

Hitting a brick wall

How the UK can upgrade its housing stock to reduce energy bills and cut carbon

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The Economy 2030 Inquiry

The Economy 2030 Inquiry is a collaboration between the Resolution Foundation and the Centre for Economic Performance at the London School of Economics, funded by the Nuffield Foundation. The Inquiry's subject matter is the nature, scale, and context for the economic change facing the UK during the 2020s. Its goal is not just to describe the change that Covid-19, Brexit, the Net Zero transition and technology will bring, but to help the country and its policy makers better understand and navigate it against a backdrop of low productivity and high inequality. To achieve these aims the Inquiry is leading a two-year national conversation on the future of the UK economy, bridging rigorous research, public involvement and concrete proposals. The work of the Inquiry will be brought together in a final report in 2023 that will set out a renewed economic strategy for the UK to enable the country to successfully navigate the decade ahead, with proposals to drive strong, sustainable and equitable growth, and significant improvements to people's living standards and well-being.

The Nuffield Foundation

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Summary

Insulating Britain's inefficient housing stock is one of the UK's most pressing net zero challenges today. The nation's homes account for around one-sixth of our total carbon footprint, and according to the Climate Change Committee (CCC), emissions from buildings must be halved by 2035, and 'near eliminated' by 2050, if our net zero targets are to be attained. Furthermore, the energy crisis has hastened the need to act. Families living in poorly insulated properties consume an extra 58 per cent more gas in the course of a year than they would in a home that meets the Government's Energy Performance Certificate (EPC) target of a C rating. Badly insulated homes mean higher emissions, greater reliance on imported fuels, bigger bills and – especially worryingly – cold homes.

After a decade of complacency, there are thankfully signs that the Government is waking up to this reality. At the 2022 Autumn Statement, for example, it announced a new goal of reducing the amount of energy UK buildings consume by 15 per cent by 2030; £6 billion of additional new funding from 2025; and a much-needed information campaign to raise awareness about how to save energy for a public increasingly worried about paying their bills. And although the UK is advancing from a standing start, there is clear evidence that the insulation issue is policy-responsive. In 2012 alone, for example, 1.6 million lofts and cavity walls were insulated in England and Wales as a result of Government schemes, and comparator countries such as France and Germany show that progress can be made.

We face a particularly acute challenge in the UK, however, when it comes to improving the efficiency of our homes. First, our housing stock is relatively old: close to four-in-ten (38 per cent) UK dwellings were built before 1946 when solid-wall construction and single glazing were the norm, compared to 29 per cent in France and 24 per cent in Germany. Second, much of the low-hanging fruit has already been picked: during the 2010-12 period, when insulation rates were highest, seven-in-ten of all recorded installations were loft insulation, and just 2 per cent treatment for solid walls. But newly available data shows that 9.3 million homes in England today have walls classified as poor or very poor efficiency - 40 per cent of the total housing stock. In comparison, one-in-five (21 per cent) homes have roofs at that low standard, and less than one-in-ten households (9 per cent) live in a property with poorly-graded windows.

Overlooking our old, cold walls to date means that today, they are crucial to delivering a successful (and equitable) home energy efficiency transformation over the next decade. We estimate that close to 8 million homes with poor walls require upgrading in England alone for all homes to reach a minimum EPC rating by 2035. But this is also the hardest part of the efficiency challenge. Close to half (47 per cent) of owner occupier households with inefficient walls think that upgrades are unsuitable for their homes, for example, indicating that the awareness campaign promised by the Government is overdue. But

information alone will not unleash action at the scale and speed required for two key reasons. First, at an average £8,000 per property, the upfront expense of insulating walls is considerable, and would take 18 years to recoup through bill savings even in today's new, higher-energy price world, when accounting for the cost of credit. Second, insulating walls is highly disruptive: in 2021, one-in-eight (12 per cent) uninsulated owner occupiers said it was simply 'too much hassle' to undertake such work.

Left to their own devices, then, private UK households are unlikely to step up when it comes to insulating walls (as the past decade when there has been little meaningful policy in this space demonstrates). So, could cheap loans be the solution? Although subsidies have not been overly successful in the past in the UK (the Green Deal scheme of the early 2010s had disappointing outcomes, for example), sub-market Government-backed lending has led to significant behaviour change in countries such as Germany. We show, however, that when it comes to walls, the barriers to action remain high even if households have access to zero-interest loans. On current energy price projections, for example, a household using free credit to install the best possible insulation on the worst possible walls would still take 11 years to recover their initial outlay of £8,000 from energy bill savings.

Overall, then, our analysis suggests the insulation revolution we need will only be achieved if tough action (read: regulation) is taken by Government. But insisting that individuals improve their private property will be unpopular, and involves (at least) three very significant policy considerations. First, when and how should households be mandated to insulate their homes? Here, 'nudge' economics points a way: disruptive building work is more manageable when homes are empty (between tenancies, for example) or in transition (say, when an owner occupier has just moved in). For the private rented sector (PRS) at least, this approach has form: since the introduction of regulations in 2018 prohibiting the letting of EPC F- and G-rated homes, the share of very poorly insulated rentals has fallen from 30 per cent to less than 10 per cent. But the lower turnover of owner-occupied stock, with only one in three poorly insulated homes expected to transact within a ten-year period, means a hard back-stop will still be necessary to ensure we reach the grade by 2035.

Second, if the state gets tough on insulation it will clearly need to provide financial assistance to some. Wholesale support would be far too expensive (the total bill to retrofit all the poor and very poor walls in England could be as high as £72 billion over ten years), and clearly there are many households who could cover the costs themselves. So, how could public funds best be allocated? The Government recently outlined a twin-track approach, targeting households on means-tested benefits (an indicator of low income), and in council tax bands A to D (a proxy for household wealth). It should be

commended for considering both incomes and wealth, but the methods employed have their shortcomings: 2.3 million households in the poorest income quintile do not receive support through the benefits system, for example, thereby missing out on targeted support. Conversely, six-in-ten (59 per cent) of households in the richest income quintile live in homes in council tax bands A to D meaning there will be significant deadweight to any scheme allocated on that basis.

If we want a financial assessment that integrates both income and assets, and protects those unlucky enough to incur very high costs at least to some degree, the (newly reformed) social care system springs to mind. While not a perfect analogy (the costs of social care are ongoing, while insulation will be a one-off), this model suggests richer households should self-fund all of their insulation costs up to a cap; poorer households be fully funded; and those in the middle be offered support on a sliding scale. If the assets upper bound (property equity and savings) was set at £250,000, say, half (52 per cent) of owner-occupied households would need to insulate their homes entirely at private cost. If English homeowners with assets of less than £100,000 and incomes below £30,000 were fully supported by the state, 10 per cent could upgrade their homes at an annual cost of £600 million to the public purse for ten years. Finally, if half of the costs were covered for the remaining 38 per cent of households, this would require a further £1.2 billion each year of public funds.

Third, if the state requires households insulate their homes by a certain date, and penalises them if they do not, they must ensure there are sufficient skilled workers to deliver. Our analysis suggests that concerns about workforce shortages appear somewhat overblown, at least at the sectoral level: insulating a million homes per year would add around 2 per cent to total construction industry working hours, a change well within the bounds of historical year-on-year sector change. But there are a number of worrying bottlenecks at a more granular level. Places such as Burnley and Scarborough have a construction workforce which is less than half the national average share of local employment, for example, and certain insulation-specific skills (workers with experience in solid wall insulation, and key coordinator roles that link households and tradespeople with public finance) are in short supply nationwide. As a result, on top of providing the long-term certainty that industry needs to invest in training through strong regulatory policy commitment, Government action to set up more local skills accelerators in areas where the need to insulate is greatest, and a capable workforce is most lacking, would be welcome indeed.

The key task for economic policy makers in the 2030s is to deliver sustainable growth and reduce inequality. Insulating the UK's old and inefficient homes may be a monumental challenge, but the climate emergency and the energy crisis make it one that policy

makers can no longer evade. Success depends, however, on tackling an issue that has been entirely ignored to date: the nation's inefficient walls. But upgrading walls is expensive and disruptive, and we cannot assume progress will happen automatically. Instead, what we need is a clear plan that both keeps the UK on track to net zero emissions and protects the living standards of those on low-to-middle incomes. This will require a tough approach, hard deadlines and innovative approaches to targeting support, but as this briefing note shows, it can (and must) be done.

Insulating the nation's inefficient homes is long overdue, but there are signs the Government is ready to act

Insulating the country's inefficient housing stock is one of the UK's key net zero challenges: the nation's homes account for around one-sixth of our total carbon footprint today, equivalent to that from all the petrol and diesel cars on UK roads.¹ To get back on track to legal carbon targets, emissions from the nation's homes need to halve by 2035, and be 'near eliminated' by 2050.² Furthermore, the energy crisis has hastened the need to act. Families living in poorly insulated (EPC F rated) properties consume over 58 per cent more gas in the course of a year than they would in a home that meets the Government's Energy Performance Certificate (EPC) target of a C rating.³ Badly insulated homes mean high emissions, greater reliance on imported fuels, bigger bills and – especially worryingly – cold homes.⁴

After years of limited progress, there are now signs the Government is beginning to take insulation seriously.⁵ In the 2022 Autumn Statement, the Chancellor set a target of reducing energy consumption from buildings by 15 per cent by 2030; announced £6 billion of additional capital spending from 2025 to help achieve this goal; and committed to form an Energy Efficiency Taskforce to develop policy in this area.⁶ And there is an evidence base to lead the way. As Figure 1 shows, in the early 2010s annual installations (i.e. individual insulation measures) supported by Government schemes in England and Wales reached 1.6 million, increasing steadily and significantly since the turn of the millennium, and leading in part to progress that saw nearly half (46 per cent) of English homes achieve an EPC rating of C or higher in 2020, up from just 14 per cent a decade

1 Department for Business, Energy & Industrial Strategy, [Provisional UK greenhouse gas emissions national statistics 2021](#), March 2022.

2 Committee on Climate Change, [UK housing: Fit for the future?](#), CCC, February 2019.

3 K Handscomb & J Marshall, [Cutting back to keep warm](#), Resolution Foundation, August 2022. The UK Government's current target is that as many homes as practically possible attain an EPC rating of C or better by 2035. See: Department for Business, Energy & Industrial Strategy, [Heat and Buildings Strategy](#), October 2021.

4 See, for example: NICE, [Excess winter deaths and illnesses and the health risks associated with cold homes](#), NICE guideline (NG6), April 2015.

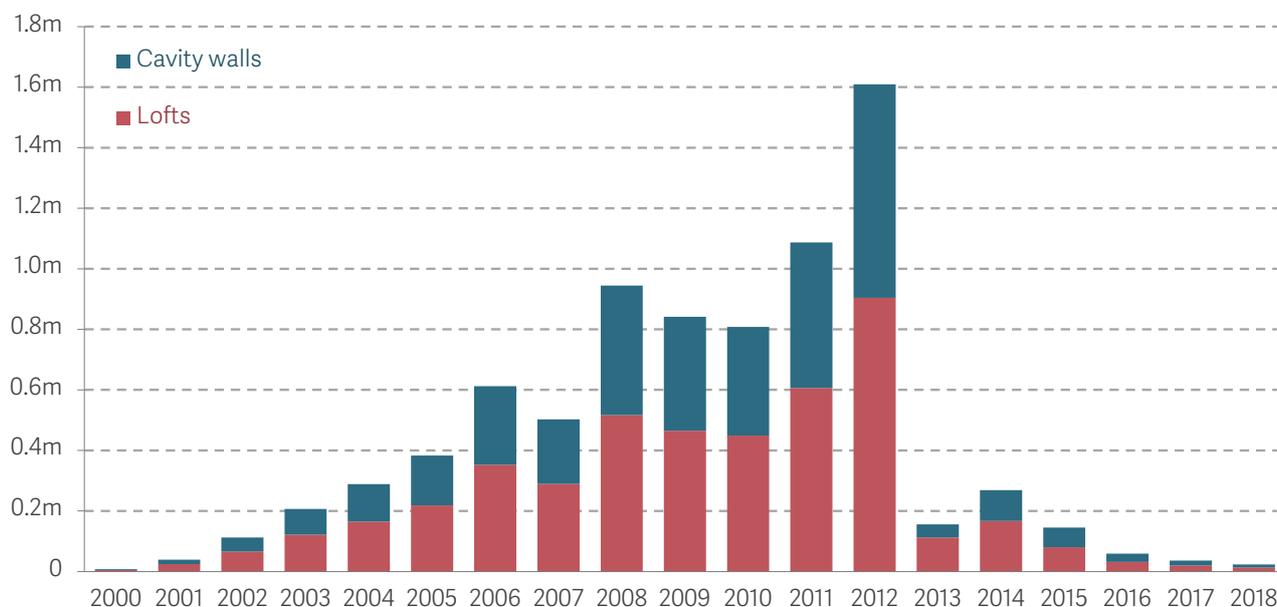
5 In 2013, the then Prime Minister David Cameron famously halted progress on energy efficiency by telling officials to 'cut the green crap'. See for example: The Guardian, [David Cameron at centre of 'get rid of all the green crap' storm](#), November 2013.

6 HMT, [Autumn Statement speech](#), November 2022.

prior.⁷ Crucially, home improvements over this period were widespread, and observed in all tenure types and in all parts of the country.⁸

FIGURE 1: **Home insulation has responded to policy interventions in the past**

Number of lofts and cavity walls insulated under Government schemes: England and Wales



SOURCE: Analysis of National Energy Efficiency Framework data.

Looking further afield, the experience of other countries also shows that the insulation issue is far from intractable. In Germany, the Development Bank KfW has supported home insulation efforts in 6 million homes for over 15 years,⁹ for example, and in France, the MaPrimeRenov scheme has led to the renovation of more than 1 million homes since 2020.¹⁰ That said, the UK faces particular challenges compared to many other nations. Critically, much of our housing stock is relatively old compared to other countries: close to four-in-ten (38 per cent) of UK dwellings were built before 1946, for example, when solid-wall construction and single glazing were the norm, compared to 29 per cent in France and 24 per cent in Germany.¹¹ Given that the age of a property is the single biggest factor when it comes to energy performance, the UK clearly faces more of an uphill struggle than many other countries when it comes to home insulation.¹²

⁷ We largely present results for England throughout this briefing note, in part because of data availability, in part because housing is a devolved policy area and different schemes are in place in the constituent nations. However, the share of inefficient (i.e. EPC rated D and below) homes in Northern Ireland (51 per cent) Scotland (55 per cent) and Wales (65 per cent) are broadly comparable to that in England (59 per cent), and the lessons we draw in this note are generalisable across the four nations.

⁸ Source: [English Housing Survey: Energy Report 2020-21](#), DLUHC, July 2022.

⁹ KfW has been in operation since 2006 and treated more than 6 million homes, deploying Eur180 million in loans and grants and crowding in investments of more than €500 million. For more, see: [State support for energy efficiency in buildings: A view from Germany](#), Israel Public Policy Institute, May 2022.

¹⁰ See, for example: Agence Nationale de l'Habitat, [338,265 Housing units renovated in the first half of 2022 thanks to MaPrimeRenov, more than one million since 2020](#), July 2022.

¹¹ Source: Eurostat, Census Hub HC53.

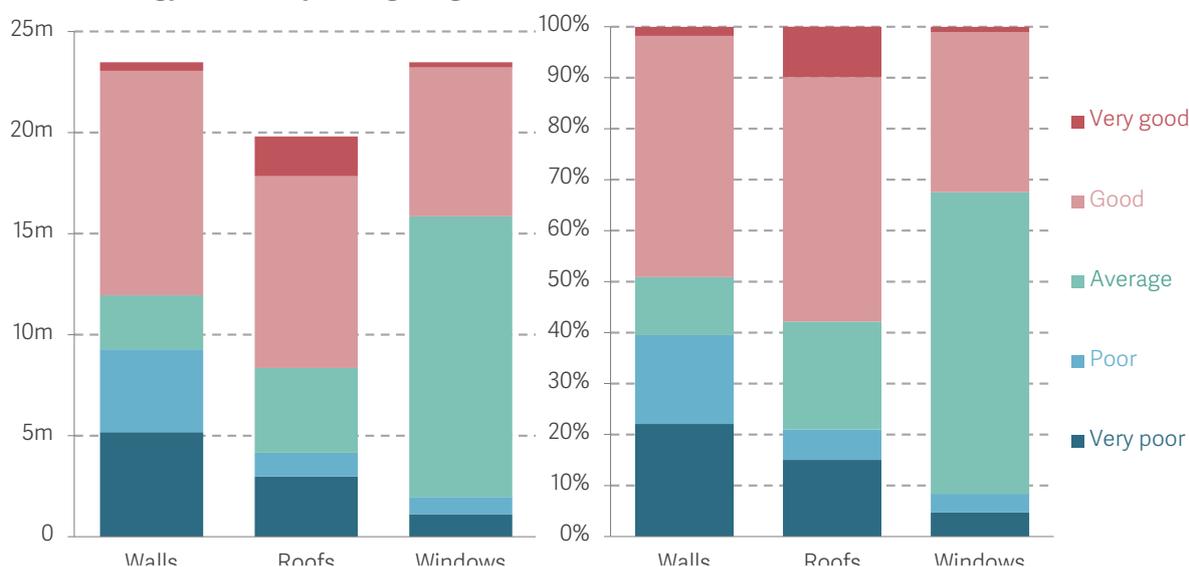
¹² ONS, [Age of the property is the single biggest factor in energy efficient of homes](#), January 2022.

Upgrading millions of inefficient walls is the country's primary insulation challenge today

Both the historical and comparative evidence shows households are responsive to policy when it comes to home insulation and that progress can be made. But we would be wrong to underestimate the scale of the efficiency challenge. Although the country has seen high rates of home insulation in the past, these were overwhelmingly concentrated on installing cheaper and less disruptive forms of insulation. During the 2010-12 peak, for example, seven-in-ten of all recorded installations (i.e. those done under Government schemes and purely privately) were loft insulation, with just 2 per cent treating the (much more expensive and disruptive) problem of solid walls.¹³ As such, it is small surprise that inefficient walls are now the biggest insulation issue we face in the country. Figure 2 shows that there are 9.3 million homes in England with walls classified as having poor or very poor efficiency – 40 per cent of the total housing stock.¹⁴ For comparison, just one-in-five properties (21 per cent) have roofs assessed at this low standard, and fewer than one-in-ten households (9 per cent) live in a home with poorly-performing windows.

FIGURE 2: Four-in-ten homes in England have walls that require significant upgrading

Number (left panel) and share (right panel) of residential properties by wall, window and roof energy efficiency rating: England, 2021



NOTES: There are 4 million homes in England, such as flats, without the ability to install roof or loft insulation. The EPC register comprises lodged certificates, where the energy efficiency of different aspects of properties are professionally assessed. These are then banded from very poor to very good based on thermal conductivity.

SOURCE: Analysis of DLUHC, EPC Register; DLUHC, English Housing Survey.

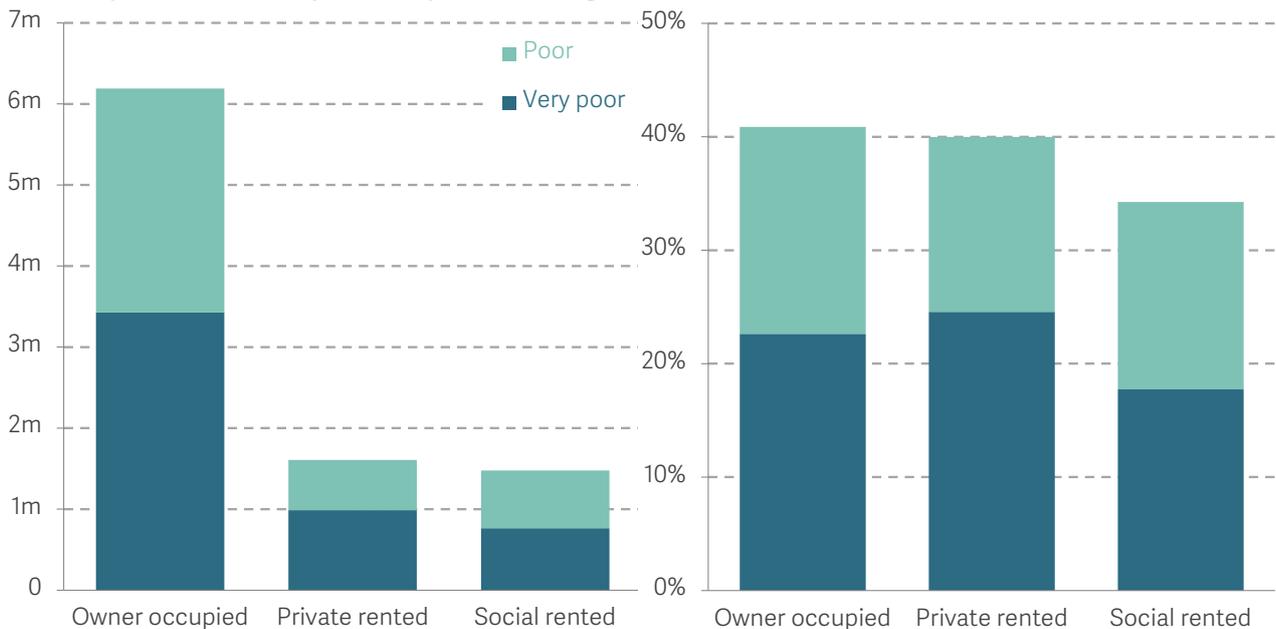
¹³ The remaining 27 per cent of installations were cavity walls. Source: Climate Change Committee, *Sixth Carbon Budget*, December 2020.

¹⁴ This briefing note uses a new dataset, DLUHC's EPC Register which contains detailed information on the energy performance of every property that has transacted in England and Wales since 2008. We take the most recent observation for each property in this dataset, and weight this using EPC performance values in both the EPC register and the English Housing Survey, to account for biases in the data that see newer properties over-represented in the EPC register. This weighting brings the EPC register in line with the English Housing Survey in terms of tenure, region, and building ages, as well as energy efficiency ratings. There is, of course, the possibility that properties have been upgraded since they transacted but given the limited action on home insulation in recent years (see Figure 1), this is unlikely to change the results we present here in a material way.

Improving such a large number of poorly insulated walls is now a crucial part of the nation’s home insulation challenge, with many of properties unable to meet the necessary EPC C rating without wall upgrades. Further analysis of the EPC register shows that close to one-third (3 million) of English homes with poor or very poor walls have already been treated with both high efficiency windows and loft insulation, yet only 15 per cent (450,000) of these homes attain an EPC C rating (none achieve a rating higher than that). Applying this logic to the remaining 6.3 million untreated homes in England implies a further 945,000 homes with inefficient walls could potentially reach EPC C standards through roof and windows upgrades alone, but 7.9 million (five-in-six of the total) cannot attain this efficiency rating (which is also the Government’s target for all homes by 2035) without wall improvements.

FIGURE 3: There are millions more poorly insulated owner-occupied homes, but private renters are just as likely to live in a property with inefficient walls

Number (left panel) and proportion (right panel) of residential properties with poor and very poor efficiency walls, by tenure: England, 2021



NOTES: Figures shows include data based on a new dataset which takes the DLUHC, EPC Register, in which the energy performance of every property that has transacted in England and Wales since 2008, weighted using DLUHC’s English Housing Survey to produce a representative picture of the nation’s housing stock. The EPC register comprises lodged certificates, where the energy efficiency of different aspects of properties are professionally assessed. These are then banded from very poor to very good based on thermal conductivity.

SOURCE: Analysis of DLUHC, EPC Register; DLUHC, English Housing Survey.

The issue of inefficient walls is greatest in the owner-occupied sector, as shown in Figure 3, where there are 6.2 million homes with poor and very poor efficiency walls, making up two-thirds of all of properties in need of such upgrades. As a share of the stock though, it is the private rented sector where the problem of very poor walls is most acute, with one-in-four (25 per cent) of all rented properties having rock-bottom-rated walls, and a further 15 per cent have poor walls. This is reflected in overall levels of efficiency by tenure, with more than six-in-ten (62 per cent) of private rented households living in properties that are rated at EPC D or worse, the highest share among all tenures, leading to a higher than average share of fuel poor homes in the private rented sector.¹⁵

Badly insulated properties are ubiquitous but there are pockets of real need

Slow progress on insulating walls is a nationwide problem, and as others have shown, there are properties in all parts of the country in need of renovation.¹⁶ Figure 4 brings home this point in a slightly different way. Here, we plot the number and share of homes with poor or very poor walls by settlement type.

As the chart makes clear, in absolute terms the greatest concentration of homes with inefficient walls in England is in the capital: 2.1 million homes in London fall into this category, a staggering 64 per cent of the housing stock.¹⁷ In absolute terms, all large towns taken together contain 2.1 million properties requiring an upgrade to their walls, but in percentage terms there is a slight 'size of settlement' gradient, with larger conurbations with their older housing stock the places with the greatest need (43 per cent of homes in core cities other than the capital in England have poor or very poor walls, for example, compared to just 31 per cent in areas dominated by villages and smaller settlements).

¹⁵ For more, see: UK Government, [Annual Fuel Poverty Statistics Report](#), February 2022.

¹⁶ See, for example: ONS, [Energy Efficiency of Housing in England and Wales: 2022](#), October 2022.

¹⁷ While areas of London, such as Tower Hamlets, are often pointed to as areas with a building stock that is more efficient than the national average, a very large number of old homes in the capital mean that, especially in terms of walls that need insulating, it is a region where significant progress must be made. In fact, London's housing stock has a high share of old homes, with 51 per cent of properties in the capital built before 1945, compared with 35 per cent across England, according to analysis of English Housing Survey data. Further, 20 per cent of the very oldest homes (those built before 1919, in this instance) are in London, compared with just 8 per cent in the East Midlands and 10 per cent in Yorkshire, for example. Further EHS analysis shows that London's walls are alarmingly poorly insulated, with 73 per cent of homes in the capital having uninsulated walls (52 per cent uninsulated solid walls and 21 per cent uninsulated cavity walls), compared to a national average of 46 per cent.

FIGURE 4: More than six-in-ten homes in London have poor or very poor efficiency walls

Number (left axis) and proportion (right axis) of residential properties with poor and very poor efficiency walls, by settlement type: England, 2021

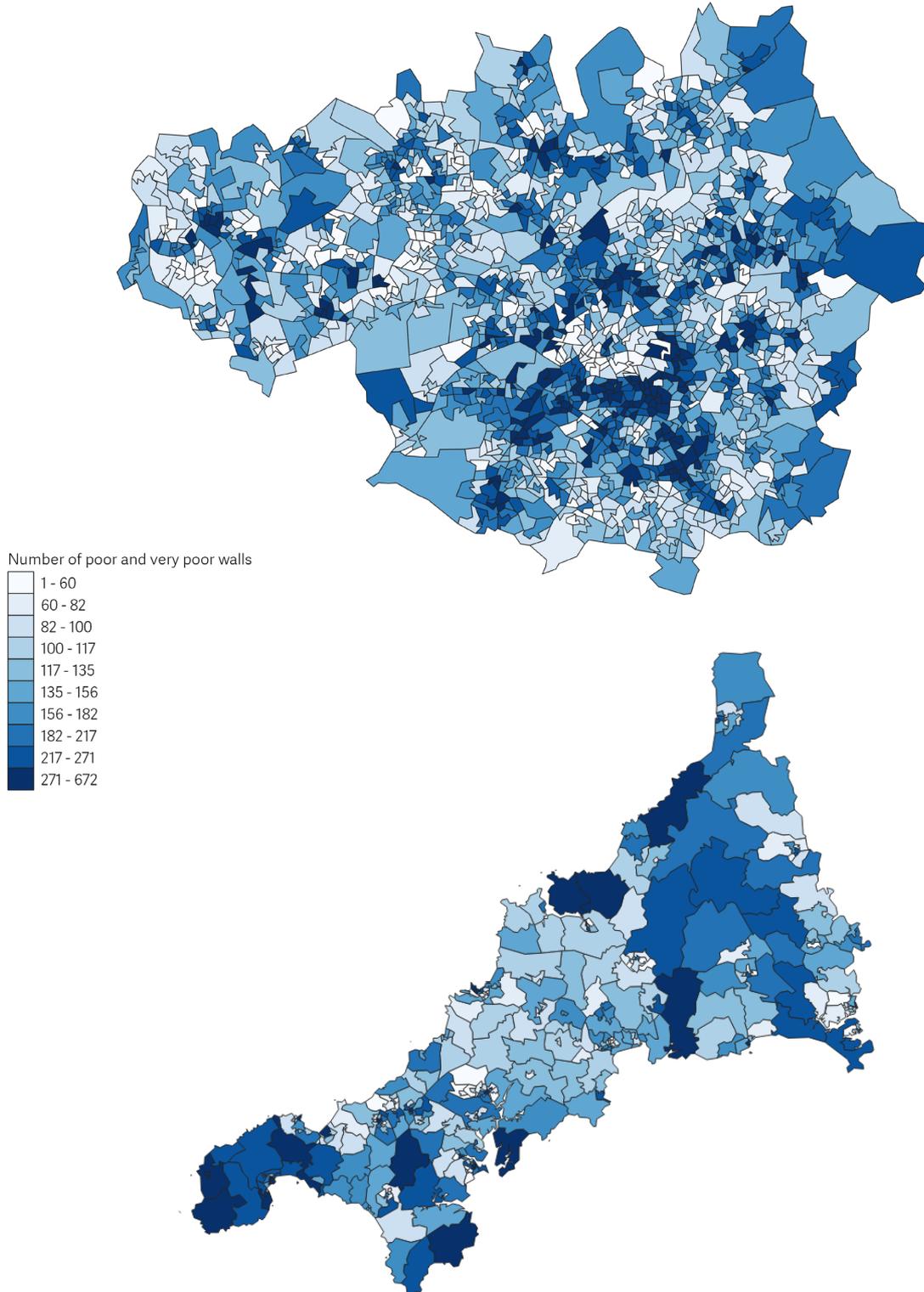


NOTES: Individual properties are categorised according to settlement type based on the dominant settlement in the local authority in which they are located. 'Core city' relates to eight major 'population and economic centres' in England namely: Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield. 'Other city' refers to other settlements with more than 175,000 inhabitants. 'Large town' refers to settlements with a population in excess of 60,000, and 'Medium town' a population of over 7,500, with 'Village' covering all other.
 SOURCE: Analysis of DLUHC, EPC Register; DLUHC, English Housing Survey. Local authority settlement types are from C Baker, City & Town Classification of Constituencies & Local Authorities, House of Commons Library, June 2018.

That said, there is a great deal of within-area variation. In Figure 5 we show the number of homes at a neighbourhood level (each of which contains, on average, around 650 properties) in two very different types of settlement: a core city – Greater Manchester – and a predominantly rural area – Cornwall. Although there are some 'hot spots' in both (there is a very obvious ring of poorly-insulated properties around the far more modern core of Greater Manchester, for example, and the housing stock in the far South West of Cornwall appears particularly bad), the maps make clear that homes with inefficient walls are ubiquitous, and highly dispersed within areas as well as between

FIGURE 5: There are hot spots of particularly poorly insulated walls in all parts of the country

Number of residential properties with poor and very poor walls, by neighbourhood (LSOA): Greater Manchester (top) and Cornwall (bottom), 2021



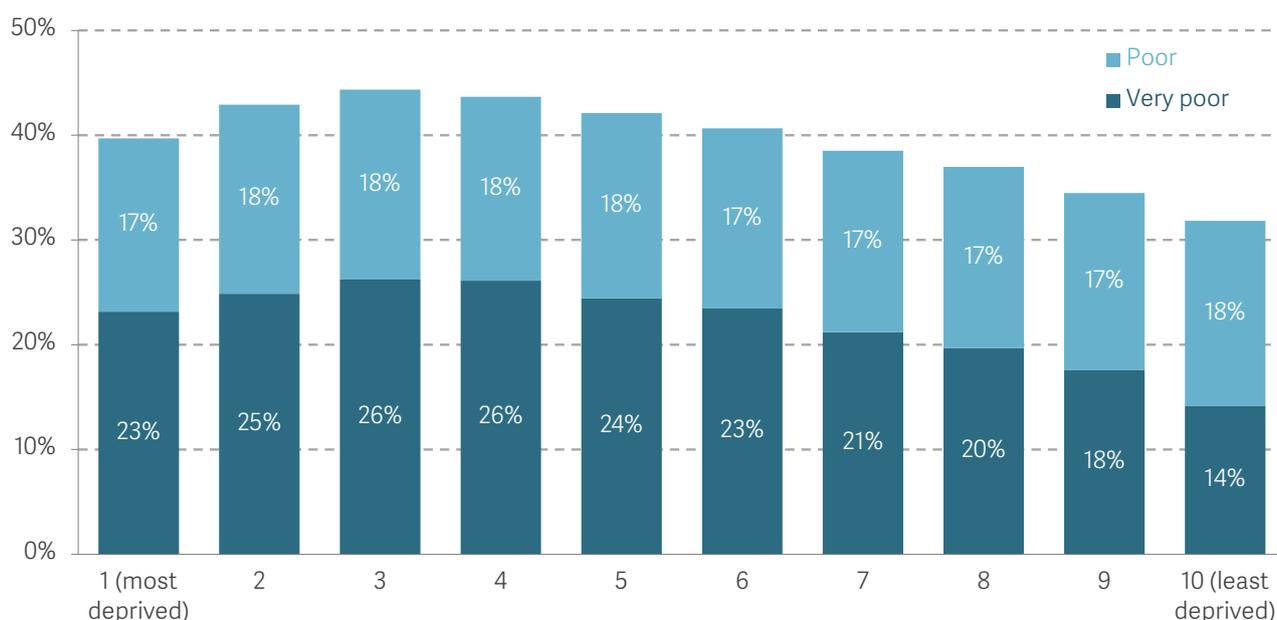
NOTES: Maps are not to scale.

SOURCE: Analysis of DLUHC, EPC Register; DLUHC, English Housing Survey; ONS National Statistics UPRN Lookup.

Furthermore, there are other interesting patterns to note at a neighbourhood level. In Figure 6, for example, we show the share of residential properties with inefficient walls by the level of neighbourhood deprivation areas (using the Index of Multiple Deprivation (IMD) income deprivation deciles). As this makes plain, there is a clear social gradient: four-in-ten (40 per cent) of homes have inefficient walls in the poorest neighbourhoods, for example, compared to just over three-in-ten (32 per cent) in the richest places. As a result, the distributional benefits from insulating poor efficiency properties will be considerable: the impacts of the energy crisis are overwhelmingly felt by poorer households, and even more so by those in poorly insulated homes, meaning interventions to reduce energy spending (permanently) will bring considerable respite for households struggling the most with day-to-day living costs.¹⁸

FIGURE 6: Households in poorer areas are most likely to live in homes which waste energy through badly insulated walls

Proportion of residential properties with poor and very poor efficiency walls, by income deprivation decile of neighbourhood (LSOA) in which the property is located: England, 2021



NOTES: IMD income deciles are based on 2019 ONS Income Deprivation Domain, which measure the proportion of a population in an area experiencing deprivation relating to low income, including both those out of work and those in work but have low earnings.

SOURCE: Analysis of DLUHC, EPC Register; ONS National Statistics UPRN Lookup.

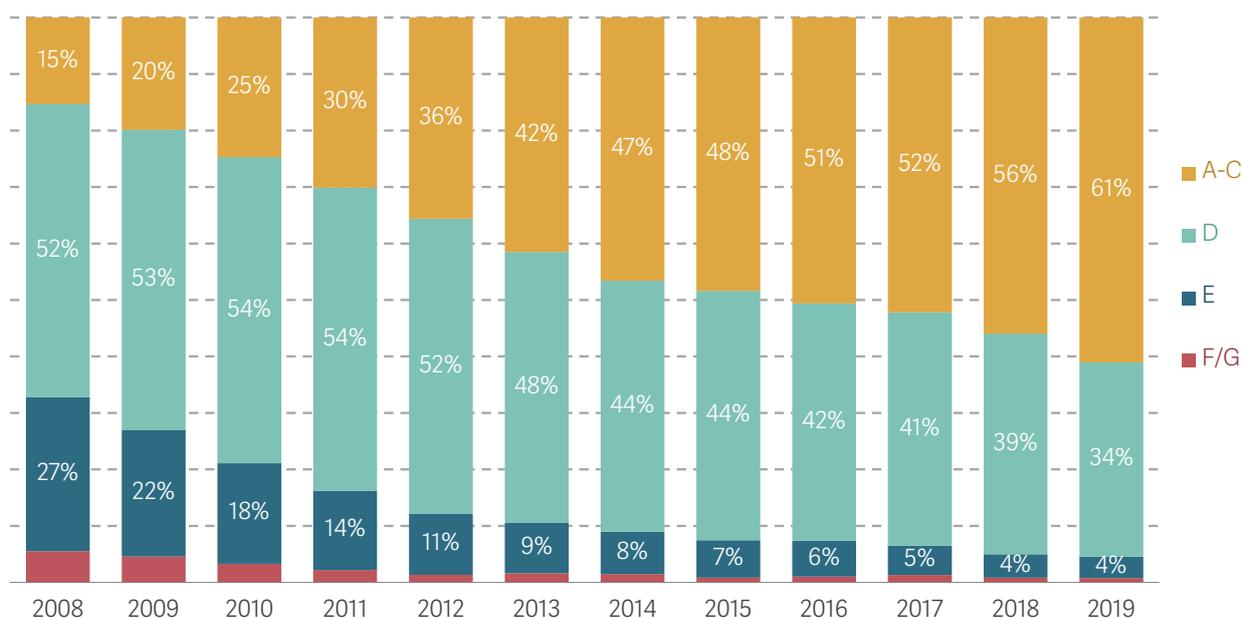
¹⁸ A Corlett, F Odamtten & L Try, *The Living Standards Audit 2022*, Resolution Foundation, July 2022; K Handscomb & J Marshall, *Cutting back to keep warm: Why low-income households will have to cut back on spending by three times as much as high-income households this winter*, Resolution Foundation, August 2022.

Insulating private homes is a far bigger policy challenge than public housing

The increased likelihood of finding a less efficient property in a lower-income area is concerning, especially as winter bites and the financial consequences of living in a poorly insulated properties come into play.¹⁹ Without the uplifting effects of the nation's social housing stock, though, this is a problem that would be far worse. And as Figure 7 shows, socially rented properties are more efficient than the stock as a whole: in 2019, six-in-ten (61 per cent) public homes in England were rated at EPC C or higher, and just one-in-twenty at EPC E or below (compared with one-in-five of the overall building stock rated E or lower). Moreover, the efficiency of England's social housing stock has improved dramatically over time, with the share of A to C rated homes increasing from just 15 per cent in 2008 to 61 per cent in 2019.

FIGURE 7: **England's social housing stock is increasingly energy efficient**

Proportion of social rented residential properties, by EPC rating: England



NOTES: EPC ratings are based on SAP 2009 methodology for 2008-2012 and SAP 2012 methodology for 2013-2019.

SOURCE: Analysis of DLUHC, English Housing Survey.

Part of the reason why social rented housing is better-performing than other tenures when it comes to energy efficiency is the age of the stock: 16 per cent of socially rented homes in England were constructed before 1945, compared with 39 per cent of the remainder of the housing stock (owner occupied and private rented).²⁰ Newer homes

¹⁹ Government estimates show that living in a poorly insulated social rented property could increase bills by £700 per year. See: UK Government, [£1.5 billion to improve energy efficiency and slash bills](#), September 2022.

²⁰ Source: Analysis of DLUHC, English Housing Survey.

generally need less work to improve their energy performance, and that needed is often cheaper and easier to conduct. Moreover, social housing providers can operate insulation programmes at scale, and clearly have a high degree of control over their housing stock which means that implementation is arguably easier than it is in other tenures.

The binding constraint on progress in this sector, then, is less a workable model and more a question of funds. Support is currently provided by the Social Housing Decarbonisation Fund (SHDF) which was introduced via the Conservative Party's 2019 General Election Manifesto and funded to the tune of £3.8 billion over ten years. To date, two 'waves' of the SHDF have been announced: the first a demonstrator, backed with £179 million of funding and a target to insulate 'up to 20,000' homes, and the second wave, which has recently launched, is backed by £800 million of public funds.²¹ But there are still a significant number of homes requiring upgrades, especially considering the outsized share of households in fuel poverty within the social sector (for whom the target is to achieve an EPC C rating for all homes by 2030).²² Analysis of the English Housing Survey shows that close to 1.4 million socially rented properties have an EPC rating of D or below. We estimate that upgrading all of these homes to a C rating would cost between £7.5 billion and £12.5 billion (although as with previous SHDF rounds it is likely that social landlords will be expected to contribute to some costs).²³

As such, while taking care not to talk down the difficulties of insulating the social rented housing stock, it is increasingly clear that the key policy problem when it comes to insulation is private homes. This is particularly tricky in the UK because a large share of housing is in private – and critically, individual – hands. The UK has higher homeownership rates than in Germany, for example, and although it has a larger private rented sector (PRS) than the UK, much of that rental stock is owned by institutional rather than individual landlords. Overall, we estimate that 77 per cent of dwellings in the UK are either owner-occupied or rented out by private individual landlords, compared to 71 per cent in Germany.²⁴ As a result, many more dwellings in Germany are held by bodies with large portfolios (meaning they have economies of scale) and property management experience (meaning they know how to go about building work) than in the UK.

²¹ Previous progress in improving the energy performance of social housing has been driven by a number of schemes, predominantly through the Energy Company Obligation since 2013, but also via a dedicated part of the Green Deal which was implemented in 2012.

²² Department for Business, Energy & Industrial Strategy, *Sustainable warmth: protecting vulnerable households in England*, February 2021.

²³ The lower bound of this scheme was based on an average cost of £5,500 taken from the English Housing Survey, and the upper bound based on £9,000 per property, in line with costs incurred during the first wave of the Social Housing Decarbonisation Fund.

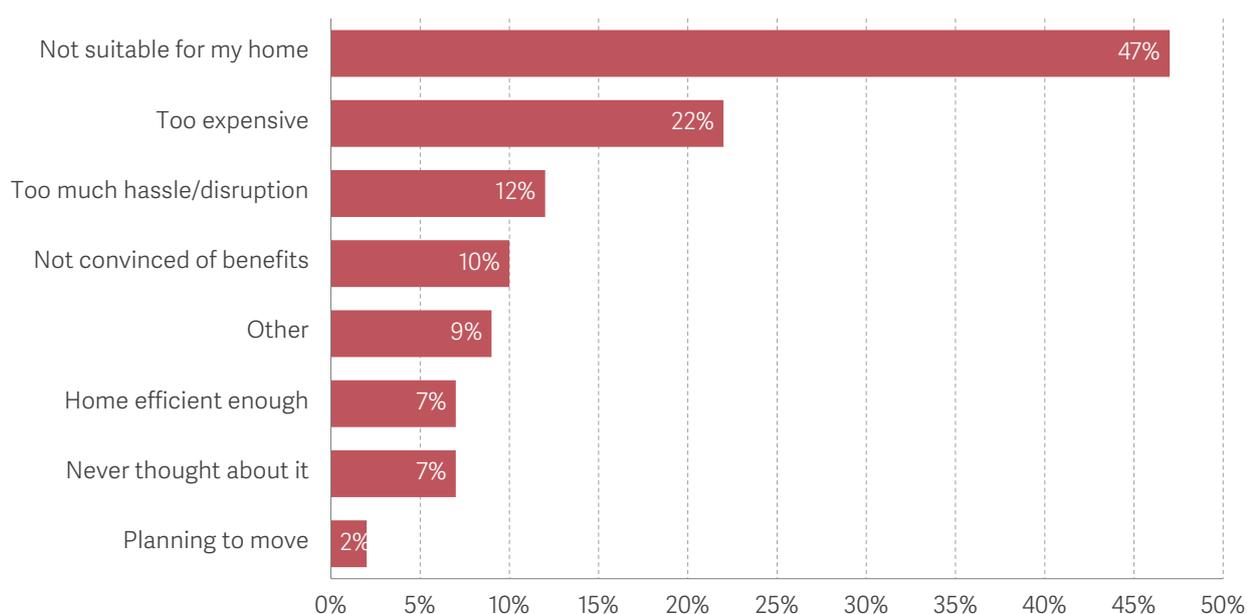
²⁴ Source: Analysis of European Survey on Income and Living Conditions data; DLUHC, English Housing Survey Private Landlords Survey; J Schuetz & S Crump, *What can the US learn from rental housing markets across the world?*, Brookings Institute, April 2021.

Lack of information, cost and worries about disruption all inhibit action by private households

Upgrading the efficiency of the nation's housing stock, then, is contingent on significant action being taken by private households. But Figure 8 suggests there is some serious resistance in this regard. Here, we show responses from owner-occupiers in poorly insulated homes to the question 'Why have you not yet installed cavity or solid wall insulation?'. To begin, as this makes clear, there is worryingly low awareness of the need for action on this front: almost half (47 per cent) of such households think that insulation is not suitable for their homes.²⁵

FIGURE 8: Lack of awareness, costs and disruption stop people insulating their homes

Share of responses to survey question 'Why have you not yet installed solid wall or cavity wall insulation?', owner-occupiers only: UK, Winter 2021



NOTES: Those already having installed measures in question excluded from results.

SOURCE: Analysis of BEIS, Public Attitudes Tracker.

These quantitative findings receive additional confirmation from participants in a recent owner-occupier-only Citizens Panel. In this exercise, homeowners spoke of a lack of knowledge and interest in insulating their homes, although they did draw a link between the ongoing energy crisis and the potential savings on offer.

²⁵ Other sources confirm this finding. When the insulation company Kingfisher asked the public why they would not be making energy efficiency upgrades in the next 12 months, 'Don't know enough about what the options are' and 'I'm not sure if it's worth the investment' were both high-scoring answers. See: Kingfisher, [Tackling the UK's energy efficiency gap](#), August 2022.

“I don’t think the homeowner, until they know the right way forward for their property, can make any kind of sensible decision.”

“...it’s not on people’s minds, it really isn’t.”

“No one gives you the cost benefit. No one says, if you spend £7,000 on double glazing, you will make your money back in five years”

“This is exactly the right time. With fuel bills going through the roof, this is exactly the right time for government to run a campaign about how you can save energy. You could have a ‘do your bit’ campaign.”²⁶

As Figure 8 makes plain, however, cost remains a serious issue given that installing insulation, especially insulating walls, often requires significant up-front investment. And households are right to be concerned: in Figure 9 we show that an indicative £8,000 spent to improve walls rated as ‘very poor’ efficiency to ‘very good’ would not be recovered through bill savings until 2040 under current energy price projections.²⁷ If (unrealistically) energy prices remain at significantly elevated levels for decades to come, it would still take upward of a decade to recoup this initial outlay, an unattractive financial offer for many.

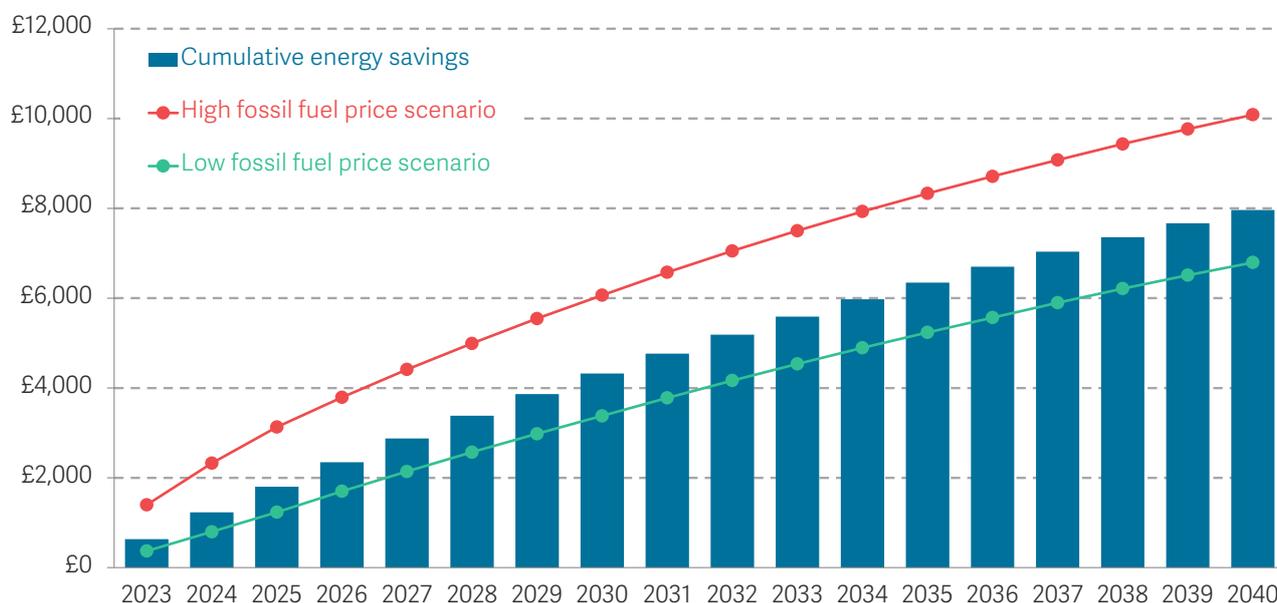
Finally, the picture is grimmer still if one assumes a reversion to pre-crisis energy prices, with a household spending £8,000 on home insulation today only recouping £7,000 via lower energy bills by 2040. While not impressive in terms of payback periods, it is worth noting that investing in wall insulation brings a decent return of approximately £650 per year (more than 8 per cent), far more than is achievable through savings products and a more stable investment than stocks and shares.

²⁶ Lancaster University & the Climate Change Committee, [Addressing emissions from owner-occupied homes: Findings of a citizens’ panel on home energy decarbonisation](#), September 2022.

²⁷ Unlike many aspects of the net zero transition, such as energy generation or electric vehicles, it is unlikely that the costs of insulating homes will materially fall over time. This is due to labour costs making up a significant proportion of the cost of works in the home, and the nature of materials used, which are typically bulk chemicals processed into boards or fibres. In fact, the energy intensive nature of producing insulating materials means they are currently experiencing one of the highest rates of inflation among all construction products, increasing in price by 46 per cent over the year to October 2022. Source: Department for Business, Energy & Industrial Strategy, [Monthly Statistics of Building Materials and Components](#), December 2022.

FIGURE 9: It takes many years to recoup the upfront costs of insulation from energy bill savings

Present value of cumulative energy cost savings from upgrading walls assessed at 'very poor' to 'very good', at 5 per cent discount rate factor



NOTES: Years shown are main year in fiscal year e.g. 2023 = 2023-24. Forecasts of energy prices in future years based on wholesale gas (NBP) projections from National Grid, up or downrated in line with Government high or low fossil fuel price projections, and based on a typical reduction in heating demand of 37 per cent for walls that are rated as very good in the EPC Register compared to those with a very poor rating, calculated using a regression in which other factors such as property size and type are held constant.

SOURCE: Analysis of DLUHC, EPC Register; DLUHC, English Housing Survey; National Grid Future Energy Scenarios; Ofgem Default Tariff Cap; BEIS Energy and emissions projections data.

Again, qualitative findings make clear that households are not convinced of the economic case for insulating their homes, at least in the short-term. This is consistent with research which shows that public engagement with policies that have distant payoffs is limited, with 'hyperbolic discounting' reducing the likelihood of sacrifices being made in the present for later gains.²⁸

"...there's a perception that the cost of insulation far outweighs the benefits, especially if you don't live somewhere very long."

"...cost would always be the primary driver."²⁹

In addition to knowledge and cost, Figure 8 points to a third main barrier which is hassle and disruption. Installing insulation, especially wall insulation, involves having workers

²⁸ See, for example: P Dolan et al., *MindSPACE: Influencing behaviour through public policy*, Institute for Government, March 2010; D Hardisty & E Weber, *Discounting future green: Money versus the environment*, Stanford University, September 2009.

²⁹ Lancaster University & the Climate Change Committee, *Addressing emissions from owner-occupied homes: Findings of a citizens' panel on home energy decarbonisation*, September 2022.

in the home, the creation of dust and noise, and can require redecorating (and in some cases even reduce internal space). As such, it is not surprising that households are resistant.³⁰ And again, this is not a new finding. Disruption has also been highlighted as a serious friction in previous Government studies and in how-to-guides from organisations such as the Energy Savings Trust.³¹ Moreover, recent polling, this time from the insulation industry, found that 28 per cent of people identified hassle as a factor putting them off making energy efficiency improvements in the next 12 months.³²

Policy makers will need to get tough if private homes are to be insulated at pace

The barriers that inhibit private households insulating their properties, then, are sizeable, but how should policy respond? One option that the Government is currently seized of is to increase knowledge levels through an information campaign.³³ This is not without merit, and the Government should be commended for plans to bolster its 'Help for households' website through which the public is offered energy saving information, and more so should it begin to focus on energy efficiency as well as general energy saving, thereby helping to 'roll the pitch' for subsequent policy interventions. But stepping back, it is clear that an information campaign alone is unlikely to make significant headway in light of the costs and disruption that insulating walls involves.³⁴

Another approach would be to offer financial incentives to households to make progress on insulation, for example through low-cost, Government-backed lending. This approach has been used to deliver some success overseas, but has not been fruitful when tried before on UK soil. The Green Deal, for example, saw fewer than 4,000 home upgrade plans through to completion, in part due to complications such as the 'golden rule' which required bills savings from upgrades to more than compensate for home upgrade costs.³⁵ And when it comes to walls, again low-cost credit is unlikely to lead to progress at the scale and pace required. As shown in Figure 10, the economics of investing in an expensive wall upgrade remain poor even with cheaper capital: a borrowing cost of zero per cent would see cumulative net energy savings reach £8,000 in 2034-35, still significantly into the future.

³⁰ Moreover, the age of those in the household could prove a drag factor. Younger owner-occupiers are much more likely to live in more efficient housing: 13 per cent of A-C rated homes are lived in with a household head aged 34 or less, whereas for D-G rated homes this share is just 7 per cent. At the other end of the scale, older households are much more likely to live in inefficient homes, with 41 per cent of owner-occupied D-G rated homes headed by someone aged 55 or over, compared with 28 per cent of A-C rated homes. Source: Analysis of DLUHC, English Housing Survey.

³¹ See, for example: Department for Energy and Climate Change, [Removing the hassle factor associated with loft insulation: Results of a behavioural trial](#), September 2013; J Palmer & N Terry, [Solid wall insulation: Best practice and innovation](#), Department for Business Energy and Industrial Strategy, October 2017; Energy Saving Trust, [Solid wall insulation](#), accessed November 2022.

³² Kingfisher, [Tackling the UK's energy efficiency gap](#), August 2022.

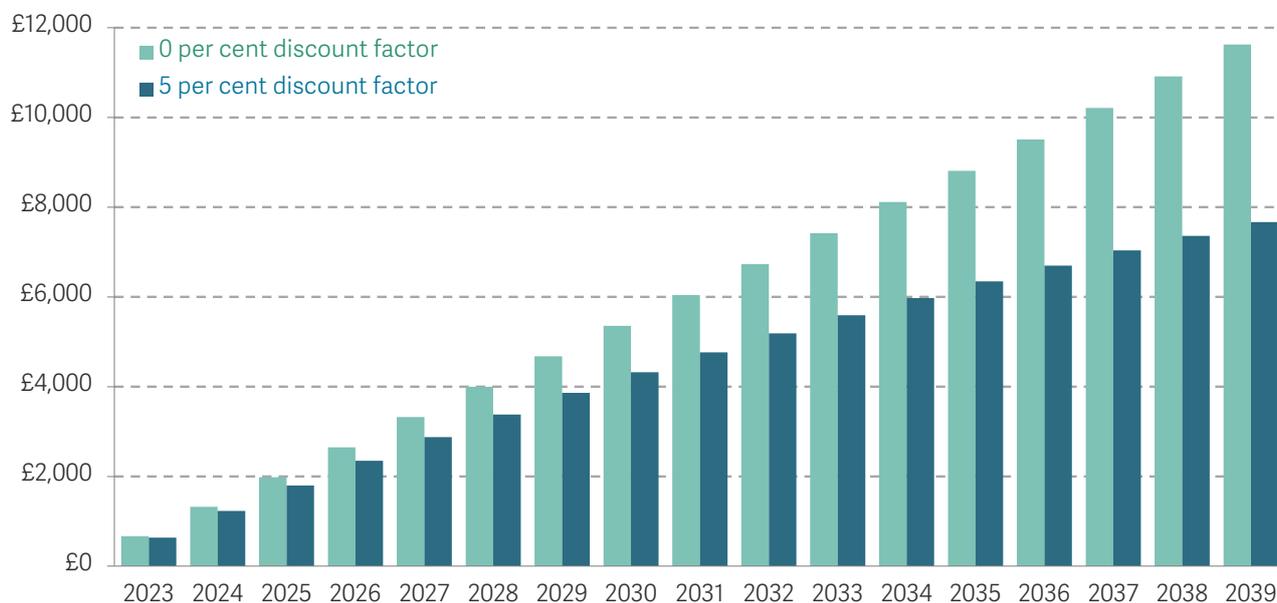
³³ S Swinford, [Jeremy Hunt tells Britons how to save energy](#), The Times, November 2022; UK Government, [Help for Households](#), accessed November 2022.

³⁴ Information has only gone so far in the past in changing behaviours. For example, wearing seatbelts, reducing smoking and parents no longer taking children on school holiday during term time, all required legislation to make significant headway.

³⁵ For more detail on the failings of the Green Deal, see: A Corlett & J Marshall, [Shrinking footprints: The impacts of the net zero transition on households and consumption](#), Resolution Foundation, March 2022.

FIGURE 10: Zero per cent finance improves the incentives, but it would still take a decade to recoup an outlay of £8,000

Present value of cumulative energy cost savings from upgrading walls assessed at 'very poor' to 'very good', at 0 per cent and 5 per cent discount rate (central energy price scenario)



NOTES: Years shown are main year in fiscal year e.g. 2023 = 2023-24. Forecasts of energy prices in future years based on wholesale gas (NBP) projections from National Grid, and based on a typical reduction in heating demand of 37 per cent for walls that are rated as very good in the EPC Register compared to those with a very poor rating, calculated using a regression in which other factors such as property size and type are held constant.

SOURCE: Analysis of DLUHC, EPC Register; DLUHC, English Housing Survey; National Grid Future Energy Scenarios; Ofgem Default Tariff Cap; BEIS Energy and emissions projections data.

Overall, then, our analysis suggests the insulation revolution we need in the UK will only be achieved if tough action (read, regulation) is taken by Government. Only this is likely to result in the pace required to meet Government targets, which involve a rapid acceleration in the number of homes treated per year from 130,000 currently to 1 million by 2030.³⁶ Further, with current energy forward curves indicating that high bills are here for the foreseeable future, insulating the building stock is sorely needed to bring down household energy expenditure.

Efficiency improvements should be mandated when they are easiest to implement, but a hard backstop will still be required

Insisting that individuals improve their private property, taking on associated costs and disruption, will be a sizeable (and no doubt unpopular) ask from the Government. So,

³⁶ Climate Change Committee, *2022 Progress Report to Parliament*, June 2022.

how could policy be designed and implemented so as to achieve the task at hand, but also be considerate of the household journey? Here, 'nudge' economics shows a way. The point of transaction – purchasing, selling or renting a property – is the obvious time to require homes be insulated to a certain standard: disruptive building work is more manageable when properties are empty, or when people are putting their own stamp on a new home, and it is also when households often raise additional capital. Moreover, on a more practical level, this is the obvious (and possibly only workable) time at which new and higher requirements could be checked and enforced.

How could this work in practice? Policy should not disincentivise mobility, so it makes more sense to place the burden of home efficiency improvements on the buyer rather than the seller, with a one-year grace period within which to ensure their new home meets minimum efficiency standards. Regulating buyers rather than sellers would be better timed with disruption: extensive works are more likely to be carried out by those moving into rather than out of a property, and would allow sellers to negotiate on price, reduce the risk of shoddy work being done by sellers, and be timed to make it easier to access additional lending.

For the private rented sector, enforcing minimum efficiency standards at the point of transaction has some form. Since 2018, for example, it has not been permitted to rent out a home rated with an EPC rating of F or G. As Figure 11 shows, this led to a rapid and dramatic reduction of the number of these inefficient properties being let, with the share of very poor efficiency homes registered falling from 30 per cent in early 2017, to less than 10 per cent as the regulations began to bite. Moreover, despite concerns that landlords would exit the sector in droves if they were mandated to upgrade their properties, there has been little evidence of this effect in the past: the number of privately rented properties in England fell only slightly since the 2018 regulations were imposed, for example.³⁷

³⁷ There were 4.7 million private rented homes in England in 2017, compared with 4.4 million in 2021. During this time there have also been significant tax and legislative changes to the private rented sector, so it is hard to deduce the sole cause of this reduction. Source: MHCLG, [English Housing Survey Headline Report 2016-17](#), January 2018; DLUHC, [English Housing Survey Headline Report 2020-21](#), December 2021.

FIGURE 11: The privately rented housing stock has become much more energy efficient following the introduction of minimum standards in 2018

Proportion of private rented residential properties that had 'very poor' energy efficiency (EPC rating of F or G) at previous assessment, by latest energy efficiency: England



NOTES: Data presented as 3-month rolling averages.

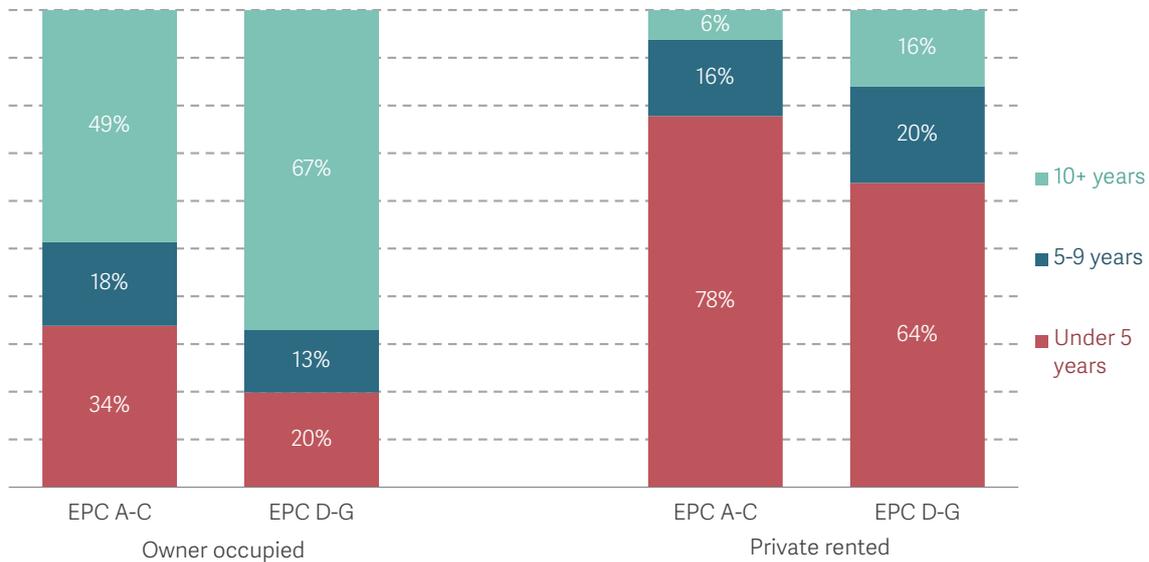
SOURCE: Analysis of DLUHC, EPC Register; DLUHC, English Housing Survey.

However, this strategy will only get us so far for two key reasons. First, as Figure 12 shows, inefficient properties transact less frequently than better-insulated homes – in part, perhaps, because younger, more mobile households are more likely to live in newer, higher-standard properties. Second, insisting insulation upgrades be made at or around the point of transaction would, unsurprisingly, be a more effective policy approach for private rented stock than for owner occupied homes. Just one-in-eight (16 per cent) private rented properties in England with an EPC rating of D or below have not changed hands in the past decade, compared to two-thirds (67 per cent) of low-efficiency properties in the owner-occupied sector. As such, targeting the point of sale or lease is only likely to deliver significant progress for rented properties – owner-occupied homes will need additional (more radical) measures that target the stock of un-transacted homes.³⁸

³⁸ The Government has pledged to prohibit the letting of homes that fall below EPC C standard from 2025, and ensure that all privately rented homes attain this standard by 2028. See: UK Government, [Improving the Energy Performance of Privately Rented Homes in England and Wales](#), September 2020. In this, they face considerable resistance: 46 per cent of landlords who currently let out inefficient homes saying new regulations would force them out of the game. See: National Residential Landlords Association, [Energy efficient landlords: investment without reward](#), April 2021. It is also worth noting that unlike in countries such as France, we do not currently have minimum efficiency standards for short-term lets. See: Politico, [France wants to ban poorly insulated rentals from Airbnb](#), October 2022.

FIGURE 12: Efficient homes transact more often than inefficient ones, and private rented stock much more frequently than owner occupied

Length of residence in residential properties, by EPC rating and tenure: England, 2019-20



SOURCE: Analysis of DLUHC, English Housing Survey.

Assuming that the low transaction rates of low EPC-rated, owner-occupied homes are also seen in those with badly insulated walls, we would expect only a third of these problem properties to change hands – and therefore be mandated to be upgraded – inside a decade. This would leave two thirds, or more than 5 million homes, still with poorly insulated walls into the 2030s. Another point in owner-occupiers’ property lifetime that could be regulated is when major works are carried out. As it stands, homes that are renovated do not have minimum energy requirements. Correcting this oversight (ideally to include targets additional to energy efficiency, such as those on solar panels, electric car charging, and heat sources) would help target owner-occupied homes, although with around 200,000 householder development planning applications submitted per year in England, this is unlikely to make significant headway into the stock of poorly-insulated owner-occupied homes that do not transact.³⁹

Many households will need financial support to upgrade their home, at considerable cost to the state

Another way Government will need to soften the blow to households being required to insulate one’s home(s) by a certain point in time is for the state to provide financial assistance to cover the considerable costs. But given over 9 million homes in England alone have poor or very poor walls, and 7.9 million of these are unlikely to reach an EPC C rating without wall upgrades, the costs to the state of supporting all households

³⁹ Source: Analysis of DLUHC, [Planning applications in England: January to March 2022, June 2022](#).

would be clearly prohibitive (up to a staggering £60 billion).⁴⁰ Moreover, homeowners are a relatively affluent class: they have higher-than-average incomes, hold more savings compared to those living in other tenures, and simply by virtue of owning property they have an asset that could at least in theory be borrowed against.⁴¹ But there inevitably will be some who will struggle with the upfront costs of insulating their home because of limited means (their savings are too small, for example, or their ability to borrow is constrained by low equity in their homes or an insufficient income to service an additional mortgage), because the work required to upgrade their property is complex, or both.⁴²

So, when should the state step in to help? The Government, to its credit, appears to be thinking seriously about this issue and taking a twin-track approach. First, it has made clear that support will be available for households in receipt of means-tested benefits.⁴³ But as the left-hand panel of Figure 13 shows, this would overlook an estimated four-in-ten of households in the poorest income quintile who do not receive means-tested benefits (in part due to incomplete take-up): equivalent to 2.3 million families. Second, a recently announced consultation suggests the Government is minded also to offer support to households in homes with Council Tax bands A to D, using this as a proxy for household wealth.⁴⁴ But this approach suffers from the opposite problem to benefit passporting in being too encompassing: six-in-ten (59 per cent) of households in the richest income quintile live in homes in council tax bands A to D for example (right-hand panel of Figure 13), leading to significant deadweight for any scheme allocated on this basis.

⁴⁰ Source: Analysis of DLUHC, EPC Register, and based on an average per-property cost of £8,000.

⁴¹ Average equivalised after housing costs incomes for property owners range from £37,900 to £39,000 for those who own properties outright and with a mortgage, respectively, compared with £18,500 for renters. Savings of property owners are also higher, averaging £36,000 for outright owners and £13,250 for mortgagors, compared with just £4,500 for renters. Source: Analysis of ONS, Wealth and Assets Survey.

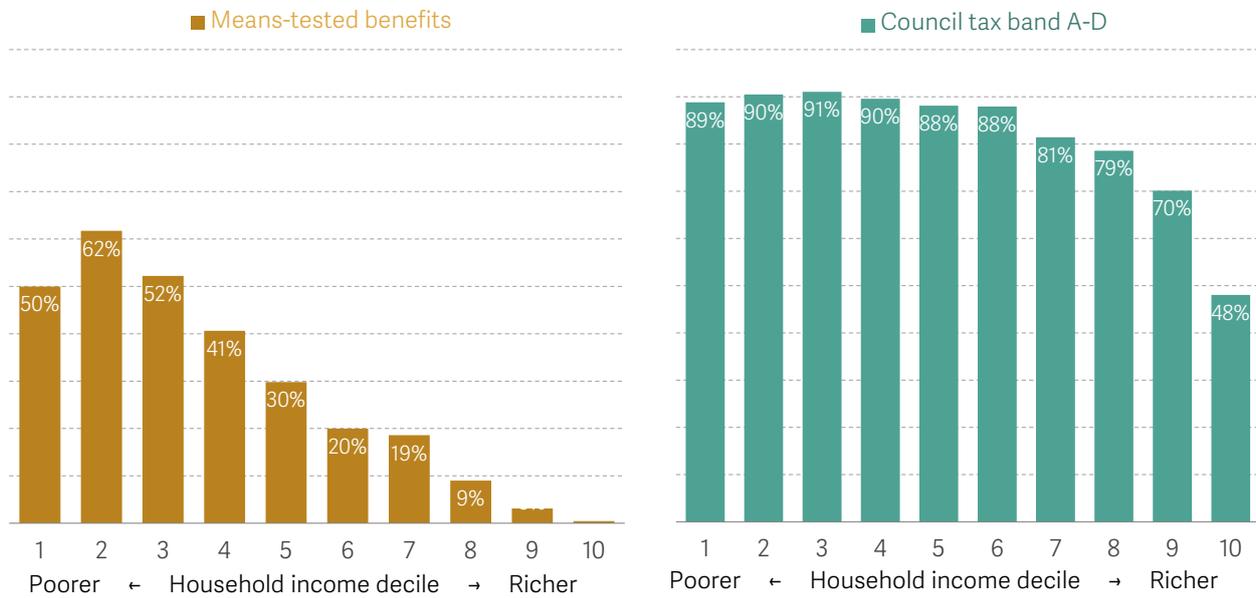
⁴² A recent ONS survey found that households are taking widespread action to improve the energy efficiency of their homes in response to the ongoing energy crisis, although those in wealthier areas are responding the most. 35 per cent of households in the least deprived areas have reported that cost of living pressures has led them to make energy efficiency improvements to their home, compared with 24 per cent of those in the most deprived areas. For more, see: ONS, [Public opinion and social trends, Great Britain: 8 to 20 November 2022](#).

⁴³ Department for Business, Energy & Industrial Strategy, [Energy Company Obligation, ECO4: 2022-2026 Government Response](#), April 2022.

⁴⁴ Department for Business, Energy & Industrial Strategy, [Energy Company Obligation ECO+ 2023-26](#), November 2022.

FIGURE 13: Passporting support by means-tested benefits misses too many poorer households, but using council tax bands includes too many richer ones

Proportion of households in receipt of means-tested benefit (UK, 2023-24, left-hand panel) and resident in homes with a Council Tax band of A-D (England, 2018-20, right-hand panel), by equivalised after housing costs income decile.



NOTES: Households included where at least one person is in receipt of: Universal Credit or legacy equivalent (but not Housing Benefit only), or Pension Credit.

SOURCE: Analysis of IPPR Tax Benefit Model; DWP, Households Below Average Income.

Designing a means test that does not exclude low-income households, but does not include too many wealthy households, is clearly a tricky task. But there is a workable model that does just this: the (newly reformed) social care financial assessment. From October 2025, those with eligible assets over £100,000 will be required to self-fund their social care costs in the UK, up to a lifetime cap of £86,000.⁴⁵ Those with assets below this upper bound will be means-tested on their income to determine the share of their social care costs that will be borne privately or by the state. (These individuals are assumed to have a ‘tariff income’ of £1 per week for every £250 of assets they hold over £20,000).⁴⁶ Although not a perfect analogy (the costs of social care are ongoing, for example, while insulating one’s home is one-off and upfront), this shows it is possible to design a means-test that takes both income and assets into account, and protects particularly unlucky households from runaway costs.

Applying a social care type-model to home efficiency points to richer households self-funding all of their insulation costs and poorer households having their home upgrades

⁴⁵ In the 2022 Autumn Statement the Chancellor announced that the cap, previously due to start in October 2023, would be delayed by two years. The main home is classed as an eligible asset in a very limited range of circumstances for social care purposes, largely when the care receiver is entering a residential home and there is no close relative (e.g. a partner or dependent child) still resident in the main home.

⁴⁶ For more details on funding for social care, see: Department of Health and Social Care, [Paying for your care](#).

fully funded by the state. Those in the middle could either be offered support on a sliding scale, covering nearly all of the costs for those who just miss out on grants but providing only a very small subsidy for those on the cusp of the upper bound, or for administrative ease, a flat proportion of the costs incurred (say, 50 per cent). We can also borrow the notion of a cost ceiling from the social care model, thereby protecting those who have the misfortune to live in harder to treat homes from potentially very high costs – a much fairer (and climate friendly) solution than exempting these properties from upgrades entirely. For the asset rich but cash poor, this will likely mean drawing down some of their existing property equity, an issue we discuss further in Box 1.

BOX 1: The 'green mortgage' industry must mature if homeowners are to draw down on assets to pay for insulation

Being landed with a bill in the thousands of pounds will see millions of homeowners look to the value of their assets (with the highest value component typically the family home) as well as income when looking to raise the capital. This is not an uncommon practice: extensions, new bathrooms, kitchens and other large home purchases are commonly paid for through additional borrowing, and a fair means test (such as that proposed above) should be wise to this store of wealth.

The UK has a growing green mortgage market. Green lending is marginally cheaper than traditional borrowing – typically by around 0.5 percentage points at the time of writing – and fits into two categories: for homebuyers looking to purchase an already energy efficient property; and for those looking to access capital in their home to fund

improvements. On top of this, some lenders are also rewarding existing mortgagors with grants specifically for green improvements: for example, Barclays recently launched a trial product to fund upgrades up to the tune of £2,000.⁴⁷ However, of the 52 green lending products currently on the market, just 19 are targeted at additional lending for properties not at the point of transaction.⁴⁸

There are, however, tentative signs of this demand growing, with four-in-five mortgage advisors reporting a significant increase in the number of enquiries for green mortgages during the last three months of 2021.⁴⁹ But as with traditional mortgages, availability will differ across society, with those on lower incomes and with less equity in their homes (and therefore looking for higher loan-to-value products) facing lower choice, higher rates, or both. For

⁴⁷ Barclays Bank, November 2022.

⁴⁸ Green Finance Institute, accessed November 2022.

⁴⁹ UK Finance, *Green Finance and Climate Risk: A guide for the mortgage market*, April 2022.

example, a household with 50 per cent equity in their home is currently able to borrow at an interest rate 1 percentage point lower than one who owns just ten per cent of their property.⁵⁰

Equity among UK homeowners is not evenly distributed. Unsurprisingly, younger homeowners own less of their homes, with the median share of equity for 25 to 34-year old homeowners just 30 per cent, while the median pension age household owns all of their home. Generally speaking, regardless of equity, younger age groups are at a significant financial disadvantage when it comes to taking out loans. On average, they are more likely to have higher debt and lower levels of savings than older people – in 2018-20, over 66 per cent of younger people (aged 20-29) had

savings of less than one month's income, compared to 20 per cent for older people (aged 65-74).⁵¹

Beyond age, research has shown that non-white households, especially on lower incomes, struggle to access the same number of mortgage products compared to white households.⁵²

This is borne out in property wealth across ethnicities, with the median Bangladeshi family having £26,000 in net property wealth (equity), 78 per cent lower than the median White British household of £115,000 in equity.⁵³ On top of lower assets, nearly 50 per cent of those within the Black African, Bangladeshi, and Black Caribbean communities will, on average, have less than £1,000 in savings to lean on as well.⁵⁴

The social care model shows how policy makers could balance affordability and fairness when it comes to funding home insulation

Figure 14 shows one way in which a social care-type model could be calibrated when it comes to helping households install home insulation. Setting an upper bound of assets (including both property wealth and savings in this case) of £250,000 would see just over a half (52 per cent) of owner occupiers having to insulate their homes at private cost. At the other end of the scale, one-in-ten (10 per cent) of owner occupier households with assets of less than £100,000 and incomes below £30,000 would be fully supported by the state. Analysis suggests this approach would be relatively equitable in other ways too: for example, from a generational point of view, more than half (57 per cent) of homeowners receiving full support would be under the age of 45. And when we look at how this would

⁵⁰ Based on lending figures from [Barclays Bank](#) as of November 2022.

⁵¹ M Broome et al., [An intergenerational audit for the UK: 2022](#), Resolution Foundation, November 2022.

⁵² Y Solomon, [Ethnic minorities' access to mortgages in the UK: The undesirable impact of the Great Financial Crisis](#), March 2022.

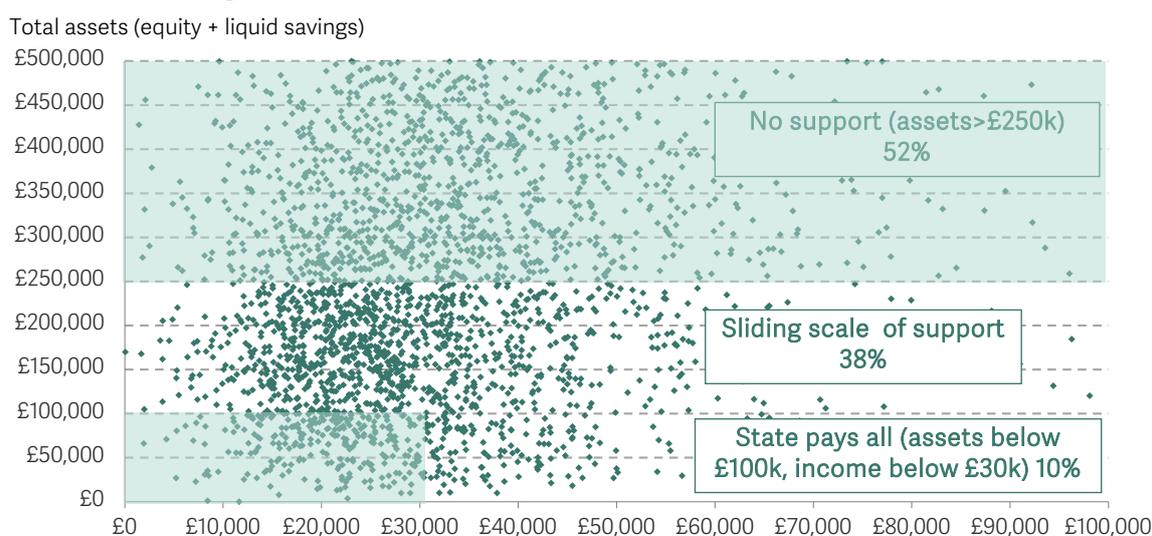
⁵³ ONS, [Household wealth by ethnicity, Great Britain: April 2016 to March 2018](#), November 2020.

⁵⁴ G Bangham, [A gap that won't close: The distribution of wealth between ethnic groups in Great Britain](#), Resolution Foundation, December 2020.

play out regionally, we find with just one-in-fourteen (7 per cent) living in London or the South East would be fully funded by the state if the model used the cut-off points above.⁵⁵

FIGURE 14: A model that means tests on assets and income could be calibrated to share costs equitably between households and the state

Value of assets (home equity and liquid savings), and equivalised income after housing costs for owner occupied households, and indicative levels at which Government support for insulation costs would be made available through a model based on social care, 2018-20: England



NOTES: Figure shows all English households, rather than only those who live in an EPC D-G rated property, which cannot be separated out due to data issues. Liquid savings defined as current accounts in credit, value of savings account, value of ISAs and value of national savings products. Households with total assets of more than £500,000 and/or after housing costs incomes upwards of £100,000 not shown on the chart but accounted for in relative shares.

SOURCE: Analysis of ONS, Wealth and Assets Survey.

The model shown in Figure 14 would incur both public and private costs. Funding the 10 per cent of poorly insulated walls in English homes lived in by households warranting full support would cost the taxpayer in the region of £600 million per year over the next decade, while funding an average of half of the costs for each household in between the lower and upper bounds would bring an annual public price tag of £1.2 billion, combining to a state bill of £1.8 billion per year. As with the social care model, much of the costs would be pushed onto private households, who in this case would pick up 71 per cent of the total bill, at an annual cost of £4.5 billion for the next decade. This is a significant investment on the part of private households, but when the costs are associated with improving private property (especially those who can draw on property equity, as explained in Box 1), it is arguably fair to push most of the costs onto those who will benefit, on the proviso that they are not unaffordable.

⁵⁵ Source: Analysis of ONS, Wealth and Assets Survey. Increasing the salary level below which households receive full support to £40,000 would see the eligible share increase to 14 per cent; lowering it to £20,000 would cut the eligible share of households to just 4 per cent.

This leaves one final and important design question when it comes to a fair sharing of the costs and that is how should we treat properties other than the main residence, and especially homes that are then rented to others? Applying the model above, just 0.2 per cent of private landlords would qualify for full state support to help them upgrade their rented properties, compared with 87 per cent being liable for the full costs of insulating the homes they let.⁵⁶ It may also be prudent to exclude the remaining 13 per cent from public support for part of the costs, on the grounds that it is fairer to apportion scarce public resources to those more likely to struggle to raise capital.⁵⁷ Moreover, given that properties rated A to C on the EPC scale typically command a rental premium of around 5 per cent on their D-rated counterparts, landlords can over time recoup their outlay.⁵⁸ When they come to sell, they will also be able to cash in on similar premiums observed in sale prices for more efficient properties.⁵⁹

We have the workforce to insulate the country's homes, although there are geographic gaps

Finally, if property owners are to be mandated to carry out works on their houses, it is essential that there is a labour force of sufficient scale, in the right locations, and with the right skills to avoid hold-ups, especially if penalties are applied if works are not completed by a certain date. Insulation schemes in the past have been blighted by poor standards, with numerous reports of substandard cavity wall insulations carried out under the Green Deal for example,⁶⁰ and a lack of accredited tradespeople identified as a key reason the 2021 Green Homes Grant failed.⁶¹ Moreover, when members of the public were asked what holds them back from insulating their homes, they stressed that there are not enough installers to meet current demand, and that finding someone to carry out works to a high standard was a worry.

⁵⁶ Compared with the population as a whole, private landlords are a very wealthy subset: half have more than half a million pounds of equity in the properties that they own, and one-fifth have more than £1 million. Source: Analysis of ONS, Wealth and Assets Survey.

⁵⁷ Private landlords have previously been able to apply for state support to insulate their properties, through Government mechanisms such as the Green Deal, Green Homes Grant and Energy Company Obligation.

⁵⁸ For more, see: F Fuerst & H Adan, [Do House Prices and Rents in the Private Rented Sector Reflect Energy Efficiency Levels?](#), University of Cambridge, September 2017.

⁵⁹ For more, including on the Government's expectation that improving energy efficiency of a property would see its value increase by around 5 per cent, see: Department for Business, Energy & Industrial Strategy, [Support for new affordable green finance products to drive up energy efficiency](#), October 2022; Department for Energy & Climate Change, [Energy saving measures boost house prices](#), June 2013, and [Nationwide House Price Index 2021](#).

⁶⁰ For a discussion, see: S Hinson & L Conway, [Q&A: Cavity Wall Insulation](#), House of Commons Library, Briefing Paper Number 8471, January 2019.

⁶¹ See: [Green Homes Grant Voucher Scheme](#), House of Commons Committee of Public Accounts, November 2021.

“Tradesmen. Trusting the tradesmen. That’s a big thing for me. If you’re going to outlay that money, you want to know that it’s not going to be shoddy.”

“I’m thinking, is this a government scheme, or is this cowboys coming to my house, offering cash only, mate. And some of them, I heard, were putting down just one roll [of insulation] and claiming the money from government.... It’s just so risky.”⁶²,

Successive Governments have reportedly reined in on efficiency ambitions on account of a limited workforce: even today, the £6 billion of new support announced in the 2022 Autumn Statement is being delayed until 2025, which should give the labour force more time to gear up.⁶³ But it is important to be clear about exactly what supply shortages exist. The work required to insulate millions of homes will draw on all aspects of the construction sector – from plasterers, architects, roofers and scaffolders, to supervisors, auditors and planners. As such, it has been estimated that retrofitting the country’s homes will require recruiting and training an additional 100,000 people in Trustmark retrofit roles and the general construction sector by 2028.⁶⁴ But as Figure 15 shows, the total construction sector workforce currently stands at around 1.75 million, and has remained fairly constant over the past two decades, including up to and around the 2012 insulation peak (since then, the average annual growth rate has been virtually zero). Moreover, construction is one of the sectors that has seen the number of EU employees hold up relatively well despite Covid-19 and the UK’s exit from the EU, and strong increases in the number of non-EU employees.⁶⁵ On first sight, then, an additional 100,000 workers in six years should not be a major problem, especially when intra-sector reskilling and retraining is considered.⁶⁶

⁶² Lancaster University & the Climate Change Committee, [Addressing emissions from owner-occupied homes: Findings of a citizens’ panel on home energy decarbonisation](#), September 2022.

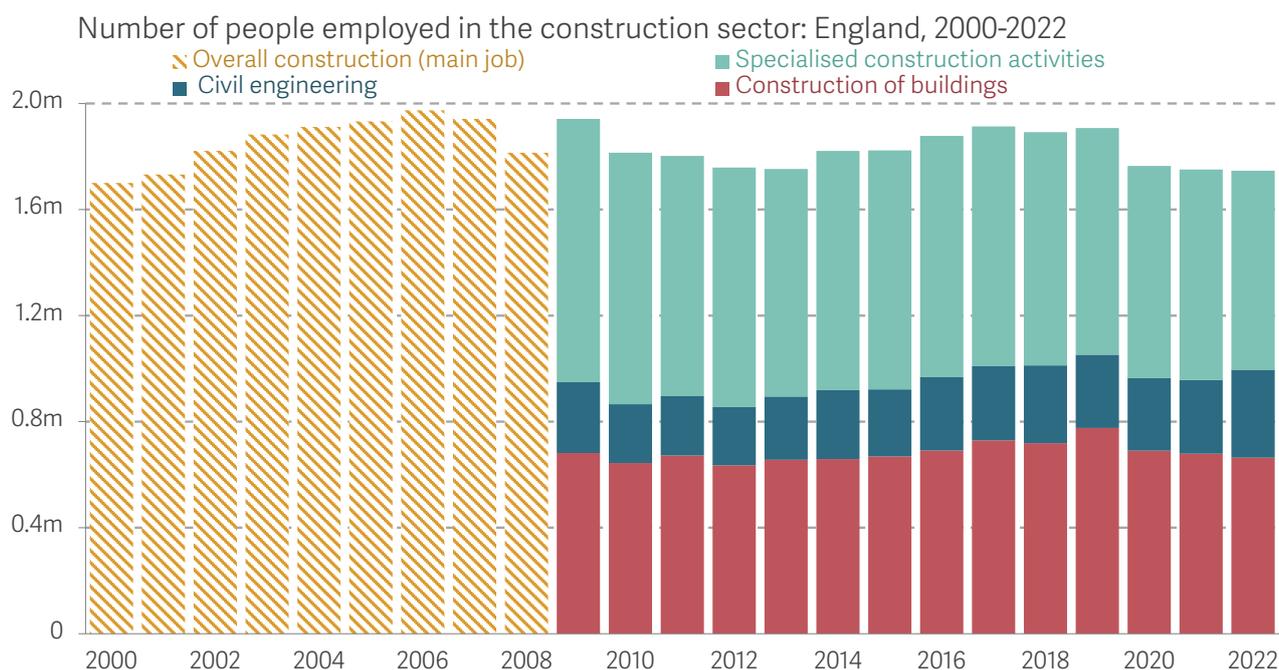
⁶³ For example, CITB estimates that improving the fabric energy efficiency of every building in the country requires training 12,000 workers each year between now and 2025. See: Department for Business, Energy & Industrial Strategy, [Training for thousands to take advantage of green job opportunities](#), December 2022.

⁶⁴ See: CITB, [Building Skills for Net Zero](#), March 2021.

⁶⁵ But as a recent report from the Migration Observatory shows some industries such as construction rely less heavily on workers who have arrived recently implies that the impact of Brexit on those industries may simply take longer to emerge, as more years of low EU migration deplete or at least slow the growth in the EU workforce. This helps explain why the share of construction workers who are non-UK born has remained fairly constant since the UK left the single market in early 2020 (around 14 per cent, analysis of the Labour Force Survey). See: M Sumption et al., [How is the End of Free Movement Affecting the Low-wage Labour Force in the UK?](#) The Migration Observatory, August 2022.

⁶⁶ Previous Economy 2030 analysis of green which has shown the shift to net zero will likely result in a reskilling of the existing pool of workers rather than a boom in new jobs. See: M Broome et al., [Net zero jobs: The impact of the transition to net zero on the UK labour market](#), Resolution Foundation, June 2022.

FIGURE 15: The number of total construction sector jobs has held up well over time



SOURCE: Analysis of ONS, Labour Force Survey.

We can also estimate the additional demand that insulating Britain will put on the construction sector. If we assume that the 7.9 million homes that need wall renovations in order to reach an EPC C grade are all improved over the next decade, we estimate that this would lead to a less than 2 per cent increase in annual working hours of the construction sector, or a lower than 3 per cent increase in total sector revenue.⁶⁷ This increase in working hours of the construction sector is equivalent to the pre-2008 average annual growth rate. In other words, when it comes to the workforce, the scale of change needed to end the UK's record of having the least efficient in homes Europe is far from insurmountable.

That said, a promising high level and national picture is one thing, but it is no use to a household in Southampton if all these workers are north of the M4 corridor. So, are there potential geographic bottlenecks? Construction jobs are fairly evenly distributed at a regional level: the construction sector as a share of the workforce varies from 5.5 per cent in London to 7.9 per cent in East England.⁶⁸ But at a more localised level we do observe some worrying differences: for example, there are four travel to work areas (Burnley, Scarborough, Greenock and Barrow-in-Furness) in which construction

⁶⁷ We use the Labour Force Survey to estimate the total hours worked in the construction in 2022, and Blue Book data on sectoral turnover, and then industry estimates of the costs and time taken to install internal solid wall insulation, scaled up by the number of homes over which works are needed.

⁶⁸ This gap of 2.4 percentage points is smaller than the one that exists between the regions with the highest (Yorkshire & the Humber, 18.3 per cent) and lowest (London, 13.9 per cent) share of the workforce employed in hospitality (4.4 percentage points). Source: Analysis of ONS, Annual Population Survey.

represents between 2 and 3 per cent of overall employment, less than half of the 6.4 per cent national average.

We need more workers with specialist skills to insulate our older housing stock

A potentially much larger challenge is whether the general construction workforce has the specialist skills required to retrofit the country's stock of older homes. Older and harder to treat homes are considered 'traditional', meaning that they have solid rather than modern cavity walls. Industry evidence shows that training and expertise in the skills required to maintain and improve solid walls is severely lacking across the construction sector, with a lack of policy certainty that companies need before investing in new training and workers an often-cited cause.⁶⁹ In fact, more than one-fifth of insulation industry professionals highlighted the expertise needed to insulate solid walls (either internally or externally) as the two key skills currently missing from the sector – exactly that we need most today.⁷⁰

And there is another critical role that needs to be embedded more in the wider construction supply chain: retrofit co-ordinators and assessors, with both the Green Jobs Taskforce and the CCC identifying these as essential roles that must grow in numbers.⁷¹ These more desk-based jobs are vital to ensure homes are upgraded properly and consistently, and for accessing government funded schemes. They also require a skillset that takes time to accrue: for example, learning how to project manage and work with homeowners from start to finish when it comes to planning, organising and managing the project, as well as ensuring quality standards are adhered to.

Figure 16 shows the scale of the challenge here, plotting the number of TrustMark-registered (Government-endorsed quality standard for home improvements) retrofit companies against the number of homes with very poor walls in Travel to Work Areas (TTWA). Nationwide, there are approximately two thousand firms providing this service currently, clearly an inadequate number. However, there are promising signs that this industry is following demand given the clear positive relationship we see in the chart.⁷²

⁶⁹ CITB, *Building Skills for Net Zero: Industry insights and analysis*, March 2021.

⁷⁰ Based on conversations with numerous industry actors and data provided to Resolution Foundation by The Installation Assurance Authority.

⁷¹ Climate Change Committee, *2022 Progress Report to Parliament: The CCC's annual assessment of UK progress in reducing emissions*, June 2022.

⁷² Numbers of employees in retrofit roles are not publicly available, but the Climate Change Committee figures suggest that there are currently around 6,700 people employed as TrustMark retrofit coordinators or other specialism, see: Climate Change Committee, *2022 Progress Report to Parliament: The CCC's annual assessment of UK progress in reducing emissions*, June 2022.

FIGURE 16: There is a relationship between the supply of retrofit businesses and where very poorly insulated walls will most need upgrading

Number of very poorly insulated walls and number of TrustMark-registered retrofit companies, by Travel to Work Area (local authority in London): England, 2022



NOTES: Retrofitters are defined as those businesses on the TrustMark register that contain either of the phrases “retrofit coordinator” or “retrofit assessor”. London travel to work area is broken down into local authorities. Not all travel to work areas have TrustMark data.

SOURCE: Analysis of TrustMark register.

There are good signs that the Government is prioritising the skills development of both general and desk-based skills shortages in its recently announced funding, but more could be done.⁷³ To prevent local bottlenecks, especially when households risk penalties for not having carried out upgrades, the Government should further build out its series of ‘accelerator zones’ that deliver additional workforce training and support. These areas will require targeted skills and education initiatives, which should be led and implemented by a combination of councils and Further Education (FE) providers, who will naturally have a greater understanding of local levels of supply and demand than national Government. This model need not reinvent the wheel and could build on the local skills trailblazers that bring together employers, colleges and independent training providers to identify and resolve skill gaps.⁷⁴ In a similar vein, local mayors are already committing resources to increase green skills within their regions.⁷⁵ There are, however, a few practical steps that could spur things along.

⁷³ Department for Business, Energy & Industrial Strategy, [Press release: Training for thousands to take advantage of green job opportunities](#), December 2022.

⁷⁴ Department for Education, [Local skills improvement plan trailblazers and strategic development fund pilots](#), Updated April 2022.

⁷⁵ West Yorkshire Combined Authority, [Mayor of West Yorkshire announces Green Jobs Taskforce to make region a leader in green skills](#), August 2021.

First and foremost, local authorities should utilise the specific local intelligence on where the local need for home energy improvements is most acute – this should not be onerous as data is publicly available.⁷⁶ Second, boards for the purpose of training the wider construction sector to work in home insulation should be set up. Of course, this would build on work done by the Construction Industry Training Board (CITB) at a national level and could even sit under the umbrellas of local skills improvement plans and skills advisory panels.⁷⁷ There are already examples of industry bodies taking the initiative and convening retrofit roadshows and exhibitions of key skills (and shortages) within the sector.⁷⁸ But a wider effort is required from councils, local businesses and FE to identify what locally is required. Third, any skills and education provision would want to avoid pigeon-holing people, which means mainstreaming home insulation techniques as part of regular training and apprenticeships.⁷⁹

Overall, then, our take is that the workforce broadly exists to undertake the work required to insulate homes, but within it there are key skills gaps that need to be filled. These are best dealt with locally, where knowledge of the scale of mismatch between supply and demand is clearest, but will require funding and support from local government, as well as long term certainty that the regulations proposed in this note would bring to the insulation industry. By pushing the supply chain to develop faster we can mitigate the risk of repeating the recent past where unsatisfactory progress on insulating homes has been blamed on an inadequate workforce.

Conclusion

Although the ongoing energy crisis has pushed the need to insulate the nation's homes up the policy agenda, delivering at the scale and pace we need to decarbonise our economy is a far from simple task. High upfront costs and the significant disruption involved in insulating one's home are both major barriers to progress, as are UK-specific features such as our relatively old housing stock and high levels of individual ownership. This note sets out a way to solve the hardest parts of the insulation challenge – upgrading the millions of poorly insulated walls that must be tackled if all homes are to reach EPC C by 2035.

⁷⁶ There are promising signs that local authorities (convened by the Local Government Association) are already sharing skills and insights on home retrofitters. For example, Essex County Council received funding from the Community Renewal Fund alongside the Retrofit Academy to kickstart the retrofit sector in Harlow and Tendring, sharing progress and workplans with the LGA. See: [Building Housing Retrofit Skills webinar](#), LGA, July 2022.

⁷⁷ Department for Education, [Skills Advisory Panels](#), Published November 2020.

⁷⁸ The Insulation Assurance Authority, presentation at BACH conference, November 2022.

⁷⁹ This would build a set of skills that would help with long-term career prospects (i.e. once the insulation installations are complete). As set out by the Retrofit Academy (a not-for-profit who develop and train retrofitters): “the gateway for many into the retrofit workforce is via more general construction entry points; in other words, we need to consider the route to a retrofit career at the earliest stages, when people are learning core, highly transferable construction skills”. See: Retrofit Academy, [Retrofit Careers Pathways: Report for Consultation](#), September 2022.

As such, we conclude the Government must start getting tough. Regulating private property will be unpopular, but the evidence is that only this policy approach will deliver progress at a scale commensurate with the challenge at hand. But there are ways to soften the blow. First, requiring insulation is undertaken at the point of transaction when homeowners' tolerance for disruption is higher, and access to funds is better, is one tack we suggest. Second, we propose a model of public funding that takes both assets and incomes into account to share the considerable costs of upgrading one's home between the state and private households as fairly as possible. Third, if homeowners are to be mandated to make changes to their properties, it is essential that there is a sufficient workforce to avoid hold-ups. The UK has a sizeable construction sector, but there are crucial skills gaps which must be overcome through local level accelerator schemes.

The key task for economic policy makers in the 2030s is to deliver sustainable growth and reduce inequality. Insulating the UK's old and inefficient homes may be a monumental challenge, but the climate emergency and the energy crisis make it one that policy makers can no longer evade. The approach we recommend in this note is radical, but it is commensurate with the scale and urgency of the problem. And we should not forget the benefits that an efficient housing stock would bring: lower bills, a smaller carbon footprint, reduced fuel imports and warmer homes are the prize.

THE ECONOMY 2030 INQUIRY

SHAPING A DECADE OF CHANGE

The UK is on the brink of a decade of huge economic change – from the Covid-19 recovery, to exiting the EU and transitioning towards a Net Zero future. The Economy 2030 Inquiry will examine this decisive decade for Britain, and set out a plan for how we can successfully navigate it.

The Inquiry is a collaboration between the Resolution Foundation and the Centre for Economic Performance at the London School of Economics. It is funded by the Nuffield Foundation.

For more information on The Economy 2030 Inquiry, visit
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