



# Tackling the UK's energy efficiency problem

## *What the Truss government should learn from other countries*

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### Summary

Liz Truss, the new prime minister, has unveiled her plan to tackle spiralling energy bills. The government will freeze household energy bills at £2,500 for two years from October, and offer equivalent support to businesses for six months. This is well below the more than £3,500 bills were set to reach in October and more than £5,000 they were forecast to reach in January.

The government has so far provided no costings, but reports suggest this could cost around £150 billion and will be paid for through borrowing. The Labour Party had proposed freezing the energy price cap for six months at its current level, which could cost as much as £40bn up to April, paid for in part by a windfall tax on energy companies.

Both proposals have the benefit of matching the scale of the crisis, providing certainty and being relatively simple to understand (other options were available, but allowing widespread destitution would have been disastrous). Yet they share the downsides of being expensive, poorly targeted and undermining incentives to reduce energy use – while doing little to help tackle the crisis in the longer term.

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Forecasts suggest prices will remain very high throughout next year – and well above historic levels beyond that. The crisis therefore also requires a medium- and long-term response. Here, Truss has focused on energy supply, lifting the ban on fracking and announcing new licences for North Sea oil and gas. But these measures, as the new chancellor acknowledged as recently as February, will make no material difference to the medium-term energy costs paid by UK consumers. Boosting production will take time – fracking, in particular, will face fierce opposition and legal challenge – and, more fundamentally, it would not shift prices on international markets.

An area that could make a real difference, but was entirely absent in the prime minister's plan, would be tackling the UK's energy efficiency problem. The UK's homes and buildings are among the least efficient in Europe, which is making the crisis especially painful for households and businesses. Yet remarkably the Johnson government and now seemingly the Truss government have ignored this so far in their responses. The case for action is even stronger now that the government will be taking such large energy costs directly on to its balance sheet.

This paper outlines the problem and the options available to the new government to tackle it, drawing lessons from policies implemented across Europe. It compares these with current and past policies in England and Scotland (home energy efficiency is devolved, though the four nations face similar challenges and their responses are linked). Its key points are:

- **The UK is among the most exposed countries in Europe to surging gas prices.** Although the UK is not directly reliant on Russian gas, it is unusually heavily reliant on gas for heating and its homes and buildings are the least energy-efficient in Europe. During the current crisis UK households have seen the biggest direct cut in spending power in western Europe, according to the International Monetary Fund (IMF). A key factor in this has been other countries taking earlier and more extensive action to control prices, but poor home energy efficiency has contributed to the hit faced by UK households (including some of the most vulnerable).<sup>1</sup>
- **Energy inefficiency will remain a major vulnerability beyond the short term.** Gas prices are set to remain high throughout 2023, and be volatile beyond that, which suggests that the UK will remain vulnerable as long as it is highly dependent on gas. Improving energy efficiency could make a much bigger difference than energy supply measures in the medium term.<sup>2</sup>
- **The UK is paying the price for a decade of failure.** The UK's old housing stock meant it faced a steeper challenge than other countries, but it scaled back subsidies in the 2010s and the last two major policy interventions – the 2012 Green Deal and the 2020 Green Homes Grant – were poorly designed, failed to boost uptake, and harmed trust among consumers and installers. It also ditched plans to tighten regulations on new-build homes in 2015. Policies have also struggled to drive improvements in non-domestic buildings, which face different issues and challenges. Ministers have paid too little attention to energy efficiency, and the lack of a strong supply chain remains a key barrier, which future interventions will need to address.

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- **Success requires long-term certainty, scale and applying a range of policy levers consistently.** There is no one-size-fits-all but the most successful approaches abroad have been stable and long-term, implemented at scale, and utilised a range of policy levers in support of a clear goal – avoiding the stop-start schemes and conflicting signals that have undermined UK progress. Germany has achieved impressive results with a very long-term programme involving grants, loans and expert advice. France and Italy have accelerated retrofits with targeted grants and tax changes. Finland’s shift away from reliance on oil heating has shown how consistent tax incentives can support a clear national mission. Successful countries have effectively tightened building regulations to drive progress and, in response to the current crisis, several have taken further steps to curb demand like advising households and businesses on energy use.
  - **The UK’s current approach lacks ambition and funding – and it has ignored demand during the current crisis.** The 2021 *Heat and Buildings Strategy* fell short of emulating these successes and presenting a convincing plan for home retrofit. It contained some welcome ambition but it was too short-term and included major gaps including on owner-occupied homes. The new government should reassess it in light of the current crisis, learning from successes abroad. There is a strong case for further investment, with over £3bn promised in the 2019 Conservative manifesto yet to be spent.<sup>3</sup> Upgrades could now pay back as much as four times more quickly compared to last year, given the level of gas prices.<sup>4</sup> Analysis has suggested a major programme to reduce energy use, including by boosting insulation, could reduce aggregate household energy costs by £27bn as early as 2023.<sup>5</sup> The new government should also make use of other levers available to it to reduce energy waste immediately. At a minimum, it should roll out a mass campaign on changing boiler flow temperatures – a simple and cost-free step that can reduce gas use by as much as 10%, but which ministers have so far proved unwilling to publicly support, apparently for fear of appearing nannyng.<sup>6</sup>

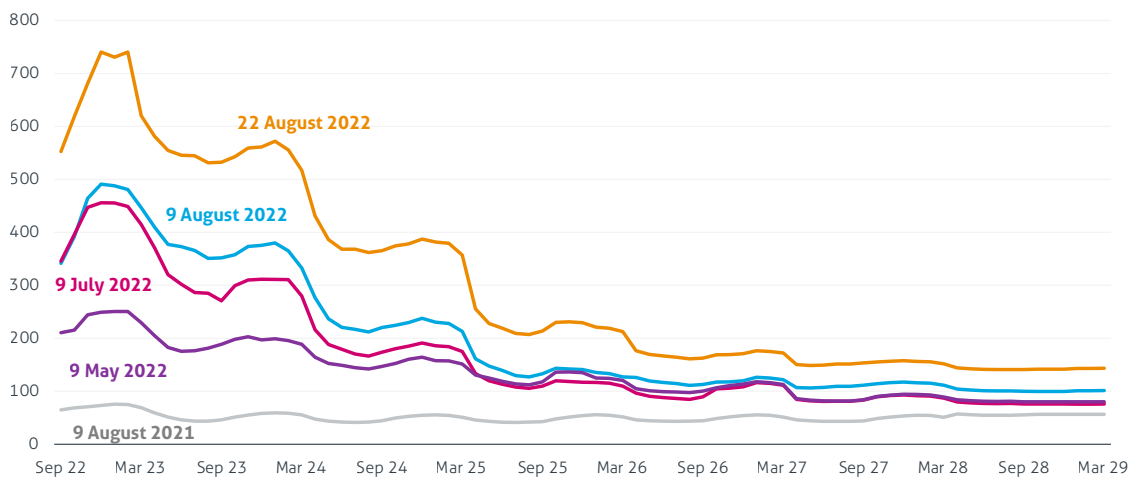
The UK government has been forced into adopting a series of necessary but suboptimal policies this year in the face of a catastrophic rise in energy prices. But UK households and businesses are likely to still be facing high energy bills in the winter of 2023 – quite possibly beyond that. If the government focuses only on short-term financial support, and long-term measures to boost supply that are unlikely to have a major impact, it will find itself in an even more difficult position in a year’s time. Funding very high energy costs through borrowing, without a strategy to reduce demand, will prove unsustainable.

Launched immediately, a concerted national effort to improve energy efficiency could deliver significant savings within a year – and substantial benefits in the years beyond.<sup>7</sup> Such a programme was already required if the UK is to stay on track for net zero. In an era of energy instability, it should now be seen as critical for protecting consumers and businesses and boosting resilience.

# The UK is among the most exposed countries in western Europe

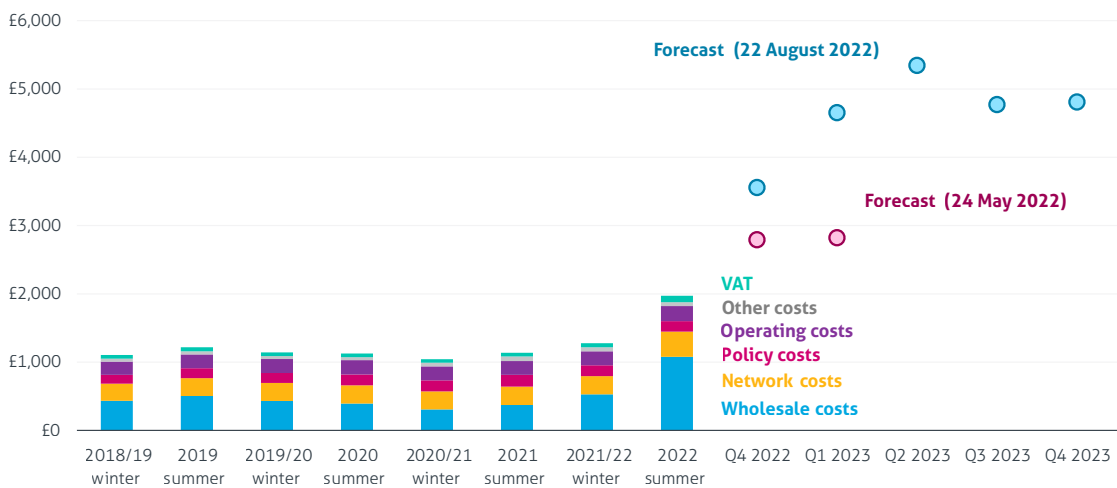
Energy prices are now expected to rise further and stay higher for longer than had been expected earlier in the crisis. If the current Ofgem price cap were to remain in place, the latest forecasts show prices continuing to increase between October and January, rising again in April 2023, and then remaining as much as four times higher than historic rates into 2025. This means previous government support packages have quickly been outstripped – and it has placed a greater emphasis on the medium-term response.

Figure 1 Evolution of the forward curve for gas prices over the past year



Source: Institute for Government analysis of International Continental Exchange, UK Natural Gas Futures.

Figure 2 Ofgem price caps, outturn and forecast (Cornwall Insight)



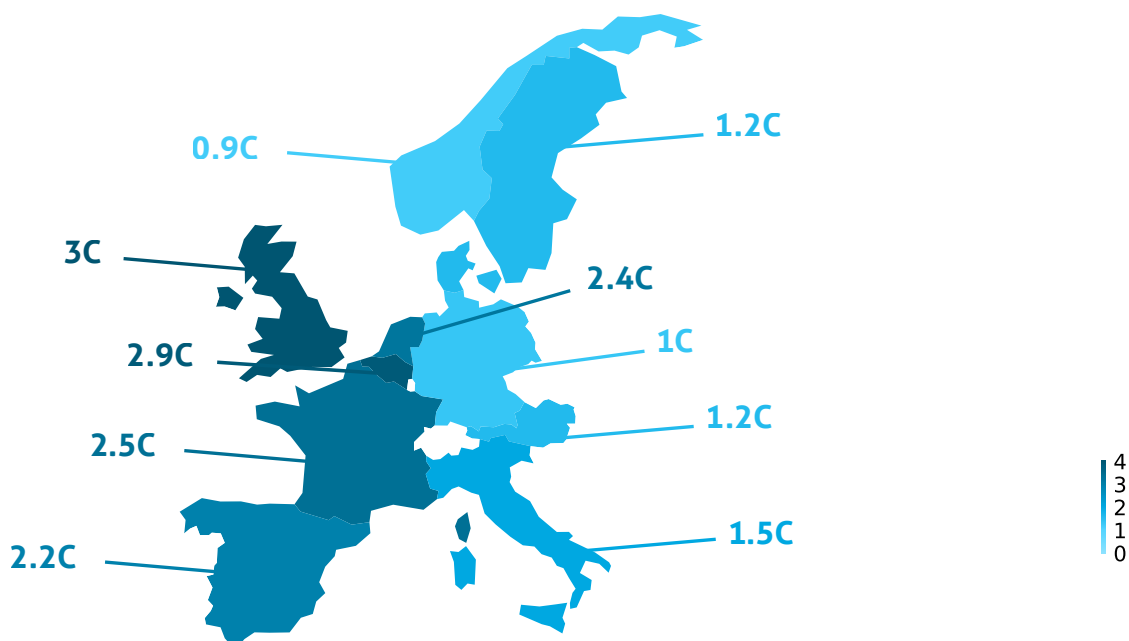
Source: Institute for Government analysis of Cornwall Insight, 'Cornwall Insight's Price Cap predictions jump after Ofgem release new guidance', 24 May 2022; Cornwall Insight, 'Price cap to remain significantly above £3,000 a year until at least 2024', 2 August 2022; Ofgem, Breakdown of the default tariff price cap (GBP £, direct debit).

The UK is particularly exposed to these price rises because it is heavily reliant on gas compared to other countries, using it for heating homes and buildings, producing electricity and supplying industry.<sup>8</sup> This dependence has deep roots, which include the availability of gas in the North Sea, and efforts to diversify the energy used for heating have been hampered by governments consistently loading policy costs on to electricity but not gas.

The primary driver of the UK's gas dependence is heating homes. More than four fifths of UK homes are currently still heated by gas boilers, a much higher proportion than in most countries. The UK's housing stock is also the oldest and least energy efficient in Europe. Over 52% of homes in England were built before 1965 and nearly 20% were built before 1919.

As a result UK homes use more energy than typical homes in other nations across the EU.<sup>9</sup> One recent study by heating and cooling company Tado of 80,000 of its users suggested that a UK home with an indoor temperature of 20C and an outside temperature of 0C lost on average 3C after five hours, up to three times as much as homes in some other European countries like Germany.<sup>10</sup> The UK scored worse than countries right across the continent with a range of climates.

Figure 3 **Average home heat loss over five hours (20C internal temperature, 0C external) 2020**

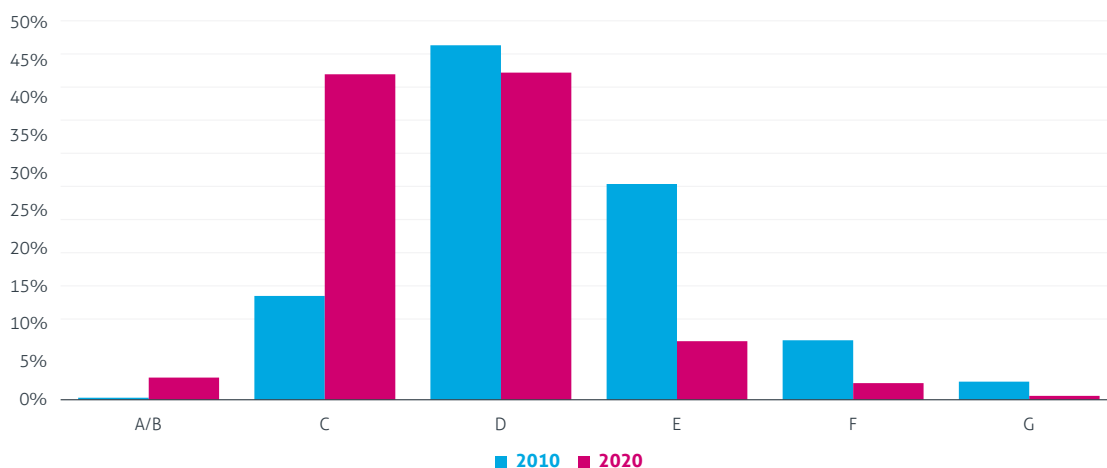


Source: Institute for Government analysis of Tado, user survey, 2020.

## Most homes in the UK are poorly insulated

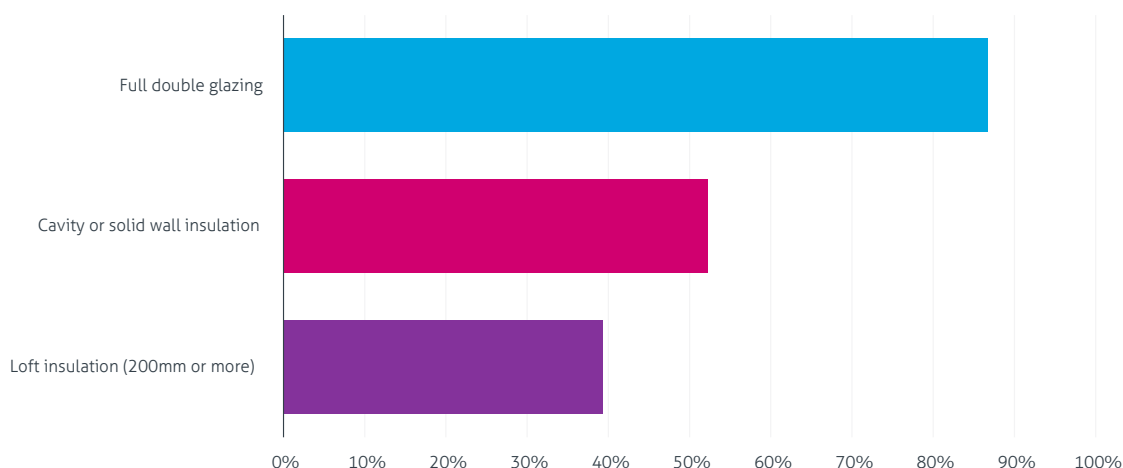
Draughty and inefficient homes have long been identified as a key problem in the UK. Energy performance certificate (EPC) ratings have improved in the last decade, including as a result of better lighting and boiler quality. But data from the latest English Housing Survey shows a very small percentage of homes with the highest A or B ratings, and over 50% rated D or lower (properties vary but a D rating typically equates to a house that is not well insulated, has a dated boiler and poor double glazing). Only just over 50% of dwellings had wall insulation and less than 40% had 200mm or more of loft insulation.<sup>11</sup>

Figure 4 **EPC ratings, housing England 2010 and 2020**



Source: Institute for Government analysis of DLUHC, English Housing Survey 2020 to 2021, December 2021.

Figure 5 **Percentage of homes with selected insulation measures, England 2020**



Source: Institute for government analysis of DLUHC, English Housing Survey 2020 to 2021, December 2021.

Addressing poor energy efficiency could help those on the lowest incomes for two key reasons. First, poor households are particularly vulnerable to price rises because, on average, energy costs make up a much larger share of their budgets.

Second, lots of people on lower incomes live in energy-inefficient homes. The picture varies by type of dwelling – for instance, social housing tends to be more efficient than private rented or owner-occupied homes. But the latest UK Housing Review found there were nine million poorer people living in energy-inefficient homes in England.<sup>12</sup>

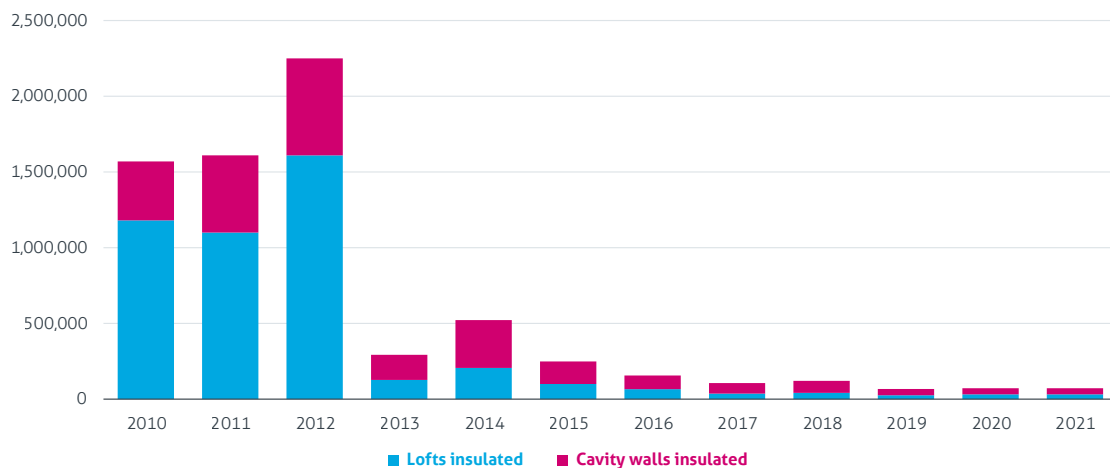
Energy efficiency measures can make a major difference to people’s bills. Homes with an EPC rating of F are likely to have a gas bill almost £1,000 higher than a home rated C this winter, according to the Energy and Climate Intelligence Unit.<sup>13</sup> The Department for Business, Energy and Industrial Strategy (BEIS) estimated in 2021 that the reduction in gas consumption from energy efficiency measures ranged from 4% from loft insulation to 18% from solid wall insulation.<sup>14</sup>

There is significant variation across the UK, particularly due to differences in types of dwellings. In 2021 Tower Hamlets was the local authority with the highest percentage of better-performing dwellings, with almost three quarters at EPC rating C or above, reflecting the many tower blocks in the London borough. The least efficient was the Isles of Scilly, with just over 10% at C or above.<sup>15</sup> This complexity points to the difficulty in targeting programmes at those most in need.

## The UK’s progress has stalled in the last decade

As recently as 10 years ago, the UK was hitting more than two million annual installations of loft and cavity wall insulation. But in the last decade rates of installations under government schemes have collapsed due to a string of bad policy decisions.

Figure 6 UK home energy efficiency improvements 2010–2020



Source: Institute for Government analysis of Climate Change Committee, Progress in reducing emissions – 2021 report to parliament, charts and data, June 2021.

The UK was among the first countries in Europe to introduce an energy efficiency obligation on energy suppliers, with schemes dating back to 1994. The Carbon Emissions Reduction Target (CERT) and the Community Energy Saving Programme (CESP) were in place from 2008–2012 and delivered annual savings of around 1.1% of final household energy consumption. But in 2013 they were replaced by the

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Energy Company Obligation (ECO), as part of David Cameron’s drive to “cut the green crap”. The ECO had a lower target, a more complex system, and focused on more expensive measures.

At the same time the coalition government introduced its flagship Green Deal policy, which it said would revolutionise the take-up of energy efficiency measures in homes. The idea was that homeowners would not have to pay for improvements upfront, with businesses financing changes and getting paid back via energy bills.

However, the programme was shut down after only two years, having attracted low take-up and delivered almost no energy savings. A key reason for the programme’s failure was that the Treasury insisted on a high interest rate. But policy makers in the department for energy and climate change (DECC) also had a poor understanding of how to design the necessary behavioural incentives to generate demand. The National Audit Office said the department based the policy on wrong assumptions, failed to test its plans and implemented them chaotically – concluding it had in fact increased suppliers’ costs and therefore energy bills.<sup>16</sup>

The combination of the switch to ECO and the Green Deal led to annual rates of cavity wall and loft insulation in 2013–15 plummeting by 60% and 90% from 2008–2012.<sup>17</sup> On top of this in 2015 the newly elected Conservative government decided to scrap the introduction of a long-planned requirement for new-build homes to be more energy-efficient – known as the Zero Carbon Homes standard – which industry had spent years preparing for and investing in. Ministers at the time, particularly George Osborne, the chancellor, justified this as prioritising increasing housebuilding, but housing experts suggested there was little evidence it had this effect.<sup>18</sup>

More recent attempts have not fared much better. The Green Homes Grant was introduced in 2020 with the dual aim of boosting the post-pandemic recovery and incentivising retrofitting. It offered homeowners vouchers worth up to £10,000 towards various energy efficiency improvements or low-carbon heating systems. However, conflicting objectives, inadequate attention paid to the reality of supply chains, a short timescale and administrative issues meant the scheme failed and it was cancelled after only nine months.<sup>19</sup> A key constraint was potential installers having little confidence in government schemes.<sup>20</sup>

This lost decade leaves the UK facing an uphill battle on energy efficiency. In a period of low gas prices, these failures may have seemed politically acceptable, even if they attracted significant criticism and conflicted with the UK’s climate ambitions. In retrospect, it has left households and businesses hugely and unnecessarily vulnerable to sharply rising gas prices.



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## Policy makers have a range of levers at their disposal

A review of energy efficiency policies used across Europe (see table in the Annex for full details) shows that countries have a wide range of policy levers to boost the use of energy efficiency measures in both existing and new-build homes. These include:

- **Grants:** Grant schemes are often used to help households pay for improvements – and support the creation of a supplier base. They can be costly and suffer from free-rider effects, though some grants are targeted at low-income households.
- **Loans:** Low-interest loans and measures to encourage green mortgages can help households meet high upfront costs. They can be guaranteed by the state or delivered through public–private partnerships. Loans can supplement grants to cover any remaining cost of improvements.
- **Tax policies:** Taxes raising the cost of energy incentivise uptake of more energy-efficient technology or behaviour – and in theory do so in a way that leaves consumers with the flexibility to work out the cheapest way to reduce their usage. There is some evidence that these feed through to behaviour, but this is likely to vary across populations and some consumers are simply willing to pay more for their energy.<sup>21</sup> Tax rebates or deductions can also be used to compensate consumers for part of the cost of energy efficiency work, while stamp duty can be linked to EPC ratings to provide a clear incentive for homeowners, and target those most able to pay for upgrades.
- **Supplier obligations:** Supplier obligations require energy suppliers to deliver energy efficiency improvements, with schemes so far generally focusing on simple and low-cost measures. These schemes can be regressive as costs are passed on to energy bills.
- **Regulation and standards:** Minimum standards can change the range of consumer choices and force manufacturers, housebuilders and installers to develop and use more energy-efficient products. Building regulations are critical to improving performance for new buildings but require monitoring and effective enforcement. Energy performance certificates can be used as a way to measure and drive progress, and can be linked to the sale of homes or influence market value.<sup>22</sup>
- **Information and advice:** Information and advice services can help reduce time costs and friction for consumers by making clear to them how they can most effectively reduce their energy use. Impacts vary but measures are generally relatively low-cost and can help support other policies. 'One-stop shops' make the process of embarking on improvements quicker and easier. Governments can also provide information in other ways.

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## Other countries offer lessons for the UK

Every country faces different challenges due to variation in housing stock and heating systems, patterns of property ownership and tenancy, and attitudes to energy use and home upgrades. But successes point to some lessons.

### 1. The most effective approaches are stable, long-term, large in scale and combine a range of policy levers

Most countries have used a combination of the levers above to deliver change – and a stable long-term approach has been critical.

A good example of this is Germany. It currently has a combination of grants of up to 50% of improvement costs, with a long-running low-interest loan scheme to cover remaining costs, as well as grants for advice from energy efficiency experts and tax rebates for both the cost of improvements and of accessing advice. It also taxes fossil fuel use and electricity consumption (in effect a carbon tax, with electricity from renewable sources exempt) and is simultaneously progressively tightening building standards.

Uptake of energy efficiency schemes in Germany has been high and increased rapidly in recent years as schemes have been expanded. Applications for energy efficiency programmes almost doubled in 2019–2020 (from 326,000 to 600,000) and applications for installing renewable energy heating systems increased from 76,000 in 2019 to 280,000 in 2020. A key lesson from Germany is that the large-scale and long-running loan scheme, backed by the well-established KfW, which has strong links with local banks, has helped to build a reliable supplier base and bring down costs, such that the scheme is now self-financing.

Regulation also plays a key role in driving change in industry and supporting any policies designed to boost uptake. Most countries have succeeded in tightening regulation on new-build homes much more effectively and consistently than the UK, while some have also used regulations to drive changes in existing homes. In France, for example, the sale of the lowest performing homes will be banned from 2025, with progressive tightening of requirements up to 2050.

Combining a range of levers helps governments to achieve a range of outcomes more effectively, compared with over-reliance on a single instrument. For example, if tax deductions are largely taken up by wealthier homeowners, grants can be targeted at low-income households. Similarly, although generous grant and loan schemes can put pressure on supply chains in the short term, clarity about future regulation can help markets prepare for future demand.

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## 2. More targeted policies can help support low-income households

French governments have taken a similar approach to that in Germany, with a combination of grants, loans, guidance and support finding a contractor, a reduced rate of VAT, and progressive tightening of building standards.<sup>23</sup>

However, France has also targeted support more specifically at low-income households. Grants vary according to the type of improvement undertaken but also the financial situation of the household, with higher grants for lower-income households. A separate grant scheme is also targeted specifically at low-income households, with higher grants and personalised support.

Short-term indicators are positive – more than one million homes have been renovated since the schemes were introduced in 2020, with more than 300,000 financed from January to March 2022. A survey showed high satisfaction and 66% of respondents said they wouldn't have completed the work without the scheme and 68% of households that benefited were low-income.<sup>24</sup> This shows the potential benefits of allowing some policies to be tailored to specific groups, while others remain broad-based.

Several other countries target policies specifically at the worst performing buildings, for example, using specific eligibility requirements or higher grants and loans for those properties. Rented properties are often a particular challenge as incentives for improvements can be limited. The private rented sector has the highest concentration of fuel poor homes in the UK.<sup>25</sup> To combat this the UK government announced new regulations in 2020 to target the worst performing homes, requiring landlords to ensure their properties had an EPC rating of E or higher. Scotland has some loan schemes targeted specifically at landlords, while in Denmark, for example, specific regulations cover rent increases in relation to energy efficiency improvements.

The challenge for effective targeting is first to have the necessary data to inform an approach, and second to avoid creating excessively complex and bureaucratic schemes which put consumers off.

## 3. Aggressive schemes can kick-start markets, but they risk poor targeting and implementation problems

Italy has opted for a more aggressive approach – introducing a very generous tax relief scheme in 2020. The Superbonus, due to be slowly phased out to 2025, is a tax relief of 110% of the cost of a number of energy efficiency improvements, as well as solar panels, EV charging and improving resilience to earthquakes.<sup>26</sup> It has been very popular, with €21bn spent by March 2022. The IMF said the scheme had been “highly successful” at boosting the post-pandemic recovery in construction and GDP.

However, Italy's experience also highlights potential problems. It has been criticised for including new gas boilers and the IMF also suggested that the subsidy was too high and poorly targeted, with the risk of subsidies going to wealthy homeowners who might have completed improvements anyway. Italy's public finance watchdog said it had not achieved the goal of getting maximum emissions cuts at minimum cost. The scheme has an estimated total cost of €33bn by 2026.

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While the scheme got up and running quickly, there were high levels of fraud and billions of euros worth of tax credits were frozen, which prompted the introduction of additional checks. Capacity can be a critical barrier to such checks being implemented effectively: in the UK the CCC has said improvements are needed in EPCs and Local Authorities needed to be well enough resourced to be able to conduct inspections and enforce standards.<sup>27</sup>

The Italian scheme also suffered from bottlenecks with supply chains not prepared to meet the high level of demand. This pushed up the cost of construction services, forcing the Italian government to cap prices for some building materials.

#### **4. Policy design needs to take account of consumer behaviour**

A key weakness of recent UK schemes, including the Green Deal, has been a failure to properly understand consumer incentives, resulting in very low take-up. ONS data shows that awareness of the potential benefits of energy efficiency improvements remains low, and it is often considered a low priority compared to other home improvements.

Successful schemes abroad have properly grasped financial and other barriers that might prevent consumers from paying for upgrades. For instance, a very low interest rate helped the German scheme achieve a large scale, while a high rate was a key factor in the Green Deal's low take-up. Of course, backing more generous loan terms carries a cost for the government, but the evidence suggests it is a trade-off worth making if it helps to foster a thriving industry to deliver upgrades and reduces exposure to energy spikes.

The role of independent and expert advice is also critical in building the trust and confidence of consumers. Many consumers are unsure about which upgrades would be most beneficial and cost-effective for their home, or concerns about the risk of being ripped off with low quality work. A combination of trusted and accessible advice, and effective regulation and enforcement, is required to build consumer confidence.

Early uptake of heat pumps in Finland stalled after a lack of quality control resulted in poor installations and maintenance, but it addressed this by introducing certification schemes for heat pumps and installers in the 2000s. In some countries advice is integrated with financial support and links to certified suppliers – what Ireland has called a 'one-stop shop'.

Others have drawn on the role of trusted local institutions such as local government and citizens advice bodies. In Sweden advice has long been provided at a local level and early on the Danish parliament delegated some authority on energy efficiency to local areas.

In addition policy makers need to consider the moment at which consumers are most likely to make upgrades. Considering what can seem disruptive and costly changes are not a top priority in most people's day-to-day lives. Targeting policies at moments when disruption is already occurring – for example, using building standards that apply at the point of renovation or sale, as in France – has proved an effective way of overcoming this.

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## 5. Consistent tax signals in support of a national mission can be as important as grants

Another useful precedent for UK policy makers is Finland's switch towards heat pumps and away from oil and biomass heating since the 1970s. Finland had found itself particularly exposed to the oil crises in the 1970s, and as a result successive governments embarked on a concerted national programme to reduce its vulnerability to future price shocks.

Initially this included subsidies and loans available for households switching from oil heating to more energy-efficient options including small subsidies for heat pumps. District heating became more popular in the late 1980s and early 1990s, and initial problems with heat pump installations and maintenance were addressed, with the government playing a key role in supporting the development of a supplier base. But grants were concentrated on low-income households or those switching from oil heating.

Alongside this the government offered generous tax deductions on heat pump installations, and progressively increased taxes on fossil fuels – from 2004–2017 the tax on coal quadrupled, the tax on natural gas increased sixfold and the tax on heating oil doubled. Minimum energy performance standards for new buildings and retrofits have also been progressively tightened since 2001.<sup>28</sup>

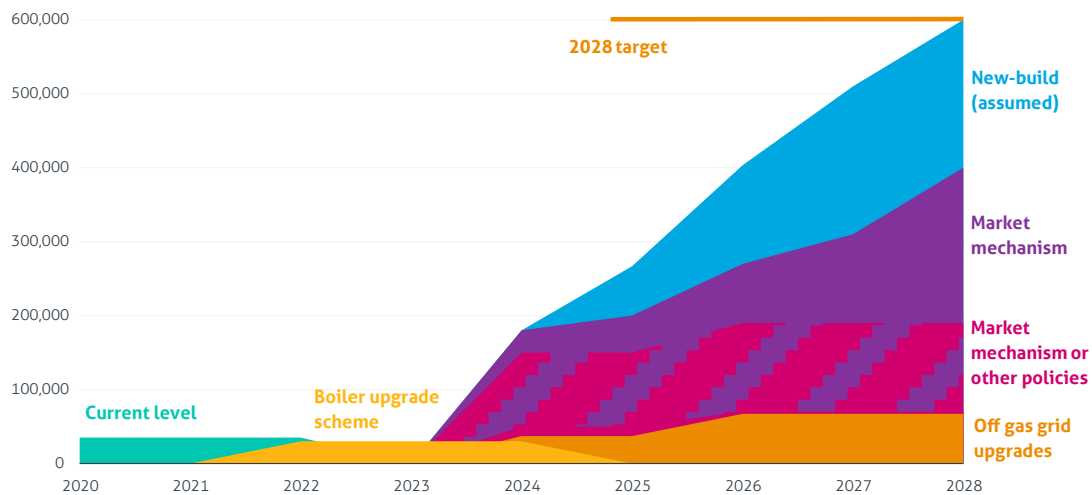
Overall Finland's approach – a very stable long-term policy goal with clear tax incentives and flanking policies in support – has proved highly effective in reducing its exposure to oil shocks. By 2018, 41% of households have a heat pump, while 70% of new-build small houses chose a heat pump, and deployment accelerated in response to the current energy crisis.<sup>29</sup>

## The UK's current approach lacks ambition on efficiency

In October 2021 the UK government published the long-awaited *Heat and Buildings Strategy*, which set out to address a lost decade on energy efficiency and explain how homes and buildings would switch from gas boilers in line with the UK's net zero target. The strategy was published alongside the government's wider net zero strategy – and developed before the severity of the current energy crisis became apparent.

It included serious thinking about the policy challenge and some welcome measures including support for heat pumps – setting out a £450 million boiler upgrade scheme, with a £5,000 subsidy for consumers to replace the Renewable Heat Incentive. But it was unclear how the government intends to deliver a switch on the scale required. The scheme runs for only three years with enough funding to cover 90,000 heat pumps, compared to the current target of 600,000 a year by 2028. The strategy proposed a market-based approach to heat pump installations, with an obligation on boiler manufacturers to sell a certain number of heat pumps. But details were limited and, almost a year later, how it will work is still unclear.

Figure 7 **Targets for UK annual heat pump installation by mechanism**



Source: Institute for Government analysis of 'Consultation on a market-based mechanism for low-carbon heat', BEIS, 2021; 'Phasing out the installation of fossil fuel heating in homes off the gas grid', BEIS, 2021.

The strategy also left serious questions about how the government intends to boost insulation in homes unanswered. The Climate Change Committee (CCC) said it failed to provide a clear plan for driving energy efficiency in owner-occupied houses, apart from a voluntary target for mortgage lenders, with some limited spending targeted at public sector buildings, fuel poverty and social housing.<sup>30</sup> It also failed to provide the sort of long-term certainty that has been successful in other countries: many policy details are currently missing beyond the next three years, limiting businesses' and homeowners' ability to make longer-term plans.<sup>31</sup> The Future Buildings Standard, which will set out regulation on new builds, is also still to be finalised and implemented – and meeting the heat pump target would rely on the UK hitting annual housebuilding targets that far exceed average levels over the past decade.

So far, unlike in many European countries, the energy crisis has not prompted any significant shift in policy in the UK. The government did launch a new energy advice service, but it is still in a beta version and its features are limited.<sup>32</sup> It could go a lot further in communicating to the public simple ways to reduce energy use – for example, by changing boiler flow settings – and in integrating information about financial support and recommended installers with potential measures.<sup>33</sup>

The 2022 Spring Statement also reduced VAT on home energy efficiency improvements, but while the energy security strategy described energy efficiency as "the first step", it offered no new policies or funding. Briefings suggested that the Treasury rejected suggestions from BEIS and No.10 for an extra £200m per year for energy efficiency measures for low-income households through the ECO. Even that amount would have left investment short of manifesto commitments.<sup>34</sup> The CCC stated in June that "given soaring energy bills, there is a shocking gap in policy for better insulated homes".<sup>35</sup>

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In part this lack of action may have been down to the assumption that this was a short-term shock, and that energy efficiency measures would take too long to have a useful impact, but that no longer holds. The recent price increases are likely to drive some additional uptake of efficiency measures, but with household budgets so stretched and awareness of the benefits of upgrades low,<sup>36</sup> this incentive will not be nearly enough to make up for major gaps in the government policy.

## Conclusion

In her first speech as prime minister, Liz Truss said she will do what is required to get the country through the storm of the current energy crisis. She has announced a generous package of financial support to help with bills, funded through borrowing. She also needs a plan for tackling the UK's energy efficiency problem.

The UK is among the most exposed countries in Europe to the current spike in prices following a lost decade in which rates of improvement to energy efficiency have collapsed. Yet despite rising energy prices hitting UK households and businesses, UK policy makers have shown remarkably little interest in addressing this vulnerability.

Other countries show what is possible. Announcing a national mission to boost energy efficiency and reduce gas dependence could start to deliver benefits within a year, and achieve substantial savings over three to five years – a timeframe in which forecasts suggest gas prices will remain a long way above pre-crisis trends.

The government should learn from what has worked abroad – and what has failed at home. Several steps are 'no-brainers' that could increase take-up while costing little or no money. These include providing clarity about the government's long-term approach, and offering much better advice to households. Other steps – such as boosting public investment, ensuring households could access cheap finance, tightening regulations, and taking further steps such as investing in skills to help strengthen supply chains – would involve costs. But the evidence suggests the benefits would far outweigh them.

While the new prime minister did not emphasise tackling the UK's energy inefficiency during her campaign, key members of her team, notably the new chancellor, have done so in the past. The latest forecasts, and the government's decision to pay for a freeze in bills through additional borrowing, only make those arguments stronger. As it develops a broader energy plan, the new government must look again at urgently tackling the energy we are wasting.

## Annex: Review of European energy efficiency policies

Country	Scheme	Outcomes
Germany	<p><b>Grants and loans:</b> The energy-efficient construction and refurbishment scheme is a long-term programme from the German development bank KfW, giving low-interest loans and grants for buying, retrofitting or building energy-efficient houses.<sup>37</sup></p> <p>In 2021 this was replaced by Federal Funding for Energy-Efficient Buildings (BEG). Individual measures receive funding of 20% to 40% depending on the technology (up to 50% for replacing oil heating systems) up to a maximum of €120,000 or €150,000 for those that hit higher energy efficiency standards. There is also funding for consulting energy efficiency experts on which measures to implement.<sup>38</sup> From May 2022 subsidies for gas heating systems were discontinued.<sup>39</sup></p> <p>The Climate and Transformation Fund (KTF) was also announced in July 2022. It provides €56.3bn for energy efficiency retrofits up to 2026. It is funded out of its incomes and reserves including from emissions trading and carbon pricing.<sup>40</sup></p> <p><b>Tax policies:</b> Tax reliefs were introduced in January 2020 for measures such as replacing heating systems, fitting new windows, insulating roofs and external walls. They will continue until the end of 2029. Tax payable can be reduced by 20% of costs spread over three years up to a maximum of €40,000 per property. Half (50%) of costs can be reclaimed from energy-related advice.<sup>41</sup></p> <p>Germany also taxes fossil fuel use and electricity consumption, although electricity from renewable sources is exempt.<sup>42</sup></p> <p><b>Regulation:</b> Standards for energy-efficient homes were tightened in 2022.<sup>43</sup> Oil heating will be banned from 2026 and updated standards for new homes will be announced in January 2023. From 2024 all new heating systems will have to run on at least 65% renewable energy.<sup>44</sup></p>	<p>An early tax credit scheme introduced in 1979 provoked an initial surge in the heat pump market but this crashed in the mid-1980s, attributed in part to poor installations giving heat pumps a bad reputation.<sup>45</sup></p> <p>Recently applications for energy efficiency programmes almost doubled in 2019–2020 (from 326,000 to 600,000). Applications for installing renewable energy heating systems increased from 76,000 in 2019 to 280,000 in 2020, with 144,000 applications for heat pumps.</p> <p>In 2020 KfW provided funding for almost half a million residential units, awarding loans and grants worth almost €27bn. By July 2021 BEG had already received 150,000 applications and had approved €2.7bn worth of grants.</p> <p>Overall Germany cut CO2 emissions from the building sector by 40% between 1990 and early 2021.<sup>46</sup></p> <p>There have, however, recently been reports of issues with supply chains, with long waits for installation of measures like heat pumps.<sup>47</sup></p>



Country	Scheme	Outcomes
Italy	<p><b>Tax policies:</b> The Superbonus was launched in July 2020. It is a tax relief of 110% of costs of a number of energy efficiency improvements as well as solar panels, EV charging and reducing earthquake risk. It was originally intended to run until the end of 2021 but was extended in the 2022 budget and will now be slowly phased out, with 110% available to the end of 2023, 70% in 2024 and 65% in 2025.<sup>48</sup></p> <p>Other tax deduction schemes had been in place since 2008 but with lower spending limits and percentage deductions available.<sup>49</sup></p>	<p>The Superbonus has been very popular, with more than 122,000 applications approved and €21bn spent by March 2022. However, it has been criticised for including new gas boilers rather than only non-fossil fuel options and the IMF suggested that the subsidy is too high and improvements poorly targeted, with the risk of subsidies. Italy's public finance watchdog, the Parliamentary Budget Office (UPB), said it had not achieved the goal of getting maximum emissions cuts at minimum cost.</p> <p>In 2021 around 57,000 buildings (out of 12.4 million in Italy) were renovated under the scheme.<sup>50</sup></p>
Ireland	<p><b>Grants:</b> The Better Energy Homes scheme provides grants for individual energy upgrades like attic or wall insulation to homeowners and landlords who want to manage the process themselves.</p> <p>The National Home Energy Upgrade scheme provides a wider range of grants for upgrading the overall energy efficiency rating of a building using a 'one-stop shop' to manage the process.</p> <p>The Better Energy Warmer Homes scheme provides free home energy upgrades for those on low incomes.<sup>51</sup></p>	<p>Early evaluations suggested the Better Energy Homes scheme had resulted in gas savings of 20% in treated homes and an improvement in efficiency ratings. Almost 190,000 homes had work completed under the scheme from 2009–2016. Surveys showed high satisfaction ratings.<sup>52</sup></p> <p>Since 2000 the Warmer Homes scheme has also supported more than 143,000 free upgrades.<sup>53</sup></p>

Country	Scheme	Outcomes
Ireland (cont)	<p>In February 2022 Ireland announced various increases in grants including:</p> <ul style="list-style-type: none"> <li>National Home Energy Upgrade – Increased grants for retrofitting up from 30–35% to 50% of total cost of deep retrofit with a heat pump</li> <li>Better Energy Homes – 80% of the typical cost for attic and cavity wall insulation; €6,500 up from €3,500 for heat pumps</li> <li>Increase in number of free energy upgrades under Warmer Homes Scheme for those at risk of energy poverty to 400 per month, from an average of 177 in 2021 and wider eligibility criteria.</li> </ul> <p><b>Supply chain support:</b> National Development Plan funding of €8bn for energy efficiency supply chain (€5bn from carbon tax revenues).<sup>54</sup></p>	
Spain	<p><b>Tax rebates:</b> In October 2021 Spain approved income tax deductions of 20, 40 or 60% for energy efficiency improvements with a maximum limit of €15,000 per home. The amount of tax deductible varies according to how much measures improve the energy efficiency of the building. The first two deductions are available until the end of 2022, with the 60% rate available through 2023.</p> <p><b>Grants:</b> In 2021 €6.8bn was budgeted for subsidies for measures like insulation, solar panels and heat pumps as well as renovating government buildings and building new social housing. The maximum subsidy is between €8,000 and €12,000 per dwelling or 40 to 75% of the investment, depending on family income.</p> <p>Earlier subsidies ran from 2013 at varying rates, with loans available to cover the remaining investment required.<sup>55</sup></p>	<p>The number of buildings being renovated increased 10% between 2017 and 2019 but Spain has had lower renovation rates than many neighbouring countries.</p> <p>Concerns have been raised about the supply of appropriately skilled workers and about subsidies largely going to wealthier homeowners.<sup>56</sup></p>

Country	Scheme	Outcomes
<p><b>Scotland</b></p>	<p>The Scottish government has committed funding of £1.8bn over this parliament.</p> <p><b>Loans and grants:</b> Home Energy Efficiency Programmes for Scotland (HEEPS) includes a number of different programmes.</p> <p>Interest-free loans were launched in 2017 to cover energy efficiency improvements and renewable heating systems, with cashback of up to 40% on eligible energy efficiency measures and 75% for certain renewable heating systems (as long as funds last). Maximum funding for energy efficiency is £15,000, with maximum cashback of £6,000. Various kinds of insulation are covered as well as gas heating. Maximum funding for renewable heating is £17,500 plus £6,000 for energy storage, with up to £11,750 cashback. This covers wind, solar panels, heat pumps, biomass and connection to district heating.</p> <p>Launched in 2015, Warmer Homes Scotland pays for energy efficiency improvements for people in receipt of various benefits or those over 75 without a working heating system. Eligible measures include insulation and renewable heating but also new gas boilers. In most cases all costs will be covered but in some cases contributions will be required, which are eligible for an interest-free loan.</p> <p>Area-based schemes fund local authorities to develop and deliver energy efficiency programmes (largely solid wall insulation) in areas with high levels of fuel poverty.</p> <p>Registered Social Landlords (RSL) loans offer interest-free loans of up to £1m to support energy efficiency measures for social landlords.</p> <p>Private Rented Sector Landlord loans provide up to £15,000 for each property for insulation measures and gas heating systems, up to £17,500 for renewable heating and £6,000 for energy storage. Loans are interest-free for landlords with five properties or fewer.</p>	<p>Between 2013 and 2019 HEEPS helped to deliver energy efficiency measures to around 150,000 households, saving more than £936.1m on fuel bills and 3.4m tonnes of CO<sub>2</sub>.</p> <p>Warmer Homes Scotland has helped more than 25,000 fuel-poor households across Scotland.</p> <p>Home Energy Scotland loans helped 1,221 households install more than 1,247 measures in 2020–21. The number of heat pumps with committed funding increased from 586 in 2019–20 to 762 in 2020–21.</p> <p>In total £935,000 has been paid towards finalised equity loans since the pilot was launched in 2017.</p> <p>Advice centres provide help to more than 90,000 customers a year, with high satisfaction scores. However, the Covid pandemic meant that the amount of specialist advice delivered in person fell dramatically in 2020 – 59% of customers received a home visit in 2019–20 compared to 8% in 2020–21.</p>

Country	Scheme	Outcomes
<b>Scotland (cont)</b>	<p>A pilot Equity Loan Scheme was also launched in 2017 to help homeowners in certain areas borrow money against the value of their property to fund energy efficiency improvements, with no requirement to make ongoing repayments. Loans are generally repaid when the property is sold, with a cap on the amount that has to be repaid if property prices rise. The scheme is primarily targeted at those who were not eligible for the standard interest-free loans.</p> <p><b>Regulation:</b> From 2024 new homes will need to use zero-emissions heating and have high energy efficiency.</p> <p><b>Advice:</b> Home Energy Scotland also provides free advice on energy efficiency measures and home decarbonisation as well as a one-stop shop for access to financial support schemes. There are five regional centres offering localised advice.<sup>57</sup></p>	<p>Scottish emissions from buildings fell 22% between 1990 and 2019, with the CCC saying that the increase in the share of homes having an EPC rating of C or higher – up from 24% in 2010 to 41% in 2014 – suggests that some of these reductions reflect genuine underlying progress. However, improvements have been slower since 2014 with only 49% of homes EPC C or higher in 2018.<sup>58</sup></p>
<b>Finland</b>	<p><b>Early measures:</b> Historically Finland had a high proportion of oil and biomass heating, leaving it particularly exposed to the OPEC crises in the 1970s. Heat pumps started being introduced in the late 1970s, with subsidies and loans available for households switching from oil heating to more energy-efficient options but only small subsidies for heat pumps. Over the 1970s and 1980s district heating grew rapidly, promoted by building regulations in many areas. Heat pumps became a less popular option through the late 1980s and early 1990s.</p> <p>After 2000 liberalisation of the energy market led to increases in the price of district heating, electricity and oil, making heat pumps a more attractive option again and sales increased. Subsidies were limited, with no subsidies for heat pumps in new houses, although subsidies were introduced for those switching from oil heating in 2003. Around 15–20% of equipment and material costs were available for conversions from oil or electric heating between 2006 and 2011.</p>	<p>Between 2000 and 2018 Finland managed a transition to heat pumps that reached almost a third of homes.</p> <p>Heat pumps are now a relatively popular option – in 2018 70% of new-build small houses chose a heat pump. Some 41% of households have a heat pump and 130,000 heat pumps were installed in 2021 – almost 5% of homes.<sup>59</sup></p>

Country	Scheme	Outcomes
<b>Finland (cont)</b>	<p>Tax deductions of €4,000–€6,000 for a two-adult household were available for retrofits to old houses. Grants increased in 2011, sparking a significant increase in sales but were removed for all but low-income households in 2013.</p> <p><b>Grants:</b> Subsidies are currently available for retrofitting buildings, with those with the worst energy efficiency ratings most likely to be eligible. A new subsidy scheme was introduced for 2020–2022 for energy efficiency improvements for owners of small houses, private housing companies and publicly owned residential rental buildings. Owners of private buildings can apply for a maximum of 50% of the costs of energy efficiency improvements up to a maximum of €4,000 or €6,000 per apartment.</p> <p>Subsidies of up to 70% are also available to improve the housing conditions of elderly or disabled individuals, including insulation and heating as well as accessibility.</p> <p><b>Loans:</b> The Housing Finance and Development Centre of Finland (ARA) can grant low-interest loans for building and retrofitting of housing, mainly for rental or social housing.</p> <p><b>Tax policies:</b> For some measures, like heat pump installation, tax deductions of 45 to 60% of costs are available.</p> <p>Fossil fuel taxes have also been progressively increased – from 2004–2017 the tax on coal quadrupled, the tax on natural gas increased sixfold and the tax on heating oil doubled.</p> <p><b>Regulation:</b> Minimum energy performance standards for new buildings and retrofits have been progressively tightened since 2001. Certification schemes for heat pumps and installers were also introduced in the 2000s.<sup>60</sup></p>	

Country	Scheme	Outcomes
Sweden	<p><b>Grants:</b> Sweden's EU recovery plan proposed SEK4.05bn (approximately £0.32bn) in grants for measures that increase energy efficiency by at least 20% for apartment buildings with the worst energy performance. Starting in 2021, the grants were designed to run for three years in the first instance.</p> <p>Investment support for new rental or student housing is also conditional on energy efficiency ratings, with higher support available for more efficient schemes.</p> <p><b>Tax policies:</b> Tax deductions have been available since 2008 for the cost of labour relating to housing repair, maintenance or rebuilding. They also cover some energy efficiency improvements. In 2016 the maximum deduction was reduced from 50% to 30% with a maximum amount of SEK50,000 per person per year.</p> <p>The plan also raised a number of environmental taxes (Sweden has the highest carbon tax in the world) and announced a plan to phase out tax reductions for heating fuels in industry, agriculture, forestry and aquaculture in 2021 and 2022.</p> <p><b>Advice:</b> Local areas have provided energy and climate advice in various forms for almost 40 years with new guidelines issued in 2016.<sup>61</sup></p>	<p>The national strategy for energy efficiency renovation stated in 2020: "Although the overall trend indicates that a reduction in energy consumption amongst the building stock is already taking place, there is potential for further improvements."<sup>62</sup></p>
Denmark	<p><b>Early measures:</b> From the 1970s Denmark actively promoted district heating and combined heat and power units, primarily to minimise dependence on fossil fuels and utilise their hydroelectric plants effectively. Prior to this point most heating was provided by oil meaning the oil crisis had a major impact. The Danish parliament delegated authority to local areas, while investing significant amounts in CHP systems and transmission networks. From 1990 CHP operators received an energy premium and a moratorium was placed on coal use.</p>	<p>Between 1976 and 2011 Denmark's promotion of district heating reached 80% of households, with 800,000 heating systems converted, reducing CO2 emissions by 20%.</p> <p>According to the OECD, in 2016 Denmark had one of the lowest energy intensity to GDP ratios.</p>

Country	Scheme	Outcomes
<p><b>Denmark (cont)</b></p>	<p><b>Regulation:</b> Denmark's first building standards with energy requirements were introduced in 1961. Regulations are reviewed every five years and current regulations set high standards for efficiency. Building regulations specify that profitable energy savings must be implemented when a building owner renovates due to wear and tear. This generally incentivises the installation of solar panels, district heating and heat pumps.</p> <p>Regulations also cover rent increases in relation to energy efficiency improvements to encourage landlords to renovate rented buildings.</p> <p><b>Tax policies:</b> Denmark has some of the highest energy taxes in the world, including taxation of energy used for heating buildings with the exception of biomass. For oil, natural gas and electricity, energy and CO2 taxes amount to more than DKK65/GJ (approx. £7.37). In 2016 taxes made up 69% of the final price of electricity and 57% of the price of natural gas for residential consumers. Taxes on oil and natural gas are indexed for inflation. However, taxes on electricity used for heating have reduced recently and are now significantly lower.</p> <p>Tax deductions of up to DKK12,200 per person per year (in 2019) are available for wages for skilled work in homes, including energy efficiency improvements.</p> <p><b>Supplier agreement:</b> A voluntary agreement with energy companies allowed consumers to apply for grants and advice on energy saving measures up to the end of 2020.</p> <p>Until 2020 Denmark also had a heat pump subscription scheme, in which selected companies installed, owned and operated a heat pump on behalf of a building owner, who typically paid a connection fee, ongoing subscription and payment for heat consumed. The companies received a grant for each heat pump installed.</p>	<p>Final energy consumption for heating properties per square metre of area heated was reduced by almost 45% between 1975 and 2020 while net heat consumption per m2 was reduced by almost 30%. However, a significant proportion of this reduction took place between 1979 and 1984 as a consequence of rising energy prices caused by the second OPEC crisis.</p> <p>The Danish government attributes the steady reduction between the mid-1980s and 2013 to government initiatives including building regulations, consumer information, energy rating, grants funds and energy taxes.</p> <p>However, between 2013 and 2018 heat consumption actually increased slightly – the reasons for which are unclear.<sup>63</sup></p>

Country	Scheme	Outcomes
<p><b>Denmark (cont)</b></p>	<p><b>Grants:</b> In 2021 this was replaced by a new scheme giving grants only for “deep renovations” where as much (cost-effective) work as possible is done. Grants are awarded to building owners who can document the most energy-saving potential and therefore the least energy-efficient segments of building stock. Grants are also available from 2021–2024 for replacing oil boilers with a heat pump subscription.</p> <p><b>Loans:</b> Local areas can apply for loans to retrofit buildings and building owners can apply for loans through the mortgage credit system, using the building as collateral.</p> <p><b>Advice:</b> Various sources of information and advice on energy efficiency are available. BetterHomes can help building owners throughout the renovation process, including with financing. Companies installing and fitting renewable energy systems in homes are accredited by the Danish Energy Agency under the renewable energy accreditation scheme.<sup>64</sup></p>	
<p><b>France</b></p>	<p><b>Grants and loans:</b> MaPrimeRénov’ was launched in January 2020, providing grants for energy efficiency and home decarbonisation improvements varying according to the type of work and the financial situation of the household, with higher grants for lower income households.</p> <p>MaPrimeRenov’ Sérénité is targeted at low-income households, with higher grants and personalised support. Zero interest rate loans are available to pay the remaining balance. Landlords are also eligible.</p> <p><b>Advice:</b> Guidance is provided via FranceRenov’ as well as help finding a licensed contractor.</p> <p><b>Tax policies:</b> VAT is charged at a reduced rate of 5.5% on energy efficiency improvements.</p> <p><b>Regulation:</b> The sale of F and G rated homes will be banned from 2025, with progressive tightening of standards up to an A or B rating by 2050.<sup>65</sup></p>	<p>More than 1m homes have been renovated since 2020, with more than 300,000 financed from January to March 2022. Overall, 18% of those grants were for heat pumps, 20% for pellet heating, 29% for other heating improvements, and 21% for insulation.</p> <p>A survey showed high satisfaction and 66% of respondents said they wouldn’t have completed the work without the scheme. Of the households that benefited, 68% were low-income.<sup>66</sup></p>



Country	Scheme	Outcomes
Netherlands	<p><b>Grants:</b> The Investment Subsidy Renewable Energy and Energy Saving scheme (ISDE) provides subsidies for a range of measures for individual homeowners:</p> <ul style="list-style-type: none"> <li>• €3,325 for connection to a heat network</li> <li>• Up to around €13,000 for a heat pump depending on type and model</li> <li>• Between €6 and €150 per m<sup>2</sup> for different types of insulation measures (at least two must be combined)</li> <li>• Up to around €4,000 for installation of a solar water heater depending on type and model.</li> </ul> <p>There are also subsidies available for associations of homeowners and landlords:</p> <ul style="list-style-type: none"> <li>• The incentive scheme for natural gas-free rental homes (SAH) provides 30–40% of the cost, up to €5,000 per home, for switching from gas to a heat network including improvements to make homes ready for the switch and for the costs of connecting to a heat network.</li> <li>• The Energy Saving Own Home Subsidy (SEEH) provides subsidies for energy and EV charging advice as well as insulation measures.</li> </ul> <p><b>Loans:</b> The National Energy Savings Fund provides loans of between €2,500 and €25,000 to private home and apartment owners for various energy efficiency improvements including insulation, heat pumps and advice. Higher amounts of up to €65,000 are available for packages to make homes highly efficient. Interest is usually tax deductible. Higher mortgages are also available for very energy-efficient homes.</p>	

Country	Scheme	Outcomes
<p><b>Netherlands (cont)</b></p>	<p><b>Tax policies:</b> A lower rate of VAT is applied to energy-saving home improvements.</p> <p>There are also taxes on coal and liquid fuels. The use of electricity and natural gas is also taxed (after a certain base level). Energy tax has been lowered for 2022 to reduce bills and the exempt amount increased.</p> <p><b>Regulation:</b> From 2021 new-build homes and non-residential buildings must meet the requirements as 'nearly energy-neutral', with a minimum proportion of renewable energy used.<sup>67</sup></p>	

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Rosa is a researcher at the Institute for Government, working on policy making. She recently completed a PhD in economic history looking at how attitudes to tax changed in Britain between 1945 and 1992. During that time, Rosa spent six months on secondment in the Cabinet Office Open Innovation Team. She also has an MPhil in economic and social history at the University of Cambridge, and a degree in history from the University of Manchester. She has previously worked as an analyst for the climate think tank InfluenceMap.

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Tom is an associate director at the Institute. He leads the Institute's work on policy making including its work on the net zero transition and the UK's response to the Covid pandemic. Since joining the Institute in 2017 he has led a wide range of research including projects on public engagement, civil service reform and government outsourcing. He also delivers the Institute's training programme for academics on how UK government and parliament works. Before joining the IfG, Tom worked at the Open Data Institute, where he advised governments and businesses on data policy, and the think tank Reform, where he researched health and criminal justice.

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