WARM HOMES MISSION: ADDRESSING FUEL POVERTY WITH ENERGY EFFICIENCY

SEPTEMBER 2024

WWW.FRONTIER-ECONOMICS.COM

Contents

frontier economics

1 Executive Summary

Frontier Economics has been commissioned by WWF-UK and ScottishPower to develop a modelling tool that can investigate how different additional public spending levels could help address fuel poverty across Great Britain through energy efficiency improvements.

Applying the English definition of fuel poverty, we estimate that fuel poverty affects nearly four million households across Great Britain.[1] Those in fuel poverty often face significant health and wellbeing issues through inadequately heated homes, as well as higher risks of falling into debt. Increasing home energy efficiency has the potential to reduce fuel poverty, providing significant social benefits, while also delivering major reductions in greenhouse gas emissions.

In this report, we assess the impact of providing additional funding targeted at improving fuel poor homes, on top of existing policies and UK Government commitments, and alongside the strengthening of private rented sector regulations.

- Across all our scenarios, we assume the roll-forward of the current funding levels of £1.4bn per year for ECO and the Great British Insulation Scheme to the end of March 2030. We also assume that £0.7bn per year of public funding for energy efficiency from March 2025 to March 2028 (announced by the previous Government for the period 2025 to 2028), is focussed towards improving the energy efficiency of fuel poor homes.
- In addition to this, we model four levels of new public funding per year for energy efficiency focussed on the fuel poor, starting from the new Government's Manifesto commitment of £6.6 billion over the Parliament, which would represent around £1.3bn a year, and exploring the impact of three further scenarios of increased funding. [2]
- We also consider the impact of strengthening the current regulations to improve energy efficiency in the private rented sector. More than one-third of all fuel poor homes in

1 Different definitions of fuel poverty are applied across the Devolved Administrations. The measure used in this report relates to the definition adopted in England by the UK Government in the statutory Fuel Poverty Strategy made under the Warm Homes and Energy Conservation Act 2000. BEIS (2021), Sustainable Warmth

2 £1.3bn is based on the Labour Manifesto commitment to invest £6.6bn over the five years of this parliament.

England are from the private rented sector.[3] We factor in the impact of strengthening the existing measures in this sector to our analysis.[4,5,6]

We find that applying this funding and these measures to improve the energy efficiency of fuel poor homes would, at all levels considered, facilitate strong progress towards meeting the target of ensuring that as many fuel poor homes as is reasonably practicable achieve a minimum energy efficiency rating of Band C, by 2030.[7] It would also deliver significant bill and carbon savings (Table 1).

3 Committee on Fuel Poverty (2024), Can Fuel Poverty be Ended?

4 On 23 September 2024, DESNZ announced plans to consult by the end of 2024 on a strengthening of the existing regulatory regime around energy efficiency standards in the private rented sector in England and Wales with a view to this taking effect by 2030. The analysis presented in this report models a strengthening of the regulatory regime in the private rented sector taking effect such that homes are upgraded either during 2028 or 2029. This is to assess its possible contribution towards meeting the UK Government's statutory Fuel Poverty Target of improving as many fuel poor homes as reasonably practicable to an energy efficiency rating of Band C by 2030.

5 In 2020, the then UK Government consulted on proposals to strengthen the existing regulations but decided not to move forward with the proposals. BEIS (2020), Improving the Energy Performance of Privately Rented Homes in England and Wales, page 21; PM speech on Net Zero, September 2023.

6 As part of its announced plans to consult on strengthening the energy efficiency regulatory regime for the private rented sector in England and Wales, DESNZ also announced on 23 September 2024 plans to consult on a new energy efficiency standard for social rented homes that will align with the approach being taken in the private rented sector for new minimum standards by 2030. Due to the timing of this announcement, we have not factored a target on socially rented properties into our analysis. We note that social renters make up 18.9% of the fuel poor in England (based on DESNZ (2024), Fuel Poverty Statistics. While social renters make up a significantly lower proportion of fuel poor households than private renters in England (35.1%), setting a new standard in this area could help with making progress towards the statutory 2030 fuel poverty target (depending on the timing of its implementation). We may analyse this further in future work using this model.

7 This is the statutory target for England. BEIS (2021), Sustainable Warmth

Table 1 Impact of increasing spending on energy efficiency measures by 2030

	Fuel poor homes reaching FPEER C	% of fuel poor homes reaching FPEER C	Average annual bill saving per household	Average annual value of carbon saving per household
£.1.3bn additional funding per year, and strengthened private rented sector regulations from 2028	2.3m	62%	£395	£122
£.1.5bn additional funding per year and strengthened private rented sector regulations from 2028	2.4m	66%	£367	£117
£.2bn additional funding per year and strengthened private rented sector regulations from 2028	2.7m	73%	£318	£108
£.2.5bn additional funding per year and strengthened private rented sector regulations from 2028	3.0m	80%	£285	£101

Source: Frontier Economics

Note: The number of fuel poor homes relates to total number of homes upgraded by public funding and strengthened private rented sector regulations from 2028, with a compliance rate of 75%. The bill savings and carbon savings figures do not take into account households upgraded through private rented sector regulations. Average household bills savings decline as funding levels increase, since we assume the homes with the lowest energy efficiency are tackled first (but the aggregate bill savings across households increase as funding levels increase). We do not include solar PV or ground source heat pumps in the analysis.

Table 1 shows that on average, household bills would fall by around £300-400 per year, depending on the funding scenario. However, these averages mask a large variation across housing types. For example, for the households with direct electric heating, installing heat pumps with insulation results in bill savings of more than a thousand pounds per year.

Throughout this analysis, we have assumed that homes with E, F or G Band energy efficiency ratings are upgraded to Band C before homes with D Band rating, since households in those homes are more likely to be in the deepest fuel poverty. Alongside the bill savings, these households will benefit from warmer homes, and there is strong evidence that this will drive positive health and wellbeing impacts. There is also the potential for significantly reduced NHS costs, with research by Building Research Establishment (BRE) suggesting these savings could be nearly a billion a year in England alone.[8]

We recognise that there are trade-offs for a government to make between focussing funding on treating the homes with the worst energy efficiency rating or focussing on treating the largest numbers of households. There are also trade-offs between delivering full upgrades to homes (including heat pumps, as appropriate) or focussing the limited funding on reaching more households with a ‘fabric first’ insulation upgrade approach. The results presented in this report reflect a prioritisation of reduced bills and warmer homes for those in the deepest fuel poverty, combined with a targeted roll out of heat pumps to a limited proportion of fuel poor households. However, the modelling tool we have developed will enable the exploration of different approaches to policy development in this important area. In light of this, we may build on this tool further as policy development continues in this area, leading up the UK Government’s planned Spending Review in Spring 2025.

8 BRE (2021), The Cost of Poor Housing in England

2 The need to address fuel poverty with energy efficiency improvements

WWF-UK and ScottishPower have commissioned Frontier Economics to assess how much progress increased public funding could make towards the target of ensuring that fuel poor homes across Great Britain achieve a minimum energy efficiency rating of Band C, by 2030.[9]

Context

Building on existing plans for energy efficiency policies, the new UK Government has committed to investing an additional £1.3bn per year over five years to support an energy efficiency upgrade to properties across Great Britain (GB). This commitment was set out in the Labour Party Election Manifesto.[10]

The Government has announced that it will be designing its new Warm Homes Plan for upgrading the existing housing stock as part of the current two stage Spending Review process, with a focus on the second stage running up to a Spending Review in Spring next year.[11] Given the tight fiscal landscape, robust prioritisation will be required across spending bids from Whitehall Departments. There will therefore need to be a very clear focus on showing value for money and fully evidencing this.

In this context, Frontier Economics has been commissioned by WWF-UK and ScottishPower to develop an analytical modelling tool to illustrate how different additional spending levels could alleviate fuel poverty through energy efficiency improvements. The modelling tool also considers the possible strengthening of the energy efficiency standards regime for the private rented sector in the last years of this decade as a way of further alleviating fuel poverty. More specifically, the report assesses the outcomes of four illustrative scenarios for public funding levels to 2030, considering the numbers of homes that can be treated, and the associated wider social and economic benefits. These key findings are set out in this report as a contribution towards the current public policy debate.

9 The Government's statutory target for England is to ensure that as many fuel poor homes "as is reasonably practicable" achieve a minimum energy efficiency rating of Band C, by 2030. BEIS (2021), Sustainable Warmth

10 https://labour.org.uk/change/make-britain-a-clean-energy-superpower/

11 HM Treasury (August 2024), Policy Paper: Fixing the foundations: public spending audit 2024-25.

How to define fuel poverty and the 2030 target?

We estimate that fuel poverty affects nearly four million households in Great Britain, under the definition for England set out in the UK Government's current Fuel Poverty Strategy[12]. Those in fuel poverty often face significant health and wellbeing issues through inadequately heated homes, as well as higher risks of falling into debt. Therefore, tackling fuel poverty by improving home energy efficiency for households in fuel poverty has the potential to provide significant social benefits, while also delivering major reductions in greenhouse gas emissions[13].

The UK Government's Department for Energy Security and Net Zero (DESNZ) estimates that improvements in energy efficiency, as well as an increase in the number of homes receiving the Warm Home Discount, have reduced the number of homes in fuel poverty in England by more than 100,000 in 2022-2023.[14] However, in the same period, energy price increases have driven a 20% increase in the fuel poverty gap (where the gap is the reduction in fuel costs required to move a household out of fuel poverty).[15]

The UK Government and Devolved Administrations have set challenging targets to tackle fuel poverty:

- in England, the statutory target is to ensure that as many fuel poor homes as is reasonably practicable achieve a minimum energy efficiency rating of Band C, by 2030;[16]
- in Scotland, the target, set out in the 2019 Fuel Poverty Act, is that, by the end of 2040, no more than 5% of households in Scotland are in fuel poverty, no more than 1% are in extreme fuel poverty and the median fuel poverty gap is not more than £250 in 2015 prices before adjusting for inflation[17]; and
- in Wales, the target is that, 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 living in fuel poverty at any one time as far as reasonably practicable and

12 Different definitions of fuel poverty are applied across the different Devolved Nations. This figure relates to the definition for England adopted by the UK Government as set out in the Fuel Poverty Strategy. BEIS (2021), Sustainable Warmth See Section 3 for our estimation methodology.

13 There is currently a substantial gap to meet the GB energy efficiency and low carbon heating targets. Frontier's Filling the Gap report for ScottishPower and WWF-UK (June 2023) found that there is a material gap to reaching the previous UK Government's 15% energy efficiency target for 2030 based on committed policies. That report focused on the energy efficiency deployment that would be required across all household types to meet the UK's national target, whereas the analysis here is based on policies focussed on those in fuel poverty.

14 Fuel poverty decreased by 112,000 households in England in this period. DESNZ (February 2024), Annual fuel poverty statistics in England, 2024 (2023 data), page 2.

15 DESNZ statistics, cited in Committee on Fuel Poverty and CSE (2024), Understanding the barriers and enablers to supporting fuel poor households achieve net zero,

16 The statutory fuel poverty target was set in December 2014 under the Coalition Government. BEIS (2021), Sustainable Warmth. It continues as a commitment under the current Government: DESNZ (2024), Warm Homes: Local Grant Guidance (page 3).

17 Scottish Government (2019), Fuel Poverty (Targets, Definition and Strategy)

the number of all households “at risk” of falling into fuel poverty will be more than halved based on the 2018 estimate.[18]

What are the aims of this report?

The starting point for this work is to assume that from April 2025 to March 2030 there is at least £1.3bn a year additional public funding available to be targeted towards energy efficiency measures for fuel poor homes across GB[19]. This is in addition to the rolling forward of the Energy Company Obligation ‘ECO’ and Great British Insulation Scheme at current levels (funded through consumer bills) through to 2030 and the deployment of the existing £6bn public spending allocated by the previous UK Government for energy efficiency schemes for the period 2025-28.[20]

Taking this additional funding, and the existing energy efficiency schemes and plans together, we assess how much progress could be supported towards the target of ensuring that as many fuel poor homes as is reasonably practicable achieve a minimum energy efficiency rating of Band C, by 2030. We consider the impact of increasing this funding, looking at additional funding levels of £1.5bn, £2bn and £2.5bn

In addition, we consider the impact of strengthening the current regulations to improve energy efficiency in the private rented sector in our analysis.[21]

The remainder of this report is structured as follows:

- In Section 3 we summarise the scale of the challenge in terms of the number of fuel poor households across GB.
- In Section 4, we estimate the number of fuel poor homes that could be upgraded to an energy efficiency rating band C level, assuming that there is a certain amount of funding available per year.
- In Section 5, we assess the wider socio-economic benefits (e.g. in terms of reduced bills and debt, improved health outcomes, jobs supported) as well as the reduction in greenhouse gas emissions that could be associated with this level of home upgrades.
- Section 6 sets out key take-aways from this analysis.

[18] Welsh Government (2021), Tackling fuel poverty 2021 to 2035

[19] £1.3bn is based on the Labour Manifesto commitment to invest £6.6bn new spending over the five years of this Parliament.

[20] DESNZ (Dec 2023), Press release: Families, business and industry to get energy efficiency support.

[21] In 2020, the then UK Government consulted on proposals to strengthen the existing regulations but decided not to move forward with the proposals. Department for Business, Energy & Industrial Strategy (2020), Improving the Energy Performance of Privately Rented Homes in England and Wales, page 21; PM speech on Net Zero, September 2023.

3 Scale of the challenge

In this section we set out the scale of the challenge, presenting our analysis of the number of homes in fuel poverty in GB, and how the numbers are distributed across different housing types.

3.1 Measuring fuel poverty

Fuel poverty is measured in different ways across the three GB nations:

- **England.** Fuel poverty in England is measured using the Low Income Low Energy Efficiency ('LILEE') metric. Under this metric, a household is considered to be fuel poor if i) they are living in a property with a fuel poverty energy efficiency rating ('FPEER')[22] of band D or below, and ii) when they spend the required amount to heat their home, they are left with a residual income below the official poverty line.[23]

- **Scotland.** In Scotland, a household is defined as fuel poor if more than 10% of their net income is required to pay for their reasonable fuel needs after housing costs have been deducted; and the remaining household income is not enough to maintain an acceptable standard of living, defined as at least 90% of the UK Minimum Income Standard (MIS) once childcare costs and disability or care benefits are deducted.[24]

- **Wales.** A household in Wales is defined to be fuel poor if they would have to spend more than 10% of their income to maintain a satisfactory heating regime.[25]

Box 1 describes the different metrics for measuring energy efficiency used by policy makers and in this report.

22 See Box 1 below for a description of the different energy efficiency ratings, and how we use them in this report.

23 DESNZ (2024), Fuel Poverty Methodology Handbook

24 Scottish Government (2021), Home Energy and Fuel Poverty

25 Welsh Government (2023), New Warm Homes Programme: policy statement

Box 1: Energy efficiency ratings[26,27]

There are three energy efficiency ratings relevant for this work:

- **Energy Performance Certificate ('EPC'):** EPCs include two ratings – the Energy Efficiency Rating (EER) and Environmental Impact Rating (EIR). The EER is typically the main metric used for policy delivery and is often used interchangeably with the term EPC.

- **Energy Efficiency Rating ('EER'):** Energy efficiency is typically assessed based on the UK Government's Standard Assessment Procedure ('SAP'), which allocates an energy efficiency rating ('EER') to a house of 1 (very inefficient) and 100 (very efficient) based on the modelled fuel costs of the home. These ratings are then converted into EER bands A (very efficient) to G (very inefficient).

- **Fuel Poverty Energy Efficiency Rating ('FPEER'):** The FPEER is an adjusted version of the standard EER rating. It is produced by DESNZ for the purposes of producing fuel poverty estimates. It is based on the Standard Assessment Procedure (SAP) used to generate Energy Performance Certificates (EPCs), but accounts for the impact of policies which discount households' energy bills (e.g. the Warm Home Discount). The methodology generates an energy efficiency rating from 0 to 100. This rating is then translated into an energy efficiency 'Band' from G (lowest) to A (highest). These are very similar to the EPC/EER ratings, however, the including of policies such as the Warm Home Discount may change the allocation into bands, at the margin. For example, a household with an EPC D certificate that receives a £150 deduction from their energy bill due to the Warm Home Discount, could have their home classed as FPEER band C.

Our use of ratings in this report

We focus on the number of homes that will reach FPEER C under different funding levels. However, some data (for example, the costs to upgrade homes to an EER Band C level from the English Housing Survey) are reported by EER/EPC band. In this report we treat data reported by EER C band as broadly equivalent to data reported by FPEER band C.[28]

26 DESNZ (2024), Annual Fuel Poverty Statistics in England

27 DECC (2014), Fuel Poverty Energy Efficiency Rating Methodology

28 For example, given that the main difference between the two definitions is the inclusion of the Warm Homes Discount in the FPEER band definition, we think it is reasonable that the costs to upgrade to FPEER should be broadly similar to the costs to upgrade a home to EPC.

3.2 Estimating the number of fuel poor homes across GB

To define the scale of the homes in fuel poverty across GB in a consistent way, we estimate the number of fuel poor homes in each GB nation, using the *English definition* of fuel poverty[29]. A detailed explanation of our approach is set out in Annex A. In summary we:

- obtain data on the number of fuel poor homes in England by heating technology and EPC band from the English Housing Survey;[30]
- use Census data on the distribution of property types by heating types to segment the English fuel poverty numbers further by property type;[31] and
- extrapolate from the English data to Scotland and Wales.

In extrapolating the English data to Scotland and Wales, we account for differences in the scale and mix of dwelling types across the GB nations. To do this, we scale down the number of English fuel poor homes by the relative size of the housing stock in Scotland and Wales (compared to England) for each building type.[32] This allows us to account for differences both in the scale and mix of property types within the housing stock across the Devolved Nations. For example, Scotland has a higher share of flats compared to England (due to a large number of tenement flats) and a lower share of terraced/semi-detached homes, while Wales has a lower share of flats compared to England and a higher share of detached and semi-detached homes.[33]

Using this approach, Figure 1 reports the number of fuel poor homes in GB by FPEER band, heating type and property type.

---

29 We use this definition since it is the metric used for the statutory target of the UK Government in England and it covers the majority of homes in GB. In addition, the intention of the LILEE measure, when it was adopted in England in 2021, was to better capture the households who would benefit from energy efficiency measures. See DESNZ (2021), Sustainable Warmth: Protecting Vulnerable Households in England. In this regard, the Committee on Fuel Poverty also recognises in its most recent Annual Report that this measure helpfully serves to prioritise the upgrading of homes on low incomes (whilst recognising the scope for reviewing it over time). Committee on Fuel Poverty (2024), Can Fuel Poverty be Ended?

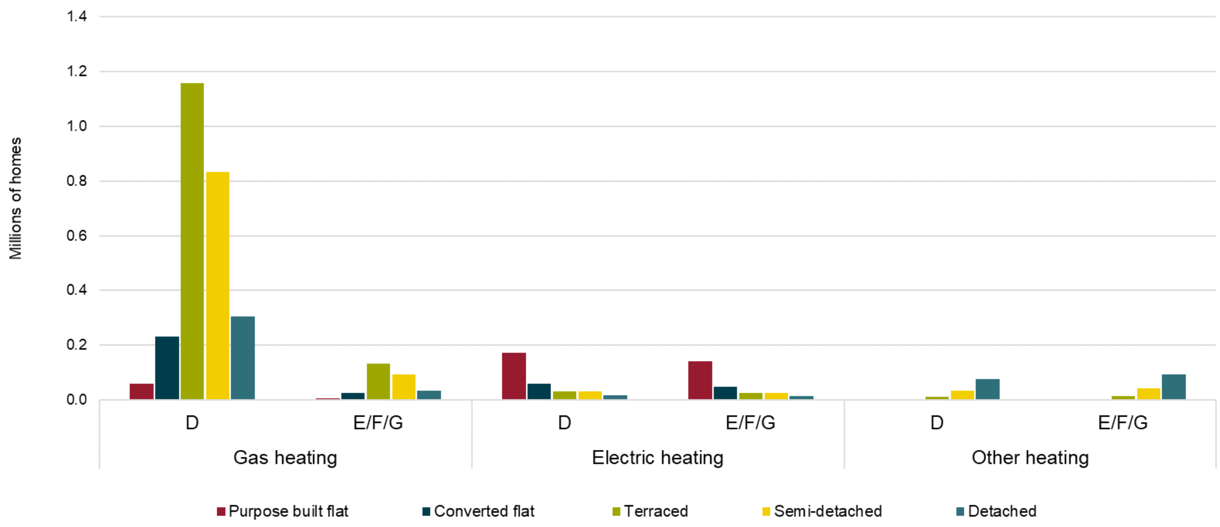
30 DESNZ (2024), Fuel poverty statistics

31 Census (2021) All data related to Energy efficiency of housing in England and Wales

32 Data on the size of the housing stock by house type is obtained from the English Housing Survey (2023 data published in February 2024), from the Scottish Housing Condition Survey (2022 data, published in February 2024), and from the England and Wales Census (2021 data published in January 2023, see Census 2021).

33 Since data on the number of homes by FPEER / EER band, property type and heating type (i.e. the cross-section of these characteristics) is not available for Scotland and Wales, our extrapolation requires us to make a simplifying assumption. Our approach assumes that distribution of the fuel poor population in England across heating technology and FPEER band applies to Scotland and Wales, but makes an adjustment for the differences in distribution across property type in England vs Scotland and Wales. We think this is a reasonable approach, given the available data, since comparisons of homes across EPC bands, across property types and across heating type across GB nations show that the largest differences relate to property type.

Figure 1 Number of fuel poor homes in GB by FPEER band and main heating type



Source: *Frontier Economics*

Note: *Electricity consists mainly of direct electric heating (including storage heaters, electric boilers or underfloor heating). A small number of heat pumps could fall into this definition, but we treat this as negligible, given the upgrades to homes associated with heat pump installation will generally increase the EPC level above D. The 'Other' category includes heating oil, anthracite nuts, house coal, smokeless fuel, wood, propane, bulk LPG, community heating from boilers/CHP/waste heat. Data is not available to split out EFG homes.*

We estimate that:

- **There are 3.7m homes in fuel poverty across GB**, including 3.2m homes in England, 381,000 homes in Scotland and 171,000 homes in Wales.
- **Most fuel poor homes are in FPEER band D**. There are 3m homes (81% of all fuel poor homes) in FPEER band D, while 700,000 homes (19% of all fuel poor homes) are in FPEER band E/F/G.
- **Most fuel poor homes have gas boilers** (2.9m homes or 77% of all fuel poor homes), **but there are also a significant number of homes with electric heating** (565,000 homes or 15% of all fuel poor homes) and other heating (276,000 homes or 7% of all fuel poor homes).
- **Most fuel poor households live in terraced or semi-detached houses** (2.4m homes or 65% of all fuel poor homes live in terraced or semi-detached houses). The remainder live in detached houses (541,000 homes or 15% of total), purpose built flats (385,000 or 10%) or converted flats (366,000 or 10%).
- **The most common 'type' of fuel poor home is those with gas boilers in terraced/semi-detached homes in FPEER band D**. This home type makes up around half of all fuel poor homes.

4 The scale of fuel poverty alleviation with different energy efficiency funding levels

In this section we estimate the number of fuel poor households in GB that could be upgraded to an FPEER C level, given different levels of assumed public spending committed to energy efficiency improvements.

4.1 Allocating public funding across fuel poor homes

We consider the benefit in terms of fuel poverty alleviation of different levels of public funding available to improve fuel poor homes, taking account of existing energy efficiency policies and plans. We consider the following:

- While the new UK Government has not yet committed to this, we assume the roll-forward of the current funding levels of £1.4bn per year for ECO and the Great British Insulation Scheme in a new Supplier Obligation Scheme over a four-year period from April 2026 to the end of March 2030 with a focus on lower incomes households in or at risk of fuel poverty.[34]

- Using a subset of the £6bn of public funding for energy efficiency (announced by the previous Government for the period 2025 to 2028) focussed on improving the energy efficiency of fuel poor homes, namely, the £400m allocated to energy efficiency grants, £500m from the local authority retrofit scheme and £1,253m from the social housing decarbonisation fund over 2025/26 to 2028/2029.[35,36]

- An additional amount of public funding of £1.3bn focussed on improving the energy efficiency of fuel poor households, over a five-year period from March 2025 to April 2030, based on the Labour Manifesto commitment to invest £6.6bn over the five years of this Parliament.[37] We also consider the potential impact of increasing this funding level by modelling levels of £1.5bn, £2bn and £2.5bn a year.

Policy makers will need to decide how to trade off different priorities when allocating this funding (Box 2). In this analysis, we use this funding to target those in the most extreme fuel poverty, and to prioritise bill savings to alleviate fuel poverty.

34 See DESNZ (2023), GB Insulation Scheme (formerly ECO+) Final IA, page 13 and DESNZ (2022), Final stage Impact Assessment ECO4, page 8. The costs of these schemes is funded via consumer bills, but we are assuming it is rolled forward at existing levels meaning no further upward pressure on consumer bills.

35 DESNZ (2023), Press release: Families, business and industry to get energy efficiency support

36 As an illustration, we have also modelled a sensitivity set out in Annex B which assumes that the full £6bn is dedicated to domestic energy efficiency.

37 https://labour.org.uk/change/make-britain-a-clean-energy-superpower/#warm-homes

Specifically, we estimate the number of fuel poor homes that could be upgraded to an FPEER C level and the impacts on bill savings as well as emission reductions, if:

- Public funding was targeted at the most inefficient homes first, whose occupants may be suffering from the most severe health and wellbeing impacts. To do this, we assume that funding is used to upgrade all FPEER E, F and G homes first, before then moving on to upgrading FPEER D homes with any remaining funding. Within these groups, homes are targeted in order of highest bill savings.

- Heat pumps are allocated so that around 5% of fuel poor homes have a heat pump by 2030.[38] Because we are prioritising reducing bills, and because we are not assuming any rebalancing of policy costs between gas and electricity retail prices in the period up to 2030 (Box 2), we allocate heat pumps to homes with direct electric heating, where the bill saving impacts are most significant. Our modelling focuses on allocating air source heat pumps only, given the higher cost of ground source heat pumps, although we note that ground source heat pumps will also have an important role in communal heating networks (which is outside the scope of this analysis).

In Annex B, we also present an alternative funding allocation rule whereby funding is allocated starting with homes that deliver the largest bill savings for the household per capital cost of the energy efficiency upgrade.

38 An assumption that 5% of fuel poor homes receive heat pumps by 2030 has been selected as the mid-point between the Climate Change Committee's recommendation that, by 2030, 10% of existing homes should be heated using a heat pump; and the recommendations of the Committee on Fuel Poverty which suggests that a 'fabric first' approach should be prioritised for the fuel poor population. See CCC (2024), Progress in reducing emissions: 2024 Report to Parliament, page 9 and Committee on Fuel Poverty (2024), Can fuel poverty be ended? The Committee on Fuel Poverty Annual Report 2024.

Box 2: Trade-offs for policy makers in allocating a limited pot of public funding

While this report focusses on supporting those in the most extreme fuel poverty, and prioritising bill savings over other objectives, other allocation rules could also be considered by policy makers.

Key trade-offs relate to the following:

- **Reaching as many homes as possible or supporting those in most extreme fuel poverty first:** Targeting funding at homes that are less expensive to upgrade first, could mean that more homes are upgraded. However, targeting the most inefficient homes first could help those facing the highest bills and the worst health and wellbeing impacts.
- **Maximising reductions in household energy bills or maximising carbon reductions:** While improving the energy efficiency of homes reduces carbon emission in all scenarios, emissions impacts are the greatest when interventions are targeted at homes with fossil-fuel fired heating. However, under current retail prices, the largest bill savings will be achieved by targeting homes with direct electric heating first, followed by homes with gas-fired heating, then homes with other fossil fuel-fired heating, (represented by oil in our analysis). At present, electricity users pay proportionately more policy costs (that is, levies to support low-carbon generation, energy efficiency and vulnerable customers) on bills than users of fossil fuels, and retail prices for electricity are relatively high. The previous UK Government committed to addressing this via rebalancing policy costs across energy consumer bills,[39] but progress in this area has not been made to date. Because this report is focussed on delivering benefits to fuel poor homes in the near term and based on current policy plans as they stand, we use retail prices[40] that assume no policy cost rebalancing. Were policy cost rebalancing to be implemented, this would have the effect of reducing the trade-off between maximising emissions savings and bill savings.[41]
- **Focussing on 'fabric first' insulation or decarbonising homes more fully with clean heating as well.** There is also a choice to be made on whether homes should be fully upgraded to renewable heating (by installing a heat pump) alongside a fabric upgrade, or whether the focus should be on making fabric improvements only, albeit to a larger number of homes. Fully upgrading homes with clean heating as well could reduce costs over the long term (for example, by reducing any fixed costs associated with finding and assessing properties). But because the capital costs associated with heat pumps are higher than the costs of insulation alone, a focus on such full upgrades would significantly reduce the number of homes that could be treated for a given funding level.

---

39 DESNZ (2023), Powering Up Britain: Net Zero Growth Plan

40 DESNZ (updated in 2023), Green Book Supplementary Guidance

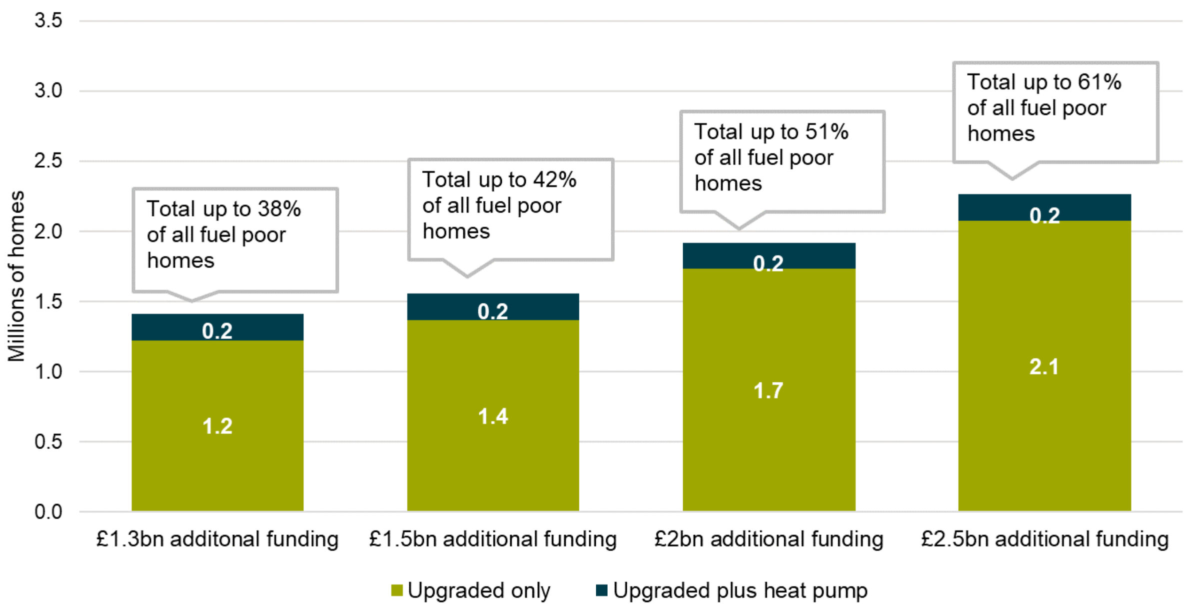
4.2 The number of homes that could be upgraded

Using costs from the English Housing Survey, the Climate Change Committee and UK Government research, we then consider the number of homes that could be upgraded under different funding levels.[42]

Figure 2 and Table 2 show the number of homes upgraded (either through insulation upgrades only or with an insulation upgrade and a heat pump) across different levels of public funding.

We estimate that additional annual public funding of £1.3bn to £2.5bn per year over the Parliament would result in between 1.4m to 2.3m fuel poor homes (38% to 61% of the GB fuel poor household group) being upgraded to an FPEER C level or above. These figures exclude the impact of potential new private rented sector regulations, which we deal with below.

Figure 2 Number of fuel poor homes upgraded



Source: *Frontier Economics*

Note: *The number of fuel poor homes upgraded is cumulative and the funding levels are annual. These figures exclude the impact of potential new private rented sector regulations, which we deal with below.*

41 For example, Nesta research suggests that under rebalancing, the majority of homes in Scotland would see a lower energy bill by fitting a heat pump, compared to 25% of homes under current retail prices. Nesta (2024), [Exploring the costs to consumers of Scottish clean heating requirements]

42 See Annex A for details of the methodology and sources.

Table 2 Number of fuel poor homes upgraded (millions)

Additional annual public funding of	£1.3bn	£1.5bn	£2.0bn	£2.5bn
Homes receiving insulation upgrades only	1.2	1.4	1.7	2.1
Homes receiving insulation upgrades plus a heat pump	0.2	0.2	0.2	0.2
All homes upgraded	1.4	1.6	1.9	2.3
Share of fuel poor household group upgraded	38%	42%	51%	61%

Source: Frontier Economics

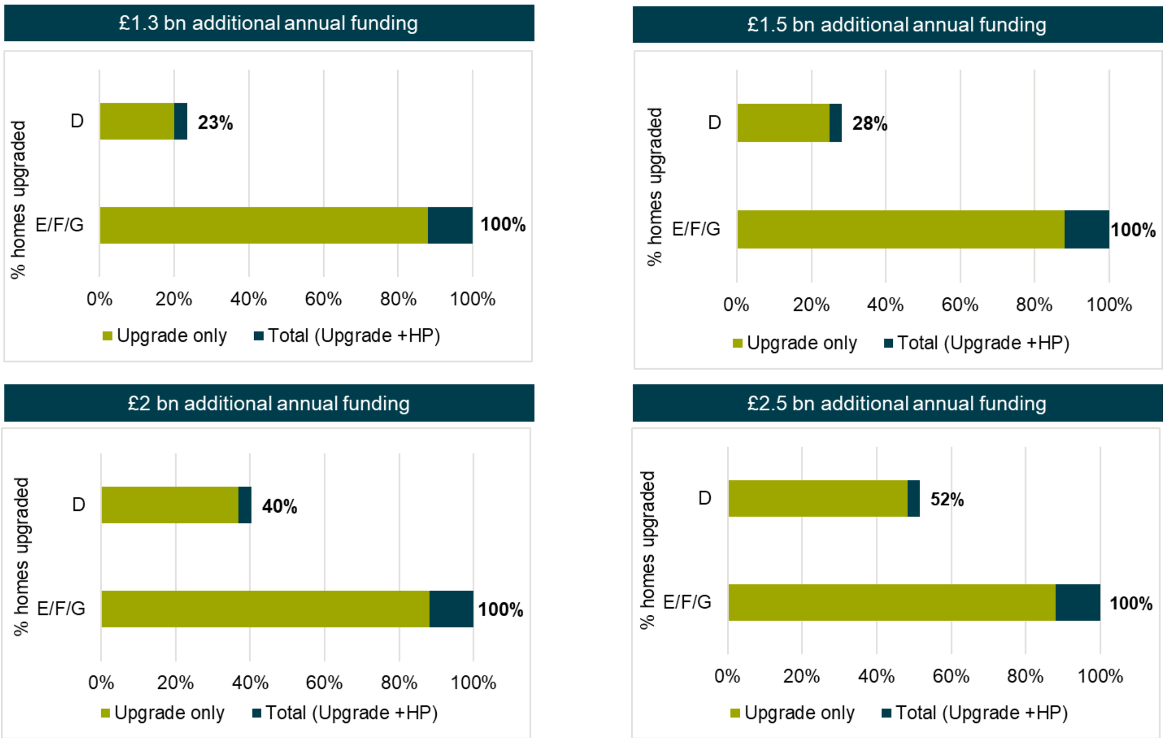
Note: The number of fuel poor homes upgraded is cumulative and the funding levels are annual. These figures exclude the impact of potential new private rented sector regulations, which we deal with below.

Under all additional public funding scenarios considered, all FPEER E/F/G fuel poor homes would be upgraded to an FPEER C level, as well as 0.7m – 1.6m FPEER D homes.[43]

Figure 3 below shows the number of fuel poor homes that would be upgraded by FPEER band, under different levels of additional public funding.

43 For simplicity, we have assumed in the modelling that all EFG homes can be upgraded. In reality, there may be a small number of homes where this is not technically feasible.

Figure 3 Fuel poor homes upgraded by FPEER band



Source: Frontier Economics

Note: The number of fuel poor homes upgraded is cumulative and the funding levels are annual. These figures exclude the impact of potential new private rented sector regulations, which we deal with below.

We observe that:

- All funding levels mean that 100% of the existing group of FPEER E/FG homes (i.e. 0.7m homes) could be upgraded to an FPEER C level by 2030. This means that all of the least energy efficient homes across the fuel poor group are being upgraded.
- In addition, a further 0.7m to 1.6m FPEER D fuel poor homes could also be upgraded to an FPEER C level by 2030. This would mean that by 2030, between 23% to 52% of all FPEER D fuel poor homes would be upgraded to an FPEER C level.

4.3 Impact of strengthened energy efficiency regulations for private rented homes

We estimate that the additional public funding scenarios considered above combined with strengthened regulations for the private rented sector from April 2028 could result in between 2.3m to 3.0m homes in the fuel poverty household group (62% to 80% of the GB fuel poor group) being upgraded to an FPEER C level or above, assuming 75% compliance with private rented sector regulations.

DESNZ estimates that in 2024, 24% of households in the private rented sector in England are classified as fuel poor, representing the highest proportion among all housing tenures.[44] These households make up more than one-third of all fuel poor homes.[45] The challenges for tenants in these homes have recently been documented by Citizens Advice.[46]

In 2020, the then UK Government consulted on proposals to strengthen the existing regulations for the private rented sector by mandating landlords to achieve an EER Band C by 2028, but in September 2023 decided not to move forward with the proposals.[47] The CCC's 2024 Progress Report states that the lack of further regulations in this sector "*leaves this part of the sector without plans to reduce emissions*" and "*misses an opportunity to reduce energy bills for tenants at a time when gas prices are particularly high*".[48,49]

Given that the private rented sector contains a disproportionately high number of GB's least energy efficient properties and fuel poor households, we have also considered the impact that strengthened regulations for the private rented sector (that require rented homes to be at an EER C level) could have on the number of fuel poor homes that could be upgraded by 2030.[50,51] We model the impact of strengthened regulations requiring private landlords[52] to meet an EER Band C target by April 2028 or April 2029 for *all tenancies*, although we note that the previous Government had previously considered introducing regulations in a phased manner, starting with *new tenancies*. Such a phased approach would necessarily have a much more limited impact on progressing towards meeting the target of ensuring that by 2030 all fuel poor households are in homes with an energy efficiency rating of at least EER Band C. We also

---

44 Committee on Fuel Poverty (2024), Can Fuel Poverty be Ended?

45 Committee on Fuel Poverty (2024), Can Fuel Poverty be Ended?, page 36.

46 Citizens Advice (2023), Damp, cold and full of mould: The reality of housing in the private rented sector

47 Department for Business, Energy & Industrial Strategy (2020), Improving the Energy Performance of Privately Rented Homes in England and Wales, page 21; PM speech on Net Zero, September 2023.

48 CCC (2024), Progress in reducing emissions: 2024 Report to Parliament, page 13, 77.

49 We note that in Scotland, private rented sector regulations are expected as part of the Heat in Buildings Bill, announced in September 2024.

50 On 23 September 2024, DESNZ announced plans to consult by the end of 2024 on a strengthening of the existing regulatory regime around energy efficiency standards in the private rented sector in England and Wales, with a view to this taking effect by 2030. The analysis presented in this report models a strengthening of the regulatory regime in the private rented sector taking effect such that homes are upgraded either during 2028 or 2029. This is to assess its possible contribution towards meeting the UK Government's statutory Fuel Poverty Target of improving as many fuel poor homes as reasonably practicable to an energy efficiency rating of Band C by 2030.

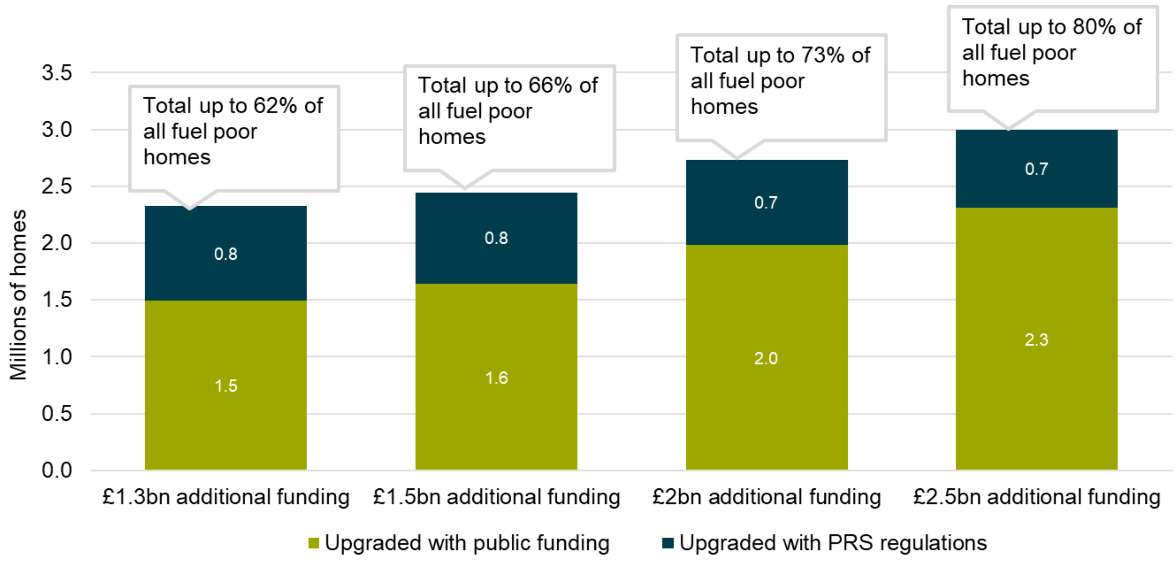
51 We do this by removing a proportion of PRS homes from our sample from 2028 (or 2029, depending on the point at which the new strengthened regulations apply), on the basis that these will be upgraded separately by private landlords. In practice, a small amount of ECO funding may be available to landlords, but we do not take account of this in our analysis. We then re-allocate funding from 2028 to the remaining households to calculate the number of homes that will be upgraded using public funding. We also assume that 11% of PRS homes will receive heat pumps as part of their upgrade based on the number of low carbon heating measured modelled as being deployed in the PRS regulations impact assessment. See DESNZ (2020), Improving the Energy Performance of Privately Rented Homes in England and Wales: Consultation Stage Impact Assessment.

52

assume that there is 75% compliance with the regulations, informed by the impact assessment that was carried out in 2020 by DESNZ as part of the consultation on the policy.[53]

Figure 4 and Table 3 below show the number of fuel poor homes that could be upgraded to an FPEER C level by 2030, assuming different additional public funding levels combined with strengthened regulations for the private rented sector from April 2028. Figure 4 and Table 3 illustrate the number of homes upgraded, if 75% of private rented sector homes comply with the regulations from April 2028.

Figure 4 Fuel poor homes upgraded with strengthened energy efficiency regulations for private rented homes from 2028 (75% compliance)



Source: Frontier Economics

Note: The number of fuel poor homes upgraded is cumulative and the funding levels are annual.

53 We note that DESNZ modelled alternative policy options with different levels of cost caps, which result in different estimated compliance levels. For the purposes of this analysis we have taken the compliance level based on the most ambitious scenario. See DESNZ (2020), Improving the Energy Performance of Privately Rented Homes in England and Wales: Consultation Stage Impact Assessment.

Table 3 Fuel poor homes upgraded with strengthened energy efficiency regulations for private rented homes from 2028 (75% compliance)

Additional annual public funding of	£1.3bn	£1.5bn	£2.0bn	£2.5bn
Homes upgraded through public funding	1.5	1.6	2.0	2.3
Homes upgraded through PRS regulations	0.8	0.8	0.7	0.7
All homes upgraded	2.3	2.4	2.7	3.0
Share of fuel poor group upgraded	62%	66%	73%	80%

Source: Frontier Economics
Note: The number of fuel poor homes upgraded is cumulative and the funding levels are annual.

We estimate that:

- **With strengthened private rented sector regulations from 2028 (75% compliance):** The additional public funding levels combined with strengthened regulations for the private rented sector from 2028 could result in between 2.3m to 3.0m homes (62% to 80% of the GB fuel poor household group) being upgraded to an FPEER C level or above. This is an additional 0.7 to 0.9m homes, compared to additional public funding alone.
- **Strengthened private rented sector regulations from 2029 (75% compliance):** The additional public funding levels combined with strengthened regulations for the private rented sector from 2029 could result in between 2.2m to 2.8m homes (60% to 76% of the GB fuel poor household group) being upgraded to an FPEER C level or above (see Annex B). This is an additional 0.6 to 0.8m homes, compared to additional public funding alone.

4.4 Cost sensitivity

We also note there is uncertainty around the exact levels of costs to upgrade homes to FPEER C. We have therefore also tested a scenario where our assumed average retrofit costs are 20% higher (in real terms) than those estimated in the English Housing Survey and by the CCC.[54] This is a purely illustrative scenario to test the impact of costs being different to those found in these sources. Under this scenario, we estimate that the public funding, combined with strengthened regulations for the private rented sector from 2028, would result in between 2.0m – 2.6m homes upgraded (between 54% to 70% of the fuel poor population).

54 See Annex A for our costing methodology and sources.

5 The benefits of energy efficiency upgrades targeted at the fuel poor

Given the tough fiscal circumstances faced by the Government, there is a need to focus on public spending that will deliver high value for money, in terms of social and economic benefits. In this section we describe the scale of the economic and social benefits of energy efficiency upgrades targeted at the fuel poor.

5.1 Direct benefits

We first estimate the direct benefits of upgrades in terms of bill savings for fuel poor households, and social benefits in terms of reduced carbon emissions. We estimate bill savings and reduced carbon emissions per home for homes upgraded through public funding (i.e. the per home bill savings and carbon savings figures do not take into account households upgraded through private rented sector regulations).

5.1.1 Bill savings

We have estimated annual bill savings for households receiving insulation upgrades, or insulation upgrades with heat pumps, based on projected retail prices from the Green Book.[55] Table 4 shows the results. On average, household bills would reduce by between £285 to £396 per year, depending on the funding scenario. However, these averages mask a large variation across housing types. For example, for the households with heat pumps installed in the direct electric heating homes with insulation, bill savings are more than a thousand pounds per year.

Table 4 Average bill savings across all homes upgraded

Additional funding levels	Average bill savings per home per year
£1.3bn	£395
£1.5bn	£367
£2.0bn	£318
£2.5bn	£285

Source: *Frontier Economics*

Note: *The bill savings figures do not take into account households upgraded through private rented sector regulations. Average household bills savings decline as funding levels increase, since we assume the homes with the lowest energy efficiency are tackled first but the total bill savings across households increase as funding levels increase. We do not include solar PV or ground source heat pumps in the analysis.*

[55] DESNZ (updated in 2023), Green Book Supplementary Guidance,

In addition to bills savings, those customers receiving heat pumps will also save on the costs of replacing their existing system. On average, this could result in a saving equivalent to £190 per household per year. [56]

5.1.2 Reductions in carbon emissions

We have also estimated annual carbon emission savings for households receiving insulation upgrades, or insulation upgrades with heat pumps, based on emissions intensity assumptions and carbon values from the Green Book[57] (Table 5). On a per household level, this equates to around £100 per home treated, per year.

Table 5 Reductions in carbon emissions

Additional funding levels	Annual average emissions saving (MtCO2e/year)	Value of annual average emissions saving (£m/year)
£1.3bn	0.11	£34m
£1.5bn	0.12	£36m
£2.0bn	0.13	£41m
£2.5bn	0.15	£46m

Source: Frontier Economics

Note: The carbon savings figures do not take into account households upgraded through private rented sector regulations. The carbon savings are valued at Green Book values: DESNZ (updated in 2023), Green Book Supplementary Guidance. We do not include solar PV or ground source heat pumps in the analysis.

This is a significant annual emissions saving, for example 0.11 MtCO2e per year is equivalent to the emissions from combusting 0.23m million barrels of oil per year.[58]

5.2 Wider benefits

In addition to the direct benefits from targeting energy efficiency on households in the fuel poor group, there are also wider benefits in terms of:

- health benefits for the household arising from adequately heated homes;

56 The saving will vary, depending on the age of the existing system, and therefore on when the household would have had to replace it. We assume a uniform distribution of system age across an assumed 15 year lifetime of direct electric systems, and a 7.5% real discount rate in this calculation.

57 DESNZ (updated in 2023), Green Book Supplementary Guidance

58 https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

- social benefits in terms of reduced risk of debt; and
- economic benefits in terms of jobs supported.

We discuss each in turn below.

5.2.1 Improvements in health and wellbeing

There are likely to be significant health benefits associated with tackling energy efficiency in fuel poor households. The bill savings we present in Table 5 take account of the fact that when energy efficiency measures are applied, on average, households respond by heating their homes more (the rebound effect).[59] This means that energy efficiency delivers warmer homes as well as energy and bill savings.

Evidence suggests that there is a strong link between inadequately heated homes and poor health and wellbeing, and that energy efficiency measures can significantly help mitigate these impacts.

- **The link between energy efficiency and health is well established in research.**
  - A review by the UK's health regulator, the National Institute for Health and Care Excellence (NICE) found that winter weather has a direct effect on the incidence of heart attack, stroke, respiratory disease, flu, falls and injuries and hypothermia, and that housing conditions are a very important factor in this area.[60] In addition, it found that cold homes can have a significant effect on people's social activities (for example inviting friends around), which can have a positive benefit for general wellbeing.
  - A later UK Government review of research found that there is evidence that excess indoor cold is linked with higher mortality.[61] It found that living in a cold home is associated with a higher risk of having poor mental health, and that for the elderly, living in cold homes can increase the risk of a loss of strength and dexterity, and of arthritis. The findings also suggest a negative impact on school and work attendance, performance, and productivity, though a limited number of studies looked at these.
  - The UK Health Security Agency's review found that energy efficiency and heating interventions that improve home warmth could improve health, especially for those with existing respiratory and other chronic diseases, with benefits for disease symptoms, improved mental wellbeing, reduced health service contacts, and fewer

59 We assume that comfort-taking is 15% of the energy savings from the installation of insulation measures, based on the assumptions used in the DESNZ (April 2022), Final Stage impact Assessment ECO4, footnote 47.

60 NICE Guideline NG6 "Excess winter deaths and illness and the health risks associated with cold homes". Originally published in 2015 and reviewed in 2019. https://www.nice.org.uk/guidance/ng6

61 BEIS (2020), Heat, energy efficiency, smart technology and health A review of evidence from high-income countries, with a focus on the UK, https://assets.publishing.service.gov.uk/media/5f240be68fa8f57acf2d2072/heat-energy-efficiency-smart-technology-health-evidence-review.pdf

days of absence from school and work.[62] A recent review commissioned by WWF-UK also reports on several trials and interventions that find strong associations between improved energy efficiency, reduced hospital admissions, and self-reported positive health outcomes.[63]

- **These findings are aligned with people's own reports of the impacts.** Most recently, ONS quantitative research in winter 2023/4 found that 24% of adults self-reported mental health impacts, and 14% self-reported physical health impacts from cutting back on energy use. [64]

Alongside the impacts of these health effects on people's wellbeing, the economic cost of these impacts is estimated to be highly significant.

- **Health benefits and savings to the NHS.**[65] Research by the Building Research Establishment (BRE) has found that in England alone, the NHS could save £857m per year from upgrading the 0.84m coldest homes (roughly aligning to those of EPC F and G).[66] This equates to a saving to the NHS of £1,026 per year per home improved.[67] The UK Government has also estimated the health benefits of energy efficiency, for example, estimating health benefits of £0.4 - £0.8bn associated with proposed regulations to improve the energy efficiency of homes in the private rented sector in England and Wales.[68]

- **Avoided wellbeing costs.** A limited number of studies have tried to monetise the wellbeing costs associated with the health impacts of cold homes. For example, a study in Sheffield, estimated wellbeing costs of tens of thousands of pounds per person falling ill, with particularly high costs associated with mental illnesses.[69] Some of these costs could be avoided through the application of energy efficiency measures to the most inefficient homes.

---

62 UK Health Security Agency (2023), *Health Effects of Climate Change (HECC) in the UK: 2023 report*

63 For example: Kearns et al (2023), Health gains from home energy efficiency measures: The missing evidence in the UK net-zero policy debate, *Public Health in Practice*,; and Rodgers et al (2018), Emergency hospital admissions associated with a non-randomised housing intervention meeting national housing quality standards: a longitudinal data linkage study, *BMJ*, 6. Research cited in WWF-UK (2024), *The Benefits of Home Decarbonisation on Health, Decarbonisation and Economy*

64 Office for National Statistics (ONS), released 29 January 2024, ONS website, article, The impact of winter pressures on different population groups in Great Britain: 18 October 2023 to 1 January 2024, . Underlying data is available here:

65 BRE (2021), The Cost of Poor Housing in England

66 The report uses Category 1 terminology, but later research notes that: "A home with an HHSRS Category 1 excessive cold hazard aligns roughly with an Energy Performance Certificate (EPC) Energy Efficiency Rating band of F or G" BRE (2023), The Cost of Poor Housing in England by Tenure

67 2018 prices.

68 The report notes that the methodology for this estimation is still under review. BEIS (2020), Improving the Energy Performance of Privately Rented Homes in England and Wales: Consultation Stage Impact Assessment

69 Stafford (2015), tool, Journal of Public Health, Volume 37, Issue 2, June 2015, Pages 251–257.

5.2.2 Reduced debt

Energy efficiency measures also have the potential to help struggling households avoid debt, bringing further social benefits.

Debt driven by energy bills has risen in the cost of living crisis and can further impact on health and wellbeing.

- There is significant evidence that the cost of living crisis has impacted on household arrears on bills.[70] In May 2024, the Joseph Rowntree Foundation found that 4.3 million low income families in the UK were in arrears with at least one household bill or credit commitment, with an average amount owed of around £1,400.[71] Resolution Foundation research in early 2024 found that the number of accounts behind on their gas and electricity bills had reached the highest level since records began in 2012, and that the average amount owed by those in arrears had increased by 51% between Q2 2022 and Q3 2023.[72] According to Ofgem, the total financial value of domestic customer debt and arrears relating to electricity and gas reached £3.3bn in Q1 2024.[73]
- Research commissioned by the statutory Committee on Fuel Poverty notes that debt such as this can exacerbate health and wellbeing issues, with impacts on feelings of powerlessness, depression and anxiety.[74] These findings are aligned with people's own reports of the impacts: the ONS found that 9% of adults surveyed reported impacts on their mental health from having to borrow money to cover household costs, while 4% reported impacts on their physical health.[75]

As set out above, energy efficiency measures focussed on those in fuel poverty can help to reduce the number of households falling into debt, as well as helping to mitigate the associated health and wellbeing impacts.

5.2.3 Jobs supported

There are also likely be positive employment benefits associated with a large-scale step-up in government-funded energy efficiency programmes.

---

70 Unsecured debt includes credit card lending, personal loans, student loans and loans from payday lenders. House of Commons Library (2024), Household debt: statistics and impact on economy

71 JRF (2024), The scale of the challenge: JRF's pre-election cost of living tracker

72 Resolution Foundation (2024), In too deep

73 Ofgem, Total financial value of domestic customer debt and arrears, existing for greater than 91 days

74 London Economics for the Committee on Fuel Poverty, Understanding the challenges faced by fuel poor households, https://assets.publishing.service.gov.uk/media/6477733fb32b9e000ca95fc0/understanding-challenges-faced-by-fuel-poor-households-research.pdf

75 ONS (2024), The impact of winter pressures on different population groups in Great Britain. Underlying data is available here.

To date, green jobs, including but not limited to jobs in the insulation and heat pump industries, have been growing in importance in the UK economy, with over 600,000 employed in the sector in 2022. This represents growth of over 20% since 2015. [76]

Stronger growth is expected in the future. The previous Government's Heat and Buildings Strategy found that the transition to low-carbon buildings could support 175,000 skilled, green jobs by 2030, noting that building upgrades are labour intensive, and that the efficient products sector already supports the largest number of full-time employment opportunities (about 114,000 FTE) of any sector in the low-carbon and renewable energy economy.[77]

While there is a large degree of uncertainty associated with directly attributing jobs to spending programmes, analysis by the Construction Industry Training Board (CITB) suggests that an additional 350,000 FTE workers will be needed by 2028 to meet the building retrofit requirements in the CCC's Balanced Pathway scenario.[78] This scenario corresponds to annual investment costs of £14bn in 2028, so around three to four times the investment analysed in this work (see Table 8 below).

76 CCC (2024) Progress Report, Figure 3.6

77 HMG (2021), Heat and Buildings Strategy

78 CITB (2021), Building Skills for Net Zero

6 Key take-aways

Frontier Economics has developed an analytical modelling tool to illustrate how different additional spending levels could alleviate fuel poverty through energy efficiency improvements.

We have used this tool to assess the impact of providing additional funding targeted at improving fuel poor homes, on top of existing policies and UK Government commitments, and alongside the strengthening of private rented sector regulations. We have also demonstrated the proportion of the *current* fuel poor population that could be supported with this funding, noting that this is based on a snapshot of the fuel poor population at the current point in time. Our modelling is also based on the current policy landscape, including retail price projections that do not take into account the possible rebalancing of policy costs between gas and electricity in future years leading up to 2030.

Under these assumptions, we have found that applying this funding and these measures to improve the energy efficiency of fuel poor homes would, at all levels considered, facilitate strong progress towards meeting the target of ensuring that as many fuel poor homes as is reasonably practicable achieve a minimum energy efficiency rating of Band C, by 2030.[79]

Specifically, we have found:

- This funding would accommodate all 0.7m FPEER E/F/G fuel poor homes being upgraded to an FPEER C level, as well as 0.7m – 1.6m FPEER D homes.[80] In total, the funding results in 1.4m- 2.3m homes being upgraded. This is 38% to 61% of the GB fuel poor group.

- When this additional public funding is combined with strengthened regulations for the private rented sector from 2028, this could result in between 2.3m to 3.0m homes in the fuel poverty household group being improved to FPEER C level. This is 62% to 80% of the GB fuel poor group.

Applying this funding and these measures would also deliver significant bill and carbon savings. We estimate that household bills would reduce by around £300-400 per year, depending on the funding scenario. For some households (such as households with heat pumps installed in direct electric heating homes with insulation), bill savings are more than a thousand pounds per year.

While the results presented in this report reflect a prioritisation of reduced bills and warmer homes for those in the deepest fuel poverty, combined with a targeted roll out of heat pumps to a limited proportion of fuel poor households, the modelling tool we have developed will

[79] This is the statutory target for England. BEIS (2021), Sustainable Warmth

[80] For simplicity, we have assumed in the modelling that all EFG homes can be upgraded. In reality, there may be a small number of homes where this is not technically feasible.

enable the exploration of different approaches to policy development in this important area. In light of this, we may build on this tool further as policy development continues in this area, leading up the UK Government’s planned Spending Review in Spring 2025.

Annex A – Methodology and key assumptions

This analysis estimates the number of fuel poor homes that could be upgraded to an FPEER C level, as well as the associated benefits in terms of bill savings and carbon emissions savings.

Our approach can be summarised in three stages:

- We estimate the number of fuel poor households across GB;
- We then estimate the number of homes that could be upgraded given the amount of additional public funding available and the cost to upgrade each home type; and
- Lastly, we estimate the benefits in terms of bill and carbon emission savings.

We discuss each stage below.

A.1 Number of fuel poor households across GB

The first step is to summarise the number of fuel poor households across GB.

As explained in Section 3 of the main report, fuel poverty is defined in different ways across England, Scotland and Wales.

- **England.** Fuel poverty in England is measured using the Low Income Low Energy Efficiency ('LILEE') metric. Under this metric, a household is considered to be fuel poor if i) they are living in a property with a fuel poverty energy efficiency rating ('FPEER') [81] of band D or below; and ii) when they spend the required amount to heat their home, they are left with a residual income below the official poverty line.[82]
- **Scotland.** In Scotland, a household is defined as fuel poor if more than 10% of their net income is required to pay for their reasonable fuel needs after housing costs have been deducted; and the remaining household income is not enough to maintain an acceptable standard of living, defined as at least 90% of the UK Minimum Income Standard (MIS) once childcare costs and disability or care benefits are deducted.[83]

81 Energy efficiency is typically measured is based on the Government's Standard Assessment Procedure ('SAP'), which allocates an energy efficiency rating ('EER') to a house of 1 (very inefficient) and 100 (highly efficient) based on the modelled fuel costs of the home. These ratings are then converted into EER bands A (very efficient) to G (very inefficient). The FPEER is an adjusted version of the standard EER rating produced by DESNZ for the purposes of producing fuel poverty estimates. The FPEER accounts policies that affect the cost of energy, namely the Warm Home Discount. The FPEER deducts the Warm Homes Discount from the modelled fuel costs to get an adjusted energy efficiency rating, which is then converted into fuel poverty energy efficiency bands ranging from FPEER band from A-G. See DESNZ (2014), Fuel Poverty Energy Efficiency Rating Methodology.

82 Department for Energy Security & Net Zero (2024), Fuel Poverty Methodology Handbook, pages 1,2.

83 Scottish Government (2021), Home Energy and Fuel Poverty

- **Wales.** A household is defined as being fuel poor in Wales if they would have to spend more than 10% of their income to maintain a satisfactory heating regime.[84]

For the purpose of this analysis, we use the English definition of fuel poverty which is based on the Low Income Low Energy Efficiency ('LILEE') metric. We use this definition since it is the metric used for the statutory target of the UK Government in England and it covers the majority of homes in GB.[85] In addition, the intention of the LILEE measure when it was adopted in England in 2021 was to better capture the households who would benefit from energy efficiency measures. In this regard, the Committee on Fuel Poverty also recognises in its most recent Annual Report that this measure helpfully serves to prioritise the upgrading of homes on low incomes (while recognising the scope for reviewing it over time).[86]

Since it is not possible to model each home in the fuel poor households group, we focus on modelling a set of key house types where each type refers to a combination of heating technology, FPEER band, building style, and the number of homes in England, Scotland and Wales.

- **FPEER band:** We consider two different energy efficiency levels: homes that are classified as FPEER band D; and homes that are classified as FPEER and E, F or G.[87]

- **Building style:** We consider four different classes of building type (i.e. detached, semi-detached, terraced, converted flats and purpose built flats).

- **Main heating type:** We consider the three main existing heating technologies captured in DESNZ's fuel poverty data which are gas boilers, electric heating[88] and 'other' heating. Electric heating consists mainly of direct electric heating (including storage heaters, electric boilers or underfloor heating). DESNZ notes that a "*small number of electrically powered heat pumps are included in electric heating.*"[89] We treat this as negligible, noting that heat pump installation will generally be accompanied by an increase in home efficiency already. DESNZ's defines 'other' heating types to include heating oil, anthracite nuts, house coal, smokeless fuel, wood, propane, bulk LPG, community heating from boilers/CHP/waste heat.[90] When modelling bill impacts for the households with 'other' heating, we use an oil boiler as a representative fuel type as it is the most common heating type in the 'other' category.

84 Welsh Government (2023), New Warm Homes Programme: policy statement

85 See DESNZ (2021), Sustainable Warmth: Protecting Vulnerable Households in England.

86 Committee on Fuel Poverty (2024), Can Fuel Poverty be Ended?

87 We group together homes classified as FPEER E and FPEER F/G to align with the definitions used in the English Housing Survey for insulation upgrade costs.

88 DENSZ (2024), Annual Fuel Poverty Statistics in England, 2024 (20230 data), footnote 31.

89 See DESNZ (2020), Fuel poverty detailed tables 2024 (2023 data).

90 See DESNZ (2020), Fuel poverty detailed tables 2024 (2023 data).

- **GB nations:** We estimate the number of homes across England, Scotland, and Wales.

We estimate the number of homes across GB using the LILEE in the following way:

- Our starting point is the number of fuel poor homes in England which provides the split by **FPEER band** and **heating technology** reported by DESNZ.[91]
- We then break down these estimates further by **property type**. We do this by multiplying the total number of homes in each FPEER band and heating technology by the share of homes in each type of property. This allows us to obtain the distribution of fuel poor homes by property type, within each FPEER band and heating technology. The share of homes in each type of property is based on their prevalence in the English housing stock with the same heating type based on Census data for England (Table 5).[92]

Table 6 Share of each property and heating type across England

	Gas heating	Electric heating (excl. heat pumps)	Other heating
Purpose built flat	12%	60%	2%
Converted flats	3%	13%	0.5%
Terraced	26%	11%	10%
Semi-detached	35%	11%	28%
Detached	23%	6%	59%

Source: Frontier Economics, based on Census data for England.

- The output of this step is the number of fuel poor homes in England, split by property type, main heating technology and FPEER band, as shown in Figure 5 below.

91 See DESNZ (2020), Fuel poverty detailed tables 2024 (2023 data).

92 See ONS (2023), Main fuel type or method of heating used in central heating, England and Wales, Table 1c.

Figure 5 Estimated number of fuel poor homes in England

	Gas		Electricity		Other		Total
Thousands	FPEER D	FPEER EFG	FPEER D	FPEER EFG	FPEER D	FPEER EFG	
Purpose built flat	54	6	155	127	2	3	348
Converted flat	134	15	34	28	1	1	212
Terraced	1,031	118	28	23	11	13	1,223
Semi-detached	730	83	28	23	30	38	932
Detached	259	30	15	12	64	80	459
Total	2,208	252	259	212	108	135	3,174

Source: Frontier Economics

- We then extrapolate the number of fuel poor homes in England to Scotland and Wales by scaling down the English fuel poor homes by the relative size of the housing stock in Scotland and Wales (compared to England) for each building type. Specifically, we multiply the number of homes (Figure 5) by the ratio of the housing stock in Scotland/Wales vs England (based on size of the housing stock are shown in Table 7 below).

  This step allows us to account for differences both in the scale and mix of property types within the housing stock across Scotland and Wales. For example, Scotland has a higher share of flats compared to England (due to a large number of tenement flats) and a lower share of terraced/semi-detached homes, while Wales has a lower share of flats compared to England and a higher share of detached and semi-detached homes.[93]

[93] Since data on the number of homes by EER / FPEER band, property type and heating type (i.e. the cross-section of these characteristics) is not available for Scotland and Wales, our extrapolation requires us to make a simplifying assumption. Our approach assumes that distribution of the fuel poor population in England across heating technology and FPEER band applies to Scotland and Wales but makes an adjustment for the differences in distribution across property type in England vs Scotland and Wales. We think this is a reasonable approach, given the available data, since comparisons of homes across EPC bands, across property types and across heating type across GB nations show that the largest differences relate to property type.

Table 7 Number of homes in England, Scotland and Wales (thousands)

Thousands	England	Scotland	Wales
Purpose built flats	4,130	304	138
Converted flats	904	628	30
Terraced	7,431	543	358
Semi-detached	6,637	496	432
Detached	5,402	578	384
Total	**24,504**	**2,549**	**1,343**

Source: Frontier Economics[94]

The output of this step is an estimate of the number of fuel poor homes in GB, split by property type, FPEER band, main heating technology and country.

Lastly, we note that we do not make any adjustments to control for differences in the share of homes below the poverty line since the proportion of individuals below the poverty line is similar across England, Scotland and Wales (i.e. c. 18% in England and 17% in Scotland and Wales).[95]

A.2 Number of fuel poor households upgraded

In the second step, we estimate the number of each type of home that could be upgraded to an FPEER C level, with different assumptions around public spending.

This is done in three steps.

- First, we define the annual pot of funding that is available.
- Second, we calculate the costs to upgrade each type of home

94 Data on the size of the housing stock by house type is obtained from the English Housing survey (2023 data published in February 2024, see Table 7 in Fuel poverty detailed tables 2024 (2023 data), from the Scottish Housing Condition Survey (2022 data published in February 2024, see Table KA1a and KA1b in 'SHCS 2022- Chapter 01 Key Attributes of the Scottish Housing Stock – tables and figures') and from the England and Wales Census (2021 data published in January 2023, see Census 2021). We note that the data for Scotland and Wales does not distinguish between flats and converted flats. We therefore estimate the number of converted and purpose-built flats in Scotland and Wales. For Scotland, we estimate the proportion of flats that are converted based on the number of flats that are classified as being tenement flats or 'Houses converted to flats' (c. 67% of all flats). For Wales we calculate the average proportion of all flats in England and Scotland that are converted (c. 43%) and apply this to the number of flats in Wales.

95 See House of Commons (2024), Poverty in the UK: Statistics, page 55 and accompanying spreadsheet here, which is based on data published by the Department for Work and Pensions (DWP) as part of the 'Households below average income (HBAI) statistics.

- Third we allocate funding across household types to estimate the number of homes that could be upgraded given the amount of funding available and the cost to upgrade each type of home.

We discuss each in turn below.

Step 1: Define the annual pot of funding available.

We consider the benefit in terms of fuel poverty alleviation of different levels of public funding available to improve fuel poor homes, taking account of existing energy efficiency policies and plans. We consider the following:

- While the new UK Government has not yet committed to this, we assume the roll-forward of the current funding levels of £1.4bn per year for ECO and the Great British Insulation Scheme in a new Supplier Obligation Scheme over a four-year period from April 2026 to the end of March 2030, with a focus on lower income households in or at risk of fuel poverty.[96]
- Using a subset of the £6bn of public funding for energy efficiency (announced by the previous Government for the period 2025 to 2028) focussed on improving the energy efficiency of fuel poor homes, namely, the £400m allocated to energy efficiency grants, £500m from the local authority retrofit scheme and £1,253m from the social housing decarbonisation fund over 2025/26 to 2027/2028.[97]
- An additional amount of public funding of £1.3bn focussed on improving the energy efficiency of fuel poor households, over a five-year period from March 2025 to April 2030, based on the Labour Manifesto commitment to invest £6.6bn over the five years of this Parliament[98]. We also consider the potential impact of increasing this funding level by modelling levels of £1.5bn, £2bn and £2.5bn a year.

The total funding is shown in Table 8 below.

---

96 See DESNZ (2023), GB Insulation Scheme (formerly ECO+) Final IA, page 13 and DESNZ (2022), Final stage Impact Assessment ECO4, page 8. The costs of these schemes is funded via consumer bills, however, by rolling this forward to the end of the decade at existing levels this will not put upward pressure on consumer bills.

97 DESNZ (2023), Press release: Families, business and industry to get energy efficiency support.

98 https://labour.org.uk/change/make-britain-a-clean-energy-superpower/#warm-homes

Table 8 Total funding levels

£bn	2025/26	2026/27	2027/28	2028/29	2029/30
ECO/GBIS	1.4	1.4	1.4	1.4	1.4
Allocation of £6bn	0.7	0.7	0.7		
Additional funding	1.3 – 2.5	1.3 - 2.5	1.3 - 2.5	1.3 - 2.5	1.3 - 2.5
Total	3.5 - 4.7	3.5 - 4.7	3.5 - 4.7	2.7 - 3.9	2.7 - 3.9

Source: Frontier Economics

Step 2: Estimate costs to upgrade each type of property

We then calculate the costs to upgrade each type of house. We consider three types of costs:

- Cost of insulation to upgrade homes to an EER C level;
- Cost to switch to a heat pumps; and
- Search costs.

We discuss each in turn below.

Costs of insulation to upgrade homes to an EER Band C level

The English Housing Survey provides data on the average cost to upgrade homes to EER C by property type, and separately by EER band (but the not the cross-section). We therefore need to make some assumptions to estimate the costs to upgrade homes to EER C for the cross-section of property type and EER band.

- We obtain data on the average cost to upgrade homes to EER C for a home that is in band D or band E/F/G as reported by the English Housing Survey (step A).[99,100]

- We obtain data on the cost to upgrade properties of different types (detached, semi-detached etc.) for a home that is in band D or band E/F/G (again, as reported by the English Housing Survey) and calculate the ratio of the cost for each property type relative to the national average cost (step B).

- We multiply the cost to upgrade a home (step A) by the ratio of the cost for the house type compared to the national average (step B). The output of this step is a set of insulation costs for different combinations of property type and EER band.

99 Data is not available to split out homes between E/F/G bands.

100 See Ministry of Housing, Communities and Local Government (2024), English Housing Survey 2022-2023, Chapter 2 – Annex tables.

- Lastly, since the English Housing Survey data is based on 2022 prices we uplift the insulation costs to 2024 prices.

  Taking this approach means that we are assuming that the driver of variation in upgrade cost across properties is the property type and the starting EER rating, rather than the starting fuel type. We believe this is a reasonable assumption, as the type of insulation to be applied will not vary by fuel type. We also assume that these costs (based on the English Housing Survey) also apply to Scotland and Wales per property type (as noted in section 3 above, we are adjusting for the different mix of property types across the devolved nations).[101]

The results are shown in Table 9 below.

Table 9 Average cost to upgrade a property to EER band C

	Band D	Band E/F/G
Purpose built flat	£3,548	£7,742
Converted flat	£6,688	£14,594
Terraced	£7,472	£16,305
Semi-detached	£6,562	£14,318
Detached	£7,590	£16,562

Source: Frontier Economics
Note: Costs apply for all heating types.

Costs to switch to a heat pump

In this analysis, we allocate heat pumps to homes with direct electric heating only, where the bill saving impacts are most significant. We estimate the costs to install a heat pump for these house types based on data from the CCC's Sixth Carbon Budget[102]. While estimates are available from other more recent publications[103], the CCC's data is available differentiated across property types and by heating technology. Since we are applying heat pumps to direct electric homes only, and since the costs of applying heat pumps to these homes is significantly lower than applying them to homes with gas- or oil-fired boilers, using the differentiated costs, rather than average costs is important. Our modelling focuses on allocating air source heat

101 The costs to upgrade to an EPC C level in the EHS (2022-2023) are underpinned by a set of costs for installing various measures. EHS obtains these costs from the SAP Product Characteristics Database (PCDB). We have cross-checked the individual costs of measures from the English Housing Survey across a number of sources such as Energy Saving Trust, Cambridge Architectural Research (2023), Faster Deployment of Heat Pumps in Scotland and Scottish Government (2021) Fuel Poverty Strategy - Analytical Annex. We found that costs reported for Scotland were broadly in a similar range to the costs reported in the English Housing Survey.

102 CCC (2020) Sixth Carbon Budget

103 For example, such as the BEIS (2022), Boiler Upgrade Scheme: Impact Assessment

pumps only, given the higher cost of ground source heat pumps, although we note that ground source heat pumps will also have an important role in communal network heating (which is outside the scope of this analysis).

There are three types of upfront capital costs:

- **Fixed capex (£/asset):** We use the average over 2025 to 2029 of the CCC's fixed capex cost for an air source heat pump from the Balanced Pathway scenario.
- **Marginal capex (£/kW):** Heat pumps have a 'marginal capex' cost that varies according to the installed capacity of the technology. We use the average over 2025 to 2029 of the CCC's marginal capex cost for an air source heat pump from the Balanced Pathway scenario. We estimate the installed capacity required based on the home's heating requirements after the insulation upgrade (and accounting for the rebound effect, which we apply when insulation is installed, see discussion further below).
- **Installation costs (£/asset):** There are additional costs associated with switching from an existing heating technology to a new technology. For example, for homes with electric heating switching to a heat pump, this includes the installation of a wet distribution system.

We add the three capex components above to derive total fixed capex for each house type. Since the CCC's data was in 2019 prices we adjust the capex costs for inflation. Since the CCC's data was UK wide, we assume the same heat pump costs apply in England, Wales and Scotland.

The results are shown in Table 10 below for homes with electric heating.

Table 10 Heat pump costs for homes with electric resistive/storage heating

	£ per heat pump
Purpose built flat	£7,739
Converted flat	£7,782
Terraced	£8,729
Semi-detached	£8,458
Detached	£9,136

Source: Frontier Economics

Search costs

We also assume that there is a fixed search cost per home of £308 for homes on the gas grid and £513 for homes off the gas grid, based on the search costs assumed in the UK Government ECO4 Impact Assessment.[104]

Step 2: Allocating funding across households

We allocate funding across households in the following way:

- We start with the annual 'pot' of funding for each of the five years from 2025/26 – 2029/2030, as defined above.
- Funding is allocated to house types starting with the homes that are classified as being at FPEER band E/F/G first. Within this category, we allocate funding in descending order of bill savings per capex cost. The bill savings and capex cost accounts for the upgrade to FPEER C as well as a proportionate element of heat pump take-up within the group. We allocate heat pumps to homes with electric heating (electric resistive/storage heating only) such that the overall number of fuel poor homes with heat pumps is 5% by 2030.[105]
- After all the homes classified as being in band FPEER E/F/G are upgraded to FPEER C[106], we then move to allocating the remaining funding across the D homes, again in descending order of bill savings per capex cost.

The main output from this step is the number of fuel poor homes upgraded with insulation only as well as the number of fuel poor homes upgraded with insulation and a heat pump.

A.3 Bill and carbon emission savings

Lastly, we calculate the direct benefits of the home upgrades in terms of bill savings and carbon emission reductions.

We do this in the following steps:

- **Starting energy consumption**: We estimate consumption prior to the insulation upgrade. We obtain data on actual energy consumption from the National Energy Efficiency Data-

---

104 See BEIS (2022), ECO4 Final Stage Impact Assessment, Table 30. The ECO4 Impact Assessment presents search costs for different insulation measures. We calculate the average search cost across key insulation measures relevant for this work (i.e. wall insulation, floor insulation, loft insulation and heat pumps), and make an adjustment to uplift the 2021 costs to 2024 prices.

105 An assumption that 5% of fuel poor homes receive heat pumps by 2030 has been selected as the mid-point between the Climate Change Committee's recommendation that, by 2030, 10% of existing homes should be heated using a heat pump; and the recommendations of the Committee on Fuel Poverty which suggests that a 'fabric first' only approach should be prioritised for the fuel poor population. See CCC (2024), Progress in reducing emissions: 2024 Report to Parliament, page 9 and Committee on Fuel Poverty (2024), Can fuel poverty be ended? The Committee on Fuel Poverty Annual Report 2024.

106 For simplicity, we have assumed in the modelling that all EFG homes can be upgraded. In reality, there may be a small number of homes where this is not technically feasible.

Framework (NEED) published by DESNZ and calculate the average consumption for each property type and EPC band (we used EPC band as a proxy for FPEER band). [107] Since the NEED data covers the general population, we make an adjustment to reflect the lower consumption of the fuel poor population compared to the general population.[108]

- **Energy consumption post-upgrade:** We estimate the change in consumption after the insulation upgrade (and after the installation of a heat pump, if applicable):
  - We calculate the reduction in energy consumption for each house type after the insulation upgrade based on the difference in average consumption between EPC C homes and EPC D or EPC E/FG/homes in the NEED dataset (Table 11). [109]

Table 11 Percentage reduction in mean consumption when property upgraded to EPC C

	EPC D	EPC E/F/G
Purpose built flat	19%	28%
Converted flat	19%	28%
Terraced	15%	26%
Semi-detached	15%	26%
Detached	6%	23%

Source: *Frontier Economics calculated based on NEED data*

  - We also account for the fact that some energy savings from installing insulation may be offset by comfort-taking (the so-called ‘rebound effect’). Specifically, we assume that comfort-taking is equal to 15% of the energy savings from the installed insulation measures.[110]

---

107 The NEED data includes a property level dataset with gas and electricity consumption for an anonymised sample of 4 million households from 2005 to 2022. DESNZ (2024), National Energy Efficiency Data-Framework (NEED): anonymised data 2024.

108 We use data published by DESNZ as part of a special feature on theoretical energy consumption which provides information on the differences between modelled and actual energy bills for the general population and the fuel poor. We use this data to make a high-level downwards adjustment to the average actual consumption of the general population which results in c. 12% reduction. See DESNZ, Special feature – Theoretical energy consumption.

109 We note that the average reduction in consumption for a detached home upgraded from an EPC D level to an EPC C level is materially lower than for the other property types in the NEED data set. If this is due to an anomaly in the underlying data, this could mean that our estimates of bill savings are conservative – these would be higher if a higher percentage reduction in consumption was assumed.

110 See DESNZ (2022) Final Stage Impact Assessment ECO4, footnote 4.

    - For homes that also take-up heat pumps we estimate the change in consumption using the average efficiency of an air source heat pump over 2025 – 2028 from the CCC's Sixth Carbon Budget (Balanced Pathway) of 337%.[111] In line with the Boiler Upgrade Scheme Impact Assessment, we do not apply a rebound effect for heat pumps.[112] There is limited evidence on rebound effects for heat pumps. However, since heat pumps are different from other heating technologies in that they are designed to be set to operate at a certain level (rather than being switched on and off as needed), there is likely to be less scope for alternating the heating pattern, meaning that rebound effects may not be important for this technology.

- **Bill savings:** We calculate the bill savings by calculating the change in energy consumption post-insulation upgrade (and heat pump where relevant) and multiplying the change in energy consumption by the retail energy price.[113]

- **Carbon savings:** We calculate the reduction in carbon emissions per home (kgCO2e) by calculating the reduction in consumption (i.e. the change in gas, electricity, or oil kWh) after the insulation upgrade and rebound effect. We then multiply the change in consumption by the relevant emissions factors from the Green Book.[114]

111 We use the average efficiency over 2025 – 2030. See Element Energy (2021), Sixth Carbon Budget Assumptions tool, tab "Efficiencies".

112 BEIS (2022), Boiler Upgrade Scheme: Impact Assessment

113 We use retail energy prices from DESNZ (updated in 2023), Green Book Supplementary Guidance, These prices cover the period from 2025-2030. Since prices are in a 2022 price base, we adjust these to a 2024 price base.

114 DESNZ (updated in 2023), Green Book Supplementary Guidance.

Annex B Sensitivity testing

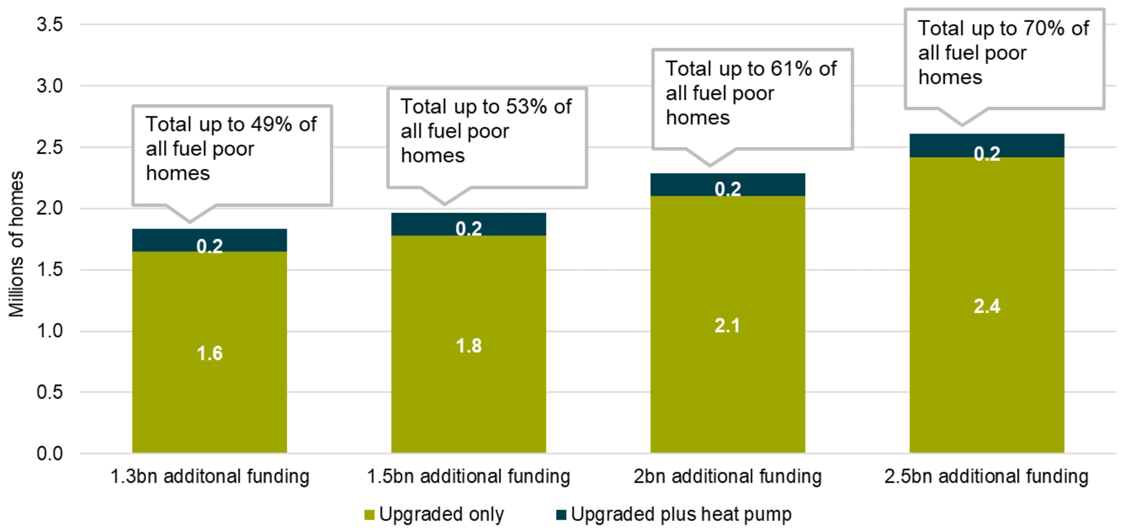
B.1 Impact of alternative assumptions for allocating public spending

As explained above, we allocate funding starting with the homes that are classified as being at FPEER band E/F/G first and, within this category, we allocate funding in descending order of bill savings per capex cost.

We have also tested a scenario where funding is allocated based on only descending order of bill savings per capex cost only. Under this sensitivity, between 1.8m to 2.6m homes are upgraded (49% to 70% of the fuel poor population). In other words, a higher number of homes are upgraded compared to a situation where the least efficient homes are tackled first.

These results are shown below in Figure 6 and Table 12.

Figure 6 Number of fuel poor homes upgraded



Source: Frontier Economics

Note: The number of fuel poor homes upgraded is cumulative and the funding levels are annual. This does not include the private rented sector regulations.

Table 12 Number of fuel poor homes upgraded (millions)

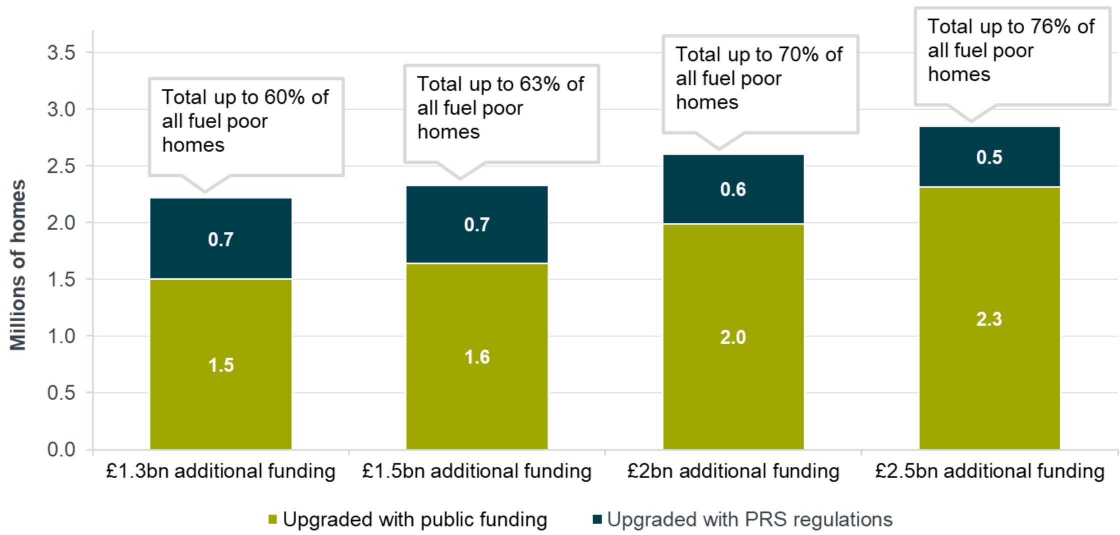
Additional annual funding of	£1.3bn	£1.5bn	£2.0bn	£2.5bn
Homes receiving insulation upgrades only	1.6	1.8	2.1	2.4
Homes receiving insulation upgrades plus a heat pump	0.2	0.2	0.2	0.2
All homes upgraded	1.8	2.0	2.3	2.6
Share of fuel poor population upgraded	49%	53%	61%	70%

Source: Frontier Economics

B.2 Impact of strengthened energy efficiency regulations from 2029

We have also tested a scenario where the strengthening of the PRS regulations is assumed to be implemented in April 2029. Figure 7 and Table 13 shows the number of homes upgraded if 75% of PRS homes comply with the new regulations.

Figure 7 Fuel poor homes upgraded with strengthened energy efficiency regulations for private rented homes from 2029 (75% compliance)



Source: Frontier Economics

Note: The number of fuel poor homes upgraded is cumulative and the funding levels are annual.

Table 13 Fuel poor homes upgraded with strengthened energy efficiency regulations for private rented homes from 2029 (75% compliance)

Additional annual public funding of	£1.3bn	£1.5bn	£2.0bn	£2.5bn
Homes upgraded through public funding	1.5	1.6	2.0	2.3
Homes upgraded through PRS regulations	0.7	0.7	0.6	0.5
All homes upgraded	2.2	2.3	2.6	2.9
Share of fuel poor population upgraded	60%	63%	70%	76%

Source: Frontier Economics
Note: The number of fuel poor homes upgraded is cumulative and the funding levels are annual.

B.3 Alternative funding scenario

For illustrative purposes, we have also modelled a sensitivity in which assumes that all of the £6 billion energy efficiency funding for 2025 to 2028 announced by the previous Government[115] is allocated wholly to domestic energy efficiency, and not for the purposes of wider energy efficiency improvements, for example, in the public sector or in industry (Table 14).

Table 14 Fuel poor homes upgraded with alternative energy efficiency allocation and strengthened energy efficiency regulations for private rented homes from 2028 (75% compliance)

Additional annual public funding of	£1.3bn	£1.5bn	£2.0bn	£2.5bn
Number of homes upgraded	2.6	2.7	3.0	3.2
Share of fuel poor homes upgraded	70%	73%	80%	86%

Source: Frontier Economics
Note: The number of fuel poor homes upgraded is cumulative and the funding levels are annual.

[115] DESNZ (2023), https://www.gov.uk/government/news/families-business-and-industry-to-get-energy-efficiency-support