Every home should be a warm and safe place

FUEL POVERTY MONITOR 2021

NEA
Action for Warm Homes

energy action SCOTLAND
for a future without fuel poverty

Acknowledgements

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1 Executive Summary

National Energy Action (NEA) and Energy Action Scotland (EAS) are the UK's national charities aiming to end fuel poverty. For two decades, we have published a yearly investigative report on progress to eliminate fuel poverty across the UK and within each of the four UK nations: the UK Fuel Poverty Monitor (UKFPM).

This year's UKFPM identifies: the opportunities associated with decarbonising heat for fuel poor households; the barriers they face in doing so; the likely risks of the decarbonisation agenda for them; the value of transparency, in terms of how energy policies are paid for; and which policy developments and interventions are required to ensure that the decarbonisation of domestic heating can be fair and affordable. It seeks to highlight the actions that must be taken if fuel poor households are to be the first to benefit from the decarbonisation of the way we heat our homes.

Through a Call for Evidence (CfE), which gained responses from 122 respondents covering the breadth of the UK, and wider engagement with stakeholders, we have considered the opportunities, impacts and barriers for fuel poor households of decarbonising their homes. To further inform our research, we interviewed representatives from governments, regulators, and consumer advocacy groups to understand their views on the links between decarbonisation and fuel poverty. We also conducted interviews with households that NEA has supported with decarbonising their heating to understand more about their experiences. The barriers and benefits they encountered are incorporated into this report in the form of three case studies, each of which tells the real-life story of a household that has tried to decarbonise their home – but with mixed results and from which several lessons must be learnt.

Decarbonising heat is essential for fuel poor households. It is needed to mitigate against climate change and to reduce the level of climate risk for fuel poor households. The direct opportunities for fuel poor households could also be substantial. There are significant financial savings on offer if decarbonisation is done in the right way. Overall, 83% of the stakeholders who responded to our CfE noted the opportunity to create more affordable and manageable energy bills at the same time as decarbonising fuel poor homes by improving energy efficiency. In turn, stakeholders said this would lead to warmer homes, with healthier occupants and thriving communities.

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There are huge opportunities for fuel poor households through the decarbonisation of domestic heat.

Decarbonising homes will require households to reduce their energy demand, primarily through increased thermal efficiency of buildings. Those living in the worst performing properties, with an EPC of F or G, can save more than a thousand pounds per year if they are able to increase the thermal efficiency of their buildings and reach an EPC of C or above. We estimate the total value of this to be approximately £850m per year.

Additionally, improved energy efficiency gives more protection when energy prices sharply increase, giving fuel poor households insurance against price spikes (like those seen for wholesale gas in the current winter).

In addition to making financial savings, a reduced cost of heating homes can lead to greater thermal comfort for fuel poor households. This can save the NHS more than £1.5 billion per year and can lead to better health and wellbeing,

There are also opportunities to support the levelling up agenda. The need for energy efficiency upgrades is well spread out across the UK. Public money spent on energy efficiency means money saved for householders, predominantly in economically deprived areas. This saved money is likely to be spent in the local area, driving the local economy.

There are, however, also key risks. The most significant is that fuel poor households may not benefit from decarbonisation policies, continue to live in poor housing and face increasing energy costs. The danger of this happening is real – the poorest households will not benefit from decarbonisation without direct intervention and programmes which recognise their individual circumstances. Our research identified the barriers that would lead to this risk being realised across four different areas.

Financial Barriers

- Fuel poor households need additional financial support to cover upfront costs associated with decarbonisation in order to access the direct benefits of decarbonising their homes.
- There are significant 'hidden' costs, unaffordable for fuel poor households, associated with home upgrades, such as rewiring or upgrading their electricity network connection to use electric forms of heating. These are not covered by current grant schemes.
- Transitioning to a low carbon heating technology from a gas boiler could result in higher bills if policy costs on bills remain high.
- Fuel poor homes in arrears cannot switch their energy supplier to a tariff which may be more suitable for different low carbon heating technologies.
- Low-income households face financial difficulty paying off large standing charges on bills, which often need to be paid before gas connections can be capped if the household is no longer using gas as heating or cooking fuel.

Physical Barriers

- Fuel poor homes are less likely to have high standards of energy efficiency. This means that more money must be spent to get their homes 'net zero ready'. If homes are not energy efficient enough, switching fuel types can result in higher running costs.
- The investment needed can be much higher for the worst performing rural homes. There are also additional challenges in rural homes: low incomes; limited connectivity (digital, transport, and social); limited access to essential services; hard-to-treat housing stock quality; socio-demographics, especially ageing populations; and the greater prevalence of more extreme weather conditions. They are also often locked into expensive, unregulated high carbon fuels.
- There is a lack of installers of both energy efficiency measures and of low carbon technologies available to meet the considerable challenge of decarbonising the four million fuel poor homes across the UK.

Awareness and Advice Barriers

- There is a lack of awareness of which technologies are suitable to which homes, and while energy advice in general is relatively well advanced, there is a gap in advice specifically to help households decarbonise their homes.
- There is little central funding for energy advice, let alone advice specifically relating to decarbonising homes. Where this advice exists, it is often digital only or restricted to local areas, creating postcode lotteries of provision.
- There is a lack of consumer protection for energy efficiency and low carbon heating technologies, meaning a poor consumer journey and a lack of redress if things go wrong.

Policy and Regulatory Barriers

- While there are schemes available to help fuel poor households to decarbonise their homes across each of the UK nations, the amount of funding available and their design are often not fit for purpose. There is simply not enough money available, nor a long-term plan, to help all fuel poor households to decarbonise in a timely manner.
- Where there have been schemes with funding available, they have been relatively short-term, and even longer-term schemes such as the Energy Company Obligation have been subject to changes within different 'phases' of the scheme. This cycle of short-term funding causes reduced confidence from both householders and the supply chain.
- There is a lack of clarity over the future of the Warm Home Discount and Energy Company Obligation in Scotland, leaving uncertainty over this key provision.
- There has been a lack of clarity in the policy environment regarding decarbonising heating. While new net zero and domestic heating strategies across the UK go some way to addressing this, there are still gaps in policy, particularly around the ongoing cost of electricity and the future of the gas network.
- There are issues in the private rented sector which lead to vulnerable people living in poor quality housing. A lack of enforcement of the private rented sector minimum efficiency standards (MEES) has led to some properties still not reaching the legally required standard.

As well as the barriers above, in the full report, we have also investigated the need for transparency in how energy policies are paid for and by whom.

Despite the barriers and many challenges, the report finds that warm and safe homes can be, and need to be, at the heart of a fair and affordable transition to net zero. Without programmes to transform the homes of those on low incomes and the least efficient homes and providing clean heating, we will fail at both. To address the barriers above and to improve transparency in how the costs of the decarbonisation of domestic heat are met and by whom, we identify key recommendations to overcome barriers, reduce risk and increase the likelihood of fuel poor households accessing the direct opportunities.

Addressing financial barriers for fuel poor households

- There must be adequate funding to make sufficient progress in decarbonising the homes of fuel poor households through energy efficiency upgrades by 2025.
  - In England, the UK Government should increase the funding envelope within the Home Upgrade Grant scheme by £1.4bn to 2025 to match the commitment made in the Conservative Party manifesto to support fuel poor homes in the least efficient properties.
  - In Wales, the Welsh Government should increase fuel poverty funding, to £325m to 2025, as per the recommendation from the Future Generations Commissioner for Wales.[1]
  - In Scotland, funding to improve the energy efficiency of fuel poor homes should increase to £522m to 2025.
  - In Northern Ireland funding totalling £440m[1] should be committed to 2025 to ensure that all fuel poor homes can reach EPC C to 2030.
- Governments across the UK and Ofgem should ban household contributions within the Energy Company Obligation and any other decarbonisation scheme that is aimed at fuel poor households. Grants should also cover the whole costs of upgrades, including those that are ancillary such as rewiring.
- The UK Government should look to reduce the cost of electricity by moving policy costs such as the Renewable Obligation and Feed in Tariffs into general taxation. Any move to increase Treasury income to recuperate these costs should not increase the cost of gas for fuel poor households until at least 2030.
- Ofgem should create a reliable and consistent mechanism to allow low-income households to uprate their connection to the electricity network when they install low carbon heating, at no upfront cost within the ED-2 price control.
- Ofgem should establish a working group of energy suppliers, energy networks and consumer groups to develop a good practice guide on how gas connections can be capped if a household is no longer using gas for heating or cooking. This should include consideration of how unpaid standing charges can be repaid, written off or socialised when low-income households are no longer using the gas network.

1 Based on an average cost to upgrade a dwelling to EPC C of £6,200, and a flat approach over 9 years.
Average cost to upgrade dwellings from NIHE (2020) **Home Energy Conservation Authority Annual Progress Report**

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Addressing physical barriers for fuel poor households

- All policies aimed at decarbonising heat in homes should be attached to a 'fabric first' philosophy to ensure that a good standard of energy efficiency is achieved before or when low carbon heating is installed. This will ensure that the heating technology can work more efficiently, giving the best chance of achieving cost reductions for households. It would also help reduce the total cost of decarbonising heat across the UK by £6bn per year.
- Grant schemes for fuel poor households to upgrade their homes must come with sufficient cost caps to enable the worst properties to be upgraded to a suitable EPC rating.
- Governments should provide long-term (5-10 year) funding for decarbonisation measures, to ensure that businesses can grow sufficiently in order to meet the challenge of increasing the supply chain in line with demand.
- Governments should provide additional support to rural households, including higher cost caps in grant schemes and more accessibility options to ensure that the most vulnerable households living in the least efficient rural homes have suitable access to support.

Improving Awareness and Advice

- Governments should consider how they fund practical advice to households who are digitally excluded.
- Energy-related topics should be included within wider national, or local authority, digital inclusion and numeracy strategies and training.
- Governments should investigate ways in which advice specifically for decarbonising homes can be improved and included in national skills initiatives.
- High quality installation standards and advice go hand in hand. Following the positive introduction of PAS 2035 and TrustMark under some schemes, the highest retrofit standards must also be applied when carrying out work under Government programmes, but this must be done in a pragmatic way, where working 'to the principles' of PAS 2035 is allowed where reasonable. This would ensure that the measures deliver the expected benefits and do not lead to unintended negative impacts for householders due to poor installation practices.
- Accreditation schemes should include a requirement to provide redress to households if and when installations don't meet the required standards.
- A targeted campaign should be introduced encouraging recipients of the Discretionary Coal Allowance to adopt cleaner alternatives. Their payment should also not be stopped when they install alternative heating technologies.

Removing Policy and Regulatory Barriers

- Ofgem should clarify the future of the Fuel Poverty Network Extension Scheme. If the scheme is deemed not to be compatible with wider policy objectives concerning the future of the gas network, networks should be able to use the equivalent funding to deliver other heat cost reductions for households eligible for the scheme.
- Scottish Government should consult immediately on their plans for the future of the Warm Home Discount scheme and Energy Company Obligation in Scotland.
- Governments should extend the regulations in the private rented sector minimum energy efficiency standards so that all private landlords upgrade their properties to EPC C by 2028.
- Governments should ensure that funding mechanisms for decarbonising homes are available at least in part to private landlords where their tenants live in or are at significant risk of fuel poverty.
- The UK Government should work with local authorities to create a landlord register to ensure better enforcement of regulations in the private rented sector.
- The UK Government Department for Business, Energy and Industrial Strategy (BEIS) and Department for Levelling Up, Housing and Communities (DLUHC) should look to update the Decent Home Standard so that minimum expectations for energy efficiency in the social rented sector mirror those in the private rented sector.

Improving Transparency in the transition.

- UK Government should reinstate the regular reporting of how policy costs impact on consumer bills in order to provide transparency over the funding implications of the transition to decarbonised heating.
- Irrespective of the long-term future of the Default Tariff price cap, the UK Government should commit to keeping a long-term price protection mechanism in place to ensure that policy costs on bills continue to be passed through in a transparent and fair manner.
- UK Government should commit to impact assessments for all policy decisions at a more granular level, to better understand the distributional impacts of policy change, using Ofgem's distributional impact tool as a starter.

Polling prepared by YouGov on behalf of NEA to gather a nationally and politically representative view on a fair and affordable transition to net zero showed strong public support for our recommendations.

79% of British adults said that it is not likely that the UK can achieve net zero carbon emissions if the Government does not provide financial support to the poorest homeowners to make changes to decarbonise their homes.

66% of British Adults said it is more important that the UK transitions to net zero in a way that does not increase the cost of living for the poorest households, even if this means additional financial support from the Government.

74% of British adults said the government should provide support to everybody (52%) to switch to a green home heating system or that support should only be given to the poorest (22%) households only. 8% said The Government should provide financial support to the most polluting households only.

76% of British adults said the government should provide support to everybody (47%) to switch to a green home heating system or that support should only be given to the poorest (29%) households only. 7% said The Government should provide financial support to the most polluting households only.

48% of British adults said that the Government should pay the full cost of switching to a green home heating system for the poorest households.

44% of British adults said that the Government should pay the full cost of making home improvements to make their home more energy efficient for the poorest households.

2 Fuel Poverty Across the Nations

England

Progress Towards the Fuel Poverty Targets and Milestones			
Target/ Milestone	2010 Progress	2018 Progress	2019 Progress
2020 Milestone (EPC E or above)	91.5%	97%	97.4%
2025 Milestone (EPC D or above)	64.6%	86.8%	88.8%
2030 Target (EPC C or above)	14.6%	44.4%	47.8%

Definition

Low-Income, Low Energy Efficiency (Household income lower than 60% of median income; EPC rating of worse than C).

Statutory Target

Statutory Target for all fuel poor households to reach EPC C by 2030. Corresponding milestones to reach EPC D by 2025 and EPC E by 2020.

Scotland

	Target	Current (2019)
In Fuel Poverty	<15% by 2030, 10% by 2035, 5% by 2040	24.6%
In Extreme Fuel Poverty	<5% by 2030, 3% by 2035, 1% by 2040	12.4%
The Median Fuel Poverty Gap	£350 by 2030, £300 by 2035, £250 by 2040	£750

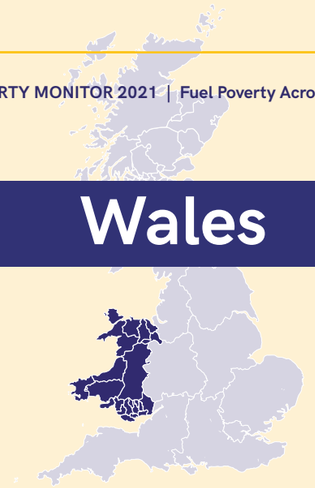
Definition

A household is defined as being in fuel poverty if more than 10% of its net income (after housing costs) is required to heat the home and pay for other fuel costs, with not enough money left for a decent standard of living. If more than 20% of net income is needed, the household is defined as being in extreme fuel poverty.

Statutory Target

No more than 5% of Scottish households in fuel poverty by 2040, and no more than 1% of households being in extreme fuel poverty. There are also targets to reduce household fuel poverty levels as progress is made towards meeting the 2040 targets.

Wales



	Target	Current (2019)
Fuel Poverty in All Households	0% by 2018	12%
Fuel Poverty in Vulnerable Households	% by 2010	11%
Fuel Poverty in Social Housing	0% by 2012	9%

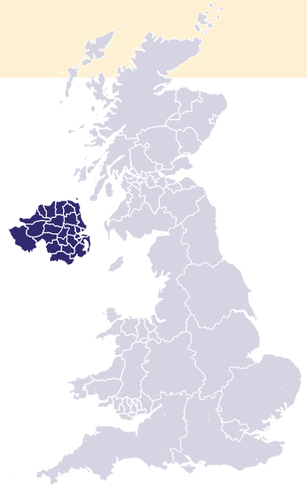
Definition

- Fuel Poverty - Households needing to pay more than 10% of their full household income to maintain a satisfactory heating regime
- Severe Fuel Poverty - Households needing to pay more than 20% of their full household income to maintain a satisfactory heating regime
- Persistent Fuel Poverty - Households needing to pay more than 10% of their full household income to maintain a satisfactory heating regime in two out of the three preceding years
- At risk of Fuel Poverty - Households needing to pay more than 8%, but less than 10% of their full household income to maintain a satisfactory heating regime.

Three targets by 2035

- No households are estimated to be living in severe or persistent fuel poverty as far as reasonable practicable
- Not more than 5% of households are estimated to be living in fuel poverty at any one time as far as reasonably practicable;
- The number of all households "at risk" of falling into fuel poverty will be more than halved based on the 2018 estimate

Northern Ireland



	Target	Current (2018)
Fuel Poverty in All Households	None at present	22% /160,000
In severe fuel poverty (15%+)	Target 33,000 spending 25% of income	6% / 43,800

Definition

A household is said to be in fuel poverty if it needs to spend more than 10% of its income on energy costs.

Statutory Target

2014 target to alleviate fuel poverty by targeting 33,000 in extreme fuel poverty (25% of income)

3 Introduction

National Energy Action (NEA) and Energy Action Scotland (EAS) are the UK's national charities aiming to end fuel poverty. For two decades, we have published a yearly investigative report on progress to eliminate fuel poverty across the UK and within each of the four UK nations: the UK Fuel Poverty Monitor (UKFPM).

Last year witnessed the beginning of the Covid-19 pandemic, and the UKFPM 2019/20 subsequently focused on capturing the issues facing fuel poor households during the crisis. We recommended a range of solutions to ensure that there was guaranteed support available throughout a period of acute and unprecedented hardship for many households. This year's UKFPM looks through a longer lens, examining the links between fuel poverty and decarbonisation and focusing on how the drive to decarbonise domestic heating can be harnessed to alleviate fuel poverty across the nations. This has become an incredibly important topic this year, with policy announcements such as the Heat and Buildings Strategy from Westminster, the Heat in Buildings Strategy in Holyrood, and the Net Zero Wales Plan, along with the imminent introduction of Northern Ireland's new Energy Strategy. But there has also been a gas price crisis, which has brought into focus the need to ensure that our homes are adequately insulated from the potential for global markets to create significant price spikes.

This year's UKFPM identifies: the opportunities associated with decarbonising heat for fuel poor households; the barriers they face in doing so; the likely impacts of the decarbonisation agenda on them; the value of transparency in terms of how energy policies are paid for; and which policy developments and interventions are required to ensure that the decarbonisation of domestic heating can be fair and affordable. It seeks to highlight the actions that must be taken if fuel poor households are to be the first to benefit from the decarbonisation of the way we heat our homes. In July 2021 we issued a Call for Evidence (CfE) to stakeholders across the UK and Europe, and across sectors such as energy supply, distribution, and installation; local, regional, and national Governments; health and social care; housing; and not-for-profits and charitable organisations. The CfE aimed to explore the views of our stakeholders and members on different pieces of the decarbonisation puzzle, and how these pieces should be put together to ensure fuel poor households are at the front of the queue to benefit from the transition.

Through this Call for Evidence (CfE), which gained responses from 122 respondents, and wider engagement with stakeholders, we have considered the opportunities, impacts and barriers to fuel poor households of decarbonising their homes. To further inform our research, we interviewed representatives from governments, regulators, and consumer advocacy groups to understand their views on the links between decarbonisation and fuel poverty. We also conducted interviews with households NEA has supported with decarbonising their heating over the past year to understand more about their experiences. The barriers and benefits they encounter are incorporated into this report in the form of three case studies, each of which tells the real-life story of a household that tried to decarbonise their home – but with mixed results and from which several lessons must be learnt.

Using this rich data, we present recommendations to address the barriers that are faced by fuel poor households as we look to decarbonise our homes, and to harness the vast opportunity that can be achieved if we do so in the right way.

4 Background

It is recognised that warm and safe homes can be, and need to be, at the heart of a fair and affordable transition to net zero. Without programmes to transform the homes of those on the lowest incomes living in the least efficient properties, and to provide clean heating technologies, we will fail at both.

The UK has had a statutory target to significantly reduce the carbon emissions of its economy since 2008, and since then, the target has tightened, with legislation now stating that the UK must not exceed net zero carbon emissions by 2050. In addition to these carbon targets, each country of the UK has their fuel poverty target, and some have their own carbon targets, as **Table One** shows.

Nation	Carbon Targets[ii]	Fuel Poverty Target
Whole UK	Net zero emissions by 2050 78% reduction by 2035	NA
England	NA	All fuel poor households to reach EPC band C by 2030. All fuel poor households to reach EPC band D by 2025.
Wales	Net zero emissions by 2050 63% reduction by 2030 89% reduction by 2040	By 2035: No households are estimated to be living in severe or persistent fuel poverty as far as reasonably practicable. Not more than 5% of households are estimated to be living in fuel poverty at any one time as far as reasonably practicable. The number of all households "at risk" of falling into fuel poverty will be more than halved based on the 2018 estimate.
Scotland	Net zero emissions by 2045	By 2040: No more than 5% of Scottish households in fuel poverty by 2040. No more than 1% of households being in extreme fuel poverty.
Northern Ireland	No Specific Target	No live target. Lapsed target to, by 2014 alleviate fuel poverty by targeting 33,000 in extreme fuel poverty (25% of income).

Table One: Carbon targets and fuel poverty targets in each UK nation

Much has already been done to decarbonise the heating of our homes. For over a decade there have been schemes designed to help make energy more affordable for households through energy efficiency (which also reduces carbon emissions), and to reduce our carbon emissions more explicitly. The Energy Company Obligation (ECO) has operated since 2013, and as far back as 1991 there was a Home Energy Efficiency scheme in Great Britain. In order to understand where the journey towards decarbonising domestic heating is going, it is important to understand what has been achieved so far. This section outlines progress to date for both the energy efficiency of our homes, and the way we heat them.

ii Carbon reductions compared to a 1990 baseline.

4.1 Progress Decarbonising Homes to Date

Energy Efficiency

Across Great Britain, fuel poor households live in a diverse range of housing, with varying levels of energy efficiency and heating types. **Table Two** shows the energy efficiency of fuel poor dwellings, including both the number and percentage of all fuel poor households in each EPC band.

EPC Band	England		Wales		Scotland		Northern Ireland	
	Number of Fuel Poor Households	% of Fuel Poor Households	Number of Fuel Poor Households	% of Fuel Poor Households	Number of Fuel Poor Households	% of Fuel Poor Households	Number of Fuel Poor Households	% of Fuel Poor Households
A/B/C			21,000	14%	213,000	34%	33,245	21%
D	2,461,000	77%	64,000	41%	283,000	46%	70,377	44%
E	548,000	17%	35,000	23%	87,000	14%	43,757	27%
F	126,000	4%	35,000	23%	36,000	6%	12,453	8%
G	41,000	1%						

Table Two: The energy efficiency of fuel poor dwellings, including both the number and percentage of all fuel poor households in each EPC band

Energy efficiency schemes have been accessible in the UK for decades, with the first GB scheme starting in 1991. Statistics before ECO are relatively hard to come by, but **Figure One** shows that while significant progress was made in the early 2010s to improve the energy efficiency of homes, this has recently slowed substantially.

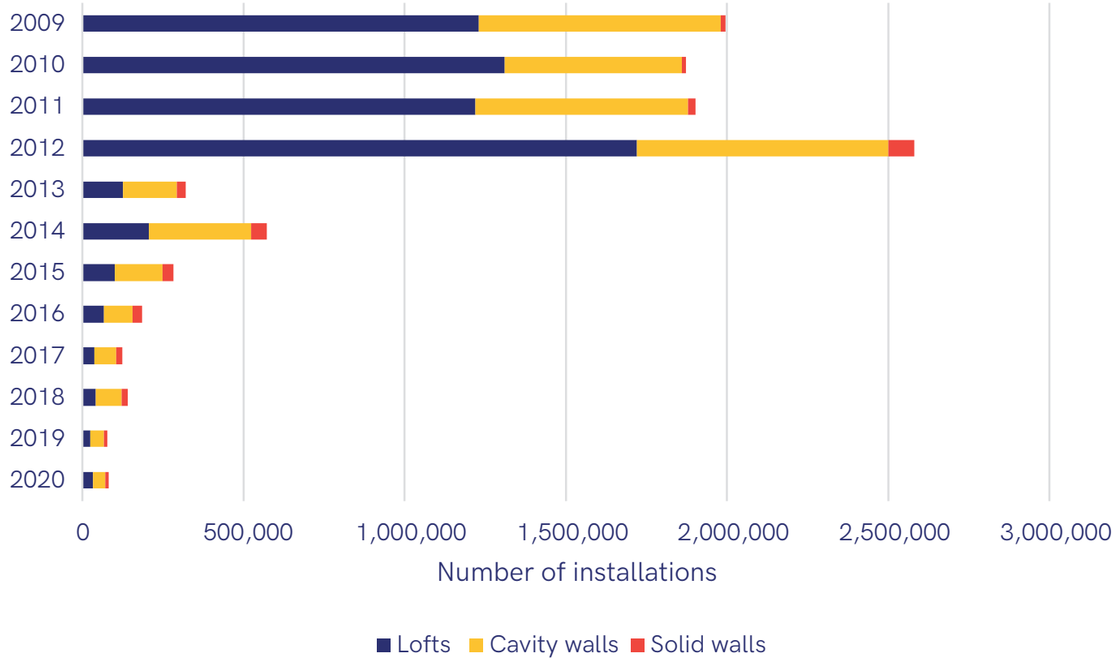


Figure One: Home insulation installations by measure by year in Great Britain[2]

Increased energy efficiency also impacts those in fuel poverty, as many Government schemes to increase the efficiency of our homes have focused on fuel poor households. In England, the number of least efficient homes has reduced significantly since 2010.[3], with only 2.5% of fuel poor households in properties with an EPC of F/G in 2019, compared to 8.5% in 2010. In Scotland, the energy efficiency of domestic buildings increased by 6 SAP points on average between 2010 and 2018. In 2018 half of all Scottish dwellings were rated 68 or better, an increase from 62 in 2010. Both ratings fall into band D.[4] In Northern Ireland, good progress has been made improving loft insulation, with 55% of homes having the highest standard of loft insulation in 2016, compared to 35% in 2011. Wales has the oldest and least thermally efficient dwellings compared to other UK nations and northerly European countries, and lags behind the rest of the UK in upgrading the energy efficiency of its housing stock.[5] This disproportionately affects poorer households in Wales; more than 80% of fuel poor households in Wales live in inefficient homes.

Statistics on the outcomes of ECO also demonstrate the impact of improving the energy efficiency of the poorest homes on energy bill affordability across Great Britain, as shown in **Figure Two**. It shows there have been approximately 1.7 million measures installed under the Affordable Warmth segment of ECO to the end of June 2021, with an estimated lifetime bill saving for households of £17.1 billion.

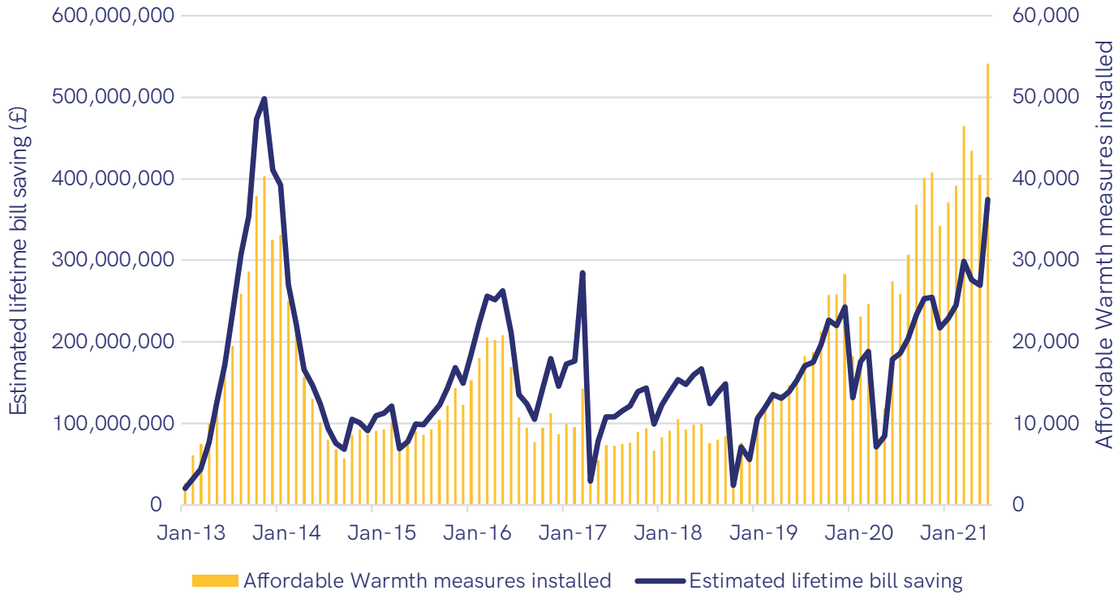


Figure Two: Affordable Warmth measures installed through ECO and estimated lifetime bill savings by quarter and year[6]

The ECO scheme does not stretch beyond Great Britain and the picture regarding energy efficiency in Northern Ireland is quite different. Northern Ireland has historically been behind the standards in the rest of the UK. There are higher levels of fuel poverty and lower levels of disposable income, arguably with worse environmental conditions, particularly in the West of Northern Ireland, where there are higher levels of rainfall, lower average temperatures, and higher altitudes, all of which exacerbates heat and energy loss from buildings.[7]

Heating Technologies

In Great Britain, domestic heating is dominated by the use of gas boilers.[iii] Although burning gas emits carbon dioxide, developments in gas boiler technology have made significant contributions to reducing the carbon emissions from our homes over the last two decades. With the introduction of condensing boilers, an efficiency of around 95% can now be achieved when using gas to heat our homes. This is compared to an efficiency of approximately 60% for boilers from 25 years ago. In 2008, BRE estimated[8] that between 1970 and 2006, the average efficiency of space heating jumped from about 50% to more than 70%. Since 2005, it has been law that all new gas boilers must be condensing boilers, meaning that for the last 16 years, all newly installed gas boilers have been capable of reaching efficiencies above 90%. This progress has achieved significant carbon savings towards interim carbon targets. However, now that we are moving towards net zero carbon emissions, we must find a way to fully decarbonise home heating. No matter how efficient a natural gas boiler is, it will still emit carbon dioxide. Alternatives must be found.

iii Whilst in Great Britain domestic heating is dominated by gas boilers, in Northern Ireland there is a different picture and heating is dominated by oil boilers, which make up 68% of the market.

To decarbonise domestic heat, it is broadly agreed that heat pumps are a crucial heating technology that will be used in the UK. Heat pumps extract ambient heat from the air or ground and use it to heat homes and hot water. In the Heat and Buildings Strategy, published in October 2021, the UK Government reaffirmed their target of installing 600,000 domestic heat pumps per year by 2028.[9] In their 'Balanced Net Zero' pathway, the Climate Change Committee (CCC) similarly project that heat pump sales will reach over 1 million per year in new and existing homes by 2030.[10] However, progress needs to swiftly accelerate for these targets to be achieved. While reliable data on the number and type of heat pump installations across the UK is difficult to identify, statistics from the CCC suggest that annual domestic heat pump installations increased slightly from 33,000 in 2019 to 36,000 in 2020.[11] Heat pump deployment therefore needs to be rapidly scaled up if the CCC 'Balanced Net Zero' pathway is to stay within reach, as **Figure Three** below shows.

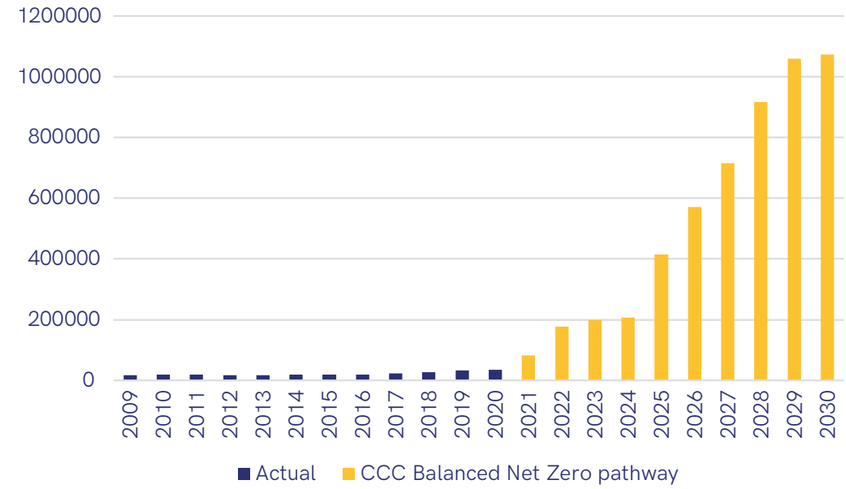


Figure Three: Heat pump sales/installations in the UK per year to 2020, and the sales required by the CCC 'Balanced Net Zero' pathway to 2030.[12]

Two further main heating technologies are also options for the decarbonisation of domestic heat. The first relates to the repurposing and conversion of the existing gas network to distribute hydrogen, which emits no CO2 at the point of use.[13, 14] While the hydrogen option is not yet mature, the UK Government is currently supporting a number of hydrogen heating trials in the 2020s to explore the feasibility and economic cost of converting the grid. The recently published Hydrogen Strategy states that, if the case for hydrogen heating is successful, an area-by-area conversion could begin in the early 2030s, and also notes the Government's intention to explore the possibility of mandating the installation of 'hydrogen ready' boilers in homes in the mid-2020s.[15] This is in line with the CCC's 'Balanced Net Zero' pathway, which includes a scenario whereby all new gas boilers are hydrogen ready by 2025.[16] In addition, the UK Government is also considering whether, as an interim step, hydrogen could be safely blended into existing natural gas supply to begin reducing the carbon intensity of gas heating and provide industry with a stimulus to scale up production.[17] Proponents of hydrogen suggest that conversion could be a way of eliminating emissions from UK homes at scale with minimal consumer disruption,[18] but some whole energy systems modelling has suggested it should not be considered a cost-effective or primary technology for decarbonising homes.[19]

Another main heating technology, which is already in deployment across the UK, are heat networks. Figures from the Heat Trust state that heat networks currently supply only 2-3% of current heat demand in the UK.[20] Heat networks primarily consist of a distribution system of insulated pipes that transport heat from a central production source to domestic homes. The central production source is typically either a bespoke unit, such as a combined heat and power plant, or waste heat redirected from other industrial processes, such as waste treatment or geothermal power.[21] The CCC has noted that at present, approximately 93% of heat networks use fossil fuel sources, but they project that all new heat networks will use low-carbon sources by 2025, with any legacy fossil fuel networks converted by 2040.[22] In their 'Balanced Net Zero' pathway, the CCC also estimate that, from 2028, 0.5% of total heating demand will be converted to heat networks per annum, with around a fifth of heat being provided through heat networks by 2050.[23] There are, however, challenges with the current use of heat networks. It is not a sector that is regulated in the same way as electricity and gas, meaning that households are not offered the same level of consumer protections as for other technologies. This risk has been identified by BEIS, who are in the process of instating Ofgem as the regulator of heat networks.[24]

Other available (though less prevalent) technologies that are within its projections of what will be needed to decarbonise heating include:

- **Direct electrical resistive heating technologies** are in use in over 690,000 residential properties across the UK. The efficiency of these heaters is 100% - all energy input is converted to heat. However, they are expensive to run because of the relatively high costs of electricity.
- **Electric Storage Heaters** are in use by more than 1.6 million households. These heaters are designed to create heat at one point in time but delay the release of this heat into the home. This allows these heaters to take advantage of time of use tariffs, using electricity when it is cheapest and dispersing it when it is needed. They are, however, currently more expensive to run compared to gas due to their low overall efficiency.
- **Biofuel Boilers**, which very few households currently use. They work by burning various types of fuels that are obtained from organic matter, for example wood. This process can be carbon neutral, but this is not always the case.

Each of these technologies could help to reduce carbon emissions, mitigating climate change and therefore reducing climate risk for fuel poor households. Beyond this inherent advantage, each technology has advantages and disadvantages for fuel poor households. A summary of these is shown in **Table Three** below.

	Advantages	Disadvantages
Heat Pumps	Proven technology Very efficient, producing many units of heat per input unit of energy Potential to provide cooling as well as heating	Could come with need to replace radiators. Not effective for some off- gas fossil heated properties due to poor energy efficiency and internal fuels limits (~20% of the housing stock). May require behaviour change if operating at low temperatures (for best efficiency). Not suitable for prepayment users because of the risk of self-disconnection. Would potentially require electricity connections to the home. More expensive to install than a gas boiler. Currently more expensive than a gas boiler to run due to the cost differential between electricity and gas (partially due to policy costs).
Heat Networks	Can reduce bills and ongoing maintenance costs. Can be particularly cost effective in dense urban environments Can potentially deliver cooling as well as heating. Little or no upfront costs to the householder, with costs recovered over a long period.	Not currently regulated in the same way as power and gas. Can be complex to build and connect multiple buildings in a local area Sufficient heat demand is necessary to make investment worth it.
Hydrogen	Would use the existing gas networks, with some adjustment needed to the infrastructure such as upgrading from metal to plastic pipework. Similar to use when compared with a gas boiler. Hydrogen ready boilers can be used with the current gas infrastructure ahead of any conversion. Hydrogen boilers themselves are relatively cheap to install.	Hydrogen as a fuel is to be significantly more expensive than natural gas. Will require capital investment in network infrastructure. Relies on clean production of hydrogen to be a fully decarbonised option. This is likely to be challenging. Could come with need to replace radiators and piping inside the home.
Direct Electric Heating	Relatively cheap to install. Provides high temperature heat which is closer to the current experience of many householders.	Very expensive to run. Relatively inefficient compared to a heat pump. Mass rollout would require significant capital to be spent on upgrading electricity network infrastructure.
Electric Storage Heaters	Can provide relatively cheap heat if used with the right tariff and with correct settings.	Can be very expensive to run if the tariff and the controls are not set up in the right way. Mass rollout would require significant capital to be spent on upgrading electricity network infrastructure.
Biofuel Boilers	A viable option for homes that are difficult to heat and difficult to improve in terms of energy efficiency. Can be more expensive to run than a current gas boiler.	In 2018, domestic burning through wood burning stoves and coal fires was the single largest contributor to national emissions of particulate matter. Burning wet wood has a much lower heat output and can result in more than twice the amount of smoke emissions than from seasoned or dry wood. Uncertainty around the sustainability of biofuel supply chains.

Table Three: Advantages and disadvantages of key low-carbon heating technologies for fuel poor households

Rich, disaggregated data on separate heating types is not available for each nation, but Figure Four below represents National Grid's estimates of heating types used by all households across the UK.

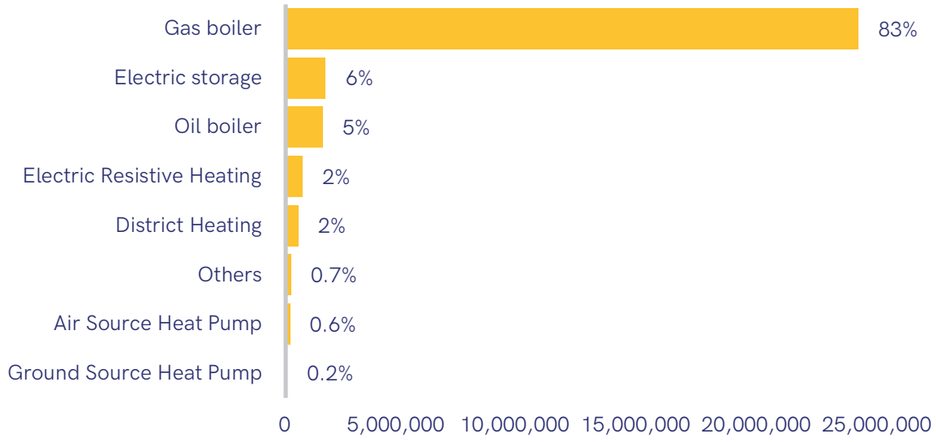


Figure Four: Estimated share of domestic heating in the UK[25]

This mix of heating fuels and technologies varies within different nations across the UK, primarily because of differences in access to a mains gas grid:

- In England, natural gas boilers dominate the domestic heating market (85%), with most non-gas households being electrically heated (7% of the heating market), and the remainder (6%) using unregulated high carbon fuels like oil and Liquified Petroleum Gas (LPG).
- In Wales and Scotland, gas central heating is slightly less prevalent than in England (82% in Wales and ~80% in Scotland) owing to there being more homes living in rural settings, but gas remains by far the dominant heating fuel.
- In Northern Ireland, the gas grid is relatively nascent, meaning that relatively few homes heat their homes this way (25%). The dominant heating source is heating oil, with 68% of households in Northern Ireland relying on oil-fuelled boilers for heat.

4.2 Policy Background

In order to achieve the physical improvements needed to decarbonise homes, Government and regulatory policies are needed. **Table Four** below shows the policies that exist across the UK to help decarbonise homes.

Location	Policy	Description	Scale of Funding
GB	**Energy Company Obligation**	An obligation on energy suppliers to achieve energy savings in homes.	From April 2022 will be £1bn/year to April 2026
England	**Green Homes Grant – Local Authority Delivery**	Funding provided to local authorities to help decarbonise low-income households.	£700m in total from September 2020 to April 2022
	Home Upgrade Grant Scheme	Funding to help low-income households off the gas grid to improve their energy efficiency and switch to clean heat.	£1.1bn in total from September 2021 to April 2025
	Social Housing Decarbonisation Fund	Funding to help social housing providers improve the energy efficiency of their properties and switch to clean heat	£950m in total from September 2021 to April 2025
England and Wales	**Boiler Upgrade Grant**	Grant scheme providing financial assistance towards the installation of a heat pump in domestic properties (not limited to low-income).	£450m in total from April 2022 up to April 2025
	Minimum Energy Efficiency Standards in the Private Rented Sector	Legal standard for all private landlords to spend at most £3.5k to ensure their property reaches EPC E.	Regulation without funding
Wales	**Warm Homes Programme: Nest**	Funding provides advice and free home energy efficiency improvements to eligible low-income and vulnerable households across Wales.	Currently combined £40m/year. Will be re-assessed in upcoming review to be finalised in 2022.
	Warm Homes Programme: Arbed	Funding for free home energy efficiency improvements in areas most likely to be affected by fuel poverty.	
	Optimised Retrofit Programme	Funding to test a new, whole-house, pragmatic approach to decarbonising homes in Wales, focused to-date on social housing.	£19.5m in 2020/21; £50m in 2021/22; £69.5m in 2021/22
Scotland	**Home Energy Efficiency Programmes for Scotland**	Funding for local authorities to develop and deliver energy efficiency programmes (mainly solid wall insulation) in areas with high levels of fuel poverty.	£482m in total from 2013 to 2022
	Energy Efficient Scotland: Warmer Homes Scotland	Funding available to private sector households (tenants or owner-occupiers) who are living in or at risk of living in fuel poverty and who meet the qualifying eligibility criteria.	£16m / year until September 2022
Northern Ireland	**NISEP**	Funding to help households improve the energy efficiency of their homes. 80% of the funding is directed at vulnerable customers.	£7.4m in 2020/21
	Boiler Scheme	Funding for owner occupiers whose annual total gross income is less than £40,000, providing assistance to help with the cost of replacing outdated oil or gas boilers.	£1.4m in 2020/21
	Affordable Warmth	Funding to help reduce the effects of fuel poverty in the private sector, offering a range of measures for households with an annual income of less than £20,000.	£12.3m in 2020/21

Table Three: Advantages and disadvantages of key low-carbon heating technologies for fuel poor households

5 Where there is opportunity, there is risk

In order to understand how to achieve a fair and affordable decarbonisation of heating for fuel poor households, we need to understand the impact that decarbonising heat could have on them, both in a positive and negative sense. This section draws on stakeholder responses to our CfE to examine the likely impacts of current plans to decarbonise heat for fuel poor households.

5.1 The Opportunities of Heat Decarbonisation

The respondents to our research signalled that there are four opportunities that can be achieved if the decarbonisation of heating is fair and affordable. These are: financial savings through thermal efficiency; reduced emissions from homes; increased thermal comfort; and improved health and safety.

Financial savings through thermal efficiency

In order to decarbonise our homes, the most cost-effective options from a whole-country perspective are to reduce space heating demand first, reducing the need for national infrastructure like power stations and the expansion or reinforcement of gas and electricity networks. For fuel poor households, this means increasing the thermal efficiency of domestic buildings. Through this, significant savings can be made. Those living in the worst performing properties, with an EPC of F or G, can save more than a thousand pounds per year if they are able to increase the thermal efficiency of their buildings and reach an EPC of C or above.[26] For fuel poor households who are in debt to their energy supplier, this means that debt can be repaid quicker, reducing the burden of additional payments.

Additionally, improved energy efficiency gives more protection when energy prices sharply rise. In the current winter of 2021/22, for example, significant increases in wholesale gas prices have led to increased domestic energy prices. This has resulted in higher bills for millions of households. Those living in relatively well insulated properties will see much lower increases in their bills than those in worse properties. E3G have found that by April 2022, those living in EPC D properties may be seeing a bill increase of over £100 higher than those living in more efficient properties.[27]

"The ideal activity contributes to fuel poverty, healthy homes, low-carbon, air quality, and local employment/ levelling up policy goals. Appropriate insulation ticks all these boxes."

Local Authority, England

iv This calculation is based on the average fuel poverty gap for each EPC band in England (the reduction in energy costs if a home is upgraded to EPC C) being applied to fuel poor households in each band across the nations.

Overall, NEA estimates that upgrading the 3.85 million homes in fuel poverty across the UK to a suitable level of energy efficiency, an average saving of £223/year for each household could be achieved, with total energy savings of £850 million per year[iv].

Reduced Carbon Emissions from Homes

Decarbonising fuel poor homes will greatly reduce domestic carbon emissions. Although low-income households account for a relatively small proportion of emissions on a per capita basis, reaching our net zero target will require all homes to decarbonise. Indeed, analysis conducted by Agility Eco and Gemserve[28] has estimated that the total value of carbon emissions reduction achieved by meeting the fuel poverty target for England and decarbonising fuel poor homes is approximately £12bn.

Thermal Comfort

Reducing the cost of heating homes can lead to greater thermal comfort for fuel poor households by reducing the likelihood that they will need to ration their energy use. Energy rationing often forms part of a set of harmful coping mechanisms employed by fuel poor households to meet the cost of energy and/or other essential spending priorities. Such practices can have significant impacts on health and wellbeing, whilst improvements to thermal comfort can, likewise, improve it. Some of the most common energy rationing practices are shown below.

The value of thermal comfort is hard to quantify, with the impact on the health sector being the main economic benefit. This is addressed below. Analysis suggests that cold homes cost the NHS approximately £1.4bn/year in England,[29] £95m/year in Wales,[30] and £80m/year in Scotland.[31] On a per capita basis, this translates to approximately £50m for Northern Ireland. It is also estimated that the health service saves £0.42 for every £1 spent on retrofitting fuel poor homes,[32] and that the total costs to society of poor housing is £18.6 billion.[33] In total, across the UK, this amounts to a total potential benefit of more than £1.5bn if the decarbonisation of heat ends cold homes. The potential benefits of removing the health and safety risks posed by thermally inefficient homes is discussed further in the following section.

83% of CfE respondents agreed that decarbonising fuel poor homes is an opportunity to create more affordable and manageable energy bills by improving energy efficiency

"The major benefits of more energy efficient homes would be the immediate improvements to householder thermal comfort, with knock-on benefits for their health and wellbeing. In many cases this is also likely to lead to more affordable energy bills, especially in cases of 'deep retrofit'."

Academic, England 85% of CfE respondents agreed that decarbonising fuel poor homes is an opportunity to increase thermal comfort.

Improved Health and Safety

Households which have been forced to live in colder indoor temperatures, either due to affordability or energy efficiency issues, can be at risk of experiencing significant ill-health:

- **Respiratory disease.** With each 1°C drop in temperature below 5°C, GP consultations for respiratory illness in older people increase by 19%. Hospital admissions for Chronic Obstructive Pulmonary Disease (COPD) are four times more likely to happen over the winter. Moreover, homes which have damp or mould have been linked with a 30-50% increase in respiratory problems (with asthma sufferers two to three times more likely to live in a damp home than non-sufferers). Children living in cold homes are more than twice as likely to suffer from asthma or bronchitis as children that do not (those in damp and mouldy homes are three times more likely). They have a 32% greater risk of wheezing illness and 97% greater risk of suffering from breathing problems at night.
- **Cardiovascular disease.** It has been estimated that 9% of hypertension in Scotland could be prevented by maintaining indoor temperatures above 18°C. Increased plasma fibrinogen levels and factor VII clotting during winter account for a 15% and 9% rise in coronary heart disease, respectively. A 1°C drop in living room temperature can lead to a 1.3mm Hg rise in systolic blood pressure and a 0.6mmHg rise in diastolic blood pressure in people aged 65-74.
- **Mental ill health.** Living in cold and poor-quality housing has been linked to persistent worries about affordability, concern about physical health, higher levels of depression and worry, and chronic thermal discomfort. NATCEN found that 10% of people suffering from a Common Mental Disorder (CMD) were not able to keep their homes warm enough during the winter. Children, young people, and parents have been shown to be especially at risk. More than 1 in 4 adolescents living in cold housing are at risk of multiple mental health problems, compared to 1 in 20 adolescents who have always lived in warm housing,[34] and parents living in fuel poverty are between 1.5 and 1.8 times more likely to develop depression than parents who live in a warm home.[35] Poor quality cold housing has also been linked to several negative mental health consequences for children, such as stigmatisation, social isolation, and feelings of helplessness, which can negatively impact on educational attainment and social mobility.[36]
- **Sickle Cell Disease.** Comfortable temperatures for someone with SCD range from 20°C to 30°C, though those on low incomes may struggle to afford to meet the cost of maintaining a healthy temperature at home. A single hospital admission for SCD can cost £637-£11,367, and some have argued that part or fully subsidising the heating bills of SCD sufferers would be more cost effective to the NHS.
- **Issues with Nutrition.** Cutting back on food spending to meet the cost of paying for energy can lead to malnutrition, poor infant weight gain, and adverse impacts upon other health conditions such as tuberculosis (TB) and diabetes.[37]

"Excess cold is one of the primary reasons for homes failing health and safety standards. In 2018, an estimated 17,000 people died due to cold homes. Decarbonising our homes has the ability to not only tackle the climate emergency but also save lives, and address fuel poverty."

Charity, England

Additionally, the emissions that are an output of burning carbon-based fuels can cause health and safety issues. In the home, burning fossil fuels creates the risk of creating carbon monoxide, which can be deadly. It is estimated that there may be 250 admissions per year in England due to carbon monoxide poisoning.[38] Emissions can also have an impact on the air quality of our neighbourhoods. Long-term exposure to air pollution reduces life expectancy by increasing deaths from cardiovascular and respiratory conditions, and from lung cancer, and it is estimated that long-term exposure to air pollution in the UK has an annual effect equivalent to 28,000 to 36,000 deaths.[39] However, recent research by the Royal Society has emphasised that decarbonising the residential sector is a significant opportunity to reduce air pollution, and that heat pumps, direct grid electricity generated from low-carbon sources, and solar PV could "lead to positive air quality outcomes, reducing NOx, VOC and particle emissions in the urban environment."[40]

89% of CfE respondents agree that decarbonising fuel poor homes is an opportunity to reduce health problems associated with cold homes

83% of CfE respondents agree that decarbonising fuel poor homes is an opportunity to improve local air quality

70% of CfE respondents agree that decarbonising fuel poor homes is an opportunity to improve home safety

June's Story

June lives with her husband in a town on the west coast of England. They are both approaching state pension age and receive benefits after her husband had a stroke. June had a heat pump installed after seeing an advert on social media and doing some research into how they work. Overwhelmingly, she was persuaded by the case that swapping her old gas boiler for a heat pump would be better for the planet, and for her family:

"The environment is well in the news. I've got grandchildren and I don't want them suffering later on. You know? We've got to do something. It's a little bit, but it's my contribution."

June took out a loan to pay for the cost of the heat pump and described how the installation was completed in a day with minimal disruption. Before leaving, the installers took the time to help her set the temperature to the level she wanted and explained how she could change it. For her, the outcome has been quite satisfactory; her heating costs have not increased, and she is warmer and happier at home:

"At the moment, it's just being used for hot water, but I've never turned the tap on and not had hot water. It's so quiet. Outside, when it runs, it's so quiet, you can't hear it at all. We have had a couple of cold nights [here], and our heating is set for 18 degrees, so if it drops below 18 degrees, it comes on. We've never got up [in the morning] and it's been cold yet."

However, June's experience was not entirely positive. Following the installation of her heat pump she enquired as to how she might have her gas supply removed and was told it could cost up to £2,000. With limited money coming in and mindful of her age, June worked out it would be cheaper to leave the meter alone and continue paying the standing charge:

"While the meter is connected, we still have to pay the standing charge. So it's how much it's going to cost to have it taken out because, apparently, it can cost up to nearly £2,000. So what's the point in paying it all? You may as well just keep paying the £100 or whatever it is because it's cheaper to do that in the long run.

June's story demonstrates that when done well, low-carbon technologies can bring multiple benefits to fuel poor households. Her house is warm, and she feels a sense of pride that she is contributing to making the planet a better place to live for her grandchildren. But her experience also shows that we aren't quite there yet – she had to take out a loan for her heat pump and received no financial support, information or advice around potential ancillary costs, which means she is still paying for a gas supply she does not have. Had the appropriate financial and advice-based support been available, her journey could have been much smoother and appropriate to the needs of someone in or at risk of fuel poverty.

Economic development and improved local areas

The need for energy efficiency upgrades is spread relatively evenly across the UK, and recent research is beginning to evidence the broader ripple effects of energy efficiency programmes across local economies. For example:

- Research by Agility Eco and Gemserv found that further spending on fuel poor homes would result in positive returns to the economy, and that if Government funding is increased to the level required to meet fuel poverty targets, an indicative net return to the economy of £16 billion could be achieved.[41]
- A study by Cambridge Econometrics suggests that combining a nationwide energy efficiency programme with a broader rollout of heat pumps could provide 138,600 new jobs and a £9.8 billion boost to the economy by 2030.[42]
- Research by Strathclyde University found that if funding is entirely focused on retrofitting lower income households, social objectives, such as reducing fuel poverty, can still be delivered alongside sustained positive wider economy returns, on a scale of net per annum gains of £63.4 million GDP and 957 FTE jobs.[43]

Public money spent on energy efficiency also increases household disposable income by lowering energy bills. Preliminary outputs from the ongoing programme evaluation of the Warm Homes Fund suggests this spending will take place in parts of the local economy that require boosting in the aftermath of the Covid-19 pandemic, increasing economic activity and jobs both in the sectors and parts of the country that need it most.[44]

"Economic growth and employment is a massive opportunity, but this has yet to be realised. Jobs and skills need to be a priority if a just transition is to be realised."
Charity, Scotland

75% of CfE respondents agree that decarbonising fuel poor homes is an opportunity to create economic growth and employment in relatively deprived areas.

5.2 The Financial Risks to Fuel Poor Households of Heat Decarbonisation

Although there are clear opportunities for households and the UK as a whole of decarbonising fairly, our stakeholders also warned of negative impacts for fuel poor households that must be avoided. Although many of our CfE respondents agreed that negative impacts could be mitigated if actions were taken, they were often pessimistic about the potential risks and impacts of heat decarbonisation. Our CfE respondents were also often concerned about the financial implications for some of the poorest households if heat decarbonisation decisions were not optimal. As Table Five shows, our stakeholders strongly believed it is likely that a range of negative financial impacts will come to pass for fuel poor households, based on current plans to decarbonise. Negative impacts on energy bill affordability were expected due to:

a. An acceleration of the shift from using natural gas to using electricity as a heating fuel, if any negative distributional impacts are not mitigated from the outset.

b. A potential increase in the price of electricity (and other low-carbon heating fuels like hydrogen and biomethane) relative to the present day, as is currently predicted in some forecasts from BEIS[45] and the CCC[46].

c. The added pressure placed on energy bills (via levies) by the system costs and policy costs of decarbonising our energy system.

Respondents did feel that some of these costs were likely to be offset by continuing grant-funded energy efficiency measures, but the risk of a sharp increase in the unaffordability of energy for fuel poor households remained.

Secondly, CfE respondents believed that the upfront costs of installing new low-carbon heating systems would likely have a significant negative impact on fuel poor households (either by suffering significant financial detriment as a result of paying for such measures, or by being excluded from accessing such technologies due to cost barriers). They also felt it was likely that fuel poor households using soon-to-be-banned fuels, such as coal and wet wood, would suffer additional detriment as a result of the transition as they may not receive sufficient support to move to ways of heating compatible with net zero.

Thirdly, as the transition to primarily electric sources of heating develops, CfE respondents felt it was likely that households unable to switch early to electric heating will be left paying more for a gas network that fewer people use. Gas network maintenance and replacement costs are paid for by all consumers through their gas bills, but if more affluent households switch to electric heating and have their gas connection removed, these costs will be distributed among a smaller and smaller pool of households that are more likely to be fuel poor. This issue is exacerbated in Northern Ireland, where the gas network is still expanding without certainty over its future.

Finally, CfE respondents did not believe that incomes would rise sufficiently to offset any increases in the upfront costs or running costs of low-carbon heating systems. We have seen a possible glimpse of this future in the autumn of 2021, with surging gas and electricity prices, the removal of the Universal Credit uplift, and rising inflation combining to deepen the cost-of-living crisis for millions of households.

Impact	Positive or negative	Likelihood
Energy usage and therefore cost is reduced through grant-funded energy efficiency measures	**Slightly positive**	**Likely**
The cost of energy increases due to increased costs of decarbonising our heating supplies	**Very negative**	**Likely**
Average energy bills increase due to switching from gas to electricity for heating	**Very negative**	**Very likely**
No financial support is available to install low-carbon technologies for those unable to use fuels regulation prohibits (e.g. coal or wet wood)	**Very negative**	**Likely**
Installing a new low/zero carbon heating system is significantly more expensive than installing current gas/oil systems	**Very negative**	**Very likely**
Increased energy bill levies to pay for decarbonisation mean fuel poor households will bear a disproportionate burden of the cost	**Very negative**	**Likely**
Fuel poor households who cannot afford to decarbonise are left paying more for a gas network that fewer people are using	**Very negative**	**Likely**
Heating fuels become more expensive relative to the present day (e.g. electricity, hydrogen, biomethane)	**Very negative**	**Very likely**
Household incomes do not rise sufficiently to offset any increases in cost	**Very negative**	**Very likely**

Table Five: Stakeholder perceptions of the financial impacts of decarbonising fuel poor homes, based on current plans to decarbonise

FUEL POVERTY MONITOR 2021 | Where there is opportunity, there is risk

5.3 Other Risks of Heat Decarbonisation

In addition to the financial impacts of decarbonising heat, our stakeholders also felt there were other negative impacts that were likely to occur for fuel poor households. Firstly, CfE respondents believed that specific groups with unique vulnerabilities to fuel poverty are more likely to be left behind by the decarbonisation of domestic heating and suffer negative consequences as a result. These groups include:

- Digitally excluded households
- Households who speak English as an additional language
- Households in the social and private rented sectors
- Households in rural or remote locations
- Prepayment customers

All of these groups currently face distinct challenges in accessing the benefits of the energy market, and CfE respondents clearly felt that these challenges would continue, or be exacerbated, as the decarbonisation of domestic heat gathers pace.[47] In addition, there are further segments of the population that may be detrimentally impacted by efforts to decarbonise domestic heat. Households with occupants who have disabilities, long-term illnesses, learning disabilities, or visual impairments can have distinct energy and communication needs, such as a medical need for a minimum temperature to be maintained throughout the home or the requirement to receive support and accessible services in Braille or British Sign Language.[48] While recent research by organisations such as the Research Institute for Disabled Consumers has demonstrated some progress in the inclusive design of key heating infrastructures (e.g. smart controls) for such households,[49] as the decarbonisation of domestic heat accelerates there is an acute risk that key products, technologies, and support services do not adequately cater for them. Beyond groups that could be defined as vulnerable, there is a further and likely larger segment of the population who presently do not have the confidence, skills, or social capital to make informed decisions about the changes required to their homes.[50]

Secondly, the installation of low-carbon heating systems can often be intrusive, and respondents believed it is likely that the fear of disruption will deter fuel poor households from taking steps to decarbonise their homes. NEA has found that this is particularly the case in instances where households have a long-term illness or severe disability. One of the primary ways that fear of disruption can be assuaged is through the provision of in-depth advice, handholding, and support, something that is especially important for very vulnerable households experiencing changes to their home environment and infrastructure. However, CfE respondents also believed that this is unlikely to be provided, preventing fuel poor households from accessing and using new products and heating technologies in the optimum way.

Despite this, CfE respondents did envisage some positive outcomes of heat decarbonisation. Respondents thought it likely that the power of innovation would result in the introduction of new and beneficial smart products and services, and they also believed that decarbonisation would result in healthier homes and communities through improvements in air pollution and warmer homes.

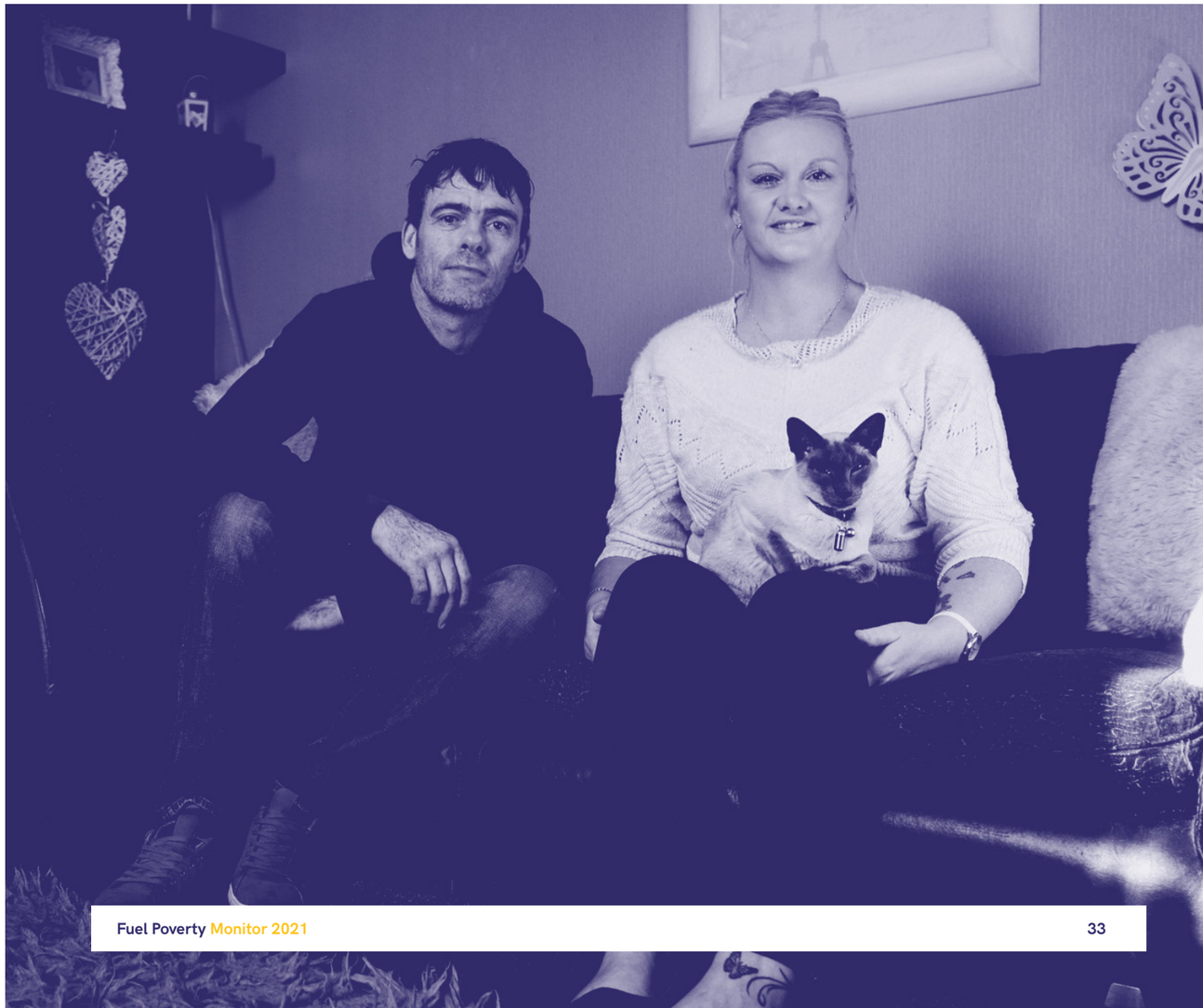
Table Six below outlines these concerns, as well as identifying opportunities that can be seized with the correct mixture of interventions and policy developments.

Impact	Positive or negative	Likelihood
Air quality in homes and communities improves due to the reduced burning of fossil fuels	**Very positive**	**Likely**
Households become healthier as a result of warmer, better insulated homes	**Very positive**	**Likely**
New complementary smart products, services, and heating-related technologies are introduced to help households manage energy and keep warm at home	**Positive**	**Likely**
Digitally excluded households are not able to easily access products, services, and schemes to decarbonise their homes	**Very negative**	**Very likely**
Those who speak English as an additional language do not receive the advice they need to upgrade their homes	**Negative**	**Likely**
Tenants do not see the benefits of decarbonisation due to the inaction of their landlord	**Very negative**	**Very likely**
Households in rural or remote locations do not receive the support they need due to the complexity of treating their homes	**Very negative**	**Very likely**
A lack of advice prevents households from utilising new products and heating technologies in the optimum way	**Negative**	**Likely**
The perceived disruption of installing low-carbon technologies deters fuel poor households from decarbonising	**Negative**	**Likely**
New heating technologies are less compatible with particular payment types	**Negative**	**No majority stakeholder view**

Table Six: Stakeholder perceptions of the other impacts of decarbonising fuel poor homes, based on current plans to decarbonise

5.4 Conclusions on the Opportunities and Risks of Decarbonising Heat for Fuel Poor Households

It is clear from our research that there are significant opportunities for fuel poor households in the decarbonisation of homes. However, there are also significant risks of adverse impacts. In order to ensure that fuel poor households do benefit from decarbonisation, it is important to understand the barriers that make it harder to access the benefits, and more likely to expose households to risks. This will be explored in the next section.



6 The Barriers to Decarbonising Heating for Fuel Poor Households

The UK will not reach net zero without addressing fuel poverty. Similarly, we will not end fuel poverty unless we harness the drive towards net zero. Therefore, in order to reach our end goals for each of these two agendas, it is important that we address the barriers to decarbonising heating for fuel poor households. This section builds on work done through our CfE and interviews to identify the main barriers that fuel poor households face.

These are:

- Financial barriers
- Physical barriers
- Advice and awareness barriers
- Policy and regulatory barriers

The following sections consider each of these barriers in turn.

6.1 Financial Barriers

As NEA previously highlighted in our report on Heat Decarbonisation and Social Equity,[51] the various options for decarbonising heating have differing cost structures, depending on the required capital investment of the technology, the ongoing running costs/commodity costs, and/or the cost of additional distribution infrastructure.

The different financing methods have particularly strong adverse distributional impacts since the availability and cost of any upfront finance can mean lower-income households either cannot access the measures or must pay more for them. Similarly, high ongoing costs can have particularly adverse impacts on fuel poverty. Accurately predicting what differences in costs mean for fuel poor consumers across the UK nations is hugely challenging due to:

- Different timescales for rollout, which could span over 20-25 years.
- Different costs for each solution, housing type and/or location.
- Different cash-flow requirements (network investment might be paid for upfront by a regulated operator and reclaimed over time in use of system charges; increased running costs may come from a more expensive fuel, e.g. hydrogen; for others the main costs may lie in consumer appliances and heating systems requiring significant upfront capital outlay from individuals, e.g. heat pumps).
- The interactions with energy efficiency investment.

The financial barriers created by upfront and ongoing costs are discussed in depth below.

Upfront costs

Decarbonising a home can require a significant amount of upfront capital, even if ongoing costs are reduced in the long-term. For example, insulating a home to EPC C or above could cost £10,000 or more. Additionally, in order to fully decarbonise a home, the heating technology may need to be changed. Installing a typical heat pump can currently cost around £7,000-£13,000,[52] compared to £2,500[53] for a gas boiler replacement. These costs are not achievable for the poorest households in the current economic climate. In June 2021 Resolution Foundation[54] found that 25% of households with the lowest incomes had seen their debts increase during the pandemic, and more than 15% saw their savings decrease. In its distributional analysis as part of the Spring Budget 2021, HMT found that incomes had been reduced during the pandemic for all but those within the bottom decile of working household net incomes.[55]

The upfront costs of low-carbon heating technologies and energy efficiency measures were viewed as the most significant barrier to decarbonising fuel poor homes by CfE respondents and interviewees. Charities and other organisations delivering direct support to fuel poor households discussed the simple impossibility of the poorest and most vulnerable households being able to afford the necessary costs. For example, one

96% of CfE respondents agreed that the upfront costs of low-carbon technologies are a barrier to fuel poor households decarbonising their heating, with 64% strongly agreeing.

94% of CfE respondents agreed that the upfront costs of energy efficiency measures are a barrier to fuel poor households decarbonising their heating.

8 in 10 CfE respondents agreed that household contributions in support programmes are a barrier to fuel poor households decarbonising their heating.

charity working in England told us that "one-off costs are the hardest thing for low-income households to bear, and measures which involve a large upfront cost, compensated by a lower monthly bill, are difficult for low-income households to bear", while another charity working in Scotland commented that "our anecdotal experience is that any up-front costs can be a significant barrier for fuel poor households and that loans (even where these are interest free) are not an attractive option for those living in fuel poverty."

Support is therefore clearly needed for the poorest homes to access energy efficiency measures and low-carbon technologies, without the requirement for client contributions. While there are schemes available to help fuel poor households with the upfront costs of energy efficiency and low-carbon heating, they do not all prohibit client contributions. As one charity working across England and Wales noted, "the requirement for household contributions to ECO measures is a major barrier for many low-income households. Some households will pay but will often go without other essential goods and services as a result."[56]

Network and ancillary costs

When installing some technologies, there might be additional costs that need to be covered in order to ensure that it can work effectively, or even just to restore the home to a reasonable state. Some examples of these ancillary costs are:

- **Rewiring.** To make some changes to a home, it must be rewired for safety reasons. This can cost thousands of pounds.
- **Servicing and maintenance.** Grant funding provided through many available schemes do not cover the costs of annual servicing and maintenance. If these costs cannot be met by the household, there is an increased risk of the heating system developing a problem.
- **Redecorating and paintwork.** Some low-carbon installations will result in a home needing redecoration in order to restore it to its previous state.
- **'Capping' the gas supply.** When a householder chooses to decarbonise their home by moving away from gas and to all-electric, there is a need to 'cap' the gas pipe, so that the householder is no longer classed as a gas customer and can therefore stop paying gas standing charges. This can otherwise result in a householder paying fees towards a network that they do not use. This can be difficult to coordinate, and households can sometimes be asked to make a financial contribution.
- **Upgrading the electricity network.** In some cases, when a householder decides to install a heat pump as their main heating source, their connection to the electricity grid may not be enough to support such equipment. NEA is aware of some occasions where the network has demanded that the household provides a financial contribution towards the cost of the upgrade before it takes place.

84% of CfE respondents agreed that network costs associated with low-carbon technologies are a barrier to fuel poor households decarbonising their heating

86% of CfE respondents agreed that ancillary costs are a barrier to fuel poor households decarbonising their heating

Some CfE respondents suggested that grant programmes should not only incorporate funding uplifts to cover these costs, but also additional resource to help fuel poor households coordinate and manage the order or 'chain' of works taking place in their homes. For instance, a heat pump installation might require a householder to coordinate an upgraded connection to the electricity network, a full home rewire, and a partial redecoration, all in the right order and in conjunction with the installation itself. As one CfE respondent commented, even in cases where funding for all of this is provided, if a household "is required to coordinate works to enable their install, this barrier proves too much for them to overcome […] identifying and securing trades, organising the work to be done, and coordinating between trades (e.g. a joiner and plumber) can sometimes prove too difficult for some householders." Furthermore, as June's story (on page X) demonstrates, there are additional financial risks associated with ignoring the necessity of ancillary costs, such as a household no longer using gas in their home but continuing to pay the standing charge because they cannot afford to pay for the gas capping.

Running costs

Currently, a modern gas boiler is a relatively cheap way of heating a home. In addition, many households living on a low fixed income value the responsiveness of gas heating, which can be switched on for a limited period during the day or evening to heat their homes or a single room. This is particularly valuable for households who use gas prepayment meters to control their energy costs. Cleaner forms of energy such as using electricity for heating can be more expensive as the unit price of electricity is significantly higher than the unit price of gas; as of November 2021, the equivalent per unit level of the price cap to the nearest pence for a typical customer paying by direct debit is 21p per kWh for electricity and 4p per kWh for gas.[57] Even very efficient electric heating technologies such as an air source heat pump, which can reach effective efficiencies of 400%, are therefore still likely to result in higher bills than gas boilers because of the difference in energy prices between fuels. Other heating technologies have comparable running costs to gas, but these tend to be more polluting (such as oil boilers or coal burners).

The differential between gas and electricity costs are down to two main factors. Firstly, the wholesale price of gas is currently generally cheaper than the wholesale price of electricity. Secondly, the vast majority of environmental and social levies in energy (which fund the Energy Company Obligation, Warm Home Discount, Renewable Obligations, Feed-in-Tariffs and others) are added to the electricity bill, not the gas bill. In 2021, these costs made up 25% of the average electricity bill and less than 3% of the average gas bill. This was originally done for good reason. Households are more likely to have an electricity connection than a gas connection, so the levies are distributed between more households. Fuel poor households are also more likely to heat their home using gas, meaning that putting these costs on electricity bills has a relatively lower impact on fuel poverty than adding costs to gas bills.

Moving towards a low-carbon heating technology can therefore result in a greater level of everyday affordability pressures as well as a high upfront cost. Several CfE respondents discussed the implications of this for fuel poor households both now, and in the future. For example, one English local authority described how they "advise customers about the running costs of switching to low-carbon heating", but that "this has led to a number of aborted jobs as it is not cost effective for the householder to switch from gas to a heat pump." A charity working directly with fuel poor households across England also told

56% of CfE respondents agreed that running costs associated with low-carbon technologies are a barrier to fuel poor households decarbonising their heating.

us that "we are experiencing difficulties in trying to move people from gas to electric heating due to the unaffordability of electric." Others described situations such as those in Astrid's story (below), where very vulnerable households had been promised an equivalence in running costs with their previous system ahead of an installation, only for the reality to be very different. While ongoing research such as BEIS's Electrification of Heat demonstrator is attempting to establish the conditions in which electric heating can be cost competitive with gas,[58] it is evident that the running costs of electric systems are a major barrier to moving fuel poor households towards low-carbon heating.

Looking further forward, CfE respondents also discussed the risks of changing the current balance of environmental and social levies without including specific protections for fuel poor households. As one Welsh charity put it, "many consumers may find themselves on a double knife-edge: they will be priced out of 'green' heating, and then forced into gas heating which will get more and more expensive to run and maintain in the coming years." There is, in other words, a significant risk that more affluent households will have the knowledge and resources to make the shift to low-carbon electric heating early, and that they will therefore accrue the most financial benefit from any reduction of levies on electricity bills. If they do not receive appropriate support, fuel poor households may conversely be unable to make this shift. If levies on gas gradually increase, they could subsequently be left shouldering an increasing proportion of the network costs needed to maintain the gas network as well as soaring running costs. The distributional injustice of this scenario requires little explanation, and it is clear that a fairer rebalancing of levies across gas and electricity bills is required to ensure fuel poor households benefit first from decarbonisation, rather than last, or not at all.

> **"People struggling to keep warm and pay energy bills have little or no option to switch from fossil fuels to cleaner options, as the current initiatives do not support such change. My team find themselves working with people to replace like with like (gas heating for example) as there are no other options. This is frustrating for our clients and the team."**
>
> **Charity, Wales**

The impact of utility debt on decarbonisation

Through NEA's work outside of this research to help fuel poor households to decarbonise their heating, we have encountered barriers that are linked with the ability of households to pay their energy bills. There are two in particular that have posed significant difficulties.

Fuel poor homes are more likely to find energy unaffordable and are often in debt to their energy supplier. If they are in arrears, and using a credit meter, this can mean that switching between suppliers is difficult to achieve. This is important in the context of changing their heating technology to a heat pump, as the most suitable tariffs, for example variable time of use tariffs, are not universally available through all suppliers. This means that they cannot make optimal use of their new heating technology and could therefore face higher costs than if they could switch.

Additionally, if they are moving away from gas for heating and cooking, low-income households who use prepayment meters can build up debt on their meter that must be paid off before the gas connection is capped. A particular problem is the build-up of debt that can occur from the continual accrual of standing charges if they have self-disconnected.

Astrid's Story

Astrid lives alone in an end terrace house in a remote village in rural Cumbria. She is entering her 70s, suffers from multiple health conditions, and receives daily support and care from her family (who live nearby). Over the past couple of years, her health has increasingly confined her to bed, and the need for her home to be safe and warm has grown in parallel. Astrid's home was heated for decades by a coal-fired back boiler, but in 2019 it malfunctioned and stopped working. As a rural homeowner claiming Pension Credit and Personal Independence Payment, and with no gas network for miles around, she qualified for a free air source heat pump through a fuel poverty scheme.

In theory, the heat pump should have worked for Astrid. Her home is well insulated with pitched loft and good cavity wall insulation – an EPC Band C property. The full costs of the unit and installation were covered, meaning she would not have to pay any contribution. But when she spoke to us, over two years after the breakdown of her old boiler, her heating situation was not only unresolved, it was worse.

To begin with, the installation itself was a terrible experience for Astrid. She described how multiple installers made disruptive visits to her home over several months to complete the installation, and at no point did she receive information or advice about how the heat pump would meet her energy needs or how to use it, either from the installers or the fuel poverty scheme:

"The mantra they used constantly was 'it's cheaper than coal'. So, I obviously thought I was going to have a cheaper system. I didn't realise it'd have to be on constantly. Nobody went through it."

After she was eventually told the heat pump would need to be on constantly to provide the level of warmth she needed, Astrid turned it off, terrified of not being able to afford it. This was in summer, but with her illnesses and living close to the Scottish border, this still left her cold at home:

"It's caused a hell of a lot of stress, because when you're physically ill and then you've got a mental stress with this, as well, I mean, I'm freezing. I'm lying in bed with a hot water bottle, massive condensation in the house. I just need a heating system I can put on and afford."

To try and resolve her issue, Astrid sought help from a charity offering energy advice, but as she explained, they couldn't help her because they didn't understand enough about how the technology worked: "the bloke hadn't heard of it either."

At the time of writing, Astrid is receiving support from NEA to resolve her issues ahead of the winter of 2021/22. But her story underlines the barriers facing rural and remote households in decarbonising their heating, including the need for better information provision and support before, during, and after installation; the need for installers to understand the requirements and vulnerabilities of fuel poor households; and, finally, the need for energy advisors to be upskilled to provide support with low-carbon heating technologies. Most of all, her story foregrounds the negative and potentially deleterious consequences of getting low-carbon technology installations wrong and serves as a reminder that we have to get them right.

6.2 Physical Barriers

Thermal inefficiency

Fuel poor households are more likely to live in a thermally inefficient home than the average household. While this is true across the nations, it is particularly marked in Scotland and Wales. Latest statistics show that in Wales in 2018, 43% of households living in properties with poorer energy efficiency (EPC Bands F and G) were fuel poor compared to 5% of households living in properties in bands B to C.[59] In Scotland, poor energy efficiency standards are the core driver of fuel poverty for households not defined as income poor, especially in electrically heated properties and rural properties.[60] Lower energy efficiency standards consequently shape how difficult it is to decarbonise a fuel poor home compared to the average for two key reasons.

8 in 10

CfE respondents agreed that fuel poor homes are too thermally inefficient for low-carbon technologies to run effectively

Firstly, at low thermal efficiencies some low-carbon technologies are less efficient. For example, heat pumps have a higher efficiency in more efficient properties, and it will simply cost more to heat a thermally inefficient home using a low-carbon fuel due to current price differentials. This was commented on by numerous CfE respondents, many of whom were concerned that installing heat pumps in poorly insulated homes would be tantamount to deepening (or creating) fuel poverty, especially in cases where the previous primary heating source was a gas boiler (and not, for example, inefficient storage heaters or solid fuel systems). Respondents tended to agree that this necessitated a fabric first approach to improve the thermal efficiency of properties before a low-carbon heating system is considered, but some were concerned that the challenges of doing so were exacerbated by parallel issues such as damp and mould, or the intrusive and tricky nature of some forms of insulation (e.g. internal wall).

"Many of the low-carbon heating options are still too expensive, even for those who are not on low incomes or in fuel poverty. One issue that needs further highlighting is also that in many cases you need to do energy efficiency first, but those measures cannot be installed if people have damp houses. Damp measures alone can often be too costly."

Academic, England

"Installation of heat pumps in poorly insulated homes will increase fuel bills. While policy nominally favours fabric first, I am concerned about the emphasis on heat pumps in Government policy without concomitant measures to improve energy efficiency standards, particularly in solid walled homes."

Charity, working across England and Wales

Secondly and relatedly, and as discussed elsewhere in this section, this means that upgrading the least energy efficient homes comes at a considerable cost. One estimate suggests that the cost of improving an EPC Band F/G home to EPC Band C is between £22,500 and £27,000.[61] While some CfE respondents noted with approval the increased caps in current and forthcoming energy efficiency schemes, particularly the Home Upgrade Grant, which has a cap of £25,000 for the worst performing rural homes, the majority were unconvinced that the level of funding available would allow the kind of deep, at-scale retrofit required to treat the worst homes first. Moreover, respondents had little confidence that current levels of funding are sufficient to simultaneously upgrade the least energy efficient homes with low-carbon heating and insulation.

"The cost of upgrading the fabric's thermal efficiency is a barrier to installing heat pumps, as the current funding regime does not have the flexibility to be able to carry out a deep retrofit."

Local authority, England

Installers and the supply chain

In the year that has passed since our previous UKFPM, the flagship Green Homes Grant voucher scheme in England has been discontinued. In November 2021, it was reported that only 15,182 low-income households received insulation measures through the scheme.[62] Furthermore, statistics published by BEIS show that 46% of installers who applied to take part in the scheme failed or withdrew their applications.[63] A National Audit Office report into the programme also documented significant problems in the administrative process, which caused delays to installer payments, and noted that the programme is likely to have supported only 7% of an initially forecasted 82,500 jobs.[64] Some of these issues were experienced first-hand by Jasmine, whose case study below highlights the shared frustration with the scheme by households and installers alike.

Similarly, our CfE respondents were clear that current policies and frameworks are struggling to incentivise the supply chain to expand at the scale that is necessary for the mass retrofit of fuel poor homes. For example, one CfE respondent told us that "there are many contractors that can provide gas boiler installations and servicing works but comparatively few contractors that can offer the same services and support when considering heat pump systems". Others noted that renewable heating courses are not being taken up by builders and contractors at the necessary rate, even when places are offered for free. The broader barrier, according to numerous respondents, was that the necessary incentives – long-term policy certainty, support with accreditation, and others – are not currently sufficient to encourage installers and the wider supply chain to upskill. This finding is consistent with research undertaken for BEIS, which found that incentivising customer demand and removing barriers to training and accreditation were perceived by installers as effective measures to support low-carbon heat deployment.[65]

Two thirds of CfE respondents agreed that the lack of local renewable heat installers is a barrier to decarbonising heating in fuel poor homes

Over 70% of CfE respondents agreed that low installer knowledge about the specific needs and vulnerabilities of fuel poor households was a barrier to decarbonising their heating

46% of installers who applied to take part in the Green Homes Grant voucher scheme failed or cancelled their applications

Beyond issues in the supply chain for low-carbon technology, CfE respondents pointed out a perceived lack of certified installers of energy efficiency measures as a barrier, with one remarking that in Scotland, this was becoming more of an issue than the lack of certified renewable heating installers. CfE respondents also commented that for low-carbon heating installations to work well for fuel poor households, installers needed to have a sharper understanding of some of the issues affecting these households and be supported to spend more time giving accessible advice and instruction to them – an issue that Astrid's case study sadly demonstrates.

When considering how to overcome skills barriers and issues in the supply chain, CfE respondents primarily pointed to two key needs. The first was for greater action on a local and regional level to build networks, skills, and partnerships in the supply chain.

For example, the Greater South East Energy Hub, responsible for administering and overseeing the region's Green Homes Grant Local Authority Delivery (GHG LAD) Phase 2 scheme, is developing a network of contractors in the South East along with a portfolio of resources to support installers with accreditation, procurement systems, and future opportunities.[66] However, and secondly, most CfE respondents believed that until central and devolved governments took steps to set out a long-term roadmap for energy efficiency and clean heat funding, the supply chain would continue to operate at a fraction of the scale required to deliver the required decarbonisation of heating to reach net zero. Provide this certainty, respondents continued, and the supply chain would follow the demand and invest in the skills, jobs, and knowledge necessary to decarbonise fuel poor homes across the UK.

"The market and supply chain will respond rapidly as soon as there is demand for low-carbon heating technologies. Good heating engineers are busy and have all the work that they need, and they will only think about retraining for low-carbon technology once there is a market for it. Every time a government launches another limited-time project for low-carbon heating, it is another reminder to the trade not to bother investing in new skills."

Local authority, England

"The supply chain urgently needs long term assurance of funding in order to develop the capacity that will be needed to meet demand."

Energy efficiency and low-carbon heating installer, England

Jasmine's Story

Jasmine lives on the outskirts of a major city in the Midlands. Until recently, her home was an EPC Band E, with substandard roof insulation and no underfloor insulation. In addition, Jasmine had always had problems with heat escaping from her single glazed windows and internal doors, making her home chilly, draughty, and difficult to keep at a consistent temperature. When the Green Homes Grant was announced in August 2020, she therefore viewed it as the chance of a lifetime to make her home more energy efficient. She also met the eligibility criteria for the low-income element of the scheme, meaning she would be able to improve her home at no cost to herself.

Jasmine was keen to improve her home ahead of the winter of 2020/21 and applied for the voucher for her primary measure – pitched roof insulation – as soon as the scheme opened in September 2020. This was when her problems began. Delays in issuing the voucher meant her insulation was not installed until after winter, and by this time some of the other issues with the scheme had flowered. This affected her ability to get her windows and doors sorted:

"Eventually, the installer, at the last minute, probably about three to four weeks before I could change my installer, they emailed me and said 'Really sorry, but we have had issues with Green Homes Grant, and they have not been paying us. So therefore, we can't run our business and we will not be completing your work.' So I had, literally, a couple of weeks to change installer, and then during that period I rang over about sixty, seventy companies, and nobody was taking part and nobody could give me a quote who would take part."

Frustrated but determined to get her secondary measures, Jasmine was on the phone daily to the scheme administrators to no avail. She wrote to the Chancellor of the Exchequer, her own local MP, and sought help from several other organisations. Eventually, she was told about the Local Authority Delivery scheme and encouraged to make contact. However, because the pitched roof insulation had improved her home to an EPC Band D, she was told she was ineligible to receive help. "And that was it, I just missed out on it."

When we spoke to her, Jasmine was preparing for another draughty winter with her windows and doors, and wondering whether another scheme – local or national – might emerge in the future to help her replace them:

"Obviously, I do need them done because I think it would make a big difference to retaining the heat in my house."

Moreover, her experience with the Green Homes Grant was likely not unique. She was desperate to improve her home, and although she received insulation, she was prevented from making the changes she felt her home really needed by the lack of interest from installers and what she perceived as the inflexibility of the scheme administrators. Her story emphasises the need for simplicity and longevity in scheme design and administration, both for households and installers.

The challenges of decarbonising rural homes

Across the UK, fuel poor households in rural areas face unique challenges to decarbonising their homes. Fuel poverty is often both deeper and more prevalent in rural areas. In Northern Ireland, for example, one third of households living in small villages, hamlets or open country areas were in fuel poverty in 2016,[67] and in Wales, 14% of all households in rural locations were in fuel poverty in 2018, compared to a figure of 10% for urban areas.[68] Scotland has meanwhile become the only UK nation to include a rural 0income uplift in its methodology for calculating fuel poverty, which is intended to reflect the specific barriers faced by households in remote rural areas, remote small towns, and island areas.[69]

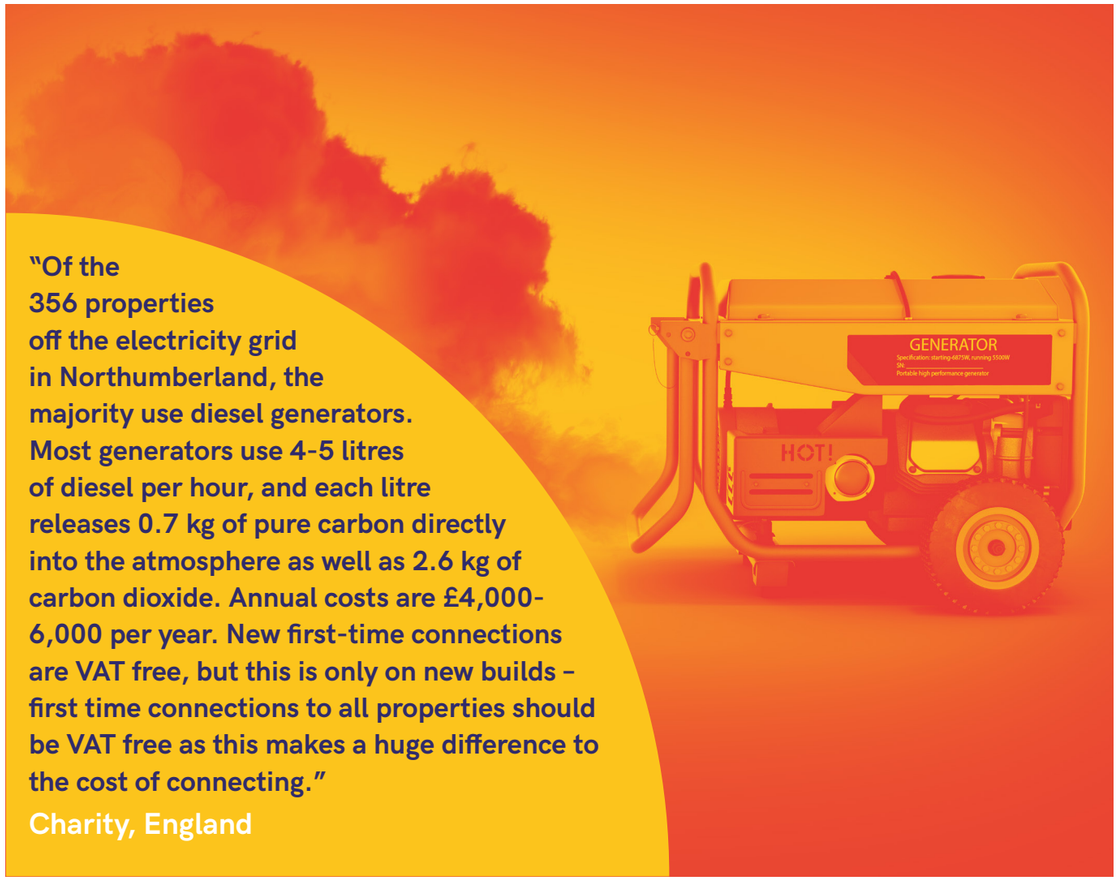
Recent research on the links between low-carbon technologies and rural fuel poverty by NEA has highlighted at least six ways in which the characteristics of rural areas interact to create fuel poverty risk: low household incomes; limited connectivity (digital, transport, and social); limited access to essential services; old and hard-to-treat housing stock quality; socio-demographics, especially ageing populations; and the greater prevalence of more extreme weather conditions.[70] Respondents to our CfE added that rural fuel poor communities across the UK, and especially in Northern Ireland, are typically locked into more expensive forms of heating fuel such as oil and LPG, and struggle to access impartial information on the different technologies and funding options for decarbonising their homes. More widely, research undertaken for the Scottish Government highlighted regional differences in electricity distribution costs, limited mains gas coverage, supplier monopolies in rural areas, and a lack of regulation of oil, LPG, and solid fuels as further drivers of rural fuel poverty,[71], and academic research is beginning to demonstrate how the intersection of fuel poverty and transport poverty disproportionately impacts remote rural areas across the UK.[72]

Respondents to our CfE also discussed barriers to decarbonising rural homes. While there was a recognition that funding for rural areas is increasing, such as through the Home Upgrade Grant in England, respondents noted that a lack of qualified installers in more remote parts of the UK limited the uptake of heat pumps and other low-carbon heating solutions. In turn, respondents described how this created a situation where the few qualified installers in a particular area would often travel hundreds of miles to undertake an installation, severely limiting the amount of aftercare, advice, and customer service they can provide to the household once the installation is complete. One respondent noted that, in some cases, this results in some rural fuel poor households having a heat pump installed without being informed how to use it properly. As Astrid's story shows, the impacts of this can be severe.

Lastly, respondents emphasised the challenges posed by connectivity to decarbonising rural homes. Smart technologies, products, and services are often considered essential for optimising the use of low-carbon heating technologies, but limited broadband and mobile connectivity was cited as a barrier to trialling and rolling out these technologies in rural areas, especially in remote and island communities. Some respondents also pointed out the unique challenges faced by rural properties that do not have a connection to the electricity grid. For such properties, the prohibitive cost of an electricity grid connection effectively locks in the use of oil, LPG, and electricity generated from diesel generators. In a future where a connection to the electricity grid is likely to be an essential requirement for the decarbonisation of rural homes, it is clear that more support is needed to enable this to happen.

6 in 10 **CfE respondents agreed that households in rural locations face barriers in securing services from installers and/or schemes to decarbonise their heating**

6 in 10 **CfE respondents also agreed that households faced barriers in obtaining the required broadband connection to fully utilise smart technologies**



"Of the 356 properties off the electricity grid in Northumberland, the majority use diesel generators. Most generators use 4-5 litres of diesel per hour, and each litre releases 0.7 kg of pure carbon directly into the atmosphere as well as 2.6 kg of carbon dioxide. Annual costs are £4,000-6,000 per year. New first-time connections are VAT free, but this is only on new builds – first time connections to all properties should be VAT free as this makes a huge difference to the cost of connecting."
Charity, England

Other physical barriers

In addition to the barriers above, there are others that are currently being investigated, in depth, through Government trials as part of the Electrification of Heat Demonstrator Projects.[73] These barriers include:

- The technology does not meet local or nationally permitted sound limits
- A lack of space within the property or surrounding area to accommodate the necessary physical work required to install technologies
- The necessary physical work required to install technologies being too disruptive for the householder
- The lack of permittance of technologies due to planning or conservation restrictions.

While our research for this report has not investigated these issues in detail, CfE respondents were asked the extent to which they thought each one was a barrier to the decarbonisation of fuel poor homes. Notably, 61% of respondents agreed that necessary physical work to install low-carbon technologies could be too disruptive for the household, and 62% of respondents agreed that properties may have a lack of space to accommodate the necessary work to install low-carbon technologies. However, for the other two barriers noted above regarding permitted sound limits and planning or conservation restrictions, there was no consensus among CfE respondents, perhaps indicating that they did not know enough about the potential issue to offer a perspective. For all of these barriers, it is clear that more research and insight is needed, and we eagerly await the outcomes of the Electrification of Heat Demonstrator Projects.

6.3 Advice and Awareness Barriers

The challenges of advice in the net zero era

There are a number of advice barriers that must be overcome to ensure that the decarbonisation of domestic heating works for fuel poor households. For fuel poor and vulnerable households that struggle even more than the average consumer to engage in the energy market, the role of the energy advisor will be pivotal to ensuring they are at the front of the decarbonisation queue. At present, energy advisors typically support households with supplier switching, smart meters, income maximisation, energy efficiency advice, debt repayment plans, escalating complaints, and applying for rebates, grants, and priority services. They also play a key role in building the confidence and capability of households to engage in the market on their own in the future.

"An online search for advice on insulation and boiler schemes returns a panoply of private companies, Government services and charities. It is extremely difficult for the average consumer to dig their way through to any impartial advice. As advisors I do not feel we are well equipped to advise on the different options."

Charity, England

However, the results of our CfE have highlighted an advice provision gap, whereby energy advisors may not currently have the knowledge to be able to support fuel poor households with decarbonising their heating. This includes pre-installation advice, such as accessible explanations about the nature of different low-carbon technologies, and advice during and after an installation has taken place, such as support understanding new heating controls, switching to a more suitable tariff (e.g. away from an Economy 7 tariff), capping a gas supply, or simply getting familiarised and comfortable with the way in which a heat pump maintains an ambient temperature throughout the home. As illustrated by Astrid's story, the advice and support that is given, or not, before, during and after an installation can have a significant impact on a householder's experience with new technologies.

Two thirds of CfE respondents agreed there is low awareness of emerging low-carbon technologies among energy advisors

8 in 10 CfE respondents agreed there is a lack of advice to households on how to use low-carbon heating technologies, and on the behaviour change required to do so

Three quarters of CfE respondents agreed there is currently limited pre-installation communication about the nature and operation of low-carbon technologies and limited post-installation support and instruction about using them

Beyond heating, a dizzying array of new smart products and services are likely to be introduced to the energy market over the coming decade that may be complicated for fuel poor households to access and understand. They may even deepen negative distributional impacts if they are designed poorly, or if adequate advice and guidance on how to benefit from them is not provided.[74] To take only one example, academic research has suggested that Time of Use (ToU) tariffs, whereby consumers pay lower prices for the flexible use of electricity at times of high renewable generation or low network constraint, could offer substantial benefits to fuel poor households, but could equally exclude them to the benefit of higher-income consumers if they are not designed in an accessible and inclusive way.[75] For those with fewer financial resources and a limited ability to be flexible, "their inflexibility increases the risk and severity of fuel poverty, and aggravates the tensions between fuel and other essential costs, particularly cooking costs if peak electricity costs fall at the same time as evening meals, as is likely to be the case."[76] In a world populated by half-hourly variable tariffs, smart heating technologies, and other more embryonic business models such as Heat as a Service (HaaS),[77] the capacity of energy advisors to provide tailored and accurate advice to households will likely become a critical challenge facing the sector.

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Two thirds of CfE respondents agreed that fuel poor households might not be able to take advantage of cheaper variable tariffs such as Time of Use tariffs

Furthermore, our research has also highlighted that when energy advisors are equipped with the skills and knowledge to support fuel poor households with low-carbon technologies, the outcomes can be hugely beneficial. Previous research by NEA has suggested it is these forms of advice, rather than the specific technology installed, that enable optimal outcomes for the most vulnerable households across the UK.[78] For example, one charity working in Wales submitted evidence to our CfE detailing how one of their clients had solar PV installed in the summer of 2020 but was not shown by the installer how to connect it to the grid to benefit from a buy-back tariff. Partially as a result, their client endured a torrid winter, unable to heat his home adequately yet forced to spend more time in it due to the reimposition of lockdown restrictions. A home energy officer, trained and experienced with low-carbon technologies, was subsequently able to support their client to connect the PV to the grid and have a smart meter installed, while also delivering wider energy-related advice concerning the timing on his storage heaters. As discussed in the previous section, this example evidences the requirement for installers to be more aware of specific needs and vulnerabilities of fuel poor households, but it also shows how upskilling energy advisors to provide support with low-carbon technologies will be essential to achieving good outcomes for fuel poor households in the decarbonisation of domestic heating.

Additionally, research from Citizens Advice has shown[79] that there is a suboptimal consumer journey for households that are looking to decarbonise their homes. A lack of consumer protections surrounding energy efficiency and low carbon heating, compared to other sectors, could leave households in detriment when things go wrong. In particular, there is no clear route to redress in the case that installations go wrong or are not completed to sufficient standards. This is important because the advice barriers associated with decarbonising heat are not limited to fuel poor households. All of the CCC's scenarios for reaching net zero involve significant behavioural and societal change, from cutting meat consumption to reducing aviation demand, and over 40% of the abatement in their scenarios to 2035 "involves at least some degree of change from consumers."[80] Stakeholders from across the UK told us that the need to change behaviours is a considerable barrier for some households, often the most vulnerable, who are more likely to be fuel poor. We were told that while technology and innovation can help us rely less on fossil fuels, without the end consumer making the right decisions at the right time, they could end up cold at home, or not reach the decarbonisation potential of their heating technologies. Add in the growing proliferation of complex new products and technologies, as well as the natural propensity of many to be risk averse and hesitant when considering expensive and disruptive changes to their homes, and it becomes clear that broader and better advice provision is required across the board, not just for fuel poor households.

Summarily, although research published by BEIS has noted that information provision alone tends not to drive significant behavioural changes,[81] a finding supported by some academic research into social practices,[82] there is growing evidence that consumers will require much more comprehensive packages of support to make improvements to their homes than is currently available. Several CfE respondents highlighted that consumers simply do not know where to go for reliable, non-partisan information and advice about home improvements, and research undertaken by Citizen Advice has similarly shown that people struggle to find relevant and useful information from credible independent sources, increasing the possibility of them installing a technology that is not right for their home.[83]

A lack of funding for advice

Despite the importance of energy advice for achieving a fair and affordable transition to net zero, there continues to be a lack of funding for central and local advice provision. Reaching fuel poverty targets and decarbonising heat simultaneously will not only require an upskilling of individual energy advisors, but a much more comprehensive network of advice provision across the entire UK which can smoothly link eligible fuel poor households to grants and schemes to decarbonise their homes.

Two thirds of CfE respondents agreed that the lack of centrally funded energy saving advice and support is a barrier to fuel poor households decarbonising their heating

85% of CfE respondents agreed that limited funding for local energy-related advice and support is a barrier to fuel poor households decarbonising their heating

Many CfE respondents referenced the need for advice about low-carbon technologies to be provided by trusted local intermediary organisations. For example, research and evidence submitted by the Centre for Ageing Better highlighted the benefits of local hubs that provide signposting to suitable funding options for low-carbon retrofit, as well as to trusted builders who can advise on the pros and cons of different technologies.[84] Wider research by NEA has also shown that locally embedded charities and voluntary groups are often essential to reaching the most vulnerable and most in need households, especially those living in the least energy efficient properties in rural areas.[85] However, some CfE respondents who championed the advantages of local provision recognised that there was a growing need for central investment to support fuel poor households in decarbonising their homes.

"Most local support energy services in the UK will be grant funded and are therefore stop and start. The temporariness of the services can be hard for customers if things go wrong down the line. Now that the need to retrofit homes is such a UK-wide high priority some more centralised support does seem logical. Perhaps more funding allocated to local councils would be helpful."

Local authority, England

Regardless of the perceived advantages or disadvantages of local and national provision, respondents to our CfE believed that the largest barrier standing in the way of this ambition is a lack of long-term funding streams for advice services. Funding streams for local charities and other similar organisations were referred to by CfE respondents as too 'stop start', which prevents them from developing year-on-year capacity and makes it difficult to retain experienced staff. Other respondents noted that the unevenness of funding creates postcode lotteries, with many areas of the country having limited or no advice provision available for fuel poor households and little capacity or willingness to signpost to national services. Reference was also made to the extra funding and resource required to develop bespoke advice offerings for vulnerable households with specific communication needs and barriers, such as those with English as an additional language, limited internet access, or who require advice in braille or British Sign Language. While some funding streams, such as the Energy Redress Fund,[86] support the development of precisely these kinds of offerings, they typically suffer from the 'stop start' and postcode lottery issues and thus rarely meet the conditions of comprehensiveness or geographical coverage.

7 in 10 CfE respondents agreed that there is a lack of advice or signposting to third parties for when low-carbon heating technologies go wrong

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Other respondents highlighted specific challenges relating to the integration of advice on low-carbon technologies into broader advice services. Most notably, evidence from the STEP-IN project, which worked with energy advisors in Greater Manchester delivering a branch of the Local Energy Advice Partnership (LEAP) programme, pinpointed two crucial issues.[87] Firstly, in Greater Manchester it was clear that "energy advice to fuel poor households tends to be largely reactive - it is understandably focused on getting a household warm as quickly as possible, which within the confines of available support and financing schemes invariably means gas central heating rather than low-carbon heating generation." Referrals to schemes that can provide support with low-carbon heating, such as ECO or GHG LAD, were described as increasingly rare. Secondly, this evidence highlighted that because funding is limited and arguably focused on the quantity of households reached rather than the quality of advice they receive, energy advice is invariably short-term, involving a single short visit during which support is delivered, referrals made, and the 'case closed'. "As such, there is very limited continued support for vulnerable households, and this could be potentially problematic following the installation of new technologies such as low-carbon heating." While evidence concerning LEAP in Greater Manchester is not necessarily representative of all advice programmes, it indicates a need for future funding structures to include provision for multiple visits and mechanisms for supporting fuel poor households to access grants for low-carbon heating.

"Overall, there is clearly a need for more long-term funding of energy advice that enables 'return visits' and continued support to vulnerable households."

Academic, England

In many ways, models for providing this kind of support already exist. In Scotland, Home Energy Scotland's network of local energy advice centres offer advice on energy saving, keeping warm at home, low-carbon heating, renewable energy, greener travel, and cutting water waste,[88] and in Wales a coalition of organisations are currently delivering a Home Energy Advice Services pilot funded by the Welsh Government.[89] Both of these programmes, in different ways, are modelled on the 'One Stop Shop' approach, and an academic review of One Stop Shops across Europe has concluded that they "might be well placed in the future to contribute to tackling [fuel] poverty by assisting in accessing financing and engaging property owners to renovate."[90] The ambition must therefore be for national and devolved Governments to develop and adequately fund networks of advice provision across the entire UK that can support fuel poor and vulnerable households to decarbonise their homes.

6.4 Policy and regulatory barriers

Scheme design and the lack of long-term policy certainty and funding

Heat decarbonisation is driven by policy and regulation. This means that when policies, laws and regulations are not designed well, they can provide a significant barrier to achieving our goals. Over the last few years, there have been several policies designed to help households decarbonise their heating. All of these have been relatively piecemeal, and because of Government decisions to limit the length of spending plans, lack longevity. It has also meant that schemes must be designed quickly, which can lead to suboptimal policies and delivery models. These were issues that were persistently identified by our stakeholders throughout the research.

Across the nations, spending on energy efficiency is incredibly variable, and commitments often change year on year, with expectations on spending not matching what comes to fruition. In the 2021 UK Spending Review, for example, the Chancellor of the Exchequer announced a further £950m towards the Home Upgrade Grant scheme. This was £1.4bn short of what the industry could have expected from the Conservative Party manifesto commitments, meaning that 112,000 households will miss out on energy savings of £750/year.[91] In Scotland, the next phases of ECO and WHD will be devolved, meaning that from April 2022 the Scottish Government will have the power to direct that funding at their discretion. However, there has not been any signal as to how this money will be spent, leaving uncertainty in the market, as well as for households.

"The short-term nature of Government initiatives (particularly the Green Homes Grant) has not provided the longer-term certainty required to build industry capacity to deliver retrofit programmes."

Charity, England

In our CfE, respondents picked up on these barriers in two ways. Firstly, some respondents told us that current Government funding streams are insufficient to achieve fuel poverty targets and create unwelcome competition between local authorities for grant income. For instance, one local authority in England noted that current funding available through GHG Local Authority Delivery and the Home Upgrade Grant is not sufficient for carrying out the deep retrofit that many of the worst properties require, and therefore that "the LAD/HUG programmes need a significant injection of investment to be able to reach the fuel poor households that need help – the current investment is a drop in the ocean." Other local authorities that responded to our CfE also noted the challenges of administering and delivering multiple overlapping public schemes, with one local authority in particular suggesting that "running two strands of the GHG Local Authority Delivery model simultaneously, one not through local authorities but through Regional Energy Hubs, create[s] competition between publicly funded schemes." Similarly, unpublished research by NEA, cited by the Committee on Fuel Poverty, has highlighted how challenges of funding, resource, and capacity leave some areas of the country with no energy efficiency delivery at all, including in areas with a higher prevalence of fuel poverty than the national figure.[92]

85% of CfE respondents agreed that a lack of clarity on the medium- and long-term future of energy efficiency and clean heat schemes is a barrier to fuel poor homes decarbonising their heating

Secondly, multiple CfE respondents highlighted the lack of clarity, certainty, and long-term thinking in energy efficiency policy as a barrier to decarbonising fuel poor homes. Effectively, this was discussed as a comparable barrier to the one facing advice services. The phased approach taken to schemes such as the GHG Local Authority Delivery, with each phase having a small delivery window and no certainty as to when (or if) the next will appear, was described as creating several delivery challenges for local authorities, not least "the need to wrap up just as they are getting going", as one put it. Devolved energy efficiency programmes across the nations were also discussed in a similar way, with the lack of policy direction and strategy in Northern Ireland highlighted as a particular problem. For example, we were told in an interview with a stakeholder in Northern Ireland that a lack of clarity on the future of the gas market was a particular policy barrier because the infrastructure that supports the market is relatively young and transitioning away from it would lead to stranded assets.[93] This barrier also exists in Great Britain, but perhaps not to the same extent because of the relative ages of the two gas networks.

More broadly, the lack of clarity was perceived as contributing to a shared inertia among the different actors involved in delivering energy efficiency, preventing local authorities, installers, and energy advice services from setting out their own long-term strategies for supporting the most vulnerable and least energy efficient households to improve their homes. While there is always a need to pause and evaluate the strengths, weaknesses, and outcomes of different schemes, the combination of a lack of long-term clarity and limited funding is clearly placing an impediment on shared ambitions to upgrade our housing stock.

The private rented sector

Properties in the private rented sector are among the least efficient across the UK nations, costing over £6bn in energy bills in 2018 and producing greenhouse gas emissions totalling around 11 MtCO2e every year.[94] Partly as a consequence, when disaggregated by tenure the proportion of households in fuel poverty in 2019 was highest for private renters in England at 26.8%, with these households facing an average fuel poverty gap of over £200.[95] Academic research has consistently highlighted the challenges facing fuel poor households in the sector, especially a lack of housing rights and limited access to retrofit schemes.[96]

In England and Wales, the energy efficiency status of private rented housing is governed by the Minimum Energy Efficiency Standard (MEES). There are currently no equivalents in Scotland or Northern Ireland. In September 2020, the UK Government consulted on making amendments to the MEES regulations to improve the energy performance of privately rented homes, encompassing:

- Raising the energy performance standard to Energy Performance Certificate (EPC) energy efficiency rating (EER) Band C.
- A phased trajectory for achieving the improvements for new tenancies from 2025 and all tenancies from 2028.
- Increasing the maximum investment amount, resulting in an average per-property spend of £4,700 under a £10,000 cap.
- Introducing a 'fabric first' approach to energy performance improvements.[97]

88% of CfE respondents agreed that the required standard of private rented housing is currently insufficient

93% of CfE respondents agreed that there is currently insufficient enforcement of energy efficiency standards in the private rented sector

However, our CfE respondents highlighted two persistent challenges regarding the private rented sector. Firstly, CfE respondents commented on the lack of enforcement of the current MEES regulations by local authorities and how this was allowing "recalcitrant" landlords to let energy inefficient properties without penalty. CfE respondents highlighted a number of perceived reasons for this, such as a lack of funding to local authorities from central Government for the required staff and expertise to uphold standards, and also the Covid-19 pandemic limiting visits to private properties by housing officers. Analysis has shown that the introduction of selective licensing schemes by some local authorities has however been broadly effective in improving standards, with evidence of enhanced enforcement capabilities in areas where schemes are used.[98]

"If one individual is unhappy with the energy efficiency of a property, there will always be another desperate person who will be happy to rent a cold or damp dwelling simply to have somewhere to live"

Academic, England

"Tenants would see the benefits of decarbonisation if effective enforcement action was taken against recalcitrant landlords"

Charity working across England and Wales

Secondly, CfE respondents underlined what they perceived as a much wider lack of tenant rights in the private rented sector, especially among uniquely vulnerable groups such as recent migrants, refugees, or those with long-term health conditions or disabilities. One respondent testified that low-income and vulnerable households are also generally disadvantaged within the private rented sector; "they often only have a very limited choice in the market anyway and so their top priority is simply getting a roof over their heads. Landlords are typically aware of this and so have no market incentive to improve conditions." This comment underscores the power imbalance in the social relationship between tenant and landlord, which results in many tenants being unwilling to request energy efficiency upgrades even if they are aware of MEES regulations, for fear of reprisal (or even eviction) by their landlord.

There was a recognition by some CfE respondents that the proposed amendments to the MEES regulations would represent a major improvement and help to drive up energy efficiency standards in the sector. Equally, however, others were worried about the ongoing impact of the Covid-19 pandemic and the resumption of evictions resulting from rent arrears. It is clear that, in this context, there is a need for greater enforcement action and the introduction of further incentives for landlords to upgrade the energy efficiency of their properties.

A lack of parity between the private and social rented sectors

There is also an unevenness in the approach taken by the UK Government towards decarbonisation in the social and private rented sectors. As discussed in the previous subsection, in the private rented sector landlords are required to spend up to a capped amount to ensure their properties meet legal minimum energy efficiency standards. In social housing, there is no equivalent standard in England (although the Decent Homes Standard may soon be updated). However, there is funding explicitly targeted at decarbonising social rented homes, primarily through the Social Housing Decarbonisation Fund.[99] In Wales, there is also a focus on social housing; the Net Zero Wales Plan sets out an ambition to use social housing to lead the way and set the highest standards.

Whilst this difference in approach has led to the private rented sector lagging behind in terms of progress on energy efficiency, there is still progress that could be made in the social rented sector. In our CfE, 75% of respondents agreed that the required standard of social rented housing is currently insufficient, and evidence submitted to the CfE has highlighted that this is a particular issue in Northern Ireland.

"At the moment there is no decarbonisation plan for the housing sector in Northern Ireland, although the Housing Executive is currently working on developing a zero carbon and adaptation plan for the housing and estate it is responsible for. In terms of UK funding, Northern Ireland is often missed off the eligibility list even though there is an urgent need to support decarbonisation of the sector."

NGO, Northern Ireland

A lack of regulation for some heating types

Finally, there is a diverse range of options when it comes to low-carbon heating technologies. However, not all of these receive the same level of consumer protections as electricity and gas consumers (particularly, users of district heating and biomass boilers). Without proper regulation, those households miss out on:

- Price caps, which would protect them from volatile fuel prices and inflated profits for their suppliers.
- Protections regarding debt, so that their repayment plans reflect what they are able to pay.
- Additional support like energy advice, so that they can minimise their energy costs.

Without these protections, those that are forced into non-regulated markets will likely have a worse experience of decarbonising their heating than others, through no fault of their own. This is currently a particular issue in Northern Ireland, where the majority of households use unregulated fuels to heat their homes, with 68% of households using oil as their primary heating fuel. Furthermore, the development of alternative products and services in the market (e.g. Heat as a Service), possibly offered by new actors such as energy service companies or energy aggregators, presents the risk of existing regulations struggling to keep up with the direction of innovation.

70% of CfE respondents agreed that there is a lack of consumer protection for decarbonisation solutions that do not use gas or electricity

81% of CfE respondents agreed there is a risk that regulatory change is too slow to keep up with the pace of change of decarbonisation

7 The Importance of Transparency

Transparency in the energy system is essential for ensuring that low-income and vulnerable households do not become exposed to future negative impacts of the decarbonisation of domestic heating.

Our stakeholders told us that:

- Available information on the energy market could be better publicised to increase awareness.
- There needs to be a balance between customers paying fair prices and energy companies being able to stay afloat in a financially sustainable way. Transparency of pricing gives some way to judge this.
- There is a need to publish high-level indicators of the total cost to Government of the energy transition annually. Energy bill transparency necessitates strong governance, robust cost controls for Government spending, and stringent cost assessment of industry spending by regulators.

88% of CfE respondents agreed that transparency is important to achieving a fair transition to net zero.

75% of CfE respondents disagreed that there is currently sufficient transparency in the energy market to facilitate a fair transition to net zero

7.1 Opportunities to provide transparency

Through our research we have found two main ways in which transparency can be achieved to facilitate a fair and affordable decarbonisation of domestic heating:

- Publishing the overall level of policy costs that are recovered through consumer bills and the impacts of those costs.
- Price protections (such as the Default Tariff price cap).

These are discussed in turn below.

Routine public assessment of distributional impacts

According to Ofgem, policy costs currently make up 15% of the average dual fuel bill, an amount that is not insignificant. While it is useful to know the total quantum of policy costs that consumers contribute through their bills, it does not paint the whole picture.

93% of CfE respondents agreed that the overall policy costs recovered through consumer bills should be published

Each decision that the UK Government, devolved Governments, and energy regulators make about the energy market will have different impacts on different sets of consumers. In many cases, Governments will conduct an impact assessment, which looks to investigate the overall cost of a decision, who that might impact, and how. The groups that these assessments consider are relatively variable, and any consistency is mainly achieved through adherence to the Equalities Act, where the impacts must be assessed for the following characteristics:

- Age
- Disability
- Race
- Marriage/civil partnership status
- Sex, gender reassignment, religion or belief, and pregnancy and maternity
- Income

Beyond these characteristics, assessment of impacts is varied, and often minimal.

93% of CfE respondents agreed that there should be routine public assessment of the distributional impacts of decarbonisation policies funded through energy bills.

The now defunct UK Department of Climate Change (DECC) previously provided an annual assessment of the estimated impacts of energy and climate change policies on energy prices and bills.[100] This report was tied to the timing of HM Treasury's Annual Energy Statement and therefore provided a consistent and routine assessment of distributional impacts. This annual analysis included:

- Recent developments in UK energy prices and bills.
- International comparisons.
- How policies impact energy bills.
- The specific impact on household energy bills.
- Analysis of how different fuel prices would change the impact.

This robust analysis explained the policy costs that were added onto bills, and how those policies would likely impact on consumer bills. For example, while funding for energy efficiency is an initial cost on bills, it reduces average demand, so overall, over a period of time, reduces the average energy bill.

This analysis is no longer published, meaning that there is a lack of transparency as to the impact that levies have on bills, making the costs of the transition to net zero, as well as who pays these costs, harder to scrutinise. As we move towards net zero, with the potential for more of the costs of decarbonisation to be paid for through bills, this lack of annual analysis presents a gap in transparency.

In recent years, Ofgem has introduced their own model for assessing the distributional impacts of their economic regulation decisions.[101] This framework uses three groups of data to help us assess impact:

- Disposable income and energy expenditure – to assess how a policy may affect how much consumers spend on energy as a proportion of their income.
- Socio-economic factors such as age, disability status, and employment status – to assess how a policy may affect vulnerable groups.
- Attitudinal and technology adoption, such as engagement in the energy market and electric vehicle uptake – to give insight into how policies may affect those with different attitudes towards and experiences of the energy market.

Within these groups, the model assesses:

- Absolute financial savings or costs.
- Savings or costs as a percentage of disposable income.
- Equity-weighted financial savings, capturing the fact that an additional unit of income improves the welfare of a low-income household more than that of a higher income household.

This is a valuable model that increases the understanding of how economic regulation impacts on vulnerable groups. However, it should be noted that either the modelling is not completed for all decisions, or it is not always made public. For example, results of the modelling are not published for changes to the price cap for domestic electricity and gas prices in Great Britain.

87%

of our CfE respondents agreed that there should be price protection mechanisms, such as the Default Tariff price cap in the energy market

Price protection mechanisms

The Default Tariff price cap, which has been created through legislation from the UK Government and has been implemented by Ofgem, provides a key consumer protection for customers in the energy market. It not only provides some temporary relief from unpredictable price increases but greater transparency in the pass through of energy related policy costs, and other energy costs. This transparency is valuable on two levels:

1. For stakeholders with the prerequisite knowledge and interest, there is the ability to fully interrogate the cap to understand the quantum of individual costs and how they are applied to bills.

2. For households, who often have less interest and knowledge, it can provide confidence that pricing is fair, and that price increases are justified, as they are calculated by a trusted third party in Ofgem.

While the Government has announced that there is no longer a fixed end date of the price cap, there is no guarantee that the price cap, or even a reference price that could shadow a price cap without being a legal limit, will be sustained into the future.

An alternative view was offered by some stakeholders. They said that given the current situation regarding rapidly increasing price rises, price caps that only update every six months do not necessarily represent the most current costs of providing energy to households. While this is true for the wholesale element of the market, policy and network costs tend not to change so rapidly, meaning that for those components, the price cap is usually relatively accurate.

While we and our stakeholders place significant value on the transparency of the price cap, capping prices does little to impact the fairness of pricing mechanisms. For example, price caps do not currently determine the proportion of costs that are fixed (and therefore part of the standing charge) and variable (part of the unit rate). How costs recovered also forms an important part of fairness and affordability is a consideration that should not be forgotten.

7.2 Transparency in Northern Ireland

The energy market in Northern Ireland is detached from the market in Great Britain, and Northern Ireland has remained in the EU Single Energy Market even after Brexit. This means that the mechanism discussed above do not all translate easily to the Northern Ireland market. Differences in the Northern Ireland market include:

- A different price cap mechanism, whereby prices are only capped for some of the energy supply companies.
- Local decision making on policy, including whether policy costs are added to bills. Stakeholders told us that there was not enough transparency of how different costs impact on different sets of householders for decision makers to make informed decisions as to where costs for household should lie.

Although the market is decidedly different, the views on transparency were not. Stakeholders in Northern Ireland told us that transparency was important in meeting their fuel poverty and net zero ambitions, and without suitable improvements, it is unlikely that the most optimal route to net zero will be found.

7.3 Transparency is a prerequisite

Throughout our research there was near complete agreement that transparency of costs and the distributional impact of Government and regulatory decisions are crucial for achieving a fair and affordable transition for fuel poor households. We heard from our stakeholders that the value of transparency varies between actors. For example, consumers may not need to know exact details regarding the distribution of impacts, but they may take confidence that the impacts are being explored in detail. On the other hand, those who hold decision makers to account, such as charities, consumer groups and elected officials, can benefit significantly from detailed transparency. These actors exist to ensure that the best decisions can be made in the interests of households, and this function is maximised where there is transparency. In short, we have found that it is in the best interests of fuel poor households that decision makers make their distributional analyses of the costs and benefits of the transition transparent, and in detail. Without this, we will be running blind into an uncertain future with little way of determining whether we are moving towards a fair and affordable transition to net zero for fuel poor households or not.

8 Summary and Conclusions

In our analysis of available data, responses to the CfE, and broader engagement with stakeholders, we have found that achieving a fair and affordable decarbonisation of domestic heating for fuel poor households will be the key litmus test for the transition. Warm and safe homes can be, and need to be, at the heart of our efforts to decarbonise. Without programmes to transform the homes of those on low incomes and the least efficient homes and providing clean heating, we will fail at both. There are huge opportunities to alleviate fuel poverty through decarbonising homes, but barriers continue to exist which, without removal, will hinder progress towards both our fuel poverty targets and our net zero ambitions. There is a consensus that transparency is key to ensuring that governments and regulators make decisions to enable a fair and affordable transition.

Below is a summary of our key insights from the research.

The Opportunities of Decarbonised Heating for Fuel Poor households

There are huge opportunities for fuel poor households through the decarbonisation of domestic heat.

Decarbonising homes will require households to reduce their energy demand, primarily through increased thermal efficiency of buildings. Those living in the worst performing properties, with an EPC of F or G, can save more than a thousand pounds per year if they are able to increase the thermal efficiency of their buildings and reach an EPC of C or above. We estimate the total value of this to be approximately £850m per year.

Additionally, improved energy efficiency gives more protection when energy prices sharply increase, giving fuel poor households insurance against price spikes (like those seen for wholesale gas in the current winter).

In addition to making financial savings, a reduced cost of heating homes can lead to greater thermal comfort for fuel poor households. This can save the NHS more than £1.5 billion per year and can lead to better health and wellbeing,

There are also opportunities to support the levelling up agenda. The need for energy efficiency upgrades is well spread out across the UK. Public money spent on energy efficiency means money saved for householders, predominantly in economically deprived areas. This saved money is likely to be spent in the local area, driving the local economy.

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Financial Barriers

- Fuel poor households need additional financial support to cover upfront costs associated with decarbonisation in order to access the direct benefits of decarbonising their homes.
- There are significant 'hidden' costs, unaffordable for fuel poor households, associated with home upgrades, such as rewiring or upgrading their electricity network connection to use electric forms of heating. These are not covered by current grant schemes.
- Transitioning to a low carbon heating technology from a gas boiler could result in higher bills if policy costs on bills remain high.
- Fuel poor homes in arrears cannot switch their energy supplier to a tariff which may be more suitable for different low carbon heating technologies.
- Low-income households face financial difficulty paying off large standing charges on bills, which often need to be paid before gas connections can be capped if the household is no longer using gas as heating or cooking fuel.

> **"Removing some or all of environmental and social obligation costs from electricity would help reduce electricity bills and make heat pump running costs competitive with gas heating. We'd prefer to see these costs move into general taxation, as there are significant distributional impacts associated by moving some or all of these costs onto gas bill payers and there would need to be careful consideration about how to mitigate the impact on fuel poor gas customers."**
>
> Independent energy organisation, working across the UK

> **"Financial support schemes should be made available to consumers to help with the initial costs of installing or converting home systems to low-carbon, high efficiency technologies. Once the overall envelope for funding has been agreed, policy makers must ensure this is fairly attributed to different consumer groups, for example those on low versus high incomes, those living in urban versus rural areas, and intergenerational fairness."**
>
> Non departmental public body

Physical Barriers

- Fuel poor homes are less likely to have high standards of energy efficiency. This means that more money must be spent to get their homes 'net zero ready'. If homes are not energy efficient enough, switching fuel types can result in higher running costs.
- The investment needed can be much higher for the worst performing rural homes. There are also additional challenges in rural homes: low incomes; limited connectivity (digital, transport, and social); limited access to essential services; hard-to-treat housing stock quality; socio-demographics, especially ageing populations; and the greater prevalence of more extreme weather conditions. They are also often locked into expensive, unregulated high carbon fuels.
- There is a lack of installers of both energy efficiency measures and of low carbon technologies available to meet the considerable challenge of decarbonising the four million fuel poor homes across the UK.

> "Thermal inefficiency means a fabric first approach should be taken prior to looking at renewables."
>
> Local Authority, England

Awareness and Advice Barriers

- There is a lack of awareness of which technologies are suitable to which homes, and while energy advice in general is relatively well advanced, there is a gap in advice specifically to help households decarbonise their homes.
- There is little central funding for energy advice, let alone advice specifically relating to decarbonising homes. Where this advice exists, it is often digital only or restricted to local areas, creating postcode lotteries of provision.
- There is a lack of consumer protection for energy efficiency and low carbon heating technologies, meaning a poor consumer journey and a lack of redress if things go wrong

> "We urgently need a national campaign to raise awareness of the available solutions and their benefits, as many householders have never heard of solid wall insulation or heat pumps."
>
> Installer/engineer, England

> "Additional funding should be made available from the UK and/or Welsh Government to ensure that vulnerable consumers are supported with advice to switch supply when the time comes, as well as heat their homes efficiently and cost-effectively, in similar means to what they are able now through Warm Home Discount and Nest schemes."
>
> Charity, Wales

Policy and Regulatory Barriers

- While there are schemes available to help fuel poor households to decarbonise their homes across each of the UK nations, the amount of funding available and their design are often not fit for purpose. There is simply not enough money available, nor a long-term plan, to help all fuel poor households to decarbonise in a timely manner.
- Where there have been schemes with funding available, they have been relatively short-term, and even longer-term schemes such as the Energy Company Obligation have been subject to changes within different 'phases' of the scheme. This cycle of short-term funding causes reduced confidence from both householders and the supply chain.
- There is a lack of clarity over the future of the Warm Home Discount and Energy Company Obligation in Scotland, leaving uncertainty over this key provision.
- There has been a lack of clarity in the policy environment regarding decarbonising heating. While new net zero and domestic heating strategies across the UK go some way to addressing this, there are still gaps in policy, particularly around the ongoing cost of electricity and the future of the gas network.
- There are issues in the private rented sector which lead to vulnerable people living in poor quality housing. A lack of enforcement of the private rented sector minimum efficiency standards (MEES) has led to some properties still not reaching the legally required standard.

> "Some support for private landlords, particularly those with low profit margins, might be necessary. However, in general private landlords have made huge profits from their homes. We need effective enforcement of regulation, much improved tenants' security and affordability plus significant Government investment in expanding social housing as an alternative to private renting."
>
> Charity, working across England and Wales

We have also investigated the value of transparency in the market to decarbonise heat, and concluded that it is a pre-requisite to achieving a just transition for fuel poor households. In order to achieve the opportunities set out above, changes must be made to increase transparency and remove the above barriers. We have tested some interventions to achieving this with our stakeholders and our final recommendations can be found in the next section.

> "It is imperative that the strategic principle to create a flexible and integrated energy system maintains security of supply at the least cost to consumers. This will necessitate in-depth consideration of the cost impact when introducing new policies, financial support interventions and technologies, to ensure they do not result in an unfair or disproportionate financial burden on consumers as a whole, specific groups, or consumers in vulnerable circumstances. It must not be the case that those who have the capacity to adapt to and adopt new technology reap the cost and lifestyle benefits, while others, such as consumers in vulnerable circumstances, are left to languish on inefficient outdated technology, struggle to adapt to new technologies, or are left to pick up infrastructural costs."
>
> Non departmental public body, Northern Ireland

9 Recommendations

In order to remove the barriers and maximise the opportunities for fuel poor households in the move decarbonise domestic heating, we recommend addressing financial and physical barriers for fuel poor households, as well as improving advice and removing policy and regulatory barriers.

Addressing financial barriers for fuel poor households

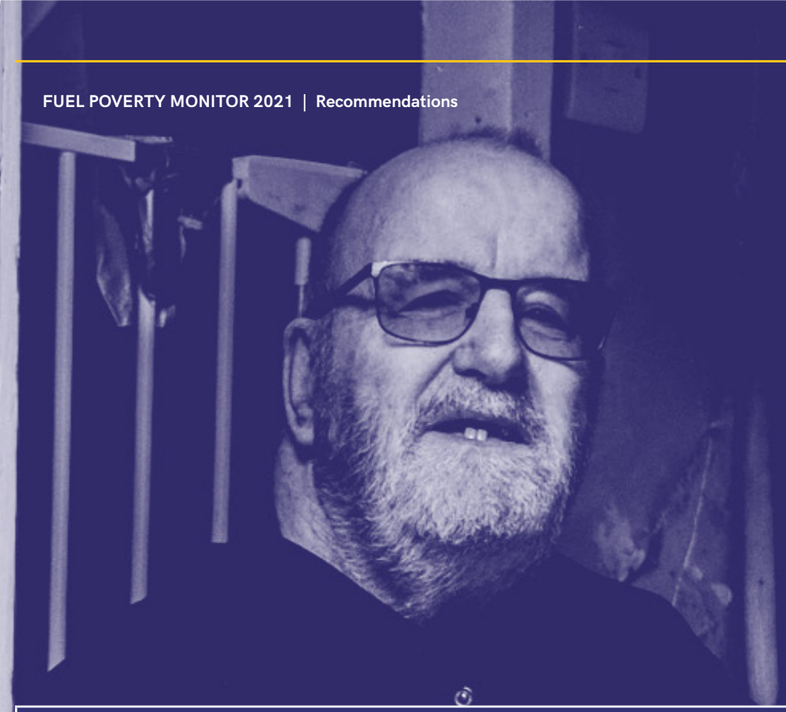
- There must be adequate funding to make sufficient progress in decarbonising the homes of fuel poor households through energy efficiency upgrades by 2025.
  - In England, the UK Government should increase the funding envelope within the Home Upgrade Grant scheme by £1.4bn to 2025 to match the commitment made in the Conservative Party manifesto to support fuel poor homes in the least efficient properties.
  - In Wales, the Welsh Government should increase fuel poverty funding, to £325m to 2025, as per the recommendation from the Future Generations Commissioner for Wales.
  - In Scotland, funding to improve the energy efficiency of fuel poor homes should increase to £522m to 2025.
  - In Northern Ireland funding totalling £440m[1] should be committed to 2025 to ensure that all fuel poor homes can reach EPC C to 2030.
- Governments across the UK and Ofgem should ban household contributions within the Energy Company Obligation and any other decarbonisation scheme that is aimed at fuel poor households. Grants should also cover the whole costs of upgrades, including those that are ancillary such as rewiring.
- The UK Government should look to reduce the cost of electricity by moving policy costs such as the Renewable Obligation and Feed in Tariffs into general taxation. Any move to increase Treasury income to recuperate these costs should not increase the cost of gas for fuel poor households until at least 2030.
- Ofgem should create a reliable and consistent mechanism to allow low-income households to uprate their connection to the electricity network when they install low carbon heating, at no upfront cost within the ED-2 price control.
- Ofgem should establish a working group of energy suppliers, energy networks and consumer groups to develop a good practice guide on how gas connections can be capped if a household is no longer using gas for heating or cooking. This should include consideration of how unpaid standing charges can be repaid, written off or socialised when low-income households are no longer using the gas network.

Addressing physical barriers for fuel poor households

- All policies aimed at decarbonising heat in homes should be attached to a 'fabric first' philosophy to ensure that a good standard of energy efficiency is achieved before or when low carbon heating is installed. This will ensure that the heating technology can work more efficiently, giving the best chance of achieving cost reductions for households. It would also help reduce the total cost of decarbonising heat across the UK by £6bn per year.
- Grant schemes for fuel poor households to upgrade their homes must come with sufficient cost caps to enable the worst properties to be upgraded to a suitable EPC rating.
- Governments should provide long-term (5-10 year) funding for decarbonisation measures, to ensure that businesses can grow sufficiently in order to meet the challenge of increasing the supply chain in line with demand.
- Governments should provide additional support to rural households, including higher cost caps in grant schemes and more accessibility options to ensure that the most vulnerable households living in the least efficient rural homes have suitable access to support.

Improving Awareness and Advice

- Governments should consider how they fund practical advice to households who are digitally excluded.
- Energy-related topics should be included within wider national, or local authority, digital inclusion and numeracy strategies and training.
- Governments should investigate ways in which advice specifically for decarbonising homes can be improved and included in national skills initiatives.
- High quality installation standards and advice go hand in hand. Following the positive introduction of PAS 2035 and TrustMark under some schemes, the highest retrofit standards must also be applied when carrying out work under Government programmes, but this must be done in a pragmatic way, where working 'to the principles' of PAS 2035 is allowed where reasonable. This would ensure that the measures deliver the expected benefits and do not lead to unintended negative impacts for householders due to poor installation practices.
- Accreditation schemes should include a requirement to provide redress to households if and when installations don't meet the required standards.
- A targeted campaign should be introduced encouraging recipients of the Discretionary Coal Allowance to adopt cleaner alternatives. Their payment should also not be stopped when they install alternative heating technologies.



Removing Policy and Regulatory Barriers

- Ofgem should clarify the future of the Fuel Poverty Network Extension Scheme. If the scheme is deemed not to be compatible with wider policy objectives concerning the future of the gas network, networks should be able to use the equivalent funding to deliver other heat cost reductions for households eligible for the scheme.
- Scottish Government should consult immediately on their plans for the future of the Warm Home Discount scheme and Energy Company Obligation in Scotland.
- Governments should extend the regulations in the private rented sector minimum energy efficiency standards so that all private landlords upgrade their properties to EPC C by 2028.
- Governments should ensure that funding mechanisms for decarbonising homes are available at least in part to private landlords where their tenants live in or are at significant risk of fuel poverty.
- The UK Government should work with local authorities to create a landlord register to ensure better enforcement of regulations in the private rented sector.
- The UK Government Department for Business, Energy and Industrial Strategy (BEIS) and Department for Levelling Up, Housing and Communities (DLUHC) should look to update the Decent Home Standard so that minimum expectations for energy efficiency in the social rented sector mirror those in the private rented sector.

Improving Transparency in the transition.

- UK Government should reinstate the regular reporting of how policy costs impact on consumer bills in order to provide transparency over the funding implications of the transition to decarbonised heating.
- Irrespective of the long-term future of the Default Tariff price cap, the UK Government should commit to keeping a long-term price protection mechanism in place to ensure that policy costs on bills continue to be passed through in a transparent and fair manner.
- UK Government should commit to impact assessments for all policy decisions at a more granular level, to better understand the distributional impacts of policy change, using Ofgem's distributional impact tool as a starter.

Polling prepared by YouGov on behalf of NEA to gather a nationally and politically representative view on a fair and affordable transition to net zero showed strong public support for our recommendations.

79% of British adults said that it is not likely that the UK can achieve net zero carbon emissions if the Government does not provide financial support to the poorest homeowners to make changes to decarbonise their homes.

66% of British Adults said it is more important that the UK transitions to net zero in a way that does not increase the cost of living for the poorest households, even if this means additional financial support from the Government.

74% of British adults said the government should provide support to everybody (52%) to switch to a green home heating system or that support should only be given to the poorest (22%) households only. 8% said The Government should provide financial support to the most polluting households only.

76% of British adults said the government should provide support to everybody (47%) to switch to a green home heating system or that support should only be given to the poorest (29%) households only. 7% said The Government should provide financial support to the most polluting households only.

48% of British adults said that the Government should pay the full cost of switching to a green home heating system for the poorest households.

44% of British adults said that the Government should pay the full cost of making home improvements to make their home more energy efficient for the poorest households.

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