Scottish buildings must be decarbonised by 2045. In practice this means replacing the heating systems of nearly 90% of Scotland’s 2.5 million homes that are currently heated with fossil fuels. This is no small challenge. But addressing this challenge swiftly, with clear and well-orchestrated regulations and supports, will capture the significant benefits for Scotland’s households and economy. Reducing energy use and reliance on imports and increasing investment and jobs in clean energy sectors are clear economic wins. Perhaps the most compelling benefits, however, are offered to households in the form of healthy homes, lower bills and massively reduced exposure to highly volatile fossil fuel prices.

The recent Heat in Buildings Strategy sets the framework to move the building stock to zero emissions by 2045. It uses two parallel strands of regulation. First, all homes should achieve a minimum energy performance, defined as Energy Performance Certificate (EPC) C, by 2033. This will be combined with a reform of the EPC metrics. Alongside this, fossil fuel boilers are to be phased out, with no new or replacement fossil fuel boilers in homes off the gas grid from 2025 and on the gas grid from 2030. Multi-occupancy buildings have a more flexible timeline until 2040–45 to comply, due to legal and practical complexities. The Strategy also sets out important interim targets, notably for the vast majority of off-grid and one million on-grid homes to be fully decarbonised by 2030.

Focussing on the owner-occupied stock, this paper adds detail, and identifies and fills gaps in the Strategy. We aim to inform and support the Scottish Government in the process of developing the detail of a fair, proportionate and robust framework. The Scottish Government can only act within devolved powers, so coordination with the UK Government is necessary. Illustrated below are key elements of both Scottish and UK strategies.

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**Key features of Scottish and UK heat decarbonisation strategies for owner occupied housing**

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**Zero emissions heating systems installs per year**

- 200 k/yr
- 2.6 TWh
- 6 TWh
- 500 k/yr

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**Zero emissions heating systems installs per year**

- Thermal energy from networks
- Total zero emissions heating systems installs per year

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**MARKET**

- Scottish Heat in Buildings Strategy target
- Scottish Heat in Buildings Strategy regulation
- UK Heat and Buildings Strategy element
Scotland’s commitment to fully decarbonise by 2045 leaves just over 20 years to deploy solutions suitable for every home. The emphasis is, however, on early action this decade. Clarity on the decarbonised destination for each home allows clear and timely large-scale planning, certainty and clearer guidance for homeowners, and foresight for the relevant industries and supply chains to scale up. All of this contributes to a more efficient transition.

The Heat in buildings Strategy identifies no-regrets technologies, but uncertainties remain around the costs for some homes on mains gas, the possibility of 100% green hydrogen for home heating and areas to be served by district heating systems. One huge area of uncertainty is removed by the growing body of evidence that confirms that hydrogen will not be appropriate or available at a large scale for home heating. The high cost of green hydrogen means it will be prioritised for use where there is no suitable alternative, particularly in industry and transport. This limits the main uncertainties that would hinder swift, no-regrets decision making to ones of timing:

- Identification of zones for district heating and possible hydrogen networks in a very small number of areas, which should be addressed by swift area-based planning and robust Local Heat and Energy Efficiency Strategies
- Reduction of the whole life cost of heat pumps through long-term rebalancing of electricity and gas prices to reduce the risk of high running costs and support for upfront investment and market development to reduce capital expenditure costs.

### Fabric first

The proposals in this report aim to ensure that the implementation of regulations is well timed and staged to ensure that fabric improvements are completed before heating systems are changed. They are also sensitive to different building types, some of which face higher barriers, and the need to decarbonise higher carbon fuels first. The ‘fabric first’ approach matters because:

- Improved fabric efficiency reduces the size of the heating system needed to effectively heat the home, reducing initial installation and ongoing running costs.
- A high level of fabric energy efficiency is the best protection against fuel poverty and future energy price shocks.
- Higher fabric energy efficiency allows for heat to be delivered through lower water temperatures in heating systems, which makes the heating system more efficient.
- Reducing demand before electrifying heating allows new loads to be absorbed by the electricity system more efficiently, reducing generation and grid costs to all.
- Fabric energy efficiency allows homes to retain heat for longer periods, increasing comfort and resilience in the event of outages or emergencies, and allowing electric heating schedules to be moved to off peak times.

### Primary solutions for Scottish homes will be:

- **Low temperature heat pump**: Fabric energy efficiency with low temperature heat pump and heat storage providing heat for existing wet heat distribution system (with possible radiator upgrades), including hot water.
- **District or group heating**: Fabric energy efficiency and connection to district or group heating system (or a dedicated hydrogen network in a small number of areas) delivering heat and hot water from a variety of decarbonised sources.
- **Passive or highly efficient**: Very high fabric efficiency with little or no space heating demand, or small properties with low heat demand. Heat (where needed) and hot water delivered directly through direct electric or storage heaters.

**Two secondary solutions** – heating with a high temperature heat pump or biomass boiler – may have a role in a smaller number of homes.
Fabric efficiency standard

The fabric efficiency standard should use an energy demand metric in kWh/m²/yr, based on the energy demand for space heating and cooling only, not the existing EPC rating. This metric is independent of the wider energy system, and the fuels and heating systems used. This will require a reform of EPC ratings to redefine the A to G bandings for fabric efficiency. Improvements to the assessment methodology are also recommended.

The new minimum standard should be set at the level of fabric efficiency necessary, in conjunction with heat distribution system, to ensure heat can be delivered at lower flow temperatures and that the heating schedule can be operated flexibly without compromising comfort. This standard provides safeguards and cost reductions to households and the grid.

Introduced from 2025, the regulations should require compliance at all practical and useful trigger points in the building lifecycle – sale, major renovation, conversion and extension. The backstop date for all homes to meet the standard should be brought forward from 2033 to 2030. This aligns with the start of the phase out of mains gas boilers and is important to ensure that households benefit from fabric improvements before replacing heating systems.

Fossil fuel boiler phase-out

The natural point to exchange a fossil-based heating system for a zero emissions one is when a boiler is replaced. A phase-out of fossil fuel boilers at replacement - from 2025 for off-gas and 2030 for on-gas boilers - should be implemented through inclusion of new requirements in the existing system of Building Standards that govern boiler characteristics. This will require a new system for registration of boiler characteristics and installations.

Given the average lifetime of a boiler is 15 years, the natural replacement cycle will not be enough to deliver on the target for around half of the stock to be decarbonised by 2030. An additional trigger point of sale of a home with a boiler over a notional end of life (eg over 10 years old) should be considered from 2025 alongside significant incentives and signalling.

Backstop dates to end the use of fossil fuels for home heating are also needed in homes on the mains gas network by 2045, and those not on the network by 2030 or 2035. These backstops can be implemented through restrictions on the sale, purchase or use of such fuels, and ultimately a phase-out of the mains gas grid implemented in conjunction with the UK Government. There is no guarantee in the regulations that all homes off the gas grid will meet the fabric efficiency standard before they exchange their boiler. Signalling, incentives and a scrappage scheme could encourage early retirement of boilers, coupled with fabric efficiency improvements before 2030.

Tenements and flats

There are significant legal and organisational barriers for homeowners in multi-occupancy buildings, which the Scottish Government is taking steps to address. Renovation measures for more complex buildings are often more efficiently planned and carried out at building level rather than individual unit, so a whole building renovation plan is needed. This allows for consideration of shared solutions like communal heating and external wall insulation. The fabric efficiency standard and the requirement to install zero emissions heating should therefore apply to the whole building not just individual units. They may also be applied simultaneously, not in sequence. The use of individual unit trigger points is not as useful for mixed-tenure buildings as they do not align the interests of the various stakeholders, nor do they require whole building works. Whole building triggers, like major renovation, area-based triggers and firm backstop dates are therefore more suitable.
Key actors and enablers

The regulatory framework will rely on a coherent, integrated and well-resourced infrastructure of enabling and enforcement. Regulations must be practical to monitor and enforce making use of existing mechanisms where possible. Local authorities have a central role in both enabling and checking compliance with the standards. Local authorities are the nearest point of contact with a public authority for the majority of residents and are responsible for the key functions of building control, local area planning for heat networks and multi-occupancy building compliance. Adequate resourcing is critically important, both financially and in terms of information and training.

Regulations must be supported by a framework of practical and financial support, ensuring a complete matrix of provision for all household situations, illustrated below. Safeguards should also ensure that, in switching from low-cost gas to higher cost electricity, fuel poor households do not face higher bills. An effective quality assurance framework, to protect homeowners and their investments in their homes, is also needed.

Illustration of the key elements of the enabling framework around regulations

- National messaging
- Renovation plan
- End-to-end household support
- Regulatory framework for decarbonising heat
- Scaled up
- Suitable for all
- Incentivises exceeding regulations
- Quality standards
- Redress
- Installer certification

Area-based plans and zoning, resourced enforcement, data access, monitoring of impact, skills and supply chain development.

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Gaps remaining

Despite the proposals made in this paper, gaps can still be identified in the framework. All opportunities should be taken to fill them, through incentives, signals and in the information provided to households.

- There are insufficient measures to deliver zero emissions heating take up early enough in the 2020s.
- The regulatory framework alone will not ensure that fabric efficiency is improved in off-gas homes before fossil boilers are replaced from 2025.
- Incentives to achieve higher fabric efficiency than set out by the minimum standard are missing. In many cases this will be cost-effective and offer non-energy benefits.
- There is a need to ensure gas connections are removed and cooking with gas is phased out.
- Support is needed for households to adopt demand side flexibility measures, which may fall outside of the fabric standard and the boiler replacement requirements.
- The regulations contain no signals or incentives for improvements to the efficiency and flexibility of heating systems in homes currently heated by electricity.

Next steps

Essential, immediate next steps to enable the continued development and introduction of the regulations include:

- Reform of EPC metrics and presentation.
- Assessment of the stock to define a fabric energy performance standard that allows homes to be heated using low flow temperatures and with flexible heating schedules.
- Establishment of mandatory heating system installer certification and registration.
- Area-based planning to identify areas for heat networks.
- Legal reform to ease the process of renovating for owners in tenements and flats, accompanied by building specific or zonal plans and backstop dates.
- Swift assessment of gaps in the enabling framework including communications and public engagement, practical support for renovations and provision of funding, and steps to fill these gaps.
SUMMARY OF RECOMMENDATIONS
Taking the starting point of the Scottish Heat in Buildings Strategy, the recommendations in this report are addressed to the Scottish Government unless otherwise noted.

Remove uncertainty to ensure all actions are no regrets
• Identify areas suitable for district heating and potential dedicated hydrogen networks this year to allow unhindered roll out of individual solutions in all other areas.
• Ensure a full matrix of practical and financial support suitable for all households.
• Communicate standards early to allow timely planning by households and the supply chain.
• UK Government to reform energy pricing to improve the economics of electrification.

Phase out fossil fuels for heating through incentives, triggers and backstops
• Phase out replacement fossil fuel boilers through performance or prescriptive standard for new heating systems in Building Regulations. Introduce the phase-out from 2025 for off-gas homes and 2030 for on-gas homes, and from 2025 when a home with a boiler beyond its notional end of life is sold.
• Deliver full phase-out through restrictions on the sale, purchase or use of fossil fuels for heating, and phase-out of the gas grid. Backstop dates for the end of the use of fossil fuels in heating for off-gas homes by 2030 or 2035 and for on-gas homes by 2045.
• Scottish Government to work with the UK Government to align dates and approaches to overcome barriers due to devolved power limitations. UK Government to bring forward the start of the off-gas phase-out from 2026 to 2025 and introduce a phase-out of mains gas boilers from 2030.
• UK Government and regulator to come forward with a plan for the decommissioning of the gas grid as soon as possible.
• Introduce incentives to replace off-gas boilers coming to an end of their life, combined with achieving the fabric energy efficiency standard, before 2030.
• Use signalling and incentives to drive replacement of on and off-gas boilers before 2030.

Enable effective standards through changes to Energy Performance Certificates (EPC) and Standard Assessment Procedure (SAP)
• Reform the metrics used on the Scottish EPC to include a heat demand indicator, an energy use indicator and a carbon emissions indicator to support standards.
• UK Government to implement a range of improvements to the SAP, underpinning EPCs.

Introduce a fabric energy efficiency standard to enable efficient, flexible heating
• Define a new metric for the fabric energy efficiency standard, expressed in kWh/m²/yr.
• Define a minimum standard that ensures homes can be heated more efficiently, through lower flow temperature water, and at flexible times, without compromising comfort.
• Require compliance with the standard from 2025 at the trigger points of sale, major renovation, extension and conversion.
• Bring forward the proposed backstop date for full compliance from 2033 to 2030 to bring into line with the start of the phase out of mains gas boilers.

Enable compliance for more complex, multi-occupancy buildings
• Apply both fabric efficiency and heat standards to the whole building, not just individual units, potentially simultaneously to reduce disruption and administrative burden.
• Use whole building triggers and area-based or archetype-based backstop dates.
• Additional unit-based triggers for whole building assessment and renovation plan.

Utilise existing compliance structures and resource local authorities to enable and enforce
• Implement enforcement through existing conveyancing and building control compliance mechanisms, a new heating system register and use of the EPC register.
• Limit exceptions and enable full compliance.
• Resource local authorities as the main enabling and enforcement body.
The Existing Homes Alliance Scotland is a coalition of housing, environmental, fuel poverty and industry organisations who are working together to end fuel poverty and deliver the transformational change needed to address the climate emergency.

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