeholders and as relevant consult on whether there is need for further measures to increase the utilisation of waste or surplus heat via heat network. For example there may be ways in which the completion of heat offtake agreements between Heat Network and Energy from Waste operators could be supported or streamlined. In addition, Heat & Power Plans could be further developed to form a useful source of information for those seeking to develop heat networks.

To help identify and build a pipeline of heat network projects we will develop a Heat Network Investment Prospectus, which will build on the report on Opportunity Areas for District Heating, to identify key strategic opportunities for heat network development in the 2020s. This investment prospectus will help to guide our capital investment and will underpin the development of LHEES.

Heat networks are technically complex infrastructure projects requiring a range of specialist expertise. In order to drive projects forward, we will launch the Heat Network Pre-Capital Support Unit in 2021 to expand on the previous role of the Heat Networks Partnership in Scotland to act as a key mechanism for supporting the development of a pipeline of projects across Scotland, co-ordinating support across the public and private sectors, identifying and nurturing opportunities for new heat networks, expansion of

existing zero emissions networks and considering the options for decarbonising existing fossil fuel powered networks.

Summary of action we are taking:

48. Consult on the use of sections 44 and 63 of the Climate Change (Scotland) Act 2009 to introduce mandatory connections for large and publicly-owned buildings in next Parliament.
49. Consult on how new powers under section 15 of the Non-Domestic Rates (Scotland) Act 2020[liii] could be used to de-risk investment and drive net zero behaviour, including connections to heat networks.
50. Develop a set of common technical standards for development and operation of heat networks across Great Britain which will help support the development of skills and the sector's supply chain.
51. Include heat networks in our ongoing programme of reviewing Permitted Development Rights (PDR) and, subject to the findings, lay Regulations.
52. We will consult in 2021-2022 on whether the need for further regulatory measures or support measures to increase the utilisation of waste or surplus heat, for example from Energy from Waste plants, to be supplied and/or used through heat networks.
53. Publish a Heat Network Investment Prospectus during the next financial year that will demonstrate the size and location of heat network opportunities across Scotland, as well as information on the decarbonisation requirements of existing networks in Scotland.
54. We will launch the Heat Network Pre-Capital Support Unit in 2021, expanding on the previous role of the Heat Network Partnership to provide enhanced support to the public and private sector in developing a pipeline for delivery.

Chapter 6 Kick-starting Investment in the Transition

Transforming Scotland's homes and buildings over the next 24 years is a significant investment opportunity that will support supply chains, jobs and a healthy economy.

The Scottish Government will kick start this transition with at least £1.8 billion of capital funding during the next five years, allowing us to accelerate energy efficiency upgrades and renewable heating deployment, creating new jobs and supply chain opportunities across Scotland. We will target our funding to support the most vulnerable, aiming to ensure that interventions through our delivery programmes do not have a detrimental impact on fuel poverty and build in additional support where required to ensure people can continue to enjoy warm homes that are affordable to heat.

Alongside raising awareness of the scale of the transition needed for our building stock, improving quality and consumer trust in the supply chain will be an important part of this journey. We will use our investment to drive up quality and work with the sector to make it as easy as possible for people to make changes.

National Public Energy Agency

We are committed to establishing a National Public Energy Agency to accelerate the transformational change in how we heat and use energy in homes and buildings. To achieve this, the Agency will have a remit to raise public understanding and awareness, co-ordinate delivery of investment, and coordinate national, regional and local government delivery of heat decarbonisation and energy efficiency rollout, working closely with public, private and third sector partners. We will establish the Agency first as a virtual agency and transition to a dedicated body by September 2025. We have begun a period of evidence gathering to support the development of the scope and responsibilities of the Agency.

Delivering Early and Significant Progress

The Scottish Government has successfully funded energy efficiency and heat delivery programmes for a number of years (see table of current delivery programmes below and in annex for more detail), supporting those living in fuel poverty, and encouraging others, including small and medium businesses and the public sector, to retrofit their properties to reduce their energy costs and emissions. We have also supported large scale low carbon energy infrastructure projects, including a number of heat networks across Scotland.

As outlined in Chapter 3, we will continue to invest in our Home Energy Scotland and SME advice services, improving our digital presences and extending the support to provide more in-depth support.

We will also take action to deepen the level of public engagement through simplification of our branding, to make the delivery landscape easier to navigate, and expansion of the existing Green Homes Network, so that people can learn from those who have already made the transition to zero emissions heating.

Summary of Scottish Government Delivery Schemes

Domestic support	**Home Energy Scotland** Free, independent advice on energy efficiency and low and zero emission heating.Also acts as a referral scheme for the Warmer Homes Scotland scheme. Portal for accessing number of support packages including HES loan, PRS loan, cash back incentives, equity loan pilot and Warmer Homes Scotland. Delivered by Energy Saving Trust.	**Warmer Homes Scotland** Fuel Poverty scheme which enables eligible households to receive energy efficiency and heating improvements. The scheme delivers insulation and heating measures including an increasing amount of air source heat pumps. Recently extended grant levels of increased support for heat pumps. Delivered by Warmworks.
	Area Based Schemes (ABS) Provide energy efficiency improvements to households in or at risk of fuel poverty living in their own home or a private rented property, leveraging Energy Company Obligation (ECO) finance and private investment. ABS is effective in delivering large numbers of improvements to mixed tenure, multi-occupancy properties (e.g., flats, terraces, council estates/projects). Delivered via local authorities.	**Home Energy Scotland Loans and Cashback** Interest free loans and cashback (grant) for eligible energy efficiency measures. Up to 40% cashback (grant) up to £6,000 for energy efficiency measures and up to 75% cashback (grant) up to £7,500 for renewable heating systems. Operators on first come first served basis. Householder is responsible for arranging and managing work. Delivered by Energy Saving Trust.
Business Support	**Business Energy Scotland** Free advice and support package to Scottish SMEs to help improve energy efficiency and decarbonise heating in their premises. Delivered by Energy Saving Trust from April 2022, replacing the Energy Efficiency Business Support Service.	**SME Loan and Cashback** The SME Loan and Cashback scheme provides interest free loans from £1,000 up to £100,000 to small and medium sized Scotland based enterprises for the installation of energy efficiency measures and renewable energy technologies. SMEs can also receive a cashback grant of up to £20,000 for the installation of renewable and energy efficiency measures. Delivered by Energy Saving Trust
Communities and Public Sector	**The Community and Renewable Energy Scheme (CARES)** Advice and funding support to community groups and other eligible organisations seeking to explore their renewable energy options. Delivered by Energy Saving Trust under the Local Energy Scotland brand	**Public Sector Non-Domestic Energy Efficiency Framework** Energy Performance Contract Framework designed for larger public sector projects. Improvement measures are financed via savings. NDEE Support Unit supports project delivery.
Multi-sector support	**Low Carbon Infrastructure Transition Programme** Through our successor LCITP programme we will continue to provide a range of support from expert advice to financial support to assist the development and delivery of large scale zero emission heat projects. This will include capital support for heat networks and support for social landlords for heat decarbonisation. Delivered in house with support from Project Partners including SFT and Zero Waste Scotland.	**District Heating Loan Fund** The refocused District Heating Loan Fund will be aimed at promoting communal heating solutions, including heat networks, across Scotland. It will provide competitive fixed rate loans to projects employing net zero emission heat technologies that demonstrate a carbon emissions reduction. Delivered by Energy Saving Trust.

Scaling up delivery – aligning support to strategic priorities

We recognise our delivery programmes must now move to a new phase: one capable of supporting deployment at an unprecedented scale. Our delivery programmes – and auxiliary support – will need to underpin the mass move from fossil fuel reliant systems to low and zero emissions heating in tandem with achieving a good standard of energy efficiency across all buildings.

To achieve this, we will use our investment of at least £1.8 billion to build upon, expand and improve existing programmes, bring forward new mechanisms where necessary, and maximise investment from other sources. We recognise there are choices to be made around how best to maximise the impact of our funding. We will need to strike a balance between supporting the vulnerable and ensuring that they are not left behind in the transition, and making demonstrable and sustained progress in those areas where we have most ground to cover, such as increasing the absolute volume of zero emissions heat installations.

What we have set out in this Strategy is an indicative prioritisation of our available capital funding over the lifetime of this Strategy. We propose to expand existing delivery programmes to focus on accelerating deployment against the four strategic priorities on the following page, which received widespread support through the consultation, with at least £465 million to support those least able to pay through our programmes targeted at those in fuel poverty and over £1 billion to support heat decarbonisation and energy efficiency across our other strategic priorities.

We know the importance of targeting government funding where it can best have impact and unlock barriers to transforming our building stock. A balance will be needed on how best to split our investment between energy efficiency measures and heat installations as well as the level of intervention needed to act as catalyst to decarbonise at the scale and pace needed and to stimulate more private investment.

Strategic Priorities

1 - Supporting those least able to pay

We will expand our programmes to support more households to eliminate poor energy efficiency as a driver of fuel poverty and accelerate the deployment of zero emissions heat across Scotland's social housing stock. We will target our intervention so that it does not have a detrimental effect on fuel poverty and will build in additional support where required to ensure people can continue to enjoy warm homes that are affordable to heat.

2- Investing in strategic technologies in low or no regrets areas

We will target deployment at scale of strategic technologies and will seek to maximise private investment through the aggregation of demand. This investment will be targeted through the successor to the Low Carbon Infrastructure Transition Programme (LCITP), a re-focused District Heating Loan fund (DHLF) and community-focused schemes such as the Community and Renewable Energy Scheme (CARES), including dedicated support for islands and remote communities.

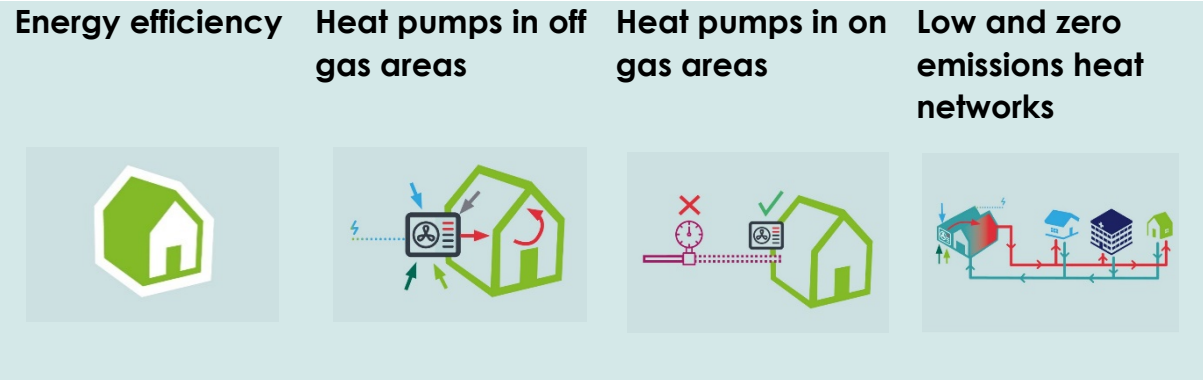
3- Showcasing Net Zero leadership and share learning through early adoption in key areas of focus

Supporting market growth in heat technologies by growing demand and customer base to help scale and attract further private investment through our successful domestic and SME cashback schemes. We will develop a new support programme to enable those households and SME businesses – who want to – to take early action, and investing in the retrofit of public sector buildings to showcase zero emissions buildings and to act as a catalyst for wider action.

4- Investing in innovation and demonstration to drive forward competitive advantage

We will need to continue to innovate and demonstrate in order to develop the business models, finance and technology to meet the needs of the future, and to overcome existing barriers in zero emissions heat deployment. We will support innovation and demonstration in strategic areas such as electrification, hybrid systems and network impact and in the more challenging aspects of decarbonisation such as multi-tenure buildings.

Our investment will continue to be underpinned by a place-based focus for our programmes as Local Heat & Energy Efficiency Strategies are rolled out, to ensure alignment with LHEES designations of strategic heat decarbonisation zones, and to support locally-driven Delivery Plans. We will take early action to strategically plan deployment and delivery with a focus on the 'no and low regrets areas' and strategic technologies identified earlier in this strategy (see Chapter 2)



Supporting home owners, landlords and tenants

We believe support for early adopters will be essential if we are to deliver our targets. We propose to continue to offer interest-free loans accessed via Home Energy Scotland, with a commitment to run our cashback scheme (or a grant replacement) until at least 2023 to help households overcome the upfront cost of taking early action. We have increased the cashback available to home and building owners on measures to improve the efficiency of buildings and install zero emissions heating. In 2022/23, we will replace current arrangements with a grant scheme to support energy efficiency and zero emissions heat improvements.

We will continue to monitor the success of these schemes, and undertake user research and market testing to understand the need for other products which may support and smooth the consumer journey, including the option for a self-funded pre- and post-installation service. We will take an evidence-based approach to the development of proposals for supporting self-funding households over the longer-term, and as we move into a regulatory framework. We are currently evaluating the area-based equity loans pilot. A Call for Evidence was opened in August 2021 and a Customer Survey and stakeholder engagement is taking place during Summer and Autumn 2021. Any future equity scheme will be considered in light of this evaluation.

Supporting those least able to pay

Over the next five years, we will invest at least £465 million to support those in fuel poverty in the heat transition and to remove poor energy efficiency as a driver of fuel poverty. We will continue to deliver energy efficiency investment to support fuel poor households to make homes warmer and cheaper to heat and to reduce the impact of any potentially increased running costs from zero emissions systems. We will seek to improve targeting so that we can reach more households in fuel poverty.

Over the next five years, it is our intention that our heat in buildings Area Based Schemes will increase their reach to support higher numbers of households in (or at risk of) fuel poverty, prioritising those in greatest need and in the least energy efficient properties. We will continue to maximise energy savings for fuel poor households, as well as the overall reduction in emissions. We expect our Area Based Schemes to deliver an increasing number of 'whole house' retrofits to fuel poor households and we have adopted a 'zero emissions first' approach (outlined in Chapter 3: People) in improving heating systems.

The Warmer Homes Scotland contract is due to end in September 2022 and we propose to replace it with a new and enhanced 7-year national scheme which will continue to have support for fuel poor households at its heart. We propose that the new scheme will embed increased support for zero emissions heating, enabling a zero emissions first approach (outlined in Chapter 3: People).

Support for Non-Domestic and Small & Medium Sized Enterprises

We support Small and Medium Sized Enterprises (SMEs) via our Business Energy Scotland (BES) (from April 2022 – currently Energy Efficiency Business Support (EEBS) service) and SME Loans to take action to reduce their energy use and cut emissions. SME businesses can continue to access free and impartial advice and support as well as low-cost loans to help spread the upfront cost of investing in energy efficiency and zero emission heat. We propose to continue to run our SME loan cashback schemes (or grant replacement) until at least 2023 to help reduce the cost of investing. In order to understand the support and investment SME businesses need to secure an accelerated rollout of energy efficiency and zero emission heating systems, we will consult and work with the sector to develop new policies and proposals for SMEs.

We will expand our Green Network for Businesses, so that SMEs can learn from people, businesses and organisations who have already made the transition to warmer, greener and more efficient buildings.

Larger businesses and organisations can access support on the open market to invest in decarbonising their property assets. Many larger organisations

already have strong corporate social responsibility policies which are driving low carbon decision making, with many organisations retrofitting their properties to reduce running costs and cut emissions. We will ensure that our work on regulations and finance consider how to drive early action so that this segment of the market can help lead the way and support and develop enhanced supply chains in Scotland.

Supporting Communities

Scotland is already recognised as an exemplar when it comes to our approach to supporting and investing in community energy. We want to continue to support communities to take the necessary steps to transform their assets so that they are ready for a net zero Scotland. The current Community and Renewable Energy Scheme (CARES) contract period commenced in April 2021 and will run until March 2025. The scheme will have a greater focus on supporting heat decarbonisation in community-led projects, while seeking to help inform decisions of all those participating in (or developing) local energy projects, and supporting community engagement in Local Heat & Energy Efficiency Strategies (LHEES).

CARES, which is delivered by Local Energy Scotland, will provide support to those developing local and community renewable projects with Local Energy Scotland's network of Development Officers, providing free, expert and impartial advice to community groups and organisations throughout project development. Loan and grant funding can be accessed through enablement grant funding, development grant funding, as well as through our funding calls.

Through CARES, up to £5.25 million has been made available this financial year to assist community groups in developing renewable energy projects, supporting the growth of community and locally owned energy in Scotland. In addition, our support will recognise the distinct challenges faced by island, rural and remote communities. We have made an additional £3 million available to support decarbonisation of Scotland's most remote and rural off-grid communities by upgrading their energy systems, making them more energy resilient and sustainable for the future. We will set out more detail in our forthcoming Islands Energy Strategy.

Case study: Decarbonising heat and cooking on the Small Isles and Shetland

There are 93 inhabited islands in Scotland, with a population of 103,700[liv]. The Islands of Rum, Eigg, Muck, Canna, Foula and Fair Isle are some of our smallest islands and all completely off-grid, not connected to the national electricity or gas networks. **These remote islands have set forward an ambitious vision[lv] to reduce emissions associated with space and water heating by 80%, and to reduce the volume of fossil fuels used for cooking by 50%, all by 2025.** In order to deliver on this progressive vision, these islands will initially target those using higher carbon systems. The islands will also look at ways to renovate and retrofit existing buildings to make them more energy efficient, helping to meet the ambitious vision.

Image of houses on the Isle of Eigg, provided by the Eigg Electric (December 2020)

Public sector

The public sector must demonstrate its commitment to transforming Scotland's buildings by taking early and sustained action to decarbonise the public sector estate and improve the energy performance of all public buildings. To achieve this we will consult the Scottish public sector during 2022 to develop and agree a series of phased targets with increased funding available to support delivery of these targets – starting in 2024, with the most difficult buildings like hospitals being decarbonised by 2038 – for all publicly owned buildings to meet net zero emission heating requirements by 2038. We will also introduce Fair Work standards as a condition to public sector heat and energy efficiency contracts.

Over the next Parliament, we will invest at least £200 million in the Scottish public sector estate to improve and reduce energy use and install zero emissions heating systems. We launched a new Scottish Green Public Sector Estate Scheme in June 2021, which brings together our existing Public Sector Energy Efficiency Loan Scheme, Public Sector Non-Domestic Energy

Efficiency Frameworks and Project Support Unit, with new support for Central Government bodies to support leadership for energy efficiency and heat decarbonisation right across the public sector. So far in 2021, we have committed over £15 million of capital funds to public sector estate projects.

The Scottish Government Learning Estate Strategy

The Scottish Government Learning Estate Strategy[lvi] sets out a range of outcomes we want to see from our investment in school buildings. One of these outcomes is an energy efficiency target that learning environments should be greener and more sustainable, contributing to Scotland's net zero greenhouse gas emissions commitment. Our energy efficiency target for schools replaced or upgraded through the £1 billion Learning Estate Investment Programme (LEIP) is highly ambitious at 67 kWh per square meter, per year. This target is not just ambitious on paper; we will be following up with local authorities to ensure that the targets are achieved in practice, once the schools are in use.

At scale support

Since its launch in 2015, we have used our highly regarded Low Carbon Infrastructure Transition Programme (LCITP) to make technical expertise and financial support available to innovative low carbon infrastructure projects which have potential for replication. This approach has led to the successful delivery of a number of renewable heat projects, including the Queens Quay heat network in Clydebank, which utilises heat from the River Clyde, and a new heat network in Stirling, which harnesses energy from waste water and supplies heat to nearby public buildings and businesses.

As the current LCITP programme draws to a close in 2021, we are developing a successor programme as the primary mechanism for deploying zero emissions heat at scale, co-ordinating our support for the roll-out of heat networks and heat infrastructure. To achieve this, we will invest £400 million over the next five years in large-scale heat decarbonisation infrastructure.

Alongside this significant capital commitment, our future programme must effectively blend government support, including newer financial mechanisms such as the Green Growth Accelerator, with co-financing from the private sector to deliver our ambitious emissions reduction targets whilst delivering value for money and future financial sustainability for these schemes.

We also propose that the successor programme to the LCITP will maintain a focus on innovation and demonstration by creating a dedicated funding

stream to allow us to more flexibly support further innovation in strategic areas such as large scale heat pumps, heat network development and electrification of heat and to tackle more challenging aspects of decarbonisation such as multi-tenure buildings and whole building retrofit.

We are working to design and develop the successor programme, offering a comprehensive package of financial and wider support across capital and development needs to large-scale heat decarbonisation projects which will be launched later this year.

Social Landlords

Twenty-four percent[lvii] of Scotland's domestic dwellings are social housing. The social housing sector has shown strong leadership on improving fabric energy efficiency, which has supported tenants to reduce their energy bills, and contributed carbon savings. This early leadership puts the sector in a position to champion zero emissions heat measures in the most efficient parts of its stock.

In the second half of 2020, we launched the Social Housing Net Zero Heat Fund, to support social housing landlords across Scotland to take forward projects to deploy zero emissions heat, improve energy efficiency and reduce fuel poverty. In August 2021, we launched the second £30 million call for this Fund, including an additional funding stream focused on energy efficiency as the first step in our commitment to help upgrade the most inefficient and expensive to heat social homes to the highest possible standard in one leap.

We will to continue to operate the Social Housing Net Zero Heat Fund until 2026, investing £200 million in a sector already leading the way in considering how it will change how it heats and use energy in its homes.

We are reviewing the recommendations from the Zero Emissions Social Housing Taskforce (ZEST) contained in its August report. The social housing sector has shown strong leadership on improving fabric energy efficiency, which has supported tenants to reduce their energy bills, and contributed carbon savings. This early leadership puts the sector in a position to champion zero emissions heat measures in the most efficient parts of its stock.

However, fabric improvement alone will not get us close to our targets for net zero and we need to develop a stronger focus on heating system change – as is the case for all other tenures where we propose to regulate to require installation of zero emissions heating systems as well as energy efficiency upgrades, where within our competence.

We remain committed to working with the social housing sector and encourage the sector to take full advantage of the support available

including through our Social Housing Net Zero Fund, through which we are investing £200 million of capital funding to support decarbonisation of social housing over the course of this parliament.

We will also consider how this financial support for zero emissions heating will work in tandem with our other delivery programmes such as our Area Based Schemes.

In addition, we will invest £3.44 billion to deliver more social and affordable homes over the period 2021-2022 to 2025-2026. We will continue to support affordable housing providers who wish to install zero emissions heating systems in these homes ahead of regulatory requirements in 2024.

Utilising UK Government Funding

As a result of our sustained investment since 2009, Scotland has been successful in leveraging significant additional investment from UK Government funding programmes, such as the Energy Company Obligation (ECO) and the Renewable Heat Incentive (RHI). See Annex C for Summary of GB wide funding schemes.

The UK Government has consulted about changes to the Energy Company Obligation scheme from March 2022 onwards. The Scottish Government will continue to seek to maximise the impact of levy funding in reducing energy bills for fuel poor households and enabling increased progress with decarbonisation of heating systems.

Scottish Government delivery programmes and advice services will continue to align with UK Government funding as appropriate to ensure that this targets need in Scotland and is delivered more cost effectively. We continue to press the UK Government to provide more funding via GB-wide schemes, including working with UK Government to identify a more progressive way of funding these programmes.

Summary of action we are taking:

55. We will establish a single dedicated National Public Energy Agency by September 2025 to accelerate transformational change in how we heat and use energy in homes and buildings, aid public understanding and awareness, and coordinate delivery of investment.
56. We will expand existing delivery programmes to focus on accelerating deployment over the next 5 years against the following four strategic priorities: (1) those least able to pay, (2) investing in

strategic technologies in low or no regrets areas, (3) showcasing Net Zero Leadership and share learning through early adoption in key areas of focus and (4) investing in innovation and demonstration to drive forward competitive advantage.

57. We will offer interest-free loans for heat and energy efficiency technologies via Home Energy Scotland, with an additional commitment to run our cashback scheme (or a grant replacement) until at least 2023 to help households overcome the upfront cost of taking early action.
58. We have increased the cashback available to home and building owners on measures to improve the efficiency of buildings and install zero emissions heating, and to replace in 2022/23 with a grant scheme to support energy efficiency and zero emissions heat improvements.
59. We will undertake user research and market testing to understand what further products may be needed to support and smooth the consumer journey, including the option for a self-funded pre- and post-installation service.
60. We are evaluating the area-based equity loans pilot and will consider any future equity scheme in light of this evaluation.
61. We will continue delivery of energy efficiency investment to support fuel poor households in order to make homes warmer and easier to heat and to reduce the impact of any increased running costs from zero emissions systems, including recognising the distinct challenges faced by island, rural and remote communities, and seek to improve targeting so that we can reach more households in fuel poverty.
62. We will continue our investment in Area Based Schemes, extending their reach to support higher numbers of households in or at risk of fuel poverty. We will continue to develop ABS as a 'whole house' retrofit programme for fuel poor households based upon a 'zero emissions first' approach to improving heating and making more effective use of micro-generation.
63. We will procure a new, enhanced successor to Warmer Homes Scotland following expiry of the current contract in September 2022, which will provide support for fuel poor households at its heart, and embed increased support for zero emissions heating, adopting a zero emissions first approach.
64. We will support SME businesses via Business Energy Scotland (BES) (from April 2022 – currently Energy Efficiency Business Support (EEBS)) advice service and SME Loans to take action to reduce their energy use and cut emissions.
65. We will continue to run our SME loan cashback schemes (or grant replacement) until at least 2023 to help reduce the cost of investing.

In order to understand the support and investment SME businesses need to secure an accelerated rollout of energy efficiency and zero emission heating systems, we will consult and work with the sector to develop new policies and proposals for SMEs.

66. We will expand our Green Homes and Business Networks, so that SMEs can learn from people, businesses and organisations who have already made the transition to warmer, greener and more efficient buildings.
67. Throughout the next 4 years, we will continue to support communities to take the necessarily steps to transform their assets so that they are ready for a net zero Scotland through our new CARES programme, delivered by Local Energy Scotland.
68. We will set out further detail on how we will support island communities in our forthcoming Islands Energy Strategy.
69. We will invest at least £200 million in the new Scottish Green Public Sector Estate Scheme launched in June 2021 – drawing together capital grants, loans, and other support mechanisms – as the main government-led capital funding mechanism to support leadership for energy efficiency and heat decarbonisation right across the public sector.
70. We are developing a successor programme to LCITP as the primary mechanism for deploying zero emissions heat at scale, co-ordinating our support for the roll-out of heat networks and heat decarbonisation infrastructure. To achieve this, we will invest £400 million over the next five years in large-scale heat decarbonisation infrastructure.
71. We commit to extending the Social Housing Net Zero Heat Fund until 2026 and investing £200 million of support to further accelerate the decarbonisation of our social housing stock, and considering how this financial support will work in tandem with our other programmes, such as ABS, to deliver a comprehensive approach to decarbonising our social housing stock.
72. We continue to support affordable housing providers who wish to install zero emissions heating systems in homes through our Affordable Housing Supply Programme, ahead of regulatory requirements in 2024.
73. We will continue to align Scottish Government delivery programmes and advice services with UK Government funding to ensure these target need and are cost-effective.
74. We continue to press the UK Government to provide more funding for energy efficiency and zero emissions heating via GB-wide schemes, including working with UK Government to identify a more progressive way of funding these programmes.

Chapter 7 Working Towards A Long-Term Market Framework

This Strategy sets out a proposed long-term policy framework. It is supported by ambitious targets on climate change and fuel poverty, a stretching deployment pathway for energy efficiency and low and zero emissions heating, a significant capital funding commitment over this Parliament, and creation of a regulatory framework to underpin delivery and provide future certainty to the market (as detailed in Chapter 8).

However, we know that to grow the market in line with the transformation needed, energy efficiency and low and zero emissions heating need to feel like a positive choice for households and building owners. As we scale up deployment over the course of this decade, it will be important that this transformation is underpinned by an appropriate market framework, which helps to create the demand for energy efficiency and low and zero emissions heating, helps consumers overcome the upfront investment costs and helps to attract and secure further private investment and finance to help meet the costs of the transition.

Investing in net zero

We estimate that the total capital cost of converting our building stock to zero emissions by 2045 is in the region of £33 billion[11]. This estimate includes the costs of upgrading the energy efficiency of domestic and non-domestic properties and replacing their heating systems with zero emission alternatives. Further investment will also be required to upgrade our energy networks and ensure sufficient energy generation capacity (as identified in Chapter 5). However, it is important to bear in mind that this is the gross cost; even without decarbonisation, the building stock would require significant investment as heating systems and fabric elements reach the end of their lifespans. For example, it would cost around £5 billion to replace existing fossil fuel heating systems in the domestic sector on a like for like basis.

We expect the total annual building level investment required will rise gradually throughout the early 2020s, peaking in the region of £2 – 2.5 billion in the late 2020s, before falling throughout the 2030s as transformation of the

[11] Cost expressed in real terms (today's prices). This estimate is based on a high-electrification pathway. Other pathways could result in a different distribution of costs (for example with lower building level investment costs but higher costs upstream in the energy system). Note that it is possible that as technology develops and the market scales up, real costs could fall over time. By way of comparison, there have already been very significant falls in the costs of renewable electricity generation.

building stock nears completion and our economy wide net zero emissions target is reached.

We recognise that higher up-front costs compared to fossil fuel incumbent systems can be a barrier and for some individuals, businesses and organisations, the cost of upgrading their home or workplace may be prohibitive, preventing them from taking action.

Building level investment

The costs of upgrading individual homes, workplaces and community buildings will vary driven by the building type and condition, materials, existing levels of energy efficiency and type of heating systems being replaced. We know that the average cost of installing a heat pump is currently around £10,000, with approximately an additional £2,000 for energy efficiency measures. This compares to around £2,500 for replacing a fossil fuel boiler[lviii]. However, the cost of conversion to low and zero emissions heating systems is likely to vary significantly across different properties.

Some properties which are already energy efficient and using zero emissions heating systems may require little or no investment. For other properties, the costs will be lower than the typical £10,000 to £12,000 set out above because other types of zero emissions heating systems, such as heat networks, will offer a more cost-effective solution than heat pumps. However, there will also be properties where for a variety of reasons, such as constraints on technology options available, location, property type, impact on the fabric of historic buildings, space constraints, and capacity of the electricity grid, the cost will be higher than £10,000 to £12,000.

We continue to develop the evidence base on the costs of different low and zero emissions heat options suitable to different properties across the Scottish building stock.

As set out in Chapter 6, we currently offer a range of support to help individuals, SME businesses and the public sector overcome the upfront costs, including grants, as well as interest-free and low-cost loans to help overcome the upfront costs of investing. However, we know that for many, taking on more debt to fund upgrades is just not possible, and we must find new ways to help secure the upfront investment required to transform the nation's

building stock. The sheer scale of investment needed means it cannot be fully funded by government alone.

Alongside public funding and investment by individual households and businesses, we need to see increasing levels of private finance and investigate innovative finance mechanisms and business models to meet the total investment need.

New Finance Mechanisms

Public sector funding from the Scottish Government, UK Government, local authorities or investment from new institutions like the Scottish National Investment Bank will be a part of the solution to deliver the scale of transformation needed by 2045, but private investment – whether from homeowners, landlords or business paying for their own properties or from financial institutions providing financing for large scale infrastructure – must also drive progress. We must mobilise and work in collaboration with the private sector to leverage the scale of investment needed and to develop innovative and new approaches to financing heat decarbonisation and energy efficiency measures.

We will establish a Green Heat Finance Taskforce before the end of this year – a proposal which was widely welcomed in the consultation responses.

This Taskforce will forge a new partnership approach between the Scottish public sector, heat decarbonisation experts and the financial sector, working with organisations including the Green Finance Institute and financial institutions, to explore potential new and value for money innovative financing mechanisms for both at-scale and individual level investment. The Scottish Government and the Scottish Futures Trust will work together to provide co-secretariat support for the independently chaired Taskforce to demonstrate a clear government and industry partnership to drive forward the work of the Taskforce.

The Green Heat Finance Taskforce will make recommendations on the range of approaches that the Scottish Government – working in collaboration with the private sector – should bring forward to support the scaled growth in private capital needed and, where possible, pilot innovative solutions to attract investment. This will build on the rich evidence base already developed by the UK Climate Change Committee, the Coalition for the Energy Efficiency of Buildings and others. It could include looking at opportunities to expand already tried and tested models such as Public-

Private Partnerships[12] or Regulated Asset Based-type models[13] to fund large scale infrastructure including heat networks, as well as new emerging and established business models for households and business such as Heat as a Service, Energy Performance Contracting, green mortgages and salary sacrifice models. Building on the evidence from our equity loan pilot, we will also ask the Taskforce to explore how unlocking of asset wealth for existing property owners could act as a potential financing mechanism. The Taskforce will need to be rigorous in covering the breadth and depth of potential financing mechanisms with a clear expectation from the Scottish Government that the Taskforce will shape how the heat transition is financed in the future. We expect the Taskforce to make its recommendations ahead of the introduction of regulations (as set out in Chapter 8), so that there is a clear and identified range of financial support mechanisms available to support building owners to meet proposed regulatory obligations.

To complement this work, we will also consider how our local tax powers, such as council tax and non-domestic rates, could be used to incentivise or encourage the retrofit of buildings. We will commission further analysis to identify potential options, to be implemented from the middle of the decade where appropriate, subject to consultation and public engagement.

We have already begun some of this innovative financing work. The Scottish Government is a member of the advisory council for the European Energy Efficiency Mortgage Initiative[lix] working to create a standardised energy efficient mortgage that can help bridge the renovation gap through use of low-cost private sector financing.

Linking the mortgage market to energy performance and emissions can help to drive change over time and help to encourage positive consumer choice. We welcome the UK Government's proposals to require lenders to disclose the average EPC performance of properties on their mortgage portfolio and to adopt a voluntary target of meeting a portfolio average of EPC C by 2030. This will help to create a market for new mortgage products helping to secure further private investment into the sector. To ensure that this approach is consistent with our net zero objectives, we urge the UK Government to ensure

[12] Public private partnerships (PPPs) are arrangements typified by joint working between the public and private sector. PPPs can take a variety of forms but the basic concept uses private sector finance and expertise to provide services or infrastructure. They can take the form of a contract with the public sector with a unitary payment made for the services or infrastructure paid by the public sector; a free-standing project with services or infrastructure paid for those who benefit, or a joint venture where some public investment is needed to enable the project to go ahead.

[13] A Regulated Asset Based (RAB) model is a type of economic regulation typically used in the UK for monopoly infrastructure assets such as water, gas and electricity networks. The company receives a licence from an economic regulator, which grants it the right to charge a regulated price to users in exchange for provision of the infrastructure in question. The regulated return helps secure private finance.

reform of the EPC framework for the rest of the UK, in parallel with our commitment for Scotland, so that EPCs at UK-level do not drive investment in fossil fuel heating systems – taking steps similar to those we are proposing in Chapter 8.

We are developing a new pilot for use of guarantees with mortgage providers as an effective route to market for financing emission reduction measures. This could support lenders offering additional low-cost finance to borrowers, particularly at key trigger points when borrowers are buying, re-mortgaging or improving their properties.

Securing long-term and low-cost private investment will require us to create new revenue streams to repay the upfront private capital investment that is being made. The UK Green Deal was an example of this, and was intended to help households cover the upfront cost of investing in energy efficiency through 'on-bill' financing. However, the UK's Green Deal scheme failed to secure sufficient take up - owing to high interest rates, low levels of quality assurance and consumer protection and lack of regulation to drive uptake. Building on the lessons from the UK Green Deal, our Green Heat Finance Taskforce will also consider how we can create these new revenue streams, for example by use of our local tax and charging powers or by utilising powers that are already provided for in the Scotland and Energy Acts. We will consider how to use these powers alongside our planned approach to regulation.

We will explore opportunities for other market actors, such as suppliers, retailers and manufacturers to drive investment in zero emission heating and energy efficiency. We will work with the UK Government to explore options for new market mechanisms to drive investment and innovation so that an increasing share of heat comes from low and zero emission sources. These options may include new obligations on market actors, product standards and innovation funding, some of which may cut across reserved and devolved competencies.

We will also look closely at the EU's proposals to bring natural gas (and other fossil fuels) for domestic heating into the EU Emissions Trading System[lx], as a mechanism to drive investment to reduce emissions. We will consider whether these proposals are suitable and workable in a UK context, working with the UK Government and other devolved administrations as part of the proposed review of the scope of the new UK Emissions Trading Scheme.

New Business Models

We have commissioned independent advice on the concept of Heat as a Service and its potential as a route for decarbonisation in Scotland. The Heat as a Service model has similarities with the way in which many consumers choose to lease a mobile phone or car, with the upfront ownership costs of a

new low or zero emission heating system being recouped over a period of time through regular payments, sometimes including operating and maintenance costs.

The research suggests that Heat as a Service could help overcome the two main barriers that put people off installing low-carbon heating systems: concerns about cost and comfort. We will continue to explore how this model might support our heat decarbonisation agenda by enabling consumers to purchase or run low or zero emission heating systems, while delivering the energy outcomes consumers want.

Case study: Danish 'Heat as a Service' Scheme

The Danish Energy Agency introduced a boiler scrappage scheme in 2020 to encourage Danish consumers to adopt heat pumps via a 'Heat as a Service' subscription business model. In this model, consumers pay an up-front fee to cover some of the installation and equipment costs, then a fixed price per unit of heat delivered and a monthly payment for the heat pump and maintenance. The minimum subscription period is 10 years. The Danish Energy Agency defined the pricing structure and allow providers to adjust the up-front fee, price per unit of heat and monthly payment, depending on their business model.

Four energy service providers were selected from an open tender to provide finance, install, operate and maintain heat pumps for consumers. The scheme is intended to encourage market competition, recognising that the businesses that can install, operate and maintain the heat pumps most efficiently will be able to offer consumers the lowest prices.

The scheme is still in its initial stages, but early findings are that more heat pumps have been installed than would have been without the scheme, consumers have been offered a new way of installing heat pumps without buying or leasing, and energy companies have said they would not have offered a subscription scheme without the Danish Energy Agency led scheme.

To do this, we will continue to undertake market and consumer research while working with industry and the regulator to understand when and where 'Heat as a Service' could be used in Scotland and consider different routes for bringing this concept to market. The Green Heat Finance Taskforce will consider its potential as a private sector financing mechanism. We will build

on engagement with the Danish Energy Agency to understand how this model has been developed and rolled out in Denmark.

Creating Favourable Market Conditions

As we undertake the necessary transformation of our homes and buildings, we also want to ensure that the energy market evolves to support decarbonisation and allows energy bills to remain affordable for households and businesses alike.

Currently, primarily owing to the relatively low-cost of gas in comparison to electricity, in some situations zero emissions heating systems can be more expensive to run than fossil fuel systems like gas and oil. The impact that installing a zero emissions heating system will have on energy bills is dependent on a number of other factors, including the design and quality of system itself, user operation, the system it is replacing, and the energy efficiency of the property in which it is installed. Wider system costs, for example upgrading energy networks, will also likely have an impact on consumer bills and we will undertake further analysis on this issue.

Electricity prices in recent years have been 4-5 times greater than gas[lxi], having risen by around 35% in real terms from December 2010 to December 2019, whereas gas prices remained virtually unchanged in real terms over this period[lxii]. There are a number of reasons why electricity costs more than gas, including wholesale and generation costs as well as policy costs, such as social and renewable electricity obligations, which are recouped through charges and levies placed on consumer bills. Historically, the majority of these policy costs have been added to electricity bills, with comparatively little added to consumer gas bills. The figure on the following page outlines the make-up of energy bills, and illustrates that around 23% of an electricity bill is made up of environmental and social obligation costs, compared to around 2% of a gas bill[lxiii].

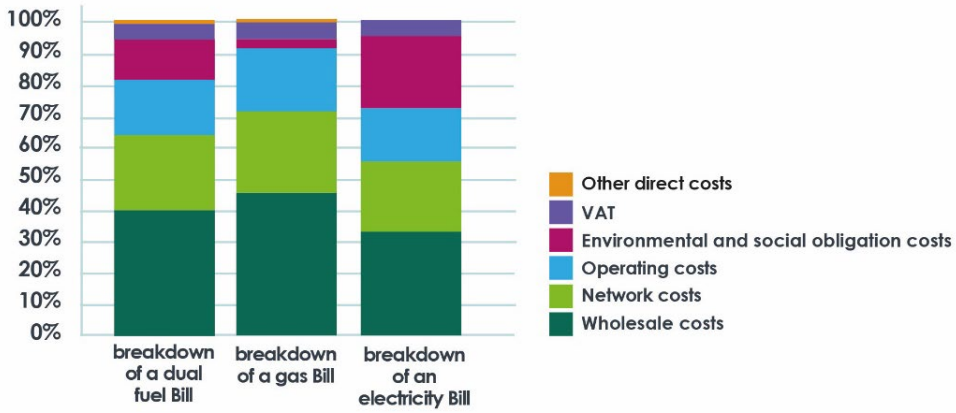


Figure 8: Breakdown of GB gas and electricity energy bills. (Source: Ofgem, 2021)

As we accelerate deployment of a wider range of heating systems, it is important that the market evolves with it so as not to disincentivise households from switching to zero emissions systems and to reduce the risk of tension between our climate change and fuel poverty targets. The current imbalance of gas and electricity costs is incompatible with our net zero objectives and acts to disincentivise take up of zero emissions heating technologies. We agree with the recommendation, from the UK's Climate Change Committee, for action to address this imbalance.

We do not have the levers to control energy prices, such as reforming the energy market or restructuring the various levies and charges that are added to energy bills. These powers remain reserved to the UK Government. We have commissioned research to understand whether rebalancing of levies and charges between electricity and gas supplies might impact the deployment of low and zero emissions heat in both domestic and non-domestic settings in Scotland. The research will be published alongside this Strategy[lxiv].

We welcome the UK Government's commitment as set out in its Energy White Paper[lxv] to publish a Call for Evidence this year to begin a strategic dialogue between government, consumers and industry on affordability and fairness. We urge the UK Government to quickly progress this and issue all parts of the Call for Evidence package, so that a fair settlement for energy consumers can be achieved which unlocks our just transition to a net zero economy. We remain ready to work with the UK Government as it progresses the Call for Evidence to ensure that any reforms that may emerge do not disadvantage Scottish consumers and that they fit with and enable delivery of both our more ambitious climate targets and fuel poverty targets.

In particular, we reiterate our call for the UK Government to take urgent action to rebalance energy prices so that the running costs of zero emission systems are comparable to fossil fuel incumbents, helping to ensure that any regulations introduced in Scotland to require zero emissions heating systems (see Chapter 8) do not see Scottish building owners facing disproportionately higher running costs for those systems.

Summary of action we are taking:

75. We will establish a new Green Heat Finance Taskforce in late 2021 to provide advice and recommendations to Scottish Government on potential new financing models and routes to market.
76. We will set out options for future financing and delivery in 2023 ahead of the introduction of proposed regulations (see Chapter 8), with a view to implementing these new mechanisms from 2025 where applicable and allowed within our legislative competence.
77. We will work with the UK Government to develop new market led incentives to drive delivery of low and zero emissions heating.
78. We will continue to undertake market and consumer research while working with industry and the regulator to understand when and where 'Heat as a Service' could be used in Scotland and consider different routes for bringing this concept to market.
79. We will consider how our local tax and charging powers, such as council tax and non-domestic rates, could be used to incentivise or encourage the retrofit of buildings, alongside our planned approach to regulation. We will commission further analysis to identify potential options, to be implemented from the middle of the decade where appropriate, subject to consultation and public engagement.
80. We will work with the UK Government as it progresses its call for evidence on affordability and fairness to ensure that any reforms do not disadvantage Scottish consumers and that they fit with and enable delivery of our more ambitious climate targets.
81. We will publish research on the balance of consumer levies on electricity and gas bills.

Chapter 8 Developing a Regulatory Framework for Zero Emissions Buildings

Principles of our approach

To underpin our investment and provide long-term certainty to the sector and home owners, landlords, owners of non-domestic premises and the public sector, we will introduce new mandatory legal standards for zero emissions heating and energy efficiency, where it is within our legal competence, during this term of Parliament. Together, these regulations will cover the full range of Scotland's domestic and non-domestic buildings and address both their energy efficiency and their direct emissions from heating. This chapter sets out our proposed approach for the introduction of these regulations for both new and existing buildings, including: reforming the assessment process and metrics underpinning Energy Performance Certificates; standards for existing homes; standards for existing non-domestic buildings; and standards for mixed-use and multi-tenure buildings.

Energy efficiency and zero emissions heating investments are long term decisions that require certainty and clear end-points. Regulations will help provide that certainty and also help build supply chain confidence to invest in training, skills and new projects. In this way, regulation can help to lower the costs of the transition[14].

We will introduce regulation fairly and in a way which considers the health and wellbeing of Scotland's people, including continuing to target the eradication of poor energy efficiency as a driver of fuel poverty and ensuring our actions have no detrimental impact on fuel poverty, unless additional mitigating measures can also be put in place. We will ensure sufficient periods of transition to allow people and the market to adjust and prepare for new standards coming into force, and tailor our delivery mechanisms to set out a clear path of support and advice for individuals and organisations.

[14] In 2019, the Scottish Government ran a call for evidence on the future of low carbon heat for off gas buildings. Respondents saw policy and regulation as having a key role in supporting deployment of low carbon heat in off-gas buildings, particularly to provide stability and certainty to the market. Scottish Government. (2019), The future of low carbon heat for off gas buildings: a call for evidence, URL: https://consult.gov.scot/better-homes-division/the-future-of-low-carbon-heat/ (last accessed: 28/09/2021).

We will introduce primary legislation, subject to consultation and to limits on devolved competence, that provides the regulatory framework for zero emissions heating and energy efficiency, and underpinning powers to support this transition and the wider Heat in Buildings programme. We will engage with the UK Government ahead of introducing this legislation to secure agreement on changes that are necessary to the energy markets in reserved areas, to ensure a just transition to zero emissions heating, or securing further devolution of the powers needed to make such changes in Scotland.

The regulatory framework we set out in the draft Strategy received support in the consultation, with reactions including describing the proposals as comprehensive and easy to follow, and emphasising their role in enabling significant market changes.

Alongside our regulatory approach, we are developing our delivery programmes to support the acceleration towards net zero emissions for buildings (as set out in Chapter 6: Kick starting investment in the transition). We will also take account of the recommendations of the Green Heat Finance Taskforce ahead of the introduction of regulations (as set out in Chapter 7) so that there is a clear and identified range of financial support mechanisms available to support building owners to meet proposed regulatory obligations.

Summary of action we are taking:

82. We will introduce primary legislation, subject to consultation and to limits on devolved competence, that provides the regulatory framework for zero emissions heating and energy efficiency, and underpinning powers to support this transition and the wider Heat in Buildings programme.
83. We will engage with the UK Government ahead of introducing this legislation to secure agreement on changes that are necessary to the energy markets in reserved areas, to ensure a just transition to zero emissions heating, or securing further devolution of the powers needed to make such changes in Scotland.
84. We will introduce any regulation in a way that promotes a just transition and which considers the health and wellbeing of Scotland's people.
85. We will also ensure sufficient periods of transition to allow people and the market to adjust and prepare for new standards coming into force.
86. We will tailor our delivery support to set out a clear path of support and advice for those affected, and will also take account of the

recommendations of the Green Heat Finance Taskforce ahead of the introduction of regulations (as set out in Chapter 7), so that there is a clear and identified range of financial support mechanisms available to support building owners to meet proposed regulatory obligations.

Existing homes

In responding to the challenge of net zero, we recognise that our proposed regulatory framework needs to go further than previously set out in the 2018 Energy Efficient Scotland Route Map.

Following feedback from recent Energy Efficient Scotland consultations, advice from our Heat Decarbonisation External Advisory Group and responses to the consultation on the draft Strategy, we are revising our approach and developing a regulatory framework for energy efficiency and heat supply that will:

- reform the assessment process and metrics underpinning Energy Performance Certificates (EPCs) so that standards are effective, meeting the demands of both climate change targets and fuel poverty targets.
- address both heat decarbonisation – to the extent that our powers allow – and energy efficiency, where previously our regulatory approach was centred on energy efficiency alone.
- increase clarity and pace by regulating to ensure that all homes meet at least the standard of an EPC C or equivalent by 2033, and that all homes use zero emissions heating (and cooling) by 2045[15]. This brings forward the target end date for energy efficiency standards by 7 years and proposes to introduce standards for heating, not previously included in the Energy Efficient Scotland Route Map.

Energy Performance Certificates

Energy Performance Certificates (EPCs) and the methodology behind these are the backbone of our existing standards. The UK Climate Change Committee (CCC), the Scottish Government's own EPC Assessment Short Life Working Group, and responses to recent consultations on the setting of

[15] Multi-tenure or mixed-use buildings under certain circumstances may be given until 2040-45 to improve both their energy efficiency and install a zero emissions heat supply, depending on the complexity involved in coordinating works and recovering costs between multiple owners, which may necessitate a 'whole building intervention' simultaneously covering energy efficiency and heat supply improvements.

standards across various tenures and for off gas grid properties, have all recommended a need to reform EPCs so that they can be effectively used as the basis of regulation and to ensure that they drive the energy efficiency and heat decarbonisation measures needed for our net zero objectives.

The CCC recommends[lxvi] that the domestic EPC framework should be reformed and improved to ensure it is robust and enforceable and fit for the purpose of driving energy efficiency improvements and to ensure it does not disincentivise the installation of zero emissions heating. To do this, we need an EPC framework that helps building owners understand:

- The measures required to improve the energy efficiency of their property, so as to reduce the demand for heat and ensure that poor energy performance is not a driver of fuel poverty.
- The changes needed to the heating system so that it is zero emissions.
- The impact of these changes on running costs.

To be a useful tool for property owners, EPCs need to set out clear property-level recommendations on the measures needed to reduce demand for energy and reduce emissions to zero.

For EPCs relating to properties in mixed-tenure and mixed-use buildings, it will be important that they recommend the necessary communal works which might be needed to retrofit the whole building.

It will be important that EPC recommendations are tailored and appropriate to the property, and are in line with heat zoning, for example as set out in the area's Local Heat & Energy Efficiency Strategy.

EPCs for domestic properties currently include two ratings: an Energy Efficiency Rating and an Environmental Impact Rating. The former is currently an energy cost rating based on energy demand; the latter is based on carbon emissions. The Energy Efficiency Rating is the primary rating in use; is relatively well known; is included in adverts for property; and is currently the basis of our energy efficiency standards.

The current Energy Efficiency Rating can be improved by installing a cheaper-to-run fossil fuel heating system, such as replacing electric storage heaters with a gas or oil boiler. Conversely, installing a zero emissions system could lead to a worsening of the rating[lxvii].

As such, the current system is not compatible with our zero emissions objectives. However, simply adopting the Environmental Impact Rating as the basis of our regulatory approach would not be compatible with our statutory fuel poverty targets.

Our consultation[lxviii] on reform of the existing EPC considers options to include three indicators as a basis for future standards:

- an indicator for energy efficiency (which will recommend to building owners the measures needed to reduce demand for heat, as appropriate to their building type and fabric; and will also show the measures needed to remove poor energy efficiency for fuel-poor households);
- an indicator for heating emissions (which will recommend to building owners the most appropriate form(s) of heating system to reduce emissions to zero, as appropriate to their building type and fabric, and taking account of wider changes to heat supply in the area);
- an indicator for cost of heating (which will inform building owners and tenants of the impact of the energy efficiency and heat emissions measures on their energy bills).

As we reform the EPC system it will be important that it continues to fulfil its original purpose, as well as enabling strengthened action, including as a regulatory tool, on emissions and fuel poverty. As we do this, it will be important to ensure a degree of equivalence for energy efficiency so that the trajectory for energy efficiency improvements required remains broadly the same in the reformed system as we have already proposed.

Energy Efficiency and Zero Emissions Heat

We are already committed to taking action across all tenures to address the energy efficiency of existing homes. Our proposals for a regulatory framework for decarbonising homes, as set out here, build on and update the regulatory framework set out in our 2018 Energy Efficient Scotland Route Map.

The framework we set out in 2018 focussed only on energy efficiency. We now need to strengthen this framework so that it covers both energy efficiency and zero emissions heating, so that it is aligned with our net zero emissions targets while continuing to support progress on eradicating fuel poverty.

We will strengthen our proposed regulatory framework to the extent that our powers allow and, where required, will seek additional powers from the UK Government to enable this. We propose that under our strengthened regulatory framework a large majority of buildings should achieve a good level of energy efficiency by 2030, equivalent to EPC C for homes, with all

homes meeting at least this standard by 2033, and that all buildings have zero emissions heating systems by 2045 at the latest[16].

Details are set out below for a proposed new all-tenure zero emissions heat standard, as well as minimum energy efficiency standards for private-rented, owner-occupier and social housing. We will also develop a bespoke approach to regulating for improvements in mixed-tenure and mixed-use buildings.

Tenure of Scotland's homes.

62% of all homes in Scotland are owner occupied, 24% are social rented and 14% are private rented[lxix]. Just over one third of Scottish households live in flats, which are often found in mixed-tenure and mixed-use buildings, where residents include owner occupiers and private and social renters, and commercial premises occupy the ground floor.

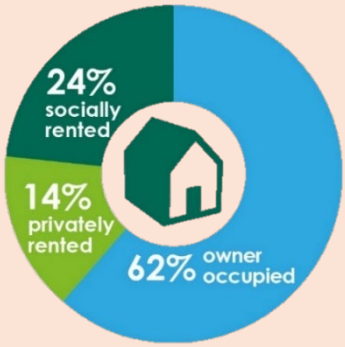


Figure 9: Breakdown of tenure in Scotland's domestic buildings (Source, Scottish Government House Condition Survey, 2019)

All-Tenure Zero Emissions Heat Standard

We will bring forward legislation during this Parliamentary term which, subject to devolved competence, will include regulatory proposals to require the installation of zero or very near zero emissions heating systems in existing buildings – in both the domestic and non-domestic sectors. We welcome the support expressed in the consultation for this regulation and will take into account points that respondents raised as we further develop our proposals.

[16] Multi-tenure or mixed-use buildings under certain circumstances may be given until 2040-45 to improve both their energy efficiency and install a zero emissions heat supply, depending on the complexity involved in coordinating works and recovering costs between multiple owners, which may necessitate a 'whole building intervention' simultaneously covering energy efficiency and heat supply improvements.

This legislation will support our commitment to phasing out the need to install new or replacement fossil fuel boilers in off gas properties from 2025, and in on-gas areas from 2030.

This would be subject to technological developments and decisions by the UK Government in reserved areas, with our intention that compliance with a new zero emissions heat standard be phased in for off-gas grid areas from 2025 and on-gas grid areas from 2030, with all buildings needing to meet this standard no later than 2045.

It may be appropriate to have an earlier backstop date for certain types of properties or areas. This could, for example, apply in the 'low regrets' areas of activity, such as where heat network zones have been identified and a heat network is available, or in high emissions properties, such as those that currently use heating oil or coal as their primary heating fuel.

In consulting on these proposals, we will consider whether these regulations will use the same (or similar) trigger points as those applying to energy efficiency standards, on which we have previously consulted (see below). However, as a minimum, we expect to propose that the regulations will be triggered by the replacement of an existing heating system.

We would seek to consult during 2022 on a proposed all-tenure zero emissions heat standard and any legislation needed to underpin this.

Private Rented Housing Minimum Energy Efficiency Standard

Twenty percent of private rented housing has a poor EPC rating (of E, F or G) compared to just 6% of social housing and 17% of owner-occupied[lxx].

To tackle the low energy performance in the private rented sector and help to make the heating bills of those living in those homes more affordable, we have been committed to the introduction of regulations to ensure properties in the private rented sector reach an EPC D by 2025 and have trailed this standard for the past 3 years. However, we recognise that the private rented sector has been significantly affected by the ongoing COVID-19 pandemic, with emergency legislation needed to prevent evictions, support tenants and landlords and protect the broader sector.

As a result, and to reflect the need to reduce pressure on the sector, we are removing this step and now working with the sector to introduce regulations in 2025. These will require all private rented sector properties to reach a minimum standard equivalent to EPC C, where technically feasible and cost-effective, at change of tenancy, with a backstop of 2028 for all remaining existing properties, in line with the direction provided by the CCC[lxxi].

Together with our proposals for regulating the owner occupied sector also to be introduced in 2025 (below), this will ensure that from 2025 onwards all private housing must achieve minimum standards equivalent to EPC C at respective trigger points, where technically feasible and cost-effective to do so - with backstops of 2028 (for the private rented sector) and by 2033 (for owner occupiers).

Owner-Occupied Private Housing Minimum Energy Efficiency Standard

We will set out and consult on detailed proposals for introducing regulations for minimum energy efficiency standards for all owner-occupied private housing.

It is envisaged that these will be set at a level equivalent to EPC C where it is technically feasible and cost-effective to do so. This will apply at key trigger points.

We propose to introduce regulations from 2023-2025 onwards, and all domestic owner-occupied buildings should meet this standard by 2033. This brings forward the previously proposed backstop from 2040 to 2033.

Where it is not technically feasible or cost-effective to achieve the equivalent to EPC C rating, we propose that a minimum level of fabric energy performance through improvement to walls, roof, floor and windows, as recommended in the EPC, would apply.

Social Housing Minimum Energy Efficiency Standard

Social housing is already paving the way for energy standards. The first milestone, the Energy Efficiency Standard for Social Housing (EESSH1) was based on a minimum energy efficiency depending on house and fuel type (specified SAP ratings within bands C or D)[lxxii]. It was due to be met in December 2020. The Scottish Housing Regulator reports that 89% of social rented homes have met the 2020 milestone and social landlords (local authorities and registered social landlords) are working towards the second EESSH2 milestone for all social housing to meet, or be treated as meeting, EPC B, or be as energy efficient as practically possible, by the end of December 2032. The £200m funding we have committed to in the Social Housing Net Zero Heat Fund will ensure the sector continues to lead the way for energy efficiency and heat decarbonisation.

As set out in the draft of this Strategy, we will review of EESSH2 standard with a view to strengthening and realigning it with wider net zero requirements so that we can work in partnership with social housing to lead the transition to zero emission buildings and avoid the need for further retrofit in the future.

The Zero Emissions Social Housing Taskforce recommended that this review be undertaken sooner than 2023, the date proposed in the draft of this Strategy. We are currently considering the report and recommendations and will respond in due course.

Mixed-tenure and mixed-use buildings

Mixed-tenure or mixed-use buildings[17] make up a significant share of Scotland's building stock. Such buildings could include a mixture of owner occupied, private rented and social housing, and also non-domestic uses, or simply multiple ownership within the same tenure. We recognise the challenges that common works present to mixed-use, tenement and mixed-tenure buildings, and that this often presents a barrier to installing energy efficiency and zero emissions heating measures unless property owners act together.

Local Heat & Energy Efficiency Strategies can go some way to supporting delivery in these areas, by making it clearer to building owners the measures most likely to be appropriate in their building and the surrounding area.

For mixed-tenure, multiple ownership, or mixed-use buildings, it may be more helpful for energy efficiency and heat standards to apply to the whole building rather than to individual properties or units, such as individual flats or ground floor commercial premises within a tenement.

We will consult on options for a regulatory approach for mixed-tenure buildings which would see them required to reach a good level of energy efficiency, equivalent to EPC C rating, where technically feasible and cost effective, and install a zero emissions heating supply by 2040-45[18]. In consulting, we will consider whether there are circumstances under which certain households or owners of other multi-tenure or mixed-use buildings are exempt, have a longer period of time to meet standards, or will require a distinct set of standards to comply with.

We propose that specific backstop dates for both energy efficiency and heat in individual building blocks or areas would be determined by their date of zoning (see below section on Regulatory Trigger Points and Area-Based Regulation) – reflecting the need for coordinated measures for example

[17] The term mixed-use here refers to more than one use in the same building such as domestic and any non-domestic use or retail and office use in the same building.

[18] Multi-tenure or mixed-use buildings under certain circumstances may be given until 2040-45 to improve both their energy efficiency and install a zero emissions heat supply depending on the complexity involved in coordinating works and recovering costs between multiple owners, which may necessitate a 'whole building intervention', simultaneously covering energy efficiency and heat supply improvements.

through 'whole building retrofit'. Therefore, this could see some buildings required to comply with zero emissions standards ahead of 2045.

This approach to zone-based regulation for mixed-tenure and mixed-use buildings may be guided by Local Heat & Energy Efficiency Strategies, ensuring a careful phasing to improve this whole portion of the building stock, year-by-year.

We will introduce regulations from 2023-25 onwards, with an expectation that all of these buildings should meet this standard by 2040-45.

To facilitate the common works that will be essential for decarbonisation of these buildings, such as connection to heat networks or whole building insulation, we will consider bringing forward primary legislation to support this.

Historic Buildings

We will work with Historic Environment Scotland to consider what specific support may be needed within regulations to take account of buildings which are designated as listed or in conservation areas, in meeting requirements for decarbonisation of their heat supply and reducing their demand for heat.

Summary of action we are taking:

87. We are consulting on a reformed domestic EPC assessment process to better align with wider net zero objectives whilst meeting our fuel poverty obligations during summer 2021, and will publish an analysis of this consultation in early 2022.
88. We will bring forward proposals for regulating, to the extent that devolved powers allow, to require the installation of zero or very near zero emissions heat in existing buildings from 2025, with a backstop of 2045.
89. We will phase out the need to install new or replacement fossil fuel boilers, in off gas from 2025 and in on gas areas from 2030, subject to technological developments and decisions by the UK Government in reserved areas.
90. We will bring forward regulations requiring domestic private rented sector properties to achieve an equivalent to EPC C by 2028.
91. We will consult on detailed proposals to introduce regulations from 2023-2025, to require owner occupied private homes to meet a minimum level of energy efficiency (equivalent to EPC C) by 2033.

92. We will aim to bring forward the review of EESSH2 with a view to strengthen and realign the current standard to meet wider net zero requirements.
93. We will consult on introducing regulation to require mixed tenure, multiple ownership and mixed-use buildings such as tenements to reach a good level of energy efficiency (equivalent to EPC C where technically feasible and cost effective), and to install a zero emissions heating supply by 2040-45, including provisions on ensuring cooperation between building owners to carry out works and recover costs.
94. We will work with Historic Environment Scotland to consider what specific support may be needed within regulations for buildings designated as listed or in conservation areas.

Existing Non-domestic buildings

Since 2016, regulations[lxxiii] have required non-domestic buildings over 1000 m^2 on sale or rental to a new tenant to carry out an assessment to determine and implement modest energy efficiency improvements. Owners have the option of either implementing the measures identified or lodging a Display Energy Certificate reporting annual energy use.

In the 2018 Energy Efficient Scotland Route Map, we set out our ambition to expand and tighten requirements in the 2016 regulations so that they cover all non-domestic buildings. The Committee on Climate Change, the Climate Assembly, and the Climate Emergency Response Group (amongst others) have recommended the use of in-use energy consumption rather than modelled data. In February 2021, the UK Government consulted on an operational ratings scheme. We are now considering the most effective regulatory approach for non-domestic buildings, taking into account the diversity of building uses and energy demands – ranging from hospitals to small corner shops and large warehouses – and expect non-domestic backstops to apply between 2035 and 2045.

We intend to consult on the regulatory approach in 2022 and introduce regulations by 2025 to require owners to reduce demand for heat through energy efficiency improvements where feasible, and install a zero emissions heating supply, within the extent of our powers.

In the Energy Efficient Scotland Route Map 2018, we proposed that regulations be phased in, starting with the largest buildings with the scope of the regulations increasing over time so that by 2045 all non-domestic buildings would be improved. A phased approach is likely to remain appropriate.

We will consult on our proposed regulatory framework for non-domestic buildings, including trigger points, backstop dates, compliance and enforcement, in 2022.

Public sector buildings

We are committed to showing leadership in the 23,000 public sector buildings[lxxiv] in Scotland. This means that the public sector needs to act more rapidly and in advance of the introduction of further regulations for new-build and existing non-domestic buildings. We will develop and agree through consultation a series of phased targets starting in 2024, with the most difficult buildings like hospitals being decarbonised by 2038, and for all publicly-owned buildings to meet zero emission heating requirements, with a backstop of 2038.

We expect public sector leadership to include the early phase-out of all fossil fuel-based heating systems in the public estate at the earliest feasible dates. The Scottish public sector should take a zero emissions-first approach to heating system replacement, with new or replacement heating systems designed to be compliant with public bodies duties set under Section 44 of the Climate Change Act and the net zero declarations made by public sector organisations.

To further support public sector leadership, we will develop guidance for minor refurbishments and heating system replacements in the public sector.

Summary of action we are taking:

95. Develop and introduce strengthened regulation for non-domestic buildings, to ensure they reduce demand for heat where feasible and install a zero emissions heating supply; and launch a consultation on these proposals in 2022.
96. For the public sector, we will develop and agree through consultation a series of phased targets starting in 2024, with the most difficult buildings like hospitals being decarbonised by 2038, and for all publicly-owned buildings to meet zero emission heating requirements, with a backstop of 2038.
97. We will develop guidance for minor refurbishments and heating system replacements in the public sector.

Regulatory Trigger Points and Area-Based Regulation

There are a range of natural points where changes happen to a building. These could be used as triggers at which regulation could come in to force including:

- change of tenancy (when a property is empty);
- point of sale;
- major refurbishment;
- replacement or installation of a new heating system.

In many cases standards triggered at the individual property level will be appropriate. However, in circumstances where there are common or shared issues across an area it may be more appropriate to require action across a defined area, for example:

- in areas where there is a common building fabric type or construction archetype;
- in areas where there are mixed-tenure or mixed-use buildings requiring common works; or
- in areas where a communal or area-based heat solution, such as a heat network, is identified through zoning[19], requiring action to be taken across multiple buildings in tandem.

As we develop our regulatory approach for buildings we will consult on area- or zone-based triggers to complement those at the individual property level. For some of these triggers, such as sale of a property or identification of a heat zone, an appropriate grace period[lxxv] may be needed so as not to place an undue burden on individuals and in some cases achieve changes more cost-effectively.

Zoning may also be important as a means of ensuring action by building owners who have otherwise not received triggers to take action at an individual property level (for example, properties that have not been sold or changed tenancy), ahead of the final compliance dates for the regulations (i.e. 2033 for energy efficiency; 2045 for zero emissions heating). Again, appropriate time would be needed to notify building owners, to allow compliance, and to allow phasing of works for the supply chain, to avoid potential last-minute bottlenecks ahead of backstops.

[19] This could include for example heat network zones as set out in the Heat Networks Bill.

Summary of action we are taking:

98. We will consult on area or zone-based triggers to complement those at the individual property level.

New Buildings

To ensure that new buildings do not require retrofitting in the future to achieve zero emissions, the Scottish Government is currently developing regulations which will require all new buildings, for which a building warrant is applied for from 2024, to use zero emissions heating (and cooling). The requirement will apply to new non-domestic buildings where a building warrant is applied for from 2024 where technically feasible. This means that, where there is an installed heating system contained within the curtilage of a new building, it will be required to produce zero direct greenhouse gas emissions (at the point of use).

We published our initial Scoping Consultation on the 2024 New Build Heat Standard (NBHS)[lxxvi] on 9 December 2020, and are publishing the analysis of consultation responses alongside this Strategy[lxxvii].

Ahead of 2024, we will seek further evidence and stakeholder input on the development of the NBHS. This includes a consultation – planned for 2022 – which will also set out, in greater detail, the NBHS' application in practice, including in respect of non-domestic buildings.

In parallel with development of the New Build Heat Standard, we are reviewing energy standards set through building regulations, to deliver further improvements in building energy performance. This will include very high levels of building fabric performance in our new homes, avoiding the need for costly retrofit in the future, contributing towards removing poor energy efficiency as a driver of fuel poverty, and making homes more affordable to heat.

This will mean that where a building warrant is applied for from 2024, new buildings must use zero emissions heating as the primary heating source and meet significantly higher energy efficiency standards. In addition, the Shared Policy Programme sets out explicit support for Passivhaus and equivalent standards.

For new public sector buildings, we have developed the Net Zero Carbon Public Buildings Standard, working with the Scottish Futures Trust and other public sector partners. This new standard, published in March 2021, is being progressively applied to new build and major refurbishment projects across

the public sector. The voluntary Standard has been adopted by Scottish Ministers and we are working with our wider public sector partners to provide practical support for the application of the Standard to projects, helping public sector bodies to meet their commitments to reach net zero. This will feed into work to introduce regulation and mandatory standards across the non-domestic sector more widely from 2023-25 onwards.

To lead by example, all new homes delivered by Registered Social Landlords and local authorities will be zero emissions by 2026.

This will mean accelerating the introduction of zero emissions heating systems ahead of the 2024 regulations coming into force and making greater use of offsite construction in the social rented sector to deliver high-quality and energy-efficient homes.

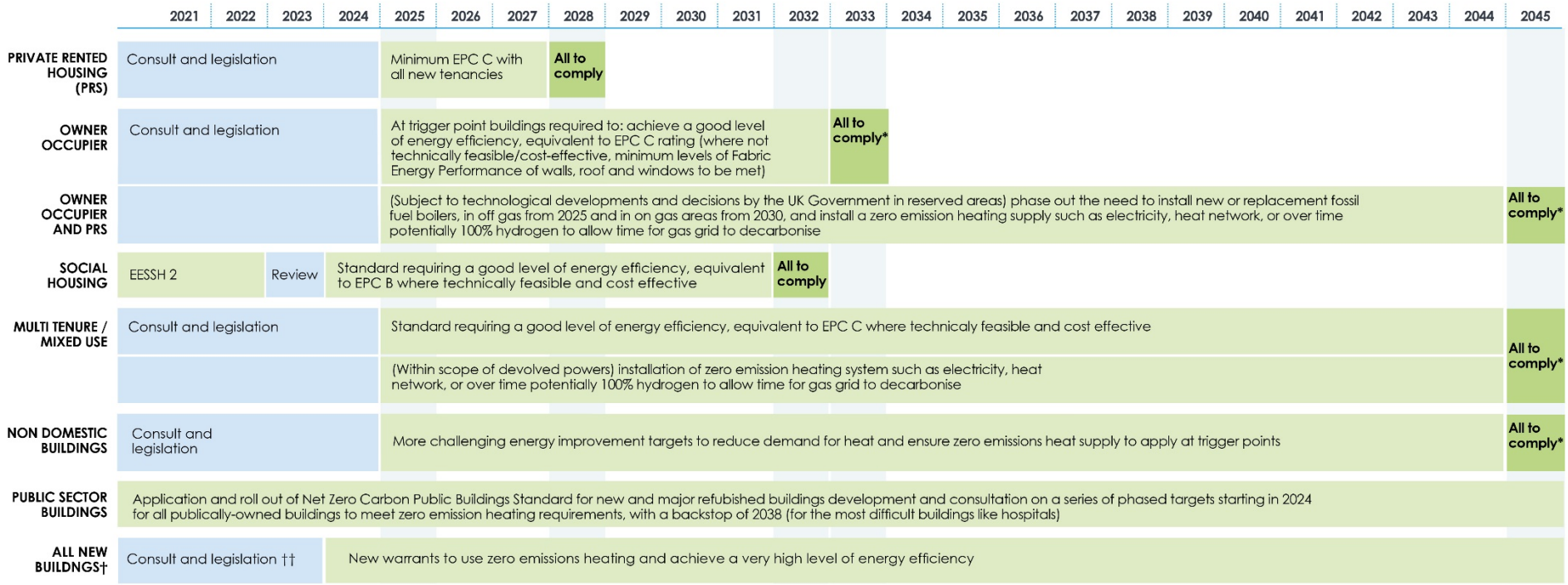
Summary of action we will take:

99. Develop and bring into force the 2024 New Build Zero Emissions from Heat Standard, requiring all new buildings to have zero direct emissions heating systems.
100. Review energy standards within current building regulations to deliver further improvement in energy efficiency and emissions reductions in new buildings in 2021 and 2024.
101. Work with wider public sector partners to support the application of the Net Zero Carbon Public Buildings standard that was published in March 2021, and work to introduce regulation across the non-domestic sector more widely from 2023-25 onwards.

UK-Wide regulation

We know that introducing regulation to require changes to the way in which our buildings are heated will impact on the current operation of the heating market, which is currently dominated by fossil fuel (high emission) heating systems. Whilst regulating for emissions, heat and energy efficiency are largely devolved matters, the regulation of energy markets, fossil fuels, consumer protection and competition are reserved to the UK Government. As such, there is a risk that in exercising devolved powers we cut across into areas that are reserved to the UK Government. Given that the UK Government faces the same challenge to decarbonise heat in buildings that we face, we will engage with them ahead of introducing new legislation – as has also been recommended by respondents to the consultation – to secure agreement on changes that are necessary to the energy markets in reserved areas to ensure a just transition to zero emissions heating, or to secure further devolution of the powers needed to make such changes in Scotland.

REGULATORY PROPOSALS AND STANDARDS



* Backstops could be set earlier for example for zones for zero emissions heating.
† All new buildings includes domestic and non-domestic buildings
†† In advance of requiring zero emissions heating, the Scottish Government consulted in July 2021 on an interim change to Building Regulations Standard 6.1.
From 2022 this would reduce the emission target rate for new building, in anticipation of the further tightening in 2024. **consult.gov.scot/local-government-and-communities/building-regulations-energy-standards-review/**

Chapter 9 The Economic Opportunity

Developing Scottish supply chains – the net zero opportunity

Transforming our buildings by making them more energy efficient and converting them to zero emissions has the potential to make a significant economic contribution and represents a sizeable opportunity for Scottish businesses over the next 24 years. The proposals and actions set out in this Strategy aim to provide a clear set of signals to the market, helping to give clarity and confidence to companies to invest for the transition.

Consultation responses supported our view that the heat transition presents significant opportunities across a range of areas, to bolster our supply chain, create new jobs, enable the deployment of low and zero emissions technologies and encourage new entrants to the sector.

The necessary pace of the transition requires a substantial growth in supply chains, particularly in the availability of skilled heating and energy efficiency installers. Consultation responses were clear that investment in workforces is needed ahead of time to ensure that supply chains do not act as a constraint to deployment, or artificially drive-up prices.

This chapter sets out the challenges and opportunities for heat in buildings supply chains in the transition, highlighting the growth opportunities for Scottish businesses and the actions we will take to unlock investment.

Existing Supply Chain

We have a strong foundation on which to build, with the heat and energy efficiency sectors in Scotland currently generating an annual turnover of £2 billion and supporting around 12,500 full-time equivalent jobs servicing today's demand[lxxviii].

However, the construction sector and its supply chains are still recovering from the dual impacts of COVID-19 and EU Exit, presenting specific challenges in the downstream supply of services for heating and energy efficiency installation.

Industry bodies have highlighted a lack availability of skilled staff to meet existing levels of demand before any increased demand arising from the heat in buildings transition is taken into account. This, combined with recent materials shortages and increased prices across the construction sector, sets a challenging context for investment in the heat in buildings supply chain.

Case study: Manufacturing Heat Pumps in Scotland - Mitsubishi Electric Air Conditioning Systems Europe Ltd

Mitsubishi Electric has a long association with Scotland, being based in Livingston since 1979. The Livingston manufacturing campus produces a range of air source heat pump technologies, marketed under Ecodan. The Livingston campus currently operates within a footprint of 54,000 thousand m^2 across 5 separate production sites and employs circa. 1,400 people, with a doubling in the number of employees over the last 6 years.

Figure 10: Image of Mitsubishi plant in Scotland, sourced from Mitsubishi (January 2021)

The opportunity presented by the heat transition will require a further step change in the capability and capacity of supply chains in Scotland; one that needs to begin now to meet the forecast demand.

Economic Opportunities

Overall, we estimate that an additional 16,400 jobs will be supported across the economy in 2030 as a result of investment in the deployment of zero emissions heat[lxxix].

As set out in Chapter 6: Kick Starting Investment in the Transition, it is estimated that the total investment in buildings alone required to meet our net zero targets for buildings will be in the region of £33 billion. This figure does not include the potential opportunities arising from Scottish companies servicing the demand from wider UK and international markets. Through our Supply Chains Development Programme, we will work to maximise the economic opportunities for Scottish based manufacturing businesses from public sector investment.

Based on our estimated deployment pathway, annual investment will need to rise gradually, peaking at around £2-2.5 billion towards the end of the decade.

As set out in the 2021 Programme for Government, we want to see – as a minimum – zero emissions heat installations scale up to provide a total of at least 124,000 systems installed between 2021 and 2026. We recognise that setting medium term credible aspirations for deployment of categories of heating technology can build confidence and support investment across supply chains. We welcome the views submitted in the consultation on the role technology specific milestones could play in ramping up supply chain capacity, and are considering how best to proceed.

Challenges

It's essential that we understand the potential demands on the heat in buildings supply chain to ensure that the availability of skilled labour does not drive-up prices and act as a constraint on the delivery of our ambitions. Equally, it is important that we are well equipped to benefit from the growth in demand for key products, such as heat pumps, by ensuring that manufacturers in Scotland benefit from our investment and that manufacturing sites have access to the necessary skilled workforce.

While the overall impact of the transition is a forecast increase in jobs, the transition will present challenges for traditional, fossil fuel-based jobs, particularly in the gas industry, and it is vital that we have a planned approach to ensure a just transition for these sectors.

In order to ensure that we can proactively design support for workforce investment, we have partnered with Scottish Renewables to undertake a Heat in Buildings Workforce Assessment Project. This will consider the timing of necessary workforce growth and consider the wider context and demand for skills in multifaceted sectors. The report will provide a view on how best to support people transitioning into key sectors, alongside workforce growth through youth employment. A final output from this research will be published in Spring 2022.

In addition to ensuring there is sufficient *capacity* in the supply chain, it is also essential that we ensure the supply chain is *equipped* to deliver high quality services to consumers. In this respect, developing a robust quality assurance framework, and ensuring that the sector is capable of complying with this, represents a key challenge.

Supply Chain Support

We are already delivering valuable, tailored business support to the heat in buildings supply chain through our existing Sustainable Energy Supply Chain programme and our economic development agencies – Highlands and Islands Enterprise, South of Scotland Enterprise, Scottish Enterprise and Scottish Development International.

Sustainable Energy Supply Chain programme

The Sustainable Energy Supply Chain programme is funded by the Scottish Government and administered by Energy Saving Trust. Since 2013 it has provided support and assistance for businesses in Scotland to help them participate fully and effectively in the supply chain for energy efficiency and micro-generation measures and installations. Over 4,000 people have benefited so far from the support provided by the programme.

To augment our existing programme, we will develop a new Heat in Buildings Supply Chain Delivery Plan by Summer 2022, specifically focussed on strengthening the broad supply chains needed to deliver energy efficiency and zero emissions heat in buildings at the pace and scale we need. We will work with industry to co-produce this delivery plan which will:

- Review the supply chain sector support in place, and ensure that measures are introduced to fill any gaps in provision;
- Identify mechanisms to ensure the supply chain is aware of UK and Scottish market stimulation programmes, including Scottish Government funding programmes such as our low-cost loans and cashback;
- Work with the supply chain sector to prepare them for the proposed timetable for introduction of regulatory standards and expected compliance dates, so that it can plan with certainty for delivery to support building owners to meet these standards;
- Set out how the public sector and industry will address barriers and fill gaps identified to deliver our targets, as well as secure the economic benefits in Scotland;

- Identify global opportunities and set out mechanisms for supporting export potential, and consider requirement for inward investment;
- Include a specific focus on developing local supply chains, attracting inward investment, and securing local jobs, particularly in our islands and remote communities;
- Identify the support needed for training and skills development, specifically for those in remote rural and island areas.

Working with industry

We recognise the significance of the heat in buildings opportunity for the construction industry and will continue to work with our partners and industry through existing forums such as the Construction Leadership Group.

However, the heat in buildings transition will be a joint endeavour between government, industry and civic Scotland. It is essential that we deliver the transition through a broad partnership involving key stakeholders working towards specific goals.

Throughout 2020/2021, we have been working with the heat pump industry to explore the potential for Heat Pump Sector Deal for Scotland. This would be a new process of engagement between Government and industry, working to unlock the necessary growth in the supply chain.

In June, the independently chaired Heat Pump Sector Deal Expert Advisory Group published a detailed interim report offering views across a range of important issues for the heat pump sector. The group is now finalising its recommendations.

We will respond to these recommendations at the earliest possible opportunity, and also consider whether or not such a model might be relevant in other parts of the heat in buildings supply chain.

Exporting our capabilities

Building strong and competitive Scottish supply chains will not only be critical to unlocking the high-volume delivery required later in the decade but also offers the potential to compete in markets outside of Scotland. Our ambitious net zero targets and well-developed supply chain will present opportunities to generate exports earnings from overseas markets through utilising our expertise, technology and skills.

We will work with our enterprise agencies and Scottish Development International to understand more about the potential for generating export growth through Scotland establishing itself as a centre of technical expertise and manufacturing excellence.

Supporting innovation

Innovation, in terms of products, services and business models, will be required to meet our ambitious targets for transforming Scotland's homes and buildings. Fostering and incubating this innovation in Scotland will help to create further economic opportunities for Scottish businesses.

We will work with our partners, including our Enterprise Agencies and the National Manufacturing Institute for Scotland, to create a forward looking and proactive Research and Development community focussed on creating solutions to help decarbonise Scotland's homes and buildings.

As part of our Heat in Buildings Supply Chain Delivery Plan, we will consider the role of technology innovation in the sector and whether there is a need to bring forward a package of support to ensure that innovation continues to play a role in supporting progress towards our targets.

Case study: Innovation in our supply chain- supporting heat decarbonisation through innovative heat batteries.

Sunamp is a Scottish company that designs and manufactures thermal batteries using phase change material that cuts fuel costs and carbon emissions by storing available energy from renewable and non-renewable sources as heat and releasing it to deliver hot water and space heating on demand.

Their heat batteries are up to four times smaller and more efficient than conventional hot water cylinders, freeing up space in homes and saving energy. The patented technology, developed in collaboration with University of Edinburgh, also has wide applications in commercial, industrial and automotive settings.

Scottish Enterprise has supported Sunamp from its inception, with a total of £2m invested to date via R&D and commercialisation grants, and is now working with the company to develop a heat battery factory with the potential to produce 500,000 heat batteries per year for Scottish, UK and export markets. Scottish Government funding has enabled the installation of heat batteries in over 800 Scottish homes. The technology has been eligible for support through Home Energy Scotland loans since 2018, acknowledging the role of thermal storage in the decarbonisation of heat.

Through these made-in-Scotland products, Sunamp aims to transform how we generate, store and use heat in order to make a significant impact on tackling climate change both in Scotland and beyond.

Figure 11: Image of Cupboard Comparison showing space saving using water cylinder. Provided by Sunamp (January 2021)

Defining quality assurance standards

In 2018 we convened a Short Life Working Group to consider the quality assurance requirements needed for energy efficiency and zero emissions heating. The Group made 19 recommendations, including that a relevant quality mark should be adopted for suppliers delivering work through Scottish Government funded schemes. We consulted further on this approach in 2019.

Following consultation feedback, we will adopt the UK PAS 2035/30 standards for our delivery programmes, which will ensure that installers of energy efficiency measures are suitably skilled to undertake required works. These standards cover the entire energy efficiency retrofit process in homes, from initial assessment and design, through to installation and evaluation. We will also consider using the UK government endorsed TrustMark quality assurance framework to ensure compliance with these standards.

TrustMark

TrustMark[lxxx] was established in 2005 and operates within a Master Licence Agreement issued by the UK Government's Department for Business, Energy and Industrial Strategy (BEIS). TrustMark lists 'approved' trades for home improvements and recently in 2019 broadened their remit to include energy efficiency installers.

A TrustMark approved energy efficiency installer must:

- Be certified to the BSI installer standards (PAS 2030) and be compliant with BSI retrofit standards (PAS 2035).
- Comply with the TrustMark Code of Conduct and Customer Charter.

For microgeneration, including heat pumps, we already require measures installed under our schemes to be installed by an MCS certified installer. Together, PAS 2035/30 and MCS standards will ensure that installations are both good quality and fit for purpose.

To ensure these standards are tailored to the needs of the Scottish market, we have developed an installer skills matrix which we propose to integrate within the PAS 2030 and MCS installer standards. This will provide more clarity on the qualifications required, as well as the different routes for achieving these.

This proposal was included in our Consultation on Scottish skills requirements for energy efficiency, zero emissions and low carbon heating systems, microgeneration and heat networks for homes[lxxxi].

We plan to publish our response to this consultation in a separate policy statement in late 2021. This will also include our proposals for quality assurance including quality marks and consumer protection.

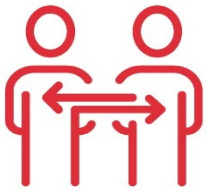
Heat networks are not covered by the PAS 2035/30 or MSC Standards and as complex large-scale infrastructure, it requires its own bespoke skills across design, development, operation and maintenance[lxxxii]. As the heat industry grows there may be opportunities for redeployment from other sectors. We are working with partners to develop at least two accredited training courses, to be delivered by universities and colleges in Scotland. We expect these courses to be on offer from 2021.

As the quality assurance requirements set out above are adopted, and demand for energy efficiency and zero emission heating grows, we will work with partners to ensure that there are sufficient training opportunities

to support career pathways for those who wish to enter the sector. We will also work with our partners to develop new qualifications for energy efficiency and zero emissions heat as may be appropriate. Our approach will be set out in the Heat in Buildings Supply Chain Delivery Plan, as detailed above.

Summary of action we are taking:

102. By Spring 2022 we will publish the results of our Heat in Buildings Workforce Assessment Project in partnership with Scottish Renewables
103. By Summer 2022, we will co-produce a new Heat in Buildings Supply Chain Delivery Plan with the sector. This will specifically focus on the development of energy efficiency and zero emissions heat in the buildings supply chain in Scotland.
104. We will respond to the final recommendations of the Heat Pump Sector Deal Expert Advisory Group following their final publication.
105. We will work with our Enterprise Agencies and Scottish Development International to understand more about the potential for generating export growth through utilising Scotland's technical expertise and manufacturing capabilities.
106. We will adopt the UK PAS 2035/30 standards for our delivery programmes.
107. We will respond to our energy efficiency, zero emissions and low carbon heating systems skills requirements consultation in late 2021.



Chapter 10 Working with the UK Government and Authorities

Transforming our building stock requires a step-change in deployment rates, supported by new policy and updated regulation across a wide range of areas. Some of the powers likely to be needed, such as regulation of building level greenhouse gas emissions, are currently devolved to the Scottish Government, while others, including many aspects of energy policy, remain reserved to the UK Government. As a consequence, we need UK Ministers to take decisions that facilitate Scotland's meeting of pathways set out in the Climate Change Plan Update. Emissions from buildings cannot be reduced to zero in a fair and just way through action only within devolved competence.

We therefore reiterate our call for the UK Government urgently to set out in its Heat and Buildings Strategy and wider net zero policy a clear vision for how the energy markets will be reformed to support decarbonisation of heat and how the UK Government will ensure the costs of the transition are shared equitably. A broad suite of energy market reforms is needed, including taking strategic decisions, and urgent first steps to implement those, on the future role for the gas network, changes to the ways in which policy costs are applied to energy supply and new safeguards put in place to share the cost of the transition fairly across consumers. Energy generators, as well as network and supply companies, need better incentives to deliver zero emissions heat solutions, and investment from the UK Government and the private sector needs to be significantly ramped up.

The changes we need to see in heating are not limited to Scotland. They are critical to delivering the UK's collective climate change commitments. A collaborative approach, which enables Scotland to move faster than the rest of the UK in some areas, will enable new and innovative solutions to be developed. As such it is imperative that the Scottish and UK Governments work together to take action and deliver the change needed.

Below, we set out a clear series of actions that we need and expect the UK Government to take. If the UK Government fails to take these actions, there is significant risk to our ability to achieve the necessary emissions reductions from buildings. The Committee on Climate Change has already highlighted

the need for strong coordination and an effective devolution of powers and responsibility to drive delivery.

New investment, innovation and market mechanisms

We are working with the UK Government on their plans to develop new market led incentives to drive investment and innovation, to accelerate deployment of low and zero emissions heating. These options may include new obligations on market actors, product standards and innovation funding, many of which are likely to cut across reserved and devolved competencies. We welcome progress in this area and look forward to BEIS consulting on options in the near future.

We will work with the UK Government to ensure that any future changes to the heating market support a fair distribution of the costs of transition across building owners, consumers and market actors such as suppliers, retailers and equipment manufacturers. This should be combined with continued protection for vulnerable consumers and the fuel poor. In relation to this, we welcome Ofgem's confirmation this year that it will implement market-wide half-hourly settlement in the mid-2020s, which we agree can support the kinds of flexible consumer options and behaviours that will be an essential part of a decarbonised energy system.

We welcome the UK Government's proposals detailed in their 'Improving home energy performance through lenders' consultation[lxxxiii], making a mandatory requirement for lenders to disclose the average EPC performance of properties on their mortgage portfolio, and for lenders to adopt a voluntary target of meeting a portfolio average of EPC C by 2030. In particular, the scope to make this target mandatory, could help drive change if insufficient action is undertaken.

Decarbonised heat within the wider energy system

Heat demand is a major part of the energy system in Scotland and the UK. Making good decisions for heat means considering the consequences and the opportunities for other energy sectors. For example, to deliver zero emissions heat across Scotland's building stock, we need to ensure appropriate supplies of low carbon energy and appropriate infrastructure to deliver it. Many of the decisions associated with these wider aspects of our energy system are reserved to the UK Government and it is critical that there is a shared understanding between Scottish and UK Government of the scale and speed of the heat transition, and its wider effects.

We continue to urge the UK Government to take parallel action at the pace needed to help Scotland meet its legislated statutory targets for 2030 and 2045, as recommended by the Climate Change Committee in its 2019 Net Zero Report[lxxxiv].

The UK Government must use its reserved powers over energy markets, prices and consumer protection to support the Scottish Government in exercising its devolved competence to reduce emissions from heating buildings, or it should grant further devolution. Without this action from the UK Government, or further devolution, there is a significant risk that Scotland may not be able to meet its 2030 share of emissions reduction from the buildings sector.

We are calling on the UK Government to accelerate decisions on the role of hydrogen and the future of the gas network, and to ensure relevant regulations are updated in a timely manner to support those decisions. We also see a compelling case for a continued programme of demonstration for hydrogen and funding for Carbon Capture Usage and Storage (CCUS).

We will continue to stress to the UK Government and Ofgem the importance of ensuring that their reserved policy and regulatory decisions support the development of Scotland's renewable electricity pipeline – such as the design of the Contract for Difference scheme and the approach to transmission network charging. These will be critical to ensure that generation capacity is adequate to meet the increasing role of electricity in meeting heat and transport demand across both Scotland and the UK.

Ofgem's statutory obligations need to be updated to reflect its role in enabling the delivery of net zero and interim statutory greenhouse gas emission targets in Scotland and across the UK. This could be achieved through a Strategy and Policy Statement for the Regulator, upon which the UK Government committed to consult during 2021 in its Energy White Paper.

Also during 2021, Ofgem along with the Scottish Government and Scotland's Energy Network Companies agreed a set of 'Principles for the development of Scotland's Gas and Electricity Networks'[lxxxv]. These Principles agree on the important need for network companies and the regulator to recognise and respond to Scotland's faster net zero commitment, and ensure that there is sufficient network investment and growth to deliver on our statutory targets. As part of these principles the Scottish Government has committed to supporting network companies in building the evidence base needed to justify these investment decisions, the costs of which are ultimately paid for through gas and electricity bills.

Affordability and fairness

All four governments in the UK must work constructively together to develop coherent policies and programmes that deliver a fair and just transition for all communities across the UK. We must ensure that the outcomes from the Net Zero Review and any subsequent policy measures at UK level provide the right financial incentives for households and businesses across the UK to

choose energy efficiency and zero emissions heating technologies, whilst supporting the eradication of fuel poverty.

We welcome the UK Government's commitment to publish a Call for Evidence this year to begin a strategic dialogue between government, consumers and industry to establish a framework for affordability and fairness. We await the full Call for Evidence package.

Alongside this Call for Evidence, we will work with the UK Government to consider how best to ensure that all Scottish consumers can benefit from future changes to the energy market proposed in the Energy White Paper. These include ensuring that new business models within the energy sector (such as third party intermediaries) and new frameworks such as opt in (and potentially opt out) supplier switching are designed to meet the needs of all consumers. Any such changes must be undertaken with accessibility as a priority and whilst considering the circumstances of consumers in rural and island locations. In order to facilitate these changes, all households should have access to smart meters as soon as possible regardless of household heating technology or geography.

We urge the UK Government to act on the UK Climate Change Committee's recommendation to rebalance environmental and social obligation costs (levies) on energy bills to reduce the difference in unit costs between gas and electricity, and help to unlock the deployment of low and zero emissions heating.

Some respondents to the draft Heat in Buildings Strategy consultation also called for the disparity in levies between electricity and gas to be addressed, to reduce the price of electricity. The UK Government should progress this work quickly and deliver a fair settlement for energy consumers which accelerates our transition to a net zero economy.

We would also like to see changes to the VAT regime so that all energy efficiency and renewable heat retrofit installations receive a reduced or zero VAT rate. Reducing the VAT rate on retrofit has been shown in other countries to incentivise uptake and helps to reduce the cost for households and businesses who may otherwise struggle to make such an investment.

We will look closely at proposals in the EU to bring natural gas for domestic heating and heating oil into the EU Emissions Trading System, as a mechanism to drive investment to reduce emissions, and consider whether these proposals are suitable and workable in a UK context, working with the UK Government and other devolved administrations as part of the proposed review of the scope of the new UK Emissions Trading Scheme (ETS). We will work with the UK Government and other devolved administrations within the UK ETS Authority to consider the UK's proposed commitment to explore expanding the UK ETS to the two thirds of UK emissions not currently covered

by the scheme, whilst carefully considering any potential just transition impacts to ensure that we secure the benefits in carbon terms whilst avoiding any detriment to fuel poverty.

Regulation of the gas system

We are seeking urgent clarification from the UK Government on the full implications of its proposal to amend the Gas Act 1986 to prevent extension of the gas grid to new developments.

These proposals will help to support the implementation of our New Build Heat Standard in 2024. In addition, we are seeking clarification from the UK Government on how future enforcement of, or amendments to, the Gas Act may also help ensure that existing buildings in Scotland are able to comply with any new zero emissions heat standards introduced within our competence.

We also urge the UK Government to expedite commitments in the Energy White Paper to 'review the overarching market framework set out in the Gas Act', including gas quality standards to enable the widest range of gases to be used to decarbonise heat, and the Domestic Load Connection Allowance.

Heat network customer protection

We have asked the UK Government to ensure that legislation creates powers for the Scottish Government to appoint a regulator of its choosing, to enforce both UK-wide heat network consumer protection and the Scottish regulatory framework being introduced by the Heat Networks (Scotland) Act. This should include new powers for Scottish Ministers to extend the remit of Ofgem, in relation to heat networks only, so that Ofgem can act in this capacity if desired by Scottish Ministers.

Hydrogen-ready boilers

We are asking that, should evidence and decisions on the gas grid support a significant role for hydrogen in heating, and should they prove affordable, the UK Government revise product standards for gas boilers, requiring them to be hydrogen-ready, and to work with the Scottish Government on this and the subsequent regulation of such appliances. We welcome the recent UK Government commitment to consult later this year on encouraging or requiring new gas boilers to be hydrogen-ready by 2026, and will work with the UK Government on this assessment, ensuring that the interests of Scottish consumers and our regulatory and policy landscapes are taken into account.

Bioenergy

As set out in the draft Heat in Buildings Strategy consultation, we see a limited role for bioenergy in heating, in line with advice from the UK's Climate Change Committee. We recognise there may be a small number of buildings for which bioenergy, in particular bio heating oil, bioLPG and biomass, may represent the only practicable option for heat decarbonisation.

Following the publication of the Bioenergy Update in March 2021, we have established an internal Bioenergy Working Group, and are in the process of establishing an Expert Panel to support this group, to consider and identify the most appropriate and sustainable use of bioenergy resources within Scotland. This will inform a Bioenergy Action Plan which we will publish in 2023.

We continue to urge the UK Government to work with the Scottish Government and key stakeholders to explore the role for different bioenergy fuels in buildings where alternatives are limited and as appropriate, develop sustainability and other appropriate criteria for these forms of bioenergy. Enforcing these criteria alongside the Scottish Government's wider approach to regulation of heat in buildings may require UK legislation or devolution of specific powers to Scotland.

Schemes that operate across Great Britain ("GB wide schemes")

As a result of our sustained investment since 2009, Scotland has been successful in leveraging significant additional investment from GB-wide funding programmes, such as the Energy Company Obligation (ECO) and the Renewable Heat Incentive (RHI).

As supported by respondents to the consultation, the Scottish Government will continue to seek to maximise the impact of GB wide funding, to support faster progress with decarbonisation of heating systems and continued progress in improving energy efficiency, addressing one of the drivers of fuel poverty.

Energy Company Obligation

The Energy White Paper indicates that the Energy Company Obligation scheme will continue beyond 2022. The Scottish Government will continue to seek to maximise the impact of this funding in reducing energy bills for fuel poor households and enabling increased progress with decarbonisation of heating systems.

We urge the UK Government to review levy funding for the Energy Company Obligation and the Warm Home Discount and work with Scottish Ministers so that these can be brought together into a single Combined Levy to establish

a single, flexible Scottish Fuel Poverty scheme, as provided for in the Scotland Act. This will support low-income households with higher energy costs, and help fund necessary energy efficiency improvements and the switch to zero emissions heating.

Green Gas Support Scheme

The UK Government Green Gas Support Scheme will run for four years from Autumn 2021. The scheme will support biomethane injection into the gas grid, which is expected to contribute 21.6 $MtCO_2e$ of carbon savings over the lifetime of the scheme. The scheme will be funded via a Green Gas Levy and we urge the UK Government to prioritise the transition of the levy from a per meter point design to a volumetric mechanism.

We therefore call on the UK Government to:

- take parallel action across reserved areas at the pace needed to help Scotland meet its statutory targets for 2030 and 2045;
- clarify the full implications of its proposal to amend the Gas Act 1986 to prevent extension of the gas grid to new developments. These proposals will help to support the implementation of our New Build Heat Standard in 2024;
- clarify how future enforcement of, or amendments to, the Gas Act can help to ensure that existing buildings in Scotland are able to comply with any new zero emissions heat standards introduced within our competence;
- work with us to identify and develop options for new market mechanisms to drive investment, innovation and deployment of low and zero emissions heating;
- work with us to ensure a fair distribution of the costs of the transition and to put in place the right financial incentives for households and businesses;
- accelerate decisions on the role of hydrogen and the future of the gas network, and expedite updates to relevant regulations;
- amend Ofgem's statutory obligations to include a duty to enable delivery of statutory greenhouse gas emission targets across all administrations in the UK reflecting the principles agreed this year between Scottish Government and the energy networks sector;
- ensure that legislation creates powers for the Scottish Government to appoint a regulator of its choosing, to enforce both UK-wide heat network consumer protection and the Scottish regulatory framework being introduced by the Heat Networks (Scotland) Act;

- work with us on product standards for gas boilers, for example requiring them to be hydrogen-ready;
- progress the consultation on enabling or requiring hydrogen-ready boilers;
- rebalance environmental and social obligation costs on energy bills to help unlock deployment and ensure a fair settlement for consumers;
- ensure that new frameworks within the energy supply market (such as opt in switching) are designed so as to allow all consumers to benefit;
- amend the VAT regime so that all energy efficiency and renewable heat retrofit installations receive a reduced or zero VAT rate;
- work with the devolved administrations under the proposed review of the new UK Emissions Trading Scheme, to consider how it could drive investment to reduce heat emissions;
- explore the role for bioenergy in heating, and for different bioenergy fuels in buildings and, as appropriate, develop sustainability and other appropriate criteria;
- review levy funding for the Energy Company Obligation and the Warm Home Discount and work with Scottish Ministers to bring these together into a single Combined Levy to establish a single, flexible Scottish Fuel Poverty scheme; and
- prioritise the transition of the Green Gas Levy to a volumetric mechanism.

Chapter 11 Monitoring, Evaluation and Future Decision Making

Monitoring and Evaluation

In order to ensure we are on track to achieve our long-term vision and track progress towards milestones, we will be monitoring and evaluating delivery. Monitoring and evaluation will allow us to adapt and flex our approach where necessary.

As well as looking at outputs, including policy and programme interventions, we will be monitoring and measuring outcomes and capturing the impact the transition to warmer, greener and more efficient homes and buildings has on Scotland's people, businesses and communities.

A clear majority of respondents to the consultation expressed their agreement for the development of a monitoring and evaluation framework for the Heat in Buildings Strategy, which we will publish in due course, setting out:

- a comprehensive framework for monitoring progress against the objectives set in this Strategy covering homes, work places, public sector buildings and other non-domestic buildings. As the consultation suggested, we will aim to create a framework that is robust, independent, thorough and long term;
- a range of output and outcome indicators, linked to our outcomes (Chapter 2), to inform an annual statement of progress, taking account of the Climate Change Plan monitoring framework, as well as the monitoring and evaluation requirements for Fuel Poverty within the Fuel Poverty (Targets, Definition and Strategy) Act 2019.

We will build in evaluation to our delivery programmes, such as Warmer Homes Scotland, Area Based Schemes, the replacement to the Low Carbon Infrastructure Transition Programme and CARES, to ensure lessons are learned and inform future approaches and rollout.

Our work should be based on and driven by clear evidence and data. As such, we will be reviewing available data, identifying where any gaps exist and where we can draw on existing evidence, ensuring we have the most accurate baseline for our building stock. We will also curate exemplars of excellence and best practice, to inform future decisions on targets, regulations and delivery, as well as project and programme design.

It will be important that our Heat in Buildings Strategy stays current and reflects the latest thinking and developments in the UK, Europe and elsewhere in the world. As such, we will review the strategy in the mid-2020s, making any adjustments required and setting out more detailed actions to accelerate and drive progress through the second half of the decade to 2030.

Future Decision Making

Reflecting the expansion in our investment and delivery programmes we are refreshing our governance arrangements to provide appropriate oversight and strategic direction. We will continue to draw advice from stakeholders and advisors through a variety of channels, building on our productive External Advisory Group. This group is made up of a wide range of stakeholders representing different interests, including energy networks, consumers, supply chains and delivery partners.

Transforming Scotland's homes, workplaces and community buildings is a shared endeavour. We set out earlier the importance of working with individuals and communities to secure this transition in a way that works with, and for, people. Local government will be a key partner in achieving delivery on the ground. We will continue to work with COSLA to strengthen and integrate governance arrangements on heat and energy efficiency, to ensure effective delivery over the long term.

One of the most important things we have heard to date is the need for certainty. This is needed to allow people and businesses to plan and phase investments and work. We know that uncertainty arising from changing priorities, targets and milestones, as well as support mechanisms, can slow down progress.

In order to overcome this, we have already committed to a 5-year capital budget for our heat and energy efficiency programmes and will, during this Parliament, bring forward regulations across energy efficiency and heating systems, setting the long-term statutory requirements for buildings to become zero emissions.

Summary of action we are taking:

108. We will publish a monitoring and evaluation framework in due course.
109. We will build in evaluation to our delivery programmes, to ensure lessons are learned and inform future approaches and rollout.
110. We will refresh our governance arrangements to provide appropriate oversight and strategic direction as we expand our investment and delivery.
111. We will continue to work with COSLA to strengthen and integrate governance arrangements on heat and energy efficiency to ensure effective delivery over the long term.

Annex A Summary of Actions

1. We are undertaking analysis to better understand the extent to which building-level storage technologies (including heat batteries, electric batteries and thermal storage cylinders) could help to support the widespread deployment of zero emissions heating in domestic properties by reducing household energy costs when installed alongside zero emissions heat systems.
2. We will publish a review of evidence on heat pumps in Scotland alongside this Strategy. The review found no evidence to suggest that heat pumps could not operate effectively in Scotland, but also found that correct specification and sizing of heat pumps and heat emitters are critical determinants of heat pump performance.
3. We will further improve the non-domestic buildings evidence base, including work to develop a database of this part of the building stock in Scotland.
4. We are undertaking further modelling and analysis to better understand the role of energy efficiency in unlocking the deployment of zero emission heating systems, which will inform future delivery and regulatory programmes.
5. We are keeping the role of hybrid systems under active review as the evidence base develops.
6. We have been working with BEIS to understand the cooling needs of our building stock, and this will inform future policy development in this area.
7. Building on the Climate Change Public Engagement Strategy, we are developing a bespoke public engagement strategy for heat in buildings.
8. Over the next year, we will establish a virtual National Public Energy Agency to bring new coordination and leadership to our existing advice and delivery programmes, including informing the public on the changes needed and providing expert advice. We will then scale up this approach within a single dedicated physical Agency by September 2025.
9. We will respond to the Climate Assembly's recommendations and take action on them.
10. We will continue to ensure our schemes easy to identify and navigate, helping to build trust and awareness.
11. We will identify and support disengaged and vulnerable groups, ensuring that support is available to all of society. We will give due regard to equalities, and will not unfairly discriminate based on any protected characteristics.

12. We are investing in growing our advice services so that they continue to meet people's needs. This includes improving our digital presence and continuing to provide in-depth support for installing zero emissions heating systems.
13. We will expand our Green Homes and Business Networks so that people can learn from other householders, businesses and organisations who have already made the transition to warmer, greener and more efficient buildings.
14. We have published here a set of guiding principles to underpin our commitment that no one is left behind in the heat transition, ensuring we only take forward actions where they are found to have no detrimental impact on fuel poverty rates, unless additional mitigating measures can also be put in place.
15. We continue to build the evidence base on the interactions between our fuel poverty and climate commitments, and are applying that knowledge to our policy design and to our programmes, mitigating any risk of unintended consequences, and tracking progress and learning by doing in order to adjust immediately where unintended consequences nevertheless arise.
16. We continue to prioritise energy efficiency measures through our delivery programmes, as this will enable the roll-out of zero emissions heating, as well as help to tackle fuel poverty.
17. We are taking action through our delivery programmes to maximise the number of homes with households in fuel poverty achieving a level of energy efficiency equivalent to EPC C by 2030 and EPC B by 2040.
18. We are taking a zero emissions first approach in our delivery programmes and will phase out funding for fossil fuel heating systems by 2024, where it is not detrimental to our fuel poverty objectives. We have already phased out oil and LPG boilers from Warmer Homes Scotland, Area Based Schemes or Home Energy Scotland Loans.
19. We will continue to work with energy retailers to ensure households have access to the right tariffs, that tariffs tailored to zero emissions heating systems are available, and continue to press for customers with pre-payment meters to access similar tariffs to direct debit customers.
20. We are conducting analysis to consider the distributional impacts of decarbonising our homes and buildings and to further quantify the impact of making our homes and buildings warmer, greener and more efficient for those on lower incomes and those in or at risk of fuel poverty.

21. We are working closely with consumer groups to continuously monitor and identify potential issues and take mitigating action where they arise.
22. We are working with the Energy Consumers Commission, Consumer Scotland and a range of Scottish consumer representative organisations to ensure that issues of consumer detriment are identified and addressed, focussing on consumer understanding, accessibility, costs, redress, and support for vulnerable consumers.
23. We are exploring how to integrate heat decarbonisation into community climate action initiatives such as Climate Action Towns and Community Climate Action Hubs.
24. We are supporting communities to work together to address, and champion, heat decarbonisation through the new CARES programme and are working to understand further the models and solutions most appropriate for communities in Scotland.
25. We are also working in collaboration with the Scottish Cities Alliance and the seven cities on the opportunities to accelerate activity at pace to ensure the Scottish cities cumulatively play their role in meeting our heat decarbonisation and energy efficiency ambitions whilst maximising the economic and well-being outcomes across cities.
26. We have commissioned a full evaluation of the LHEES pilot programme.
27. We are working with local authority partners and wider stakeholders to finalise the LHEES methodology and guidance, with a view to introducing legislation to establish LHEES on a statutory basis so that Strategies and Delivery Plans are in place for all local authority areas by the end of 2023.
28. We will use LHEES Delivery Plans to pinpoint areas for targeted intervention and early, low-regrets measures.
29. Through National Planning Framework 4 we will look for opportunities to strengthen planning policy to enable and encourage energy efficiency and low and zero emissions heating.
30. We have included low and zero emissions heat networks and micro-renewable technologies in the review programme for Permitted Development Rights.
31. We will work with stakeholders, including Historic Environment Scotland, to develop approaches and solutions to transition Scotland's historic buildings to low and zero emissions heating while respecting and preserving the special characteristics of our buildings and places
32. We will publish an Energy Strategy and Just Transition Plan for consultation in Spring 2022, taking into account the whole system

issues raised by our net zero climate targets and the wider needs of our energy system.

33. We will continue to conduct analysis to understand generation and network requirements, in terms of the scale and location of the demand that heat electrification could bring.
34. We continue to press the UK Government to continue to provide the support needed to develop Scotland's renewable electricity pipeline needed to meet a decarbonised future for heat.
35. We are commissioning work to explore the potential network investment costs of the heat transition for Scotland, to provide greater clarity on the likely range of costs, and likely impacts on consumers, including those in, or at risk of, fuel poverty and help inform further decision-making.
36. We will conduct research into the role of energy storage in buildings in reducing consumer costs.
37. We will continue our Heat Electrification Strategic Partnership with Scotland's electricity network operators, and use this forum to ensure that the upgrades required are delivered when and where they are needed and that the LHEES framework can inform this.
38. We will investigate demonstration projects through our delivery programmes strategic priorities to allow us to model real time network impact of heat pump deployment, smart-enablement, energy storage and demand management.
39. We continue to engage Ofgem and work with them in line with the Principles we agreed for development of Scotland's Gas and Electricity Networks to ensure that Scottish Government targets and ambitions as set out in this final Strategy are fully considered as part of decisions on network investment.
40. We will continue to work with SGN and National Grid Gas Transmission to provide evidence on the role gas decarbonisation can play in meeting our targets, and a timeline for resolving uncertainties.
41. In cooperation with stakeholders, including network companies, local authority and delivery partners, we are working to identify strategic areas most likely to have access to hydrogen in the future, and high-potential areas for the use of hydrogen for heat in Scotland
42. We will work with the UK Government to ensure that the Green Gas Support Scheme meets the needs of Scotland. We will monitor the impact of the Green Gas Levy on end user costs, especially in relation to fuel poverty levels, and we will continue to urge the UK Government to make progress on the transition to a volumetric mechanism for the levy.

43. We will work with the Gas Network Operators and the UK Government to explore opportunities for increasing the blend of hydrogen in the gas network.
44. We will urge the UK Government to expedite progress on amending regulations and legislation to support hydrogen blending, accelerate decisions on the role of 100% hydrogen in the gas grid and to enable our ambition to maximise volumes of renewable hydrogen in our energy system as quickly as possible.
45. We will continue to support the development of evidence on the potential role of hydrogen in decarbonising heat including demonstration projects such as H100.
46. We will continue to press the UK Government to progress the consultation on enabling and requiring hydrogen-ready boilers.
47. We will support initial action by SGN on their pathway to converting large segments of their network to 100% hydrogen, wherever those actions are commensurate with keeping options open and limiting consumer costs.
48. Consult on the use of sections 44 and 63 of the Climate Change (Scotland) Act 2009 to introduce mandatory connections for large and publicly-owned buildings in next Parliament.
49. Consult on how new powers under section 15 of the Non-Domestic Rates (Scotland) Act 2020 could be used to de-risk investment and drive net zero behaviour, including connections to heat networks.
50. Develop a set of common technical standards for development and operation of heat networks across Great Britain which will help support the development of skills and the sector's supply chain.
51. Include heat networks in our ongoing programme of reviewing Permitted Development Rights (PDR) and, subject to the findings, lay Regulations.
52. We will consult in 2021-2022 on whether the need for further regulatory measures or support measures to increase the utilisation of waste or surplus heat, for example from Energy from Waste plants, to be supplied and/or used through heat networks.
53. Publish a Heat Network Investment Prospectus during the next financial year that will demonstrate the size and location of heat network opportunities across Scotland, as well as information on the decarbonisation requirements of existing networks in Scotland.
54. We will launch the Heat Network Pre-Capital Support Unit in 2021, expanding on the previous role of the Heat Network Partnership to provide enhanced support to the public and private sector in developing a pipeline for delivery.
55. We will establish a single dedicated National Public Energy Agency by September 2025 to accelerate transformational change in how

we heat and use energy in homes and buildings, aid public understanding and awareness, and coordinate delivery of investment.

56. We will expand existing delivery programmes to focus on accelerating deployment over the next 5 years against the following four strategic priorities: (1) those least able to pay, (2) investing in strategic technologies in low or no regrets areas, (3) showcasing Net Zero Leadership and share learning through early adoption in key areas of focus and (4) investing in innovation and demonstration to drive forward competitive advantage.
57. We will offer interest-free loans for heat and energy efficiency technologies via Home Energy Scotland, with an additional commitment to run our cashback scheme (or a grant replacement) until at least 2023 to help households overcome the upfront cost of taking early action.
58. We have increased the cashback available to home and building owners on measures to improve the efficiency of buildings and install zero emissions heating, and to replace in 2022/23 with a grant scheme to support energy efficiency and zero emissions heat improvements.
59. We will undertake user research and market testing to understand what further products may be needed to support and smooth the consumer journey, including the option for a self-funded pre- and post-installation service.
60. We are evaluating the area-based equity loans pilot and will consider any future equity scheme in light of this evaluation.
61. We will continue delivery of energy efficiency investment to support fuel poor households in order to make homes warmer and easier to heat and to reduce the impact of any increased running costs from zero emissions systems, including recognising the distinct challenges faced by island, rural and remote communities, and seek to improve targeting so that we can reach more households in fuel poverty.
62. We will continue our investment in Area Based Schemes, extending their reach to support higher numbers of households in or at risk of fuel poverty. We will continue to develop ABS as a 'whole house' retrofit programme for fuel poor households based upon a 'zero emissions first' approach to improving heating and making more effective use of micro-generation.
63. We will procure a new, enhanced successor to Warmer Homes Scotland following expiry of the current contract in September 2022, which will provide support for fuel poor households at its heart, and embed increased support for zero emissions heating, adopting a zero emissions first approach.

64. We will support SME businesses via Business Energy Scotland (BES) (from April 2022 – currently Energy Efficiency Business Support (EEBS)) advice service and SME Loans to take action to reduce their energy use and cut emissions.
65. We will continue to run our SME loan cashback schemes (or grant replacement) until at least 2023 to help reduce the cost of investing. In order to understand the support and investment SME businesses need to secure an accelerated rollout of energy efficiency and zero emission heating systems, we will consult and work with the sector to develop new policies and proposals for SMEs.
66. We will expand our Green Homes and Business Networks, so that SMEs can learn from people, businesses and organisations who have already made the transition to warmer, greener and more efficient buildings.
67. Throughout the next 4 years, we will continue to support communities to take the necessarily steps to transform their assets so that they are ready for a net zero Scotland through our new CARES programme, delivered by Local Energy Scotland.
68. We will set out further detail on how we will support island communities in our forthcoming Islands Energy Strategy.
69. We will invest at least £200 million in the new Scottish Green Public Sector Estate Scheme launched in June 2021 – drawing together capital grants, loans, and other support mechanisms – as the main government-led capital funding mechanism to support leadership for energy efficiency and heat decarbonisation right across the public sector.
70. We are developing a successor programme to LCITP as the primary mechanism for deploying zero emissions heat at scale, co-ordinating our support for the roll-out of heat networks and heat decarbonisation infrastructure. To achieve this, we will invest £400 million over the next five years in large-scale heat decarbonisation infrastructure.
71. We commit to extending the Social Housing Net Zero Heat Fund until 2026 and investing £200 million of support to further accelerate the decarbonisation of our social housing stock, and considering how this financial support will work in tandem with our other programmes, such as ABS, to deliver a comprehensive approach to decarbonising our social housing stock.
72. We continue to support affordable housing providers who wish to install zero emissions heating systems in homes through our Affordable Housing Supply Programme, ahead of regulatory requirements in 2024.

73. We will continue to align Scottish Government delivery programmes and advice services with UK Government funding to ensure these target need and are cost-effective.
74. We continue to press the UK Government to provide more funding for energy efficiency and zero emissions heating via GB-wide schemes, including working with UK Government to identify a more progressive way of funding these programmes.
75. We will establish a new Green Heat Finance Taskforce in late 2021 to provide advice and recommendations to Scottish Government on potential new financing models and routes to market.
76. We will set out options for future financing and delivery in 2023 ahead of the introduction of proposed regulations (see Chapter 8), with a view to implementing these new mechanisms from 2025 where applicable and allowed within our legislative competence.
77. We will work with the UK Government to develop new market led incentives to drive delivery of low and zero emissions heating.
78. We will continue to undertake market and consumer research while working with industry and the regulator to understand when and where 'Heat as a Service' could be used in Scotland and consider different routes for bringing this concept to market.
79. We will consider how our local tax and charging powers, such as council tax and non-domestic rates, could be used to incentivise or encourage the retrofit of buildings, alongside our planned approach to regulation. We will commission further analysis to identify potential options, to be implemented from the middle of the decade where appropriate, subject to consultation and public engagement.
80. We will work with the UK Government as it progresses its call for evidence on affordability and fairness to ensure that any reforms do not disadvantage Scottish consumers and that they fit with and enable delivery of our more ambitious climate targets.
81. We will publish research on the balance of consumer levies on electricity and gas bills.
82. We will introduce primary legislation, subject to consultation and to limits on devolved competence, that provides the regulatory framework for zero emissions heating and energy efficiency, and underpinning powers to support this transition and the wider Heat in Buildings programme.
83. We will engage with the UK Government ahead of introducing this legislation to secure agreement on changes that are necessary to the energy markets in reserved areas, to ensure a just transition to zero emissions heating, or securing further devolution of the powers needed to make such changes in Scotland.

84. We will introduce any regulation in a way that promotes a just transition and which considers the health and wellbeing of Scotland's people.
85. We will also ensure sufficient periods of transition to allow people and the market to adjust and prepare for new standards coming into force.
86. We will tailor our delivery support to set out a clear path of support and advice for those affected, and will also take account of the recommendations of the Green Heat Finance Taskforce ahead of the introduction of regulations (as set out in Chapter 7), so that there is a clear and identified range of financial support mechanisms available to support building owners to meet proposed regulatory obligations.
87. We are consulting on a reformed domestic EPC assessment process to better align with wider net zero objectives whilst meeting our fuel poverty obligations during summer 2021, and will publish an analysis of this consultation in early 2022.
88. We will bring forward proposals for regulating, to the extent that devolved powers allow, to require the installation of zero or very near zero emissions heat in existing buildings from 2025, with a backstop of 2045.
89. We will phase out the need to install new or replacement fossil fuel boilers, in off gas from 2025 and in on gas areas from 2030, subject to technological developments and decisions by the UK Government in reserved areas.
90. We will bring forward regulations requiring domestic private rented sector properties to achieve an equivalent to EPC C by 2028.
91. We will consult on detailed proposals to introduce regulations from 2023-2025, to require owner occupied private homes to meet a minimum level of energy efficiency (equivalent to EPC C) by 2033.
92. We will aim to bring forward the review of EESSH2 with a view to strengthen and realign the current standard to meet wider net zero requirements.
93. We will consult on introducing regulation to require mixed tenure, multiple ownership and mixed-use buildings such as tenements to reach a good level of energy efficiency (equivalent to EPC C where technically feasible and cost effective), and to install a zero emissions heating supply by 2040-45, including provisions on ensuring cooperation between building owners to carry out works and recover costs.
94. We will work with Historic Environment Scotland to consider what specific support may be needed within regulations for buildings designated as listed or in conservation areas.

95. Develop and introduce strengthened regulation for non-domestic buildings, to ensure they reduce demand for heat where feasible and install a zero emissions heating supply; and launch a consultation on these proposals in 2022.
96. For the public sector, we will develop and agree through consultation a series of phased targets starting in 2024, with the most difficult buildings like hospitals being decarbonised by 2038, and for all publicly-owned buildings to meet zero emission heating requirements, with a backstop of 2038.
97. We will develop guidance for minor refurbishments and heating system replacements in the public sector.
98. We will consult on area or zone-based triggers to complement those at the individual property level.
99. Develop and bring into force the 2024 New Build Zero Emissions from Heat Standard, requiring all new buildings to have zero direct emissions heating systems.
100. Review energy standards within current building regulations to deliver further improvement in energy efficiency and emissions reductions in new buildings in 2021 and 2024.
101. Work with wider public sector partners to support the application of the Net Zero Carbon Public Buildings standard that was published in March 2021, and work to introduce regulation across the non-domestic sector more widely from 2023-25 onwards.
102. By Spring 2022 we will publish the results of our Heat in Buildings Workforce Assessment Project in partnership with Scottish Renewables
103. By Summer 2022, we will co-produce a new Heat in Buildings Supply Chain Delivery Plan with the sector. This will specifically focus on the development of energy efficiency and zero emissions heat in the buildings supply chain in Scotland.
104. We will respond to the final recommendations of the Heat Pump Sector Deal Expert Advisory Group following their final publication.
105. We will work with our Enterprise Agencies and Scottish Development International to understand more about the potential for generating export growth through utilising Scotland's technical expertise and manufacturing capabilities.
106. We will adopt the UK PAS 2035/30 standards for our delivery programmes.
107. We will respond to our energy efficiency, zero emissions and low carbon heating systems skills requirements consultation in late 2021.

108. We will publish a monitoring and evaluation framework in due course.
109. We will build in evaluation to our delivery programmes, to ensure lessons are learned and inform future approaches and rollout.
110. We will refresh our governance arrangements to provide appropriate oversight and strategic direction as we expand our investment and delivery.
111. We will continue to work with COSLA to strengthen and integrate governance arrangements on heat and energy efficiency to ensure effective delivery over the long term.

Annex B Summary of Scottish Government Delivery Programmes

Domestic advice and support

Supporting domestic consumers – Home Energy Scotland - Delivered by Energy Saving Trust.

Free, independent advice on energy efficiency and low and zero emission heating. Also acts as a referral scheme for the Warmer Homes Scotland scheme. Portal for accessing number of support packages including HES loan, PRS loan, cash back incentives, equity loan pilot and Warmer Homes Scotland.

The commitment to provide a free and impartial advice service was set out in the EES route map in May 2018 and has formed part of the foundations of our work on energy efficiency from the outset. Advice is provided independently and free of charge and considers all aspects of energy efficiency including energy saving, keeping warm at home, reducing energy bills, renewable energy, lowering carbon footprint and income maximisation. The advice helps those in, or at risk of falling into fuel poverty and the service acts as the referral mechanism for customers to access grants, tailored advice and practical delivery measures, such as Warmer Homes Scotland. Over the next 5 years research will help inform us of the best form of service to provide, taking account of likely increases in demand, changes in the way people access information, and reacting to changes to government grant and loan schemes to help people achieve their aims.

	Home Energy Scotland Loans and Cashback	**Equity Loan for energy efficiency and essential repairs**	**Private Rented Sector Loan (PRS)**
	We have introduced a further incentive via the Home Energy Scotland (HES) Loan Scheme by offering owner occupiers up to 75% in cashback (capped at £7,500) towards the installation of renewable heating systems. This incentive makes the uptake of renewable heating more attractive. We also offer cashback on HES loans for energy efficiency measures, and have increased the rate of this incentive from 25% to 40%.	In January 2017, the Scottish Government launched an area-based pilot equity loan scheme to assist homeowners to carry out energy efficiency interventions and essential repairs in participating council areas. The pilot will remain open to those who qualify until March 2021. The equity loan pilot allows homeowners (including private landlords in certain circumstances) to borrow up to £40,000 from the Scottish Government for eligible works (energy efficiency measures, heat loss reduction measures and repairs) and repay when the home is sold or ownership transferred. The loan is available for properties in Council Tax bands A to C or for properties in all council tax bands where the owner is in receipt of qualifying benefits. An evaluation of this pilot is currently being undertaken and any future equity	This Scottish Government funded loan helps landlords improve the energy efficiency of properties and meet minimum standards. The loan is administered by Home Energy Scotland (HES) It is available to registered private landlords for improvements to domestic dwellings which are listed on the Scottish Landlord Register, are not a holiday or second home, are registerec with the Scottish Assessors Association as paying domestic council tax rates, are not under construction, and are currently occupied by at least one tenant or will have at least one tenant in place within 30 days of the payment of the loan. It provides loans of up to £15,000 split across works including solid wall insulation heating systems, gas

		scheme will be considered in light of the realignment of Energy Efficient Scotland with the Government's decarbonisation of heat and climate change targets to support the focus on low and zero emissions heat options moving forward.	connection, some glazing, insulated doors, some roof insulation, and some loft, floc and cavity wall insulation. Funding is also available for up to two home renewable systems per property, worth up to £17,500 in total, plus an energy storage system up to a max of £6,000.
SME advice and support	**Supporting SMEs – Business Energy Scotland (BES) – Delivered by Energy Saving Trust from April 2022** (Currently Energy Efficiency Business Support (EEBS) Service – Delivered by Zero Waste Scotland until March 2022) Free advice and support package available to Scottish SMEs to help improve energy efficiency and decarbonise heating in their premises. Substantial, free advice and support offering to Scottish SMEs to help them understand how to improve energy efficiency and decarbonise heating in their premises. The two main offers of support are an initial energy opportunities assessment which identifies where and how energy savings can be made and a comprehensive report including a potential site visit to highlight possible improvements, further advice and potential sources of funding. **SME Loan Scheme and Cashback** Once SMEs have been through the assessment, they can then apply for interest free SME loans up to a maximum of £100,000 with cashback incentives also available.		

We have introduced a further incentive via the SME Loan Scheme by offering SMEs up to 75% in cashback towards the installation of renewable heating systems (capped at £10,000). This incentive makes the uptake of renewable heating more attractive to SMEs.

We also offer cashback on SME Loans for energy efficiency measures, and have increased the rate of this incentive from 15% to 30% (capped at £10,000). We will continue to explore further opportunities to incentivise our offer to SMEs and are actively considering what kind of advice, support and financial offering would help us deliver at scale to this sector of the economy.

In total SMEs can apply for a maximum of £20,000 in cashback grant funding.

Supporting communities

The Community and Renewable Energy Scheme (CARES) - Delivered by the Energy Saving Trust under the Scottish Government Local Energy Scotland Brand

Advice and funding support to community groups and other eligible organisations seeking to explore their renewable energy options.

CARES was established in 2010 as a successor to the Scottish and Community Household Renewable Initiative. Since its inception, CARES has offered funding of over £51 million and supported over 600 projects to develop, own or take a stake in local renewable energy projects across Scotland. CARES provides advice and funding support to community groups and other eligible organisations seeking to explore their renewable energy options. CARES, delivered under the Scottish Government brand of Local Energy Scotland, aims to support the delivery of Scottish Government community and locally owned energy targets and its shared ownership ambition.

CARES provides support to those developing local and community renewable projects with Local

Energy Scotland's network of Development Officers providing free, expert and impartial advice to community groups and organisations throughout project development. Loan and grant funding can be accessed through development funding of up to £150,000 with support including feasibility studies, design, and consenting of new renewable or innovation projects.

Enablement grant funding of up to £25,000 can be accessed in order to fund non-capital aspects of projects. This includes start-up costs of feasibility studies, community consultations and other preparatory costs. Funding can also be accessed through frequent CARES funding calls which run throughout the year.

In the post COVID-19 green recovery period and beyond, decarbonisation will be a key driver for community led activity at a local level. Recognising this, CARES will incorporate a greater degree of flexibility and increased partnership working in offering tailored packages of advice and support to projects focusing on decarbonisation and supporting community involvement in Local Heat and Energy Efficiency Strategies (LHEES).

The current CARES contract, running for a 4 year period from April 2021 – March 2025 will have a greater focus in supporting heat decarbonisation in local communities and supporting community engagement in Local Heat and Energy Efficiency Strategies (LHEES). In giving greater focus and priority to decarbonisation, particularly heat decarbonisation, this will act as the driver for community led action.

The contract supports delivery of our 2030 2GW community and locally owned energy targets as well as our shared ownership ambition of at least half of all newly consented commercial renewable energy projects having an element of shared ownership with communities.

Additional funding is also available to support some of Scotland's most remote and rural off-grid

communities to upgrade their energy systems making them more resilient and sustainable for the future,

Supporting fuel poor areas

Energy Efficient Scotland – Area Based Schemes (ABS) - Delivered via Local Authorities

Provide energy efficiency improvements to households in or at risk of fuel poverty living in their own home or a private rented property, leveraging Energy Company Obligation (ECO) finance and private investment. ABS is effective in delivering large numbers of improvements to mixed tenure, multi-occupancy properties (e.g. flats, terraces, council estates/projects).

Since 2013 the Scottish Government has invested over £373 million in our Area Based Schemes (ABS), providing energy efficiency and zero emissions heating measures to over 100,000 households across Scotland. Local schemes are designed and delivered by councils, in conjunction with energy companies and local delivery partners, providing improvements to households in or at risk of fuel poverty living in their own home or a private rented property. ABS projects prioritise help for 'harder to treat properties' requiring solid wall or complex cavity wall insulation. ABS funding also helps leverage Energy Company Obligation (ECO) finance and private investment to maximise reductions in CO2 emissions and cost savings for households. Taking advantage of economies of scale and shared costs, ABS has proved extremely cost-effective in delivering large numbers of improvements to mixed-tenure, multi-occupancy properties (e.g. flats, terraces, council estates/projects).

Over the next five years our ABS funding will continue to target areas with higher numbers of households in or at risk of fuel poverty, prioritising those in greatest need (i.e. the least energy efficient properties). We will build upon the expertise and experience of local delivery partners in delivering projects that benefit entire communities, reflecting local needs and conditions. As well as

prioritising insulation measures - fabric first - we will deliver more 'whole house' retrofits to fuel poor households as ABS projects. We will adopt a 'zero carbon first' approach in improving heating systems and ensure that households continue to benefit from warmer homes, and reduced energy costs and CO2 emissions.

Supporting fuel poor households

Warmer Homes Scotland - Delivered by Warmworks Scotland LLP on behalf of the Scottish Government

Warmer Homes Scotland is a fuel poverty scheme which enables eligible households to receive energy efficiency and heating improvements. Primarily, it delivers heating measures including an increasing number of heat pumps.

We have invested more than £124 million in our Warmer Homes Scotland Scheme since its launch in September 2015 helping more than 20,000 households throughout Scotland. Warmer Homes Scotland is the Scottish Government's flagship fuel poverty scheme which offers each eligible household a bespoke package of measures that takes account of both the needs of the property and the needs of the household. Through Warmer Homes Scotland we have made available low and zero emissions heating systems and new insulation measures particularly beneficial to rural and remote communities not served by the gas grid. These include: air source heat pumps, micro-wind, micro-hydro, micro-CHP (Combined Heat and Power) systems and 'Q-Bot' - an underfloor insulation system installed by a robot. Additional enabling measures introduced under the scheme include extraction of failed cavity wall insulation, asbestos removal and the installation of fuel storage tanks and low energy lighting. Currently, households who receive improvements through the scheme are expected to save over £300 per year on their energy bills. It also supports skills development and training opportunities in the supply chain through the Employment and Skills plan embedded into the contract. Since Warmer Homes Scotland commenced in September 2015 there has been a steady increase in the number of air source heat pumps being installed. Changes have recently

been made to the scheme to further incentivise zero emissions heating measures to help meet Scotland's climate change targets. The Warmer Homes Scotland contract is due to end in September 2022. The successor to Warmer Homes Scotland will have heat decarbonisation and energy efficiency at the heart of the offer to help fuel poor households reduce their fuel bills through the installation of energy efficiency measures and zero emissions heating options.

Public sector support

Public Sector Non-Domestic Energy Efficiency (NDEE) Framework

Energy Performance Contract Framework designed for larger public sector projects. Improvement measures are financed via savings. NDEE Support Unit supports project delivery.

The Scottish Government launched the Non-Domestic Public Sector Energy Efficiency (NDEE) Framework and Project Support Unit in March 2016.

This framework has been designed to support Public and Third Sector organisations procure Energy Efficiency retrofit work. The economies of scale and standardised approach offered by the pan-public sector framework is attractive to both the public sector and private sector offering both better solutions and better value for money. 32 projects are currently in progress or have completed using the framework across Local Authority, University, College and NHS estates.

Projects at tender stage and beyond have, to date, committed circa. £27.5 million towards energy conservation measures providing 'guaranteed' annual energy cost savings of circa £3.3 million, and future use of the framework will support decarbonisation of the public sector estate.

Salix

Interest free loan funding from Scottish Government is available to the public sector in Scotland through Salix Finance to improve the energy efficiency of existing buildings, with over £50 million invested since 2008.

Multi-sector support

Low Carbon Infrastructure Transition Programme

Delivered in house with support from Project Partners including Scottish Futures Trust and Zero Waste Scotland.

Provides a range of support, from expert advice to financial support, to assist the development and delivery of private, public and community low-carbon projects across the country. Includes capital support for heat networks and support for social landlords for heat decarbonisation.

Launched in 2015, the Low Carbon Infrastructure Transition Programme (LCITP) is a collaborative partnership led by the Scottish Government, working with Scottish Enterprise, Highlands and Islands Enterprise, Scottish Futures Trust and Zero Waste Scotland. The Programme aims to stimulate commercial interest and investment and maximize Scotland's vast potential in the low carbon sector whilst contributing to the positive progress of the Scottish Government in reducing Scotland's greenhouse gas emissions.

Since 2015, the LCITP has awarded over £58 million of grant funding to 28 low carbon demonstration projects across Scotland which encourage replications and wider uptake of innovative renewable technologies.

This intervention, which is co-funded by the European Regional Development Fund, focuses on supporting the acceleration of low carbon infrastructure projects across the public, private and community sectors to develop investment grade business cases to help projects secure public and private capital finance. The LCITP and District Heating Loan Fund together have invested around £66 million in renewable heat since 2013. The LCITP will draw to a close in 2021, with a new fund launched shortly after.

District Heating Loan Fund - Delivered by the Energy Saving Trust

Loan fund for district heating projects open to local authorities, social landlords, SMEs and ESCOs with fewer than 250 employees. Depending on loan value may require co-investment.

Annex C Summary of GB Wide Funding for Heat and Energy Efficiency

Domestic Renewable Heat Incentive (RHI)

The GB wide Domestic Renewable Heat Incentive (Domestic RHI) is a UK Government financial incentive to promote the use of renewable heat.

Successful applicants to the scheme receive quarterly payments for seven years for the amount of clean, green renewable heat their system is estimated to produce.

The scheme opened in April 2014, and will run until 31 March 2022, having been extended by a year with only minor changes to the scheme. These include allowing those who commissioned their plant on or after 1 March 2019 to apply for accreditation up until the closure of the scheme, rather than within 12 months of the commissioning date.

Currently 19% of installations accredited under the Domestic RHI are located in Scotland.

Non-Domestic Renewable Heat Incentive (NDRHI)

The GB wide Non-Domestic Renewable Heat Incentive (RHI) is a UK government environmental programme that provides financial incentives to increase the uptake of renewable heat by businesses, the public sector and non-profit organisations.

Eligible installations receive quarterly payments over 20 years based on the amount of heat generated. The scheme closed to new applications on 31 March 2021.

While some changes were made prior to the closure of the scheme with regards to tariff guarantees and with some commissioning deadlines extended beyond the closure, no payments will be made beyond 31 March 2041. Applicants who commission now that the scheme has closed will receive a shorter payment lifetime.

As with the Domestic scheme, 19% of installations accredited under the Non-Domestic RHI are located in Scotland, more than its pro-rata share.

Green Gas Support Scheme

The UK Government Green Gas Support Scheme will run for four years from autumn 2021. The scheme will support biomethane injection in to the gas grid and is expected to contribute 21.6MtCO2e of carbon savings over its lifetime. The scheme is to be funded via a Green Gas Levy.

Energy Company Obligation (ECO)

The Energy Company Obligation (ECO) is a UK Government programme to deliver energy efficiency measures across Great Britain (GB). The legislation obliges eligible energy providers to deliver energy efficiency improvements to help fuel poor households to reduce the cost of heating their homes (HHCRO or the Help to Heat Cost Reduction Obligation). ECO is funded through a charge on the energy bills of all customers of regulated energy companies with over 250,000 customers.

As of December 2020, BEIS report that 287,996 households in Scotland have received ECO finance (13.4% of total ECO measures in GB); an average of 118 measures per 1000 households (compared to 81 in Wales and 77 in England). The council with the highest reported number of ECO measures per household (number of measures per 1000 households) in GB is Comhairle nan Eilean Siar (Western Isles council).

Warm Home Discount (WHD)

Warm Home Discount is a GB wide scheme that provides an annual one-off discount on electricity bills paid by energy companies between September and March. Currently the Warm Home Discount is worth £140 and the costs of the discount are applied to all household bills.

In 2017-18 Scottish households represented around 10.9% of WHD recipients compared with 9.2% of all households in Great Britain. Two groups are eligible: a 'core' group where the household receives the Guarantee Credit element of Pension Credit (income under £167.25 for a single pensioner or £255.25 for a couple); and a 'broader' group on a low income as set by suppliers - some households receiving income related benefits must be included on a 'first come, first serve basis'.

9.6% of all rebates were to the overall 'core' group in Scotland (117,020 Scottish households) and 12.5% to the 'broader' group (121,425 Scottish households).

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