MITSUBISHI ELECTRIC

The Mitsubishi Electric Guide to

Delivering Net Zero in Social Housing

Guide

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NET
ZERO

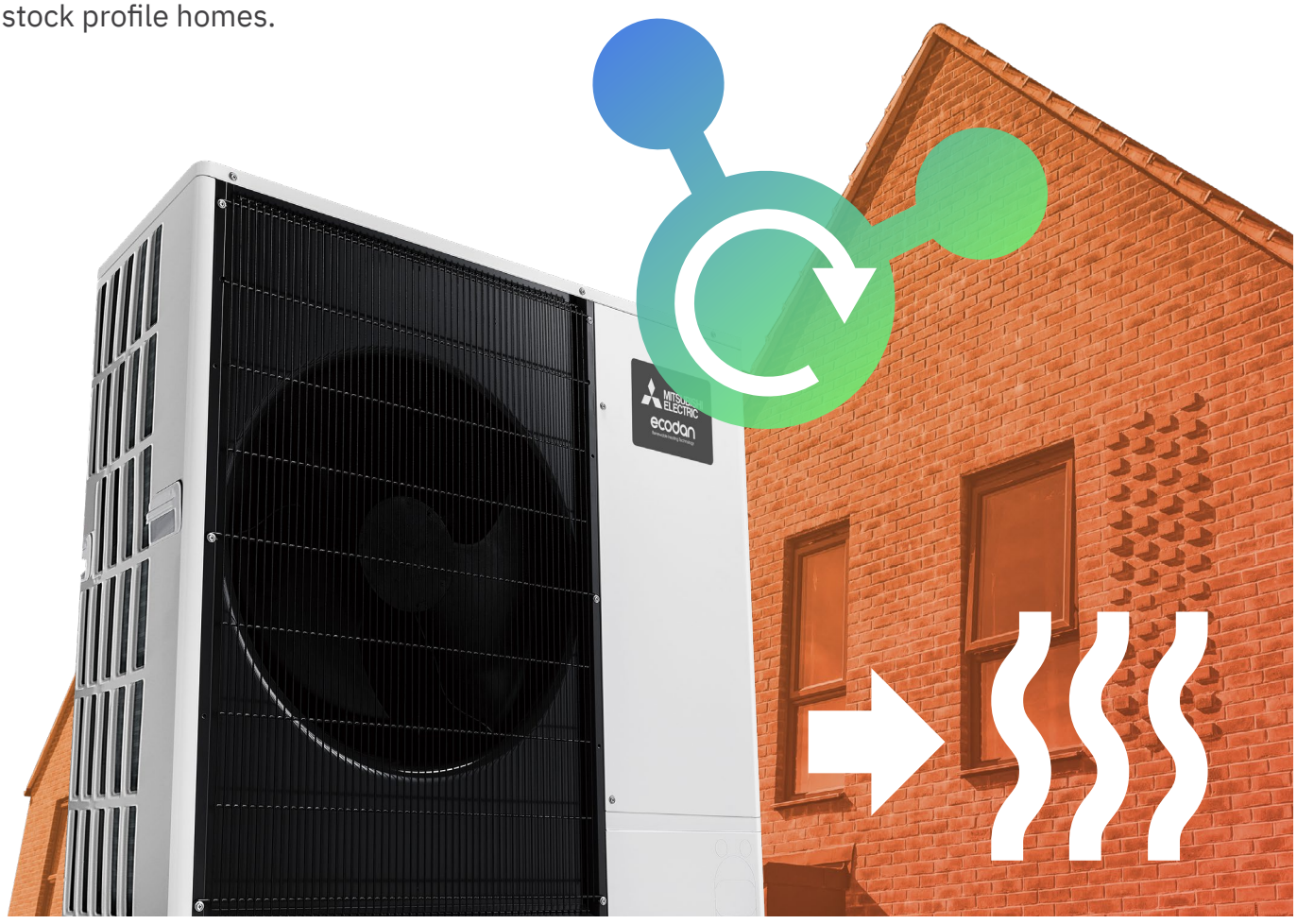
Contents

Introduction

This report considers the challenges and opportunities in delivering net zero in the UK's social housing sector through the decarbonisation of heating systems. It highlights the need for engagement along the supply chain combined with innovative thinking about low-carbon technology such as heat pumps.

Residential heat pumps can help the UK meet its net zero carbon goals while also tackling pressing issues in the social housing sector such as fuel poverty and provision of healthy indoor environments for households.

This Report highlights the experience of **SNG** (Sovereign Network Group), one of the UK's largest housing associations, in its successful application of Ecodan air source heat pumps for its core stock profile homes.



1

Britain’s social housing sector - an opportunity for carbon saving at scale

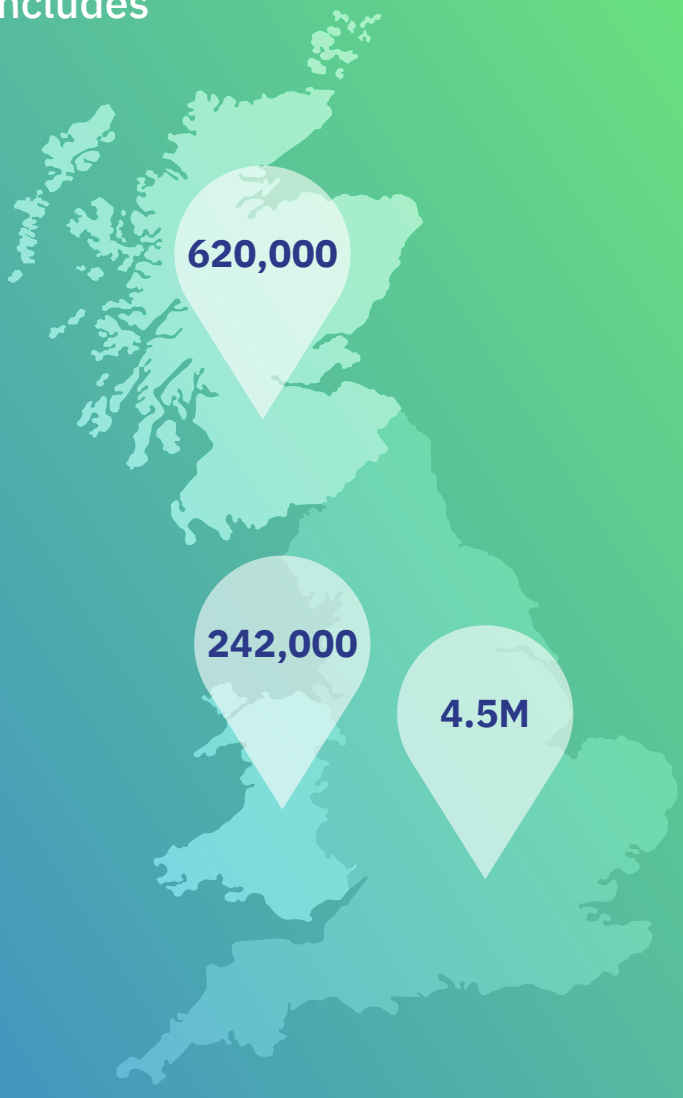
Social housing is defined as homes owned by social landlords that are rented by households at lower rents than in the private sector. Social landlords may be local authorities or private registered providers, which includes housing associations.

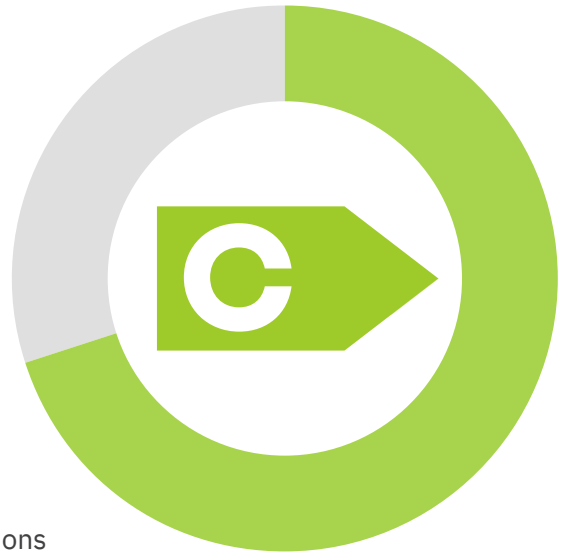
Britain’s social housing sector totals approximately 5.3 Million homes:

England: 4.5 Million

Scotland: 620,000

Wales: 242,000





Social housing providers have been relatively successful in delivering energy efficient homes, with around 70% of social housing stock achieving an Energy Performance Certificate (EPC) C or better.

This compares favourably to the private rented sector where approximately 44% achieve an EPC C rating[4].

Whilst energy efficiency has an impact on the UK's carbon emissions it is only part of the picture. Decarbonisation of heating is a critical goal if the UK is to reach its net zero 2050 target.

This will require removal of fossil fuel (gas, oil, and solid fuel in some cases) heating systems from millions of homes. This is complemented by the government's milestone of 95% clean power by 2030.

The benefit of decarbonisation across social housing is that social landlords can work at scale, delivering speedier results than private individual households.

Another important factor for the social housing sector is energy affordability. Social housing residents are disproportionately affected by fuel poverty, with around **18% of households spending 10% of income on heating**. In some cases this can be higher, for example, the National Housing Federation (NHF), which represents social landlords across the UK, calculates that social housing residents in the least energy efficient homes (with an EPC of G) spend as much as **15.5% of their income on heating bills, which is five times the national average**.

As the NHF states:

> **“Decarbonising home heating and hot water systems will play a crucial role in bringing down energy bills for residents, making heating their homes more affordable and reducing fuel poverty.”**

The UK government has supported the social housing sector’s switch away from fossil fuel heating with the Social Housing Decarbonisation Fund (SHDF), now the Warm Homes: Social Housing Fund (WH:SHF). To date, much of the funding has been associated with improving the fabric performance of homes through improved insulation.

However, several social housing providers are now looking to remove fossil fuels from their housing portfolio, often by retrofitting heat pumps. This not only supports national sustainability targets, but also provides a cost-effective approach to heating and hot water in social housing as well as supporting healthy indoor environments.

2

The benefits of retrofitting heat pumps

Heat pumps provide an excellent alternative to fossil fuel boilers in the residential sector. This puts them at the forefront of the UK's drive to reduce carbon emissions.

The UK's Heat Pump Association (HPA) estimates that on average a heat pump creates 1.6 tonnes of CO_2 per household, compared to 3.7 tonnes for a gas boiler or 5.3 tonnes for an oil boiler per annum.

Domestic gas prices are currently lower than electricity per kilowatt hour with the previous UK government stating it would consult on changing this approach and lowering electricity prices[5] enabling heat pumps to provide long-term affordability. Households can therefore expect to see fluctuation in future prices, with gas prices set to rise while electricity costs fall with energy efficient electric heating in the form of heat pumps providing long-term protection from fuel poverty for many households.

Healthy indoor environments for the customer are a priority for social landlords. Challenges with damp and mould can potentially be detrimental to health and exacerbate long-term health conditions. Traditional fossil fuel heating is primarily used as an on-off approach with higher fixed flow temperatures for heating. While this allows for rapid heating of the air in a home, if walls and other surfaces are cold, then condensation can form. This is a major contributor to the formation of health-damaging mould, especially when the weather is cold.

Heat pumps provide a steady heat, rather than bursts of heating supplied by fossil fuel heating. As a result, walls and other surfaces are warmed along with the indoor air. Adequate ventilation is needed to reduce indoor dampness, while a steady supply of warmth - supported by heat pumps - plays a major role in maintaining a healthy indoor environment. The main source of heat energy for an air source heat pump is air therefore, unlike fossil fuels, its calorific value is not fixed so the higher the temperature, the more efficient they become.

As Robert Hicks, Asset Sustainability Manager at SNG, says: **“The efficiency of a heat pump is undeniable: for every unit of energy consumed, it can deliver up to three or more units of heat. The key factors influencing this performance are the external air temperature and the heating system’s water flow temperature. These factors determine the system's overall efficiency potential. However, the cost of each unit of energy (kWh) plays a crucial role - it can either support or hinder the ability to realise this potential and provide affordable warmth for homes.”**

3

A case study with SNG: Installing Ecodan heat pumps

SNG was formed from a merger of Sovereign Housing Association and Network Homes at the end of 2023 (see page 18 for more).

Managing over 84,000 homes for 210,000 customers across London and the South of England, SNG is one of the UK's largest housing associations and a proud member of the G15, which represents London's leading social housing providers.

SNG Sovereign Network Group

In 2020, Sovereign Housing Association's Sustainability Strategy mandated that all its properties would achieve an EPC of C or above by 2035, an EPC of B by 2047; and be net zero by 2050. With a change to government policy requiring EPC C by 2030, SNG has already ensured that 74.33% of its stock achieves EPC C or better, placing the association on a leading path to achieve this goal.

Rob Hicks
Asset Sustainability Manager

SNG, through its Homes and Place Standard, mandates the introduction of low carbon technology to all new build homes avoiding costly retrofit works, improving affordability and reducing the carbon footprint.

Rob Hicks, Asset Sustainability Manager for SNG, said that its Home and Place Standard approach has reduced the association's portfolio of homes at EPC D or below by around 4,000 homes to approximately 14,500 since 2020.

"We know that the EPC is not a perfect measure for sustainability of a building, but it does provide a metric for comparison," he says. SNG used EPC ratings along with its fuel poverty calculator based on the DESNZ and BRE approach, Low Income Low Energy Efficiency (LILEE)[6] method.

"By reviewing our stock condition and EPC data, the link to a home's energy efficiency and the potential for one of the two conditions of fuel poverty against LILEE measures soon became apparent," explains Rob.

"This meant we could focus our light in the right place, prioritising those most in need and looking first at the homes with the lowest RdSAP scores (the calculation method used to assess EPCs for existing dwellings). Since 2020, our dedicated energy efficiency programme, EPC2C, has been leading this journey. And more recently also our successful SHDF wave 2.1 bid for **1,000 homes all with low temperature air source heat pumps**," he adds.

For SNG's core stock profile, the eight key retrofit building components the organisation considers are:

1. Wall insulation
2. Double glazing
3. Insulated external doors
4. Loft insulation - 300mm
5. Air tightness
6. Ventilation
7. Low carbon heating

   Houses, maisonettes and bungalows - Low and Medium temperature heat pumps - Fixed Flow Temperature.

   Flats - HHRS (Home Health and Safety Rating System).
8. Electric Generation and Storage

One of the key points to note about this programme is that these homes are from SNG's off-gas grid portfolio, with either electric storage, oil, or solid fuel heating.

Rob emphasises the importance of 'reducing potential energy consumption first'. A fabric-first approach to retrofitting homes makes sense.

Rob says: **"If you consider the relatively low cost of these measures (excluding hard to treat homes), wall insulation make sense, offers a long-term payback and will last 25 years. The same can be said for double glazing and loft insulation. These actions provide good value for money."**

When looking at decarbonising heating in these homes, heat pump technology was the first choice. Rob points out that the adjustments to fabric, air tightness and ventilation have benefits for heat pump performance:

“If you don’t look at areas such as insulation, air tightness and ventilation, then you are going to need a larger heat pump which is more expensive in terms of SNG capital/operational costs and running costs for our residents. Not considering reduction measures first means you’ll likely spend more money than could be necessary. This approach should be the same for all fuel types and systems.”

The chosen technology was **Mitsubishi Electric’s Ecodan R32 air-to-water heat pump**. This is designed to suit a range of domestic projects and is a self-contained unit that only requires connection of water and electricity so there is no need for gas supply, flues or ventilation. In addition, the Ecodan R32 has low maintenance needs and is quiet in operation.

One of the most vital points that Rob makes is that, in retrofitting their homes it’s imperative to consider their residents' needs first. The SNG approach is to balance Comfort (affordable warmth), Cost (capital and operational expenditure and resident fuel bills), and Carbon. This means weighing the benefits of reducing a home’s carbon footprint against the affordable comfort of the occupants and their energy bills.

“Without a holistic, balanced approach to each home, changing just the heat source could be detrimental to our residents,” says Rob.

“The unintended consequence could be potentially higher fuel bills (Cost) and decreased warmth (Comfort).”

Low temperature air source heat pump installations were carried out by Faulkner Heating of Reading. The company has a long-standing relationship with SNG, stretching back almost three decades. Managing director, Kim Faulkner explains that the business became accredited with the Microgeneration Certification Scheme (MCS) in 2009.

"We focused on gas boilers installations for many years, but we have seen our air source heat pump installations grow significantly over the past decade. I would say that now, the split between gas boilers and air source heat pump installations is fifty-fifty."

When working with SNG on large scale air source heat pump installations, Mr Faulkner highlights the importance of understanding each property.

"When we install gas boilers, we carry out a property survey first, and we do the same with air source heat pumps. You can have two three-bedroom semi-detached homes next to each other and they can be very different."

Time invested in surveying and on calculations is a critical factor for successful installations. Faulkners' Head of Renewables, Rob Cole points out that good installation practice pays dividends in terms of promoting the benefits of air source heat pumps.

"Our surveyors are often at the forefront of encouraging residents that air source heat pumps can benefit them." he says.

Here, the surveying team assists by not only collecting technical data, but also by selecting households as early adopters of heat pump technology.

> **"We find that neighbours will talk to each other about the benefits they're getting. Sometimes we may fit air source heat pumps into five or six homes on a street, but people will chat and find out how much money their neighbours are saving and then they want to switch too."**
>
> Rob Cole.

Faulkners' experience with installation of air source heat pumps into social housing shows that energy cost savings for householders can be substantial. This is particularly true where residents are switching out oil and LPG boilers or electric storage heaters.

Mr Faulkner says:

> **We don't just want to install heat pumps. We want to bring something to the residents; to lift them out of fuel poverty and to give them affordable comfort. Some households we meet are running a single storage heater in their home because it's so expensive. An air source heat pump can change their lives for the better. One lady we spoke to said she was saving around £700 a year on her energy costs after having a heat pump installed.**

Faulkners' advice to housing associations looking at adopting air source heat pump technology is to ensure they are working with installers who can deliver high-quality installations.

"It's vital for local authorities and housing associations to pick the right contractors for this work. It's not just about making a good presentation but ensuring that they have invested in training for their teams and can field good engineers."

He adds that targeting households with the oldest boilers, or those that are causing the most problems for maintenance is a good approach. This benefits the residents most in need, while also helping to reduce issues for building maintenance teams.

Air source heat pumps and how they work

An air source heat pump is a renewable heating system that heats a home by moving existing heat from the air outside and distributing this around a property.

Due to their low sound output, an Ecodan air source heat pump can sit anywhere outside the property and just needs to be connected to electricity and water for it to work. The heat pump provides all the heating and hot water a property needs to provide a constant temperature throughout the home.

Ecodan heat pumps are manufactured and designed specifically for the UK, so they work at temperatures as low as -25 degrees. They can also be used with any type of heating system, such as underfloor heating and traditional radiators.

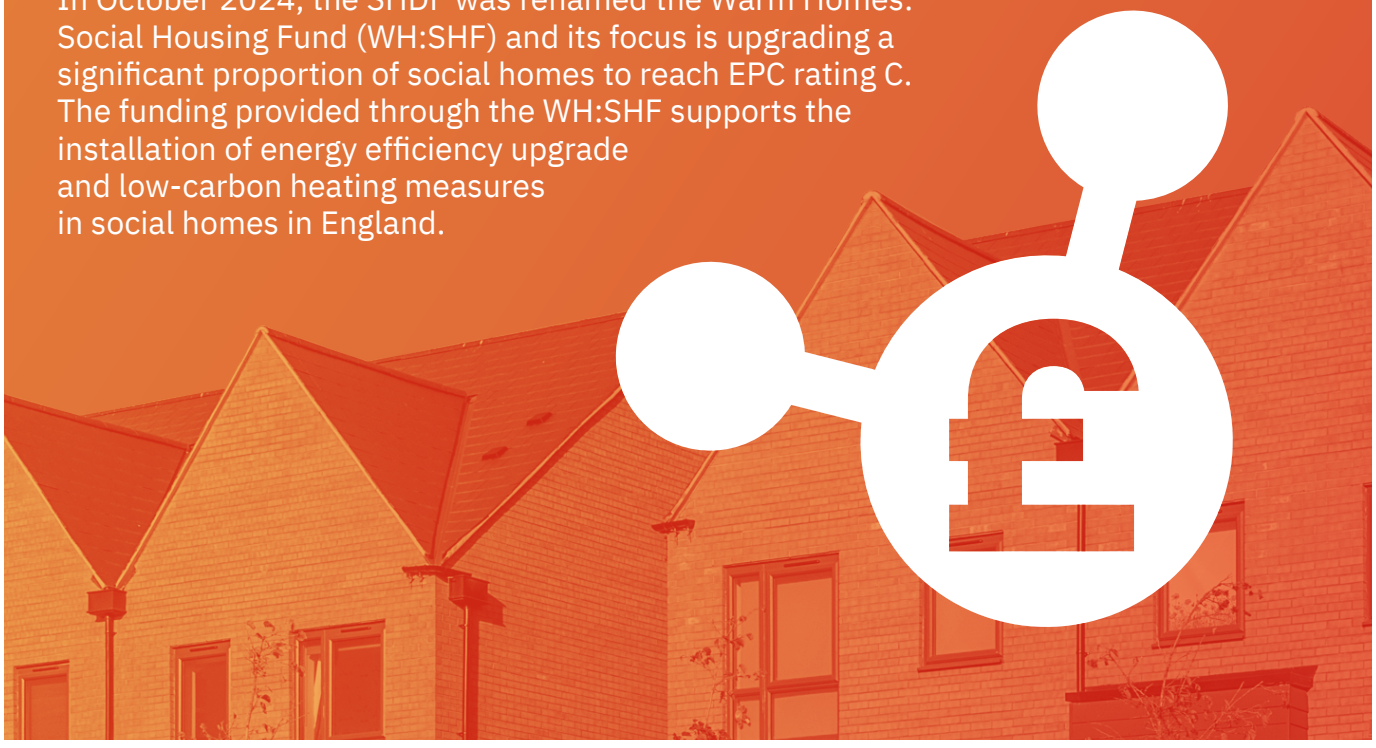
For every one kilowatt of energy it uses, it creates 3 kilowatts of heat energy, making it 300% efficient and therefore coefficient (in comparison, oil and gas are only 90% efficient).

The Social Housing Decarbonisation Fund - now the Warm Homes: Social Housing Fund (WH:SHF)

The Social Housing Decarbonisation Fund (SHDF) was one of a series of measures targeting homes owned and managed by housing associations and local authorities. The SHDF was first introduced in 2019 with £3.8 billion set aside over a decade to help social housing providers decarbonise their stock.

The first Wave (as the phases of the scheme referred to) saw 29 projects receive £179 million. The following Wave 2.1 amounted to £778 million given to 108 successful bidders. Around 90,000 homes were improved as a result of that funding. The next Wave of funding (Wave 2.2) was allocated in April 2024 and amounted to £80 million. Funding from this phase must be spent by March 2025.

In October 2024, the SHDF was renamed the Warm Homes: Social Housing Fund (WH:SHF) and its focus is upgrading a significant proportion of social homes to reach EPC rating C. The funding provided through the WH:SHF supports the installation of energy efficiency upgrade and low-carbon heating measures in social homes in England.



SNG: bringing together Sovereign Housing Association and Network Homes

In September 2023, the boards of Sovereign Housing Association and Network Homes agreed to merge to form Sovereign Network Group (SNG). The merger took place in October 2023.

The merger formed one of the largest housing associations in the UK, with over 84,000 homes and 210,000 residents across London and the South of England.

It plans to invest around £9.2 billion in existing and new homes over the next 10 years. This includes an annual development programme of up to 2,500 homes a year alongside an ambitious retrofit strategy.

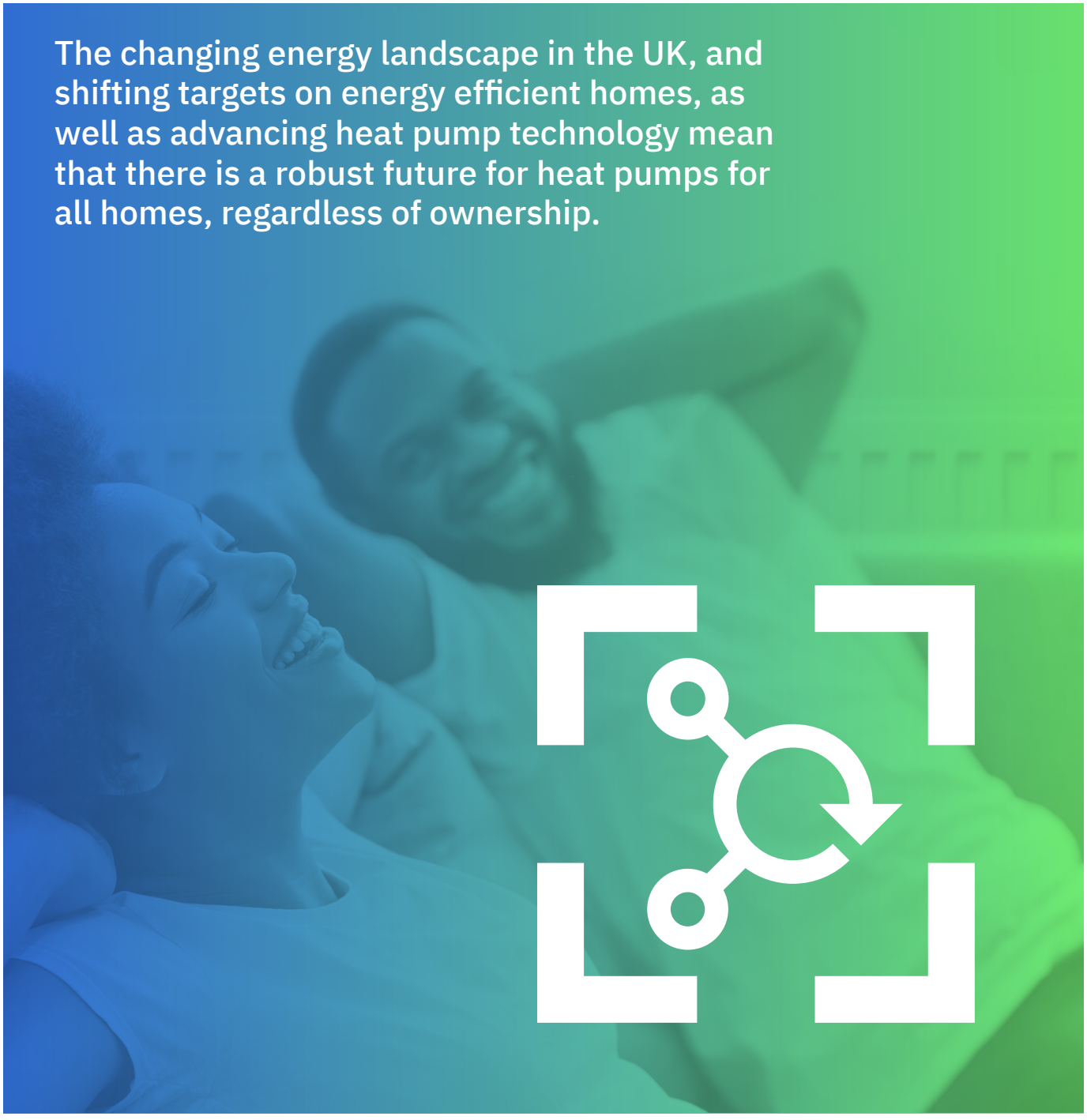
SNG Sovereign Network Group

84,000 homes + 210,000 residents

4

The future for low-carbon social housing

The changing energy landscape in the UK, and shifting targets on energy efficient homes, as well as advancing heat pump technology mean that there is a robust future for heat pumps for all homes, regardless of ownership.



Social housing is not a static market. Housing associations continue to build and the demand for social homes is growing. We need to find solutions for decarbonisation that can be applied swiftly to existing homes.

Furthermore, at the Labour Party conference in September 2024, Ed Miliband, the Secretary of State for Energy Security and Net Zero, announced that all housing association properties will have to achieve a minimum EPC of C by 2030. With ageing stock and higher EPC ratings to meet, affordable energy efficient heating and hot water will be vital.

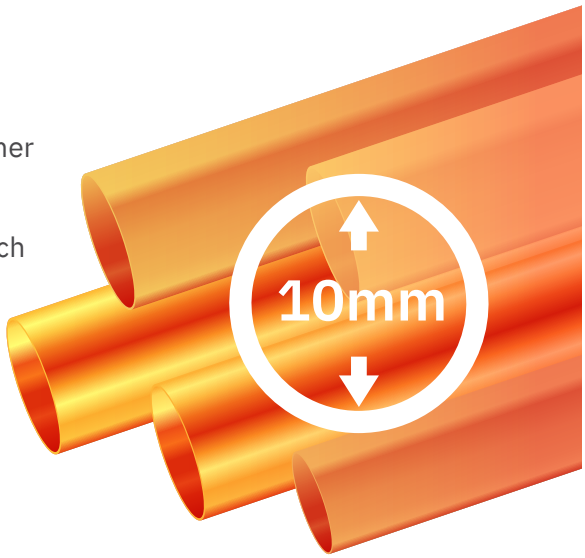
The relative pricing of gas and electricity in the UK is also under consideration by government since the higher price of domestic electricity (compared to gas) is seen as a barrier to heat pump take-up, The Climate Change Committee recognised in its seventh carbon budget that the price of electricity should be made cheaper by “rebalancing prices to remove policy levies from electricity bills.”

While these changes are taking place in the wider market, heat pump technology is also advancing. New high temperature heat pumps, such as Mitsubishi Electric’s Ecodan R290 high temperature range, are already on the market. They provide even more potential as a low carbon retrofit solution to replace gas heating systems.

SNG plans to use high temperature heat pumps more widely across its portfolio and has been awarded WH:SHF Wave 3 funding. The initial rationale behind the use of Mitsubishi Electric’s Ecodan R290 was that the GWP of the refrigerant is only 0.02, making it an excellent technology for low-carbon heating.

SNG is currently underway to install, monitor and evaluate weather compensated high temperature heat pumps in six of its homes. This is an accelerated element of its self-funded Home and Place Retrofit Pilots which are seeking to understand its approach to retrofitting gas heated homes to air source technology, especially those where 10mm microbore radiator connection pipework has been used.

The scheme aims to demonstrate that weather compensated high temperature heat pump systems will operate with existing radiators, valves and pipework - with no need to replace these components until they are at the end of their cyclical life.



Rob Hicks stresses that this innovative approach came from a desire to balance several resident and SNG key drivers, such as:

1	**Reducing disruption to the customers**
2	**Fuel bill cost reduction**
3	**Whole home holistic approach**
4	**Reducing capital cost for replacing radiators and pipework for heat pump installation**
5	**Avoiding early component replacement**
6	**Lowering capital and operational cost**
7	**Lowering the costs of making good**
8	**Reducing the costs of resident floor covering replacement**
9	**Cost reduction offsetting**

Ultimately, for SNG, the key enabler to gas heating replacement with air source heat pumps is resident take up. Their weather compensated high temperature heat pump pilots aim to find the ‘sweet spot’ for a holistic and balanced approach.

SNG wants to share the outcomes of this pilot (and others they are carrying out) and the wider application of weather compensated high temperature heat pumps as soon as possible in 2025.

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4. Decarbonising Home Heating, Public Accounts Committee Inquiry - National Housing Federation submission
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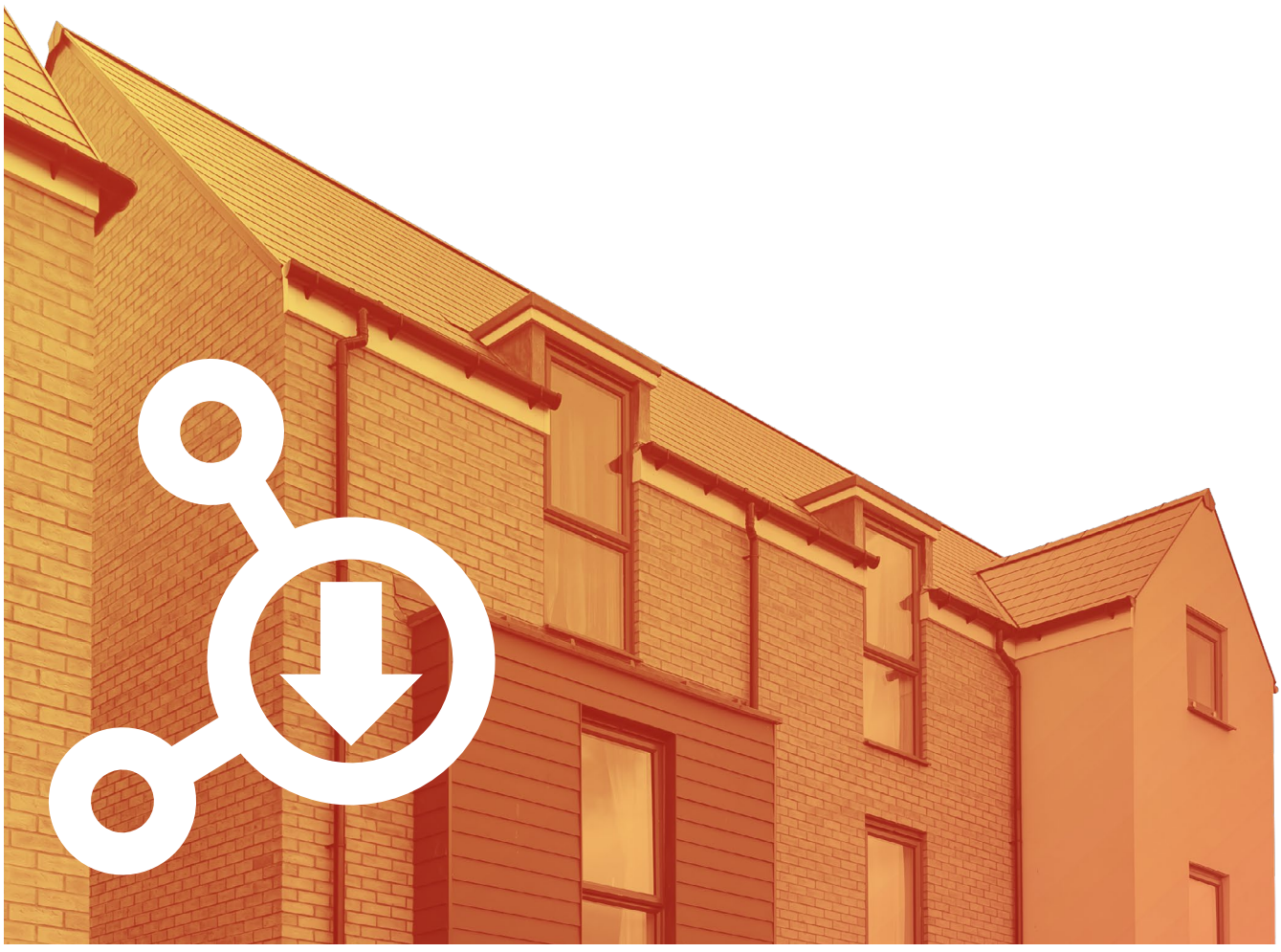


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Note: The fuse rating is for guidance only and please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R513A (GWP:631), R454B (GWP:466), R515B (GWP:292), R454C (GWP:148), R1234ze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a hydrocarbon, R290 (GWP:0.02). *These GWP values are based on IPCC 6th edition.

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www.greengateway.mitsubishielectric.co.uk
Mitsubishi Electric UK's commitment to the environment

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