NEW ECONOMICS FOUNDATION

An emergency insulation plan to cut bills this winter

Policy briefing | Christian Jaccarini, Paulo Yunda and Chaitanya Kumar | October 2022

1. Executive summary

The global energy crisis has had a profound impact on many major economies, particularly so in Europe, forcing a scramble to diversify our energy supply[1] and end our dependence on Russian gas. The result has been an unprecedented rise in energy prices that has caused inflation spikes across the European Union (EU) and beyond. Nations have announced fiscal support packages ranging from 2-7% of GDP[2] to shield consumers and businesses from high energy bills, with the UK spending the largest proportion. But severing ties with Russia is not just costing governments – it is costing the earth. The global use of coal, one of the dirtiest fossil fuels, has been on the rise this year,[3] with more coal plants in Europe coming back online. The UK is also turning to unconventional forms of energy like fracking[4] while doubling down on what little is left of North Sea gas.

But a critical piece of the puzzle that isn't being considered enough in the UK: the need for energy demand reduction and energy efficiency. The European Commission has urged all EU governments to cut peak electricity demand by 5%, overall demand for electricity by 10% and gas demand by 15%, by March 2023. To put it in perspective, that would mean removing the equivalent of the entire annual electricity consumption of Spain[5] in six months.

The UK however has no such targets, instead announcing a freeze on unit prices of energy amounting to a price cap of £2,500 for the next six months for a typical household. Estimated to cost £35.5bn over six months, this energy price guarantee is poorly targeted and reduces the

1 Lau, M., Ricks, W., Patankar, N. and Jenkins, J.D. 2022. Europe's way out: Tools to rapidly eliminate imports of Russian natural gas. https://ec.europa.eu/commission/presscorner/detail/en/IP_22_1511

2 Europe's energy plan: is it enough to get through winter. Financial Times. 2022. https://www.ft.com/content/d40c434a-01db-48a2-a535-3dd502354736

3 Power Transition Trends 2022: Coal power spikes, but progress on renewables brings hope. BloombergNEF. 2022. https://assets.bbhub.io/professional/sites/24/BNEF-Power-Transition-Trends-2022_FINAL.pdf

4 Fracking: I'd allow drilling in my back garden, says Jacob Rees-Mogg. BBC News. 2022. https://www.bbc.co.uk/news/uk-politics-63121832

5 Electricity production consumption and market overview. Eurostat. 2022. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Electricity_production,_consumption_and_market_overview

incentive for high energy-consuming households to curtail their energy demand. The New Economics Foundation's (NEF) proposal for a new system of free basic energy[6] could both lower costs to households while increasing the incentive to reduce energy demand. It would do this by ensuring that while average bills were lower than under the Ofgem price cap system, the marginal price for additional energy consumption is higher.

Had the government taken energy efficiency seriously, and upgraded our housing stock, the government would have needed to spend less to maintain the energy price cap. To forecast the huge savings potential, we modelled the savings implied if all housing stock in England and Wales had been upgraded to a decent energy efficiency standard (Energy Performance Certificate C or higher) by this October. The government has already set this as a target for all fuel-poor households by 2030 and for the entire housing stock by 2035. If insulation rates had kept pace at their peak in 2012,[7] this target would have largely been met by now.

The analysis shows that had all homes been upgraded to EPC C, government spending would have been £3.5bn lower over the six months of the frozen price cap alone (based on the current forecast for energy prices), reducing the cost of the scheme for England and Wales by 10%. Alongside this, households would also make considerable bill savings. By moving all homes to EPC band C, households in England and Wales could cumulatively be saving £7.1bn over the next year, an average of £530 per upgraded household.

So the total saving would be £10.6bn in the first year alone. The misdirection of this government's intervention is particularly evident when you consider that the government itself estimates that the UK wide cost of upgrading all homes to Energy Performance Certificate (EPC) C could be as little as £35bn[8] – which means almost a third of the cost could have been recouped in a single year alone.

The benefits would also include reduced greenhouse gas emissions, which we estimate would fall by 9,200 kt CO2e per year – equivalent to the annual carbon footprint of Leeds, Bradford, and Bristol combined.[9] It would also make the UK less dependent on gas imports, reducing England and Wales' demand for gas by 41,200 GWh, 7% of the total gas imported[10] into the UK

6 Warm homes, cool planet. New Economics Foundation. 2022. https://neweconomics.org/2022/09/warm-homes-cool-planet

7 Analysis: Cutting the 'green crap' has added £2.5bn to UK energy bills. Carbon Brief. 2022. https://www.carbonbrief.org/analysis-cutting-the-green-crap-has-added-2-5bn-to-uk-energy-bills/

8 Government response to BEIS Select Committee's recommendations. BEIS Select Committee. 2019. https://publications.parliament.uk/pa/cm201919/cmselect/cmbeis/124/12403.htm

9 Net zero what is the carbon footprint of my city. Centre for Cities. 2022. https://www.centreforcities.org/data/net-zero-what-is-the-carbon-footprint-of-my-city/

10 Energy Trends: UK gas. GOV UK. 2022. https://www.gov.uk/government/statistics/gas-section-4-energy-trends

last year. This is a greater priority than ever, with the energy regulator Ofgem warning recently that the UK could face a severe risk of gas shortages this winter.[11]

The 'mini budget' announced in September did include additional funding of £1bn over three years[12] to expand the Energy Company Obligation (ECO) scheme, which obliges suppliers to provide energy efficiency measures to certain households. The scheme remains the flagship energy efficiency policy and it is no surprise that the government has turned to it again. This additional support represents a 30% jump in the annual spending allocation for the programme and is expected to be delivered through two key mechanisms. The first is focused on narrowing the eligibility criteria of the ECO scheme to deliver fully funded low-cost efficiency measures like loft and cavity wall insulation to low-income and fuel-poor homes. The second is through grants of up to £1,500 targeting the least efficient homes in lower council tax bands.

However, considering the scale of the energy price guarantee, which simply transfers huge amounts of public money into the pockets of energy suppliers, this support of £330m for energy efficiency is a pittance and also highlights a key missed opportunity to use the crisis as a way to engage the public in a much wider energy efficiency and demand reduction programme. Crucially, the policy won't even start until April next year: the date by which the EU has a target to reduce electricity consumption on a scale equivalent to current consumption in Spain.

The government should get on with insulating homes this winter as part of an emergency insulation programme. An estimated 10m properties in some of the most fuel-poor homes have a loft and/or cavity wall that can easily be insulated affordably and quickly, cutting bills permanently for those that most need it.

2. A programme of emergency insulation

The UK is in desperate need of an emergency insulation programme, reducing the pressure on families, the treasury and the planet. Some of the early gains in energy efficiency have already been achieved, with cheap measures delivered on easy to access properties over the last decade. But we still have a long way to go. As figure 1 highlights, nearly 19m properties[13] are in need of upgrading to a decent energy efficiency standard of EPC C, with a majority of them in the owner-occupied sector. The Climate Change Committee (CCC) estimates that decarbonising this stock will require, on average, £10,000 per home[14] over the next three decades, with a

11 'Significant risk' of winter gas shortages in Great Britain, warns Ofgem. The Guardian. 2022. https://www.theguardian.com/business/2022/oct/03/significant-risk-of-winter-gas-shortage-threatens-uk-power-supply-says-ofgem

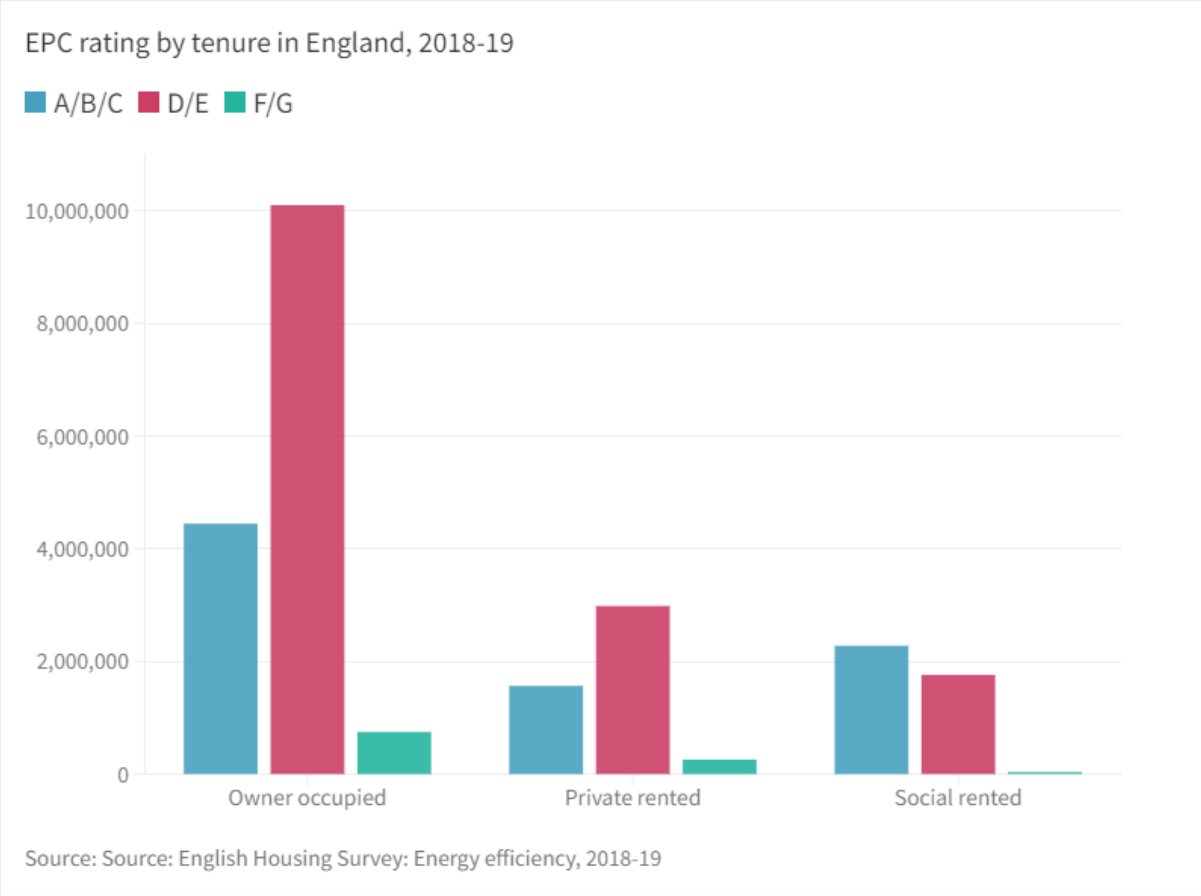
12 The Gropwth Plan 2022. HM Treasury. 2022. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1105989/CCS207_CCS0822746402-001_SECURE_HMT_Autumn_Statement_2022_BOOK_Web_Accessible.pdf

13 Achieving net zero. Parliament UK. 2021. https://publications.parliament.uk/pa/cm5801/cmselect/cmenvaud/346/34605.htm#footnote-278

14 The Six Carbon Budget – The UK's path to Net Zero. Climate Change Committee. 2020. https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf

majority of it going towards the installation of low-carbon heating technologies like heat pumps.

Figure 1:

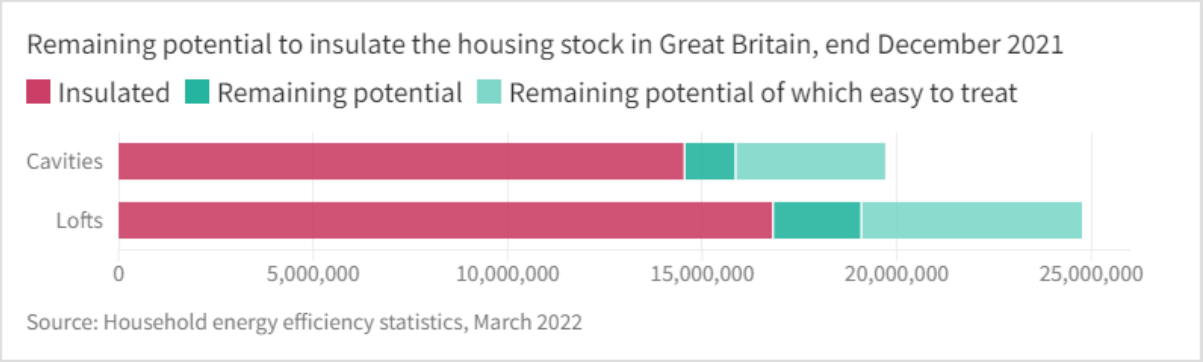


2.1 Starting with the cheapest, quickest measures

Within this inefficient housing stock, an estimated 5.2m homes in Great Britain are still without[15] cavity wall insulation and 7.9 m without loft insulation of the appropriate thickness (defined as less than 125mm thickness). Figure 2 highlights this and shows that 3.8m cavities and 5.7m lofts are 'easier to treat', as opposed to those homes that have certain physical characteristics like narrow or partially filled cavities that make them less favourable to receiving a straightforward insulation measure. Roughly 15% of homes or 4m do not have double glazing and another 8m have solid walls, which are typically harder and more expensive to insulate.

15 Household Energy Efficiency. BEIS. 2022. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1062658/HEE_Stats_Detailed_Report_Release_March_22.pdf

Figure 2:



If we are to begin a programme of insulating homes in earnest, fixing the more straightforward homes is the place to start. With energy prices so high, it makes economic and political sense to deliver rapid bill savings through those measures that can be delivered most quickly. The CCC also highlights that 63% of the inefficient housing stock may need to spend no more than £1000[16] per household on energy efficiency measures.

Table 1 lists possible measures and briefly appraises their suitability. It is arguable that further interventions on aspects such as air tightness, ventilation and moisture control, and thermal bridging are critical measures. But these measures are also comparatively expensive and householders are often deterred by the so-called 'hassle-factor'[17]. During a crisis when immediate energy savings need to be achieved, simpler measures can still cut energy bills significantly. It is worth noting however that despite the relative speed and ease with which these can be installed, there remains a risk of poor or shoddy installation that can undermine the investment and estimated savings on bills.

Based on the energy price guarantee, we estimate the typical savings, both to households and the exchequer, from installing these basic emergency insulation measures. We present this across different household types as laid out in table 2. We estimate that after an average investment of £1,158 a typical household in a semi-detached property could see their already-capped energy bills reduce by £272, in the year from October. Even if families were paying for the entirety of the investment themselves, it would pay itself back fully within just five years. Our average accounts for work already done based on the English Housing Survey (EHS).

16 The Six Carbon Budget – Buildings. Climate Change Committee. 2020. https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-Buildings.pdf

17 de Vries, G., Rietkerk, M. and Kooger, R. 2020. The hassle factor as a psychological barrier to a green home. Journal of Consumer Policy, 43 (2), pp.345-352.

Table 1: A list of emergency insulation measures and their suitability

Emergency insulation measure	Cost per property (depending on type)	Suitability and benefits
Loft insulation	£372-£435 (cost would vary depending on property type and if it has already some mm of insulation)	Loft insulation leads to good annual cost savings and carbon emissions savings for all property types. The payback time of installation costs is short (approximately 1–3 years) and the work can be done in a day. Qualification requirements are also relatively minimal.
Cavity wall insulation	£395-1800	Around 35% of heat loss from uninsulated homes is through walls, so this can be an impactful measure. Installation time is short (can be done in a day) and any associated training can be undertaken within two months.
Draught proofing	£88-405	This is a cheap method, and the savings can sometimes be significant. Most draught proofing measures do not require expertise to install and most properties are expected to benefit from draught proofing, especially around windows and doors.
Thermostatic radiator valves (TRVs)	£160-200 (depending on the number of radiators)	TRVs are straightforward to install, affordable, and deliver high potential energy savings. They can be installed DIY or by a professional within a few hours.
Smart heating controls	£250	They are easy to install and the supply chain is well established. The cost and carbon-cutting potential are significant, and the measure is expected to have a short payback period.

Source: NEF analysis of Energy Savings Trust. The range of costs represents those associated with different housing types. A cavity wall insulation for a typical detached home could cost up to £1800 but as little as £395 for a flat/maisonette where applicable.

Table 2: Average investment cost and annual savings across different property types, England Oct 2022 – Sep 2023 (inclusive)

Property type	Investment cost	Annual saving	
		Households	Government
Semi-detached house	£1,158	£272	£139
End of terrace house	£953	£202	£103
Flat-maisonette	£958	£199	£102
Detached house	£1,526	£406	£207
Bungalow	£1,116	£246	£126
Mid-terrace house	£959	£216	£110

Source: NEF analysis of Energy Savings Trust data on annual bill savings. We calculate average property-type investment using data from the English Housing Survey (2019) to account for the fact that not all measures will be appropriate for each home. Investment costs and annual savings are presented as an average across the entire housing stock split by property type and therefore can be higher or lower for any given household. Cost reductions from economies of scale are not factored in and savings, in reality, have diminishing returns after installation of each measure.

2.1 Delivery mechanism

Local authorities are well placed to deliver these measures, rolling them out street by street across all neighbourhoods, ensuring any and every house that needs the measures gets them. The advantage of such an approach, as research indicates,[18] is that it potentially enhances public participation, achieves cost savings through process innovation and economies of scale, and builds trust in the improvements being made.

However, local authorities can't upgrade all the homes in their area at once and are also unlikely to have the necessary financing without significant government support. As we argued in our

18 Past, present and future: Housing policy and poor-quality homes. Centre for Ageing Better. 2021. https://ageing-better.org.uk/resources/past-present-and-future-housing-policy-and-poor-quality-homes

recent working paper[19] with Friends of the Earth, local authorities could begin with fuel-poor homes across different housing tenures to deliver these emergency measures. These are homes that local authorities would have a better sight of than the central government. The research identified over 8,900 fuel poverty hotspots[20] in the country, with data at the postcode level, where intervention is most urgently needed.

Considering that fuel poverty is an indicator of both the energy efficiency of the property and the low income of the occupants, future improvements to get these properties to at least band C or above will be essential. To do so, these urgent measures should be followed by a detailed energy audit that enables and supports the delivery of more expensive retrofit measures in the future.

2.3 Costs and savings

Estimating the costs of such a nationwide programme to install basic energy efficiency measures in all homes which need it is fraught with uncertainty as costs can vary across regions owing to a diffused supply chain. We estimate that an average household requires an investment of £1,108 to install these basic retrofit measures, accounting for the fact that not all measures will be appropriate for each home. Based on these average costs for a single property, we estimate that the total cost of such a programme of basic measures would cost £27.0bn and generate an annual saving of £9.6bn, of which £3.3bn goes to the government through savings on maintaining the energy price guarantee. This modelling assumes no economies of scale and was based on a top-down approach using averages rather than a microsimulated bottom-up approach.

However, as past experience has shown, the current state of the UK's supply chains and workforce means the industry is unlikely to cope with a large increase in demand over a very short period of time. These supply-side constraints limit the amount of public investment that the sector can absorb quickly. Because of this, we estimate that around £3.6bn, in addition to existing energy efficiency public support over the remainder of this parliament is the appropriate level of initial investment to kickstart the programme. Despite the huge political pressures the government is under – and in fact, partly because of them – there is no better time than now to deliver such an emergency programme. This winter is the time to show leadership and help families cut their energy consumption and bills, keeping homes warm and the planet cool. Crucially, it is the only permanent solution to any future energy crisis.

19 Councils and the energy crisis – a plan of action. Friends of the Earth. 2022. https://policy.friendsoftheearth.uk/download/councils-and-energy-crisis-plan-action

20 Why the energy crisis demands street by street energy saving measures. Friends of the Earth. 2022. https://policy.friendsoftheearth.uk/insight/why-energy-crisis-demands-street-street-energy-saving-measures

3. Methodology

Benefits of upgrading the housing stock to EPC C

In this note we summarise our approach to estimating the savings that would result from having upgraded the housing stock in England and Wales to EPC C by this October. We model the impacts for the four quarters from Q4 2022, to Q3 2023.

To model energy consumption, we use data on mean electricity and gas consumption (kWh) by EPC Band, from the National Energy Efficiency Database (NEED).[21] We then seasonally adjust this data for each quarter, using national statistics on energy trends.[22] We estimate the impact of upgrading homes from below EPC C to EPC C, by calculating the seasonally adjusted energy consumption differentials between band C and bands D, E, F, and G. We assume that the consumption of homes in band C is representative of the energy consumption of homes in lower bands were they to be upgraded, and recognise that this is something that could be better informed by further research.

To estimate the household-level energy cost saving to the government and households we then apply the energy price guarantee rates[23] and estimated quarterly energy prices to the consumption differentials. The energy price guarantee rates are only applied for the current six-month duration of the policy. For Q4, we take the now non-binding energy price cap[24] as the energy price. For later quarters, we estimate energy prices using futures prices for peak electricity, base electricity, and natural gas. The futures prices are as observed on Tuesday 27 September.[25]

To scale up our estimates from the household level to the national level (England and Wales) we use the English Housing Survey[26] and dwelling stock estimates for Wales.[27] We assume Wales has the same distribution of homes across EPC bands, though given the proportion below band C is higher in Wales than in England, we expect that this will mean our figures understate the aggregate savings.

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21 National Energy Efficiency Data-Framework (NEED): consumption data tables 2021. BEIS. 2021. https://www.gov.uk/government/statistics/national-energy-efficiency-data-framework-need-consumption-data-tables-2021

22 Energy Trends: UK total energy. GOV UK. 2022. https://www.gov.uk/government/statistics/total-energy-section-1-energy-trends

23 How the £2,500 Energy Price Guarantee works. Octopus energy. 2022. https://octopus.energy/blog/how-the-energy-price-guarantee-works/

24 Energy price cap explained. Ofgem. 2022. https://www.ofgem.gov.uk/information-consumers/energy-advice-households/check-if-energy-price-cap-affects-you

25 Products – Future & Options. ICE. 2022. https://www.theice.com/products/Futures-Options/Energy

26 English Housing Survey 2019. DLUHC. 2022. https://www.gov.uk/government/collections/english-housing-survey

27 Dwelling stock estimates by year and tenure. Stats Wales. 2022. https://statswales.gov.wales/Catalogue/Housing/Dwelling-Stock-Estimates/dwellingstockestimates-by-year-tenure

To translate our figures into equivalised carbon emissions we use BEIS estimated emission factors from BEIS.[28]

The costs and benefits of an emergency insulation programme

To estimate the costs and benefits of our proposed emergency insulation programme, we built on our existing research undertaken for Friends of the Earth.[29] In this we identify measures best suited to an emergency intervention, considering cost, installation speed, installation skills required, carbon-cutting potential, and short-term cost-saving potential.

To estimate costs and savings we primarily use figures from the Energy Savings Trust (EST). Some estimates are from other sources, as detailed in the appendices of our search with Friends of the Earth.[30] Many of the assumptions have been updated to account for the national scope of the above analysis and can be made available upon request. For loft and wall insulation we combine existing costs and savings data from the EST with data on current insulation levels from the English Housing Survey 2019 (EHS). The costs and savings associated with upgrading homes with different levels of existing loft insulation is modelled on two point estimates from the EST: the cost and savings for a property with no insulation that is being upgraded to 270mm, and a property with 125mm of insulation being insulated to 270mm.

When estimating savings we consider the four quarters from Q4 2022, to Q3 2023, and update energy savings trust forecasts such that they reflect the forecasted energy prices, as described above. Government savings are only relevant over the energy price guarantee's current six-month duration.

Our analysis breaks down the UK housing stock into six types: semi-detached houses, end of terrace houses, flat-maisonettes, detached houses, bungalows, and mid-terrace houses. We then scale up the household-level to England-wide estimates using England housing stock data.[31]

28 Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. BEIS. 2021. https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

29 A Council-led response to the energy affordability crisis. New Economics Foundation. 2022. https://policy.friendsoftheearth.uk/sites/default/files/documents/2022-08/Council-Led%20Retrofit%20Final.pdf

30 Ibid.

31 Ibid.

New Economics Foundation
www.neweconomics.org
info@neweconomics.org
+44 (0)20 7820 6300