

Defining net zero for social housing

Decarbonisation task and finish group discussion paper
July 2021

Summary

[The National Housing Federation is in the midst of a project to support housing associations to decarbonise.](#) This discussion paper has been developed as part of that project for two reasons.

- To summarise some of the current policy analysis which is guiding our ongoing project.
- To gather further input from our members on the topics it covers and ensure this feedback contributes to our ongoing project.

The paper discusses how to define 'net zero' for housing associations and outlines our role in the wider economy's decarbonisation journey. We have drawn significantly upon the current statutory advice of the Climate Change Committee (CCC). Throughout, this paper poses questions, which we would greatly appreciate your feedback on to inform our ongoing project and wider policy analysis. The NHF is set to launch the results of our current decarbonisation project in the autumn.

In summary, this discussion paper presents the following:

- In line with our international obligations under the Paris Agreement, and the advice of the CCC, the government has legislated for the UK to reach net zero carbon emissions by 2050, with intermediary targets of a 68% reduction by 2030 and a 78% reduction by 2035 (compared to 1990 levels).
- Housing associations will play a critical role in our collective journey to net zero as to reach that goal, the CCC is clear that there must be complete elimination of greenhouse gas emissions from housing.
- The road to net zero outlined by the CCC is focused on retrofitting all housing first, with the vast majority of fabric energy efficiency improvements being completed by 2035 (and all social homes reaching EPC C by 2028).

- It is widely understood that EPC ratings are a flawed measure of energy efficiency and can drive awkward behaviour in their current form. We support government's intention to reform the methodology to address these issues.
- This approach – of achieving a minimum energy efficiency standard as soon as possible, and then installing clean heat – sets out the minimum changes housing associations would need to deliver for their existing homes.

What is net zero for the UK?

The government has legislated for the UK to reach net zero carbon emissions by 2050, [with intermediary targets of a 68% reduction by 2030 and a 78% reduction by 2035 \(compared to 1990 levels\)](#). These targets ensure that, as a nation, we meet our international obligations set out in the Paris Agreement of 'highest possible ambition'. If our reductions were matched globally, as a planet we would have [a 50% probability of limiting global warming to 1.5°C and a 66% probability of limiting it to 2°C](#).

Net zero for the country as a whole simply means that the amount of carbon/greenhouse gases emitted by the UK minus any 'offsets' (e.g. carbon absorption through mass tree planting) or 'capture' (deployment of carbon capture technologies) equals zero, or better. The role of offsets and carbon capture for the economy as a whole can only ever solve a tiny proportion of the challenge, with most emissions needing to be eliminated altogether.

What role does housing have to play in the UK achieving net zero?

According to the CCC, in 2019 the direct burning of fossil fuels to heat space and water in homes accounted for 13% of the UK's total carbon emissions. [The CCC are clear that, for the UK as a whole to meet net zero by 2050, there must be a complete elimination of these emissions from housing](#). The modelling behind the CCC's main 'Balanced Pathway' is predicated on 100% elimination of these carbon emissions by 2048 and their more rapid scenarios see housing eliminate these emissions by 2044. It may actually be the case that housing will need to go beyond 'net zero' (a carbon

negative sector) and support decarbonisation in other sectors, e.g. through generating significant amounts of surplus renewable electricity through solar PV or wind turbines and pumping that into the national grid.

Additionally, to meet the relevant intermediary carbon emission reduction targets (e.g. 78% reduction by 2035) housing will need to be well on the way to eliminating emissions much earlier than 2050. Rapid action in the housing sector is required in order to create headroom in the wider economy where some sectors, for example aviation, will take longer to decarbonise due to technological and other challenges. The CCC recommends that by 2035, the emissions from existing homes should be around half today's levels.

What carbon emissions are we talking about?

In order to reach a conclusion on how to define net zero for the housing association sector we must first decide on the scope of the carbon emissions we are seeking to eliminate. Housing associations will directly produce or contribute to a wide-range of carbon emissions. This will include for example, carbon emissions produced from staff commuting and using organisational fleet transport, from energy usage in office buildings, from construction of new homes and emissions from gas boilers in housing stock.

There are a few key definitions for emissions we can draw upon to help us understand the scope of the challenge.

1. Direct emissions in housing stock

Direct emissions are the carbon emissions produced directly from the burning of fossil fuels in homes to heat space and water, e.g. gas boilers.

2. Indirect emissions in housing stock

Indirect emissions are emissions produced from the burning of fossil fuels in power stations to generate electricity or heat (not in a home) which in turn supplies heating sources in homes for space and water. This includes for example, the carbon emissions resulting from the production of electricity in a power station that powers an electric heat pump in a home, the carbon emissions produced by a heat network that feeds a home or the carbon emissions resulting from hydrogen production that

feeds a hydrogen boiler in a home. These emissions only exist when the production of such electricity/heat/hydrogen outside the home is not net zero.

3. Regulated emissions in housing stock

Regulated emissions are produced either directly or indirectly as defined above, by a household's use of structural/fitted energy consuming items over which a landlord has control. Examples include space and water heating mechanisms and mains lighting. These emissions are often covered by building regulations and are addressed in a building's Energy Performance Certificate.

4. Unregulated emissions in housing stock

Unregulated emissions are produced directly or indirectly by a household through use of personal energy consuming items. These might include kitchen appliances, televisions, hairdryers etc.

5. Embodied or supply chain emissions in housing stock

Embodied or supply chain emissions are those produced through the building of new – or works on current – housing association homes. These include the emissions resulting from the production and transportation of building materials.

6. Peripheral organisational emissions

Peripheral organisational emissions are the carbon emissions a housing association may produce or contribute to through wider organisational activities outside of their housing stock. This might include for example, the carbon emitted through staff commuting, organisational vehicle usage and office building emissions.

So what emissions do we need to eliminate?

There are undoubtedly benefits in our sector taking steps to reduce/eliminate carbon emissions in all of the above areas. For example, by engagement with the construction supply chain to source greener materials and work practices, through running resident engagement activities to drive down unregulated carbon emissions, replacing gas cookers with electric in stock where possible, or by greening offices and staff vehicle usage. These activities should not be discouraged and can form a

crucial part of an organisation's individual net zero strategy, particularly in areas where a housing association has greater control (e.g. cookers in stock, heating systems in office buildings, reducing commuting through policy changes). However, the strategic responsibility for net zero with many of these emissions lies with each of their relevant sectors (e.g. transport policy to decarbonise cars/improve public transport for staff commuting, construction and heavy industry practices to address embodied carbon) and not with housing associations.

In addition, while we must reach net zero as rapidly as possible, it is already the case that we have 'locked in' at least 1.5C of global warming. Housing associations preparing their homes and wider organisation for the impacts of this warming should also form part of any holistic net zero strategy.¹

Finally, the climate emergency we face is not only one of global heating caused by greenhouse gases, it is also one of environmental degradation, species collapse etc. In a holistic strategy to tackle the climate emergency housing associations may also want to support activities to improve environmental sustainability by contributing to projects like rewilding. It is essential that we engage with many of these issues as part of our longer-term strategic work on sustainability, but they are not our current focus in this project of decarbonisation.

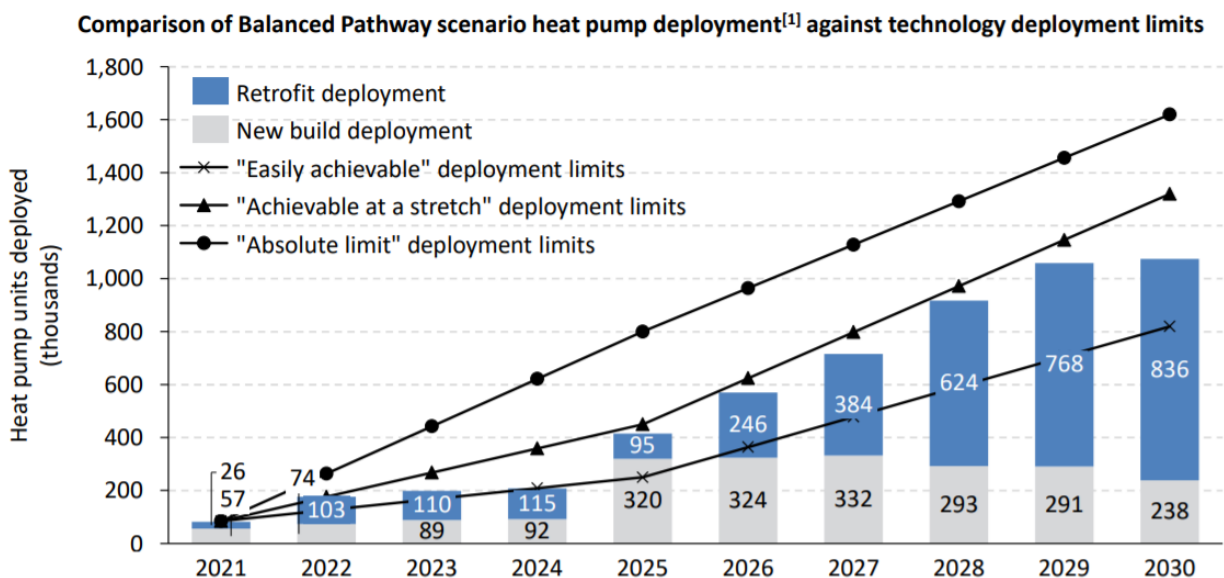
The definition of net zero for our sector is that housing associations need to eliminate our share of the 13% of direct, regulated carbon emissions produced by the burning of fossil fuels to heat space and water in residential buildings in all our current and future housing stock. In doing so, we are making the assumption that the other areas of the economy upon which the sector relies to make that possible (the national grid, heat networks, hydrogen production etc.) themselves become net zero.

To do this, the approach outlined by the CCC (and likely to be taken forward by the government) is that we must first improve the energy efficiency of all homes, and then roll out clean heat installation. In the next sections of this paper we outline the expected trajectories of both these measures and their purpose.

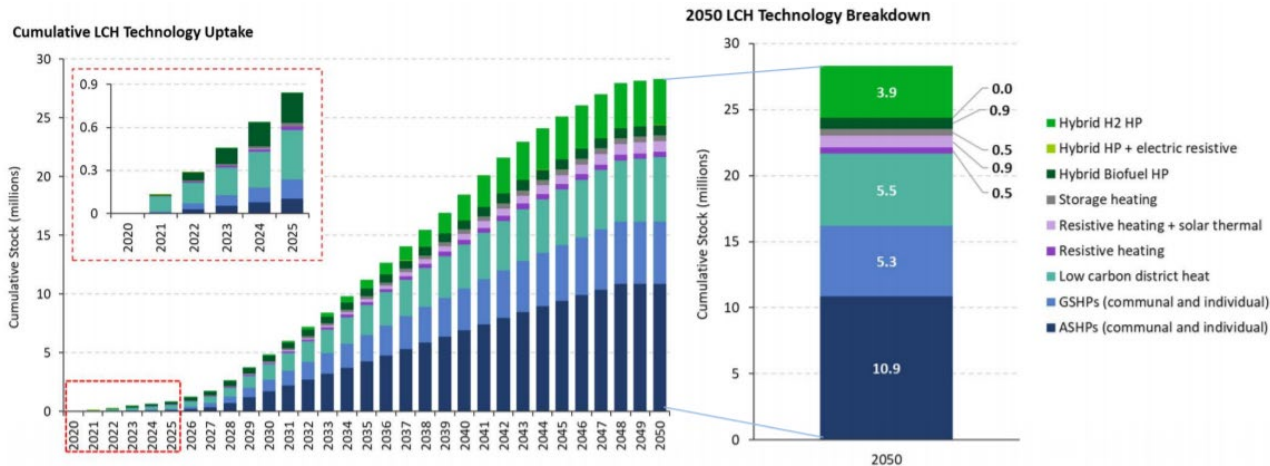
The trajectory of clean heat installation

¹ [The CCC have done significant work on the issue of adaptation, particularly for the built environment, and argue government must take it more seriously and join up decarbonisation strategies with adaptation.](#)

To follow the plan outlined by the CCC, between now and 2025 the government and housing sector needs to begin scaling up heat pump supply chains, trialling other clean heat technologies like hydrogen and decarbonising and creating new heat networks. Priority needs to be given to boosting heat pump supply chains as these will be the primary technology for at least 11 million homes in 2050. From 2025 onward, the deployment of clean heat technologies should accelerate significantly with the CCC recommending that 3.3 million heat pumps are deployed in existing homes by 2030 and eight million by 2035. The two graphs below, [developed for the CCC](#), show the proposed trajectory for heat pumps up to 2050 and the final projected make-up of clean heat sources in residential buildings (although there is flexibility in this latter forecast). [The Prime Minister has pledged to ensure that at least 600,000 heat pumps are installed every year from 2028, in line with the 'easily achievable' trajectory in the graph below.](#)



[1] Includes new build heat pumps, which were not directly modelled in this work.



The role of fabric retrofit

Retrofit is the common term given to fabric energy efficiency improvement works on existing homes. To achieve net zero, it would be theoretically possible to not engage in any fabric retrofit activity and eliminate direct, regulated carbon emissions from housing by simply switching the space and water heating sources for all homes from fossil fuels to clean heat fed by net zero renewable energy, as per the plans in the above graphs. Fabric retrofit is only essential to the journey to net zero because:

1. In the time whilst homes remain utilising carbon-fuelled space and water heating mechanisms, fabric retrofit will reduce the scale of these emissions by reducing heating demand and 'shrink the size of the problem' until clean heat sources can be installed. A combination of fabric energy efficiency measures and changes in resident behaviour should deliver a 12% reduction in heat demand to 2050.
2. Low-carbon technologies can be more expensive than gas for residents and may continue to be so even if the government take action to rebalance the current environmental levies on electricity bills and wider costs. Creating highly energy efficient homes, through fabric improvements, will mitigate any increase in fuel costs that result from a transition away from fossil fuel heating sources.
3. Technologies such as heat pumps may struggle to comfortably heat highly energy inefficient homes.
4. The mass shift away from the use of fossil fuel heating will create strain on national energy infrastructure such as the national grid, heat networks and hydrogen production. By improving fabric energy efficiency, retrofitting will

reduce the strain and thus the need for upgrades to the energy sector's infrastructure.

5. The less energy that is required to heat homes and water, the easier it will be to meet that energy demand through renewable sources and support the energy sector to reach net zero.

To ensure retrofit fulfils its purpose on the journey to net zero, housing should take a 'fabric first' approach to retrofit, prioritising improvements to the fabric of the building (such as lighting, draft-proofing and insulation) opposed to the installation of more energy efficient carbon heating systems. This is reflected in the advice of the CCC who recommend a 2028 end-date for all homes to be made energy efficient and recommend that around 65% of energy efficiency deployment in all existing homes is installed by 2030.

How to define/measure retrofit effectiveness

What is the minimum retrofit standard or target that all housing associations should be brought up to in order to facilitate the installation of clean-heat?

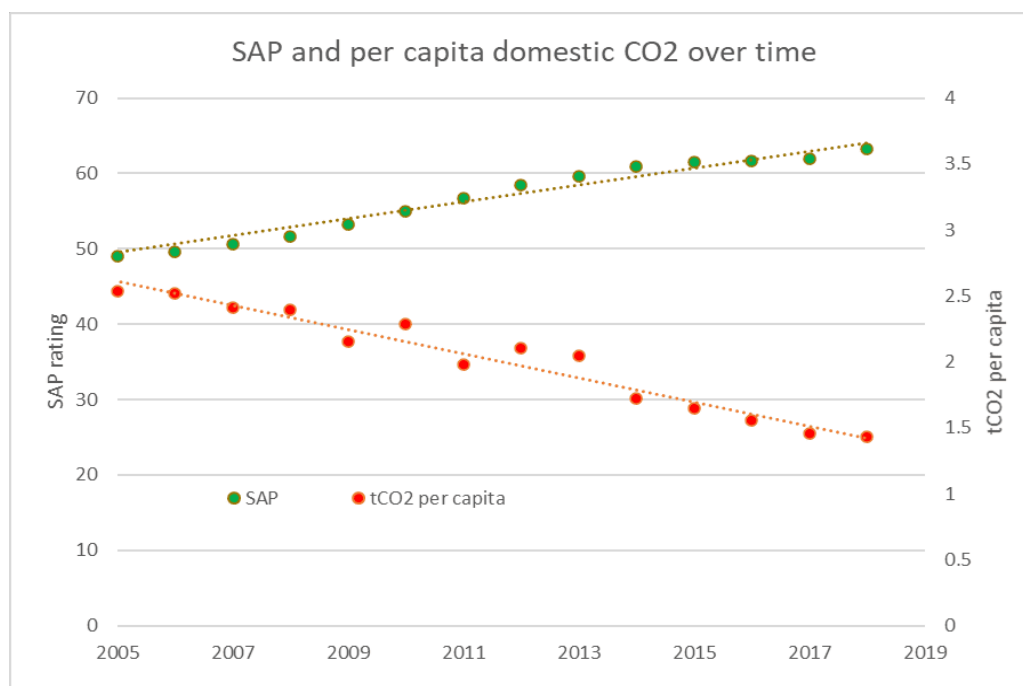
So far, the CCC, the government and other thought leaders have settled on the use of Energy Performance Certificates (EPC) and the Standard Assessment Procedure (SAP) as the most useful available metrics in driving the relevant retrofit works for decarbonisation. For example,

- The government has a target for all homes to meet EPC C by 2035.
- The CCC recommends that social housing meets EPC C by 2028.
- [IPPR recommends all social housing meets EPC B \(and C if not technically feasible\) by 2030.](#)
- The government's Social Housing Decarbonisation Fund (SHDF) is aiming to bring all social housing up to EPC C by 2030.

Their collective rationale is that Energy Performance Certificates (EPCs) are a widely recognised measure of the energy performance of buildings, making them accessible to policy-makers, residents and property-owners alike and are embedded in building regulations. EPCs are required when selling or letting a property to provide information to householders on the performance of a home and to promote energy performance improvements in buildings. EPCs underpin a number of current government policies including fuel poverty targets, as well as the regulations around

minimum energy efficiency standards (MEES) for the private rented sector. They are also beginning to play an increasing role in Green Finance markets. EPCs are based on the SAP methodology which quantifies a home's 'performance' in terms of energy use per unit floor area (kWh/m²), a fuel cost-based energy efficiency rating (the EPC rating, in £/kWh/m²) and emissions of CO₂ (the Environmental Impact (EI) rating, in CO₂/m²). The EPC reports both the EPC rating and the EI rating on a scale from A (highest) to G (lowest).

The CCC has argued that EPC/SAP is more suited to tackling fuel poverty than decarbonisation. However, it is essential that fuel poverty is at the heart of any decarbonisation project and it is true that homes that are cheap to run are always low carbon, but the opposite is not always true, some low carbon homes are not cheap to run. In addition, there is also a historic correlation with high EPC/SAP and low CO₂ emissions. The following data is from local authorities' carbon reports and the English Housing Survey. It shows that, historically, per capita domestic CO₂ emission decreases correlate with average SAP increases:



Despite the benefits, there are significant issues with the use of EPC/SAP. EPC ratings are subject to fuel price variations over time and the use of the Energy Efficiency Rating can incentivise the installation of fossil fuel-based heating systems (which are cheaper for the resident to run) and 'punish' the installation of clean heat. If the policy environment did not change and the government set a target of EPC C

for all homes by 2030, many homes may reach EPC C following retrofit, but then theoretically fall below EPC C following the subsequent installation of clean heat.

EPCs are also underpinned by a wide-range of assumptions about a resident's expected energy use and a home's energy performance that may not always match reality. This is often called ['the performance gap'](#). There can also be significant variation in the EPC obtained depending on the assessment carried out. For example, a [mystery shopping exercise](#) for the ['Green Deal'](#) policy initiative 2013-2015 found that the range of EPC ratings obtained spanned at least two EPC bands for almost two thirds of the homes analysed.

The actual coverage of EPC certificates across housing stock is also quite poor, with [roughly only 50% of English housing stock having a valid EPC certificate](#). The recommendations for home improvement that come with an EPC certificate are often not aligned to the best strategy for decarbonisation. For example, they may recommend the installation of more efficient carbon boilers or solar panels, which may have a role to play in decarbonisation but are secondary to the overall decarbonisation strategy of fabric first improvements followed by clean heat installation.

The government has sought to circumvent the problems of EPCs regarding decarbonisation by caveating their use in the context of fabric first activity. For example, the SHDF is going to require homes to be brought up to EPC C but will proscribe the installation of fossil fuel heating and prioritise funding fabric first measures which produces improvements in space heating demand.

The CCC and others have recommended an overhaul of EPCs, which would:

- Improve the coverage of EPCs across the housing stock.
- Provide better guidance to residents about how to reduce energy bills and decarbonise their home effectively, including linking them to funding and suppliers.
- Make better use of real-time performance data to improve accuracy.

Eventually, the CCC and many other have proposed that all homes should have a [Green Building Passport](#).

[The Scottish Government's recent Heat in Buildings Strategy](#) has indicated that they will overhaul their current EPC framework so that it helps building owners and residents understand:

- The measures required to improve the energy efficiency of their property, 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.

They will do this by ensuring EPC contains 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).

We believe the government is working on similar measures to those in Scotland.

While reforms to EPC are essential to support decarbonisation, there does not seem to be a current practical alternative available at-scale, which is able to link in with relevant national policy. As such, housing associations should prioritise fabric first energy efficiency measures to bring all properties up to at least EPC Band C and aim to prioritise measures that ensure the home can be practically and affordably heated by a low-carbon heating technology either now or in the future.

Key questions for NHF members

- Do you agree with the strategic approach and trajectory outlined regarding retrofit and clean heat installation? Is the sector aware of these trajectories and this approach?
- Do you agree with the outlined definition of net zero and the role housing associations must play?
- Do you agree with the use of current SAP/EPC to drive retrofit changes in the short-term?
- If so, should we ensure the use of current SAP/EPC as a target is always caveated with the requirement for fabric first measures to support a transition to clean heat?
- Is there a different metric/definition we should be using to measure retrofit and/or net zero in the short-term?
- How important is EPC reform and what should it look like?
- What are your thoughts on [Green Building Passports](#)?
- How would you define a 'clean heat ready' home?

Please email your answers to Rory.hughes@housing.org.uk