Independent Assessment: The UK's Heat and Buildings Strategy
March 2022
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Executive Summary

The UK Government’s Heat and Buildings Strategy has laid out important high-level decisions on the UK’s approach to reducing emissions from heating buildings. The Strategy sets a new policy direction, focusing on a rapid scale-up of supply chains through a market-based approach. However, plans are not yet comprehensive or complete and significant delivery risks remain across the Strategy. Consultations need to move forward, followed rapidly by final decisions on policy design and effective implementation if the Strategy’s ambitious goals are to be met.

The five priorities for Government now are: to fill policy gaps including on home energy efficiency and funding to decarbonise public sector buildings; to build on initial proposals for critical enablers such as skills, information, finance and governance; to strengthen the coordination of the UK strategy with devolved and local plans; to take major strategic decisions, particularly addressing the relative costs of electricity and gas; and to move forward rapidly with the large number of planned consultations and policy papers over the next year, ensuring promising proposals become concrete and timely policy.

We provide this advice in the context of heightened concerns over energy security and record increases in energy bills reflecting record highs in international gas prices. Policy design will have to reflect this, but the case for urgent action to decarbonise buildings remains clear.

In this report we provide a detailed assessment that identifies several policy gaps and multiple delivery risks (Figure 1). It is also unclear how some of the targeted emissions reduction to 2035 will be delivered. Nevertheless, the Heat and Buildings Strategy is an important (and long sought) step forward that offers a foundation for making progress in the sector. We therefore identify the next steps required in completing the strategy and implementing it. They must be acted on without delay.

- **A foundation to build on.** The Strategy sets a clear direction for decarbonising buildings, culminating in the phase-out of gas boilers by 2035. Credible policies have been proposed for most, but not all, segments of the building stock. As well as policies to drive roll-out of energy efficiency and low-carbon heating, the Strategy includes proposals to strengthen enabling policies, including measurement, enforcement and skills.

- **Policy gaps.** Around a third of the emissions reductions required in 2035 does not yet have a clear policy plan and/or has significant funding gaps, or it is unclear how the Government plans to deliver its targeted ambition.
  - **Energy efficiency.** There is only a voluntary target for mortgage lenders to encourage borrowers to improve the energy efficiency of properties, with limited oversight and enforcement mechanisms, for the 65% of the housing stock (in England) made up by owner-occupied homes. Further, insufficient public funding has been allocated to improve the fabric efficiency of social homes.
- **Public sector buildings.** Funding for public sector buildings decarbonisation up until 2025 currently only covers around a third of what is needed to achieve the Government’s goal of reducing public sector building emissions by 75% from 2017 to 2037.

- **Gas boiler phase-out in non-residential buildings.** The Government’s plans lack sufficient regulatory levers to drive the transition away from gas boilers in commercial buildings, with a late phase-out date for installation of new gas boilers (2035).

- **Unexplained emissions reduction.** The Government has not published detailed figures for the contribution of individual policies or technologies towards its overall ambition. Based on assumptions used in the Committee’s advice on the Sixth Carbon Budget, we would expect the Strategy’s ambition for roll-out of low-carbon technologies to contribute around 18% less emissions reduction than the Strategy targets by 2035. The Government should urgently clarify how it expects this remaining unexplained emissions reduction to be delivered and justify any more optimistic assumptions used.

- **Climate adaptation.** Plans for future proofing the UK’s building stock must integrate the need to adapt to a changing climate, including addressing the risk of overheating in all buildings and flooding. While there have been welcome steps forward on flooding in recent years, current policy on overheating only covers new builds.

- **Delivery risks.** The other two-thirds of the ambition in the Strategy faces at least some, and often significant, delivery risks. These reflect novel policy approaches that are still in development and must be monitored closely, a need for more progress on enabling policies and more coordination with devolved and local plans, and a lack of published detail and decisions that are yet to be confirmed.

- **Reliance on a market-based approach.** The Government has proposed a market-based mechanism for heat pumps (via an obligation on boiler manufacturers to install a rising number of heat pumps) and relies on the market to drive delivery in other areas, such as heat networks. Such approaches have significant potential upsides in innovation, efficiency and reduced Exchequer costs. They also bring delivery risks. The Government must clarify how mechanisms will work, monitor progress closely and be prepared to make changes if necessary, including potentially providing more funding. It must also ensure that other ‘enabling’ policies, such as on skills, finance, planning and energy prices, provide sufficient support.

- **Enabling policies and coordination.** Skills shortages risk being a major barrier, with stronger Government action needed to support the market in scaling up training and reskilling. For effective enforcement, improvements are needed in Energy Performance Certificates (EPCs), and Local Authorities need to be resourced well enough to conduct inspections and enforce standards. More needs to be done to coordinate the national strategy with plans of devolved and local government. There should be improved data sharing and more effective local energy planning and heat network zoning.

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**Material policy gaps remain, notably for energy efficiency in owner-occupied homes and social housing.**

We have not been able to account for 18% of the expected emissions reduction in the Government’s pathway in 2035. How this will be achieved must be urgently clarified.

There are delivery risks linked to 65% of the emissions reduction in the Strategy. These must be addressed as policy designs are finalised.

Risks include a reliance on an untested market-based approach for heat pump roll-out, the need for faster progress on enablers like skills, enforcement and governance, and a lack of pace and clarity across a number of policy levers.
Lack of pace and clarity. The Government has announced consultations which it has yet to initiate, including on owner-occupier energy efficiency, hydrogen-ready boilers and boiler phase-outs for buildings on the gas grid. Plans to rebalance levies between gas and electricity will need to reflect the present circumstances, but must make progress to enable the desired shift away from gas in the longer term. Other consultations, including on heat network zoning, energy efficiency regulations for the private rented sector and the heat pump market mechanism, have concluded but have not yet been acted on. Decisions still due in 2022 include ending gas-grid connections to new homes, regulations for buildings off the gas grid and energy efficiency policy for owner-occupied commercial buildings.

Next steps. Ambition and high-level intentions for heat and buildings are in place, but policy details are missing, particularly beyond the next three years.

Figure 2 sets out a timeline for key policy decisions expected in the coming year, as committed by Government, as well as key policy implementation milestones out to the mid-2020s. It also highlights where policy progress is behind schedule and by when gaps must be filled. There is a huge amount to do in a short amount of time. The Government needs to move quickly to fill the policy gaps, and to complete development and implementation of proposed policies.

The Committee will continue to monitor progress on the key issues set out above and report back in our statutory report to Parliament in June. We will look in particular for progress in the areas where faster pace and urgent clarification are needed: policies for energy efficiency, the development of low-carbon heat markets and action across the range of enabling measures. The Committee is also developing deeper indicators of real-world progress, which will aim to track how the market for heat pumps is scaling up.

The rest of this report is set out in five sections, followed by an Annex:

1. Introduction and background on UK buildings
2. The Government’s ambition for heat and buildings
3. Policy assessment
4. Actions to close the policy gap and mitigate delivery risks
5. Next steps and managing near term risks
Figure 1 The Heat and Buildings Strategy reduced policy gaps, but many delivery risks remain


Notes: We estimated the share of abatement for each policy measure at the time of the Heat and Buildings Strategy (HABS) publication, based on the above sources. We then scored these abatement chunks, based on how we would have assigned them a risk rating before HABS, and how we assess their risk rating now. See Annex A for further details on the assessment criteria which informed these scores. We have scored the ‘unexplained emissions reduction’ wedge before HABS as ‘policy gap’, as there was less detail on deployment of key measures before HABS and not a clearly defined difference between ‘policy gap’ and ‘unexplained emissions reduction’.
Figure 2 Policy implementation timeline

### Energy efficiency

<table>
<thead>
<tr>
<th>Energy efficiency</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2030</th>
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<tr>
<td>Planning and decisions</td>
<td>Consultation on options to improve energy efficiency in occupied commercial buildings</td>
<td>Plan for supporting SMEs to improve energy efficiency in occupied commercial buildings, with retrofit costs</td>
<td>Call for Evidence on EPC standards for owner-occupied homes</td>
<td>Energy Performance Certificate (EPC) for buildings in the private rented sector</td>
<td>EPC standards for private rented non-domestic buildings</td>
<td>EPC standards for social homes</td>
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<tr>
<td>Implementation</td>
<td>Concrete plan for performance-based rating scheme for large commercial buildings</td>
<td>Owner-occupied buildings energy efficiency funding pilots</td>
<td>Execution of EPC standards for private rented non-domestic buildings</td>
<td>EPC standards for social homes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcomes</td>
<td>All new buildings are at least EPC C as a practical</td>
<td>EPC standards for commercial buildings are completed</td>
<td>Public buildings emissions reducing 50% of 2020 levels</td>
<td></td>
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### Low-carbon heat: General

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<td>Low-carbon heat: Heat pumps</td>
<td>Decision on heat pump market measures, including financial support for installation, &amp; legislation will be needed</td>
<td>Heat pump manufacturer carbon regulations if needed</td>
<td>Heat Pumps Market Obligation obligation (in place 2023)</td>
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### Enablers: Actions to enable the transition to energy-efficient low-carbon buildings, including:

- Clear plans to grow and upskill the workforce, with sufficient funding and capacity for key stakeholders to implement
- A public engagement strategy, and mechanisms to provide tailored information to households
- Clarity on changes to rules and responsibilities across levels of government, and for Local Area Energy Plans
- Ambitious EPC reform, integrating in-use performance, SMETES data and green building passports
- Strengthened enforcement and monitoring of minimum standards and requirements
- Strengthened data sharing and join-up across government
- Simple, accessible and wide-ranging green finance options for home retrofit
- Integration of adaptation priorities into standards and plans

### Key

- **Planning**
  - Research, consultations, pilot schemes
  - Outcomes: Establishment of Energy Efficiency Programmes
- **Decisions**
  - Consultation, responses, concrete policy plans
  - Outcomes: Implementation
- **Legislation**
  - Legislation, implementing regulations
  - Outcomes: Legislation implementation
- **Implementation**
  - Implementation strategies, funding starts, deployment starts
  - Outcomes: Heat and Buildings Strategy

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Independent Assessment: The UK’s Heat and Buildings Strategy
1. Introduction and background on UK buildings

This section sets out the questions this report aims to tackle in order to assess the Government’s Heat and Buildings Strategy. It also provides an overview of the current state of UK buildings and the changes needed to deliver a building stock fit for a Net Zero and climate resilient future. It is divided into four sub-sections:

a) Overview of this report
b) UK buildings today
c) Buildings fit for the future
d) The costs and benefits of the heat and buildings transition

a) Overview of this report

This report is the Committee’s comprehensive assessment of the Heat and Buildings Strategy1 and relevant components of the Net Zero Strategy.2 Our analysis builds on our earlier response, Independent Assessment: The UK’s Net Zero Strategy.3 It addresses five questions relating to these strategies, and to other recent elements of the UK Government’s approach to decarbonising buildings:

- Has the Government described a plausible level of ambition to reduce emissions from heat and buildings?
- Does the Government’s approach provide a coherent and deliverable way to meet its stated ambition, with sufficient funding and policy support?
- What are the gaps in the Government’s stated policy approach?
- What actions does the Government need to take to support key enablers, and action on adaptation in the built environment – in both the near and long term?
- How does the Government manage the near-term risks arising from policy gaps and need for action on enablers, and what are the next steps for the Government with respect to emissions from buildings?

The focus of this report is to assess the policy proposals in the UK Government’s Heat and Buildings Strategy, which covers reserved policy. Where there is significant divergence between policies in the Strategy and devolved policy, we note this in our assessment. Devolved policy is covered in more depth in our annual Progress Reports for the whole UK, and similar reports on progress in Wales and Scotland.4,5,6
b) UK buildings today

The UK has more than 28.6 million homes\(^7\) and has built around 178,000 new dwellings per year since 2000.\(^8\) There are over 1.9 million non-residential buildings in the UK,\(^7\) including commercial premises and public buildings such as hospitals and schools.\(^9\)\(^,\)\(^10\)

Direct buildings emissions come from the combustion of fossil fuels for heat, hot water and cooking. Indirect buildings emissions occur as a result of the electricity used in buildings.

Direct buildings emissions were 88 MtCO\(_2\)e in 2019, 18% of the UK total and more than any sector other than surface transport (23%).\(^11\)

- Around 74% of the UK’s heating and hot water demand in buildings was met by natural gas, and 10% by petroleum. The rest was mostly a small amount of wood (or other biomass) and coal.\(^12\)

- As of 2019, direct buildings carbon dioxide emissions were largely from homes (77%), with a smaller proportion from commercial buildings (14%) and public buildings (9%).\(^13\)

In terms of indirect emissions (i.e. emissions from the use of electricity), around three fifths of the UK’s current electricity consumption (resulting in emissions of 31 MtCO\(_2\)e in 2019) is used to power our buildings – for appliances, lighting, some heating, cooling and catering.\(^14\) Indirect emissions from buildings have fallen in recent years as the power sector has decarbonised.

Most homes in England are owned by their occupants (65%), with the rest being privately rented (19%) or socially rented (17%).\(^15\) The private rented sector has the highest concentration of fuel poor homes.\(^16\) Social rented houses typically have higher energy efficiency, while owner-occupied homes have the lowest efficiency on average, (as measured by their Energy Performance Standard rating (EPC)).\(^17\)

The UK has the oldest housing stock in Europe.\(^18\) Over 52% of homes in England were built before 1965, nearly 20% were built before 1919.\(^19\) These older homes are less energy efficient than newer builds.\(^20\)\(^,\)\(^21\) As such, UK homes use more energy than typical homes in other nations across the EU.\(^22\)

This means that the UK needs to do more than many other countries to eliminate emissions from its homes. But it also implies that the UK stands to reap relatively greater benefits from buildings decarbonisation than these other nations in terms of savings on energy bills, improving comfort in homes and creating healthier spaces to live in.

\(^*\) We do not have a single dataset for the UK as a whole, but there are over 1.7 million non-residential buildings in England and Wales, and 220,000 in Scotland.
Direct emissions from buildings fell by 19% from 1990 to 2015 and (on a temperature adjusted basis, i.e. allowing for cold or mild winters) have not changed significantly from 2015 to 2019 (see Figure 1.1).\textsuperscript{23} In part that reflects that progress in installing home efficiency slowed dramatically after 2012, following changes to the supporting policies (see Figure 1.2).

The COVID-19 pandemic, and the increase in home-working brought about by restrictions imposed in light of it, resulted in shifting patterns of buildings occupancy. Temperature-adjusted buildings emissions increased by 4% between 2019 and 2020 as a result.\textsuperscript{24} It is unclear to what extent these shifts in behaviour, and their impact on buildings emissions, will persist.

![Figure 1.1 Direct emissions from buildings](image-url)
c) Buildings fit for the future

Good buildings are comfortable, enjoyable and healthy places to be in. This means warm in the winter, cool in the summer – with good natural light, fresh air, and resilience to climate impacts such as flooding and overheating. This is true for our homes, our places of work, our hospitals, and our schools.

Buildings which are highly energy-efficient and heated by low-carbon sources can be all these things. This can be achieved at reasonable cost to the householder and the taxpayer, while improving the value and longevity of some of our most important national assets.  

Below we set out the key overarching outcomes which are needed to reach net-zero emissions from buildings in the UK. These are set out in detail in our Sixth Carbon Budget advice and the policies the Committee has identified that could achieve them are summarised in Box 1.1:

- **All new buildings** should be low-carbon and have very high levels of efficiency:
  - New homes should be built with low-carbon heating, high fabric efficiency, and climate-resilient measures like shading and flood resilience as standard.
– The technologies needed to deliver low-carbon buildings already exist: heat pumps, low-carbon heat networks, and direct electric heating powered by renewable energy, alongside high levels of fabric efficiency.

• The pace of improvements to the fabric of the existing building stock needs to ramp up quickly and continue over the next 10-15 years:

– Upgrades to the energy efficiency of buildings will return long-run benefits in the form of lower operating costs and heating systems that are more efficient and cheaper to maintain (see Box 1.2). By reducing peak demand for energy these efficiency improvements will also reduce the need to reinforce electricity networks.

– In addition to insulation, improvements to shading and ventilation will make buildings – especially homes – more liveable as well as more efficient.

• Low-carbon heating should become the norm across the building stock:

– Expansion of low-carbon heat networks will deliver low-carbon heat effectively in heat dense areas like cities, or around anchor loads such as schools and hospitals.

– Widespread use of well-designed and well-installed heat pump systems will help decarbonise space heating, while maintaining quality. The heat pump market should scale up rapidly over the 2020s from current low levels to be the dominant heating technology installed by the early 2030s.

– Other forms of low-carbon heat (such as hydrogen boilers, biomass boilers, and hybrid heat pumps) may have a role to play. Preparations for the potential role of hydrogen will enable strategic decisions in the mid-2020s.

• Fuel poor households* need protection from rising energy bills, and support to improve their homes to the same standard as non-fuel poor homes:

– There were nearly 4.2 million fuel poor households in Great Britain in 2018, 3.5 million of which were in England.† The number of households in fuel poverty is expected to increase by between 2 and 4 million (depending on the definition of fuel poverty used) due to unprecedented rises in the wholesale price of gas.26,27

– These households will need support in paying for energy efficiency and low-carbon heat improvements in their homes.

* The definition of fuel poverty varies in England, Wales, Northern Ireland and Scotland. Most of the policies to address fuel poverty set out in the Heat and Buildings Strategy, and assessed in this report, apply to England, where a household is considered to be fuel poor if they: have above average fuel costs and would be left with a residual income below the poverty line if they were to pay for fuel costs.

† CCC estimates based on official fuel poverty statistics in England, Scotland and Wales.
## Box 1.1
Previous CCC policy proposals for Net Zero buildings

In our Sixth Carbon Budget advice, we set out a Balanced Pathway to Net Zero, including key regulatory and policy milestones:

- Finalise a clear set of **standards** for fossil fuel phase-out and high levels of energy efficiency in new builds, coming into force by 2025.
- Introduce a range of **regulatory measures** for minimum EPC ratings, including EPC C for rented homes, and homes for sale by 2028.
- Complete **commercial energy efficiency** renovations by 2030.
- Set out clear dates for phasing out installation of **fossil fuel boilers** in existing buildings (2028 for oil and coal phase-out, and 2033 for homes), with earlier dates for non-domestic buildings.
- Phase out new district heating from relying on Combined Heat and Power from 2025, and convert existing **heat networks** to low-carbon sources by 2040.

We also set out some key enablers of progress, which include:

- Shift **relative prices** in favour of electricity over gas, and value flexible electric loads.
- Ensure quality **household information** with real-world performance measurement, including by reforming EPC and SAP frameworks.
- Strengthen **compliance** and **enforcement**.
- Engage in **area-based planning** and **green building passports** across the housing stock.
- Unlock **green finance** at scale.
- Take **strong early action** in new build homes, off-grid, social rented sector and public buildings.
Improving the energy efficiency of buildings is a means of reducing emissions, and an enabling measure for installing low carbon heat. Energy efficiency measures also bring a number of other benefits – reducing bills, improving comfort, and reducing the need to reinforce the grid when using electricity for heat. They enable buildings to maintain a more stable temperature, staying cooler in summer and warmer in winter.

The model used in our Sixth Carbon Budget analysis calculated the most cost-effective combinations of energy efficiency and low-carbon heat measures for different housing archetypes:

- Our analysis used updated evidence on the costs and energy saving potential of efficiency measures, including real world performance data from the National Energy Efficiency Data-Framework (NEED).
- In our analysis energy efficiency and behavioural measures generated a 12% reduction in heat demand from homes (in the Balanced Pathway scenario). This was achieved through basic measures such as draught-proofing and hot water tank insulation, insulating all practicable lofts and cavity walls, and insulation of walls to around half of solid-walled homes. All fuel poor homes received a high efficiency upgrade.
- Our analysis showed that on average, homes receiving a heat pump would require less than £3,000 of investment in energy efficiency measures.

For non-residential buildings, our models drew on data from the Building Energy Efficiency Survey (BEES). The analysis suggests that energy efficiency measures can reduce energy consumption in non-residential buildings by around 25%.

There is scope for the use of energy efficiency measures to deliver greater energy savings, requiring more expensive and disruptive retrofitting programmes, than assumed in our Balanced Pathway. This is unlikely to be the most cost-effective approach, but would deliver advantages such as lower household bills. Our analysis suggests that the scale of energy efficiency measures required for electrification of heat should not present a barrier to reaching Net Zero.


d) The costs and benefits of the heat and buildings transition

Our Sixth Carbon Budget scenarios imply growing and enduring savings in operating costs, alongside a major investment programme. In the long term there is scope for cost and energy bills savings:

- The CCC pathway to Net Zero* requires investment across the building stock at an average rate of around £12 billion per year to 2050, partly offset by reductions in operating costs of around £5 billion per year. These figures reflect cautious estimates of cost reductions for heat pumps as the market scales up; we note that the Government is targeting much larger cost reductions.
- The total investment costs to decarbonise homes are less than £10,000 per home on average. Energy efficiency improvements will deliver ongoing operating cost savings resulting in lower overall bills for households in the long term.

* References to the CCC pathway to Net Zero in this report relate to the Balanced Pathway from our Sixth Carbon Budget advice, unless otherwise stated.
• These operating cost savings in buildings, coupled with cheaper renewable power in electricity generation, have the potential to lower energy bills, even if fossil fuel prices fall back to lower levels seen before recent price spikes.

Wholesale gas prices are currently at record highs, affecting the context within which changes to buildings and energy bills will be felt. Policies need to recognise and factor in the current price context in their design. But the risk of sustained high gas prices, and heightened concerns over energy security reinforce the need to act. Improving the energy efficiency of buildings (homes in particular) and widespread electrification, alongside the shift to a renewables-based power system, will reduce UK exposure to volatile international gas prices:

• In late-2021, continuing into 2022, wholesale prices for natural gas have risen to unprecedented levels in the UK and Europe. This has had a direct impact on the energy bills consumers pay. This impact has been felt both through the price of heating – for the majority of UK buildings a gas boiler provides heat and hot water – and through the price of electricity, which reflects the price of gas as the marginal source of generation.

• Currently, consumers are afforded some protection from the volatility of fossil fuel prices through the energy price cap. However this is set to increase from April 2022 by £693 to £1,971 for a typical household on a default tariff, and by £708 to £2,017 for prepayment customers. The cap is likely to rise further in October 2022. As set out above, this will push millions of additional households into fuel poverty, and also increase the pressure on existing fuel poor households.

• This underlines the need to move quickly away from fossil fuel heating in homes and accelerate the pace of fabric efficiency upgrades. Our Sixth Carbon Budget analysis previously found the costs of decarbonising the entire economy to peak at less than 1% of GDP each year by 2035. If current gas prices continued out to the Sixth Carbon Budget period, decarbonising the economy would result in a saving of 0.5% of GDP.

• There may also be opportunities to support fuel poor households better by improving the targeting of support. Addressing fuel poverty in line with the Government’s targets would require increased funding if the current high prices are sustained.

Section 5 of this report further addresses the implications of energy price increases for buildings policy.

* Assuming gas prices stayed at 212p/therm (the average price between 1 Jan and 3 March 2022) until 2035.
2. The Government’s ambition for heat and buildings

In this section we examine the Government’s ambition for heat and buildings; that is, the intended scale and pace of emissions reduction up until 2050 and its targets for roll-out of particular low-carbon technologies and behaviours.

Setting the Sixth Carbon Budget in line with the Committee’s advice required Government to raise its ambition on heat and buildings. The Heat and Buildings Strategy (HABS) and Net Zero Strategy (NZS) provide the Government’s response, setting out the intended level of buildings emissions reduction up until 2050, and how this will be delivered.

The ambition in those strategies is now broadly where it should be – aiming for the full decarbonisation of buildings by 2050, and recognising the need to reach good levels of energy efficiency across the stock by 2035 and phase out installations of gas boilers by 2035.

a) Emissions in the Net Zero Strategy compared to CCC analysis

The Government is aiming for emissions from buildings to be lower than the CCC pathway set out in the Committee’s advice on the Sixth Carbon Budget:

- In the Net Zero Strategy, the Government published its own pathways for residual annual emissions between 2020 and 2050 in each sector of the economy. These pathways indicate upper and lower bounds for expected emissions.
- For the buildings sector, the majority of the Government’s expected emissions range falls below the trajectory indicated by our pathway.
- The Government relies on these lower (expected) levels of buildings emissions to make up for higher residual emissions from other sectors, such as agriculture, fuel supply and aviation (Figure 2.1).

These differences are driven primarily by differing assumptions about baseline emissions, rather than by higher ambition (Figure 2.2).

The lower baseline used in the Net Zero Strategy largely arises from assumptions around the impacts of COVID-19 and a differing approach to temperature adjustment of emissions (see Box 2.1), which result in a lower starting point. While the assumptions underlying both the Committee’s and the Government’s baselines are of course uncertain, a lower baseline than we assumed in the Sixth Carbon Budget is reasonable.

The lower baseline implies that the Sixth Carbon Budget would be slightly easier to meet than in our original advice. However, we note that this is a relatively small difference across the economy (of the order of less than 2% of emissions), and in the context of other uncertainties, such as over emissions factors and land use emissions. We still consider the legislated Sixth Carbon Budget to be a suitable pathway to Net Zero in 2050.
Irrespective of the precise level of the baseline, the Government relies on the resulting emissions pathway for buildings to compensate for higher emissions in other sectors. Future progress in reducing emissions will therefore need to be assessed against this revised pathway for buildings.

**Figure 2.1** Additional ambition in buildings in the Net Zero Strategy compensates for lower ambition in other sectors

![Graph showing emissions reduction in different sectors](image)


**Box 2.1**
Differences between the CCC and Net Zero Strategy baselines for buildings

The starting point for the central Net Zero Strategy baseline in 2020 is about 7 MtCO₂e lower than the CCC’s baseline. This difference arises due to how the Government handles the expected impacts of COVID-19 on emissions, and differences in the approach used to adjust emissions for temperature:

- The NZS starting point allows for a reduction in emissions due to the impact of COVID-19. The resulting starting point for 2020 is around 3 MtCO₂e below the reported emissions for 2020. This may suggest an overadjustment to the baseline to account for COVID-19 impacts, although this cannot be confirmed until any longer-term impacts appear in the reported emissions figures.

- The CCC starting point included a temperature adjustment to actual emissions, to adjust for the impact of higher winter temperatures in recent years. The NZS starting point used unadjusted emissions. The adjustment used in the CCC baseline was based on averaged 1981-2010 heating requirements, rather than more recent trends, which is likely to overestimate underlying emissions trends.

The differences in baseline emissions, rather than abatement ambition, play an important role in the lower emissions pathway in the Net Zero Strategy.
The Government’s expected abatement from buildings in 2030 is 1.3 MtCO₂e higher than the CCC Balanced Pathway, but the difference in residual emissions is 6.7 MtCO₂e.

By 2037, the amount of abatement the Government projects is 4.6 MtCO₂e higher than the CCC Balanced Pathway, while the difference in residual emissions is 8.9 MtCO₂e.


**Figure 2.2 Comparison of Net Zero Strategy and CCC baselines and pathways for the buildings sector**

CCC and NZS pathways are similar if using the same starting point.

b) Delivering the ambition in the Net Zero Strategy

The similar emissions pathways (after correcting for differing starting points) in the NZS and the Committee’s Sixth Carbon Budget reflect comparable approaches to the roll-out of low-carbon measures, with differences at the margin (Table 2.1):

- Both the CCC and Government pathways aim to achieve the bulk of energy efficiency upgrades by 2035, although the Government pathway so far includes fewer regulatory milestones to drive this change, and these come in a little later in general.

- Government ambition for low-carbon heating includes rapid growth in heat pump installations coupled with the phase-out of fossil-fuelled boilers through to the 2030s:
  - The Government has targeted a UK market for heat pumps delivering at least 600,000 installations per year by 2028. The initial roll-out is slower than our pathway in the late 2020s, but it exceeds it by the mid-2030s.*
  - Both the CCC and Government pathway see gas boilers in new buildings phased out in 2025.
  - The phase-out of installation of gas boilers in existing homes occurs in 2035 under the Government’s plans, and 2033 in the CCC’s pathway.

- The Government’s ambition on heat networks is lower than the CCC pathway.

- The Government’s ambition for public sector decarbonisation is higher than the CCC pathway, aiming for a faster rate of emissions reduction in the 2020s.

The Government has not published detailed calculations setting out how its policies would reduce emissions in line with the pathway in the Net Zero Strategy. Using assumptions developed for our Sixth Carbon Budget advice implies that the Government’s roll-out plans would only deliver 82% of their ambition for reducing emissions:

- We have calculated the impact we would expect these measures to have on emissions, by combining available figures for the policy proposals with assumptions used in our Sixth Carbon Budget analysis (Table 2.2).

- We cannot account for nearly 18% of abatement required to deliver the Government’s expected emissions in the Heat and Buildings Strategy in 2035.

- There is uncertainty over how specific measures affect emissions – for example, the abatement delivered by heat pump installations depends on the type of properties in which they are installed. For the Government’s plans to deliver the targeted abatement, more optimistic assumptions are needed than those used by the Committee. Until the Government publishes detailed figures and explanations of its assumptions, we describe this as ‘unexplained emissions reduction’.

* The Government aims to be replacing around 1.7 million fossil fuel boilers annually by the mid-2030s. This target encompasses heat networks as well as heat pumps, although we expect heat pumps to provide the majority of replacements.
A key action for Government in the coming months is to clarify its plans for this unexplained emissions reduction. If the Government assumes that more can be delivered from each low-carbon installation (e.g. each heat pump), it should set out these assumptions and explain how it will implement policies in a way that these more ambitious assumptions can be met. If the Government believes other measures will close the gap, it should set these out and how policy can be expected to deliver them.

Our assessment of proposed policies in section 3 considers how credible these policies are in terms of their ability to deliver against the assumptions we used in the calculations in Table 2.1.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>CCC pathway</th>
<th>Government ambition</th>
</tr>
</thead>
</table>
| Heat pump installations in homes              | 900,000 heat pump installations per year by 2028  
1.4 million installations per year by 2035 | 600,000 heat pump installations per year by 2028, with a third coming from new builds  
1.9 million installations per year by 2035 |
| Heat delivered by low carbon district heat networks | 2035: 50 TWh  
2050: 80 TWh (one fifth of heat demand for all buildings) | 2035: 15-29 TWh  
2050: 70 TWh |
| Gas boiler phase-out dates                    | 2025: all newbuild homes  
2030: public buildings  
2033: commercial buildings  
2033: existing homes | 2025: all newbuild homes  
2035: all existing buildings |
| Oil boiler phase-out dates                    | 2025: public buildings  
2026: commercial buildings  
2028: existing homes | 2024-26: public and commercial buildings  
2026: existing homes |
| Energy efficiency minimum standards           | Private Rented Sector: EPC C by 2028  
Social Housing: EPC C by 2028  
Owner-Occupied:  
• Homes for sale: EPC C from 2028  
• Homes with mortgages: EPC C by 2033 (mandatory)  
All: not specified | Private Rented Sector: EPC C by 2030  
Social Housing: not specified  
Owner-Occupied:  
• Homes for sale: none  
• Homes with mortgages: EPC C by 2030 (voluntary)  
All: 2035 |
| Funding for fuel poor owner-occupied homes     | £6.6 billion to 2026³ | £8.2 billion to 2026⁴ |
| Emissions from public buildings               | Reduce by 60% by 2037 (against 2017 levels) | Reduce by 75% by 2037 (against 2017 levels) |


Notes:

1 The expected proportion of existing heat networks converted to low carbon heat sources is unclear.
2 Where practical, cost-effective and affordable.
3 This figure was calculated in Dec 2020, before the current energy crisis. The top end of the range includes floor insulation in all fuel poor homes. This was implemented in our modelling by assigning high energy efficiency packages to these homes, and as such floor insulation was also included. In practice, it is likely that deployment of floor insulation may be more limited (particularly where this is more expensive solid floor insulation).
4 Includes funding for policies in the Heat and Buildings Strategy (LAD, SHDF and HUG) which are mostly England-specific, with the exception of ECO, which applies to Great Britain.
### Table 2.2
Comparison of abatement for buildings in 2035 under the Heat and Buildings Strategy proposals and the CCC pathway, as estimated by the CCC

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>CCC pathway</th>
<th>Heat and Buildings Strategy</th>
<th>Key policies in the Heat and Buildings Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low carbon heat in non-fuel-poor homes</td>
<td>34%</td>
<td>35%</td>
<td>Market-based mechanism for low-carbon heat, Boiler Upgrade Scheme</td>
</tr>
<tr>
<td>Heat networks</td>
<td>18%</td>
<td>7%</td>
<td>Heat network zoning, Heat Networks Investment Programme, Green Heat Networks Fund</td>
</tr>
<tr>
<td>New homes</td>
<td>10%</td>
<td>6%</td>
<td>Future Homes Standard, Interim building standards uplift</td>
</tr>
<tr>
<td>Energy efficiency in non-fuel-poor homes</td>
<td>10%</td>
<td>5%</td>
<td>Minimum standards in the private rented sector and social housing sector, voluntary mortgage lender obligations at the point of sale</td>
</tr>
<tr>
<td>Commercial buildings¹</td>
<td>13%</td>
<td>14%</td>
<td>Minimum EPC requirement for private rented sector, performance-based rating system for large commercial buildings, Market-based mechanism for low-carbon heat, boiler phase-out, performance-based rating scheme for large commercial buildings</td>
</tr>
<tr>
<td>Public buildings²</td>
<td>8%</td>
<td>10%</td>
<td>Public Sector Decarbonisation Scheme</td>
</tr>
<tr>
<td>Fuel poor homes</td>
<td>7%</td>
<td>5%</td>
<td>Energy Company Obligation, Home Upgrade Grant scheme, Local Authority Delivery scheme</td>
</tr>
<tr>
<td>Cooking and product efficiency³</td>
<td>0%</td>
<td>0%</td>
<td>Energy-related products policy framework</td>
</tr>
<tr>
<td>Unexplained emissions reduction</td>
<td>-</td>
<td>18%</td>
<td>Share of expected abatement that cannot be accounted for by policy proposals</td>
</tr>
</tbody>
</table>


Notes: Estimated shares of abatement for each policy measure are based on CCC calculations. We used CCC assumptions on the amount of abatement that specific measures can deliver, developed as part of our Sixth Carbon Budget advice, and applied these to the Government’s own projections for policy delivery (such as the number of heat pumps being installed per year).

¹,² Not including heat networks
³ Positive direct abatement is cancelled out by negative abatement from electric appliance energy efficiency (due to heat replacement effect)
3. Policy assessment

The Heat and Buildings Strategy (HABS) and the Net Zero Strategy (NZS) outline a policy framework that aims to substantially reduce emissions from buildings over the next 15 years. This should help put the UK on a pathway to Net Zero emissions from buildings by 2050.

These strategies have laid out important high-level decisions on the UK’s approach to decarbonise heating, setting a new policy direction which focuses on a rapid scale-up of supply chains through a market-based approach. It includes a wide range of supportive policies and measures, from funding for the fuel poor, to higher efficiency standards for homes and commercial buildings. These policies cover all different types of building and occupant, although not comprehensively and many plans are not yet complete.

Our assessment of the Heat and Buildings Strategy has resulted in a reduction in the risk rating of policies in most areas, including delivery of low-carbon heat, public buildings and support for fuel poor homes. A few key policy gaps remain, in particular around encouraging energy efficiency improvements for owner-occupied homes – the main delivery model for this is a proposed obligation on mortgage providers, which is currently only voluntary and relies on Energy Performance Certificates (EPCs), a metric with known measurement and consistency issues. Other gaps include in funding for public buildings and adequate phase-out dates for boilers in commercial buildings.

The Government’s proposed market-based approach carries significant potential upsides – delivering the buildings transition at least-cost to households without placing additional burdens on the Exchequer. But relying on markets also brings significant delivery risks. The Government must develop policy and provide clarity about how mechanisms work at faster pace than at present for this strategy to be effective.

This section sets out our assessment of the Government’s approach in five sub-sections:

a) The Government’s proposed policies for buildings
b) Policy assessment for all buildings
c) Policy assessment for residential buildings
d) Policy assessment for commercial buildings
e) Policy assessment for public buildings

a) The Government’s proposed policies for buildings

As part of our Sixth Carbon Budget advice, the Committee set out four key pillars to guide Government policy action in decarbonising buildings: setting a clear direction, shifting incentives to favour low-carbon choices, tackling barriers to delivery and ‘getting on with it’ (Figure 3.1). The Government’s proposed set of policies can be mapped to these pillars.
i) Setting a clear direction

The Government has used its strategies and consultations to set out a clear direction for the decarbonisation of heat across most building types, including:

- **New homes.** The Future Homes Standard, which will require all new homes to use low-carbon heat sources, coupled with high fabric efficiency from 2025.

- **Energy efficiency.** Targets for private rented buildings to reach a minimum requirement of EPC C by 2030, where practical, cost-effective and affordable.

- **Low-carbon heating.** Cut-off dates after which new fossil boilers cannot be installed: 2024 for large off-grid commercial buildings, 2026 for off-grid homes and 2035 for buildings on the gas grid.

- **Hydrogen.** A commitment to make a strategic decision on the role of hydrogen in heat by 2026, using the intervening time to run a series of pilot projects and demonstrators to test the viability of hydrogen as a low-carbon option.

- **Public buildings.** An ambitious new target to reduce public sector emissions by 75% of 2017 levels, by 2037.

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**Figure 3.1 Sixth Carbon Budget policy package**

- **1. A clear direction**
  - Clear trajectory of standards towards fossil fuel phase-out
  - Clear signals on the future of the gas grid – critical role for electrification, with hydrogen providing flexibility and as a regional solution

- **2. Making low-carbon financially attractive**
  - Shift relative prices in favour of electricity over gas, value flexible electric loads
  - Further financial incentives
  - Unlock green finance at scale

- **3. Enabling measures**
  - Quality household information with real-world performance measurement
  - Stronger compliance and enforcement
  - Skills and retraining packages

- **4. Getting on with it**
  - Strong early action in new build homes, off-grid, social rented sector
  - Area-based planning and green building passports across the housing stock
  - Energy planning informing RIIO investment cycles

ii) Shifting incentives in favour of low-carbon choices

The Government aims to use a market-based approach to shift incentives, making low-carbon heat financially attractive while providing targeted public funding to boost early-stage market development. This approach hinges on several key measures:

- **Rebalancing gas and electricity prices.** A commitment to address the imbalance in policy costs that currently favours gas over electricity, acting as a barrier to the take-up of heat pumps.

- **Heat pumps.** New obligations (subject to consultation) will require boiler or heat pump manufacturers to deliver a certain number of heat pump installations each year, between 2024 and 2028. This is intended to create demand for heat pumps and help the market to scale up during the 2020s.

- **Energy efficiency.** Consulting on plans for a scheme to rate and benchmark the energy and carbon performance of large non-residential buildings. Targets for the private rented sector would require homes to reach a standard for efficiency before they could be let. Similar, voluntary, targets will also be applied to mortgage lenders, to encourage certain levels of home efficiency at the point of sale.35

- **Heat networks.** Planned regulation for heat networks will give heat network providers the same statutory rights as other utilities and set a limit on carbon emissions from heat networks. Various funding streams will support new heat networks and the improvement of existing heat networks.

- **Public buildings.** New funding commitments for the Public Sector Decarbonisation Scheme, a programme providing grants to public sector bodies to fund heat decarbonisation and energy efficiency measures. A proportion of funds committed to developing heat networks is also expected to go towards heat networks in public buildings. This is expected to help build up supply chains by creating demand for low-carbon heat.

iii) Tackling barriers to delivery

The Government has set out how it will bolster enabling factors, such as skills, finance, planning and innovation. We review these plans in more detail in section 4:

- **Skills.** Taking steps to support the construction workforce to ensure that it grows and has the necessary capabilities to deliver Net Zero. This includes specific policies to support skills needed in buildings decarbonisation, such as launching retraining schemes for construction and reviewing the apprenticeships framework for heating and plumbing, as well as reforms to the wider skills system.

- **Finance.** Providing direct public funding for decarbonisation in fuel poor homes and public buildings. The Heat and Buildings Strategy acknowledges that the scale of investment needed requires private finance. While this is an area of policy which remains under development, priorities include ensuring that SMEs and homeowners can access low-cost loans to support low-carbon heat and energy efficiency improvements.
• **Planning powers for local authorities.** Proposals for heat network zoning will enable local authorities in England to designate areas best suited for heat networks.*

• **Innovation.** Funds have been allocated from the £1 billion Net Zero Innovation Portfolio (NZIP) to tackle questions and develop policies relating to building decarbonisation. This includes support for research competitions and pilot projects covering issues such as retrofits, green home finance, installer skills and energy efficiency.36

• **Household information.** A proposal to advance work laid out in the EPC action plan to improve the information that homeowners have, given known issues around EPC ratings at present.37 This includes steps towards approaches that measure in-use, whole-building energy performance using smart technologies, and improving energy performance with higher standards for product efficiency.

iv) Getting on with it

The Government has followed the Committee’s proposals in expecting new homes and buildings off the gas grid to provide early market stimulus. However, its proposals do not go as far as they could on green passports and local area energy plans:

• **Starting with new homes and buildings off the gas grid.** Using early action in new builds and off-gas buildings to deliver progress on emissions while allowing space for other policies – particularly its market for low-carbon heat – to develop. New homes will be subject to much higher standards from 2025, and new oil boilers will be banned in commercial properties from 2024 and homes from 2026.

• **Measuring energy performance.** Taking steps in an area with many ‘no regrets’ actions, including improvements to efficiency standards for products, and approaches to improve household information. The Strategy misses some easy wins, such as setting out more ambitious plans to improve EPCs so that they more accurately reflect a buildings energy usage and performance, including considering innovations such as Green Building Passports.

• **Local area energy plans.** The government acknowledges the value of Local Area Energy Planning (LAEP) but is yet to bring forwards strong policy proposals that would set a direction here.38

In general, there is a need to move policies forward more quickly. Even in areas where progress has been made, like using early action in new builds, standards could be used to drive progress earlier than what is being proposed. We address these points in greater detail in section 5 of this report.

* Heat network policy is devolved. Scotland has recently developed new regulations for heat network zoning following the passage of the Heat Networks (Scotland) Act 2021. Wales is addressing heat networks as part of its spatial planning policy.
b) Policy assessment for all buildings

The policies set out in the Heat and Buildings Strategy (HABS) and Net Zero Strategy (NZS) represent a significant step forward, with adequate funding commitments in place in several key areas and new proposals covering some previously identified policy gaps:

• The heat pump supplier obligation, heat network zoning proposals and proposed policy for mortgage providers, along with the new timelines for standards in homes off the gas grid and regulations in the private rented sector all help to close previous policy gaps out to the Sixth Carbon Budget period (2033-37).

• Proposals to introduce a minimum energy efficiency requirement for rented buildings by 2030, and to roll-out an in-use performance rating scheme for large commercial buildings are welcome proposals in line with previous CCC recommendations, which have the potential to shift incentives for commercial property owners and tenants.

• The Government has committed £8.2 billion of funding out to 2026 to support decarbonisation in fuel poor homes.*

In several areas, HABS has provided promising policies in the near term. However, the picture in the medium to long term is more uncertain. Figure 3.2 shows the Committee’s assessment of the policy gap left by Government policies for reducing emissions in buildings. Table 3.1 provides an overview of the scoring criteria which informed our judgement:†

• **Between now and 2025** some policies represent firm and funded emission reductions. These policies include programmes to support fuel poor households, such as the Energy Company Obligation, and early-stage funding for heat networks. Other policies, such as minimum standards proposed for the private rented sector, have some risks attached to them, but should deliver the abatement needed at this stage if the Government acts fast to implement and sends clear signals. Other near-term policies carry some or significant delivery risks, including the market-based approach to low-carbon heat and newbuild standards before 2025.

• **Beyond 2025**, a growing share of emissions reduction depends on policies with some or significant delivery risks, or the abatement has no firm policy or funding to deliver it. In addition to the market-based approach to low-carbon heat, which is also a risk earlier in the period, risks from 2025 include heat networks, improvement of energy efficiency in non-fuel poor homes and commercial buildings, and funding to decarbonise public sector buildings.

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* This figure includes £1.6 billion from ECO3 (2018-2022), £4 billion from ECO4 (2022/23-2026), £700 million from the Local Authority Delivery Scheme phases 1 to 3 (2022-2023), the £930 million Home Upgrade Grant, and £960 million from the Social Housing Decarbonisation Fund (2021/22 – 2024/25).

† The Annex at the end of this report provides further details of our methodology to assess and categorise the policies and associated abatement in the Government’s strategies as per the scoring criteria in Table 3.1.
The main policy gaps throughout the period are in funding for public buildings, policies to drive improvements in energy efficiency across all building types, and policies to support small and medium-sized enterprises (SMEs) in small owner-occupied buildings.

The next three sub-sections describe Government progress, policy gaps and delivery risks in detail for residential, commercial and public buildings in turn.

Table 3.1
Scoring criteria for assessing the Heat and Buildings Strategy’s policy proposals

<table>
<thead>
<tr>
<th>Credible policy</th>
<th>Credible policies and / or funding in place, no action needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>No action needed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Some risks</th>
<th>Policies in place, but some adjustment may be needed to mitigate uncertainties, and delivery or funding risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment may be needed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Significant risks</th>
<th>Policies under development, further work needed to enact policies and overcome uncertainties and delivery or funding risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy development needed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Policy gap</th>
<th>Policies are either missing, inadequate, or lack funding, and new proposals are needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>New policy needed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unexplained emissions reduction</th>
<th>Share of expected abatement that cannot be accounted for by policy proposals; justifications or more ambitious plans are needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>New plans needed</td>
<td></td>
</tr>
</tbody>
</table>
Figure 3.2 Risk rating for emissions reductions from policies in the Heat and Buildings Strategy

Reflecting the early stage of many policy proposals, significant delivery risks remain for the Government’s ambition to decarbonise buildings.


Notes: Estimated shares of abatement for each policy measure are based on CCC calculations. Where data on deployment rates (e.g. heat pumps installed per year) was available, we used CCC assumptions on the amount of abatement that specific measures can deliver, developed as part of our Sixth Carbon Budget advice, and applied these to the Government’s own projections for policy delivery. Where this level of detail was not available, we drew on published Government policy proposals, and Sixth Carbon Budget assumptions, to model the rough share of abatement associated with policies. See Annex A for further details on the assessment criteria which informed these scores.
c) Policy assessment for residential buildings (account for 71% of buildings abatement in 2035)

In this section, we assess Government progress in residential buildings against five major policy areas,* starting with the one with the most potential to cut emissions:

i) Low-carbon heat in non-fuel poor homes

ii) Heat networks

iii) New homes

iv) Energy efficiency in non-fuel-poor homes

v) Fuel poor homes

The Government’s strategies introduced new policies and updated existing policies. These changes represent tangible progress since we published our 2021 Progress Report, albeit with more progress still required (Figure 3.3) – policy areas which have been upgraded in their scoring following the Heat and Buildings Strategy include low-carbon heat, heat networks and decarbonising fuel poor homes (Table 3.2).

We have assessed Government policies to decarbonise residential buildings based on credibility and risk (Figure 3.4). Despite progress, policy gaps remain. The Government needs to do more to meet particular challenges, such as improving the fabric efficiency of owner-occupied homes, and driving the adoption of low-carbon heat:

- **Credible policies** (a negligible portion of targeted emissions reduction in 2035) include funding for heat networks until 2025 and abatement in fuel poor homes covered by the extension to the Energy Company Obligation (ECO)† and products policy.‡

- **Policies with some risks** (around 14% of emissions reduction in 2035) include policy around newbuild homes from 2025, covered under the Future Homes Standard, energy efficiency proposals for the private rented sector and abatement in fuel poor homes covered by programmes other than ECO.

- **Policies with significant risks** (54% of emissions reduction in 2035) include:
  - Abatement from low-carbon heat in non-fuel poor homes, where the Government’s policy approach offers significant upside but carries many delivery risks due to its novelty and potential complexity.
  - The unfunded portion of heat networks abatement, beyond 2025, due to uncertainties around funding, market growth and the implementation of zoning proposals.

* A portion of the abatement covered by our assessment follows reductions in emissions associated with Government proposals on cooking, household appliances, device efficiency and garden machinery. These emissions represent a very small fraction of the total, and our policy assessment was broadly positive. As such we have not covered it in depth in the body of this report, although these emissions savings are reflected in our analysis.

† While we have rated this policy as credible, we were unable to estimate its precise emissions reduction impact. It therefore does not appear as ‘credible policy’ (or green) in Figures 3.3 and 3.4. We have taken this assessment into account when scoring overall policy for fuel poor homes as having ‘some risks’, however.

‡ Products policy has an indirect emissions reduction impact that is not reflected in Figure 3.3, which only shows direct emission reductions.
Policy gaps cover 7% of emissions reduction out to 2035, including energy efficiency in owner-occupied and social housing. There is a significant portion of emissions reduction which we have not been able to account for.

- Policy around new build homes out to 2025, ahead of implementation of the Future Homes Standard, due to the likelihood that the standards will not do enough to drive the uptake of heat pumps.

- **Policy gaps** (7% of emissions reduction in 2035) include policy proposals in the owner-occupied and social housing portions of energy efficiency abatement.

- The **unexplained emissions reduction** set out in the previous section, where we have been unable to attribute targeted emissions reduction to a particular Government policy, corresponds to 24% of residential abatement in 2035.

---

**Figure 3.3 The Heat and Buildings Strategy reduced policy gaps in residential buildings, but many delivery risks remain**


Notes: We estimated the share of abatement for each policy measure at the time of the Heat and Buildings Strategy (HABS) publication, based on the above sources. We then scored these abatement chunks, based on how we would have assigned them a risk rating before HABS, and how we assess their risk rating now. See Annex A for further details on the assessment criteria which informed these scores. We have scored the ‘unexplained emissions reduction’ wedge before HABS as ‘policy gap’, as there was less detail on deployment of key measures before HABS and not a clearly defined difference between ‘policy gap’ and ‘unexplained emissions reduction’.
### Table 3.2
Policy assessment of residential buildings progress following the Heat and Buildings Strategy

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>2021 CCC Progress Report</th>
<th>Heat and Buildings Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low carbon heat in non-fuel poor homes</td>
<td>Policy gap</td>
<td>Market-based mechanism is the main delivery model, supported by (proposed) obligations on heat pump manufacturers and phase out dates for fossil-fuelled heat sources</td>
</tr>
<tr>
<td>Heat networks</td>
<td>Policy gap</td>
<td>Heat network funding until 2025 (Green Heat Networks Fund and the Heat Networks Innovation Programme)</td>
</tr>
<tr>
<td>New homes</td>
<td>Interim building regulations uplift likely to only deliver low levels of heat pumps</td>
<td>Funding for heat networks beyond 2025 is unclear, and zoning proposals need work</td>
</tr>
<tr>
<td>Energy efficiency in non-fuel-poor homes</td>
<td>Private-rented sector: proposals for minimum efficiency standards at the point of tenancy</td>
<td>Future Homes Standard still needs to be finalised and implemented; no commitment currently to near Passivhaus levels of efficiency despite need to signal well in advance to allow time to upskill workforce</td>
</tr>
<tr>
<td></td>
<td>Social-rented sector: no clear policy which would either support improvements in these homes, or incentivise homeowners to reach higher standards, has yet been announced.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Owner-occupied: policy gap</td>
<td>Mortgage provider obligation is the main delivery model. But this proposal is currently voluntary, and relies on EPCs, which brings problems. No proposals for regulations at point of sale.</td>
</tr>
<tr>
<td>Fuel poor homes</td>
<td>ECO 3 and ECO 4 fully funded and implemented</td>
<td></td>
</tr>
</tbody>
</table>


Notes: See Annex A for further details on the assessment criteria which informed these scores.

1 The Social Housing Decarbonisation Fund does not explicitly rule out providing finance to owner-occupiers who are able to pay, particularly in mixed-tenure settings, however the scheme is designed to prioritise fuel poor homes.
i) Low-carbon heat in non-fuel poor homes (35% of 2035 buildings abatement)

The Government’s approach to decarbonising heat in non-fuel poor homes relies predominantly on heat pumps, in line with the CCC pathway. The Government’s ambition for deployment of heat pumps in existing homes is similar to the CCC pathway to 2033. Beyond that, deployment accelerates, so that by 2037 the cumulative deployment of heat pumps in existing homes is around 25% higher than the CCC pathway.

The Government’s approach to rolling out low-carbon heat aims to promote the widespread development and adoption of heat pumps at least-cost to the taxpayer by putting an obligation on boiler manufacturers. This approach is being used in other policy areas – like transport, where Government announced an end to sales of internal combustion engine vehicles from 2030, backed by a Zero Emission Vehicle Mandate to drive electric vehicle market development. Supplier obligations have also had some success in buildings in the past, driving higher levels of insulation roll-out until 2012. However, it is a novel approach for roll-out of low-carbon heating, with significant potential upside but also delivery risks.
The Government’s approach to low-carbon heat roll-out relies on three market levers to rapidly grow supply chains while minimising the need for public funding – regulation, rebalanced energy levies and capital funding. This market-based approach aims to rapidly grow supply chains while minimising the need for public funding, drawing on lessons from previous schemes such as the Renewable Heat Incentive and the Green Homes Grant. There are three policy levers which support the goals – regulation, shifting energy levies and limited capital funding:

- **Regulation.** The market frameworks are supported by a (proposed) obligation on boiler and heat pump manufacturers to deliver installations and phase out dates for existing high-carbon heat sources:

  - The obligation would require heat pump and boiler manufacturers to deliver a certain number of verified installations each year. The number would be proportional to the size of the firm. The Government is also considering the possibility of applying the obligation to energy suppliers, rather than manufacturers, drawing on the successful model established by ECO.

  - The Government has yet to define the exact delivery model, or who would administer this programme. But in principle compliance would be enforced through a system of financial penalties on firms.

  - Cost is a major barrier to widespread adoption of heat pumps. The market-based approach aims to drive costs down by creating demand and stimulating competition, while incentivising suppliers to cross-subsidise between boilers and heat pumps when costs remain high (Box 3.1).

  - The obligation is supplemented by targets for boiler phase-out dates, standards in new-build homes (from 2025), and capital funding for low-carbon heat installations – both in fuel poor and non-fuel poor homes (see below).

- **Energy levies.** To support the new market frameworks the Government intends to shift energy levies, which are currently largely placed on electricity, to make it cost-competitive with gas:

  - Most of the options for low-carbon heat depend on electricity. However the current allocation of policy costs makes electricity (an increasingly low-carbon power source) more expensive on a like-for-like basis than natural gas or oil.

  - Shifting energy levies will directly lower running costs for heat pumps in particular, making them more financially viable for owner-occupiers.

  - Despite committing to consult on the issue, Government has made no progress on energy levies since the publication of the Net Zero Strategy in October 2021. While clearly plans must reflect the ongoing energy bills crisis, action is vital and must not be derailed.

  - Shifting energy levies would also fulfil part of the UK’s obligation to phase out inefficient fossil fuel subsidies made at COP26 in Glasgow. Action now would signal the UK’s commitment to the actions agreed in the Glasgow Climate Pact.
The Government is also providing limited demand-side stimulus to low-carbon heat through the Boiler Upgrade Scheme and other funding allocations directed at fuel poor households.

**Capital funding.** The Government is providing limited demand-side stimulus in the form of the £450 million Boiler Upgrade Scheme and other funding allocations directed at fuel poor households:

- This programme will be available to non-fuel poor homes both on and off the gas grid. This should support around 90,000 heat pump installations in total (or 30,000 per year over the next three, similar to the 36,000 installations across the UK in 2020). The extent to which these installations will boost sales, rather than fund people who would have bought a heat pump anyway, is unclear.

- The market will also receive a stimulus from other public and private funding allocations directed at fuel poor households, such as ECO, the Local Authority Delivery Scheme and the Social Housing Decarbonisation Fund. These are covered in more detail below.

This approach is novel, which adds risks and uncertainties. The Government still needs to complete a considerable amount of further policy development. While we do not expect policies to be perfectly designed at the proposal stage, there are immediate gaps and risks which the Government should address:

- Ministers are yet to make key decisions on the market-based mechanism (such as boiler phase-out dates and obligations on manufacturers). This creates uncertainty around what the construction and heat pump industries can expect between now and 2028.

- The Government has not yet provided enough detail on how the various regulatory and support mechanisms – such as the manufacturer obligation – will work. It needs to confirm who the obligated parties are, how targets will be set, and how a potential secondary market for qualifying installations would operate.

- Limited funding and a lack of a firm phase-out date for high-carbon heat sources create demand risk. If these interventions are inadequate, they may limit early market growth, making it difficult or impossible to scale up sufficiently to meet the growing volume of deployment needed from the 2030s.

- The Government should not let the perfect be the enemy of the good. Progress should be made, with policies then refined over time. This process can be de-risked by bringing forwards proposals for robust monitoring and evaluation processes which will allow BEIS to identify weak points in the policy framework on an ongoing basis. Policies can then be adjusted accordingly.

### Actions on low-carbon heat in non-fuel-poor homes

- The Government needs to provide more clarity about its market-based approach by publishing a detailed response to its consultation as soon as possible, preferably before June 2022. This should describe how the manufacturer obligation will work and whether legislation is needed to enable it. If so, draft legislation should be laid during 2022.

- The Government should collect and publish data that describes the growth of the market – such as the relative price of heat pumps and boilers, the size of the installer base, and the volume of heat pumps being produced by manufacturers for the UK market. This will allow a fair assessment of the government’s policies and identify if changes are required.
The Government needs to provide more detail on the role of hybrid systems and hydrogen-ready boilers as bridging options.

### Box 3.1
A market-based approach to low-carbon heat

The Government’s approach to deliver low-carbon heat aims to build up a well-developed market by the late 2020s, allowing homeowners to buy and install heat pumps for prices comparable to a gas boiler. To achieve this cost reduction, and enable hundreds of thousands of heat pumps to be installed each year, the Government has devised a system of policies that aim to help grow supply chains. Supply chains involve manufacturers, vendors, installers and consumers – to make the market work, the policy needs to stimulate demand from consumers while boosting supply to match. Aspects of this relating to skills, finance and regulation are covered in section 4 of this report.

The main driver on the demand-side will be new-build requirements, phase out-dates for oil boilers, coupled with the natural life cycle of heating systems:

- From 2025 the Future Homes Standard will require all new build homes to use low-carbon heating. The majority of these will be heat pumps, with some connected to heat networks and a few using electric resistive heating. The standards need to be supported by a firm commitment to end new connections to the gas grid at the same time.

- From 2026, homeowners with oil boilers will have to opt for a low-carbon alternative when their existing boiler reaches the end of its life. For most of these homes (which are off the gas grid) the primary option will be a heat pump, or some sort of hybrid system.

- Between now and the phase-out dates set out by Government, other interim drivers of demand will include capital funding (such as funding for fuel poor homes, or the £450 million Boiler Upgrade Scheme).

- The boiler phase-out does not necessarily require legislation (which was not needed for coal power, or petrol and diesel cars). If the manufacturer obligation ratchets up to 100% by those target dates, it would give the same effect as a ban.

The manufacturer obligation represents a supply-side intervention:

- This obligation, planned to begin in 2024 would apply to all manufacturers who supply appliances for installation on the UK market, even if they are not a UK-based company.

- As firms will need to meet installation quotas under the obligation, they will be incentivised to find ways to make the manufacture and installation of heat pumps cheaper and more attractive to the consumer.

- The Government is also considering the potential of making installations (defined by certificates or some other form of credit) tradeable, so manufacturers might not need to do the installations directly themselves.

- That could be achieved through cross-subsidising heat pumps from boiler sales, or by driving down heat pump costs or improving the consumer offer.

Businesses have started to respond to this signal, and there is evidence of innovation towards making heat pumps that are cheaper and easier to install:

- One way to offset the cost of a heat pump is through a boiler scrappage scheme. For example, Daikin (a manufacturer) is offering £500 to homeowners who scrap their boiler for one of their heat pumps.

- Octopus Energy (an energy supplier) aims to deliver heat pumps for the same price as a gas boiler by April 2022 (after the Government grant). It has invested money in research and development, and is reconfiguring its supply chains to find cost savings that can be passed on to consumers.

ii) Heat networks (7% of 2035 buildings abatement)

Many heat networks will serve both residential and non-residential properties, but will be governed by a single policy framework. The overarching policy assessment for heat networks is presented here, while our gap analysis splits out the expected share of abatement for residential (Figure 3.4), commercial (Figure 3.5) and public buildings (Figure 3.6).

The Government, in line with the Committee’s analysis, sees district heating as a key part of getting buildings to Net Zero, especially in areas where there is a high density of demand for heat, or where large, low-carbon heat sources are available. The Government has presented policies to grow the amount of heat delivered between now and 2050. These aim to deliver 29 TWh of heat through heat networks by 2035, and 70 TWh by 2050. This is less than the amount in our pathway (80 TWh in 2050).

The Government’s plans rely on a regulatory approach to create new markets which will drive the growth of heat networks. Demand is created through enabling measures and new regulations – including zoning and consumer protections, phasing out new boiler installations, and direct capital funding:

- **Heat network zoning.** The Heat and Buildings Strategy proposes to introduce heat network zones in England by 2025. Under these new rules central and local government would work together to designate zones where heat networks are preferred:
  - Local authorities will have the power to designate an area as a heat network zone. Some building types (for example, large public sector buildings and all new builds) will be required to connect to provide ‘anchor loads’.48
  - A limited amount of ‘gap’ funding will be available to improve the economics of wider roll-out (see below).
  - The Government is developing pilots to determine how zoning could work. These have already started in six cities (Bristol, Birmingham, Greater Manchester, Leeds, Newcastle and Nottingham). These pilots should help to identify measures that can be replicated in other places, and additional, more detailed pilots are being planned.

- **Regulation.** The Strategy provides an indicative timeline suggesting that regulations on a Heat Network Market Framework would come into force before the mid-2020s:
  - The Government has already consulted on this framework and on recovering the costs of heat networks regulation. But it has not yet set out timelines for implementing regulations, beyond committing to table primary legislation in this Parliament.
  - The Government has appointed Ofgem as the heat networks regulator for Great Britain. It is also proposing to legislate for further primary powers to act in this area, in line with recommendations made by the Competition and Markets Authority in 2019.

* For example, industrial facilities or power plants.
Regulatory certainty is a key enabler of private investment, which the Government’s approach hinges on. Until rules around market operation are legislated for, the ability of programmes to leverage private capital will be limited. Legislative action to clarify how the market will operate should be taken without delay.

• **Capital funding.** The Government has provided some capital funding to support the deployment of heat networks, which it intends to use to spur further private investment:

  - Heat networks are not currently cost-competitive with high-carbon heat generation in most areas. The Government is providing capital funding through the £338 million Heat Network Transformation Programme between 2022 and 2025. At least £270 million of this will go to the Green Heat Networks Fund (GNHF) which replaces the earlier Heat Networks Investment Programme (HNIP). The GHNF aims to support new and existing heat networks to move to low-carbon sources, which is an important goal as most existing heat networks, and many of those that are currently under construction or proposed, use high-carbon heat sources, such as gas Combined Heat and Power.

  - The Government expects that this scheme will leverage substantial sums of private capital. Although they do not specify how much, the target for private capital leveraged for the HNIP (which started in 2018 and runs to 2022) was at least £1 billion, roughly three times the amount of public funding provided. However, there is limited evidence that additional money has been leveraged to the extent the Government hoped.

  - The CCC pathway sees capital investment in heat networks of £6 billion to 2025. The amount of committed public funding coupled with private finance could be enough to match the Government’s ambition for heat networks out to 2025, if leveraging of private finance at a 3 to 1 ratio were achieved.

  - There is additional uncertainty beyond 2025, after which point no public funding has yet been committed. There is a risk that the initial stimulus will fail to create strong market conditions to enable progress in the late 2020s without additional public funding, in particular if changes to regulation are slow.

In contrast to heat pumps, where the obligation on manufacturers is designed to bolster supply, there is no corresponding obligation for heat networks. There are significant risks to relying on the market to drive delivery in the absence of such an obligation.

Our assessment reflects these gaps in the market framework and uncertainty over how much private finance will be leveraged.

All the proposals for heat networks apply to England. The GNHF and HNIP also apply in Wales. The Heat Network Market Framework applies to Great Britain. The programmes within the Heat Networks Market Development policy are UK-wide. There is scope for devolved administrations to go faster and further if they choose. More aspects of heat network policy fall under devolved competences and will depend on decisions at the national level.
• The Scottish Government in particular has gone further with its own proposals for heat networks. Scotland has recently developed new regulations for heat network zoning following the passage of the Heat Networks (Scotland) Act 2021.

• Wales is addressing heat networks as part of its spatial planning policy.

**Actions on heat networks**

• The Government needs to implement robust plans for heat zoning. Following the recent consultation this effort should include details on the exact powers and responsibilities that local authorities will have with respect to zoning, and the specific geographies over which these will apply. The Government needs to clarify which areas are a priority for heat networks, and direct corresponding funding and policy support so that they can make progress sooner rather than later.

• The Government should legislate for the new primary powers needed to regulate the growing market for heat networks.

• The Government needs to monitor the effect of funding allocations on market growth, tracking the amount of private investment that is leveraged as a result. The Government should then consider future funding allocations in light of this experience. As it does this, the Government should also coordinate policy support for the growing heat network market with action in other areas, such as industry, construction and hydrogen.

iii) New homes (6% of 2035 buildings abatement)

All new homes need to have high standards of energy efficiency and low carbon heating. This process should also produce homes which are fundamentally more durable, more resilient, cheaper to run, and healthier and more enjoyable places to live.

The Future Homes Standard sets out the Government’s proposed standards for new homes beyond 2025. This should deliver zero carbon ready homes, although there is room for improvement to proposed efficiency standards. The policies that are intended to ramp up to the new standards up to 2025 are less credible, and carry risks which could spill over, and limit the success of the Future Homes Standard.

This section covers the aspects of the Government’s proposed uplifts to newbuild standards where they relate to emissions abatement. Section 4 covers the measures which relate to overheating and adaptation to a changing climate, as well as progress on policies to improve enforcing standards and supporting skills.

The Government has finalised policy to address emissions from new homes from 2025.\(^57\) However, it has missed an opportunity to use the proposed uplift in standards for new homes in earlier years to build capacity within heat pump supply chains:

• **Standards from 2025.** The Government published its response to the consultation on the Future Homes Standard in January 2021. This will come into force in England in 2025.\(^*\)

\(^*\) Similar standards will come into effect in Scotland from 2024 and Wales from 2025.
- From 2025, the standards should deliver emissions reduction in line with the Government’s pathway: they are expected to drive a 75-80% reduction in carbon emissions. But they lack a commitment to ultra-high levels of efficiency, which would minimise running costs and demands on the electricity grid. Higher energy efficiency requirements would see a space heat demand of 15 kWh/m²/year, sufficient to reduce the requirements for internal heating distribution systems and associated costs.

- These standards will need to be supported by improvements in planning, and the monitoring and enforcement of building regulations, which is currently an area where many local authorities lack sufficient resources (see section 4 of this report for more on this).

- Interim standards. An interim building standards uplift will apply prior to the Future Homes Standard, from June 2022. This includes measures that are supposed to help ratchet standards up towards the levels expected from 2025, while allowing developers to adjust and supply chains to grow:

  - With the interim building standards the Government aims to reduce emissions from new homes by 30% compared to 2013 levels, with improvements in air tightness and fabric efficiency, and increasing uptake of low carbon heat.

  - The standards allow developers to choose their preferred route to compliance. In practice this is likely to mean a gas boiler and photovoltaic panels, rather than a true low-carbon heat option. However, the policy assumes that 50% of housebuilders will comply by installing heat pumps by 2025, and then 100% selecting low-carbon heating once the 2025 Future Homes Standard applies.

There are specific risks in the Government’s approach to newbuild homes:

- There is a risk that there is insufficient capacity to enforce the new standards at the local level. This could compromise the amount of abatement we can expect from new builds.

- The Government’s strategies do not address the issue of embodied carbon associated with constructing new buildings.

- While the Future Homes Standard implies that all new homes should be on low-carbon heat from 2025, the Government has delayed a final decision to phase out connections to the gas grid for new homes.

There are also emergent risks which do not affect new builds directly, but are nonetheless significant to the wider success of the Heat and Buildings Strategy. These arise from the Government’s reliance on action in new builds to support demand-led market growth for heat pumps, and for the skills needed to install them:
• **Demand for heat pumps.** The Government has announced that it will ban new connections to the gas grid for new homes. Without this ban developers will have leeway to continue installing gas boilers in new homes. This would undercut the demand-side support that newbuild policy is supposed to provide to the wider market-based mechanism for heat pumps.1

• **Demand for energy efficiency capabilities.** The modest improvements to energy efficiency implied by the standards are unlikely to create significant demand for new skills (see section 4). In particular, those needed to deliver near Passivhaus levels of efficiency in new homes by 2025, including high levels of air tightness.

**Actions on new homes**

• The Government needs to set out how it will ensure the industry is prepared to deliver heat pumps and high levels of efficiency from 2025 (given the missed opportunity to use the 2021 uplift to reward early movers). This will involve working with developers to emphasise the importance of low-carbon heat in new builds during the period of interim standards (2022-2024). But it will also require coordinated and coherent policies across a range of enablers, particularly skills.

• The Government needs to establish new standards for construction practices. This includes working with the construction industry to introduce practices which minimise the embodied carbon of new build homes.

• The Government needs to provide additional resources to local authorities to ensure that they have the capacity to conduct planning and building standards enforcement.

**iv) Energy efficiency in non-fuel-poor homes (5% of 2035 buildings abatement)**

As well as reducing emissions, improving the fabric efficiency of homes is an important enabling step for low-carbon heat and an important route to reducing costs to households and the wider system. The Government’s strategies acknowledge the importance of improving energy efficiency across the housing stock. However they are not ambitious enough to deliver the deployment of efficiency measures required and they lack a comprehensive policy framework to make it happen.

Tighter regulations for the private rented sector should drive some improvements, but there are major gaps in both policy and funding for the social housing sector (17% of households in England) and owner-occupiers (65% of households in England):62

• **Owner-occupied homes** are the largest single category of buildings and largest share of residential emissions. However, policy proposals for households in this segment (excluding those classified as fuel poor) are very weak:

  – The Government has proposed a new mandatory disclosure, and voluntary target-setting policy for mortgage lenders.63 This aims to

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1 The Government’s deployment projections for low-carbon heat assume levels of housebuilding that are well above the trend. The target of 600,000 heat pump installations per year by 2028 expects 200,000 of those to come from new builds – with heat pump connections on top of that. But there have been less than 178,000 completions per year on average between 2000 and 2019.
improve efficiency by creating new incentives at the point of sale or remortgage. Mortgage lenders would be required to disclose the energy performance information of their portfolio. They would be expected (but not legally required) to achieve an average energy efficiency for homes in their portfolio of at least EPC C. This target could be made mandatory if insufficient progress is made.

- This proposed obligation is currently the main policy intended to drive up efficiency standards in able-to-pay, owner-occupied homes. The Government has said that it will look at further regulatory options, focusing on key points in the lifecycle of homes – i.e. point of sale, re-mortgaging, refinancing, and when repairs or improvements are made.

- We classify this as a policy gap. Our analysis for the Sixth Carbon Budget suggests that a standard on mortgage lenders would cover just under half of owner-occupied homes – this could be augmented if standards were applied at the point of sale.

- In addition, while the mortgage lenders proposal is welcome, it is currently voluntary and does not yet have established oversight or enforcement mechanisms. It also relies on EPC ratings, which have known shortcomings, including inconsistencies in measurement and a focus on cost rather than carbon, and need to be reformed (see section 4).

- Proposed minimum standards for the private rented sector are an improvement, but do not go far enough and need to be updated. Legislation to implement these changes is pending following a consultation which closed over a year ago:

  - Currently the majority (around two thirds) of privately rented homes in England and Wales are rated as EPC D or worse. Since April 2020 regulations have required private rented homes to be at least EPC E. Our pathway to Net Zero expects these to be EPC C or better by 2028.

  - In September 2020, the Government consulted on policy proposals to improve the energy efficiency of privately rented homes in England and Wales to EPC C by 2030. The consultation closed in January 2021 and no response has yet been published, despite a commitment in the consultation to publish a response by Spring 2021 and lay legislation to amend the private rented sector (PRS) regulations in the autumn of 2021.

- Social housing. The Government announced that it is considering a long-term regulatory standard for social homes:

  - This standard would require these homes to be at least EPC C, although no target date has been proposed.

  - We assess this as a policy gap. While the Government has stated that it intends to review the Decent Homes Standard currently no clear policy which would either support improvements in these homes, or incentivise homeowners to reach higher standards, has yet been announced.
The key strategic challenge here is for Government to set out a compelling vision for how it will deliver on the EPC C target for the majority (65%) of homes which are owned by the occupants, and where they are currently expected to pay for the upgrades. This needs to be sufficiently ambitious and visible to households, making it as easy as possible for people to invest in their homes. A useful comparator is the decade long KfW scheme in Germany, which is largely self-funding and widely celebrated as a major policy success (see section 4 for more on this).

While there can be a role for targeted incentives (particularly to support early supply chains or more vulnerable households) along with reforms to the tax system, these are unlikely to close the policy gap on their own. Each of these levers will only capture a fraction of the market – and even a strong intervention such as regulation at point of sale (as proposed by Scottish Government, for example) takes time to flow through (Box 3.2).

Ultimately, a package of measures will be needed to realise the Government’s EPC C ambition, with standards announced well in advance working in tandem with supportive policies to reward early movers, and action to tackle barriers. An essential part of this is thinking through the consumer journey. The Government needs to work alongside business to create a clear, joined-up offer which households can have confidence in. This includes a good source of information at household level to inform choices, and skilled, tailored support (e.g. through the role of retrofit coordinator). Section 4 covers these enabling policies in greater detail.

**Actions on energy efficiency in non-fuel poor homes**

- The Government needs to define new and stronger policies that will incentivise or require existing homes to meet high standards of energy efficiency. This approach must be stronger than voluntary self-regulation.

- The Government needs to review the Decent Homes Standard, consult on minimum EPC requirements for social homes, and finalise the delivery mechanism for achieving energy efficiency upgrades.

- The Government needs to develop its understanding of policy options for energy efficiency and publish outstanding responses to consultations. This includes consulting on the potential to use the tax system to incentivise improvements to energy efficiency and publishing a response to the consultation on energy efficiency standards in the private rented sector and legislating to amend regulations accordingly.

- The Government needs to develop more comprehensive policies that will improve access to in-use performance information for households. For example, building on the existing smart meters programme, reforming EPCs and considering Green Building Passports (see section 4).
Standards can be used to drive improvements in energy efficiency, including through regulations on mortgage lenders, tighter standards on renovations and regulations at the point of sale.

### Box 3.2
Options for improving the efficiency of non-fuel-poor owner-occupied homes

There are several standards-based policy levers which can drive improvements in energy efficiency: through regulations on mortgage lenders, tighter standards on renovations and regulations at the point of sale.

In the Sixth Carbon Budget Balanced Pathway, we focussed on regulations on lenders and at the point of sale:

- We assumed that the former are introduced in 2025 and point of sale standards come into force in 2028 (Figure B3.2).

- The roll out of energy efficiency measures is then a function of the portion of the market which is captured by each of these levers. For instance, if a third of owner-occupiers have a mortgage, and 10% of those renew in a given year, then 3% of the overall market would be subject to these measures in that year. Similarly, for point of sale, some similar percentage of market turns over in any given year. We base our assumptions on the current turnover of once every ten years for mortgages and once every 24 years for outright owners.

- Based on these calculations, if homes with mortgages achieved EPC C by 2033, just under half of all owner-occupied homes would be covered.

- An additional 15% of owner-occupied homes would then be covered by 2035, if point of sale requirements were introduced from 2028.

- However, this means that even if standards are introduced along those timelines, only 60% of potential is captured by 2035.

- Homes off the gas grid will need to move faster than homes on the gas grid. There is the need to fit insulation ahead of upgrading heating systems will drive improvements. While there are options such as further financial incentives (subsidies or taxation), these are currently not the preferred route for Government for this segment of the market. There are several possible justifications for this:

  - Widespread use of subsidies could incur significant costs to the taxpayer and could result in lower income households subsidising home upgrades for those who are able to pay, to some extent.

  - Measures to increase the price of carbon (through tax or other means) could raise revenue and incentivise some changes but are unlikely to drive widespread changes without further policy to address barriers (e.g. lack of skilled workforce to implement measures, behavioural barriers).

  - Other policy interventions such as changes to stamp duty or council tax can also play a role, but are unlikely to be sufficient to lead to a full upgrade of the building stock without supporting regulatory approaches.

Ultimately, this underlines the need for early action, with standards announced well in advance, and a strong offer to households which supports them to invest in upgrading their homes.
v) Fuel poor homes (5% of 2035 buildings abatement)

There were nearly 4.2 million fuel poor households in Great Britain in 2018, 3.5 million of which were in England.* About half live in homes rated EPC D or worse.70 Investing in energy efficiency for fuel poor homes not only reduces energy costs, it also improves the quality of life for the people living in them. Over time, the savings on bills from having more efficient homes will help people out of fuel poverty.

Policies to tackle fuel poverty are devolved and Scotland, Wales and Northern Ireland each have their own fuel poverty definitions, targets and strategies.† The geographic coverage of UK Government policies set out in the Heat and Buildings Strategy varies, although most are specific to England.‡ The fuel poverty reduction target in England, which was set in legislation in 2014, is to ensure as many fuel poor homes as reasonably practicable achieve a minimum energy efficiency rating of band C by the end of 2030.

* Estimates for Great Britain undertaken by the CCC based on England, Wales and Scotland official fuel poverty statistics. 2018 is the latest year for which data is available in England and Wales.
† Northern Ireland does not have a target at present – it’s last target is from 2014.
‡ ECO is the exception and applies to all of Great Britain.
The Government has committed to reduce fuel poverty and support those who are unable to pay for energy efficiency and low-carbon heat. It has laid out new policies (and extensions to existing ones) to support this ambition:

- Various schemes will support energy efficiency upgrades and low-carbon heating installation for fuel poor homes. These include the Energy Company Obligation (ECO 4), Home Upgrade Grant (HUG), Social Housing Decarbonisation Fund and Local Authority Delivery (LAD) scheme (see Box 3.3).

- Combined committed funding for these schemes equates to nearly £8.2 billion over the period out to 2026. Most policies have funding commitments out to 2024/25, with the exception of ECO, which runs until 2026.

- Additional schemes exist to directly support households with their energy bills. Although these are not necessarily targeted at fuel poor homes, some fuel poor homes will be eligible (see Box 3.3).

The Government’s decision to extend well-established and successful schemes to tackle fuel poverty, such as ECO, should minimise delivery risks. However, more funding may be needed given record high gas prices, and better targeting of existing funding will be essential:

- Although Government funding commitments out to 2026 exceed what our analysis for the Sixth Carbon Budget suggests will be needed to decarbonise fuel poor homes (around £6.6 billion), Government funding is not currently adequately targeting fuel poor homes. The Committee on Fuel Poverty (CFP) estimate that only 20% of planned funding for energy efficiency and assisting households with their fuel bills is allocated to fuel poor homes.*

- As highlighted by the CFP in their 2021 annual report, proposals to improve targeting of the Warm Homes Discount, consulted on in July 2021, have not yet resulted in achieved better results. There are no plans to improve targeting of the Warm Homes Discount or to target Winter Fuel Payments towards fuel poor homes (which was previously a joint recommendation of the CCC and the CFP).71

- As set out in section 1, rising natural gas prices and energy price cap rises could push between 2 and 4 million additional households into fuel poverty.72,73 The pot of public funding allocated to support decarbonisation in fuel poor homes may no longer be sufficient if gas prices stay at current levels.

- While current funding commitments for these policies minimise medium-term uncertainty, their continuation after 2025 is still dependant on the outcome of future budget cycles.

**Actions on fuel poor homes**

- Improve policy targeting, including through better data sharing between departments (see ‘data’ section in chapter 4), to allow households in most need to access the support the Government has made available.

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* This estimate is based on funding commitments for WFP, WHD and ECO in 2022. While this assessment does not include HUG, SHDF or LAD, as the bulk of public funding for fuel poverty goes towards ECO (£4 billion over the period in question) targeting of the overall budget will continue to be inadequate.
- Monitor the impact of energy price rises and inflation on the number of fuel poor households and adjust funding and policy support accordingly.

- Reaffirm long-term commitments to support energy efficiency and low-carbon heating improvements in fuel poor homes.

**Box 3.3**

Existing Government schemes to support low-income and fuel poor households

The UK Government has two main schemes to offset the costs of fuel bills: the Warm Home Discount and the Winter Fuel Payment:

- **Warm Home Discount.** Applied directly to energy bills, with costs borne by the energy company. When established in 2011 the discount paid a rebate of £120 to eligible households (i.e., people who receive the Guarantee Credit element of Pension credit, or are on a low-income and receiving certain means-tested benefits). This amount rose to £140 in 2014 and has stayed at that level since. The value of the Warm Home Discount in real terms has fallen over time, due to rising energy prices and inflation.

- **Winter Fuel Payment.** Provides between £100 and £300 to pensioners in November/December to help heat their homes, regardless of income or fuel poverty status.

In addition, a series of new policies, and extensions of existing policies, have been introduced to support energy efficiency improvements and low-carbon heat roll-out for fuel poor and low-income households:

- **Local Authority Delivery scheme.** Provides funding to local authorities in England to support low-income households living in inefficient properties with improvements of up to £10,000 per household, focusing on gas fuelled homes.

- **Home Upgrade Grant.** Will be introduced in 2022 to support upgrades in the worst-performing homes off the gas grid in England.

- **Social Housing Decarbonisation Fund.** Aims to upgrade a “significant amount” of the social housing stock in England rated below EPC C.

- **Energy Company Obligation.** Began in 2013 and was extended to 2026. It is an obligation placed on the largest energy suppliers to support low income and vulnerable households to install energy efficiency improvements.

In February 2022, in response to record high fossil fuel prices, the Treasury announced plans to implement an **Energy Bills Rebate:**

- The main component of this policy is a de-facto loan. All domestic electricity customers will have £200 discounted from their energy bills from October.

- The Government will cover the costs of this discount, recouping the money over the next five years (£40 per year), starting in 2023, under the expectation that global wholesale gas prices will come down by that point.

- English households living in homes with council tax bands A-D will receive a further £150 which will not need to be repaid. This is expected to benefit 80% of households in England.

- This will offset (but not fully cover) the projected increase in the energy price cap from April. It will not cover any further rises (as expected) in the price cap in October.

As set out, most of the schemes covered in the Heat and Buildings Strategy apply to England only, with the exception of ECO which covers Great Britain. Separate programmes exist in Scotland, Wales and Northern Ireland.

vi) Hydrogen for heat*

Hydrogen is an alternative source of low-carbon heat that may play a role in decarbonising homes. Developing hydrogen as an option is one of the Committee’s recommendations and a goal for the Net Zero Strategy.

The Government has said that it will take a strategic decision on the role of hydrogen by 2026.74 While our Sixth Carbon Budget advice recommended that this happens by 2025, this should still allow enough time for the necessary infrastructure and markets to develop, in a coherent way alongside other policies for heat.

Hydrogen offers some advantages as a source of heat, but also comes with its own downsides and risks:75

- **Potential benefits.** A shift to hydrogen could make use of the existing gas grid for delivery, and hydrogen could in theory be stored in large volumes. Replacing natural gas boilers with hydrogen boilers would likely be a simpler and cheaper form of retrofit than changing homes to heat pumps or heat networks.

- **Risks and downsides.** Hydrogen used in a boiler is inherently less efficient than direct use of electricity in a heat pump, implying either a much larger electricity system or continued reliance on imported gas. Many areas will not have a convenient source of hydrogen and the UK is unlikely to develop enough production infrastructure to entirely substitute hydrogen for natural gas. It is not a viable option to decarbonise homes off the gas grid, and the existing grid may need upgrades to reduce losses of hydrogen gas.


The Heat and Buildings Strategy does not include policies for hydrogen that we can assess in a comparable way to other forms of low-carbon heat (or energy efficiency). Nor can we project the amount of abatement that hydrogen will deliver in 2035 until the Government makes its strategic decision.

However, the Government has proposed a set of policies which will help it make this decision. This is a prudent approach given the costs involved, and the risks associated with being locked into a particular technology choice. The policies are outlined below:

- **Village-scale trials.** Testing the safety and feasibility of hydrogen for heat in a series of trials. This will scale up over time, with neighbourhood trials in 2023 and a ‘hydrogen village’ trial in 2025.

- **Technology development and assessment.** The Government has allocated funding to support innovation in hydrogen heating. Various programmes including Hy4Heat will explore the viability of using hydrogen in a range of appliances – including cookers and fireplaces – over the next few years.

- **Hydrogen production.** Meeting demand for green hydrogen will require the UK to significantly expand its electricity generation capacity. The Government has allocated funding to several programmes which will explore the best options to produce hydrogen at scale.

* Although hydrogen is not assumed to save emissions in 2035 in a central scenario it is an important option for the longer-term and to manage risks of other options under-delivering. Other scenarios could see a larger role for hydrogen.
• **Hydrogen distribution**. The extent to which it is viable to use the existing gas grid to deliver hydrogen needs to be tested. Government projects are looking at the potential to blend hydrogen into the existing gas mix.

• **Hydrogen-ready boilers**. The Government has committed to consulting on enabling or requiring hydrogen-ready boilers to be installed into homes from 2026 in advance of any switch, although this consultation is also overdue.

These approaches are a credible way to de-risk hydrogen as an option and reduce uncertainty. Importantly the Government plans do not delay progress with other options such as heat pumps while the hydrogen option is being developed. Both are needed to set up a genuine and informed decision in 2026. We will continue to assess the Government’s work on hydrogen and provide advice as it moves towards its decision.

As well as determining the feasibility of, and best locations for, using hydrogen, ruling out specific low-carbon heating options for areas which are poorly suited will help local authorities and the private sector to plan and invest. We recommended in our Progress Report in June last year that Ofgem and BEIS identify areas which are unlikely to be suitable for hydrogen, allowing these areas to prioritise electrification or other alternative sources of low-carbon heat. This has not yet occurred.  

We will continue to assess the Government’s work on hydrogen and provide advice as it moves towards its strategic decision in 2026.

vii) Biomethane

Biomethane has some limited potential to help decarbonise the gas grid. The total sustainable potential identified in the Sixth Carbon Budget is equivalent to 1.5 MtCO$_2$e of abatement across all end use sectors. The Government’s approach is in line with the Committee’s advice, recognising that biomethane is low-regrets overall, but is unlikely to play a major role in decarbonisation of buildings.

The Heat and Buildings Strategy sets out plans to increase the amount of biomethane in the gas grid, and aims for the Green Gas Support Scheme to deliver 2.8 TWh of renewable heat by 2031.  The Net Zero Strategy pathway assumes that 12 TWh of biomethane is injected into the grid by 2030 – equivalent to 2 MtCO$_2$e of abatement relative to natural gas.

We have not been able to assess the contribution of biomethane to emissions reductions in the Heat and Buildings Strategy pathways. If the abatement is attributed directly to the buildings sector then it could account for part of the ‘unexplained emissions reduction’, although this would only cover a small proportion of the gap given Government’s recognition of the limited potential for biomethane in decarbonising buildings.
d) Commercial buildings (14% of 2035 buildings abatement*)

In this section, we consider commercial buildings, dividing emissions reduction into energy efficiency measures, heat networks, and low-carbon heating more generally.

Policy proposals in the Heat and Buildings Strategy also represent tangible progress in commercial buildings (Figure 3.5). Since the Committee’s 2021 Progress Report, proposals for boiler phase-out dates for both on- and off-grid non-domestic buildings have been put forward, and funding has been announced for heat networks across all buildings, including commercial buildings. Policy proposals for energy efficiency have not changed (Table 3.3).

We have estimated the expected abatement from proposed policies, using data from published Government policy proposals and consultations and, where this is limited, making assumptions based on the Sixth Carbon Budget pathways. We have then assessed Government policies to decarbonise commercial buildings based on credibility and risk. A significant proportion of the required emissions reduction from commercial buildings is covered by policies. However, many face significant delivery risks as policies are not finalised and risk delays and limited enforcement (Figure 3.6):

- **Credible policies** (2% of emissions reduction in 2035) include heat networks abatement covered by policies that are funded, including assumed funding from private investment (see heat networks sub-section in residential buildings).

- **Policies with some risks** (23% of emissions reduction in 2035) include most of the expected abatement from the EPC B requirement for the private-rented sector (as it is not yet finalised) as well as the proposal to phase-out off-grid boilers from 2024 (as it is still under consultation).†

- **Policies with significant risks** (34% of emissions reduction in 2035) include the remaining abatement from heat networks that is not yet funded; and emissions reduction as a result of the performance-based rating scheme, as details are still being developed, and may not be finalised at sufficient pace.

- **Policy gaps** (41% of emissions reduction in 2035) include owner-occupied small commercial buildings, where there is not yet a policy proposal or funding in place, as well as the remaining abatement from low-carbon technologies in on-grid commercial buildings.

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* Not including heat networks, which are calculated as a distinct category.
† Except for abatement in the early 2020s, which we assess may be slower than the Government impact assessment assumes, and which we rate as carrying ‘significant risks’.
Figure 3.5 The Heat and Buildings Strategy reduced policy gaps in commercial buildings, but many delivery risks remain.


Notes: We estimated the share of abatement for each policy measure at the time of the HABS publication, based on the above sources. Due to limited published data on the scale of abatement from some policies, there is a degree of uncertainty associated with the shares of abatement. We then scored these abatement chunks, based on how we would have assigned them a risk rating before HABS, and how we assess their risk rating now. See Annex A for further details on the assessment criteria which informed these scores.
### Table 3.3
Policy assessment of commercial buildings progress following the Heat and Buildings Strategy

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>2021 CCC Progress Report</th>
<th>Heat and Buildings Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low-carbon Heat</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat networks</td>
<td>Policy Gap</td>
<td>Heat Networks Improvement Programme funding to 2025 (including from private sector)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Funding gap post-2025</td>
</tr>
<tr>
<td>Boiler phase-out</td>
<td>Policy Gap</td>
<td>Proposal to phase-out off-grid boilers in 2024</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Late phase-out of gas boilers (2035) and limited plans for ending gas boilers in new builds</td>
</tr>
<tr>
<td><strong>Commercial Buildings – Energy Efficiency</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private rented</td>
<td>Proposals for EPC B by 2030 – at advanced stage of development</td>
<td></td>
</tr>
<tr>
<td>Large</td>
<td>Performance-based rating policy – under development</td>
<td></td>
</tr>
<tr>
<td>Small owner-occupier</td>
<td>Policy gap – consultation planned</td>
<td></td>
</tr>
</tbody>
</table>


Notes: See Table 3.1 for further details on the assessment criteria which informed these scores.

1 This assessment of low-carbon heat applies across public and commercial buildings.
Figure 3.6 Risk rating for emissions reductions from commercial buildings policies in the Heat and Buildings Strategy

![Figure 3.6](image)


Notes: We estimated the share of abatement for each policy measure at the time of the Heat and Buildings Strategy (HABS) publication, based on the above sources. Due to limited published data on the scale of abatement from some policies, there is a degree of uncertainty associated with the shares of abatement. We then scored these abatement chunks, based on how we would have assigned them a risk rating before HABS, and how we assess their risk rating now. See Annex A for further details on the assessment criteria which informed these scores. Total planned abatement for 2030 was confirmed in the Heat and Buildings Strategy; to make for easy comparison with the situation before HABS, we show the proportions of total abatement for a clearer comparison.

i) Energy efficiency

There are good policy proposals in place for a minimum EPC requirement in privately rented buildings, and a performance-based rating system for large commercial buildings. There is a policy gap for smaller owner-occupied commercial buildings:

- The Government is due to finalise plans to introduce an EPC B requirement for **privately rented commercial buildings**, where it is cost-effective to do so. The latest consultation (March 2021) proposed an interim requirement of EPC C by 2027, and measures to strengthen enforcement (more detail below). The policy would cover the majority of the rented sector, which comprise around 40% of commercial energy use. This is a welcome policy, which broadly aligns with the CCC pathway. It is limited by its reliance on EPCs, and a small policy gap remains for those buildings which will be exempt from the requirement. Following an initial consultation in March 2021, the Government is considering an annual **performance-based rating scheme** for large commercial buildings.
The scheme would start with offices and initially require annual disclosure. Over time ratings could be benchmarked or attached to regulations. This is a welcome policy which applies to the segment of the building stock responsible for over half of commercial emissions. It has the potential to address the ‘performance gap’ (the difference between how buildings are designed and how they actually perform) as it focuses on real-world building performance.

- There is not yet a developed proposal for addressing energy efficiency in smaller owner-occupied buildings, which comprise roughly a fifth of commercial energy use.

The main delivery challenges for commercial energy efficiency policies will be achieving widespread implementation at sufficient pace, improving enforcement of minimum EPC requirements and ensuring the measures used (EPCs, in-use performance) incentivise the most effective investments:

- The performance-based rating scheme is still in relatively early stages, without published timelines for implementation. There is a risk that the impacts of the scheme on emissions only materialise from the late 2020s, as it may take some years to roll-out and scale up the scheme across different commercial buildings and property types, and to introduce benchmarks or regulations relating to minimum performance.

- In relation to the private rented sector proposals, given the historic lack of enforcement and expected increase in rented buildings covered from 10% to 85%, there is a risk of limited compliance. Government plans seek to address this risk by proposing a PRS Compliance and Exemptions database which local authorities can access, and making the EPC requirement apply beyond the point of let, among other things. It remains to be seen if these measures will be sufficient.

- For both the EPC B requirement and the performance-based rating system, their impact on emissions reduction relies on the quality of the measures being tracked. There is a risk if EPCs are not improved (as per previous CCC recommendations) that the potential impact of the policy on energy efficiency and low carbon heating is not achieved. Similarly, it will be important to ensure that the rating benchmarks and targets for large commercial buildings (not yet developed) are sufficiently ambitious.

- Finally, it is important that potential overlapping regulations for large rented commercial buildings (which in future may be subject to regulations covering both EPCs and performance-based ratings) are planned for in advance. If the two policies are not coordinated there is a risk of inconsistent incentives.

Most funding for commercial energy efficiency is expected to be leveraged privately, but SMEs still lack targeted support to deliver efficiency improvements.

- Without targeted support or new business models, SMEs may struggle with the upfront capital costs required for energy efficiency measures. This is particularly likely in the context of the current energy crisis and the impacts of the pandemic on SMEs.

- Since 2019, the government has concluded a call for evidence on a new Business Energy Efficiency Scheme for SMEs, and delivered a £6 million
scheme to develop innovative business models to encourage energy efficiency uptake by SMEs.

- In the Heat and Buildings Strategy, the Government notes plans to provide support to SMEs, but does not specify what these will look like.

**Actions on energy efficiency in commercial buildings:**

- Publishing policy proposals in 2022 to ensure small owner-occupied commercial buildings achieve energy efficiency upgrades by 2030. This could be a minimum EPC requirement for owner-occupied buildings.

- For the performance-based rating scheme: (i) publishing a suitably ambitious timeline for implementing the performance-based rating scheme, to ensure that emissions impacts begin from the mid-2020s (ii) developing proposals to ensure benchmarks and targets used in the performance-based rating scheme are sufficiently ambitious and (iii) making plans for the potential overlap of EPC and performance-based rating requirements placed on large rented commercial buildings.

- For the minimum requirements for the private rented sector: (i) reviewing with key stakeholders such as local authorities whether proposed enforcement improvements for EPCs requirements in the private rented sector are fit for purpose (ii) planning additional or alternative measures to ensure early signals translate into action in the early 2020s and (iii) (as previously recommended) reforming EPCs to ensure the most cost-effective and low-carbon options are recommended and (iv) considering how to support energy efficiency in buildings exempt from the EPC requirement.

- To address potential financing constraints: (i) ensuring the payback calculator for the private rented sector EPC requirement is well-tested and captures planned changes in energy policy costs (ii) setting out plans in 2022 for supporting SMEs to overcome upfront capital costs (iii) publishing an assessment of whether additional access to low-cost finance, or other financial enablers, for larger commercial buildings will be required.

**ii) Low-carbon heating**

There are policies to support the roll-out of low-carbon heating technology to commercial buildings for off-grid buildings and heat networks, but not for large heat pumps:

- The Government is consulting on phasing out installation of new or replacement boilers for commercial buildings off the gas grid from 2024. This is welcome and is slightly ahead of the CCC pathway date (2026).

- The performance-based rating system for large commercial buildings (discussed in the section above) will also create incentives for buildings to switch to low carbon heating, initially by positively recognising a transition to low-carbon heating, with a measure which weights energy consumption based on fuel type. In the longer-term it might do this through initiatives such as a clean heat rating cap (where a building can’t receive a certain star rating unless it is low-carbon).

- **Heat networks** policies discussed in the residential section apply to non-domestic buildings.
• The Government anticipates that 20-30% of non-residential buildings that have the same characteristics as residential buildings will be able to benefit from the market-based mechanism for heat pumps (described in the residential buildings sub-section). No policies are mentioned to directly support the market for heat pumps for larger properties beyond the proposed phase-out of off-grid boilers.

There are insufficient regulatory levers for phasing out gas boilers in new and existing commercial buildings – a late phase-out date for new gas boilers, and slow development of plans to transition to low-carbon heating in new commercial buildings:

• The Government’s planned date for phasing out gas boilers in commercial buildings (2035) is later than is needed. Although there are some other policies which may encourage uptake of low-carbon heating in the 2020s in on-grid commercial buildings (the performance-based rating system for large commercial buildings, and heat networks funding), this still leaves a policy gap in the late 2020s and early 2030s.

• The Government plans to implement the Future Buildings Standard from 2025. It has published welcome plans for an interim uplift in minimum emissions reduction in 2021, and has indicated that from 2025 the Standard will produce buildings which use low-carbon heat. However, so far details on the Standard for 2025 are limited, and the plans to start a full technical consultation in 2023 risk slow signals to the market, and would miss our previous recommendation to introduce the Standards ahead of 2023.

There is likely to be sufficient funding for commercial heat networks up until 2025:

• Based on modelled Government ambition for commercial heat networks,* the funding that has been committed via the Heat Networks Investment Project (HNIP) is sufficient up until 2025.79

• This assumes that for every pound committed by the Government to HNIP, approximately three times as much private or other investment will be leveraged (see section above on heat networks). This assumption is assessed in the residential buildings section on heat networks.

Actions for low-carbon heating in commercial buildings:

• Introducing earlier incentives for a transition to low-carbon heating. This could include an earlier phase-out date for gas boilers, earlier progress on the detail of low-carbon heating requirements in the Future Buildings Standard, and introducing significant low-carbon heating incentives into the performance-based rating system for large commercial buildings as early as possible.

* In our analysis, we assume that 60% of funded low carbon heat network applies to non-domestic buildings, of which 45% applies to public buildings. 45% is an assumption, taken from the CCC pathway, as Government strategies do not state the proportionate split of heat network supply between commercial and public buildings.
The major policy gaps in public buildings decarbonisation identified at the time of our 2021 Progress Report have been addressed by the Heat and Buildings Strategy (Figure 3.7). As shown in Table 3.4, the Heat and Buildings Strategy includes new multi-year funding for public sector decarbonisation and heat networks (some of which can be assumed to heat public buildings). Across both public and commercial buildings it introduced a phase-out date for boilers (discussed in more detail in sub-section d).

We have estimated the expected abatement from proposed policies, using data from published Government policy proposals, and using assumptions from the Sixth Carbon Budget about the level of abatement associated with each pound of public spending. We have then assessed Government policies to decarbonise public buildings based on credibility and risk. A large proportion of public sector abatement is still unfunded and there are risks associated with the delivery of key policies (Figure 3.8):

- **Credible policies** (2% of emissions reduction in 2035) include funded abatement for heat networks, including assumed funding from private investment.

- **Policies with some risks** (10% of emissions reduction in 2035) include emissions reductions covered by funds committed to the Public Sector Decarbonisation Scheme from 2021-25.

- **Policies with significant risks** (45% of emissions reduction in 2035) include abatement which would result from the same annual rate of public sector spend in 2026 and beyond as that committed out to 2025 (i.e. based on the assumption that the same annual funding levels continue beyond 2025).

- **Policy gaps** (43% of emissions reduction in 2035) include heat network abatement that is unfunded, and the remaining abatement for public sector buildings that is unfunded both from 2021-25, and from 2026 if we assume similar levels of funding for the Public Sector Decarbonisation Scheme continue. The unfunded abatement is classed as a policy gap because the policy framework is reliant on funding.
Figure 3.7 The Heat and Buildings Strategy reduced policy gaps in public buildings, but many delivery risks remain.


Notes: We estimated the share of abatement for each policy measure at the time of the Heat and Buildings Strategy (HABS) publication, based on the above sources. Due to limited published data on the scale of abatement from some policies, there is a degree of uncertainty associated with the shares of abatement. We then scored these abatement chunks, based on how we would have assigned them a risk rating before HABS, and how we assess their risk rating now. See Annex A for further details on the assessment criteria which informed these scores.
### Table 3.4
Policy assessment of public buildings progress following the Heat and Buildings Strategy

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>2021 CCC Progress Report</th>
<th>Net Zero Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Buildings - Funding</strong></td>
<td>Lack of multi-year funding</td>
<td>Committed funding 2021-25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assumed similar level of funding 2026-35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remaining funding gap 2021-35</td>
</tr>
<tr>
<td>Public Sector Decarbonisation Scheme</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Low-carbon heat</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat Networks</td>
<td>Policy Gap</td>
<td>HNIP Funding to 2025 (including from private sector)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Funding Gap post-2025</td>
</tr>
<tr>
<td>Boiler phase-out</td>
<td>Policy Gap</td>
<td>Proposal to phase-out off-grid boilers in 2024</td>
</tr>
<tr>
<td></td>
<td>Commitment to phase out gas boilers by mid-2030s, and limited plans for ending gas boilers in new builds</td>
<td>Late phase-out of gas boilers (2035) and limited plans for ending gas boilers in new builds</td>
</tr>
</tbody>
</table>


Notes: See Table 3.1 for further details on the assessment criteria which informed these scores.

1 This assessment of low carbon heat applies across public and commercial buildings. For the policy gap analysis modelling of public buildings, we assign a level of risk based on funding levels for public buildings, rather than wider low carbon heat policies.
The Government’s planned approach to public sector decarbonisation is partly requirement driven:

- Public buildings in designated heat network zones will be required to connect to heat networks within a given timeframe.

- Pending consultation, off-grid public buildings will need to phase-out fossil fuel boilers from 2024. This will apply to approximately 17% of non-domestic buildings.

- These are welcome policies to facilitate the transition to low-carbon heating, which should support the development of heat network zones and supply chains for off-grid low-carbon heating.

The limited requirements the Government has proposed on public buildings, and the nature of public buildings decarbonisation mean funding will be a critical enabler of progress:

- For the 83% of public buildings on the gas grid, there is a relatively late phase-out of gas boilers (2035, rather than 2030 as proposed by the Committee).
• There are limited details in the plans for the Future Building Standard relating to low-carbon heating for new public buildings.

• The nature of ownership of public buildings means funding their decarbonisation will need to come from some public funding source.

• This means most of the abatement in the 2020s will rely on voluntary decarbonisation, making public sector funding a critical enabler of progress.

Multi-year funding for public sector decarbonisation will cover about a third of the abatement needed to achieve the Government’s ambitious aims. Unless there are additional mechanisms for leveraging funding for public sector decarbonisation, this points to a significant funding gap. Additional interventions may also be needed to incentivise energy efficiency in public buildings:

• Building on the initial success of the Public Sector Decarbonisation Scheme, additional funds of £1.5 billion (i.e. around £0.3 billion annually) have been committed for 2021-25. A proportion of the funds committed to heat networks can also be expected to fund low carbon district heating for public buildings.

• We estimate that this corresponds to approximately three-quarters of funding needed to meet the CCC public sector pathway in 2021-25, but only one-third of funding needed to meet the more ambitious Government public sector pathway 2021-25.

• 85% of funds from Phase 3 of the Public Sector Decarbonisation Scheme will be directed to replacing fossil fuel heating systems which have reached their end of life. This may help grow markets for low carbon heating systems – particularly important in light of the relatively late proposed date for phase-out of gas boilers – but leaves a gap in terms of energy efficiency. Strengthened EPC/DEC (Display Energy Certificates) requirements or additional funding may be needed to incentivise energy efficiency improvements.

The proposed governance structure for the public sector decarbonisation scheme is promising, although more oversight will be needed to review if the pace of decarbonisation is meeting Government ambitions. More details are also needed on the accessibility of the scheme to smaller public buildings:

• The Government has set out the expectation that all public sector buildings take steps to reduce direct emissions over the next five years, and that they report progress against their plans and targets, based on guidance which will be provided. If there is limited action, reporting may be made mandatory.

• There is not yet clarity on whether and how the publication and progress against public sector plans will be monitored, which will be important to ensure public buildings stay on track with the fast pace of emissions reduction in the government pathway.

• There are not yet details on how accessible the Public Sector Decarbonisation Scheme will be for smaller public sector buildings.
Actions for public buildings

• Addressing the funding gap for public buildings abatement ambition up until 2025. This could involve committing additional funds, or introducing alternative measures such as regulatory levers or mechanisms to harness economies of scale for public sector retrofit and low-carbon heating. If high energy prices continue, investment in public sector decarbonisation could save public money.

• Introducing earlier incentives for a transition to low-carbon heating. This could include an earlier phase-out date for gas boilers or earlier progress on the detail of low-carbon heating requirements in the Future Buildings Standard.

• Strengthening the governance of public sector decarbonisation plans and progress, so that annual progress in public sector decarbonisation measures and emissions reduction are tracked, and used to inform future funding and policy decisions. This could include an assessment of how accessible funds are to smaller public bodies, and how fully energy efficiency measures are being adopted.
4. Actions to support enablers and adapt to climate change

Section 3 outlined the Government’s policy proposals and progress made since our 2021 Progress Report to Parliament. It also set out policy gaps and the biggest risks to delivery, alongside key actions to address these. This chapter examines progress on ‘enablers’ and adaptation to climate change.

Enablers are a broad set of factors that have a significant bearing on the potential success of the Government’s policies. These include: the size of the workforce and the national and regional availability of relevant skills; access to quality information; the availability of finance; public attitudes towards the Government’s policies; the collection and use of data on buildings and energy use; arrangements for planning; approaches to compliance and enforcement for standards and regulations; and the governance arrangements for delivering key aspects of policy.

The Heat and Buildings Strategy also considers the need to adapt our homes and other buildings to a changing climate. This section assesses these policies and sets out priorities for the Government as it seeks to improve the resilience of the UK’s building stock, alongside decarbonisation.

This section is set out in two sub-sections, with the first split into eight sub-sections:

a) Supporting key enablers
   i) Skills
   ii) Public engagement
   iii) Finance
   iv) Building information
   v) Enforcement and compliance
   vi) Planning
   vii) Data
   viii) Governance

b) Progress on adaptation in the built environment

a) Supporting key enablers

Enablers support, and in some cases create, the fundamental conditions for policy success:

- Action on enablers will help to mitigate short-term supply chain development delivery risks, which is a necessary pre-condition for success with policy in 2025 and beyond. Effective enabling policy can underpin cost reductions that the Government is targeting and support the rapid scale-up in delivery that is required.
• Equally, if the Government does not give enablers sufficient focus, then they risk creating blockages in the policy framework and driving up costs. The Government’s approach to heat and buildings involves many interdependent policies – bottlenecks created by weak policy support for enablers create systemic risks that affect the whole approach to heat and buildings.

i) Skills

Getting buildings to Net Zero represents an opportunity and a challenge for the UK’s construction workforce. The rapid roll-out of heat pumps, heat networks and energy efficiency retrofits will create thousands of new jobs. Most of these will need to be met by reskilling or retraining the existing workforce (Figure 4.2).

![Figure 4.2 Additional FTE requirements for each qualification level and specialist skill](image)

The Heat and Buildings Strategy and Net Zero Strategy emphasise the need to invest in skills and outline steps that aim to grow the skills base needed to decarbonise the UK’s buildings. These include:

• A commitment to publish sector and supply chain development plans for critical low-carbon sectors, working with industry to maximise job opportunities from the Net Zero transition. As part of this, Government will set up an **Energy Supply Chain Taskforce** – a Government and industry partnership set up to guide policy – which will also consider how to ensure that green jobs are high-quality jobs.
• Launching the **National Retraining Scheme**, which alongside the National Skills Fund, aims to support the development of construction training hubs.

• Reforming the skills system through programmes such as the **Lifetime Skills Guarantee**, which supports workers to reskill and retrain, including through Skills Bootcamps in areas like housing retrofit.

• Working with the Department for Education to review the existing apprenticeship framework for heating and plumbing and to develop a **Heat Network Skills Programme** to increase the recruitment pool and capability of the workforce for Great Britain.

The Net Zero Strategy highlights the Government’s commitment to reform apprenticeships set out in the **Skills for Jobs** White Paper in January 2021. This reform includes:

• The creation of **Local Skills Improvement Plans (LSIPs)** to improve the responsiveness of local skills systems to changing employer skills requirements. Eight ‘trailblazer’ schemes were announced in July 2021, which bring together chambers of commerce and local colleges to develop skills improvement plans tailored to the needs of local areas. A bill is being considered which would give the LSIPs an overt requirement to consider and align with Net Zero needs.

• The creation of the **Green Apprenticeships Advisory Panel** by the Institute for Apprenticeships and Technical Education to align apprenticeships to Net Zero objectives and employer needs. Work is underway to map apprenticeship standards to green occupations and consider where new standards are needed in areas such as retrofit.

• The Government’s Plan for Growth also considers the role for **Local Enterprise Partnerships** in working with the Further Education sector, along with a continued commitment to increase levels of apprenticeships.

However, despite these positive steps, a **significant challenge remains** in terms of the pace, scale and coordination needed to grow supply chains over the near term, given varying demands for skills across time and geographically. To avoid bottlenecks in roll-out of energy efficiency and low-carbon heat, plans will need to rapidly address a number of underlying issues in the skills market (Box 4.2):

• In the context of how long it takes for upskilling and retraining of the existing workforce, and training of new entrants, training and support at the local level needs to be aligned with priority demands (e.g. via LSIPs) and time horizons of demands need to be aligned with investment in skills training and provision.

• The lack of incentives to retrain and maintain certifications, lack of apprenticeship places needed to qualify as a heating engineer and the underlying shortage in the construction workforce.

The Government also needs to address fundamental gaps in the way it gathers and analyses **workforce data**. As the Heat and Buildings Strategy notes, there are no Standard Industrial Classifications (SIC) or Standard Occupational Classifications (SOC) for professions in areas such as heat networks and energy efficiency retrofits. The absence of good information makes it difficult to target policies and track their effectiveness.
The Committee will continue to develop insights and provide advice on the changes ahead for the UK’s workforce, regional and sectoral challenges and how the shift in skills demand can be anticipated so it does not present a barrier to rapid progress.

**Actions:**
The UK’s construction workforce needs to grow overall and have the necessary capabilities to meet and support growing demand for low-carbon heat and energy efficiency in buildings. The Government can influence this in several ways:

- Clearly link plans to grow and upskill the workforce to the Government’s delivery pathways for low-carbon heat and energy efficiency, and the skills gap identified in the Heat and Buildings Strategy.

- Identify particular barriers to labour market entry into the occupations that will be needed for the buildings transition, and quickly work to facilitate pathways into these occupations. This should include further action on the skill system to increase apprenticeships, and consider visas and immigration and labour market regulation.

- Set out clear agreements between Government departments – including BEIS, DWP, DfE and the Home Office – that detail how they will coordinate policies to ensure that programmes for skills deliver at the right geographical scale.

There are other skills which the Government needs to consider, such as engineering, inspection, planning, assurance and product testing. The Government should ensure that the right resources are available to organisations that need them – local authorities, LEPs and public bodies – and should consider LSIPs as a mechanism to deliver this.

**Box 4.2**
**Tackling the skills requirements to grow strong supply chains**
The UK’s construction workforce has contracted since 2019. It will need to grow to meet demand for energy efficiency retrofits, heat pump installations and heat networks that the Government has set out with its policies in HABS and NZS:

- In September 2021 the UK had approximately 1.6 million construction workers, around 233,000 fewer than the average of the previous five years, and around 227,000 fewer than in September 2019. The Construction Industry Training Board (CITB) has identified the combination of the COVID-19 pandemic and EU exit as key factors in this contraction.

- The Government notes that 80% of the UK’s 2030 workforce are currently working today. While some of the shortage in construction industry workers can be made up through training new workers, future demand will largely need to be met with existing skills and retraining.

- The Government has recognised that skills shortages could become a major obstacle to the installation of heat networks and identified significant skills gaps in energy efficiency and heat pump installation.

However, despite growing recognition from Government on the need to act, and policy steps taken in the right direction, existing construction workers still lack strong incentives to retrain. This is particularly an issue given that, as recognised by the HABS, most immediate need for heat pump installers will have to be met through retraining, given the three-year qualification period to become a heat engineer.
• Demand for skilled workers in the construction sector is currently high. The ONS estimates that there were around 42,000 vacancies in the construction sector between October-December 2021. This followed a peak demand of around 48,000 vacancies in August-October 2021, the highest level since at least 2001.90

• Wages in the construction sector contracted during the pandemic but have subsequently rebounded, growing faster than the economy as a whole, peaking at 14.4% month-on-month growth in June 2021.91

• CITB research suggests that up to 90% of the buildings sector workforce would be willing to retrain.92 However, the costs of retraining include the course itself and lost earnings. Construction workers currently have plenty of demand for their existing skills and limited demand for new skills. As such they have few incentives to retrain.

• This creates a circular problem, where demand for low-carbon heat and efficiency retrofits cannot grow without skills, but without skills there is no easy way to grow demand.

The process for training new entrants into the market is also subject to bottlenecks, as this requires an apprenticeship and classroom learning to qualify:

• As of 2020, there were fewer than 20,000 apprenticeships in the construction, planning and the built environment sector, only a fraction of which are likely to be in heat installation.93

• The lack of published data breaking down the annual number of diplomas and apprenticeships undertaken in the sector makes it difficult to get a clear picture on the ability of classroom learning to be effectively converted into Level 2-3 National Vocational Qualifications.

The Net Zero transition in buildings will require other capabilities beyond construction across the UK:

• Regional bodies and local authorities with new responsibilities such as local area energy planning and heat network zoning will need new forms of expertise. For example, engineers and geospatial technicians who can help navigate the challenges of coordinating changes in energy use across the buildings, transport, industry sectors.

• Tighter regulations are meaningless without corresponding increases in monitoring, assessment and enforcement. Local authorities will need additional resources to conduct building inspections and ensure that building owners and occupants are being well served by the increased standards.

Notes: We estimated the size of the current workforce using the following SOC (2010) codes: 2121, 243, 3114, 312, 53, 814, 8221, and 912. For comparison the size of the workforce defined by SIC (2007) category F (Construction) was 2,224,865 in September 2021, 85,910 fewer than in September 2021.

ii) Public engagement

Effective public engagement is crucial to a successful Net Zero transition. It involves raising awareness, ensuring public buy-in and enabling access to low-carbon choices.

The necessary switch to lower-carbon choices will not be achieved unless people are engaged effectively during policy design; understand and approve of the rationale for actions towards Net Zero; and can access infrastructure, resources and an environment that makes taking low-carbon choices easy.
Over half of the emissions reduction needed to meet the Sixth Carbon Budget involves people making low-carbon choices, whether adjusting to the different characteristics of low-carbon technologies or by choosing lower-carbon goods and services. This is particularly pertinent in buildings where people will have to make low-carbon choices over the homes in which they live, including adopting low-carbon heating technologies (e.g. heat pumps), improving the energy efficiency of their homes and using their heating systems efficiently.

The Net Zero Strategy recognises the need for public engagement in meeting Net Zero - through, for instance, enabling people to make greener choices and shape and improves policies - but it does not set out how or when the Government proposes to do this.

The Heat and Buildings Strategy also recognises public engagement as a vital element of a successful transition, and commits to ensuring all people are aware of the actions they need to take and how the transition will affect them. Government proposes to do this with measures such as:

- **Information.** Reviewing the effectiveness of channels to provide information on buildings decarbonisation and energy efficiency, such as the Citizens Advice portal. The Net Zero Strategy also proposes to enhance the Simple Energy Advice digital service to provide retrofit advice specific to local areas as well as information on accredited local installers.

- **Strategies and consultations.** The Government sees the Heat and Buildings Strategy itself as a step towards improving public awareness of challenges ahead and options available for buildings decarbonisation. It will also continue to undertake public consultations on policy proposals and collect feedback on policy development, as part of monitoring and evaluation processes.

While media coverage following the Heat and Buildings Strategy publication and on the Net Zero transition more broadly is increasing awareness of the changes needed in buildings, technical documents are unlikely to engage the general public. The Government should monitor progress carefully in this area, including actions and responses from the private sector in response to the market-based mechanisms, and strengthen its own engagement activity as necessary.

The Committee is preparing a report on the key elements of what a comprehensive public engagement strategy should look like, for example with clear milestones for appropriate public engagement processes and delivery partners. It will make recommendations to Government to put forward a positive collective framing for the transition to Net Zero.

**Actions:**

- Develop a public engagement strategy based on the principles set out in the Net Zero Strategy around providing trusted advice, enabling people to make greener choices and shape policies.

- Ensure that the promised review of the effectiveness of current channels to provide information on buildings decarbonisation and energy efficiency results in clear actions to improve household access to information.

- Implement plans to provide tailored information to households on buildings decarbonisation options through the Simple Energy Advice portal.
iii) Finance

In addition to the important role of public funding, private capital will be an enabler that helps homeowners and businesses overcome the upfront capital costs of energy efficiency and low-carbon heating installations. While many of the required investments will pay off over time, payback periods can be long and uncertain.95

The Government recognises that it needs to help develop new green finance markets to benefit homeowners, and the private and social rented sectors. It also notes some initial steps that it is taking to stimulate their growth. These include plans to fund a programme for innovation in the UK green home finance market:

- **Creating demand for green finance products.** The Government recognises that demand for green finance has been low so far, but it has the potential to grow through long-sighted regulatory signals, public engagement, consumer protection and financial incentives for owner-occupiers to invest in low-carbon heating and energy efficiency measures. It also recognises that a range of financial products will be needed, given the variety of consumers, building occupants and heating technologies that exist. Investments may also need to be aggregated to become attractive to large investors.

- **Financial innovation.** The Government has indicated lenders may play a role through offering secured loans, green equity release products and unsecured concessional loans. It also recognises the important role innovative business models such as heat as a service can play. Shortly after the Heat and Buildings Strategy, the Government confirmed plans to provide up to £10 million grant funding via the Green Home Finance Accelerator, to support UK retail lenders to design, develop and pilot a range of financial propositions to encourage domestic energy efficiency and low-carbon heating retrofits.96 The Government has invited the UK Infrastructure Bank (UKIB) to steer the programme. More detail is expected in Spring 2022.

The Government has not outlined in detail its plans for growing the market for **green mortgages.** More detail and concrete plans are needed on creating the conditions for a successful green finance market for home retrofit:

- In February 2021, the Government concluded a consultation on the potential of mortgage lenders in financing green improvements, but it has not yet published its response. The Government should publish its plans for growing the market for green mortgages. This could include using the UKIB to provide access to sources of capital, help de-risk investments, and support new consumer-focussed business models.

- Building on the commitments from Lloyds, RBS and Nationwide to support homeowners to improve energy efficiency, the Government should provide financial providers with incentives and regulatory certainty to develop a range of financial products, not limited to mortgages, that allow people to raise capital for energy efficiency and low-carbon heating.

Beyond standalone financial products, Government should set out a thorough and compelling vision for how it will make it as easy and attractive as possible for **homeowners** to invest in home upgrades. A useful comparator is the ten-year KfW scheme in Germany, which is largely self-funding and widely celebrated as a major policy success:
• 65% of homes in England are owner-occupied and Government plans imply that they would pay for their home upgrades.\textsuperscript{97} Not all owner-occupied homes can be considered ‘able to pay’, and even those that are, will face other barriers.\textsuperscript{98} Making the process of investing in home retrofit as straightforward and reliable as possible will ensure uptake and address any barriers relating to time and uncertainty. This is particularly important given damaged confidence from issues with previous grants for home upgrades.

• In Germany, the state-owned development bank KfW provides low-price loans to homeowners to insulate their houses and improve their heating technology. Set levels of financial support can be accessed depending on the level of energy efficiency achieved and the low-carbon heating technology installed. The KfW programme has been made simpler for homeowners by bundling multiple funding programmes into one, and streamlining the application process. In 2020 KfW provided funding for almost half a million residential units, awarding grants worth almost \texteuro{}27 billion, which could trigger investments of up to \texteuro{}78 billion.\textsuperscript{99}

• Active public engagement efforts are needed to build reliable and widespread demand for such financial products so they can be delivered effectively and at scale.

While the Government expects most funding for commercial energy efficiency to be leveraged privately due to cost savings and regulations, it recognises SMEs may struggle with upfront capital costs. In the Heat and Buildings Strategy, the Government highlights previous schemes to support SMEs and confirms it will support SMEs in future, but does not give details. Government should set out plans for supporting SMEs to overcome upfront capital costs this year.

Actions:
• The Government should develop more concrete plans on supporting the development of green mortgages, wider financial products, structural incentives and innovative business models for homeowners, landlords, local authorities and local communities. The Government could take lessons from the success of the KfW scheme in Germany, and consider the role of the UKIB, blended public-private funding and place-based solutions.

• The Government needs to coordinate efforts by BEIS, HMT, the Financial Conduct Authority and the finance sector in designing regulations which would enable building owners to access the capital needed for building upgrades.

• The Government should publish more details on how to support access to finance for SME energy efficiency measures in smaller owner-occupied buildings. This could include a role for the UKIB.

iv) Building information

Many homes and other buildings across the UK need to improve their energy performance. However, information about this is currently poor. Government policies need to improve the collection of, and access to building information. This will allow building owners to have the confidence to make major spending decisions regarding retrofits. This will also ensure the success of the Government’s regulations relating to minimum standards for Energy Performance Certificate (EPC) ratings.
EPCs in their current form have multiple shortcomings, which we have set out in detail in previous reports, along with suggestions for reform:100

- **A focus on costs rather than carbon.** EPCs are composed of two measures: a cost-based measure and an emissions-based measure. Previous policies have been weak by only focussing on the cost measure. It is welcome that current policy proposals for EPCs in the private rented sector include new approaches that capture emissions considerations.

- **Based on assumptions.** EPCs are based on the Standard Assessment Procedure (SAP) methodology, which models the expected running costs and emissions based on building characteristics. The assumptions this process makes can sometimes lead to inaccuracies in measurement, such as the carbon-intensity of the grid, or the role of flexible technologies. There is a need to update the SAP assumptions, and to ground EPC estimates in real-world data, such as smart meters.

- **Inconsistent measurements.** The measurement of EPCs in properties is often inconsistent, in particular for existing homes.101 The underlying methodology is often applied poorly. This can have major consequences for homeowners, especially where minimum standards are required to let or sell a property.

- **Infrequent measurements.** EPCs are assessed infrequently, often only at the point of sale for many buildings, such as owner-occupied homes. This significantly limits their utility compared to the potential of in-use performance measures.

Minimum EPC requirements for buildings are an important part of the policy package proposed in the Heat and Buildings Strategy, playing a central role in driving energy efficiency uptake, along with a proposed new in-use performance measure for large commercial buildings. This means it will be important to ensure EPCs and the in-use performance measure are fit for purpose.

The Government goes some way in recognising the shortcomings of EPCs in the 2020 EPC Action Plan (referenced in the Heat and Buildings Strategy) and has demonstrated some progress in the updated 2021 EPC Action Plan, published in November 2021, after the Heat and Buildings Strategy. The exploration of the potential for SMETERS data is welcome (see Box 4.3):

- The 2020 EPC Action Plan recognises the need to improve the accuracy of EPC ratings, to move EPCs to better reflect the ‘in use’ performance of a building, including through incorporation of real-world data.

- The November 2021 update to the EPC Action Plan shows some progress in considering ways to improve EPC assessor competence, an update to the Standard Assessment Procedure to account for CO₂ emissions, and exploration of the potential for SMETERS data to make EPCs more accurate, with the intention to report on pathways to integrating SMETERS in March 2022. We will assess this further in our 2022 Progress Report.

However, more ambitious reforms to EPCs are needed to address issues of quality and accurate assumptions. Ultimately this could include moving beyond EPCs towards **Green Building passports**:

- EPCs should integrate in-use performance metrics from 2023, to address the shortcomings of the modelled approach of SAP.
• EPCs should formally integrate a trajectory for declining grid carbon-intensity, in line with government projections.

• EPCs should fully value the benefits of low-carbon and flexible technologies. It is important that alongside the EPC Action Plan, the methodology is designed to drive deployment of the necessary energy efficiency measures on a holistic basis, and does not disincentivise low-carbon heat.

• As raised in our 2021 Progress Report, home retrofit plans, as developed by the Green Finance Institute, are a tailored approach that can include comfort, aesthetics and affordability considerations, and adaptation needs. Combining these with the opportunity of smart meter data in a digital Green Building passport could unlock green finance at scale by providing a robust, quality source of information to raise finance against, track progress and help make standards enforceable.

The proposal in the Heat and Buildings Strategy to introduce a new in-use performance rating for commercial buildings is welcome, and has the potential to incentivise real-world improvements in building energy efficiency and consumption. The focus now should be on ensuring it is sufficiently ambitious and is creating the right incentives:

• Following an initial consultation in March 2021, the Government is considering an annual performance-based rating scheme for large commercial buildings. Over time ratings could be benchmarked or attached to regulations.

• This policy has the potential to have a material impact on building performance. Performance labelling for buildings allows tenants and owners to choose more efficient buildings, encouraging developers to compete for clients willing to pay a premium for efficient buildings.

• It will be important to ensure that the in-use performance rating benchmarks for large commercial buildings, which have not yet been developed, are sufficiently ambitious.

• Current Government proposals are to focus on a measure which, which would standardise different fuel consumption into a single figure, using weightings for different fuels. In theory, the weighted approach should incentivise both a switch to low-carbon heating and energy efficiency measures.

• It is important that potential overlapping regulations for large rented commercial buildings, which in future may be subject to regulations covering both EPCs and performance-based ratings, are planned for in advance.

We will assess the Government’s March update on SMETERS plans in our 2022 Progress report. This should include consideration of working with the Devolved Administrations and the practicalities of moving to in-use data.

Actions:
• Establish a timeline for the introduction of home retrofit passports, expanding on proposals made by the Green Finance Institute and work on in-use performance under the BEIS’ SMETERS programme.
• Implement improvements to the EPC and SAP framework. As set out in our previous recommendations,\textsuperscript{102} this includes committing to integrate in-use performance metrics from 2023, formally integrating a trajectory for declining grid carbon-intensity, and valuing properly the benefits of low-carbon and flexible technologies.

**Box 4.3**

**Smart Meters and the SMETER (Smart Meter Enabled Thermal Efficiency Ratings) Programme**

Smart meters are gas and electricity meters that record half-hourly price and consumption data, and provide automatic meter readings to energy suppliers. Smart meter data can help address the current limitations of SAP and EPCs by building more in-use performance into the measures, resulting in more accurate EPC ratings and more appropriate building improvement recommendations:

- SAP calculates the Heat Transfer Coefficient (HTC) of a building based on construction and design data points.
- The data inputs for SAP do not reflect the individual details of a property, such as airtightness, and so SAP calculates can be inaccurate. This results in EPC ratings which are inaccurate, and sub-optimal recommendations for home improvement measures.
- Using in-use building data from smart meters, rather than SAP modelling assumptions, could lead to more accurate calculations of a building’s HTC, resulting in more accurate and useful SAP and EPC ratings and recommendations.

In recognition of this potential, the Government is running the SMETER (Smart Meter Enabled Thermal Efficiency Ratings) programme, and has committed to considering the role of smart meters in SAP:

- The SMETER programme has developed and tested technologies that measure the thermal performance of homes using smart meter and other data to generate in-use thermal performance metrics.
- This included a trial of different smart meter technologies for their accuracy in calculating HTC as compared to an SAP/EPC assessor. Findings were promising with several technologies performing better than an SAP assessor.
- Larger scale studies covering different building types and an assessment of the practical policy implications of the programme’s findings are now needed.
- The Government has committed to consider potential pathways for including smart meters in SAP 11, which will be rolled out in 2025. This is encouraging, but is slow progress.

More accurate EPC ratings and in-use performance data as a result of smart meters would also help address the performance gap, unlock green finance, inform better targeting of policy measures and engage households:

- Evidence shows there is a performance gap between how buildings are designed and how they actually perform once built or retrofitted. An immediate improvement would be to revise standards to include metrics and certification which focus on as-built performance. Smart meter data could contribute to such metrics.
- As discussed in the section on finance, there is a need for accessible and varied green finance, including green mortgage for home retrofit. Better information on energy use retrofits funded by green mortgages could help build lenders confidence. Smart meter data could contribute to the data used in Green Building passports.
- Smart meter data on building energy efficiency performance could be used to identify which buildings within a given EPC rating(269,633),(979,671) underperforming, to highlight specific issues or measures that are consistently not leading to expected energy savings.
• More generally, smart meter data can help inform and engage households about their energy usage and bills by providing them with information on energy usage and costs. A Government impact assessment found smart meter roll-out would bring net benefit of £1.2 billion per year from 2028.

To date, there has been a gradual roll-out of smart meters across the UK:

• Since 2012 the Government has aimed for all homes to have been offered a smart meter by 2020. The roll-out experienced significant delays: as of March 2021, there were 26.4 million smart and advanced meters in Great Britain, which is approximately 47% coverage.\textsuperscript{103}

• In 2019 the New and Replacement Obligation (NRO) was activated, requiring energy suppliers to install a compliant smart meter when a meter is installed.

• In 2021 the Government set out a framework for minimum annual targets for smart meter roll-out by energy suppliers, with a trajectory for 100% coverage by the mid-2020s.


v) Compliance and enforcement

The Government’s approach to buildings relies heavily on standards and regulation, such as building regulations for new and existing buildings, EPC minimum requirements for the private rented sector and mortgage lender disclosure of average EPC ratings across portfolios. This will only be effective if building standards are maintained, EPCs are measured accurately, and minimum EPC requirements are enforced.

Both new buildings and retrofit installations need to be correctly designed, constructed and commissioned to comply with regulations and perform as expected. The relevant authorities need to monitor and enforce the standards of construction to ensure that completed buildings perform as expected and meet the requirements of users and consumers. This requirement becomes increasingly important as the number of buildings covered by an explicit EPC requirement increases.

**Building Standards.** The Government has proposed new, tighter requirements for energy efficiency and low-carbon heating in new and existing buildings. To translate these into reduced emissions, building standards need to be applied correctly and consistently in new builds and retrofits. This requires stronger enforcement and oversight by Local Authorities:

• Currently, the enforcement of building standards by local authorities is often weak and inconsistent. Limited resources make it hard to meet demand, which risks low-quality installations and building upgrades:

• For most retrofits, compliance with building regulations is achieved through self-certification by installers themselves. There is a risk that without stronger oversight many retrofits will not deliver the promised improvements in energy efficiency.

• The Government recognises the need to ensure more rigour in enforcement of buildings regulations both by Local Authorities and approved inspectors. This means ensuring incentives are well aligned and that Local Authorities have sufficient powers and funding to carry out their role.
Performance measures being assessed accurately. Currently, EPC assessments are commonly inconsistent, infrequent and unreliable. This creates risks, such as properties that appear to meet the minimum EPC level, but in reality are not sufficiently energy efficient:

- For EPCs to be an effective tool to drive policy, they need to be assessed in a consistent, high-quality way, on a regular basis.

- The process for assigning a building an EPC rating needs to be more rigorous, with corresponding oversight.

- Historically, there has been a lack of enforcement of EPC requirements in all properties. The Government has not provided Local Authorities with sufficient powers and funding to carry out their role of enforcing minimum EPC ratings.

Enforcing rules relating to minimum EPCs. The Government intends to use mortgages and leases as levers to drive improvements in energy efficiency standards. For this approach to be effective there needs to be stronger enforcement at the point of lease for tenancies and when disclosing EPCs for a mortgage application.

- The Government has set minimum EPC levels for certain buildings, and expects mortgage lenders to disclose the average EPC rating across their portfolio.

- However, the current policy proposal is for voluntary disclosure, with stiffer requirements being applied if there is inadequate engagement by mortgage lenders. The Government needs to provide more details on how disclosure by mortgage lenders will be encouraged or enforced.

- The proposed policies shift the compliance burden to mortgage lenders, letting agents and landlords. They will have to ensure that properties placed on the market to buy or lease meet certain minimum standards. Organisations that provide lending and letting services will need to be subject to new enforcement to ensure that they comply with these new rules.

EPC minimum requirements. The Government has recognised the challenge of enforcing minimum efficiency standards in buildings. It has put forward proposals to address these, including giving Local Authorities greater powers and increasing the maximum fine level for non-compliance with EPC minimum requirements:

- The Government notes they have provided £4.3 million in funding to 57 Local Authorities to support enforcement and compliance.

- In the September 2020 consultation on introducing an EPC C requirement for privately-rented homes, the Government proposed a range of measures for improving enforcement, including enabling Local Authorities to inspect rented properties, making EPC open data available to Local Authorities and increasing the maximum fine level to £30,000.104

- In the consultation on introducing an EPC C requirement for privately-rented commercial buildings, the Government set out proposals for a new PRS Compliance and Exemptions database that Local Authorities can access.
• The Government conducted a pilot study on how to strengthen monitoring, compliance and enforcement.\textsuperscript{105}

**Retrofit standards and installer certification.** The Heat and Buildings Strategy outlines key developments in the last five years that could help address some of the challenges that relate to retrofit, including updated retrofit standards and installer certification. However, more monitoring will be needed:

• The Heat and Buildings Strategy highlights the Publicly Available Specification (PAS) 2030 and 2035 standards that were published in 2019, and cover the delivery of energy efficiency measures. As of July 2021, they have been made mandatory for all publicly-funded projects, including ECO-funded retrofit projects.

• In the Strategy, the Government points to the Microgeneration Certification Scheme (MCS) which produces product and installation standards for small-scale renewable technologies that allow for certification of products and installers.

• However, these measures do not fully address the challenges of self-certification and insufficient support and incentives for those responsible for enforcing minimum standards.

**Actions:**

• Publish findings from the Government study on strengthening enforcement and its conclusions on enforcement measures for privately-rented buildings in 2022, and continue to monitor how effective these prove to be.

• Consider additional measures to monitor the compliance of qualified installers, approved inspectors and EPC assessors with regulations and minimum standards.

• Ensure sufficient resources for Local Authorities to enforce standards effectively.

**vi) Planning**

There is not a single solution to decarbonise buildings across the UK. Different locations have different requirements, and planning is needed to meet these requirements. This involves decisions at every level of Government; from nationwide strategic choices, such as on hydrogen and building standards, to hyper-local decisions about individual building developments and infrastructure for heat and energy.

The Government is rightly aiming to keep options open. This means moving forward with electrification, hydrogen and heat networks in tandem. To do this successfully will require local and regional approaches, supported by central coordination.

The Heat and Buildings Strategy recognises these challenges and the importance of using local area energy plans (see Box 4.3) to clarify decision-making at every level of Government and deliver a coordinated approach.\textsuperscript{106}
Planning for future network demands. In line with our previous advice, the Government has confirmed it is working with Distribution Network Operators (DNOs) to plan the reinforcement of the electricity network. This will be needed to meet the growing demand for electricity for heat and home EV charging. Taking action now will minimise costs and ensure a smooth transition. This should include prioritising areas off the gas grid, and considering substation capacity:

- Our earlier survey of DNOs showed the need for a clear direction from Government to inform timely investment in grid infrastructure. This is particularly urgent for homes off the gas grid.

- The Government has confirmed plans to work with Ofgem and the DNOs to plan network upgrades to ensure that the electricity system can accommodate the expected demand from buildings and other sectors.

- The Government has also recognised the need for more data on transition networks, including on heat pump installations, and is encouraging data sharing between Ofgem and DNOs.

- This effort should begin with a programme to map substation capacity, and should include an emphasis on areas off the gas grid, where the transition to electrified heat will be earlier.

Local Area Energy Planning. The Government recognises local action is invaluable for effective energy planning. If done well, this will ensure a coordinated approach for rolling out different low-carbon heating solutions in different areas. Work is underway to ensure national-level network planning and local area energy planning are joined up. But a clear policy proposal for local area energy planning, including what plans will include and what methodology underlies them, is needed urgently:

- Regional and local area energy planning and engagement can also minimise disruption and inform timely network investment. While Area-based Energy Planning is not the whole solution, where underpinned by a robust methodology, it can provide better information to facilitate the process and is a hook to engage the public.

- Many local authorities have high ambitions for decarbonisation and the government should utilise this enthusiasm. The Heat and Buildings Strategy recognises the extent to which existing local knowledge, relationships, powers and assets put local authorities in a strong position to lead on planning.

- The Government confirms it is working with Ofgem to assess whether a policy on Local Area Energy Plans (LAEPs) will be developed, and it is coordinating with DNOs to ensure local area planning is linked with electricity network planning. These are welcome developments.

- The next step should be a clear policy proposal for LAEPs. This could include a clear methodology for plans (as standards will be key in ensuring comparability, data aggregation and clarity) and possibly LAEP pilots in areas off the gas grid.
Additional resources and new capabilities. For local authorities to effectively lead the planning process, they will need appropriate resources and capabilities:

- Effective planning requires a breadth of skills, covering areas such as engineering, finance, policy development and carbon literacy.

- While the Strategy emphasises the role that local authorities will play, it does not adequately consider whether Local Authorities have the resources they need to do this. The Government should review the current and expected capabilities that authorities will need and address gaps. This could come in the form of additional direct funding, or new centralised pools of talent that local and regional authorities can draw on as and when they need. This could emulate the existing system of skilled resources provided by the Environment Agency to do flood plain assessments, or the Canadian Government’s ‘free agents’ model, which provides a pool of employees that move flexibly between assignments in line with their skills and in response to needs.109

Standard methods. A single standard for plans will enable comparisons and support consistent approaches across regional boundaries:

- Individual plans need to ultimately join up across regions and the nation as a whole. The process of forming the plans is about making local decisions. But the plans themselves will then be used to inform choices made by DNOs and others. A lack of standards could lead to incomparable plans and data, which will reduce their benefit.

- The Government’s role here is one of coordination, ensuring a consistent approach across the UK. By setting standards decisions can be devolved down.

- This also requires the Government to clearly define planning areas. The UK has numerous administrative regions, which sometimes overlap. To develop an effective planning framework the Government needs to define the specific geographies that plans will cover.

Moving forward with electrification whilst exploring a mix of options, including hydrogen. In line with our previous recommendations, the Heat and Buildings Strategy sets a clear commitment through the 2020s to building the heat pump supply chain and delivering near-term emissions reductions, whilst keeping options for full electrification, or partial reliance on hydrogen, on the table. However, it does not explicitly mention identifying areas where hydrogen will be a priority or unsustainable:

- The Government recognises that for some buildings, like new buildings and buildings off the gas grid, heat pump or heat networks are the priority options; and for those on the gas grid, hydrogen may also be an option.

- In the Heat and Buildings Strategy and Hydrogen Strategy, the Government sets out steps for testing the potential of hydrogen to meet energy demands of buildings on the gas grid, and commits to taking a strategic decision on the role of hydrogen in 2026, following pilots and research.

- Although there are promising plans for researching the role of hydrogen, including pilots and demonstrators, there is less emphasis on identifying specific areas.
The government could set out in more detail how it will identify areas which will be unsuitable and particularly suitable for hydrogen, and the nature of the decisions it will take in 2026.

**Resilience planning.** Planning needs to encompass efforts to make buildings and their local environments more resilient to a changing climate and more supportive of people’s wellbeing:

- There is already a large amount of planning work going on at the local level, particularly with respect to flood risk, led by the Environment Agency.

- Energy planning needs to be added in a way that complements, rather than complicates, existing efforts to plan the built environment.

- Plans for climate adaptation will need to increasingly encompass issues such as air quality, heat stress and resilience to extreme weather events. This needs to be integrated into energy and national infrastructure planning.

**Actions:**

- The Government should set out detailed plans for Local Area Energy Planning, including details on the standards/methodology for the plans. This could include implementing pilots for LAEPs, prioritising areas off the gas grid.

- Detailed local information makes good planning possible. The Government should continue its work to strengthen data sharing between actors such as Local Authorities, Ofgem and DNOs to report on data about issues such as substation capacity, heat network potential, flood risks and strategic infrastructure capacity. Departments such as BEIS, DLUHC and Defra should work with local authorities, and public bodies such as the Geospatial Commission and Ofgem, to develop and share this information.

- The Government should work with Ofgem on a research programme to identify priority areas for hydrogen, and areas that are unsuitable for hydrogen, to enable better planning for low-carbon heating in certain regions.

- The approach to planning needs to be consistent across the UK, and complement existing planning work, such as flooding and air quality. The role of central Government here is to set standards, to identify the appropriate levels of administration to act and empower them, and to create forums for dialogue both between individual local areas and regions, and between those areas and other stakeholders, such as the private sector and national governments.

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**Box 4.4**

*Local area energy planning*

Local Area Energy Planning will be an important enabler of the Net Zero transition in buildings. This is not the whole solution; but better information at a local level will facilitate the overall process.

It is also a hook to engage the public, supporting the democratic legitimacy of the choices to be made. A coordinated approach to planning will encompass decisions about buildings, transportation and grid infrastructure.
The goal of planning is to inform the direction of infrastructure investment at varying levels of geographical scale. Effective planning requires a dialogue between all involved. This can be complex – for example, Lincolnshire is a single authority served by three DNOs.

Every area has its own context: the share of homes on the gas grid, the size and organisation of public transport (particularly bus and tram networks) and the current and future demand for EV charging infrastructure. The local availability of different forms of energy, proximity to industrial clusters, the population density, the availability of skills and capital, and the demographic, social, cultural and economic structure of communities will influence the best options in each area.

It is difficult, if not impossible, for central Government to take these types of decisions. Meeting local needs requires local knowledge and experience – particularly in areas such as planning and standards enforcement – and so devolving powers and responsibilities makes sense.

vii) Data

Data and digital infrastructure can be enablers of the Net Zero transition – allowing for more targeted, effective and responsive policy-making and energy planning. The Heat and Buildings Strategy recognises key areas where data can play a role in enabling building stock decarbonisation, for example to help inform network capacity reinforcement, local area energy planning and flexible consumer tariffs. The Government’s goal is to ‘use data to deliver an informed and co-ordinated approach’.111

There are two broad priorities for buildings data. The first is improving the quality and availability of data on building stock, energy use and network capacity, including using information from smart meters and closing data gaps. Data protection will need to be prioritised. The second is developing policies and processes that improve information flows within Government and between central and local government and the private sector, while maintaining high standards of data protection.

Improved data will also help the Government (and the Committee) to track the progress of its policies. In particular ones that need to drive significant changes in a relatively short time frame – such as market-based approaches to low-carbon heat. More and more of this data can be collected (and analysed) automatically and the Government should explore approaches which enable this, while ensuring safeguards on the storage and use of information. The Strategy acknowledges the importance of indicators to track investment, but could go further to consider other useful data that could be gathered, these include:

- **Information on network capacity**, including the distribution of assets such as heat pumps and heat networks.

- **Smart meter data**. The number of buildings which have smart meters and controls is growing rapidly, from 3,200 in 2012 to 26.4 million by 2021. 47% of all meters are now smart or advanced.112 These are gathering a substantial amount of increasingly granular data about energy use. This could be used to inform planning and enable the half-hourly tariffs which Ofgem announced in 2021 and will come into force in 2025.

Getting the UK’s buildings to Net Zero is a whole-of-government effort. There is a wealth of information, collected by individual departments and public bodies for their own use, that could help support building decarbonisation if shared effectively.
Skills, demographic, socioeconomic and geospatial data can be used to support effective policy development and targeting and should be shared between Government departments.

- **Departmental data.** This includes skills data collected and held by the Department for Education and its arms length bodies, data on financial products held by HM Treasury and its arms length bodies, and specific data on homes, their performance and their local authorities held by DLUHC (the housing department), Defra (the environment department), and others.

- **Official statistics and other information.** It also includes geospatial, demographic and socioeconomic data (e.g. held by HMRC and DWP) – which could be used to enable better planning and targeting for policies and programmes, including for fuel poverty.

The Heat and Buildings Strategy restates the Government’s commitment to make progress on its Energy Digitalisation Strategy, which would be welcome and requires concerted effort across Government. Government leaders should emphasise the need to be more open with data, while carefully protecting sensitive individual data. Key steps to make this make progress include:

- **Data sharing agreements.** Formalising the process for sharing information has the potential to deliver a wide range of benefits. This requires a shift in attitudes within Government with respect to data ownership. Developing new trust frameworks for data sharing will help the Government make progress.

- **Interoperable data standards.** The Government’s Energy Digitalisation Strategy recognises the benefits of standard approaches to data. Standards make it easier to share and analyse data in a consistent way. They also provide ways for different parts of government to assess the work they are doing to avoid duplication of effort.

The Government also recognises the importance of Local Authorities’ access to data on a local area’s energy assets and needs, while being well-placed to engage in local area energy planning. It notes work underway with Ofgem to make distribution network data available to local authorities. This is in line with recommendations the Committee made in our latest progress report and as part of our Sixth Carbon Budget advice.

**Actions:**

- The Government needs to broaden the scope of its data collection efforts, and develop policies which facilitate the collection, sharing and use of data about heat, energy and the built environment. This effort should encompass:
  
  - Recognising the potential to automate data collection and analysis, and ensuring that where this is done there are appropriate safeguards.
  
  - Using data resulting from the increasing coverage of smart meters to improve understanding of energy use in buildings and energy efficiency performance.
  
  - Developing new standards and processes to address the technological and cultural barriers that inhibit data sharing across the private sector and local, regional and devolved government.

- The Government needs to develop new and better indicators to track policy progress, particularly for policy areas like heat pump market development. The relevant departments and agencies should commission data collection against these indicators where it is not readily available.
viii) Governance

Many aspects of buildings policy are devolved. Devolved governments have been developing their own strategies for decarbonising buildings (e.g. notably the Energy Efficiency Strategy and Heat in Buildings Strategy in Scotland) and tackling fuel poverty. And each of Scotland, Wales and Northern Ireland has (or is considering) its own emissions targets. For the UK Strategy to meet its goals and for Scotland, Wales and Northern Ireland to meet their goals, strong coordination and collaboration will be required across buildings policy.

The Government has proposed a complex policy framework that spans large parts of central and devolved governments, and includes the most local levels of administration. This reflects the scale of the challenge and the need to accommodate a wide range of local contexts to successfully decarbonise buildings.

These plans require clear governance arrangements.\textsuperscript{114} The Government needs to establish roles and responsibilities, legislate the necessary powers and ensure that decisions and delivery are coordinated at both the local and national level. The Heat and Buildings Strategy acknowledges the importance of governance in its principles and has taken some steps forward.

• **Clarify roles and responsibilities.** To minimise uncertainty and the risks that follow from that the Government needs to act soon to clarify roles and empower the appropriate organisations to act.
  
  – The Government has already taken positive steps here, designating Ofgem as the regulator of heat networks.\textsuperscript{115} This decision fits with Ofgem’s remit and can leverage its existing capabilities.
  
  – Other areas of governance are less clear. These include the designation of regulators for green finance products, and the proposed secondary market for verified heat pump installations that forms part of the market-based mechanism for low-carbon heat.\textsuperscript{116}

  – Similarly the existing powers, roles and responsibilities of local and devolved government are not wholly adequate to deliver everything that the strategies ask of them.

• **Coordination and coherence.** The Government needs to establish structures and processes that promote coordination and coherence:

  – The Government has established various forums at both the official and ministerial level to coordinate action on Net Zero. These include Cabinet Committees and a dedicated National Strategy Implementation Group, chaired by BEIS. However these seem to have been under-utilised.\textsuperscript{117}

  – In transport the Government recognised the need for a coordinated policy approach and established the Office for Zero Emissions Vehicles. This set up joint teams of officials from BEIS and DIT and seems to have been largely successful. A similar approach in buildings could offer similar benefits,\textsuperscript{118} especially since the policy framework for heat and buildings is complex, extensive, and cuts across a wide range of policy areas.
There is also need for a better dialogue between central Government, devolved government and local government. As more decisions in this area are devolved, the Government needs to establish mechanisms that allow for inquiries and information to flow in both directions.

Actions:

• Work closely with devolved governments when finalising the implementation of the policies proposed in the Heat and Buildings Strategy.

• Through consultations, draft legislation and further policy proposals, clearly define the bodies that will be responsible for delivering programmes and taking decisions. The government needs to outline the specific powers these bodies will have to act, and the accountability mechanisms that will regulate those powers.

• Establish new forums, or develop existing ones, such as the Net Zero Hubs, to promote coordination between different layers of government, and the private sector.

b) Progress on adaptation in the built environment

Action to reduce emissions from buildings, in particular improvements to fabric efficiency, should, if implemented appropriately, also make them more resilient to future changes in climate. The UK can expect warmer, wetter summers and milder winters in the future. The UK’s buildings, in particular the spaces where people spend time – such as homes and hospitals – will need to manage greater extremes. The current stock of buildings is not well suited for this future.

There have been improvements in building design which allow us to deliver homes that stay warm in winter, while cool in summer. However, there is a risk that high levels of energy efficiency installed in new and existing homes can increase the risk of overheating and exposure to indoor air pollutants, if appropriate adaptation and ventilation measures are not implemented at the same time.

The Government needs to act on several fronts to ensure that the UK’s buildings are adapted for future climate change, addressing risks of overheating in homes and other buildings as well as flooding risks.

Overheating. Policy has improved for new homes, but does not address overheating risks in existing buildings:

• Building standards. The publication of an overheating standard within Building Regulations is a significant step forward in addressing one of the most urgent climate risks, but only applies to new build homes:

  – The regulation addresses previous CCC recommendations to mitigate overheating using passive cooling measures where possible, and to ensure that developers consider energy, ventilation and overheating together.

  – However, the standard does not include retrofits of existing buildings or conversions from non-domestic to residential.

• Existing buildings. Although there are now plans to address the issue of air quality in existing homes following energy efficiency retrofits, there are still no plans to increase understanding of overheating risk and adaptation needs, nor action to retrofit existing buildings:
- The Government’s plans for reducing emissions in existing homes also do not include climate adaptation as a key priority, which is a missed opportunity to include passive cooling in retrofit programmes, especially given the risk of increased energy efficiency standards potentially exacerbating the risk of overheating.

- Various steps are also needed to enable and encourage the uptake of adaptation measures for overheating in existing homes, particularly for vulnerable or lower-income groups or those living in homes where it is difficult to make modifications.

  - **Health and social care.** There is still no plan to assess the extent of current and future overheating risks in care facilities, or how a move towards home-based care may alter the risks to patients and healthcare delivery from extreme weather under current conditions and future projections.

  - **Planning reform.** Local planning policies can reinforce the need for new developments to be planned and designed to manage internal temperatures, for example with regards to orientation, shading, building materials, window design, ventilation and green spaces.

**Flooding.** Homes continue to be built on floodplains without appropriate advice or systems in place to address increased flooding risks:

  - **New developments.** A more forward-looking outlook on flood risk is required for new developments. If building on the floodplain continues at the current level, the funding required to build and maintain new defences will continue to rise.

  - **Planning reform.** The planning system is not designed to incentivise ‘green’ Sustainable Drainage Systems, and some homes are being built in areas at risk of surface water flooding without any expert flood mitigation advice.

**Actions:**

  - Ensure that plans for reducing emissions in existing homes also include climate adaptation as a priority.

  - Expand the overheating requirement for new homes to cover refurbishments of existing buildings and conversions of non-domestic buildings to residential.
5. Next steps and managing near-term risks

There are a range of near-term risks which could hinder Government progress against its plans. The major cross-cutting risks we have identified relate to a lack of detail and pace around core policies, the reliance on an untested market-based approach, and driving buildings decarbonisation in the context of rising energy bills.

Over the next few months, we will look in particular for progress in the areas where faster pace and urgent clarification are needed, namely: consulting on rebalancing policy costs from electricity to gas, responding to the consultation on the market-based mechanism for heat pumps, consulting on options for improving energy efficiency of owner-occupier homes and setting out plans to fully deliver public buildings decarbonisation. We will also seek more information from the Government on how it expects to deliver against the ‘unexplained emissions reduction’ gap that we have identified.

Sections 3 and 4 set out actions that are required across the various areas of policy and enabling actions. Figure 5 sets out a timeline for key policy decisions expected in the coming year, as committed by Government, as well as key policy implementation milestones out to the mid-2020s. It also highlights where policy progress is behind schedule and by when gaps must be filled. Over the coming year, we expect to see a reduction in the risks attached to Government policy across the buildings sector as policy is further developed and as the Government clarifies its plans.

This section has three parts, covering the three delivery risks set out above:

a) A lack of detail and pace around key policies

b) Reliance on a market-based approach

c) Delivering buildings decarbonisation in the context of rising energy bills
### Figure 5: Policy implementation timeline

<table>
<thead>
<tr>
<th>Energy efficiency</th>
<th>Implementation</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2023</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning and decisions</td>
<td>Consult on options to improve energy efficiency in non-residential commercial buildings</td>
<td>Plans for supporting SMEs; small commercial owners with retrofit costs</td>
</tr>
<tr>
<td>Call for Evidence on EPC standards for owner-occupied homes</td>
<td></td>
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</tr>
<tr>
<td>EPC standards for owner-occupied homes</td>
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<tr>
<td>EPC standards for private rented homes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPC standards for social homes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review Decent Homes Standard; Consult on EPC update for social homes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Low-carbon heat: General**

- Initiative standards for future homes and buildings come into force
- Introduce hydrogen and other renewable gases
- Consult on Future Buildings Standards: 2025
- Phase out new fossil fuel heating in non-domestic and low-energy buildings off the gas grid
- Future Homes Standards and Future Buildings Standards come into force
- Phase out new fossil fuel heating in homes off the gas grid
- All new boilers off the gas grid are replaced with low-carbon heating from 2024-26
- All new boilers gas are replaced with low-carbon heating from 2030
- All new boilers gas are replaced with low-carbon heating from 2035
- Virtually all heat in buildings is decarbonized

**Low-carbon heat: Hydrogen**

- Gas networks: hydrogen-ready: residential and non-residential
- Neighbourhood trials of hydrogen
- Hydrogen cap trials
- All new boilers are hydrogen-ready
- Strategic decision on the role of hydrogen
- Virtually all heat in buildings is decarbonized

**Low-carbon heat: Heat pumps**

- Decision on heat pump subsidy: household heating or local district heating
- Heat pump work plan: obligations, if needed
- Heat pump achieves obligation in place (until 2035)
- 5 million heat pumps installed in homes
- 1.5 million heat pumps installed in district networks

**Low-carbon heat: Heat networks**

- Combined Heat and Power Quality Assurance Scheme
- Heat network zoning plans
- Legislation for Heat Networks in England by 2024
- Heat network zoning plans
- 50% of heat delivered through low-carbon heat networks

**Enablers**

- Actions to enable the transition to energy-efficient low-carbon buildings, including:
  - Clear plans to grow and upskill the workforce, with sufficient funding and capacity for key stakeholders to implement
  - A public engagement strategy, and mechanisms to provide tailored information to households
  - Clarity on changes to roles and responsibilities across levels of government, and for Local Area Energy Plans
  - Ambitious EPC reforms, integrating in-use performance, SMETEs data and green building passports
  - Strengthened enforcement and monitoring of minimum standards and requirements
  - Strengthened data sharing and join-up across government
  - Simple, accessible and wide-ranging green finance options for home retrofit
  - Integration of adaptation priorities into standards and plans

**Key**

- Necessary adjustments that are not included in the Heat and Buildings Strategy
- Necessary adjustments that are included in the Heat and Buildings Strategy but not in this timeline; we suggest either an earlier date, or a specific date where HASS has no plans.
a) A lack of detail and pace around key policies

As described in sections 2 and 3, the Heat and Buildings Strategy sets a clear long-term ambition and signals future policy intentions. However, in many areas, critical decisions which will inform public and private sector actors are still pending (Box 5):

- Decisions still due in 2022 include ending gas grid connections to new homes, regulations for buildings off the gas grid, specific choices relating to the development of the market-based mechanism for low-carbon heat, minimum standards for the private rented sector, energy efficiency policy for owner-occupier commercial buildings, and heat network regulations.

- Other decisions will need to follow in short order, including a critical choice on the role of hydrogen that needs to be taken before 2026.

The Government needs to wrap up consultations that are underway or have not yet started, provide detail on key policy mechanisms and clarify gaps in strategic decisions. A particular focus will be needed on how different policies relate to (and will support) each other. This will provide the certainty that owner-occupiers, developers and landlords need to act, and invest in improving their properties:

- **Act fast on consultations.** While the Government's consultative approach to policy development is welcome, the time taken between putting out consultations and making decisions on their content is often too long. Given the tight timescales to put policies in place, follow-ups to consultations need to move more quickly:
  - Consultations on several core policy proposals – including rebalancing levies between gas and electricity, and boiler phase-outs for buildings on the gas grid – are pending and should not be delayed further. Many of the issues due for consideration underpin action in other parts of the policy framework for buildings. Delays here risk holding up action elsewhere.
  - The Government has floated ideas for driving improvements to energy efficiency for owner-occupied homes but has not progressed these. Given this is a key policy gap, consultation on proposals should begin without delay.
  - Departments need to act on consultation outcomes quickly to provide clarity on the final status of policies. Consultations that have been completed and await a Government response include the market-based mechanism, heat network zoning, private-rented sector EPC regulation and boiler phase-out dates for certain building types.*
  - **Ongoing consultations** around decisions on energy efficiency – currently a major policy gap – include minimum energy efficiency standards for the private rented sector and performance-based rating schemes for large commercial buildings. Owners and landlords cannot take informed decisions and commit investment until consultations are resolved. A consultation on the role of hydrogen in heat is also still ongoing (see below).

* Covering both residential and non-residential buildings off the gas grid, and new gas-grid connections for new homes.
• **Provide strategic detail in advance of major decisions.** There are still some strategic decisions on future plans that the Government needs to make, including on the role of hydrogen and the final balance of levies on gas and electricity. The Government can reduce uncertainty by narrowing down strategic decisions sooner, and clearly signposting its intentions in advance:

  – The continued lack of clarity around the role for hydrogen could stall plans to electrify heating in areas where hydrogen is not a viable option. As mentioned in section 3, Ofgem and BEIS should identify areas which are unlikely to be suitable for hydrogen, allowing these areas to prioritise electrification or other alternative sources of low-carbon heat.119

  – Similarly, the final balance of levies on energy, and the Government’s timeline for shifting them from electricity to gas, remains unclear. This decision will have direct influence on the viability and appeal of low-carbon heat. Making this decision sooner reduces the risk for all involved in the market – manufacturers, vendors, consumers and regulators.

b) Reliance on a market-based approach

The Government’s plan is to spur market growth so that, within ten years, both the annual number of heat pumps installed and heat delivered by heat networks increase more than tenfold.

To do this, the Government needs to stimulate demand for, and support supply of, these products in tandem. Its proposed approach involves both these levers. Higher standards, new obligations on businesses, and phase-out dates will help to create demand for low-carbon heat by shifting it away from high-carbon sources, such as boilers (see Box 3.1).

The Government will need to continually monitor market development and adjust its interventions accordingly. This will require newbuilds to help to drive demand, and could entail further funding or policy support to boost a lagging market:

• **Monitor key indicators.** Under the Government’s proposals, heat pump installations should scale up by 2028, but wouldn’t be expected to take off before the new mechanism comes in, in 2024. Tracking indicators, such as heat pump deployment, will not give a sense of how the market is developing ahead of the scale up. Forward indicators of preparedness (i.e. the enablers of delivery) need to be tracked to show underlying progress – these indicators should provide a complete picture of the supply chain, including manufacturers, suppliers and installers.

• **Ensure that newbuild homes deliver early market growth.** Government plans include a third of annual heat pump installations between now and 2028 coming from newbuild homes. Plans also assume that newbuild homes will drive demand for heat network connections. The proposed uplift in newbuild standards is intended to nudge developers towards installing more heat pumps, but these can be met without low-carbon heating. There is a risk that weak demand for low-carbon heat from new builds in the near term undercuts the growth of low-carbon heat supply chains. Addressing weaknesses with the Future Homes Standard, as set out in section 3, would mitigate against this risk.
• Support supply chains and the new market frameworks. The Government should be prepared to intervene early on if indicators show that market growth is lagging. Interventions could include new funding, tighter regulation, or action on enablers such as skills, public engagement or planning.

The Committee is developing deeper indicators of real-world progress for our June Progress Report, which will aim to track how the market for heat pumps is scaling up. We will work openly with the Government as we strengthen our approach to annual progress monitoring.

c) Delivering buildings decarbonisation in the context of rising energy bills

The context for decarbonising UK buildings has shifted in recent months.

Record-high wholesale gas prices have significantly increased energy bills and are expected to push many households into fuel poverty (as set out in section 1).

Energy security has become an increasing concern. The goals of the Heat and Buildings Strategy to improve energy efficiency and move away from gas are even more important in this context.

More broadly, the COVID-19 pandemic, and the necessary policy measures put in place to support households and businesses throughout it, have significantly increased fiscal pressures. The period of the pandemic also saw significant increases in house prices across the UK, increasing the wealth of homeowners.

Good heat and buildings policy in this context needs to meet the objectives of cutting carbon, avoiding short-term bills increases and minimising long-term fiscal risks. Some of the Government’s policy proposals align to these objectives.

Moving away from fossil fuels to a renewables-based power system, improving energy efficiency and electrifying heating must continue. If high gas prices continue achieving the Sixth Carbon Budget could result in an overall cost saving of 0.5% of GDP.

• Pushing ahead with the move away from fossil fuels in both electricity generation and heating. Oil and gas prices faced in the UK are set internationally. The best way of reducing the UK’s future exposure to these volatile prices is to cut fossil fuel consumption on the path to Net Zero – shifting to a renewables-based power system, improving energy efficiency and electrifying end uses in heating (and transport and industry). While policy design needs to factor in the current price context, the risk of high gas prices reinforces the need to act. Overall costs of the transition are reduced: our analysis suggests that meeting the Sixth Carbon Budget would result in a saving of 0.5%* of GDP, relative to a high-carbon world where gas prices stayed at current levels.

* Assuming gas prices stayed at 212p/therm (the average price between 1 Jan and 3 March 2022) until 2035.
• **Strengthening energy efficiency policies.** While the costs of delivering energy efficiency upgrades have not changed since our Sixth Carbon Budget advice, their benefits are increased significantly by higher energy prices. Billpayers would save significantly more from insulating their homes and reducing their energy consumption than they would under lower gas prices. The delivery risks set out in relation to energy efficiency, in particular for owner-occupied homes, need to be tackled to ensure these savings can be made. If gas prices are sustained at current levels, there is a case for accelerating this programme even further, and for deeper energy efficiency retrofits, than we have previously recommended.

• **Reviewing the balance of levies between gas and electricity.** As noted in section 4, despite a Government commitment to tackling the imbalance between electricity and gas prices, a consultation on this has not yet been launched. Balancing the three policy objectives set out above will be critical in ensuring that this shift does not disproportionately impact certain groups. Timing is likely to be vital, and the Government has signalled its intention to rebalance prices over this decade. A plausible combination could involve shifting electricity levies to the Exchequer now – cutting bills – and over time ramping up the Green Gas Levy, or alternative carbon pricing mechanism, so that Exchequer impacts are evened out but costs are only added to bills as energy prices (and bills) start to fall again.

• **Better targeting public funding for fuel poor households and increasing support if gas prices remain at current levels.** As set out in section 3, the Government’s schemes to reduce fuel poverty could be better targeted to fuel poor households by using the existing benefits system and improving information-sharing between Government departments (as described in section 3 and in the ‘data’ enabler in section 4). If gas prices continue at current levels, the Government’s current allocation for fuel poor homes is unlikely to be sufficient to meet its objectives, even if better targeted.

The Government has set out its initial response to the energy bills crisis. Any further steps must support the transition to Net Zero, which is the best way to protect UK consumers from high gas prices in the long run.
Endnotes


Independent Assessment: The UK's Heat and Buildings Strategy


Annex A

Approach to assessing policies
We examined the policy proposals and expected emissions savings set out in the Net Zero Strategy, the Heat and Buildings Strategy, and their associated consultations and impact assessments. We then modelled the amount of direct abatement that Government’s policy proposals could deliver. We compared this to the abatement we expected to see according to our Sixth Carbon Budget pathway:

- Our modelling is based on deployment milestones described in the Government’s strategies – such as heat pump installations, or the total amount of heat delivered by heat networks. We also used additional data provided by BEIS.

- We have used our abatement values from the Sixth Carbon Budget as a starting point. We adjusted these relative to the amount of deployment described by policies in the strategies. This has been reviewed at a high-level by BEIS.

Once we had defined the expected abatement over time for different sub-sectors of the buildings sector, we assigned confidence ratings to these blocks of abatement. Our assessment of each sub-sector (and its corresponding modelled abatement) is based on our evaluation of the funding proposals, credibility of policy mechanisms and the delivery risks associated with these policies, for each sub-sector, using the scoring criteria in Table A.1:

- We modelled what level of abatement would be achieved from successful implementation of proposed policies and assessed the delivery risk (including level of funding) associated with each of these policies, assigning them a rating of ‘credible policy’, ‘some risks’, or ‘significant risks’ accordingly.

- Where abatement ambition is not covered by any policies, or it is covered by a policy which is very limited or without required funding, this abatement is characterised as a ‘policy Gap’.

| Table A.1 |
|-----------------|--------------------------------------------------|
| **Scoring criteria for assessing the Heat and Buildings Strategy’s policy proposals** | |
| **Credible policy** | Credible policies and / or funding in place, no action needed |
| No action needed | |
| **Some risks** | Policies in place, but some adjustment may be needed to mitigate uncertainties, and delivery or funding risks |
| Adjustment may be needed | |
| **Significant risks** | Policies under development, further work needed to enact policies and overcome uncertainties and delivery or funding risks |
| Policy development needed | |
| **Policy gap** | Policies are either missing, inadequate, or lack funding, and new proposals are needed |
| New policy needed | |
| **Unexplained emissions reduction** | Share of expected abatement that cannot be accounted for by policy proposals; justifications or more ambitious plans are needed |
| New plans needed | |