MISSION RETROFIT
The Building Mission Zero

RT HON CHRIS SKIDMORE OBE MP
SIMON MCWHIRTER, DEPUTY CHIEF EXECUTIVE,
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We cannot achieve net zero without decarbonising our buildings. The Net Zero Review, Mission Zero, was clear that ‘homes are at the heart of the net zero equation’. Responsible for over 30% of total emissions, tackling the emissions generated from the energy that we do not use is perhaps the most immediate and most effective way we can deliver real term, real time carbon dioxide emissions reductions.

The Net Zero Review set out a 10 year ‘mission’ for ensuring existing buildings are made more efficient and decarbonised at the same time as requiring new buildings to be net zero in their manufacture and design. The report identified key challenges around supply chains, skills, a lack of legislative certainty for future expectations, limited public engagement and advice, culminating overall in high upfront costs for energy efficiency measures and low carbon heating. Along with this ten-year mission for providing greater certainty, clarity, consistency and continuity of policy decision making to the buildings and retrofit sector, in a similar manner to how the KfW has operated in Germany, the Net Zero Review made immediate policy recommendations that the government should implement on buildings (see below) in order to maintain its progress towards net zero.

Following the publication of the government’s response to the Net Zero Review, Chris Skidmore established the Mission Zero Coalition, in order to work alongside organisations and businesses that had contributed to the Net Zero Review, and develop further the recommendations and missions set out in the report.

The Mission Zero Coalition intends to establish several networks, chaired by Chris Skidmore, to conduct further policy and engagement work on each of the ten missions set out in the Mission Zero report. The first two networks formed were the Local Mission Zero Network, which has published its first report, The Future is Local. The Buildings Mission Zero Network has been co-chaired by Simon McWhirter, the Deputy CEO of the UK Green Buildings Council. Other members of the network include:

This report would not be possible without the participation of the following organisation: AW Group, Barratt Homes, Better Buildings Partnership, British Property Federation, Business London, Centrica, the Chartered Institute of Building Services Engineers, the Commercial Real Estate Finance Council Europe, Electric Heating Company, the Energy Efficiency Infrastructure Group, Grosvenor, ISG, Landsec, Lloyds Banking Group, Natwest Group, Paragon Bank, Phoenix, SUEZ and the UK Green Building Council.

Our thanks also go to the Mission Zero Coalition Secretariat, especially Max Austin and Akanksha Sharma for their support.

The Buildings Mission Zero Network has held several evidence roundtables in preparation for this report (see appendix for list). The requirement to decarbonise buildings by 2050 can be divided into both how we reduce the energy demand and emissions from our existing buildings, which presents the vast majority of the net zero buildings challenge, given that most buildings that exist today will still be standing in 2050, and how we ensure that the new buildings we build today do not become the retrofits of the future.

The Net Zero Review highlighted the pressing need for the UK’s Future Homes Standard to be delivering truly net zero homes, as well as ensuring that government and regulations prioritise both embodied carbon and operational emissions in a whole lifecycle analysis of the emissions from future buildings. The Buildings Mission Zero Network through its membership and evidence roundtables has also focused on what further will be needed to deliver this, and how to ensure that all future buildings can be low carbon and not lock in
unnecessary future emissions. The Buildings Mission Zero Network will therefore shortly publish a second report, Building the Future, focusing on new and future buildings, to accompany this report, which focuses solely on our existing building stock, both domestic and non-domestic.

The report is structured as follows:

• **An introduction sets out why decarbonising existing buildings are so important for meeting the UK’s emission reduction targets**, and provides further detail on the Net Zero Review’s specific recommendations to achieve this, and the recent government response and policy announcements concerning retrofit and insulation that have been taken forward as a result of the Review.

• **Part One sets out the opportunity that decarbonising our existing buildings can deliver for the UK**. This opportunity is both a chance to deliver significant economic growth to the UK, to enhance the UK’s energy security by reducing our dependence on foreign-owned gas, to reduce householder’s energy costs and improve their quality of life, and as a result to improve overall UK productivity. Other countries have woken up to the overwhelming potential and positive benefit that retrofit, insulation and clean heat can achieve in both reducing emissions, but also reducing costs, bills and improving energy security: Part One highlights what measures other countries are now adopting and the international programmes established to retrofit and decarbonise homes and buildings.

• **Part Two focuses on the current UK landscape for existing buildings, both domestic and non-domestic**, including commercial and the public estate. It also looks at the current situation with specific technologies and decarbonisation schemes, such as heat pumps and heat networks.

• **Part Three addresses both the challenges and barriers that are currently holding back a retrofit revolution and sets out potential recommendations** that need to be adopted in order to deliver retrofit and insulation measures to reduce energy demand, both at pace and scale.

• **Part Four sets out what a National Retrofit Mission should deliver**, setting outcomes, and framing a Five-Point Plan for how the mission, set across a ten year period, as set out in the Net Zero Review, might be most effectively implemented.
To understand the net zero challenge that buildings present, we only have to look around us. The UK Green Building Council has observed that 80% of the homes that will be occupied in 2050 are the homes that exist now. Over half of all homes in England are built before 1965, and almost 20% before 1919.1 48% of BE emissions are produced by energy use within existing buildings; energy use in homes, 69% of operational emissions of all buildings, accounts for 16% of UK emissions; over half 62% of emissions from homes are from gas boilers.2

Reducing emissions in these 80% of existing properties must be the immediate priority of a National Retrofit Programme; unfortunately at present, we lack a coordinated nationwide National Retrofit Strategy, as proposed across the sector, including by the UKGBC, the EEIG and the National Retrofit Hub.

It is clear that buildings, whether in their existing and future form, present one of the most important challenges and opportunities to achieve net zero, at the same time as reduce our energy demand for fossil fuels. Buildings represent, after surface transport, the second largest emitting sector. They are responsible for 25% of UK greenhouse gas emissions, with around 18% of buildings emissions from the operation of buildings, 6% embodied carbon. If we continue on a business as usual trajectory, projections suggest only a 60% emissions reduction will be achieved compared to 1990 by 2050.

The overall pattern since 2010, as the CCC have observed, is bleak: ‘progress has stalled, with no substantive reductions in emissions’. ‘To reach net zero’, the CCC warns, ‘the Government urgently needs to coordinate a shift in how the UK’s 28 million homes and two million non-residential buildings use energy’.3 In his letter to the Chancellor last year, Chair Lord Deben wrote:
Building emissions have stagnated over the past decade, in large part due to under-investment in energy efficiency. A decade ago 2.3 million energy efficiency measures were installed annually through Government backed schemes. In 2021, fewer than 100,000 were installed. Reducing energy demand in UK buildings is now the biggest gap in current Government energy policy.\textsuperscript{4}

The Net Zero Review called it a ‘lost decade’, adding ‘the UK has experienced years of low home insulation rates. In 2013, government cut support for insulation and rates fell by around 90%, with successive policies failing to resurrect the industry due to being ended early or not funded enough’. This graph published in Mission Zero demonstrates the policy failure surrounding retrofit and insulation:

There are signs of promise, however. In 2022, buildings emissions fell 13% to 76 MtCO\textsubscript{2}, though much of this reduction has been put down to a mild winter in 2022: after temperature adjustments, the fall was only 6% for residential buildings, and a rise of 5% in non-residential buildings.\textsuperscript{5} Certainly it was not due to any additional energy efficiency measures, given the reality that only 204,100 measures were installed through government schemes in 2022.

Since it began in 2013, the Energy Company Obligation (ECO) has delivered around 3.5 million measures in around 2.4 million homes.
properties. Around 9% of households in Great Britain have had an ECO measure installed. Yet the uptake and delivery of ECO has in recent years performed less well compared to previous rounds, with each round consistently delivering fewer installations than before. As the CCC states, ‘the number of government backed retrofits for fuel-poor households and residents of social housing has been insufficient for some years’:

The government has signalled a shift in its approach to reducing energy demand, taking greater action to improve energy efficiency of buildings. In the Autumn Statement in 2022, the government set out:

A new long-term commitment to drive improvements in energy efficiency to bring down bills for households, businesses and the public sector with an ambition to reduce the UK’s final energy consumption from buildings and industry by 15% by 2030 against 2021 levels. New government funding worth £6 billion will be made available from 2025 to 2028, in addition to the £6.6 billion provided in this Parliament. To achieve this target, a new EETF (Energy Efficiency Task Force) will be charged with delivering energy efficiency across the economy.

This 15% energy demand reduction target by 2030, however falls short of the CCC’s balanced pathway of a 24% reduction.

The Net Zero Review: Recommendations and Response

In total, the Net Zero made 15 specific recommendations relating to energy efficiency and existing buildings:

1. Legisllate by 2025 the minimum efficiency rating to EPC B for all non-domestic buildings, both rented and owned by 2030. Legisllate for EPC B rating for all new non-domestic buildings from 2025. (Recommendation 62).
2. Government to drive the creation of sustainable material supply chains and influence market development through its public procurement standards by 2027. (Recommendation 63).
3. UK to continue to show leadership through ambitious public sector decarbonisation by conducting its own trials to ensure alignment with the targets in the Heat and Buildings and Net Zero Strategies. (Recommendation 64)
4. Government should regulate through a suite of measures to create the conditions for sustained growth of new markets for low carbon heat, so that at least 600,000 heat pumps are installed each year by 2028, and up to 1.9 million by 2033. The government should implement the off-gas grid regulations that envisage the end of new and replacement fossil fuel heating systems in the mid-2020s. (Recommendation 107)
5. Government should ensure the right policies are in place to achieve the UK’s demand reduction targets, building on the 2022 Autumn Statement announcement, with interim targets and milestones to hit this goal. Noting the UK’s 2050 Net Zero ambitions the government should publish clear analysis of which mix of policy measures gets the UK to the 15% target and assure future funding for those policies. (Recommendation 109).
6. Government should expand its energy efficiency advice service by 2023, ensuring
that it helps customers to access qualified traders and providers in local areas. (Recommendation 110).

7. Government should support establishing retrofit hubs by 2025 to bridge the gap between households and suppliers. These could enable installers to seek training and impartial advice and could connect households to suitable installers. (Recommendation 111).

8. Government should mandate that EPCs are updated on a regular basis, using a new metric which better reflects current relative costs of heat pump and accounts for wider benefits from low-carbon heating systems. Under this new metric, EPC ratings could become a more holistic Net Zero Performance Certificate (NZPC), giving consumers more detailed information about the heating technology used in the property and its associated financial and social effects. (Recommendation 112).

9. Government should provide certainty by 2024 on the new and replacement gas boiler phase out date to drive industry and investor confidence. The Review recommends bringing the proposed date of 2035 forward and legislating for 2033, including any hydrogen-ready boilers in areas possibly converting to hydrogen in the future.

   Government should set a legislative target for gas free homes and appliances by 2033, to contribute to a gas free grid in future.

   Government should legislate for all homes sold by 2033 to also have an EPC rating of C or above in line with the aforementioned NZPC, with exclusions around certain properties (e.g., listed properties, on grounds of affordability). Government should also mandate landlords to include ‘average bill cost’ alongside the EPC (and possible future NZPC) rating, when letting a property out. This will help renters understand what costs to expect, while also helping to put a premium on energy efficient homes. (Recommendation 113)

10. Government should consider options to support homes to include roof solar panels installation as part of its retrofit provision to support homes reaching the Net Zero Homes Standard. (Recommendation 114)

11. Government should include an Energy Efficiency Taskforce workstream on green finance products to report by end of 2023. This should help to support those in low EPC rated properties to carry out green home upgrades and should identify opportunities to crowd-in private finance, alongside public funding. (Recommendation 115)

12. Government should deliver the Heat Pump Investment Accelerator to catalyse private investment for at least two major heat pump factories in the UK. (Recommendation 116)

13. Government should choose from multiple options which could help increase heat pump efficiency:

   A. Suppliers say this could be done via a mandate stating the minimum efficiency which needs to be achieved by all installations. Government should test whether this could be done by most major installers for most properties.

   B. Set up a heat pump coefficient of performance competition, run for example by the Energy Efficiency taskforce. This will show the technologies with higher efficiencies and allow others to replicate these.

   C. Quality of the installation matters; training and installation standards need to be accelerated to support this. (Recommendation 117).

14. Government should extend the Boiler Upgrade Scheme to 2028 and consider whether grant levels should be increased in light of inflationary pressures, before being scaled down over time. This should happen alongside efforts to increase awareness of government support. Support for those unable to afford the upfront costs associated with improving energy efficiency and moving to low carbon heating systems
should be continued and expanded, namely through the Home Upgrade Grant (HUG), Social Housing Decarbonisation Fund (SHDF) and other existing schemes for low-income households. (Recommendation 118)

15. Government should set the policy framework and supportive investment environment to encourage reskilling and greater training opportunities in the heat pump sector. Work to encourage adoption of standards to increase firms able to take up existing schemes. (Recommendation 119).

Other recommendations in the review, while not explicitly targeted as covering buildings or energy efficiency, were equally relevant for delivering net zero buildings and homes, for instance Recommendation 102 that ‘Government should develop the distributional analysis of net zero policies started by the review in 2023’ and its call for a ‘public engagement plan for England by 2023, to ramp up public engagement on net zero’ (Recommendation 101). Other wider recommendations on net zero delivery that are essential for implementing more effective strategies included Recommendation 7, for an Office for Net Zero Delivery, and Recommendation 8, for ‘Government to consider the case for creating new separate delivery agencies to deliver long-term decarbonisation programmes’, which would be highly relevant and ideal for the newly created Great British Retrofit.

The government responded to the Net Zero Review on 30 March 2023. On the recommendations made covering buildings and energy efficiency, the government stated that:

The Government has consulted on proposals for the private rented sector and will publish the Government response in due course. We will also consider how we can further support greater energy efficiency in owner-occupied commercial buildings.

Specifically on the series of Energy Efficiency recommendations for existing buildings, the government’s response can be collated into the following paragraphs:

On reducing overall energy demand: The Autumn Statement announced a new national ambition to reduce the UK’s final energy consumption from buildings and industry to 15% by 2030 against 2021 levels. To drive delivery of this target we have also established a new Energy Efficiency Taskforce. This has an economy-wide remit, covering homes, businesses, and public sector buildings, as well as industrial processes.

On introducing a wider public engagement strategy: We have been supporting people to reduce energy usage with low and no-cost measures this winter through our ‘It All Adds Up’ campaign. The ‘Find ways to save energy in your home’ advice service on Gov.uk for homeowners builds on this with advice for improving and decarbonising their homes with links to accredited, trusted installers. We will enhance our service by launching regionally led in-person advice pilots in 2023 and are expanding the telephone helpline to also support users. We plan on making continuous improvements over the next 3 years.

On delivering greater supply chain capacity and capability: Government supports bringing gaps between households and retrofit suppliers, and there are several organisations already working in retrofit sector that fulfil some of the proposed role for retrofit hubs. This includes the five government funded Local Net Zero Hubs and TrustMark, the government endorsed quality mark for retrofit. An industry-led National Retrofit Hub has been established, to coalesce industry activity – across technical solutions, market-making, deployment plans and the full gamut of large scale retrofit activity. We are also aware of businesses offering retrofit management services to consumers, assisting them with the process of determining
which measures are appropriate for their home and joining them up with reputable and high-quality tradespeople and, in some cases, links to finance. We will continue to work with the various organisations already undertaking this sort of activity, with advice and input from the Energy Efficiency Taskforce, to consider whether more could be done and whether there is a role for further government support and signposting.

On reforming EPCs and improving data measurements for energy efficiency: The government is currently working on proposals for improving EPC metrics, and intends to consult on these, taking account also of recently published proposals from the Climate Change Committee. The Government also has a continuing programme of user research to improve the way in which information is presented on certificates. EPCs currently have a validity period of ten years and the Government intends to consult on options to change this validity period. We are overhauling the building physics model underpinning EPCs to make it fit for purpose to support net zero. We aim to consult on this new model later in 2023.

On ending of the sale of new gas boilers and gas appliances: The Government has an ambition to phase out all new and replacement natural gas boilers by 2035 at the latest, and will further consider the Independent Review of Net Zero’s recommendation in relation to this. In relation to appliances, the Energy-Related Products Framework sets out the Government’s plans for improving and building on energy efficiency policies like minimum standards where they can achieve additional benefits to consumers, businesses and our Net Zero objectives. As part of this, we will improve minimum energy performance standards and energy labelling requirements for energy-using products, including consulting on updating lighting requirements until April 2023, and on other products over the next year. We will continue this work and explore the implications of a 2033 target date on other types of gas appliances. We will respond to the consultation on improving home energy performance through lenders and we are planning to consult by the end of this year on how to improve the energy efficiency of owner-occupied homes.

On encouraging wider heat pump deployment: The Government is putting in place a number of measures to reach the ambition for 600,000 heat pump installation p.a. from 2028, including plans for regulations. This includes regulating for the Clean Heat Market Mechanism which will help transform the heating appliance market in the UK. We have consulted on phasing out new and replacement fossil fuel heating systems for off gas grid properties, and will respond to these consultations.

The government is launching the Heat Pump Investment Accelerator in 2023 to unlock significant private investment in the heat pump market, boosting our energy security and providing long term, secure net zero jobs. The government intends to consult on raising minimum performance standards as committed to in the Energy-Related Products Policy Framework to ensure industry makes improvements to the minimum efficiency of heat pumps. We are also supportive of doing more to incentivise lower lifetime costs and improved efficiency of heat pumps through our innovation programme and will consider the viability and options for delivering further support. The government is committed to improving the skills of the workforce to drive improved the performance of heating systems. On 2 March 2023, Government announced an additional £5 million to support low carbon heating training, expected to support around 10,000 training opportunities. This is in addition to the £15 million previously committed to skills in the energy efficiency and low carbon heating sectors since 2020, which have supported over 16,000 training opportunities for people working in the energy efficiency,
retrofit and low carbon heating sectors. All heat pump installations are expected to comply with building regulations, and the new funding will promote courses which ensure installers achieve the minimum competence requirements to join an appropriate competent person scheme. Contractors installing heat pumps within Government schemes are further required to be certified by the Microgeneration Certification Scheme (MCS). In addition to ensuring that installers are technically competent, MCS also provide consumers with additional protections.

On the Boiler Upgrade Scheme: Government has committed a further £6 billion from 2025 to 2028 as part of the Government’s 15% energy reduction target by 2030, and we can confirm that the Boiler Upgrade Scheme will be extended to 2028. Government is committed to increasing heat pump deployment under the BUS, and will enhance the current marketing campaign to increase consumer awareness and takeup.

On wider skills and training of the workforce needed: Our commitment to grow the heat pump market to 600,000 installations a year by 2028 provides a clear long-term signal to industry on the expected scale of heat pump deployment, providing certainty and enabling investment. The private sector is already starting to invest in training, for example Octopus Energy has invested £10 million in a new R&D and training centre near Slough, and Ideal Heating have announced a new £1 million training centre near Hull. Government is also providing funding to support engineers to take up this training through the Home Decarbonisation Skills Training competition which launched on September 20th 2022. This £9.2 million competition is funding training for people working in the energy efficiency, retrofit and low carbon heating sectors in England. The previous £6 million phase of this scheme in 2020 and 2021 supported almost 7,000 training opportunities, including training for over 2,000 heat pump installers.

Energy Efficiency Taskforce and Further Announcements

In March 2023, the Government also announced the establishment of the Energy Efficiency Taskforce, to make recommendations on how to deliver the planned 15% energy demand reduction target as set out in the Autumn Statement 2022. In July 2023, it was also announced that the Prime Minister had asked for an informal review of net zero policies, in order to ensure a more ‘proportionate and pragmatic’ approach to net zero.

The outcome of this informal review was announced in September 2023, when the Prime Minister announced that the government would not be taking forward any further reform of Minimum Energy Efficiency Standards for landlords, while the 2035 end date for no new gas boilers would be altered to a 80% provision of heat pumps or clean heat. In his speech introducing the changes, the Prime Minister stated:

*And to help those households for whom this will be hardest I’m introducing a new exemption today so that they’ll never have to switch at all. Now, this doesn’t mean I’m any less committed to decarbonising our homes. Quite the opposite. But rather than banning boilers before people can afford the alternative; we’re going to support them to make the switch.”*

At the same time, the Prime Minister increased the grant in the Boiler Upgrade Scheme by 50% to £7,500, so that ‘this is one of the most generous schemes of its kind in Europe’. On energy efficiency, as the Prime Minister noted, ‘This is critical to making our homes cheaper to heat’, pointing to the Great British Insulation Scheme:

*‘But under current plans, some property owners would’ve been forced to make expensive upgrades in just two years’ time. For a semi-detached house in Salisbury, you could be looking at a bill of £8,000. And even if you’re only renting, you’ll more*
than likely see some of that passed on in higher rents. That’s just wrong. So those plans will be scrapped, and while we will continue to subsidise energy efficiency - we’ll never force any household to do it.’

The Energy Efficiency Taskforce was also scrapped, which will mean that the recommendations it was intending to bring forward will not be formally published. This report, Mission Retrofit, therefore acts as an opportunity to present to government how the Prime Minister and the government can meet their stated commitments on retrofit and insulation.

This report both seeks to develop the recommendations made in the Net Zero Review, and also to stimulate further policy discussion on buildings and energy efficiency, at a time when the government plans to launch a series of consultations, outlined in their response to the Net Zero Review above. On 22 November 2023, the Chancellor will give his Autumn Statement, in which measures on decarbonisation and the UK’s ‘response’ to the US’ Inflation Reduction Act, potentially outlining further fiscal and investment measures to stimulate the green net zero economy will be announced.

The Great British Insulation Scheme is part of the UK government’s recent Carbon Budget Delivery Plan, and has set a new target that 1.5 million homes will be ‘treated by new domestic energy efficiency measures’ annually by 2025, falling to 0.4 million by 2030. This is in stark contrast to the deployment figures set out in the original Net Zero Strategy of 0.5 million a year by 2025 and 1 million by 2030. A comparison of the Net Zero Strategy and the Carbon Budget Delivery Plan by the CCC indicates that the government has raised its ambitions on heat pump installation to 0.2 million more heat pumps by 2035, yet at the same time they calculate that the cumulative installation rate will be 0.4-0.5 million fewer by 2030.

These new calculations in the Carbon Budget Delivery Plan create a new ambition gap in retrofit that will not be met by the Great British Insulation Scheme unless there is a seismic and paradigm altering shift in the level of insulation deployment. In 2022, there were:

- 233,000 more homes with cavity wall insulation
- 204,000 homes with extra loft insulation
- 10,000 more homes with solid wall insulation

Yet even this 233,000 figure, completely inadequate in itself, includes within it the 201,000 new homes that were built in 2022. Remove these from the statistics, and the actual level of retrofit and insulation deployment is dire. This level of progress: 32,000 cavity wall retrofits, 24,000 loft insulations and 10,000 solid wall insulations is a fraction of the CCC’s recommended installations needed to deliver a balanced pathway towards net zero. As the CCC wrote to the Chancellor in November 2022:

Our Net Zero scenarios assume between 250,000 and 440,000 households having their cavity walls insulated in 2023 and 2024 alone and
over 1.6 million further installations by 2030. Similarly, we assume 780,000 to 1.4 million lofts to be insulated in 2023 and 2024, and at least a further 5.5 million loft insulations by 2030.\(^{10}\)

It seems extremely likely that the Great British Insulation Scheme will not meet the CCC’s balanced pathway either, especially with the estimated number of installations between 2023-26 set out in its Impact Assessment. Recent analysis by Frontier Economics has also found there is “a material gap to reaching the 15% target based on committed policies”, which includes the new Great British Insulation Scheme. And that, when focusing on the existing housing stock, achieving the 15% target would require an additional 4.9 million fabric efficiency retrofits, 1.5 million heat pump installations and 0.6 million heat network connections.\(^{11}\)

The CCC have stated in their latest 2023 Progress Report that ‘the next ten years are the crucial period to decarbonise buildings, requiring a complete policy framework to be put in place, together with the necessary supply chains and supporting infrastructure, alongside public acceptance of the transition’.\(^{12}\) In particular, the scale of delivery needed to achieve the fifth and sixth carbon budgets ‘represents a step change from the current level’. The CCC has stated bluntly that ‘policy progress in the buildings sector is not on track, with 77% of the required emissions reduction by the Sixth Carbon Budget period judged to be either at significant risk or with insufficient plans’.\(^{13}\) The CBDP only meets the CCC’s balanced pathway for delivering the energy efficiency measures until 2025:

The CCC’s most recent assessment is that on buildings and energy efficiency the picture is unchanged, with ‘the government continues to avoid big, impactful decisions and action’. While most indicators of progress were ‘off track’, the committee stresses the urgency of the situation: ‘The UK needs significant new policies and programmes to underpin the delivery of low-carbon heat and energy efficiency. The current pace of Government decision making will not deliver this. There are major upcoming rule changes, such as implementing the Future Homes Standard and the ban on off-gas grid boiler replacements. These are critical steps to Net Zero and must not be delayed’.\(^{14}\)

The CCC have also set out in their 2023 Progress Report that while the government is not on track to meet their NDC for 2030 or future carbon budgets, a renewed focus on buildings and reducing energy demand can help get the UK back on track. In their most recent Progress Report for 2023, the CCC highlight that while the UK remains 5.5 MtCO\(_2\)e short of meeting its NDC for 2030 and have ‘completely sufficient plans’ for another 30.3MtCO\(_2\)e for required abatement, they suggest that if the UK government followed a ‘Tailwinds Scenario’ for buildings decarbonisation, an extra 8 MtCO\(_2\)e could be realised in emissions reductions, driven by greater energy efficiency measures and the accelerated uptake of low carbon heating.\(^{15}\)

The Net Zero Review recommended that the government not only implement the Heat and Buildings Strategy without any further delay,
but that it should ‘take a more holistic approach by packaging these measures into an ambitious National Retrofit Strategy’. Key to achieving this was to deliver a ‘long term, predictable policy framework’.

This first report of the Buildings Mission Zero Network, seeks to expand on what this long-term framework, under a National Retrofit Strategy or rather a ‘National Retrofit Mission’ might encompass. It does not seek to replace or replicate the excellent work that has already been done by the wider sector. In particular, a National Retrofit Strategy has already been developed by the Construction Leadership Council, and set out in further detail in Greening Our Existing Homes: National Retrofit Strategy, published in December 2020. The UK GBC’s Net Zero Whole Life Carbon Roadmap: A Pathway to Net Zero for the UK Built Environment published in November 2021 further adopted the work of the National Retrofit Strategy, in setting out a staged and sequential approach to developing and expanding the retrofit industry, ensuring that both demand and supply are stimulated at the same time, so that there is capacity and capability within the industry to meet the growing demand for retrofit.

As Bankers for Net Zero commented, they are ‘not alone in calling for a National Retrofit Strategy: the Construction Leadership Council and the Royal Institute of British Architects have both recently issued calls for the same’. All sector organisations have come to the same conclusion: ‘The danger of a stop-start, pick-and-mix approach to policymaking in this area is well-documented. Now is the moment to move from one-off measures to a cohesive, long-term package – to move, in other words, from tinkering to transformation’. As E.ON stated in their evidence to the review, ‘the supply chain remains blighted by short term certainty (1-3 year scheme lengths). Funding and scheme certainty of ten years in length are required to deliver the scale of energy efficiency measures and retrofitting required in the UK housing stock’. The lessons from the Green Homes Green Voucher scheme must be learnt: in its review of the scheme, the National Audit Office was damning in its criticism of the lack of resourcing in BEIS [as was] and the short timescale for the scheme that as a result ‘did not deliver the expectations of …installations or support the expected number of jobs’. Further, it came down on a range of administrative difficulties experienced and the overall shortage of installers.

While reducing our emissions must be paramount, if we are to deliver the required outcomes needed to meet the CCC’s carbon budgets or the UK’s NDC by 2030 or 2035, then we must see a step change in activity to decarbonise buildings.

To successfully achieve this step change requires not merely a national mission, but a means of incentivising growth in retrofit and efficiency activities at a scale, as the CCC has indicated, needs to be fivefold the current rate of progress. To deliver this, we need to focus on the potential for reducing energy demand in buildings, not merely in terms of emissions reductions, but also:

• **The potential for economic growth.** Buildings and energy efficiency can create hundreds of thousands of skilled, secure new green jobs and new companies – one of the biggest opportunities for economic security in a generation. as well as turbo-charge one of the UK’s largest economic sectors, both for the domestic buildings market, and also for the UK export market. If net zero is the economic opportunity of the decade, buildings and energy efficiency is the sector with the greatest potential to create the jobs of the future. Construction Leadership Council’s (CLC) blueprint for a national retrofit strategy estimates that upgrading the nation’s housing stock would generate roughly 500,000 new jobs in the sector, with £2 put back into the economy for every £1 invested.
the Energy Efficiency Infrastructure Group estimates that 40,000 jobs could be created in insulation alone over the next two years, and 150,000 by 2030. It has also been estimated that a job in home insulation can be created for £59,000 - far less than the cost of a road maintenance job, which is estimated to be more than £250,000.21

- **The need for greater energy security.** If the UK is to become an energy secure nation, it must remove its dependency on gas and oil that are at the whim of international markets. Reducing energy demand through decarbonising buildings and insulating homes can reduce our future need for gas and fossil fuels significantly, and at the same time helps to protect the future sustainability and capacity of our electricity grid as it transitions to green and clean sources of power.

- **The reality of delivering real savings and benefits for householders.** Reducing energy demand instantly lowers the costs of bills, and has the potential for long term financial savings that outweigh the costs of upfront capital investment. This investment needs to be unlocked for the future, but once realised, can deliver not only financial benefits, but health and comfort benefits also. A measure of energy self-sufficiency and household energy management also reduces bills and could offer a return that would support deployment of other measures, particularly for the able to pay. Smart Export Guarantees and other incentives for demand management will play an increasingly important role in household energy use, and investment decisions going forward. Both retrofit and higher new build standards are crucial for addressing cost of living pressures associated with rising gas prices. Latest estimates show savings of nearly £800 a year for the average household and over £4,000 for poorest performing homes. Likewise current schemes can lower bills by 70-90%.22

As David Willock from Lloyds Banking Group, stated to the network, it “helps all people trying to drive change to say, look, this is the economic case for retrofitting homes ... it’s about saving people money on their bills. It’s about cutting NHS costs. It’s about the job multiplier effect of creating jobs. And then there’s a fourth limb, which is about the global export story, exporting of this tech and this retrofit capability, because clearly, you know, we’re not the only country that has buildings ... If we get this right from data to delivery, we can go and take this into other countries and drive some growth too’. Simon McWhirter, Deputy CEO of the UK Green Buildings Council also agreed that the government ‘have had successive failures at getting this right, both on a technical delivery side, and communicating the wider story’. The narrative, he suggested to the network, ‘is about bringing down energy bills, but it’s about homes warmer in winter, cooler in summer, it’s about national energy security. We are seeing increasing evidence of distinct added value to homes from energy efficiency improvements ... There is a storytelling need, which we are way behind on at the moment’.

This new narrative also focuses on the fact that within the new global net zero race that has begun. The UK is not alone in meeting the challenge of reducing energy demand and decarbonising buildings, but it is increasingly falling behind and missing out on the opportunity and benefits that other countries are now witnessing having made significant policy and financial commitments to reducing demand. Many other countries are now prioritising buildings and energy efficiency as a means of delivering not only emissions reductions, but scaling up new green economies and improving their energy security. This is now taking place at a rapid pace, with the risk that the UK will be unable to meet its future demand for labour, materials, equipment and supplies, unless it steps up its ability to deliver for the buildings and construction industry. Clear and lasting policy commitments, set out in a long term programme, are essential for business and industry to commit to decarbonising buildings in the UK, rather than seek opportunities elsewhere abroad.
While reducing energy demand in buildings is the second greatest opportunity to reduce emissions, the paradigm shift in net zero activities establishing new net zero markets means that decarbonising buildings, reducing demand and increased energy management (flexibility) are now one of the most important sectors for catalysing a new economy that is emerging, one that prioritises investment in sectors able to quickly demonstrate real-term, real-time reduction in emissions, at the same time as boosting economic activity. By establishing a long-term Buildings and Energy Efficiency Mission, the UK can seize the opportunity that other countries are already witnessing.

The International Landscape

As with many other net zero activities, there is a growing trend towards increased investment, to seize the opportunity that greater energy efficiency can bring to deliver greater energy security, stronger economies and healthier and safer populations.

Across the globe, energy efficiency and buildings are recognised as a key part of reducing energy demand. Since Russia’s invasion of Ukraine, this has acutely been reflected in the need to reduce energy costs. The IEA’s most recent report, Energy Efficiency 2022, has demonstrated that energy efficiency measures adopted in IEA countries since 2000 has resulted in a single annual saving in 2022 of $680 billion. Globally, $1 trillion has been invested in energy efficiency measures since 2020, with $560 billion in 2022 alone.

The key lesson that the rest of the world has woken up to is that energy efficiency, reducing, and managing energy demand of buildings is no longer merely a requirement to tackle the climate crisis, essential though this is. The IEA is clear that energy efficiency measures already installed were responsible for reducing the total energy bill of IEA member countries by 15%, stating that ‘stronger efficiency is the first-best policy to bring down energy bills’.

Countries are shifting their attention to buildings and energy efficiency because they recognise not only the potential for significant emissions reductions, but the triple benefits

### IEA Member Countries

<table>
<thead>
<tr>
<th>Energy Efficiency Policies in 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canada</strong>&lt;br&gt;The Canadian government recently announced the Green Buildings Strategy, which aims to increase the rate of building retrofits and create a net-zero-ready buildings sector by 2050, backed by $190 million (CAD 150 million).</td>
</tr>
<tr>
<td><strong>European Union</strong>&lt;br&gt;The EU launched the RePowerEU plan in May 2022 to accelerate the clean energy transition and to reduce reliance on Russian fossil fuels. Energy savings is one of the plan’s three central pillars and the EU has committed to doubling the deployment rate of heat pumps to around 10 million cumulative units over 2023-27 and accelerating electrification, especially in industry.</td>
</tr>
<tr>
<td><strong>Japan</strong>&lt;br&gt;Government measures strengthen building codes and annual reporting systems for large-scale consumers. It will also provide subsidies of JPY 500 billion for replacing old facilities in factories and buildings.</td>
</tr>
<tr>
<td><strong>India</strong>&lt;br&gt;In August, India also amended its Energy Conservation Bill, which, among other measures, expands the scale and scope of its energy conservation regime through new building codes and enforcement measures.</td>
</tr>
</tbody>
</table>
of potential economic growth, improving energy security and the reality of financial savings and benefits for householders.

The recent Energy Saving Trust and Green Alliance report commissioned by the CCC, Climate Policy that Cuts Costs, highlights several international programmes that have both sought to prioritise energy efficiency and retrofit, including MaPrimeRenov in France, which between January and December 2022 had carried out 670,000 renovations. Between 2020 and February 2023 the programme has funded 1 million renovations, including 156,004 air source heat pumps - 2.8 times that fitted in the UK - and 64,711 solar water heaters. The scheme has also directly generated 93,450 jobs. The programme was part of the wider National Recovery and Resilience Plan, which has set aside 5.8 billion euros for retrofitting public and private buildings.

On 9 July 2023, French Prime Minister Elisabeth Borne announced an additional €7 billion per year in central spending for energy transitions for renovating buildings. In addition, the Senate have proposed to achieve 370,000 fully renovated homes per year by 2030 before doubling the pace to 700,000 per year.

Through its national development bank, KfW, Germany has long recognised the value of energy efficiency in its national strategy. Between 2007 and 2017, their energy efficiency programme triggered investments of over €260bn supporting an average of 320,000 jobs per year, underpinning measures in over four million homes. For every €1 invested by the government, homeowners were motivated to borrow and spend a further €6. The German government has nearly recouped its outlay through increased VAT revenue alone. It has recently announced a massive €4.7bn top-up for the scheme in light of the new imperative to reduce demand for oil and gas, following Russia’s invasion of Ukraine.

The US Inflation Reduction Act and Build Back Better

While UK attention on the Inflation Reduction Act has been to highlight its industrial and clean technology aspects of the Act, the investments and tax credit approach to retrofit and energy efficiency are potentially game-changing for decarbonising both homes and businesses. The programs in the Inflation Reduction Act build on investments in the Bipartisan Infrastructure Law, including a $3.5 billion expansion of the Weatherization Assistance Program to improve home energy efficiency for low-income families; $250 million for the Energy Efficiency Revolving Loan Fund Capitalization Grant Program, through which states can provide loans and grants for energy efficiency audits, upgrades, and retrofits to buildings; and $550 million for the Energy Efficiency and Conservation Block Grant Program, which is designed to assist states and local governments in implementing strategies to reduce energy use and improve energy efficiency. Additional measures in the Act include both rebates and tax credits to incentivise energy efficiency measures for households:

- Nearly $9 billion for states for consumer home energy rebate programs, enabling communities to make homes more energy efficient, upgrade to electric appliances, and cut energy costs. The Department of Energy estimates that these home energy efficiency and electrification consumer rebates, targeted to lower-income consumers, will save households up to $1 billion annually.
- The Energy Efficiency Home Improvement Credit provides up to $3,200 annually in tax credits to lower the cost of energy efficient upgrades by up to 30 percent, including the purchase of heat pumps, insulation, efficient doors and windows, electrical panel upgrades, and energy audits.
- The Residential Clean Energy Credit provides a 30 percent tax credit to lower the
installation cost of residential clean energy, including rooftop solar, wind, geothermal, and battery storage. The credit steps down to 22 percent by 2034.

- $1 billion for the Green and Resilient Retrofit Program at the Department of Housing and Urban Development (HUD), which will provide funding to the owners of HUD assisted multifamily properties for projects to improve energy or water efficiency; enhance indoor air quality or sustainability; implement the use of zero-emission electricity generation, low-emission building materials or processes, energy storage, or building electrification strategies; or make the properties more resilient to climate impacts. HUD also will conduct energy and water benchmarking of HUD-assisted properties.

- $1 billion for Department of Energy grants to state and local governments to adopt updated building energy codes, including zero-energy codes. Homes that are zero-energy ready are so energy efficient that a renewable energy system could offset most or all of the home’s annual energy use.

- Extension and expansion of the energy efficient commercial buildings deduction. Buildings that increase their energy efficiency by at least 25 percent will be able to claim this tax deduction, with bonuses for higher efficiency improvements. The claimant can earn additional bonus deductions by meeting prevailing wage and registered apprenticeship requirements.

The Inflation Reduction Act Renewed the Solar Energy and Geothermal Heat Pump Tax Credit for Homeowners, expanding a very popular income tax credit for solar electric, solar hot water, wind, and geothermal heat pump systems, one that has been in use since 2006 but was starting to sunset in recent years. As of 2023, the Federal Renewable Energy Tax Credit has been renewed for another 10 years, offering a 26-30% income tax credit for the costs of installing one of these system types. Unlike other IRA provisions, which, as discussed above, apply specifically to either new homes or to existing homes but not both, this tax credit applies equally to a new construction project or to adding these technologies to an existing home, and unlike the 45L tax credit for energy efficient new construction, this is a personal income tax credit for the homeowner, not the builder.

The Inflation Reduction Act also provided incentives for commercial businesses and business owners for building decarbonisation efforts. There is now a 30% tax credit for geothermal heat pumps for businesses and publicly or non-profit owned buildings (up from 10% before the IRA). The tax credits can be even higher, 40-50% with bonus tax credits for domestic content and projects located in energy communities. This tax credit is available as ‘direct pay’ cash-back from the federal government to municipalities and non-profits. Commercial entities are also eligible for the 179D tax deduction and are often eligible for utility rebates and other state incentives, creating even better bill savings for all types of buildings.

**Energy Efficient Commercial Buildings Deduction**

**Provision**

Provides a tax deduction for energy efficiency improvements to commercial buildings, such as interior lighting; heating, cooling, ventilation, and hot water; and building envelope.

- Lowers the qualification threshold from 50% energy efficiency improvement to 25%
- Increases deduction amount from $1.80/sq ft to sliding scale of $2.50-$5.00 based on % reduction in energy use, provided prevailing wage and apprenticeship requirements are met
- Likely to be more commonly taken as a deduction due to phase out of bonus depreciation from 2023-2026
Business Energy Investment Tax Credit

Provision
Provides a tax credit of up to 30% of the upfront cost of a “qualifying energy property” such as a solar, wind electricity generation and standalone battery storage projects.

- Covers a variety of renewable energy technologies such as geothermal heat pump projects for commercial buildings
- Employs a two-tier structure with a base rate of 6% and a bonus rate of 30% for either (1) meeting prevailing wage and apprenticeship requirements, or (2) producing a maximum output of <1 megawatt of electrical or thermal energy
- Offers an additional 10% for using domestic steel, iron, and manufactured products, and another 10% for technologies installed in “energy communities”

The potential for economic growth

The Cheaper Bills, Warmer Homes report calculated that if 26.2 million homes were taken to EPC C standard, this would save a total of £112bn in energy costs by 2034. The report calculated that a programme to achieve this on a similar timeline would require an £222bn investment over 10 years, but this would be limited to £60bn of public funds, a £6 billion a year investment, to leverage £164bn in private sector investment. The net benefit would far out way this however. 27

The Report estimated that the area-based roll out of home ‘future-fits’ will represent a significant investment in local economies, driving an average of £671m in total for each local area across the UK, when combining total public and private investment. 260,000 new workers would be needed to be recruited, while many of the 223,000 existing workforce will also need retraining. This will also lead to 230,000 ‘indirect’ jobs in the wider supply chain spread out around the country, creating around half a million new jobs in total. Indeed, using research into similar programs implies a net benefit of around £361bn for the UK economy. The same research indicates that for every £1 of public money invested in this program, the UK government will recoup £1.43 through tax and budget savings revenue due to enhanced economic prosperity.

The IPPR in a separate report focusing on a ‘Retrofit Revolution’ calculated that a £7 billion per annum investment in retrofit would sustain 2.7 million jobs to 2050, with certain regions directly benefitting twice as much as others, including the North East benefiting from a 5% lift in employment:

<table>
<thead>
<tr>
<th>Region</th>
<th>New direct retrofitting jobs created</th>
<th>Share of current job market in region</th>
</tr>
</thead>
<tbody>
<tr>
<td>North East</td>
<td>61,280</td>
<td>5.09%</td>
</tr>
<tr>
<td>East Midlands</td>
<td>116,806</td>
<td>4.93%</td>
</tr>
<tr>
<td>Yorkshire &amp; the Humber</td>
<td>137,662</td>
<td>4.99%</td>
</tr>
<tr>
<td>West Midlands</td>
<td>149,224</td>
<td>4.96%</td>
</tr>
<tr>
<td>South West</td>
<td>134,151</td>
<td>4.32%</td>
</tr>
<tr>
<td>East of England</td>
<td>145,627</td>
<td>4.49%</td>
</tr>
<tr>
<td>North West</td>
<td>169,521</td>
<td>4.36%</td>
</tr>
<tr>
<td>London</td>
<td>138,950</td>
<td>2.27%</td>
</tr>
</tbody>
</table>

The report lays out a 28-year plan to retrofit every household in England, which at its core would create 1.2 million direct jobs and 1.5 million indirect jobs and provide a cornerstone for the levelling-up agenda, as well as reducing households’ bills by an average of £430 a year. 28

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In addition to new additional jobs, the Passivhaus UK Trust told the network that “the process of decarbonising buildings, particularly
when aiming for Passivhaus and EnerPHit standards, creates a demand for specialised roles across various sectors. These roles include:

1. Architects and Engineers: Experts in sustainable design who can plan and oversee projects in line with high-performance building standards.
2. Energy Auditors: Professionals who assess existing buildings and recommend energy-efficient upgrades, aligning with Passivhaus and EnerPHit criteria.
3. Renewable Energy Installers: Skilled technicians capable of installing heat pumps, and other renewable energy systems to achieve sustainable energy sources within buildings.
4. Energy Efficiency Consultants: Specialists who provide guidance on achieving energy efficiency and carbon reduction targets.

These specific low-carbon job opportunities contribute not only to the reduction of greenhouse gas emissions but also to the creation of stable, sustainable employment with ample opportunities for career advancement. Furthermore, this job growth can stimulate economic development in local communities, benefiting both individuals and regions.

Improvements in energy efficiency for non-domestic commercial properties and businesses also demonstrate an important link with higher productivity and economic growth. Energy efficiency measures taken by businesses has had a major impact on delivering overall cost reductions and economic growth. Energy use per million pounds of output has fallen by 44 per cent since 1990 in non-industrial sectors and 48 per cent in industry. Studies suggest that around half of the reduction in industrial energy intensity between 1997 and 2013 can be attributed to energy efficiency rather than other factors, like changes in industry composition.

Equally significantly, energy efficiency has been directly responsible for a quarter of the UK’s economic growth since 1971. The clean growth strategy estimates that investment in energy efficiency could lead to substantial cost savings right across the economy. By 2030, it could save businesses around £6 billion a year, including a £2.7 billion saving for SMEs. The building energy efficiency survey found that implementing measures with the payback of three years or less would save businesses on average £1.3 billion per year.

**The need for greater energy security**

Heating buildings in the UK is disproportionately dominated by natural gas, which is the main source of heating for 85% of homes, while another 10% of properties, largely rural and without access to the gas grid, rely on oil. Only Hungary and the Netherlands out-compete us on their dependence on gas for heating, while the EU average, at 38%, is less than half that of the UK.

![Graph: Energy use for residential heating by fuel type (%)](image)

If we are able to decarbonise our buildings effectively, we will remove one of our greatest dependencies on fossil fuels, ensuring that we can have far greater energy security in the future by reducing our demand for gas.

The UK Green Buildings Council have stated that upgrading the UK’s 19 million homes that are
currently rated EPC grade D or below to a grade ‘C’ would reduce gas demand by 20% alone.

The CCC’s balanced pathway and tailwind scenarios set out clearly the economic choice that could be taken if the UK acted swiftly to prioritise reducing energy demand from buildings. As the CCC have stated:

If the UK’s households can install energy efficiency measures in line with our Balanced Pathway (see Figure A.6) alongside low-carbon heating, then gas demand would be nearly 40 TWh (12%) lower by 2028 (compared to demand under a high-carbon baseline), and over 130 TWh lower by 2035 (42%). Energy efficiency measures account for more than 40% of all the residential gas demand reduction in the Balanced Pathway by 2028. If households install measures in line with our Tailwinds scenario (see Figure A.6), gas demand would be nearly 60 TWh (18%) lower by 2028 than in the baseline, and nearly 200 TWh (61%) lower by 2035. Energy efficiency in this scenario corresponds to more than 60% of demand reduction by 2028.31

The reality of delivering real savings and benefits for householders

Our homes are some of the worst insulated in Europe. The UK lags behind the rest of Europe in home insulation, resulting in the double cost of the typical UK home not only using more energy, it also loses energy far faster. If a home is heated to 20 degrees in freezing temperatures outdoors, a typical UK home will lose 3 degrees of heat after five hours, compared to 2.5 degrees in France, 1.5 degrees in Italy, 1 degree in Germany and 0.9 degrees in Norway.

As a result, the UK suffers from an energy efficiency penalty that has driven not only high costs of energy, but higher than necessary spending on energy that has in turn driven the costs of inflation. Without any government intervention, including the Energy Price Guarantee, spending on energy would be the equivalent of 7% of GDP - more than the NHS budget.

Higher energy bills are also significantly affecting business’ profit margins, where in 2022 business
gas and electricity expenditure totalled £46 billion of profits, 12% of total profits, up from 6% or £23 billion in 2019. As a result, 47% of businesses in 2022 unsurprisingly adjusted their business practices to reduce energy consumption.

This double hit of high gas dependency and low energy efficiency has cost the UK dearly. We are spending not only more for the fossil fuels that we use, but for the fossil fuels we burn for heat to simply escape into the air. Energy efficiency penalty has been far greater for the worst insulated homes:

Lower Energy Bills and House Prices

The case for energy efficiency can be made in the savings generated year on year, every year, from cheaper bills. The government’s flagship retrofit scheme ECO alone has saved low-income customers £17.5 billion in lifetime energy bills since 2013, and saved the average home improved under the scheme £290 per year. These savings must be extended to all homes that remain below a EPC C standard rating, generating more income for households and families, and taking more low income households out of fuel poverty. Research has

Research by the Energy and Climate Information Unit found that the cost of gas for homes with worse insulation, rated band F on the Energy Performance Certificate (EPC) scale, was on average £1,000 a year more than homes at the Government’s target of EPC band C, with these households paying over £550 on their bills and the Government around £450 via the price freeze. When gas and electricity are taken together, the worst rated homes cost around £1,750 more than EPC band C homes – £950 on household bills, and £800 from the Government. Even those in average EPC band D homes are facing bills of £370 more than if they had been upgraded to the Government’s target of EPC band C – plus the Government is set to pay £310 more, taking the total extra cost to £680 for the year for average homes.33
identified that a family in an energy-inefficient social home (EPC D-G) will spend on average £1,343 a year on heating bills, based on the October Price Guarantee in 2022. If these homes were insulated and brought up to an EPC band C or above, this would be reduced by 42% to £776, saving them £567 every year. The Cheaper Bills, Warmer Homes 2022 Report made similar calculations that ‘by future-fitting homes, less energy will be needed to keep them warm, cool and the lights on—meaning lower bills. For the average home, this would be a saving of around £779 but for the worst performing homes currently at EPC F and G, upgrading to a C could be an average saving of £4,464 or more per year. For lower income households, or those in the 46% of the country facing fuel poverty, average bills would be 30-37% lower’.  

Retrofitting all poorly insulated homes to EPC-C standard would lower energy bills by a total of £8.1 billion and at the same time reduce our gas imports by 15%. 38 Nearly half of low-income households in England live in homes with an EPC rating of D or below, which equates to them using 27% more gas and 18% more electricity compared to EPC-C rated homes.  

For commercial buildings, the potential energy savings between 2023-2037 has been estimated at 28 terrawatt hours, which is greater than the total amount of net electricity imported by the UK in 2021 (25 TWh). If fully realised, this would result in an energy bill savings of £1.12 billion. 37

In addition to lowering energy household bills, energy efficiency and retrofit measures have the potential to raise house prices. MoneySupermarket’s analysis shows up to a 14% difference in house price between similar homes between a EPC G to an A rated home:  

Further analysis shows some regional difference in the median increase in property price, when the EPC rating is improved from a D to A/B, across each region of England. Homes

<table>
<thead>
<tr>
<th>EPC Band</th>
<th>Gas costs (£/yr)</th>
<th>Elec costs (£/yr)</th>
<th>Dual fuel (£/yr)</th>
<th>Extra costs:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total costs</td>
<td></td>
<td>Household bill</td>
<td>Gov’t support</td>
</tr>
<tr>
<td>C</td>
<td>1,877</td>
<td>1,850</td>
<td>3,726</td>
<td>2,100</td>
</tr>
<tr>
<td>D</td>
<td>2,359</td>
<td>2,048</td>
<td>4,407</td>
<td>2,470</td>
</tr>
<tr>
<td>E</td>
<td>2,729</td>
<td>2,247</td>
<td>4,976</td>
<td>2,778</td>
</tr>
<tr>
<td>F</td>
<td>2,914</td>
<td>2,578</td>
<td>5,492</td>
<td>3,051</td>
</tr>
</tbody>
</table>

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34
35
36
37
38

Table: Energy costs for different EPC Bands, their splits between household bills and Government support, and comparisons of extra costs.
in the North East sees the greatest percentage increase in value, where an improved efficiency rating sees property value increase by 12.2 per cent which equates to £16,219. However, as a result of a higher average property prices the South West sees the highest monetary increase from an improved energy efficiency rating with the average property value increasing by £19,576, an improvement of 7.7 per cent.

**Lowering Energy Demand reduces Fuel Poverty**

Based on the price of energy set at the October Price Guarantee in 2022, social renters are forced to spend on average 5.7% of their income on heating bills, compared to the national average of 3.4%. Those in the least energy-efficient homes (EPC G) will spend as much as 15.5% of their income on heating bills, the equivalent of nearly two months’ worth of their annual income.

Whilst exact definitions of fuel poverty vary between nations, in general a household is considered to be in fuel poverty when they need to spend more than 10% of their disposable income on heating their home. Over 11% of households in the UK, some 3.3 million homes, are considered to be in fuel poverty. There is a strong correlation between fuel poor households and people living in homes with poor energy efficiency ratings. For example, in England, 88% of all fuel poor households live in properties with a Band D EPC or below. These households have an average annual fuel bill of £1590 which would need to be reduced by £334 to take them out of fuel poverty. A reduction of 50% in heating demand for these households would result in a reduction of approximately £390 in their overall fuel bill - which would take millions of households out of fuel poverty.
In those homes that can benefit from energy management systems, as well as other ‘active’ technologies such as solar PV and storage, householders can expect further bill reductions, be that from flexible Time of Use (ToU) tariffs, payments from the grid for reduced peak demand, or reduced costs of fuelling their heat pump or EV from their ‘own’ electricity. In some cases, this could shift a household into energy wealth.

Warmer Homes in the Winter, Cooler Homes in the Summer

The Housing Health and Safety Rating System’s excess cold assessment indicates that over 900,000 dwellings across the UK are likely to see internal temperatures which could adversely affect the health of the occupants.

The Institute of Health Equity estimates that the NHS spends at least £2.5 billion each year treating illnesses derived from people’s living conditions, a high proportion of which are directly linked to living in cold and damp homes. 63,000 deaths were caused by excess cold in 2020/21 while extreme heat in the summer caused 56,000 deaths in 2021. During summer 2022, there were an estimated 2,985 (2,258 to 3,712) all-cause excess deaths associated with 5 heat episodes, the highest number in any given year.99

As CIBSE wrote in their evidence to the Network:

“If we accept that retrofitted buildings also improve health and comfort, then we must also accept that delaying retrofit will have social costs, as occupants continue to live and work in poor quality indoor environments. It is important to also cite the Awaak Ishab case – there is an urgent need to upgrade much social and privately rented housing to improve the health of occupants and to reduce the considerable burdens that poor housing places on the NHS. It is not inaccurate to say that landlords who provide inadequate housing are profiting at the expense of the NHS. The Housing health and safety rating system (HHSRS) needs to be significantly improved in this area and then properly implemented across the rented housing stock.’

The Cost of Not Zero

In addition to missing out on delivering the benefits of retrofit and energy efficiency mentioned above, there is also a significant economic cost of delaying further measures that can be taken now, and putting them off to tomorrow.

The decision in 2013 to cut government support for home insulation means that 10 million homes have missed out on upgrades that could have saved taxpayers up to £9 billion a year under the Energy Price Guarantee scheme.40 Conversely, analysis from the Energy and Climate Intelligence Unit (ECIU) in 2022 revealed that the energy efficiency measures installed between 2009 and 2019 saved bill payers £1.15 billion in 2022 alone. During the decade 2009 to 2019, around 6 million homes were upgraded to Energy Performance Certificate band C, which is the Government’s target for 2035. Upgrading homes from EPC band D – the average in England and Wales – to EPC band C results in a 20% cut in gas demand per home; meaning that gas bills were reduced by around £194 per year.41

There is also a wider cost to the UK economy. As the ISG stated in their written evidence:

‘The cost today is inevitably less than that of tomorrow as a result of inflation and increasing demand. Swift action gives the UK the opportunity to be an early adopter with a first mover advantage that generates the skills/innovation and products that can be exported globally. There is certainly a capacity cost of delay as we compress the timeline for action to be taken and this inevitably translates into increased overall costs as material and labour demand ramps up with a decreasing timeframe.’
The UK Government’s 2017 Clean Growth Strategy included a target for all homes to reach EPC band C by 2035 and all fuel poor homes by 2030. While the UK has some of the oldest housing stock in Europe, in fact only 3.3 million dwellings were built before 1900 and the majority (18.4M) were built after 1950. Whilst the proportion of listed buildings is very small, around 10% of our homes are in conservation areas and, overall, English Heritage estimate that up to 25% of our housing stock will have heritage features which would constrain retrofits. Even if heritage constraints apply to 25% of our housing stock, 75% of our stock is therefore suitable for most retrofit measures and offers significant opportunity to reduce energy demand.

There are currently 29.4 million properties in the UK. Understanding the different characteristics of these properties is vital for understanding what policy measures need to be put in place to meet the differing insulation needs of properties.

The latest Household Energy Efficient statistics for 2022 show that of the total number of properties:

- 20.9 million have cavity walls, of which 14.8 million have cavity wall insulation (71%)
- 8.5 million have solid walls, of which 805,000 had solid wall insulation (9%)
- 25.5 million have lofts, of which 17 million had loft insulation (67%)\(^2\)

DESNZ estimates that of the 5.1 million homes with cavity walls, yet without cavity wall insulation, 3.8 million are easy to treat standard cavities, while 1.3 million are hard
to treat. Hard to treat cavities are defined by the department as ‘ones that are more difficult or expensive to fill than standard cavities’. This includes properties with a narrow cavity and properties of either concrete or metal frame construction. The definition of hard to treat … is based on the definition used in the 2013 Housing Surveys’. For solid wall properties, of the 7.7 million uninsulated solid walls, DESNZ have stated that ‘it may not be possible to insulate all solid wall properties. Some of these properties are likely to be too costly to treat or be located in conservation areas, which means that they will never be insulated’.\(^4^3\) For loft insulation- defined as having 125mm or more of insulation- there are 7.9 million uninsulated lofts in Great Britain-31% of all lofts. Of these, 5.7 million homes could receive easy to treat insulation.

The Net Zero Review’s own analysis through the creation of a Net Zero Distributional Analysis model, was honest about the challenge facing retrofitting existing buildings, stating that ‘support for low-income households remains essential. Our analysis shows that even with additional measures to reduce the overall cost of the net zero transition for households, only 1.6% (or 450,000) households still would not make an overall saving by 2050’. It concluded that with additional policy measures that it recommended in place, ‘those households could break even with a £900 million (or £2,000 per household) well-targeted subsidy over the course of the whole transition’.\(^4^4\)

Private Rented Sector

Private rented homes are among the least energy efficient in the country. Minimum energy efficiency standards for privately rented homes were introduced in 2018, requiring a minimum EPC rating of E. Local authorities are responsible for enforcing the standards and can fine landlords that fail to comply. The government had proposed that all new tenancies be EPC C by 2025, and all existing tenancies be EPC C by 2028, however these measures were abolished by the Prime Minister in September 2023, leaving uncertainty as to the future of Minimum Energy Efficiency Standards.

Before MEES were introduced, the private rented sector has the largest proportion of the most energy inefficient homes (6.3% were F and G rated properties, compared to around 0.7% of social housing).

The English Housing Survey has found that efficiency standards in the private rented sector are among the worst of any sector. Almost one in four households (23%) are classed as ‘non-decent’, which is double that of the owner occupier and socially rented sectors. A similar proportion (24%) of households live in fuel poverty, higher than the social rented sector (19%) and owner occupier (9%). Over half (56%) of privately rented homes fall below EPC band C, which is much higher than the socially rented sector (31%)

A recent Citizen’s Advice report found that 1.6 million children are living in privately rented

£162,000 which need to be retrofitted is in the North of England; 70% of homes in Blackpool fall into this category, 69% in Burnley, and 67% in Hyndburn. According to the report, more than a third of homes in levelling-up areas are below the house price threshold for retrofit, versus less than one in 10 in non-levelling-up areas.\(^4^4\)
homes that are cold, damp or have significant mould. The research also shows that private renters in homes rated EPC D-G were 73% more likely to experience damp than those in homes rated A-C, and they were also 89% more likely to experience excessive cold.45

Social Housing and Housing Associations

The Committee on Fuel Poverty found evidence of 79,000 fuel-poor households living in English social homes with an EPC of Band E, F or G. Another 738,000 fuel-poor social households were in Band D homes.

Despite this, the level of planned retrofit in the sector is currently minimal. Thirty-three housing associations owning or managing 960,000 carried out only 694 external wall insulation (EWI) jobs in 2021-22, insulating the cavity walls of only 2,463 homes. Looking to their plans for the next five years, the 33 landlords expect to complete just over 16,000 EWI projects, and another 14,000 cavity walls.46

The current funding scheme in England for these properties is the Social Housing Decarbonisation Fund, which proposes to invest £3.8bn over 10 years. Housing associations say that the funding needs to be more long term, and the policy and regulatory landscape set to unlock more investment. To put this in perspective, Inside Housing’s analysis found that the total cost to decarbonise social homes is likely to be more than £100bn. Clarion alone estimates its bill at £1bn.

Non-Residential and Commercial Buildings

The UK’s non-domestic building stock is relatively old, with 39% built before 1970, around the time when thermal regulations were widely introduced. Only 30% of non-residential buildings were constructed in the 21st century.

Non-domestic buildings represent around ¼ (23%) of BE emissions, around 6% of UK’s consumption based emissions from energy use. Over half 66% of commercial buildings emissions are caused by fossil fuel heating systems.47

The CCC have stated in 2023 that ‘there is a large and increasingly concerning policy gap relating to non-residential buildings’. It adds that ‘there are no convincing plans to decarbonise commercial buildings’ while a ‘stable, long-term funding approach is urgently needed’. The Carbon Budget Delivery Plan saw government’s target of low carbon fuel consumption as a percentage of total fuel consumption in commercial buildings fall backwards, to 73%, down from an original target set out in the Net Zero Strategy of 78-81%.48

As set out by UKGBC in their scorecard against government policy progress in 202249: ‘Policy in this area appears to be frozen. The consultation on proposals for a performance-based policy framework and ratings system in commercial industrial offices was welcome. However, the Government’s official response is still yet to be published. In particular, the Government must define what pace of improvement in performance ratings it expects to see between now and 2030/2040, with greater clarity on the scope of this scheme and a timeframe for bringing all non-domestic buildings into the scheme. Additional clarity should be given on how often the Government will review progress, to judge if further incentives/penalties are required to achieve its aims.’

The Government’s decision that the future trajectory for the nondomestic MEES will be EPC B by 2030 is welcome. However, Government’s official response to the consultation on non-domestic MEES has been significantly delayed, prompting concerns that proposals will be watered down. The Government must introduce a range of compelling incentives to ensure that as many buildings as possible are improved to band B as early as possible; and/or consider bringing forward the 2030 target to an earlier date.
Commercial and Business Energy Efficiency

Companies have underinvested in energy efficiency. In the decade between 2002 and 2012, while some manufacturers were able to achieve efficiencies of over 50 per cent, most achieved only 10-15 per cent. And, since 2015, while almost 80 per cent of businesses complying with Energy Savings Opportunity Scheme (ESOS) audits – a mandatory energy assessment scheme for large UK organisations – have implemented some energy efficiency measures that have resulted in estimated annual efficiency energy savings of 1.65 terawatt-hours from buildings, with the total energy saving equating to more than electricity generated from landfill gas, while the existing scheme has generated a net benefit saving of £1.6 billion\(^5\), the vast majority of these were related to lighting. Less than 30 per cent of businesses invested in more efficient processes and only 22 per cent in improved ventilation systems.\(^{19}\) Progress in improving efficiency of commercial buildings has also been limited, with energy use per unit of area effectively flatlining since 2002.

Public Sector Buildings and Decarbonisation

The importance of the public estate must also not be ignored. Melanie Leech, CEO of the British Property Federation told the network that ‘government is a huge property owner and government is also a huge property occupier. So it can lead by example ... that’s probably particularly important outside London and the southeast, because the government’s a huge asset owner and occupier of commercial property in the regions’.

The UK public sector manages more than 300,000 individual properties, at a combined value of £515bn, which makes it the largest property portfolio in the country, and up to £31 billion of public sector construction contracts across economic and social infrastructure will be brought to market over the next year.\(^{54}\) It is therefore crucial that the government leads from the front, using public procurement as a key vehicle to catalyse green growth and support the development of associated supply chains.

The Government continues to update its ‘Greening Government Commitments’, the current set running until 2025, to enhance the sustainability of the Government estate directly. The Government Buying Standard for new-build construction and major refurbishments Standard (2011), requires all new projects to achieve a BREEAM ‘excellent’ rating and all major refurbishment projects to achieve a ‘very good’ rating. The Construction Playbook sets out in 14 key policies for how the government should assess, procure and deliver public works projects and programmes; which all central government departments and their arm’s length bodies are expected to follow on a ‘comply or explain’ basis. In addition OGP’s Net Zero Playbook purports to provide a methodical step-by-step guide to help Government property professionals decarbonise their estate.

In terms of finance, the Government has created the Public Sector Decarbonization and Public Sector Low Carbon Skills Funds; and has committed to halve direct emissions from public sector buildings by 2032, against 2017 levels, and aim to further reduce emissions from public sector buildings by 75% by 2037. Additional initiatives are being brought forward by devolved administrations and local authorities, in relation to new public sector buildings standards as well as existing estate management.

Since its establishment in 2004, Salix Finance interest free loans to the public sector have totalled £842 million, in almost 18,000 projects. Annual financial savings are in the region of £181 million, with emissions’ reduction more than 820,000 tonnes CO\(_2\).\(^2\) Investing nearly £2.5 billion in heat decarbonisation projects through the Public Sector Decarbonisation Scheme. The latest tranche of £409 million of grant funding
was announced on 22 March 2023, bringing total allocation up to more than £2 billion since 2020. The government stated in its response to the Net Zero Review that they ‘have an ambitious target to reduce direct emissions from public sector buildings by 75% by 2037’. To achieve this, they will be:

- Providing support for organisations to develop heat decarbonisation plans through the Low Carbon Skills Fund, which can then be used to support decarbonisation business cases.
- Providing tools and materials, such as those available through the Modern Energy Partners programme website, to help organisations access the knowledge and information they need to develop bids for decarbonisation funding and deliver projects.
- Facilitating sharing of case studies and examples of best practice through the website of Salix Finance.

CO₂ emissions reductions by 2032 and be net zero by 2040.

The first phase of the works includes the installation of an ambient loop heat network and ground array with C. 50 vertical 200-metre closedloop boreholes, providing geothermal heat to electric driven heat pumps, supplying all the heating and hot water needs for seven satellite buildings on site, with (n+1) resilience. Gas boilers in smaller satellite buildings were replaced with air-source heat pumps. Other key works include over 3,000 low-energy LEDs, a 100 kW-peak rooftop solar photovoltaic (PV) installation, and cooling controls and mechanical services insulation.

The next phase of the works has a planned start date of 2023 and will include the expansion of the ambient loop heat network with additional ground arrays and heat pumps to decarbonise the remaining satellite buildings. The main hospital steam heating system will be replaced with a central, high-temperature air source heat pump solution capable of providing the heating and cooling requirements of the hospital with (n+1) resilience.

Centrica Business Solutions helps organisations to balance the demands of planet and profit. They build, operate and maintain onsite, large-scale energy assets like Solar PV and Combined Heat and Power - to help organisations to decarbonise and save money. They also deliver a range of zero carbon and renewable gas and electricity supply options that are tailored to customer needs and budget, to help lay the foundation for a low-carbon future.

They partner with 1,800+ organisations in the UK and Ireland, and 7,000+ businesses globally, to help solve their energy challenges and harness new opportunities.
Grants and Schemes

Past government schemes have driven significant progress on building energy performance. The proportion of English housing in the highest SAP energy efficiency rating bands A to C increased considerably between 2011 and 2021 from 16% to 47%. Between 2002 and 2021 domestic energy consumption in the UK fell by 21%, in part due to making homes more energy efficient. The Net Zero Review found however that ‘Support for lower income households exists but is not delivering at the pace and scale required. However, current measures aimed at supporting households to manage the high upfront costs of decarbonising reach only 12-22% of households in the bottom three deciles.’

There are signs of shifts the rates of allocations of grants. New schemes such as the Home Upgrade Grant (HUG) and Local Authority Delivery (LAD) now account for 19% of efficiency measures being installed in fuel-poor homes, 79,000 measures in 2022. The second round of funding for the Home Upgrade Grant awarded £584 million, a significant increase on the £218 million in the first round. Meanwhile, wave two of the Social Housing Decarbonisation Fund has allocated £778 million of funding for 2022/23 to 2024/25. The Public Sector Decarbonisation Scheme has awarded £1.1 billion to 302 projects recently, with the total funding for the PSDS to reach £2.5 billion from 2020/21 to 2024/25.

This obscures the reality though, that fossil fuel boiler installations are still being permitted, and while down to a new low of 31,300 in 2022 for ECO, this dwarfs the installations of low-carbon heating measures, which were just 3,300-8% of all heat measures.53 For ECO the administration and search costs are currently around £500 million a year. The Energy Efficiency Infrastructure Group stated in their evidence to the network that: ‘Since ECO 4 started in April 2022, by the end of January 2023, 80,000 measures had been installed in 30,000 homes, including ECO 3 Interim delivery. This is just 6.6% of the 450,000 homes ECO 4 is estimated to be able to support, despite the first 6 months of the four-year scheme now having passed. Past ECO delivery targets have largely been met, however, there are a number of worrying issues related to ECO 4, including very high compliance costs and problems with finding eligible properties. This is leading to installers warning of the collapse of the supply chains required to deliver the programme. Overall, according to recent analysis by the Installation Assurance Authority, there are now fewer than 10,000 people involved in the industry and publicly-funded energy efficiency schemes, compared to 54,000 in 2012. Urgent attention is needed to address the challenges which are limiting the scheme and to build back the supply chains that underpin delivery’.

The extension of the Boiler Upgrade Scheme to 2028 has been welcomed, however this masks the fact that the scheme is currently underutilised, with only 30,000 subscriptions- less than half planned for. £70 million of the underspend for its first year has now been returned to the Treasury.54

As Centrica told the network, ‘Businesses require long term policy certainty to ensure they can achieve Government’s targets for energy efficient homes. The Green Homes Grant failed due to the short timescale available to train installers and also acquire the eligible technologies for the grants. It is important Government learns from previous programmes and continues to provide longer term funding and commitments, such as it has done for the Boiler Upgrade Scheme (BUS), so that the market can prepare adequately’.
Understanding the UK's low carbon heat challenge

Heat Pumps
There is no denying that when it comes to the laws of thermodynamics, heat pumps have little competition. They require four times less energy than a gas boiler, and are six times more efficient than using hydrogen to heat a home. Heat pumps have been proven by the Electrification of Heat Demonstration Project to be viable in most property types, some 88%, therefore as the CCC notes, ‘supporting the case for widespread electrification of heat’.55

For those households who have installed a heat pump, research by Nesta showed that 70% were either fairly or very satisfied with their heat pump, a statistic that was unaffected by the age of the property. 67% were satisfied with the running costs of a heat pump, compared to 59% who owned a gas boiler.

We also need a significant increase in the manufacturing and sourcing of heat pumps. Two thirds of heat pumps installed in the UK today are manufactured abroad, compared to half of all boilers manufactured in the UK. The Heat Pump Accelerator Investment Competition has opened, providing grant funding of up to £15 million per project for major investments in the manufacture of heat pumps and strategically important components.

The CCC have further stated that ‘there is a major skills gap for low-carbon heat and energy’ with an urgent need for the government ‘to develop further plans to ensure that the supply of labour does not constrain supply chain growth’.56

There are currently 4-5000 Microgeneration Certification Scheme (MCS) certified heat pump installers in the UK, less than a tenth of the government’s target of 50,200 installers by 2030 set out in the Heat and Buildings Strategy. In contrast, there are over 130,000 certified gas engineers, many who have the required skills to install heat pumps. Surveys suggest that over half of these installers would be willing to upskill and install heat pumps if the incentives were in place. At the same time, the heating industry is dominated by SMEs, where the average age of many sole traders and workers is over fifty. The need to promote heating engineering as a career for young people is sorely needed, yet the time and cost commitment for training a new workforce is a barrier for many SMEs. The government is launching a Low Carbon Heating Apprenticeship in September 2023, and offers up to £500 for training grants, yet the loss of earnings while training can total several thousand pounds. Policy uncertainty around the phase out of gas boilers also prevents installers from making the commitment needed to retraining. Yet in France, where a certain commitment was made to phase out oil boilers within 10 years and provide scrappage grants, there was a 264% increase in installer training between 2018-19.57

The CCC estimates that 19 million heat pumps need to be installed in the UK by 2050 in order to meet net zero, with 74% of all homes suitable to receive heat pumps by 2050. Yet in 2022, the UK installed just 72,000 new heat pumps, 69,000 of which were in homes: of these, 40,000 were retrofits and 29,000 in new homes. This is a far way off the CCC’s balanced pathway of 130,000 installations in 2022, and 145,000 in 2023. The UK continued to rank 21 out of 21 for per-capita installations of heat pumps in 2022 and was only 11/21 for total volume of installations.

The government’s Heat and Buildings Strategy first set a target of 600,000 heat pump installations per year by 2028, or 2.5% of homes per year. This is not an impossible task: Finland has currently converted 34% of homes to heat pumps between 2000-2018, and has a current conversion rate of 3% of homes per year. If the Future Homes Standard is adopted swiftly, and is suitably ambitious, this will ban
fossil fuel heating in new builds, providing a ready market of 150,000-200,000 heat pumps per year. The 600,000 target does seem impossible to reach, however, without a legislative mandate to shift away from gas boilers, of which still 1.8 million were sold in the UK last year.

The extension of the Boiler Upgrade Scheme to 2028 has the potential to deliver around 180,000 heat pump installations over this period, however currently it is only on track to deliver 13,500 installations in 2022/23- just 45% of its capacity. The BUS grants cover around 39% of the average cost of a heat pump, which have made up 96% of installations so far. In order to maximise the potential of the scheme and the take up of installations, Centrica told the network that ‘The Government should expand the Boiler Upgrade Scheme to include costs for replacement radiators, pipes and hot water cylinders, alternatively these could be included in an expanded Great British Insulation Scheme. This would incentivise the consumers to install heat pumps and remove some of the upfront cost barriers’.

The costs of heat pump installation in particular remain a barrier to households wanting to make the switch. The unit costs of the heat pump are becoming cheaper, falling by nearly 7% in 2022. Yet it is the costs of installation, driven by inflation and rising costs for materials and labour in the construction sector- a common pattern across all forms of housebuilding- that has seen the price of heat pumps become more expensive. The labour costs for installation rose 13.7% in 2020 and 17.8% in 2021, though this had reduced to 0.7% in 2022. Overall, the cost of installing a heat pump fell by 2% in 2022, compared to a rise of 19.2% in 2021.

David Pinder from the National Retrofit Hub stressed to the network that while heat pumps were the right solution for clean heat, as a technology a heat pump alone should not be seen as a solution. Rather, it must be viewed in the important wider context of ensuring a home was well insulated and fit for the future. Instead of simply focusing on cost, there was a need to discuss ‘having a home that’s heat pump ready, realizing that a heat pump is just an engine. It is not a thing in itself. It needs to have pipework, not microbore. It needs to be supported by hot-water cylinders. It needs to have a level of insulation in the home that allows for a level of comfort at low temperature. All of those things need to be considered. My concern is that we are incentivizing people to put in the wrong measures. That is a real concern. I am not anti-heat pumps at all, but heat pumps need to be in the right context. If we are incentivizing people to put in heat pumps when they should not, we will get a negative reaction to heat pumps, which will be counterproductive’.

The EEIG highlights that policies on building fabric improvements and low carbon heat must go hand-in-hand. Energy demand reductions through building insulation and fabric improvements are often needed alongside heating solutions. A building which requires 10,000 kWh of energy to heat it each year uses more energy, and puts more pressure on energy generation and distribution systems, than one with a heating demand of 5,000 kWh. Properties with high energy demand that haven’t been retrofitted will also use larger amounts of energy for heating at peak times. If the energy used for heating is electricity, every unnecessary unit of energy consumed will come at a higher price than gas at present. It has become important for energy demand reductions to be delivered in reality, with checks that homes perform as designed.
Another key technology to help meet the increased supply of low carbon heat meeting 50% of demand by 2035 is the greater application of heat networks and heat zones. Heat Networks have long been operational across Europe as a means of delivering energy and heat at lower cost. 60 million people across the EU have district heating, which provides around 11% of demand. In Denmark, Sweden and Finland, district heating accounts for between 52-43% of space heating fuel consumption.

The last official comprehensive data on heat networks was published back in 2018, recording that in 2015 there were 14,000 heat networks supplying 480,000 customers across 76,600 buildings. 80% of these were residential, and 90% of networks used gas as their main fuel source. Since then, no new real progress has been made to expand heat networks. The government’s Heat Network Planning Database features 49 new or expanded networks that have become operational since 2018, yet of these only 8 were for domestic buildings. The shift away from gas has been more prominent, with 45% of these new networks employing heat pumps and 8% biomass. Another 157 heat networks are in construction, with the majority

### British Gas Zero – Warm Home Promise, Centrica

Understanding that consumer hesitation over new technology is a barrier to the uptake of heat pumps, British Gas Zero have introduced their Warm Home Promise to ensure heat pumps are more affordable and there are protections for consumers.

The Warm Home Promise – a commitment to only install a heat pump if it will heat a home as well as a traditional boiler.

The promises aim to further accelerate heat pump uptake in the UK and encourage people to make the switch and lower their emissions. British Gas has installed more heat pumps than any other company and we have committed to training 3,500 engineers in green skills. Their heat pump offer includes:

- **Five Year Guarantee** – British Gas heat pumps come with a five-year guarantee and its expert engineers will provide a free service before the winter to make sure the heat pump is in top working order.
- **Lowest cost install** – British Gas prices are £499 across the UK (with the BUS) per install, but they will match anything lower offered by another company for a MCS credited install.
- **Quick install** – British Gas engineers are available to install a heat pump if you need to replace a gas boiler and the engineer will do a survey on your property.
- **Efficient heating solution** – British Gas won’t install a heat pump if it can’t heat your home effectively on the coldest days. Instead, they will suggest a different carbon-saving option. If the heat pump doesn’t heat the home to the agreed temperature, then British Gas will give your money back.
- **Expert Installation and advice** – On the day of installation, your installer will explain the differences and will show you how to operate your heat pump in the best way possible – and check in a few days later to make sure everything is running smoothly.

The offer has led to a significant increase in heat pump sales at British Gas.

### Heat Networks and Heat Zones

Another key technology to help meet the increased supply of low carbon heat meeting 50% of demand by 2035 is the greater application of heat networks and heat zones. Heat Networks have long been operational across Europe as a means of delivering energy and heat at lower cost. 60 million people across the EU have district heating, which provides around 11% of demand. In Denmark, Sweden and Finland, district heating accounts for between 52-43% of space heating fuel consumption.
using heat pumps. Since 2013, the government’s Heat Network Delivery Unit has also delivered 11 funding rounds with 250 projects supported across 170 local authorities.

Low carbon heat networks have the potential to transform the emissions of buildings, particularly for those existing heat networks that can be modified or retrofitted away from fossil fuels towards new clean sources of heat, as well as establishing new heat networks or heat network zones. It has been estimated that heat zoning could save 2.7 million tonnes of CO2 while the heat networks market framework could save an additional 0.4 million tonnes in the period 2033-37, the equivalent of 0.7% of greenhouse gas emissions in 2022. For the CCC, under their balanced pathway, around one fifth of heat for buildings should be delivered through heat networks: with these shifting to low carbon sources, this would result in cutting emissions by around 16 million tonnes-17% of the emissions reductions needed for the buildings sector and around 4% of the overall reduction in emissions to reach net zero. Potentially there is scope to go further. The government’s National Comprehensive Assessment of Opportunity Areas for district heating networks, published in September 2021, concluded that there was a significant potential for using waste heat, of up to 310 TWh a year.

The government has recognised recently the importance of heat networks in their net zero plans, revising their annual heat supplied via heat networks in 2035 from 29 TWh in the Net Zero Strategy to 35 TWh in the Carbon Budget Delivery Plan. The Heat Network Transformation programme has been allocated £338 million of funding.

Buildings and Adaptation

According to the CCC, adaptation remains ‘the Cinderella of climate change, still sitting in rags by the stove’. The Committee has said that adaptation is ‘under-resourced, underfunded and often ignored’.

The CCC advice on the third UK Climate Change Risk Assessment concludes that progress with adaptation policy and implementation is ‘not keeping up with the rate of increase in climate risk and that the risks to all aspects of life in the UK have increased over the last 5 years’. The CCC’s ‘Progress in Adapting to Climate Change Report’ (2023) also found that ‘while the recognition of a changing climate within planning and policy is increasing, with some policy in most areas, it is clear that the current approach to adaptation policy is not leading to delivery on the ground and significant policy gaps remain’.

The government’s third UK Climate Change Risk Assessment acknowledges that ‘the evidence shows that we must do more to build climate change into any decisions that have long-term effects, such as in new housing or infrastructure, to avoid often costly remedial actions in the future’. Indeed, the significant financial risk a lack of adaptation in the built environment poses to prospective property owners, investors, and financial organisations has become an increasingly pressing concern in the financial sector. It is crucial that both policies and interventions to promote energy efficiency retrofit and low emission newbuild standards account for both securing adaptation as well as mitigation.

Of the eight priority climate risks highlighted by the Third Climate Change Risk Assessment which should be tackled in the next two years, the risks to human health, wellbeing, and productivity from increased exposure to heat in homes and other buildings were identified as amongst the most urgent to address and most severe. Higher temperatures and more frequent heatwaves such as what the UK experienced in 2022- when temperatures over 40 degrees C were recorded for the first time and the UK issued its first ever Level 4 heat health alert. Around 20% of homes in England already experience overheating even during relatively cool summers. In addition, the proportion of green space in England, which
can provide a local cooling effect, has dropped from 63% to 55% between 2011 and 2016, exacerbating the Urban Heat Island Effect.\(^{65}\) Energy demand to cool buildings is projected to increase, possibly exceeding £1 billion per annum by 2050, during which time the number of heat-related deaths in the UK could increase by around 250% compared to today.\(^{66}\) During summer 2020, more than 2,500 heat-related deaths were recorded in England; the highest number since 2003.\(^{67}\) Likewise on average, an excess of 791 deaths associated with heat already occur annually in England and Wales.\(^{58}\) If greenhouse gas emissions continue at their current rate, hot spells will become normal by 2050, occurring on average every other year.\(^{69}\)

Issues with damp and flooding, exacerbated by the increasing frequency of extreme rainfall events, can have severe implications for residents’ mental and physical health, particularly through the former’s link with respiratory conditions.\(^{70}\) Water availability is also a growing problem in the UK – with between 27 and 52 million people likely to be living in areas with water supply problems by 2050, with average water use already considered too high, and demand reduction measures recommended to achieve sustainable supplies.\(^{71}\)

Approved Document O was added to the buildings regulations in England December 2021 and took effect in June 2022. DLUHC will also keep Approved Document O under review. However, this does not encompass new commercial buildings. In the Third National Adaption Programme 2023, the Government pledged to ‘develop measures’ that will retrofit existing buildings alongside net zero commitments in ways that appropriately consider how to minimise climate risks to buildings such as from overheating.

Whilst these developments and advances are welcome, significant policy gaps remain notably integrating adaptation (for example, external shutters, insulating paint and heat pumps able to also cool in order to adapt to overheating, or property flood resilience measures) as part of a holistic policy effort to address the UK’s existing building stock. Likewise commercial buildings have received significantly less attention, and should be within scope of future regulation. Planning reform will have a key role to play, and forthcoming opportunities to strengthen national planning policies and associated legislation should not be missed.

**Public Engagement and Energy Advice**

Perhaps the most important enabler that will need to drive improved decarbonisation and retrofit of buildings is public engagement and advice. LBG research found that 64% of respondents cited lack of awareness as being a key barrier to act in a more sustainable way. The Net Zero Review also called for the government ‘to publish a public engagement plan … to ramp up public engagement on net zero’.

Natwest’s Greener Homes Attitude Tracker, published in July 2023, demonstrates that overall appetite for making green home improvements in the next 12 months increased only slightly, with the proportion of homeowners with plans ticking up from 21% in Q1 to 22% in Q2. Data showed a similarly fractional rise in plans for the next 1-5 years (32% up from 31%). There was a more noticeable shift in attitudes towards longer-term plans, with the proportion of those intending to make upgrades in the next 6-10 years rising from 17% to 19%.

20% of people looking to purchase a property in the next 10 years considered an Energy Performance Certificate rating of C or above an ‘essential’ feature, according to data collected in the three months to June. This was little-changed from 19% in Q1. A further 35% considered it a ‘very important’ feature. Attitudes towards the importance of high EPC ratings varied widely by age group, however.
One-in-four prospective homebuyers aged 35-44 stated that an EPC rating of C or above was an ‘essential’ feature, compared to less than one-in-seven of those aged 18-24.

Among the homeowners who stated that they either were not planning to make any improvements in the next 10 years (20%) or did not know if they would (14%), almost three-quarters (74%) said that the cost of the work required was a barrier. The data suggested that it was the biggest obstacle by far, ahead of the level of disruption the work would cause (cited by 32%) and the availability of financing options (29%).

66% of homeowners plan improvements to the environmental sustainability of their property in the next ten years, up from 63% in Q1: Knowledge and awareness of government schemes remains low, with 44% of people not aware of government support schemes, while 33% of people do not know about what energy efficiency measures could be adopted.

The Heat Pump Association states that ‘heat decarbonisation advice to consumers is inadequate and inconsistent’. The Net Zero Review also recognised that access to the right skills and supply, for instance to find the right engineer with the relevant skills, was also a barrier to future delivery. The review recommended that consumers are given better access through a list of certified installers at a local level.

In addition to advice on skill supply, there remains a fundamental issue of public trust for the retrofit sector to deliver quality solutions that has been explored by the Environmental Audit Committee, which stated that ‘mistrust in the retrofit sector and a lack of consumer awareness ... is creating a vicious cycle of low investment in retrofit skills and deployment’.

All this presents a significant barrier to scaling energy efficiency. Yet schemes to encourage reducing energy demand through low cost, easy measures, have been successfully delivered by suppliers: Octopus for instance has helped customers reduce bills by 8% on average. The next section, Part Three, seeks to establish what more might be done in order to improve consumer confidence and deliver a National Retrofit Mission at scale.
Public Engagement and Convincing the Consumer

Without the consumer- in this case the householder- fully behind the case for retrofit and home improvements, we will be unable to decarbonise our buildings. That case can be made by winning hearts and minds, not merely in the emissions reduced and saved, but critically in demonstrating that retrofit is not something to be done or imposed upon homes. Rather, retrofit pays dividends, as an investment in the future, that saves money on future household energy bills, that enhances the value of a property, and ensures that homes are cosier, warmer, cooler in the summer, and are able to adapt to our changing and warming climate.

While the economic value of job creation, growth and regeneration are attractive and important narratives for why retrofit is important to UK business and industry, it must be this focus on the personal and the private household benefit that must be at the forefront of better public engagement and advice, that should be driven at a national level.

A national advice service

A national or nationally backed advice service is essential for ensuring households can plan to retrofit in the best way possible, one that will be most efficient and cost effective. BEIS’ Public Attitudes Tracker shows that 47% of people feel that there is so much conflicting information that it can be difficult to know what to believe. Often people do not know how best to prioritise actions, for instance whether to install a heat pump before improving energy efficiency. There are also some common misconceptions which can limit the effectiveness of people’s actions, including that heat pumps are not as efficient as gas boilers (in contrast they are six times more efficient and use much less energy as a result), that they cannot generate the same comfort as gas boilers (untrue) while many people expect to switch heat pumps on and off like a conventional boiler, rather than to leave them on permanently.

The CCC have suggested that there are two key shifts that need to take place in order to improve public engagement:

‘Enhancing the Government’s energy advice service. The service should provide advice on simple energy saving measures, not just the complex home retrofits currently on offer. This service should also be broadened beyond homeowners to target all households and business owners. The service should provide consumers with reliable information about the potential for cost savings and emissions reductions they can realise by making short- and long-term changes to both the fabric of their buildings and the specific ways they use energy within them, on the basis of up-to-date energy prices.

Increasing the content and reach of the Help for Households campaign to say more about energy saving. The energy reduction content should cover more options than the three currently listed, which are not applicable to all households. It can also make the link between these actions and climate change and highlight the range of other benefits available to households, including increased home comfort. Importantly, this should be expanded to be a wide-reaching public awareness campaign, which should also raise public awareness of the energy advice service.’

CIBSE stated that ‘There is a clear opportunity for the provision of clear, cost effective and independent advice to everyone from house owners to large real estate corporations’. Instead, ‘We constantly hear that owners have taken advice from manufacturers - who generally can only advise on a singular technology and not on the breadth of opportunity. At worst this can result in the wrong solution; at best it can result in an overcomplicated scenario which has increased capital cost, and where technologies are not properly integrated to work in the most efficient and effective manner’.
There is a case for a modern version of the ‘Electricity Board Shop’. Many people prefer to make major decisions on and about their homes and cars with an element of show and tell. These outlets would service the same purpose - to show consumers the options available to them. As an independent source of advice and information it would need a suitably independent host organisation, thought that could be funded through the regulated energy bills. Given the variety of contexts for homes (geography, existing energy systems, future potential systems) would benefit from being present in as many of these different settings as possible.

In the UK, in the absence of a centrally co-ordinated energy efficiency and advice service, the Citizens Advice Bureau, a statutory consultee on energy efficiency measures, and community energy groups have taken a prominent role in helping customers to make informed decisions on energy efficiency. Selce is a community energy group that since its inception in 2014 has provided one-to-one advice to thousands of low-income households struggling with their bills. For example, from August 2021-August 2022 they provided one-to-one support to 1,079 low-income households in South East London. In the same time period, its work resulted in a summed reduction in costs of more than £600,000 and avoided more than 5 million kg of CO2. Over 12 months, the team delivered 53 workshops, visited nearly 400 homes and reached over 500 residents. This included delivering more than 350 bags of simple, easy to install energy saving measures such as draught proofing, LED lightbulbs and water saving measures. Selce delivers advice in collaboration with other local organisations to ensure it reaches the most vulnerable residents. From August 2021-2022, they trained 103 front-line workers to better understand fuel poverty and embedded 10 energy advice volunteers in local organisations to deliver advice to their communities. Government should learn from the impact that community organisations like Selce are making, and in addition to creating a National Advice Service, should fund community energy efficiency projects to deliver effectively in local communities.

There are also a number of international examples that the UK can learn lessons from by ensuring that public grants and loan finance is conditional on the access to, and following the recommendations of accredited retrofit advisors.

MaPrimeRenov, France

The success of MaPrimeRenov can be seen in its wide uptake - over 600,000 installations and 158,000 heat pumps in 2022 alone. This has been possible thanks to a focus on the customer journey. Upfront quotes, energy audits, a directory of local installers, access to advisers and free consultations and access to a renovation guide and an online account have not only streamlined the process, they have given a sense of control to customers. For households to access the scheme, they must get quotes from Recognised Guarantor of the Environment (RGE) professionals who they must chose before accessing finance.

As a free and independent public service, MaPrimeRenov navigates the householder through the journey of retrofit:

- An online hub acts as a single point of contact while consumer accounts provide an automated process flow
- A financial aid simulator provides customers with an upfront, personalised estimate of their grant allocation before they proceed.
- A directory of certified installers in the customer’s local area is provided
- Customers are given access to local advisors
Public Engagement and Information Strategy

The Net Zero Review called for a public engagement strategy to be launched as soon as possible, a call that was repeated in the CCC’s 2023 Progress Report. As the Mission Zero report stated: ‘The Review recommends that government ramps up engagement with the public on net zero and publishes a public engagement plan for England by 2023. The Review heard that “we need to develop more positive visions of the future”, which engage people and sell the benefits of net zero to them. Government should provide clear, honest and positive messaging about what changes people will see during the course of the transition, and where and why action from them might be needed. This should focus on the measures with the greatest carbon and economic impacts. It should demonstrate to people the many benefits that net zero will offer them, as well as being frank about the challenges’. It added, ‘This must be designed to help households recognise how and why they should take action to reduce the carbon footprint of their homes, and to understand what support is available. It should be honest about the challenges and should dispel common misconceptions, for example that certain housing types are not suitable for heat pumps. It should also focus on helping consumers make use of low carbon heating systems in the most efficient way’.

The CCC have estimated that over 60% of emissions reductions needed by 2050 will involve societal or consumer behaviour change. It is important to recognise that other transitions have taken place recently, which have witnessed significant behavioural change and adaptation already, not least in our use of digital technologies.

There are several international examples where the focus has been to provide better public understanding and advice as a priority for delivering successful programmes. Many other countries in Europe have already established public engagement schemes to reduce energy
and in turn fossil fuel use. In France, the Sobriété Energétique, with an outcome of 10% energy saving target by 2024, resulted in gas consumption being 12% lower than the 2018/19 baseline.

An important feature of any public information campaign and energy advice service must also tackle the reality of cost for home improvements, and what can be achieved both as ‘quick wins’ and also what measures can be delivered at low cost, with financial benefits and realisable returns. A holistic, whole house retrofit approach is best, so any boost in public information should extoll the benefits of qualified retrofit coordinators producing whole house plans that can be implemented incrementally and cover all the key aspects, such as ventilation. The CCC have suggested that 60% of housing retrofits needed to deliver net zero can be met with an outlay of £1,600, while the Net Zero Review’s own analysis demonstrated that the average household will save between £400-6000 having installed retrofit measures.

There are a number of interventions that are not only no-regret policy options, they could be implemented effectively and immediately, delivering immediate benefits to householders. The CCC has outlined to the government where immediate changes, effectively communicated by government to householders, could lead to instant benefits both for reducing energy demand and also costs to households. These include encouraging households to reduce the flow temperatures for their condensing boiler from 75°C to 60°C which would only need 10% adoption by eligible households to save the Treasury nearly £28 million in 2023 alone. Other simple measures with potential for high savings include closing curtains at night (£7-34 million saved) and reducing heating by five hours a week (£4-22 million saved). Examples of ‘quick wins’ to achieve energy savings and reductions at the same time are shown in the table overleaf.

In addition, other relative low-cost measures to insulate homes quickly include water tank insulation which costs less than £100, even where a professional fitter is needed. Similarly, draught proofing for windows, doors and letterboxes is a cheap DIY measure from which most households can benefit. These measures can reduce gas demand by around 5-8% in a typical home. Other simple changes identified by the CCC include energy efficient appliances, low flow shower heads, and moving from gas to electric kitchen stoves. Improving the efficiency of other household services and appliances can save households money too. The Energy Saving Trust told the Net Zero Review that ‘About 12% of a typical gas heated household’s energy bill is from heating the water for showers, baths and hot water from the tap’ while ‘Heating water for use in our homes makes up about 5% of the UK’s total carbon dioxide emissions’. The Mission Zero report highlighted that ‘energy efficient lighting will lower electricity bills and reduce carbon dioxide emissions, with lighting making up 11% of the average UK household’s electricity consumption’. LED lights last longer than halogen lightbulbs and use 80% less power making this a significant shift to lower cost of energy for consumers in the long-term. Taken together, these are not insignificant savings both in terms of cost and carbon emissions, and while they cannot be taken as an alternative energy efficiency strategy to retrofit and insulation, within the context of committing individuals and households to realising the financial benefit and savings of energy efficiency and reducing energy demand, they are a good place to start delivering engagement and winning trust.

Public engagement over retrofit and energy efficiency also involves being honest about the trade-offs that are required in order to deliver benefits. Up front costs are required, and while this is in the majority of cases an investment, the investment will take time to pay back. The amount of return on investment will depend on the type of property, the nature of the
retrofit and the costs of the works. These costs are not static, and indeed if a mission-based approach to delivering retrofit at scale were accelerated, the labour and technology costs would fall further. Additional measures such as rebalancing of gas and electricity prices will also incentivise the reduction in costs of energy efficiency and clean heat, shortening the payback period. The Net Zero Review created a Net Zero Distributional Analysis tool to calculate savings over nearly every typology of housing. It concluded that the average household will save £400-£6,000 cumulatively by 2050, while with some of the policies suggested in the Review, this could go further – as much as £14,000 with electricity-gas price rebalancing. ‘However, these savings are not immediate – according to our analysis they will
not have materialised by 2040, when the average household will still have borne a cumulative cost of £4,000-£6,000 because of long pay-back periods from the investments’. Ultimately, the nature of these trade-offs and costs will be decided by how effective policy frameworks that are delivered now, sooner rather than later, in delivering savings to energy bills and reducing the use of and demand for costly fossil fuels.

**Costs and Finance**

It is clear that public attitudes towards retrofit and improving homes centre around costs. At a time of high inflation, high interest rates, and squeezed household budgets with high food costs, this is likely to have a greater impact on household decisions to move away from retrofit. The fact that the latest Natwest Green Attitudes Survey figures show an increase in those seeking to eventually install EV charging points, solar panels and other energy efficiency measures demonstrate that the public recognise the savings that these measures can provide and should be viewed as a positive sign that many households are still keen to retrofit in spite of the fiscal and inflationary headwinds facing them.

Citizens Advice has stated ‘the largest barrier to consumer uptake across a range of low carbon technologies remains the initial upfront cost’. As the CCC have stated, ‘the up-front capital costs needed to decarbonise the UK’s building stock remain high, and the Government has not made much progress on answers for the question of ‘who pays?’.

The CCC have further stated ‘the government has made little progress on policies which would increase access to finance for retrofits for either households or businesses … affordability remains a significant barrier to progress … Policies around financial levers need development to help consumers with prohibitive up-front capital costs’.

The challenge is greatest in the owner-occupier sector, which accounts for 63% of homes and where over half of properties are below EPC band C. The availability of competitive green finance is crucial to changing this; investing in energy efficiency needs to be made both straightforward and desirable and this needs to be demonstrated to consumers. The average cost to improve a property to band C is £8,100, though for the worst efficient buildings, properties currently rated F or G, the lowest EPC ratings, these measures could cost as much as £25,800. Installing the recommended energy improvement measures would save around £1,780 a year, meaning a payback period of 14 years.

As part of their own Green Living Award Pilot Scheme, Lloyds Banking Group conducted 8,300 consumer actions plans for green home improvements with interested customers. Based on the recommended improvements detailed in consumer action plans, the estimated average bill saving per household would be c. £306 and the average CO2 saving per year c.1.6 tonnes. However, this comes at an estimated cost of £9,300 with associated payback period of 30 years. This demonstrates that the customer business case to make retrofit home improvements is challenging. Research has found that 18% of homeowners would be willing to spend more than £10,000 and only 19% willing to spend between £5,000-£10,000 on green home improvements, indicating that there is a challenge in customers’ appetite to invest. Customer research into homeowner sentiment conducted by LBG in 2019 further showed that homeowners have a limited knowledge of energy efficiency within the home and how to make improvements. The research found that financial institutions have considerable scope to undertake more visible sustainability initiatives, with 47 per cent of respondents claiming institutions should offer products to encourage customers to be more sustainable.
Cost considerations are paramount in household budget decisions, as the Natwest Green Attitudes tracker mentioned above sets out. Reducing these upfront costs, or at least balancing these through a wider variety of incentives, particularly concerning green finance, has been a key focus of other countries such as France, Germany and now the USA, as set out in Part Two of this report.

Green Finance: Pulling the Right Financial Levers

It is essential that if the UK retrofit industry, and the transition to clean heat and better energy efficiency is to be successful, that it fully engages market forces. The current subsidy regime through grants and loans is important to scale up an industry, but it must also ensure that in the longer-term, in order to incentivise both long-term supply and demand, market principles are fully aligned with retrofit.

As Bankers for Net Zero have stated, ‘Retrofitting relies on technologies and processes that become cheaper as deployment scales up. That means that once a tipping point is reached, the industry can and will go exponential. The challenge is getting to the tipping point as quickly and efficiently as possible. This is where well-designed policy is critical. The solar and wind industries have arrived at the point where their growth is self-sustaining because of decisions taken by governments around the world, including in the UK, to support those markets through their infancy. The tipping point for the retrofit industry will come when the (falling) market cost for renovations meets the (rising) market value for improvements ... At the point of parity between (declining) costs and (increasing) value enhancement, banks will be able to lend against the future value improvement. Market forces will then kick in and drive an exponential take-off’.

The barrier to reaching a tipping point is both one of cost and value. At a time of constrained household budgets, there is no ‘able to pay’ market. Finance mechanisms need to adapt to ensure that this so-called ‘able to pay’ market is instead transformed into a ‘willing to pay’ consumer. As consumers, retrofit and energy efficiency need to be considered purchases that have real value, a value that is retained and can be traded.

As Bankers for Net Zero have observed, ‘At present, demand in both the domestic and non-domestic sectors is held back by a number of factors, including: low levels of awareness about the solutions available and their benefits; split incentives; and misalignment between businesses’ and households’ investment time horizons and the payback periods for deep retrofits. Critically, businesses and households struggle to quantify the value enhancement and cost reduction potential of undertaking deep retrofits, meaning that they do not see a compelling case to prioritise investments in energy efficiency and heat decarbonisation. The key challenge for policymakers is therefore to stimulate demand through a package of credible, quantifiable “sticks and carrots” that strengthen the investment case for private businesses and households, while using public investments in decarbonising social housing and public buildings to “pump-prime” the market for deep retrofits.’

On the question of value, this requires a better alignment of the financial advantages that retrofit and insulation bring as wider home improvements, adding to property value, but also more transparency around the continued costs of ‘not zero’ and business as usual, compared to the energy savings delivered to a household through committing to energy savings measures.

As David Willock from Lloyds Banking Group told the network, the ‘one of the biggest challenges is about perception of value in the eyes of the end user ... we haven’t yet had a breakthrough moment where the consumer really feels that a low carbon or zero emissions building is more valuable to them’. In order to help change this perception, he considered that measures should be taken to shift
householder perception towards the ‘total cost of occupancy, so when you look at mortgage and rent and you add it to the energy bills’.

Tim Abbott from Barratt Developments told the network that it was important that further work was taken forward on ‘the valuing of renewable technology in homes’: ‘if you put solar panels on your house, does that increase the value of your home? ... So there’s something about actually some uplift of your property value, so then the payback period doesn’t feel so scary. So there’s other ways you can kind of look at it’.

There has been limited progress to date on government supporting green finance products. The Green Home Finance Accelerator has provided £20 million to support green financing products. The government has also awarded £1.8 million to projects as part of the Green Home Finance Innovation Fund. The Government has said that it would engage with the UK Infrastructure Bank (UKIB) to explore their wider role in scaling up green home retail finance.

The Net Zero Review saw the development of green finance for retrofit and household energy efficiency as an opportunity for the UK financial sector, stating that ‘The UK’s financial sector can lead in this space. For example, lenders are already stepping into the green mortgage market, providing preferential treatment on the basis of a home’s EPC rating. These are primarily for those purchasing homes with a higher EPC rating (NatWest provides a preferential interest rate if you purchase or re-mortgage a property with EPC A or B).

In order to stimulate this emerging market, the review recommended that the Government should include an Energy Efficiency Taskforce workstream on green finance products to report by end of 2023, stating that ‘This should help to support those in low EPC rated properties to carry out green home upgrades and should identify opportunities to crowd-in private finance, alongside public funding’.

The landscape of available policy and regulatory interventions for advancing the retrofit and energy efficiency is laid out in several reports including Financing energy efficient buildings: the path to retrofit at scale (Green Finance Institute) and Energy efficiency’s offer for a net zero compatible stimulus and recovery (Energy Efficiency Infrastructure Group, June 2020). Notably, the Cheaper Bills, Warmer Homes report has highlighted how it is possible for retrofit to be conducted without creating additional upfront cost for households. The report sets out how no household would have to pay from their own pocket. Instead, measures are funded through a mix of repayments from energy savings and grants for lower income households. Ensuring a suitable offer for everyone, regardless of circumstances. Whether social housing, private rented or owner occupied, the cost of a home ‘future-fit’ will be paid for via a ‘blended finance mechanism’, proving a mix of suitable options for each home:

1) Zero interest loans with repayments tied to the property, not the individual, paid back automatically through a contribution from energy bill savings, never from household savings.
2) Loans supplemented by public grants for lower income homes, with the most at need receiving a greater contribution from grants, and so greater savings.
3) For those who can pay, low interest financing for wider enabling or home improvement works.

Several potential green finance solutions have been highlighted to the network, which deserve renewed consideration by the Chancellor and Treasury ahead of the Spending Review in November.

(A) Retrofit Zero-Interest Loans

Zero interest retrofit loans would provide access to finance while avoiding the high cost of debt that characterised past loan programmes.
By linking these loans to the home rather than the individual, the debt stays with the home when moving. These loans should be sufficient in scope and scale to fund the full range of measures necessary. Based on this evaluation of other successful international low/zero interest loan schemes, we expect a new finance mechanism would need to have the following features:

- A zero-interest rate. This could be achieved with the borrowing powers of the National Infrastructure Bank in a similar approach to Germany’s KfW which could issue low-cost AAA bonds, with loans handled by retail banks
- Debt tied to the property, not the individual. Using a channel such as energy bills or council tax solves the split incentive issue and can also be modulated should a household’s income change. This is especially important for the private rented sector, but also may draw in owner-occupiers who may consider moving before loans are fully repaid
- Provide financing for wider enabling or home improvement works. Retrofit measures are rarely undertaken in isolation, and typically require a range of enabling works, which may not directly contribute to energy savings. Schemes that have also provided financing for wider home improvement works have typically been more successful.

Government’s role in facilitating access to finance will be critical. E.ON have called for incentives such as guarantees to the banking industry to offer loans at low interest rates. In Germany, the KfW offer low-interest loans of up to 120,000 euros to fund the installation of energy efficiency measures, with a subsidy of up to 40% of the loan value. For every 1 euro invested by KfW, building owners were motivated to borrow or spend six euros. This meant that while the programme cost 1.7 billion euros in 2010, it unlocked 8.4 billion euros from building owners and in turn paid for itself through VAT revenue alone (1.6 billion euros). Between 2005 and 2017, the loan programme has resulted in 2.8 million installations and delivered 7.5MtCO2 emissions reductions. A $4 billion zero-interest rate loan programme has also been introduced as part of the Greener Homes Initiative, with strong interest expressed: over 288,000 households have signed up for consideration this year alone.

(B) Green Mortgages

Mortgage affordability assessments centre on the applicant’s ability to repay. Whilst a significant proportion of household outgoings relate to energy costs, current underwriting methods do not reflect this significance, nor the opportunity for energy efficiency measures to reduce these bill costs. Green Mortgages use actual energy usage data in these underwriting calculations. Lenders may provide increased lending for more efficient properties at reduced interest rates—as the higher disposable income reduces the risk of default. Indeed, two EPC band improvement, could equate to around £4,000 in additional mortgage finance. Further, by requiring mortgage lenders to disclose the EPC rating of their portfolios, this may create a ‘green premium’, increasing property values for the most efficient properties, also providing additional borrowing for retrofit measures.

For example, Ecology Building Society has been providing green mortgages for over 40 years. They reward sustainable building, renovation and development of energy efficient properties through their unique ‘C-Change’ mortgage discounts for homeowners building or converting sustainable homes, or undertaking renovation and retrofits. The discounts reduce the mortgage rate based on the property’s energy performance or environmental impact and, once the build has been certified to the relevant standard, are applied for the remaining term of the mortgage. C-Change retrofit discounts are available for properties
undergoing significant renovation works that will improve the energy efficiency. A 0.25% discount off Ecology's Renovation Mortgage rate is awarded for each EPC grade improvement. E.g. For an improvement in the EPC rating from E to B, a discount of 0.75% applies on the mortgage for the duration of the loan following certification of the improvements. A discount of 1.25% is available for properties renovated to the Passivhaus EnerPHit standard and 0.75% for the AECB Retrofit Standard.

(C) Property Linked Finance

Property-linked finance is an innovative option which entails a loan linked to the property rather than property owner. When a property is sold, repayment obligations transfer to the new owners, which can help to tackle the ‘payback period barrier’ (where households are put off from investing in measures with long payback periods, as they may not own the property long enough to fully recoup savings). It is already available in countries including the US, where it has supported more than $11 billion in investment into energy efficiency and resilience measures, but currently not the UK.

Local Area Energy Plans: A Gateway to future Green Investment

In the Mission Zero Coalition’s report, The Future Is Local, the expansion of Local Area Energy Plans both as a requirement to access future funding and to deliver on local authority net zero ambitions, should also be a key component of large scale, area based and locally managed programmes that can open up future market opportunities to partner with the private sector. Area-based programmes can also provide significant opportunity for low-risk institutional finance. The Future Is Local report highlights the Bristol City Leap model, which has seen a co-investment of £424 million from Ammeresco to develop a heat network, as a template for delivering future Net Zero Leaps that can deliver new inward investment.

Incentives within the Tax System

In addition to help to provide backing to develop innovative means of private finance, the government also has a duty to develop new incentives to encourage householders to invest their own money where possible in retrofit and insulation. This can be achieved through tax rebates and tax credits for companies and businesses, as has been developed in the US Inflation Reduction Act (see above) and through rewarding individuals with a financial benefit for making an investment in home improvements to their home. Already the Treasury have removed VAT on specific energy and retrofit related products, such as heat pumps or solar panels, yet there is significant opportunity to go further. These measures include rewarding house owners with lower rates of council tax, funding the difference directly to local authorities, to creating systems of tax rebates, or Green Allowances in the Income Tax system. The Treasury will expect on balance that measures should be fiscally neutral; if this is to be achieved, then further reforms to the Green Book would be needed to recognise the longer-term value and investment that retrofit and insulation can make to both households and the UK economy.

One area where the Treasury may be more willing to act sooner is on the VAT threshold and extending further the rebate to wider retrofit and refurbishment.

In the Spring Statement for 2022, the Chancellor announced a zero-rate of VAT for installing ‘certain Energy Saving Materials’ until April 2027. This was welcomed by the Net Zero Review, which stated that ‘this is helping to reduce costs and incentivise homeowners to make changes to their properties, and we recommend this should be maintained permanently’. Yet the removal of VAT has been limited to insulation and heat pumps, and other specific technologies and materials, rather than the overall broader aspects of retrofit work,
that can include necessary extensions and refurbishment, as well as the labour element of repair and improvement work. The National Housebuilders Federation have stated that:

We are aware that the sector has had difficulty fully utilising this VAT relief. This is because the common approach in the social housing sector, and a recommendation of retrofit experts, is to ensure all components of works are completed together. This is more practical, more cost effective and also minimises the disruption caused to the occupiers.

HMRC’s current position, where energy saving materials are installed as part of a larger refurbishment programme, is that this forms a single supply for VAT purposes and the single VAT liability of the principal supply should be applied to all of the works performed, including the installation of energy saving materials. This means that works which would qualify for zero-rating if supplied separately in their own right are not eligible for relief. VAT is charged at 20% on all the works and the benefit of the VAT relief is not realised.

Research by CBI Economics for the Federation of Master Builders and RICS has indicated that removing VAT on all aspects of repair could provide an economic boost of £51 billion including helping to create 345,000 jobs, while Green Alliance have suggested the economic stimulus would be worth £15 billion, while only costing the Treasury £920 million.

In addition to further VAT reform, there have been several calls for incentivising retrofit on owner-occupied properties through Stamp Duty Land Tax (SDLT). SDLT could be reformed to reflect the energy performance the property, centred around a baseline level that improves over time. SDLT is a strong option for incentivising retrofit because it impacts at the point of purchase – a time when renovation often takes place. Energy saving SDLT would see house buyers receive a discount if a property is above a given energy efficiency standard or pay a higher rate if its performance is poor. A home that attracts lower stamp duty becomes a more attractive proposition for buyers, and could potentially sell faster, which in time could strengthen the link between energy efficiency and property prices.

It also addresses the issue of affordability and high up-front costs by enveloping in the energy efficiency upgrade costs into the buyers mortgage which would result in a small, yet temporary increase in the mortgage payments in the first 18 months to 2 years whilst the improvements were being undertaken. Once completed and a new EPC secured, the mortgage payments would be reduced as the mortgage lender would receive the rebate/enhanced rebate directly. This would allow the mortgage lender to de-risk their loan book whilst ensuring the buyer had the funds to improve their homes and reduce their energy bills.

It would be relatively straightforward to develop a model that was revenue neutral for the government, although an enhanced rebate model would increase uptake. A key element of such a system would see a rebate offered for any household that undertook energy efficiency work within a set period (around 2 years) of purchasing a property. Depending on the level set for the neutral point (and whether an increase to Stamp Duty for inefficient homes is incorporated) this policy could also be revenue neutral to HM Treasury. An ‘enhanced rebate’ could be offered as a low cost way to channel grant funding to low value homes making improvements using the same mechanism.

The purpose of the energy saving stamp duty incentive is to stimulate the housing market to ‘value’ energy performance, in the same way it does the kitchens, bathrooms, state of repair etc, in a manner that is fair to all and encourages mass scale retrofit. It will also encourage mass scale retrofit, whilst building a sustainable market. The Energy Efficiency Industry Group,
which has campaigned for the Stamp Duty rebate within a comprehensive long-term National Retrofit Plan, explained a potential policy framework:

At point of sale
- Basic Stamp Duty Land Tax (SDLT) is calculated as now.
- Energy demand of a house calculated (using data behind the EPC) – kWh (not EPC bands).
- Basic SDLT adjusted (down and up) based on the calculated energy demand, the lower the calculated energy demand, the lower the stamp duty paid

Two years after purchase
- The ultimate stamp duty paid is determined two years after the home is purchased via an automatic rebate (calculated from a new EPC, measure minimum standards) Rebate paid: the difference between the Stamp Duty paid, at time of purchase, and the Stamp Duty that would have been paid had the energy efficiency measures already been installed prior to sale
- Any EPC recognised energy efficiency improvement installed (to minimum quality standard) reduces the SDLT paid.

Preparation
- A Statement of Intent announced by Government now, introduced in 2 years (2025) to give time to perfect the policy and prepare the market and the homeowners.

Fairness for all
- For the poor performing homes, the increase in stamp duty paid is typically approximately 1% and no more than 4% of purchase value (average house price increase 4% per year since 2015)
- All home purchasers have the opportunity to undertake energy improvements after sale, to recover any additional stamp duty paid and benefit from an overall decrease.
- For homes below the SDLT threshold:
  - better performing homes - receive a bonus o worse performing homes – still do not pay stamp duty
  - better and worse performing homes - receive a bonus energy performance improved within 2 years

CIBSE’s evidence to the network stated that ‘There is scope to use Stamp Duty as an incentive to retrofit homes – offer a rebate on stamp duty for all qualifying work undertaken by competent people and signed off as being fully compliant with requirements within two years of purchase, for example. With houses changing hands every seven years, that would provide a real impetus to the retrofit market. But it has to be supported by proper building control, which in turn means that we need a building control profession who are trained and competent in energy, ventilation and building physics, which many are currently not’.

The network recommends that at the Spending Review, the Chancellor announces a review of SDLT to incorporate the introduction of Energy Saving SDLT, for its introduction in two years time in 2025, to give the property market adequate preparation time, as indicated by the Energy Efficiency Industry Group.

Reducing Costs of Green Energy for Households

Rebalancing Electricity and Gas Costs
If the energy transition is to be truly effective in homes and buildings, then the incentives to switch to low carbon technologies such as heat pumps and install energy efficiency measures must be recognised to be a saving, and not a cost.

The consumer price of electricity compared to gas has dropped from 5.59 times that of gas in 2021 to 3.74, however this ratio only fell due to the decision to transfer policy levies from energy bills to general taxation for a limited period. This had previously resulted in consumers paying £41.74 in policy costs per MWh of electricity, compared to £1.93 per MWh of gas.
Analysis done by the Net Zero Review showed that the relative price of gas and electricity is the largest determinant of the savings which households could gain from the transition – for example, a long-term gas price of 150p/therm can cause cumulative savings of decarbonised households to increase from £6,000 to over £13,000 by 2050.

The Net Zero Review observed that: ‘Ensuring electricity is cheaper than oil or gas is essential to incentivising people to switch to low carbon technologies like heat pumps and electric vehicles. Environmental levies placed on electricity mean that, without the Energy Price Guarantee, electricity is more expensive than gas’. It recommended that ‘Government should deliver the Review of Electricity Market Arrangements (REMA) promised in the British Energy Security Strategy and rebalance these costs ... In the short-term, government should ensure there is a clear price signal in favour of technologies that use electricity rather than fossil fuels’.

It is essential that if low carbon alternatives to gas, which rely on electricity, are to be adopted at scale, that the rebalancing of gas and electricity prices takes place.

The past approach of levying policy costs and taxes onto electricity bills also keeps the price of electricity artificially high and hinders the wider use of low-carbon technologies in households. This is a mistake that the government cannot afford to repeat by placing so-called ‘green levies’ back on to electricity. Analysis conducted for the Net Zero Review shows that keeping the relative price of electricity vs. gas consistently competitive on a long-term basis will be the single biggest determinant of ensuring that the transition brings a significant amount of savings to the average household.

The Review found that a gas price below 150p/therm is a reasonable tipping point beyond which rebalancing would make a difference in helping many more households save after installing a heat pump. Government should, therefore, use this as a trigger, and commit a clear decision point on rebalancing prices and how this will be taken forward in 2024, with a detailed plan for engagement and delivery across the sector.

Flexible Demand Services

In addition to delivering a rebalancing of electricity prices to reduce costs for householders who wish to electrify their homes, the ongoing review of electricity market arrangements (REMA) is considering what changes are necessary to increase further investment in generation capacity, increase system flexibility, provide more locational signals to minimise costs. This is an important opportunity to signal further incentives to households that wish to use electricity in a smarter, more efficient way, that can both reduce energy demand (and emissions) as well as reduce energy and electricity bills further.

As potentially significant a source of funding would be future payment for those households willing and capable of flexible demand. National Grid is continuing with its Flexibility Service, providing a financial reward for those who change their energy use, while the Smart System and Flexibility Plan 2.0 (BEIS/ Ofgem) highlighted the potential of flexibility to reduce system costs by over £10bn per annum by 2050.

Realising these cost savings will require the right incentives for households, be that ToU tariffs, a revised Smart Export Guarantee to better reflect the value of demand management and flexibility, or greater deployment of Flexibility Services.

It will also clearly require the right home-based equipment, i.e. the smart management systems, and the ability to store energy, with implications for upgrading the existing stock, and expectation for the future Home Standard to come – that has the opportunity to secure these benefits for new homes while also reducing grid costs to everyone, if suitably specified.
Electricity and peak demand
Additionally, we need to manage pressure on the wider energy infrastructure, including: Measures to limit peak demand and enable load shifting (with limits on peak demand from 2030), the introduction of minimum standards for currently unregulated key appliances with high influence on annual & peak demand, i.e. cooker hobs & showers.

National Grid ESO’s Future Energy Scenarios (FES) 2022 report projects that, in order for the UK to realise its Net Zero target, between 21GW and 41GW of PV capacity will be required on domestic buildings by 2050. This is the equivalent of a typical domestic PV system installed on at least 1 in every 5 homes and in the UK. In addition, FES 2022 also suggests that up to 33GW of Demand Side Response (DSR) and 40GW of Vehicle-to-Grid (V2G) will be required to ensure the built environment is able to flex its demand sufficiently to deliver a net zero grid. A systems-thinking approach is required to ensure the decarbonisation of the grid and its resilience to annual and peak demand. Given homes are responsible for 35% of direct energy use in the UK, they have an intrinsic role to play, yet there are currently no policies to tackle unregulated loads, limit peak demand, and encourage load shifting. Uncurtailed, this is likely to inhibit our ability to deliver against our legally binding Net Zero commitment.

Currently, Building Regulations only consider regulated demand on an annual basis; there is no mechanism which rewards solutions which enable flexible demand, nor are unregulated demands considered, which have a major role to play in supporting future grid resilience. The current Part L Building Regulations (2021) only accounts for regulated energy (heating, cooling, hot water, fans, pumps and lighting) which only paints part of the picture when it comes to energy consumption. Items such as white goods in homes, or IT equipment in offices, are not taken into account, with some buildings having unregulated energy accounting for over half of total energy consumption.

The UKGBC recommends tackling currently unregulated loads by introducing minimum standards for key appliances that have high influence on annual and peak demand (i.e., cooker hobs and showers) and measures to limit peak demand and enable load shifting (with limits on peak demand from 2030 at the latest). In addition, an assessment of a new development’s viability for onsite renewable generation to drive investment in additional renewable electricity and simultaneously reduce peak and annual demand on the grid. For example, developments with SE/SW facing roof(s), could be required to install a minimum 40% solar technologies as a percentage of building footprint area unless it can be clearly demonstrated that this is not practically viable.

The move towards dynamic, predictive energy modelling also allows for the government and the sector to develop a calculation methodology for assessing and incentivising the deployment of on-site renewable generation and Demand Side Response (DSR) technologies and approaches, such as thermal storage, electrical batteries, smart appliances, and managed/V2G electric vehicle charging. This should include a consideration of the diurnal variability of carbon intensity and cost of electricity to enable the ability of such solutions to both reduce carbon emissions and energy bills to be estimated.

Barriers that Cost Householders
In addition to prices and taxes, there are other aspects of policy reform that can help reduce costs from householders, by removing the barriers that are in place that prevent swift and early action to decarbonise homes. Any delay to achieving this is a cost, particularly at a time when rising prices and inflation have resulted in increased costs for households.
wishing to make the energy transition. Removing barriers that are causing delay and uncertainty is also an economic necessity.

**Planning**

Planning encompasses key areas that are central to addressing both our housing and environmental challenges, including site-location, design, landscaping, character, transport, and technology constraints. Currently, planning delivers an unreliable and inconsistent approach to sustainable development that is hurting green investment. This leads to lengthy appeals, legal cases, unpredictable judgements and, ultimately, poorer quality, less popular development.

This uncertainty has, in turn, has been identified as a key barrier by the industry in releasing green investment.

To help achieve alignment in practice, it is essential that the Government develops a clear national methodology for carbon handling, measurement, and accounting, in both the plan preparation and development management processes. This should be closely linked to a net zero test in the planning system, which was a recommendation of the Net Zero Review.

This will help deliver a reliable system that can handle carbon clearly and effectively, reducing the scope for climate-based legal challenges, appeals thrive off the current uncertainty and ambiguity. There is currently no consistent methodology for handling carbon in the plan making and development management processes, unlike for housing numbers (Housing Delivery Test). This is leading to different, inconsistent approaches across the country.

Business appetite for a consistent, and workable approach to carbon in planning is clear from the various industry initiatives and research currently underway across the sector, with different approaches already in use by local planning authorities.

However, the Government has an essential role to play in delivering a coherent system which will help reduce both inconsistency and uncertainty, in order to provide a more reliable, efficient, and cost-effective approach to sustainable development. Recognised metrics to measure and budget carbon emissions already exist and are in use by the industry and some local authorities. But a national carbon accounting methodology and more standardised approaches in relation to development management, would improve process consistency, local transparency, and accountability. This would save stretched local planning authorities and the industry money, whilst avoiding legal disputes and divergent appeal judgments.

In addition, changes in primary legislation are also needed, as policy alone is insufficient. Currently, there is no set requirement to align with our national carbon budgets. What is needed is a means both to quantify planning’s approach to carbon accounting but also the legislative weight to prioritise climate, to protect policy from backsliding, and ensure alignment with our carbon budgets. Without this, no net zero test in planning will succeed.

In the upcoming review of the national planning policy framework, the government must ensure that stronger national planning policies that put in place to support the alignment of the planning system with net zero. This includes systematically addressing key barriers to specific technologies and innovations, such as heat pumps, solar PV, shutters, water tanks and awnings; consistently encouraging sustainable measures as the default. For instance, as Centrica told the network, ‘Planning regulations across the UK vary, which can deter installations. For example, in Wales, if you wish to install an ASHP, you can only do so 3m away from the property boundary, and many properties are therefore not suitable for installations under current rules. In England and Scotland, the distance is 1m. This means that people who want heat pumps often cannot get them in Wales’. Ensuring that there is
a level-playing field, and that the deployment of clean heat and new technologies takes place without any unfair and additional planning barriers is essential, while also ensuring that devolved powers can empower, rather than hinder, the progress of future renewable and clean heat provision.

Clear guidance and policy will also need to be provided on re-use and demolition to ensure the consistent, thorough consideration of embodied carbon within planning and associated decisions. Options for tackling whole life carbon through the planning system should be fully explored, including requiring whole life carbon assessments as recommended in UKGBC’s guidance.

Measures to reform the planning system so that it is fit for the energy transition and compatible with net zero have been explored in greater detail in the Local Mission Zero Network’s first report, The Future Is Local.

In addition to legislative reform, it is important to recognise the need for upskilling and resourcing for local planning authorities on climate, to ensure local planning officers are well-informed and have the capacity to provide proper oversight and timely assessment. The Royal Town Planning Institute (RTPI) is calling on the government to provide the English planning system with funding of £500 million over four years, which will facilitate its efforts to tackle the climate crisis and level up the country. The planning service is one of the most severely affected of all local government services in terms of budgets with a reduction of 42% since 2009, while nearly a third of planning department staff have been cut since 2009. Total expenditure on planning has fallen by 29% since 2009-10, meaning local authorities are spending just £5.50 per resident annually on planning policy.95

Information, transparency and Data
One of the most significant barriers to ensuring the effectiveness of the energy transition can be articulated to householders is in the current data and standard frameworks that are used to measure energy efficiency. Greater accessibility and affordability can only be achieved if effective information and data, can be effectively delivered. The Net Zero Review was clear that ‘currently the EPC measure does not work for net zero’. In particular, EPC ratings can show a worse score after installing a heat pump, ‘because of the inclusion of the cost of heating in the score, and this assessment being based on outdated assumptions’. In practice, this equates to moving from a notional energy use system, to an in-use/actual performance system, with EPCs and their underlying metrics and methodologies being updated accordingly. LETI have explained that:

Energy Performance Certificates (EPCs) are the national method for presenting the predicted energy efficiency of a dwelling. However, they actually provide a cost index indicating how much it would cost to run the building under assumed occupancy levels and fixed heating patterns. As the grid has decarbonised, the link between running costs and carbon emissions has weakened as electricity remains significantly more expensive than gas. Thus, lower energy costs do not necessarily mean a more efficient building with lower carbon emissions. For example, achieving an EPC A or B could be achieved by a fabric inefficient building with gas heating and a large PV array rather than a very efficient building using a heat pump. SAP is used to calculate EPC ratings, however, in its current form SAP does not accurately predict the energy use of homes. LETI therefore consider that EPCs are not a good indicator of the actual energy performance of buildings.96

Sarah Ratcliffe from the Better Buildings Partnership highlighted how ‘EPC reform is really critical for RESI, where it’s not working in terms of actually driving investment in fabric and services but what we need alongside that is the performance outcomes’.
EEIG stated in their evidence to the network that it was vital to ‘reform Energy Performance Certificates so they can better support consumers in their path to a Net Zero building, and better reflect the actual energy savings delivered by insulation retrofits and heat pump installations. The reforms should be coupled with expanded and locally delivered retrofit advice. EPCs do not always properly reflect the improved energy performance of homes. For example, installing a heat pump which cuts energy use and dramatically reduces a home’s emissions might not change the EPC rating for the better’. Centrica told the network that ‘EPCs need reform to cover heat loss. The current programme does not use thermal imaging, this should be included in an epc. Additionally epcs need to encourage low carbon uptake, at present if you have a boiler the recommendations will tell you to get another a boiler not a heat pump’.

Future EPCs must provide a trusted, accurate and reliable measure of a building’s energy performance, and move from a reflection of the features of a building to the true measure of ‘in-use’ building performance. Ultimately, all EPCs should:

- Be Heat Pump Ready: EPCs as a compliance framework must ensure homes are suitable for lower temperature heat and have a focus on a home’s energy demand via the inclusion of a heat loss or kWh/m² metric.
- Reflect actual performance: EPCs should in future be paired with smart meters to reflect the historical and real time performance of a home in terms of running costs, energy use and carbon emissions.

The reform of EPCs, towards a more accurate and authentic Net Zero Performance Certificate, as the Net Zero Review recommended, is a once in a generation opportunity to ensure that building performance standards encompass the full range of operational and embodied carbon standards that can be achieved through retrofit that are outlined in the UK Green Building Council’s Whole Life Carbon Roadmap. UKGBC and others, such as Policy connect through their Bricks and Water Cross-sector inquiry, are also calling for EPCs to be reformed to include measures of water efficiency. This would not only begin the process of integrate adaptation/ resilience into a more holistic approach to building standards, but provide a valuable means to visualise key climate resilience elements in a similarly quantifiable and accessible way, with the associated consumer awareness benefits and momentum this brings.93

To deliver better adaptation and resilience measures we also need consistent and robust national data to inform planning. Currently, data sources on key resilience risks is lacking - notably on areas such as localised overheating. Flooding data is reasonably well established via the Environment Agency, but this needs to be kept up to date to align with the latest future modelling scenarios and surface water flooding risk.

To deliver the necessary quality threshold for the Net Zero Performance Certificate, the government should ensure that it aligns with the work of the Net Zero Homes and Building Performance Standards being developed by industry, and works closely with the CLC, the National Retrofit Hub, LETI, and UK GBC and other partners in establishing a Net Zero Performance Certificate taskforce to deliver the necessary consultation for industry, and future adoption into regulation to replace the EPC regime.

The Net Zero Performance Certificate should then form the benchmark for a wider delivery plan for households seeking to retrofit, through the Net Zero Homes Passport. The National Retrofit Strategy noted that ‘deploying digital techniques to an agreed standard, an assessment based on survey, EPC input data, energy in-use data
... can deliver a building renovation plan or ‘passport’ for each residential unit or group of units, providing an evidence-based pathway to decarbonisation through fabric and water efficiency and zero carbon heating technologies, according to opportunity, ambition and budget’. 

The decarbonisation of the UK’s housing stock is an essential step to reducing the UK’s overall greenhouse gas emissions and achieving multiple co-benefits. As noted by the Environmental Audit Committee’s Building to net zero: costing carbon in construction report (2022), retrofit will ‘conserve resources, reduce waste, minimise embodied carbon emissions, and provide a cost-effective solution to delivering on housing demands.’ However, although it has been determined that mass scale retrofit is vital, research on the costs and benefits of retrofitting the UK’s housing stock has varied considerably, complicating the picture for policy makers.

To address this, the UK Green Building Council has been working alongside Leeds Beckett University, C-Path and Arup to develop a retrofit calculator which will assess and build consensus around how much investment is needed and by whom for mass scale domestic retrofit across the UK. The calculator utilises a broad range of data which analyses the current housing stock through a number of key indicators; demonstrating how many homes there are, under what building type they fit and the amount of energy they use. Layered on top of this initial data are factors such as building age, EPC band, retrofit measures (such as solid wall insulation, heat pumps etc.), tenure type and household circumstance. Through these different indicators, you can apply a variety of investment models and the calculator will demonstrate key outputs such as total energy reductions, emissions reductions, government investment, private investment, long term savings and the social benefits associated with retrofitting homes. This will allow policy makers to understand where investment needs to be spent, what the current policy gaps are, and what the energy security, social, climate and economic benefits are of retrofitting the UK’s homes. Alongside the calculator UKGBC plans to build a broad industry coalition to calculate and forge a consensus around the minimum Government investment needed over the coming years and the key policy levers required by Government to meet these targets.

Commercial and Business Decarbonisation

The Net Zero Review recommended that ‘Government should legislate by 2025 for the minimum energy efficiency rating for all non-domestic buildings, both rented and owned, to be EPC B, to be implemented by 2030’. As the Review stated, ‘The broader energy efficiency mission is not a complete package unless non-domestic buildings are considered. Energy efficiency measures have the potential to reduce business energy use by up to a third, and demand reduction is a crucial piece of the puzzle’. To achieve change, the Net Zero Review was insistent that ‘Direct funding is required’: ‘The Review recommends that there are direct funding measures for both SMEs and large companies or those in large buildings (and their landlords where applicable) or projects that are innovative in the short term. This could also involve extending the existing Industrial Energy Transformation Fund and new support for SMEs and in commercial sectors/buildings’.

The Review made the case that decarbonisation of commercial property would not merely be good for the environment, but good for business too. In 2019 the non-domestic building UK supply chain turnover was £2.4 billion - £5.7 billion, which could be expanded if there was better understanding around technology use, increased access to independent advice and clearer long-term regulation to enable businesses to evolve their business models.
BEIS estimates that around £20 billion (CAPEX) is required to achieve all energy efficiency potential in non-domestic buildings. By putting commercial minimum energy efficiency product standards in place by 2028, this will ensure that our market is seen as serious about energy efficiency, attracting more investment.

The government has recently launched a new Energy Efficiency for Business website, yet there remains, as has been highlighted by the CCC, a policy gap on helping business and SMEs decarbonise. A framework, that encompasses guidance, regulation and standards, financial incentives such have been developed in the Inflation Reduction Act, allowing for business and companies to deduct investments from the tax regime, as well as tailored support through grants and loans, is the current missing piece in the UK's net zero buildings jigsaw. Melanie Leech from the British Property Federation stated to the network that the biggest challenge to commercial retrofit was around viability, adding that the government needed to provide greater certainty on incentives, ‘whether that’s through capital allowances, whether that’s through other tax incentives, whether that’s through reform of the business rate system’. In particular, if companies upgraded their premises so the property was worth more, this currently may raise the business rates a company has to pay. Instead companies should instead ‘potentially get penalized if you don’t [make energy efficiency improvements], but you get incentivized and rewarded if you do make those energy efficiency upgrades.’

This need not be viewed as a cost or burden on business. Private finance and investment in commercial property that meets net zero standards is becoming a more attractive proposition. David Willock from Lloyds Banking Group pointed the network to the fact that ‘we are now seeing clear investor preferencing around green buildings. So there’s a good inward investment story here. The challenge we’ve got is we just don’t have enough of them ... A lot of the big investment grade tenants now, which is what investors want, are pivoting to green buildings and net zero buildings because of their own commitments. So we need to create more green buildings which will be through retrofit’. Paul King formerly at Lendlease noted to the network how business and the commercial sector has a ‘very long tail ... if you haven’t got investors or corporate tenants who are very self-aware in terms of wanting to be occupying net zero buildings, which goes for the majority of buildings, then you haven’t got the same sort of drivers’. Incentives relating to business rates and other rebates would need to be considered if the majority of businesses were to take decarbonising buildings seriously.

In 2016, Landsec became the first commercial real estate business in the world to set a science-based carbon reduction target consistent with a 1.5C global warming pathway. Since then, Landsec have updated their target to ensure their actions are consistent with addressing the climate crisis and have a near-term target to reduce emissions across our value chain by 47% from a 2020 baseline by 2030 and a long-term target to achieve net-zero by 2040. To achieve this, they are delivering a £135m net zero transition investment plan. The plan will reduce operational energy use and move to cleaner energy sources in order to promote a speedy transition to net zero. It is composed of a variety of initiatives including optimising building management systems, installing onsite renewable electricity capacity and engaging with our customers. The largest and most challenging being the retrofitting of existing buildings, removing all gas and replacing with electrified heat pumps.

The challenges encountered with retrofitting heat pumps are numerous but not insurmountable. They start at
In order to capitalise on this growing interest from investors willing to spend private capital, and to ensure that this is spent in the UK rather than elsewhere, the government should publish a Net Zero Business Buildings and Efficiency Strategy, that can help businesses and SMEs to lower their energy demand, to improve their buildings through retrofit and cut costs.

Beyond large businesses and energy intensive sectors covered by ESOS and ETS, SMEs need support to build capacity to work towards decarbonisation. This should include:

- Benchmarking and regulating for action in a proportionate and cost-effective manner. Regulatory proportionality has been called for in the recent Energy Savings Trust and Green Alliance report, that studied international comparisons noting that ‘businesses respond better to some types of regulatory design than others ... The benchmarking approach in the US may be more suitable for businesses than a Minimum Energy Efficiency standards approach. A mandatory approach may be needed where progress is sluggish’.

- Long term certainty that the standards businesses will work towards will have policy and delivery frameworks behind them, including interim targets along the way to 2050. This should include a key delivery framework of a Net Zero Business Performance Standard.

- Public financial support will be given to SMEs to fund or co-fund, or incentivise through the tax system audits and decarbonisation measures.

- Government, the Net Zero Hubs programme and Net Zero Retrofit Hubs should ensure that businesses regionally are supported with impartial advice and have the ability to co-ordinate with support networks.

Sarah Ratcliffe, Better Buildings Partnerships told the network that while ‘display energy certificates are something that exists for the public sector, the private sector would, if that was the solution, would probably want to see some amendments to those display energy certificates concerning the methodology and the benchmarks are set up’. CIBSE told the network that ‘we should target a move towards performance outcomes, beyond simple compliance. We believe that the operational performance of buildings should be subject to regulatory requirements.’

The logistics of replacing existing plant with heat pumps in constrained spaces, whilst maintaining operational buildings for our existing occupiers is as important a challenge. Landsec are ensuring that sufficient plans are in place to identify and minimise impact to their customers, work out of hours where necessary and replace equipment sequentially over multiple seasons to ensure no degradation of building comfort and conditions: ‘It is vital that we look to minimise upgrades to existing infrastructure to accommodate heat pumps, whilst optimising the energy and carbon performance of the systems’. To this end, a range of operational measures need to be considered to determine optimum solutions. These include: the mix of air source and water source heat pumps to achieve sufficiently high enough temperatures for heating; increasing water flow rate, upgrading heat exchangers and recommissioning fan coil units to name a few.
The legislative framework should be amended to capture all opportunities where building performance can be influenced and improved, adding:

To do this we need to shift our focus to a whole building approach, including the use of digital building passports, dealing with build quality standards, and embodied and operational carbon. These can be agreed with financial institutions with the intention that they become mandatory across the industry and set a series of progressive expected performance requirements.

At the same time, there is a need to ensure that embodied and operational carbon accounting for commercial buildings do not penalise retrofit over new, more attractive, net zero buildings. There is also a significant opportunity to repurpose and reuse existing commercial buildings, which remains less carbon intensive than demolition and replacement. The Chartered Institute of Buildings has stated that even when using lower carbon materials for new building, this is less effective at conserving emissions than reusing or repurposing existing buildings. Yet Victoria Herring, Grosvenor Group noted that the preference of many larger corporations is to move into new low carbon commercial premises and the promotion of new net zero building clusters has the risk of creating unintended consequences of ‘struggling to retrofit offices and demonstrate the value in that’. Existing buildings and retrofit are ‘now competing with these new build buildings that the occupier can take the benefit of the lower operational [CO2 emissions], but can just ignore the fact that the embodied carbon has just been, you know, already been spent’.

Melanie Leech, CEO of the British Property Federation told the network that ‘we urgently need a common framework for measuring energy efficiency in use in buildings … a lot of our members are pointing to NABERS coming to the UK as one potential option for taking that forward’.

Digital measurement and energy performance monitoring in the National Australian Built Environment Rating System (NABERS) scheme has led to investment in equipment and insulation to improve the efficiency of commercial buildings. This has driven a 38 per cent reduction in the energy intensity of office buildings rated under this scheme over 13 years, and a 24 per cent reduction for shopping centres in only eight years.

NABERS (National Australian Built Environment Rating System) is an Australian rating system designed to measure commercial buildings energy consumption. It provides simple, reliable, and comparable sustainability measurement for hotels, shopping centres, apartments, offices and data centres, as well as other commercial buildings. NABERS is a national government program administered by the Provincial New South Wales Government, though overseen by a national Steering Committee comprised of all State and Territory representatives, and the Australian Government. These government members have voting rights within the Committee.

NABERS has saved customers an average of 30-40% on their energy over 10 years, saving over 9.9 million tonnes of CO2 emissions over the last two decades.

NABERS rates properties from one to six stars across four factors and are valid for 12 months:

1) Energy
2) Indoor environment
3) Waste
4) Water

NABERS has partnered with Climate Active to provide a Carbon Neutral certification.
The network also noted that without an effective standards regime for commercial property, there was also a lack of a compliance regime, while a lack of effective enforcement meant that companies had no requirement to deliver on retrofit with any urgency.

The UK Green Buildings Council advocate that for commercial buildings the government should:

- Introduce performance-based rating schemes for existing non-domestic buildings via a phased approach.
- Introduce the planned performance-based rating system for large office buildings (>1,000m²) by May 2022, including mandatory energy performance disclosure.
- Introduce minimum standards and fiscal incentives for large office buildings by 2025, including separate minimum standards for new buildings (with suitable transitional arrangements). Fiscal incentives could take the form of penalties or discounts linked to existing or new taxation mechanisms.
- Introduce performance-based rating systems in other non-domestic sectors (and small office buildings) by 2025, followed by minimum standards and fiscal incentives for both new and existing buildings.
- By 2028 establish performance-based rating systems in remaining non-domestic sectors.
- Retain proposals for use of MEES in the non-domestic sector in the short to medium term. Review the need for MEES as policy lever as performance rating schemes become established.
- Review Landlord & Tenant Act 1954 to require by law that all new business leases include green lease clauses, the standards of which should be developed with industry.
- Introduce and clearly signpost a cut-off date of 2030 for the sale of gas and oil boilers.

Melanie Leech, British Property Federation told the network that in order to achieve an effective market based solution to commercial retrofit, then areas of market inefficiency should be addressed, the most immediate being data: ‘we are not necessarily collecting all of the right data, but the biggest challenge probably is data sharing between owners and occupiers, aligning incentives, sharing data, and creating therefore a common mission and the ability to

Having a NABERS Energy rating of at least 4 stars rewards users with a Carbon Neutral Building Certification.

NABERS UK was launched in November 2020 and is run by the BRE Group. Launched in November 2020, NABERS UK is run by BRE as the scheme administrator. The scheme is overseen by a steering committee comprising BRE, the Better Buildings Partnership and NABERS, on behalf of the New South Wales Government, Australia. The Better Buildings Partnership has been an integral partner in the development of NABERS UK and acts as scheme ambassador to support its uptake and success. NABERS UK is currently specifically for offices, using 6 stars for its rating scheme. The ratings system targets improvements and therefore office owners can demonstrate improvements in energy consumption, which can be used to demonstrate whether offices are on a net-zero carbon trajectory and provide investors and occupiers with the confidence that the buildings they own and occupy are aligned with their climate change ambitions.

Toronto Square in Leeds was the first NABERS verified building in the UK. The building’s owner, Grosvenor, has also set a net zero by 2030 target. To reach that target, Grosvenor has committed that all its office buildings over 1,000 sqm will hold a NABERS UK rating above 4.5 stars by the end of 2025.

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deliver it’. One specific aspect in which better data would improve performance concerns the review of the Landlord Tenant Act and mandating green leases.

As with domestic retrofit, there is a vital need for more effective and independent advice for businesses and SMEs. CIBSE noted that ‘There is a significant opportunity for independent, respected, and authoritative professional and industry bodies and initiatives such as the UK Net Zero Carbon Building Standard to provide guidance and demonstration material that shows how retrofit can be achieved cost effectively by typical businesses and what the potential savings are over time’.

Several participants in the network further highlighted the importance of the landlord-tenant relationship for delivering successful retrofit. As Ioanna Mytilinaiou from Business London told the network, ‘how do you ensure that tenants are on board with landlord’s ambitions and vice versa?’ when either party may view their ambitions to decarbonise as a distraction. Sarah Ratcliffe from the Better Buildings Partnerships stated that ‘retrofitting commercial buildings is much easier when you have an owner-occupier where you’ve got a long lease, where you’ve got a very strong owner-occupier relationship, where the service charge structure is all inclusive or gross and allows you to incorporate sort of retrofitting measures within that service charge structure, but also where the payback potential is high there and also you’ve got a long-term building retention strategy’. Sarah Ratcliffe from the Better Buildings Partnership also noted how ‘some of the leasing arrangements are not conducive to net zero retrofit. So for example, where there are provisions in a lease for like-for-like replacement, legally one has to avoid betterment at the occupier’s expense … Sometimes that can play against refurbishment, where you’re trying to improve, actually put performing equipment in from an environmental perspective’. In addition, certain ‘fabric improvements and improvements in services … sometimes reduce net lettable space … what that does is adversely impact on the current and future income for those buildings’.

**Public and Government Buildings**

In addition to demonstrating policy leadership on the non-domestic and commercial property sector, the government can demonstrate real time, real term action by putting policy into practice on its own public estate. Following Britain’s exit from the European Union, there are significant opportunities for further reforms to public procurement rules and regulations to deliver greener outcomes. Since 2019/20, several updated government sustainable procurement statements have already been issued. Crucially, the Government has indicated, through its Levelling Up and Brexit opportunities papers, alongside the net zero strategy, that it intends to pursue further reform to public procurement rules, in order to drive sustainable outcomes and specifically align with policy goals such as net zero.

To help maximise the potential for public sector to drive green growth, the Net Zero Review recommended that Government should both ‘drive the creation of sustainable material supply chains and influence market development through public procurement standards by 2027’ and ‘continue to show leadership through ambitious public sector decarbonisation by conducting its own trials to ensure alignment with the targets in the Heat and Buildings and Net Zero Strategies’.

There are additional opportunities for the government to demonstrate leadership by both setting standards and procurement targets for their public estate. The government needs to revise the Government Buying Standard for new-build construction and major refurbishments, which has not been updated since 2011. The target should be derived from the data in the UKGBC Whole Life Carbon Roadmap. The Public Sector Decarbonisation Scheme needs to be extended – beyond 2025 – to set out a longer
term programme for supporting public sector investment into carbon saving measures to at least 2030. For the NHS, representing 7% of all UK emissions, there is a vitally important need to also use the opportunities that decarbonisation presents in terms of greater energy efficiency and reducing energy waste, which at the same time can reduce costs overall.

At the same time, the Greening Government commitments should be taken further and transformed into clear, mandatory commitments that are measurable, reportable, enforceable and funded. As a start, the government needs to sign up to the Science Based Targets initiative for the UK Government Estate, to ensure emissions reductions are consistent with the Paris Climate Agreement, and become a partner and signatory to the WorldGBC Net Zero Carbon Buildings Commitment, that all buildings in the Government Estate will be net zero carbon in operation by 2030.

Private Rented Sector

The Heat and Buildings Strategy originally set out a response to the consultation on minimum energy efficiency standards (MEES) for the Private Rented Sector by the end of 2021 for residential properties, yet this has still not happened. A clear trajectory is essential to give the market the necessary confidence to move forward, ideally mandating that the domestic rented sector hits at least EPC C by 2028. The government’s decision in September 2023 to not introduce any new MEES in this parliament will cause further instability and delay within the retrofit industry, and has effectively placed a moratorium on any further ability to deliver better homes for renters. A future government should commit to ensuring that the MEES are re-introduced as soon as possible.

Regulation for minimum standards as consulted on will also be essential and urgent. A simple tax restructuring to allow energy performance improvements to be deductible against rental income could help make investment more attractive for landlords.

Landlords should also be required to make use of ECO+ and other grant schemes to upgrade their properties but be prevented from increasing rents in line with the increased property value. If landlords wish to sell their retrofitted property within 6 years of the government investment they would need to return the grant funding from the proceeds of the sale.

Standards, Data and Certification

In addition to minimum efficiency standards, which set an important benchmark for both the commercial and private rented sector in order to meet net zero building commitments, it is essential that the standards and specifications homes need to meet to seize the opportunities of a smarter, energy effective future.

Those standards and specifications will need to apply to both new build and the many properties that can be retrofitted today. Both will help grow the market for the skills, capabilities and technologies that each need. Standards play a pivotal role in shaping and guiding sustainable construction practices. There are several standards, that government and the industry can better embrace to drive progress in decarbonising buildings.

There are several standards that have been developed that establish realistic ‘fabric first’ standards that raise performance. These require not simply installer self-certification but verification of attainment and checking of performance. As the National Retrofit Strategy report states, ‘Performance standards will mitigate the risk to consumers of poor quality building works’ and can ensure that public and consumer confidence in a growing retrofit industry can be retained.
With the introduction of PAS2035, which will be a required standard for the Great British Insulation Scheme, there is a need to ensure that this standard is widely adopted across the industry for all retrofits.

CIBSE informed the network that ‘We also strongly support and encourage the use of the PAS 2035/2038 retrofit suite as the obligatory standards for retrofit. PAS 2035 (domestic) and PAS 2038 (commercial) are the over-arching documents in the retrofit standards framework. The government has proposed to make PAS 2035 compliance mandatory for all public funded projects (it is expected that the same will be true for 2038) and this needs to be delivered on quickly, as it promotes a whole-building, long term approach to the retrofit process. The need for training at all levels to meet PAS 2035 / 2038 is an opportunity for jobs across the country’.

There are additional standards that should also be considered by the government for wider adoption and dissemination, both through the lead it can demonstrate in the public estate (see above) and also for ensuring that the industry as the certainty of what are considered best in class standards.

The LETI (London Energy Transformation Initiative) Retrofit Standards are an excellent example of a comprehensive approach to retrofitting existing buildings for energy efficiency and sustainability. These standards provide clear guidelines on improving the performance of residential and commercial properties. Governments across the UK should endorse and promote LETI Retrofit Standards as a benchmark for retrofit projects, encouraging consistent, high-quality improvements.

In addition, the AECB (Association for Environment Conscious Building) Retrofit Standards focus on sustainable and low-energy retrofit solutions. These standards offer practical guidance on achieving energy efficiency and reducing carbon emissions in existing buildings. Passivhaus EnerPHit is also an internationally recognised standard for retrofitting buildings to the stringent Passivhaus standard. In time, the Net Zero Carbon Buildings Standard will set out metrics by which net zero carbon performance is evaluated for each building type – including retrofits - as well as performance targets, or limits, that need to be met. These are likely to include energy use, upfront embodied carbon, and lifecycle embodied carbon.

The government should lead by endorsing both the Net Zero Carbon Buildings Standard when developed by the industry, and ensure that wider support is given to the adoption of additional standards beyond PAS2035. Promoting the EnerPHit standard can drive the industry towards achieving a high level of energy efficiency and indoor comfort in existing buildings, while Government bodies should incorporate AECB Retrofit Standards into regulatory frameworks, making them a requirement for retrofit projects and providing incentives for their adoption. In addition, government should provide further incentives to encourage property owners and developers to pursue EnerPHit certification for their retrofit projects.

Building a Retrofit Industry

The need for 500,000 new professionals and trades to deliver on the UK’s retrofit needs is an opportunity for economic growth and development that has been highlighted, however, it poses a wider challenge of how to meet this demand, how to ensure that this workforce will achieve both quality and quantity at scale, and who will co-ordinate and plan for the skilling and reskilling of the retrofit workforce.

The Construction Leadership Council has developed a long-term plan for scaling the retrofit industry by establishing a national
programme of ‘Net Zero Retrofit Hubs’ – as part of the wider, and much-needed, National Retrofit Strategy - which can act as a co-ordinating body to facilitate local retrofit delivery. These have also been supported by the UKGBC whole life carbon roadmap. The Net Zero Review recommended that ‘Government should support establishing retrofit hubs by 2025 to bridge the gap between households and suppliers. These could enable installers to seek training and impartial advice and could connect households to suitable installers’.

As the review stated, ‘A local approach would allow regions to set their own targets for building decarbonisation and potentially to go further faster. These hubs could also help to build trust, by serving as a point of contact for accreditation, customer reviews of retrofit work and by demonstrating success and communication where something has failed and can be learned from. Working quickly and learning at every opportunity is key’.

The adoption of a National Retrofit Hub’s programme also needs to be supported by a drive towards training additional retrofitters, including 27,000 heat pump engineers, and to retrain the existing workforce to the necessary standards. It is vital that for public confidence and support, that an expansion of insulation and retrofit measures also leads to an expansion in quality. As the National Retrofit Strategy report stated, ‘fraud and scamming is a significant problem in the UK and a source of mistrust in the buildings industry’. The retrofitters of the Future will need to be quality assured, through a recognised scheme, similar to TrustMark, with all customers receiving a quality insurance-backed guarantee.

Retrofitters and home engineers need a co-ordinated plan that will underpin the necessary training required to meet demand. UKGBC supporting this by setting out that to scale up training at the required level, the Government must:

- Create a national retrofit training and skills strategy, scaling up rapidly to meet emerging demand, working with trade associations within the home repair, maintenance and improvements (RMI) market, local skills partnerships, and informed by the Government’s Green Jobs Taskforce and the CITB work on Building Skills for Net Zero.
- Launch a High profile promotion throughout the country with communications programme to inspire and recruit, targeting school leavers, those reskilling for career change in declining sectors and existing construction workers in need of upskilling.
- Leverage public procurement to build demand for skills and supply chains by providing a guaranteed pipeline to enable the transition away from traditional approaches and rapid expansion of market delivery capability. Incentivise and support firms to take on new apprentices.
- Update apprenticeship and training standards to align with the required retrofit delivery programme, optimising digital skills.

In addition, the UK Passivhaus Trust told the network that there was a need for better workforce development for High-Performance Buildings: ‘As the industry shifts towards e.g. Passivhaus and EnerPHit standards, professionals and skilled workers need to up-skill to deliver projects that meet or exceed these rigorous standards. Government leadership can signal the importance of workforce development by supporting training programs, certifications, and apprenticeships specifically designed for Passivhaus and EnerPHit. This ensures that there is a qualified and specialised workforce ready to meet the growing demand for sustainable construction practices’.
While the introduction of the Great British Insulation Scheme, along with an additional £6 billion for the Boiler Upgrade Scheme is very welcome, the network believes that the UK government, can, and must be more ambitious if it is to deliver on its Carbon Budgets, and its Nationally Determined Contributions for 2030 and 2035. The announcement by the Prime Minister in September 2023 to delay energy efficiency measures, and to delay the implementation of a new gas boiler end date will likely have a detrimental impact on the wider retrofit and clean heat sector – both from an investment and delivery perspective.

While the announcement that the boiler upgrade scheme is to increase grants to £7500, it is not yet clear that there is any new money to deliver this, or whether this will mean that the number of installations will be met from the £6 billion uplift. It is also not clear whether the government remains committed to its 15% energy demand reduction target for 2030, given this was the outcome that the now defunct Energy Efficiency Taskforce (EETF) was working towards policy recommendations for meeting. In fact there was a tacit understanding that the EETF was actually working towards a ‘well-beyond’ 15% energy demand reduction, to bring it closer into line with the government’s wider carbon reduction legal commitments.

This report has noted that the government is currently woefully off target to meet its planned targets for heat pumps. There is no clear strategy or detailed plan for how to deliver the required number of loft, cavity wall and solid wall insulation installations, or heat pumps that will be needed to meet a 15% energy demand target.

These are all now urgently needed to provide clarity and security to a retrofit and clean heat sector that no longer currently has any certainty on a consistent pathway, or messaging from the government. Mention of ‘expensive insulation’ in accompanying social media posts runs the risk of putting households off considering even basic insulation measures, that come at low cost and with a significant rate of return on investment.

After recent announcements rowing back on energy efficiency measures, the government should provide urgent leadership by expanding the Great British Insulation Scheme into a national retrofit mission.

As Phoenix wrote in their evidence to the Network: ‘Clear leadership on decarbonising buildings will help to establish/grow supply chains and UK-based expertise in key technologies, which will ensure that more of the benefit is captured by UK Plc. Confidence and sentiment are critical to investors. Government should make strong commitments that increase confidence among long-term investors that policy will be stable. Legislating for Net Zero was a great example of how the government can lead, however, it should continue to come forward with policies that attract capital into key sectors like the built environment.’

Lloyds Banking Group described how: ‘Clear leadership will encourage action. Businesses and consumers need confidence and certainty on the direction for sustainable homes and confirmation on regulations/standards to allow all the be able to plan accordingly for the future.’

Along with clarity and leadership, taking a long-term, programmatic and stable approach was called for. As Melanie Leech, CEO of the British Property Federation told the network: ‘The biggest thing that needs to happen on top of that initial drive by the vanguard, if you like, is creating the long-term stable environment within which businesses can plan. They can see direction of travel. They can see and believe there is a long-term policy framework, regulatory framework, which is moving them in a particular direction. So they can start to plan if they can’t do it now. They’ve got time to figure out how they’re going to be able to respond and the time to do that. And the certainty that the response that they plan for won’t suddenly become obsolete because policy will go off in a different direction or they’ll be asked to meet different standards.’

As Simon McWhirter reminded the network, ‘to get to 2050, we need to retrofit about 80,000 homes a month. We probably deliver a miserly few compared to this target. Slightly scarily, that is 1.8 homes per minute from now on’. The scale and size of the mission is vast, yet without a mission that is completely committed to a long-term
time horizon, in which funding and investment can be committed across governments to deliver this, we will continue to fail. As Simon McWhirter commented to the network, ‘long-term policy clarity is key here, moving away from a sort of stop-start approach, whether that's stop-start regulation or funding that comes with cliff edges, which has been so damaging’. Centrica told the network that they ‘believe the only way to know whether the suite of planned and future polices “adds up” to Net Zero, is for the UK to produce a clear, quantified and dedicated national plan for the buildings detailing how to achieve the required energy and emissions savings through to 2050’.

The UK needs a simple, communicable and easy to use, programme for retrofit. For too long, the government’s approach has been fragmented and siloed, with too many individual programmes and too little co-ordination. The network recommends that a National Retrofit Mission or Great British Retrofit Mission established. The Net Zero Review set out a ten-year mission for energy efficiency and buildings:

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action recommended</th>
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<tbody>
<tr>
<td>The distributional impact of current energy efficiency policies means that not every household is benefitting.</td>
<td>Government to choose from options that help increase heat pump efficiency:</td>
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<td></td>
<td>• Mandating minimum efficiency for installations</td>
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<td>• Heat pump coefficient of performance competition</td>
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<td>• Accelerated training and installation standards</td>
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<td>There are high upfront costs for energy efficiency measures and low carbon heating, and running costs are high especially in inefficient homes.</td>
<td>Making low carbon homes more affordable by expanding schemes such as the Boiler Upgrade Scheme (BUS), the Home Upgrade Grant (HUG) along with the already planned Energy Company Obligation scheme (ECO.) Work with the Finance and Energy sectors to develop innovative financial products like green mortgages. Bring forward tax incentives, including income tax relief for landlords and an Energy Saving Stamp Duty incentive, to drive the energy efficiency market and give building owners more options to manage and cut costs</td>
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<tr>
<td>There is a significant skills supply gap for energy efficiency and low carbon heating.</td>
<td>Ensure sufficient skills and supply to meet demand through increased training and qualifications.</td>
</tr>
<tr>
<td>There is a lack of legislative certainty on what is the expected standard for homes.</td>
<td>Set a legislative target for all homes sold to be EPC C by 2033 and consider the ideas of a future Net Zero Performance Certificate (NZPC) and Net Zero Homes Standard.</td>
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<tr>
<td>There is a lack of information and advice for consumers on how to upgrade their home.</td>
<td>Expand the energy advice service to help consumers understand how and why they should take action, what support is available and dispel common misconceptions for them. There should also be local retrofit hubs established by 2025 to help build trust in the area, allowing a central point of contact for accredited tradespeople.</td>
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**Mission: Energy efficiency for households.** This will not only reduce energy demand and bolster our energy security, but also save consumers money on their bills. This should be driven a set of specific actions to be taken over the next ten years.
This report, Mission Retrofit, aims to go further, by establishing the parameters of what a national mission might be, and how the mission might operate. It has set out the challenges and opportunities to decarbonise existing homes and buildings, and has outlined potential policy recommendations that can deliver better, cheaper, faster retrofit and insulation across the UK. For new buildings, the Buildings Mission Zero Network will shortly be publishing a separate report, Building the Future, that sets out proposals that the network has heard in its roundtables and evidence sessions.

This chapter sets out a five-point plan for delivering a mission that can provide long term certainty for householders, in order to begin the process of retrofitting their homes, but also the retrofit industry, in order to transform the retrofit industry.

**POINT 1: DEFINE THE CLEAR OUTCOME AND SCOPE OF ‘MISSION RETROFIT’**

Key to ensuring we can deliver on effectively decarbonising buildings is long term certainty, clarity, consistency and continuity of policy frameworks, the 4Cs which formed the benchmark for the Net Zero Review Mission based framework. Achieving long-term, programmatic certainty, has been called for by industry. E.ON told the Net Zero Review that: ‘The supply chain remains blighted by short term certainty (1–3 year scheme lengths). Funding and scheme certainty of ten years in length are required to deliver the scale of energy efficiency measures and retrofitting required in the UK housing stock.’

If we are to establish what a Buildings and Energy Efficiency Mission as outlined in the Net Zero Review could or should do, or indicate what might be the focus of the new Great British Insulation Scheme, then a mission-orientated approach should set out the appropriate parameters, and the outcome that should be achieved within a set time frame.

The outcomes that should be a priority for the Mission include – and where possible go beyond - the outcomes set by the CCC:

- Reduce energy demand in buildings by at least 30% by 2035 on 2021 levels.
- Increase the supply of low carbon heat to buildings to 50% by 2035.

In addition, the Mission should include the government’s own targets set in its 2021 Heat and Buildings Strategy which set out an ambition to:

- Increase the capacity of buildings to capture renewable energy, to provide a degree of self-sufficiency for household power, heat and mobility; and to provide demand side flexibility to the grid (in turn supporting heat pump deployment).
- Grow the supply chain for heat pumps with a target to install 600,000 heat pumps a year.
- Reduce the costs of installing a heat pump by at least 25-50% by 2025.
- Ensure that heat pumps are no more expensive to buy and run than gas boilers by 2030.

The ten-year mission covering energy efficiency and buildings has been taken as the template for creating a new National Mission Zero Buildings Programme that encompasses a National Retrofit Strategy. In order to help frame the focus of this mission, and its overall outcomes, the CCC’s ‘Monitoring Map for Buildings’ sets out a useful framework for understanding the scale and size of the challenge required to reduce buildings emissions by 43% by 2035, relative to 2022.

The map is split into ‘required outcomes’, that splits neatly into reducing energy demand from buildings- which requires a 30% reduction in total energy demand by 2035 compared to 2021 levels, at the same time as an increased supply of low-carbon heat in buildings. This includes two key milestones that 50% of heat demand in buildings be met by low carbon sources by 2035, while gas boiler sales should be phased out by the same date. Although, as is set out below in more detail, various industry bodies including UKGBC feel that gas boiler sales need to finish by 2030. Beneath
these two drivers of reducing energy demand and increasing the supply of low carbon heat, the CCC sets out measures needed to be delivered, followed by the enablers to achieve these measures, followed by the policies, data standards, finance, governance, and information frameworks required to ensure that the outcomes and enablers can be met.
Building off the CCC work, The UK Green Building Council, in collaboration with key organisations across the sector, has developed a comprehensive Whole Life Carbon roadmap with recommendations across the sector, to achieve net zero by 2050. Complementary to the CCC monitoring map, the industry-led UKGBC roadmap outlines a range of key targets including:

- 97% of homes should be retrofitted by 2040
- No sale of gas boilers by 2030, and no gas boilers in operation by 2050
- 80% of all homes to be using heat pumps by 2040
- 5% reduction in domestic lighting use by 2025, 10% by 2050
- 30,000 MW of PV installed on domestic properties by 2050, 1 in every 4 homes.
- Gas cooking phased out by 2040 and all households using electric induction by 2045

These targets are more ambitious than the CCC’s balanced pathway yet represent the tailwind scenario that the CCC have pointed to in their latest Progress Report. This demonstrates that within the retrofit and clean heat industry, there is the ambition to go further, faster, and that there is the option and possibility of still achieving more.

However, recent government changes to the end of new gas boilers target date of 2035 have placed all of these targets, both the CCC’s and the Government’s own Carbon Budget Delivery Plan, out of range and out of reach. It is likely that with the changes made to clean heat targets that the UK’s own NDC for 2030 of 68% emissions reduction is also becoming increasingly difficult to deliver.

Given that energy efficiency and reducing energy demand is the easiest and cheapest way to reduce gas and oil demand and deliver energy security (see above), a future administration that forms the next government should immediately seek to prioritise a new, more ambitious ‘Retrofit Mission’ that will deliver the opportunity set out by both the CCC and the UKGBC.

**POINT TWO: ESTABLISH A NATIONAL RETROFIT DELIVERY AGENCY**

To deliver and set out the outcomes of a mission, a new national independent body should be established to set and deliver. Targets for 2030 or 2035, or even the 600,000 target for heat pump installation per annum by 2028 need effective delivery plans and roadmaps that have been developed with industry as part of the National Retrofit Delivery Agency. These plans and roadmaps should identify through a systems based, operational research focused analysis of where the UK is currently off-track, and what needs to be delivered immediately to achieve success.

The National Retrofit Strategy set out the value of ‘strong, inspirational and clear leadership’. To achieve this, and to supplement any government leadership, a National Retrofit Delivery Agency should be established to:

- Provide oversight and governance of the mission programme
- Ensure and maintain quality standards
- Co-ordinate workforce training and training standards
- Scale best-practice and learning between areas and regions
- Facilitate continuous improvement

The National Retrofit Delivery Agency should be formed of all relevant industry bodies, and should be linked to the work of the Net Zero Council. The newly emergent and industry-led National Retrofit Hub could be enhanced and appropriately funded by central government to take on this role of the National Retrofit Delivery Agency, and to become the single
point of contact for action on retrofit and building energy upgrades. The National Retrofit Delivery Agency would also help to fund and co-ordinate the National Retrofit Hubs, and to become the single point of contact for action on retrofit and insulation.

**POINT THREE: A NATIONAL RETROFIT PROGRAMME**

The National Retrofit Delivery Agency should also be the lead agency for a National Retrofit Programme, underpinned by a National Retrofit Strategy that sets out how to deliver the National Retrofit Mission.

The National Retrofit Delivery Agency, and National Retrofit Programme, should follow the pathway set out in the National Retrofit Strategy and endorsed by the UK Green Buildings Council and the broader industry, that calls for an S-curve approach to retrofit delivery and output intensity. The modelling calls for:

- **Phase 1**: underpin capability, including an endorsement from the government on the purpose and structure of a National Retrofit Strategy
- **Phase 2**: A slower start to focus on the education of householders and the wider industry through a clear and committed campaign. At the same time, measures need to be escalated to train new entrants to the industry to meet the gathering pace, while supply chains are also effectively forged.
- **Phase 3**: A quick middle period that will be enabled through a developed and mature supply chain eco-system.
- **Phase 4**: Hard to treat properties are left to the end, with greater planning and focus on permitting. A signalled ramp down of activity allows for a skilled workforce to shift to other sectors without shock.

The National Retrofit Delivery Agency should plan for a strategy that ensures the UK has the necessary labour market, skills, training and retraining in place with a National Retrofit Skills Plan, as well as ensuring that the manufacturing materials supply chains are fully sustainable.

To achieve a Programme that is able to deliver on time, the effective use of finance and funding will be critical. As this report has suggested, this needs to be better leveraged, both in public funding, by creating less complex and easier to access public loans and grants, and also in private funding with the development of green finance products.

Ideally, there should be a synergy and close operational relationship between the two, under a Great British Insulation Fund, or National Retrofit Fund, that allows the stacking and flexibility of a single fund to be accessed by all, depending on income, as other European nations have successfully pioneered (for instance both in France and Germany- see examples in the report above).

**POINT FOUR: A NATIONAL RETROFIT BILL**

In addition to establishing a National Retrofit Delivery Agency, Strategy and Programme, it is clear that the recommendations in this report cannot be delivered by implementation alone. Legislative reform, both of standards and measurements such as EPCs and Net Zero Performance Certificates will be essential to provide confidence and certainty to the retrofit industry.

At the same time, as this report demonstrates, planning reform is equally essential to ensure we have clear pathways towards net zero in our built environment. Other technical regulations, whether on heat pump efficiency and location, or on building code standards as part of the Net Zero Carbon Buildings Standard, will also require legislative underpinning.
A National Retrofit Bill should seek to both address the legislative and regulatory recommendations set out in this report, but more widely through sector engagement, and utilising the work undertaken by the recently abolished Energy Efficiency Taskforce.

**POINT FIVE: TAKE A CUSTOMER LED APPROACH: A PUBLIC ENGAGEMENT, ADVICE, CERTIFICATION AND INFORMATION STRATEGY**

The greatest barrier to delivering the outcome of decarbonising our homes is the families and individuals who occupy or own them. Without their willing support, and confidence that retrofit, clean heat and insulation will make their lives better, their bills cheaper and their homes warmer, then any mission is doomed to fail. Public engagement is not only essential for success, it is ultimately the success and destination of the mission. To focus solely on emissions reduction as the outcome is to mis-understand the importance of retrofit. For if retrofit and insulation succeed, it must be a product with value that customers and households recognise the financial reward and return, as well as the enhanced comfort that will improve their individual lives.

At the heart of any mission-based approach should also be the user focus. It is important that this is primarily defined as the customer, and not focused solely on industry needs. Industry and government must work closer in partnership to deliver successfully for the needs of householders, and to meet their own concerns over affordability and cost, clarity and quality.

For this reason, the government or National Retrofit Delivery Agency should establish a National Retrofit Advice Service, as outlined in the report above, and to provide the necessary information and data that will deliver the customer need and ensure the greatest customer satisfaction. Ultimately, the customer must always come first. Placing their needs and hopes for a future of warmer homes, and lower energy bills, will be central to the success of a National Retrofit Programme, and delivering ‘Mission Retrofit’. 
SUMMARY OF ROUNDTABLE ATTENDEES

Roundtable I: 5th May 2023
Rt Hon Chris Skidmore OBE, Mission Zero Coalition
Rachel Kingdon-Saxby, AW Group
Ioanna Mytilinaiou, Business London
Jennie Colville, Landsec
Yousef Al, Electric Heating Company
Ashley Toy, Natwest Group
Tim Abbott, Barratt Homes
Harriet Butcher, Centrica
Alexia Laird, Landsec
Dan Meredith, E.ON
Callum Laidlaw, Kekst CNC
Richard Rowntree, Paragon Bank
Simon McWhirter, UK Green Building Council
Leigh Broadhurst, SUEZ
Andy Haigh, Grosvenor
Connar McBain, Phoenix

Roundtable II: 5th June 2023
Richard Rowntree, Paragon Bank
Simon McWhirter, UK Green Building Council
Rt Hon Chris Skidmore OBE, Mission Zero Coalition
Tim Abbott, Barratt Homes
Harriet Butcher, Centrica
Victoria Herrin, Grosvenor
Ioanna Mytilinaiou, Business London
David Willock, Lloyds Banking Group
Sarah Coles, Lloyds Banking Group
Adam Read, SUEZ
James Close, Natwest Group
Jennie Colville, Landsec
Alexia Laird, Landsec
Alessandra Meraviglia, Natwest Group
Paul King, Lendlease

Roundtable III: 6th July 2023
David Pinder, National Retrofit Hub
Jennie Colville, Landsec
Rt Hon Chris Skidmore OBE, Mission Zero Coalition
Sarah Coles, Lloyds Banking Group
Andrew Smithson, Paragon Bank
Louisa Sedgwick, Paragon Bank
Simon McWhirter, UK Green Building Council
Harriet Butcher, Centrica
David Willock, Lloyds Banking Group
Alessandra Meraviglia, Natwest Group
Ioanna Mytilinaiou, Business London
Andy Haigh, Grosvenor
Tim Abbott, Barratt Homes
Sarah Ratcliffe, Better Buildings Partnership
Laura Mansel-Thomas, Chartered Institute for Building Services Engineers (CIBSE)

Roundtable IV: 20th July 2023
Melanie Leech, British Property Federation (speaker)
David Dahan, Commercial Real Estate Financial Council Europe (speaker)
Rt Hon Chris Skidmore OBE, Mission Zero Coalition
Jennie Colville, Landsec
Laura Mansel-Thomas, CIBSE
Louisa Sedgwick, Paragon Bank
Andy Haigh, Grosvenor
Adam Read, SUEZ
Ioanna Mytilinaiou, Business London
Guy Bartlett, Barratt Homes
Harriet Butcher, Centrica
Andrew Smithson, Paragon Bank
Craig McLay, Lloyds Banking Group
Alessandra Meraviglia, Natwest Group
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