



# AFFORDABLE WARMTH: NEXT STEPS FOR CLEAN HEAT IN SCOTLAND

## SUMMARY BRIEFING

Our reliance on oil and gas boilers is driving up energy bills and worsening the climate crisis. In Scotland we can harness our abundant renewable energy to tackle both of these challenges, for a cleaner and brighter future.

Low-carbon solutions like energy efficiency and electric heat pumps can drastically cut homes' carbon emissions, lower energy bills and protect households from unstable fossil fuel prices. Unfortunately, the retrofit of these to homes is far too slow – just 11% have low-carbon heating and half are below recommended levels of energy efficiency, leaving too many struggling to heat cold and draughty homes.

To fix this, the Scottish Government has proposed regulations to increase investment. These are a vital mechanism to meet our climate targets and kick-start the renewal of our housing stock. WWF Scotland has commissioned new research to understand the impact of these proposals on households. We've used this research to develop recommendations to make the transition to cleaner heat fair, affordable and at the pace required to avoid the worst impacts of climate change.

### HOW RADICAL IS CLEAN HEAT?

Scotland isn't alone in moving away from fossil fuel heating and is following the lead of many other European countries. **France** now has over 8.5 million heat pumps and across the EU, annual installations are up 35%. In chilly **Finland**, one in three homes now has a heat pump – they work in all climates! Many countries are using regulations to drive the switch to low-carbon heating – France banned new replacements of oil boilers in June 2022 and in **Holland** new replacements of gas boilers will be banned from 2026.



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# HEATING SOLUTIONS EXPLAINED



## ENERGY EFFICIENCY

Insulation can reduce the heat lost through the external surfaces of a home. It can be laid in lofts, injected into cavity walls or fixed to the inside or outside of solid walls in older properties. Double or secondary glazing reduces heat lost through windows, and sealing gaps around doors, windows and service pipes with draught proofing is very effective at reducing heat loss.



## ELECTRIC HEAT PUMPS

Heat is drawn from the air or ground outside and compressed using electricity to heat up a building. An 'air-source' heat pump requires an external unit (about the size of a washing machine) and an internal unit (slightly smaller than the external unit) which sends heat to radiators and a hot water tank. A correctly installed system will be at least 300% efficient, producing three units of heat for every unit of electricity consumed (compared to fossil boilers which are only around 85% efficient).



## HEAT NETWORKS & COMMUNAL HEATING SYSTEMS

Hot water is piped from a large heat source to several units/homes within a building (known as a 'communal' system) or to multiple buildings ('district heating'). They are particularly suited for large buildings and flats in town and city centres where it may be difficult to fit individual units. They can use heat from almost any kind of source: systems are already heating buildings in Scotland using heat extracted from the River Clyde and from waste water treatment plants using large heat pumps. In the home, boilers are replaced by a similar sized box that takes heat from the network and supplies it to radiators and taps, sometimes without the need for a hot water tank.



## DIRECT ELECTRIC & STORAGE HEATERS

Traditional 'panel' or storage heaters use electricity passing through wires to create heat. They are only 100% efficient, although storage heaters which charge overnight can make use of cheaper overnight electricity. Our research found that heat pumps are cheaper to run and emit less carbon.



## BIOENERGY

Biomass (wood logs, pellets) and biogases made from virgin and waste organic material are sometimes used for home heating. Neither is recommended as a mass solution however, given the importance of bioenergy and the resources used to make it for more valuable uses in industry and transport which are harder to decarbonise. Bioenergy production must be carefully managed to ensure it delivers genuine emissions reductions and does not displace food production.



## WHAT ABOUT HYDROGEN?

In future it may technically be possible to use boilers to burn low carbon hydrogen delivered through existing gas networks (with modification or replacement to make them suitable). Gas network companies and boiler manufacturers heavily promote hydrogen as an alternative to the mass-roll out of heat pumps as a way of capitalising on gas infrastructure already in place.

Hydrogen heating has yet to be fully demonstrated or commercialised, and therefore the evidence on its feasibility and costs remains limited. We commissioned analysis by external experts CAG on its potential in Scotland and they found that if available at all, it's unlikely to be ready until the mid-2030s and is likely to be much more expensive to run than current gas boilers (you can read a full summary here). Using hydrogen to heat homes also risks diverting it from more valuable uses in heavy industry, heavy transport and electricity generation.



# RESEARCH: FINDING THE BEST SOLUTIONS FOR CLEAN HEAT

WWF Scotland commissioned experts from Cambridge Architectural Research (CAR) to explore the practicalities, costs and benefits of low-carbon heat in Scottish homes.

CAR ran detailed energy modelling of ‘typical’ homes designed and scaled to represent the Scottish housing stock. The performance and costs of different combinations of solution in the homes was assessed at hourly intervals across a year, using Scottish climate data. The full research can be accessed online [here](#). The key findings are:

## 1. ELECTRIC HEAT PUMPS ARE THE BEST SOLUTION FOR HOUSES:

they can cut carbon emissions by 90% and can be fitted in almost all types of houses, including smaller and heritage ones. Communal systems like heat networks may be more suitable in flats and tenements, which can install individual heat pumps but face extra challenges. We call on Scottish Government to provide information to households on the potential for such systems in their local area by 2025.

## 2. ENERGY EFFICIENCY HELPS MAKE HEAT PUMPS CHEAPER.

Insulation helps make heat pumps cheaper, pays back quickly, helps reduce the likelihood that radiators need upgrading and reduces risks of fuel poverty. Up to 80% of homes could benefit from low-cost draught proofing and around 50% should improve insulation with moderate cost insulation measures like loft and cavity wall insulation and double-glazing, with average costs of £1,800.

## 3. HEAT PUMPS COULD LOWER ENERGY BILLS IN A MAJORITY OF HOUSES WHEN PROPOSED SCOTTISH GOVERNMENT REGULATIONS ENTER FORCE IN 2025:

the study, using forecasts of future energy prices, finds that all the typical homes with oil boilers and electric storage heaters, and many with gas boilers, make energy bill savings. Future energy prices are very uncertain but policy changes by the UK Government could help ensure that heat pumps are cheaper.

## 4. UPFRONT HEAT PUMP COSTS START AT £4,500 WITH GOVERNMENT GRANT SUPPORT.

Some of these costs are a one off due to the change of heating system and costs are likely to fall as supply chains expand and mature. Costs for air source heat pumps begin at £12,000 according to the study (excluding Scottish Government grants which currently provide up to £7,500 per household, and £9,000 for rural homes). Continuing these grants alongside regulation will be crucial until costs reduce. Grants should also be provided for energy efficiency improvements, and households in fuel poverty should receive fully funded improvements.



# POLICY RECOMMENDATIONS

## SCOTTISH GOVERNMENT PROPOSALS

The *Heat in Buildings Strategy*, proposes regulations that would require action by homeowners and landlords. Exact details are to be consulted on but broadly it is proposed that:

- **Houses must meet a minimum level of energy efficiency from 2025:** when being purchased, rented or undergoing major renovation. All remaining houses must meet this standard by 2033 (2028 for rented properties).
- **No new replacements of coal, oil and LPG boilers from 2025** (houses only): and mains-gas boilers from 2030. Homes replacing these boilers will need to fit low-carbon alternatives.
- **Flats and tenements** and other multi-purpose buildings will need to meet a combined energy efficiency and heating standard by 2045.

The standards are to be enforced through updated Energy Performance Certificates.

To increase the pace of energy efficiency and clean heating installations in homes, the Scottish Government has proposed new regulations requiring investment at key moments such as the purchase of a house.

These proposals are a vital step to close the gap to our climate targets and minimise fuel poverty. WWF analysed the emissions reductions from homes that would be achieved and found that they would exceed our crucial 2030 target by over 50%. Closing this gap will require setting earlier deadlines for action through regulation and this should be done fairly, with households supported with Government grants. We recommend that the Scottish Government:

- 1. Alongside regulation, help households with the upfront costs of heat pump and energy efficiency upgrades:** fuel poor households should receive fully funded upgrades. Upfront grants should be provided to others, at the current level of £7,500 for heat pumps and energy efficiency (with a £1,500 uplift for rural homes). Grant levels should be reduced over time as installation costs fall.
- 2. Increase ambition by requiring earlier action:** Deadlines for improving energy efficiency in all homes should be brought forward to 2030 and some gas boilers should start to be replaced from 2025. We cannot afford further delay.
- 3. Hydrogen for heating should play a minimal role, if at all:** any support to further explore and develop this use of hydrogen should acknowledge the minimal role it is likely to play and must not distract or delay the roll-out of the established solutions we can deploy today.

Rolling out heat pumps and energy efficiency is the best way to minimise fuel poverty without exacerbating the climate crisis. Delivering at greater scale, fairly, will depend on many factors including Scottish and UK Government funding to support households and the ability of supply chains to scale quickly and affordably. Their ability to do so will be aided by clear targets and the certainty of demand that regulation can provide.

## NEXT STEPS

The Scottish Government has committed to consulting on proposals for regulation in 2023 – it is vital that this is done rapidly to give householders and industry clarity about the future and to prepare for rules taking effect from 2025. The investment needed is significant but the right one – to create warm, liveable and climate friendly homes for people in Scotland.

## ABOUT WWF SCOTLAND

WWF is an independent conservation organisation, with over 30 million followers and a global network active in nearly 100 countries. Our mission is to stop the degradation of the planet's natural environment and to build a future in which people live in harmony with nature. In Scotland, we've long campaigned to reduce climate emissions, with a particular focus on energy and agriculture.