

AFFORDABLE WARMTH, CLEAN GROWTH

Action Plan for a comprehensive Buildings Energy Infrastructure Programme

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FOREWORD

By the Rt Hon. Lord Deben

Energy efficiency consistently fails to engage the imagination or the commitment of politicians. They believe it to have no electoral appeal. As a result, we continue to build homes that are so inefficient that they will have to be retrofitted within the next decade, and, at the same time, we're not beginning properly to improve the existing stock.



Yet, it is in transforming the built environment that the battle against climate change should now be raging. Everything we build, from starter homes to the largest warehouse complex, should reach the highest energy standards and be capable of comfortable occupation in the heat waves to which we are now subject.

The nine private sector companies who together are responsible for more than 80% of new homes blame it all on Government, yet they seem able to hunt together whenever they think it's in their interests. The fact that they have shown no desire collectively to raise standards nor any real understanding that their long term future depends on creating a better product makes it necessary for Government to intervene.

That is especially so because it was the lobbying of the least progressive companies that led DCLG to postpone the introduction of higher standards and zero carbon homes. Too many house builders have become land bank operators discovering just how profitable it can be to regulate the flow, maintain the price, and leave the next generation to correct the mistakes.

This is market failure at its most pernicious and the Government needs to intervene to make the free market work. We have the technology and if component manufacturers were assured of their market by proper regulation there is no reason why homes built close to passivhaus standards need be any more expensive. What's true for housing is just as important throughout the new build sector from offices to laboratories. We don't look for prescriptive legislation that inhibits innovation but simply for high efficiency standards that will drive new technology and future-proof construction.

The excuse for not dealing with current construction is always that the real issue is the existing building stock. It's true that, in general, it is much less efficient than even substandard new build. However, that's no reason to continue to make things worse. At the same time there's so much that can be done to improve the efficiency of all our buildings.

This is much the focus of this paper. It recognises that Governments have to understand that we will not reach our climate goals unless we dramatically reduce the emissions of our current stock. This demands urgent action and a serious change in our priorities. It also plays into what ought to be the drivers of social policy. The worst performing housing is disproportionately occupied by the poor and most disadvantaged. Improvement of their homes will not primarily

make carbon savings but nonetheless it is a necessary part of ensuring the acceptability of the climate policy.

I recently saw a major programme in Wales where a very poor estate was transformed by a proper retrofit programme. I was impressed by the carbon saving figure but what I shall never forget is the school teacher who said very simply, 'It's a joy. The children are no longer coming to school in wet clothes.'

The big political concern is cost and there is a pretty mixed history in the efficacy of policy in this area. However, past failures must not be used as an excuse for inaction. As in so much else, science is increasingly coming to our aid. New insulation technologies abound. Even solid wall insulation is now significantly easier than it was. This is a good moment to build a new approach.

This report lays out a properly constructed infrastructure programme that would provide a cost-effective way of meeting our climate change objectives while significantly reducing the cost of living for a huge proportion of the population. Economic, social, and environmental imperatives combine to make this a necessary route for Government. It is essentially a matter of infrastructure and should be treated as such. We may argue about the details, but the principles must not be ignored. Let's get on with it.

A handwritten signature in black ink, appearing to read 'Deben', with a long horizontal line extending to the right below the name.

Rt Hon. Lord Deben

EXECUTIVE SUMMARY

Frontier Economics was commissioned by the Energy Efficiency Infrastructure Group to develop an Action Plan for a Buildings Energy Efficiency Programme.

Background

Increased energy performance in buildings has strengthened UK energy security, reduced energy supply infrastructure costs, and now saves the typical dual fuel household £490 per year¹. Between 2004 and 2015, gas consumption for a typical dual fuel household fell 37% and electricity consumption fell 18%², despite a significant increase in the number of household appliances³. This saving was driven substantially by energy efficiency improvements – including in lighting, appliances, heating systems and insulation⁴.

But progress has now stalled. Changes to Government energy saving programmes in the UK contributed to a 53% drop in the annual level of investment and an 80% reduction in the number of improvement measures installed in homes between 2012 and 2015⁵. In addition, plans for higher energy efficiency standards for new homes have been halted.

However, the energy saving potential in UK homes has still to be fully tapped. A recent UK Energy Research Centre briefing found that cost-effective investments in residential energy efficiency and low carbon heating over the next 20 years could reduce energy demand by 25%⁶. At current energy prices, this would reduce average household energy costs by £270 per year. In total, this represents an energy saving equivalent to the annual output of six nuclear power stations the size of Hinkley Point C. Appraisal based on HM Treasury's methodology finds that the net benefit of this saving would be £7.5bn (before considering wider health and economic benefits)⁷.

An infrastructure investment programme to make buildings fit for the 21st century

If the right policies are put in place, buildings can be an integral part of the UK's energy infrastructure and future clean economy. The immediate opportunity for the Government is to develop and implement a Buildings Energy Infrastructure

¹ CCC (2017) *Energy Prices and Bills – impacts of meeting carbon budgets*, <https://www.theccc.org.uk/wp-content/uploads/2017/03/Energy-Prices-and-Bills-Committee-on-Climate-Change-March-2017.pdf>. The CCC defines a typical dual fuel household as a gas-heated household with average energy consumption.

² CCC (2017) *Energy Prices and Bills – impacts of meeting carbon budgets*, <https://www.theccc.org.uk/wp-content/uploads/2017/03/Energy-Prices-and-Bills-Committee-on-Climate-Change-March-2017.pdf>.

³ BEIS (2017) *Energy Consumption in the UK*, Table 3.12 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/586245/ECUK_Tables_2016.xlsx

⁴ BEIS (2017) *Energy Consumption in the UK*, Tables 3.13, 3.19, 3.21-3.27, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/586245/ECUK_Tables_2016.xlsx

⁵ ACE (2016) *Home energy efficiency 2010-2020*, <http://www.energybillrevolution.org/wp-content/uploads/2016/05/ACE-briefing-note-2016-03-Home-energy-efficiency-delivery-2010-to-2020.pdf>

⁶ UKERC (2017) *Unlocking Britain's First Fuel*, <http://www.ukerc.ac.uk/news/unlocking-britains-first-fuel.html>

⁷ UKERC (2017) *Unlocking Britain's First Fuel*, <http://www.ukerc.ac.uk/news/unlocking-britains-first-fuel.html>

Programme. The Programme should leverage the investment needed to achieve the cost-effective energy saving potential by 2035. This would reduce energy costs, improve affordability and provide for increased comfort and better health outcomes.

This report sets out an Action Plan for a Buildings Energy Infrastructure Programme to improve the energy performance of the building stock, with a specific focus on housing. Seven principles underpin the proposed Programme.

- **High quality and safe:** setting up a programme that will draw on high standards of workmanship and delivery to inspire consumer confidence and ensuring that safety is a foundation for the programme by applying and monitoring world-leading safety standards for retrofitting and constructing homes.
- **Professionally managed:** using an Infrastructure Agency or Unit to ensure a high quality business-focused approach is taken to maximise programme efficiency and coordination.
- **Long term:** leveraging the maximum amount of private capital and giving the market and consumers real confidence by setting targets to make all homes perform to an acceptable energy standard by a fixed date in the future.
- **Big picture:** recognising that minimising energy costs requires integrated and coordinated energy infrastructure investment covering power, heat and energy efficiency, across all buildings in the domestic and non-domestic sectors.
- **Focused on delivering a return:** recognising that the Programme delivers benefits to the UK economy comparable to other infrastructure projects.
- **Targeted at those most in need:** ensuring the poorest with the highest energy costs are prioritised for assistance.
- **Informed:** drawing on best practice in heat and energy efficiency programme planning.

To succeed, the Buildings Energy Infrastructure Programme needs to be guided by a trio of ambitious and achievable targets:

- **From 2020:** all new homes will be built to the Zero Carbon Homes standard⁸ – to prevent homeowners and tenants being locked into unnecessarily high energy costs over the lifetime of the buildings.
- **By 2030:** all the homes of low income households and all homes in the rented sector will be retrofitted to an Energy Performance Certificate (EPC) rating of C (on a scale from A to G) – making an important contribution to reducing fuel poverty.
- **By 2035:** all other homes will achieve a C rating – maximising the economic and social benefits of meeting binding climate change targets in the most cost-effective way.⁹

⁸ As defined by the Zero Carbon Hub. See <http://www.zerocarbonhub.org/zero-carbon-policy/zero-carbon-policy>

Long term programme

The fact that cost-effective energy efficiency upgrades deliver financial returns to consumers is sometimes used to argue that government intervention is not needed. However, given the presence of market failures (including emissions externalities), intervention will be required to deliver an economically efficient level of investment in this area¹⁰. Public investment, incentives and a stable regulatory environment are all required, as is the case with any national infrastructure investment plan that aims to lever in significant private investment and avoid inefficient ‘boom and bust’ investment cycles.

Specifically, we recommend that the Buildings Energy Infrastructure Programme would be built on the following elements, with industry and the Government working together to deliver it.

New public investment

Led by BEIS and DCLG: Public investment for low income households and households in social housing – at a public cost of around £1.3bn per year to 2030

	Public cost per annum	Total number of homes supported to 2030 (million)
Fully subsidised retrofits for bringing the homes of low income owner occupiers up to an energy performance rating of C	£0.6bn	1.7
50% capital subsidy for council housing and housing association homes to upgrade their properties to a C rating	£0.5bn	2.5
33% capital subsidy for achieving a C rating for private landlords’ properties which are let to low income tenants	£0.2bn	1.8

⁹ Exemptions or a softening of standards may be required for certain buildings and in certain situations, for example those that are listed, or where the physical characteristics of the building means it is inappropriate to raise the energy performance all the way to the level of the national target.

¹⁰ For example, analysis by the International Energy Agency finds that “the greatest efficiency gains have been led by policy, and the greatest untapped potentials lie where policy is absent or inadequate”. IEA (2016) *Energy Efficiency Market Report 2016*, <http://www.iea.org/publications/freepublications/publication/mediumtermenergyefficiency2016.pdf>

New incentives

Led by HM Treasury: Incentives to drive investment in the homes of the 'able to pay' supported by a budget of £0.4bn per year to 2035

	Public cost per annum	Total number of homes supported to 2035 (million)
A revenue neutral adjustment to the Stamp Duty regime which rewards higher energy performance through a lower charge – incorporating energy performance into property values	£0bn	Up to 16 ¹¹
Demonstration of subsidised loan interest rates, partial grants or income tax relief for home owners seeking to retrofit to a C rating	£0.2bn	2.2
Renewed Landlords Energy Saving Allowance for energy upgrades of properties	£0.2bn	2.1

A stable regulatory environment

Led by BEIS and DCLG: A stable regulatory environment for encouraging investment in all homes:

	Public cost per annum	Total number of homes impacted to 2035 (million) ¹²
Raise the minimum energy performance standard in the private rented sector from an E to a D rating from 2025	£0bn	0.8
Introduce a minimum energy performance standard of E from 2025 applying to owner occupied homes at point of sale or major renovation	£0bn	0.9

The public investment is in line with levels seen in the early part of this decade¹³: it would average £1.7bn per year between 2018 and 2030 and would represent more than doubling of current levels of public investment under the Energy Company Obligation.

The standards, incentives and partial grants set out above are designed to draw in £3.9bn of private investment from households and landlords each year to 2035.

Delivery

We recommend that a dedicated Buildings Energy Infrastructure Agency or Unit is established jointly by HM Treasury, BEIS and DCLG to govern and guide the Programme. This would track progress towards the Programme's goals, coordinate the various elements introduced above and help ensure that all home

¹¹ This incentive would apply to all homes being bought and sold, regardless of tenure or the income level of the owners. It could apply alongside other incentives or measures.

¹² English Housing Survey, Table DA7101 (SST7.1): Energy performance1 - dwellings, 2014

¹³ Over £1.5bn was invested annually under Government subsidised programmes in 2012 and 2013. ACE (2016), *Home energy efficiency 2010-2020*, <http://www.energybillrevolution.org/wp-content/uploads/2016/05/ACE-briefing-note-2016-03-Home-energy-efficiency-delivery-2010-to-2020.pdf>

improvements are delivered to high levels of workmanship and customer satisfaction. Incorporating established best practice, learning from experience and continually refining the Programme must form an integral part of the Agency's or Unit's role.

It is of paramount importance that quality and safety are at the heart of building improvement initiatives. A professional infrastructure approach should help to ensure that the UK adopts, implements and enforces world-leading retrofitting and construction standards. Quality standards and accreditation covering all home energy improvements in the areas of insulation, heat and renewables, would be governed by the same single framework recommended by the independent *Each Home Counts* review (and related programmes) that industry and the Government are developing. Requiring all work delivered with Programme support to adhere to the *Each Home Counts* Quality Mark framework has the potential to transform the market for energy retrofit and drive up the overall quality, safety and resilience of the housing stock.

A flourishing home energy retrofit market should deliver the bulk of improvements needed to meet the C rating target by 2035. This market would be driven by the demand created by the proposed public investment, incentives and regulation. The cost of the Programme to the public purse is minimised by ensuring regulatory standards are in place, alongside financial incentives and support.

Delivery of the Programme for low income households will need to have local and national elements:

- **Local.** First, local schemes are needed to deliver retrofits to low income households. Local or combined authorities would be accountable for capital investment allocated by central government, but businesses and third sector organisations may often be better placed to bid to lead actual scheme delivery. This approach reflects many aspects of a successful local delivery model implemented across Scotland.
- **National.** Second, a nationally available scheme targeting low income households is needed to reduce postcode lottery risks and to ensure eligible households not reached by locally-led schemes can be supported. This is similar to the role currently played by the Energy Company Obligation's Affordable Warmth Programme across Britain, and by devolved administration-funded schemes in Scotland and Wales.

Funding could come directly from Government as infrastructure capital, or via a supplier obligation (a continuation of the Energy Company Obligation), or through a mix of both sources.

The outcome

Delivering coordinated, long term improvement in the housing stock's energy performance brings significant benefits. Recent UKERC research has found that investments similar to those envisaged under the Buildings Energy Infrastructure Programme would enable households to achieve an average £270 energy cost saving per year at today's prices¹⁴. Research has also found that raising energy

¹⁴ UKERC (2017) Unlocking Britain's First Fuel, <http://www.ukerc.ac.uk/news/unlocking-britains-first-fuel.html>

efficiency investment would deliver net present value to the UK of £7.5bn, and support up to 100,000 full-time skilled jobs across the country through the 2020s, providing clean growth opportunities supportive of the Industrial Strategy.¹⁵

In addition, stimulating further investment and strengthening regulation in energy efficiency would:

- help to meet England's fuel poverty target for 2030 and accelerate progress in Scotland and Wales;
- help to ensure that the fourth and fifth Carbon Budgets, and ultimately the 2050 emissions reduction target, are met efficiently (by reducing the need for more costly emissions reduction investment elsewhere);
- embed lower running costs into the value of properties;
- improve the comfort and health outcomes associated with people's homes; and
- achieve high levels of safety through the implementation of world-leading standards.

¹⁵ Cambridge Econometrics and Verco (2014), *Building the Future: The economic and fiscal impacts of making homes energy efficient*, <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>

1 INTRODUCTION

In 2015, Frontier Economics published a report¹⁶ setting out why improving the energy performance of the UK's building stock should be considered an infrastructure programme and why it should be a priority for Government investment. We have now been commissioned by the Energy Efficiency Infrastructure Group (EEIG)¹⁷ to discuss what this means in practice.

The aim of this report is to assist national and local policymakers in taking forward a coordinated, long term strategy for energy efficiency and low carbon heat in buildings which drives productivity and clean growth, improves energy security, increases the likelihood of meeting carbon budgets cost-effectively, and most importantly, provides quality, sustainable buildings that are cheaper to run.

In particular, the report outlines an Action Plan for delivering a Buildings Energy Infrastructure Programme that will deliver a step change in the energy performance of buildings in the UK. While the focus of this report is on domestic buildings, the Programme must ultimately cover energy performance and efficiency in all buildings, including commercial and public buildings. In addition, to deliver cost-effective improvements to buildings and maximise synergies, it must simultaneously encourage investment in energy efficiency and low carbon heat¹⁸.

This report focusses on the UK. We note, however, that different policies are in place across England, Scotland, Wales and Northern Ireland, and that the 'policy gap' is arguably largest in England.

1.1 Why is action needed?

Government has an opportunity to deliver major economic and social benefits

Improved energy performance in homes has delivered significant benefits to date. Between 2004 and 2015, gas consumption for a typical dual fuel household fell 37% and electricity consumption fell 18%¹⁹, driven substantially by energy efficiency improvements. Reductions in household energy use since 2004 now save typical dual fuel households around £490 per year²⁰.

While the benefits of historical programmes are widely acknowledged, there is sometimes a perception that the most cost-effective actions have already been

¹⁶ Frontier Economics (2015), *Energy Efficiency: An Infrastructure Priority*, <http://www.frontier-economics.com/publications/energy-efficiency-an-infrastructure-priority/>

¹⁷ The Energy Efficiency Infrastructure Group (EEIG) is a collaboration of over 20 organisations including leading industry and trade bodies, think tanks, environmental NGOs and major engineering, energy, construction and insulation businesses. <https://www.theeig.co.uk/>

¹⁸ This is discussed in Section 3.

¹⁹ CCC (2017) *Energy Prices and Bills – impacts of meeting carbon budgets*, <https://www.theccc.org.uk/wp-content/uploads/2017/03/Energy-Prices-and-Bills-Committee-on-Climate-Change-March-2017.pdf>.

²⁰ CCC (2017) *Energy Prices and Bills*, <https://www.theccc.org.uk/publication/energy-prices-and-bills-report-2017/> The CCC have adjusted their figures to take account of the recent mild winters.

taken. In fact, as highlighted by recent research, there is a major opportunity for further net benefits to be realised.

- Recent UKERC research, carried out in line with HM Treasury appraisal guidance, has found that cost-effective investment in domestic energy efficiency and low carbon heat to meet the fifth carbon budget could save around a further one quarter of the energy currently used in UK homes and deliver net benefits of £7.5 billion to the UK by 2035.²¹ The magnitude of this energy saving is huge: it is equivalent to the output of six nuclear power stations the size of Hinkley Point C, while in cost terms energy bills could be on average £270 lower per household per year by 2035 (relative to 2015).
- Factoring in health benefits (due to warmer homes) and option value²² would increase the net benefits even further.
- Investment in energy efficiency could also deliver wider economic benefits, due to the additional economic activity stimulated by the installation of measures. Macroeconomic modelling by Cambridge Econometrics and Verco suggests that an energy efficiency programme could have a significant positive impact on growth, delivering an increase in GDP of £3.20 for every £1 invested by the Government, and up to 100,000 additional jobs per year from 2020 to 2030²³.

But there is a policy and investment gap

While it is clear that investment in improving the energy performance of buildings would deliver major benefits, there is a 'policy gap', particularly in England. Warm Front, the Green Deal and the Zero Carbon Homes programmes have all been discontinued without a replacement, and the size of the Energy Company Obligation has decreased. At present, approximately 19 million homes still have an Energy Performance Certificate (EPC) rating of lower than C²⁴. Although the 2016 Autumn Statement announced total spending on housing, economic infrastructure and R&D of £170 billion over the next five years, buildings' energy performance was not specifically highlighted as a focus of this²⁵.

This policy and investment gap has contributed to an 80% decline in domestic energy efficiency measures being installed between 2012 and 2015 with a further significant decline projected to 2020²⁶. In this context, fuel poverty will remain a major problem²⁷. In addition, according to the Committee on Climate Change (CCC), investment in energy efficiency measures is not progressing at a rate that

²¹ UKERC (2017) *Unlocking Britain's First Fuel*, <http://www.ukerc.ac.uk/news/unlocking-britains-first-fuel.html>

²² Energy efficiency investments provide option value: because they involve multiple, small incremental investments, the scale and focus of the programme can be adjusted over time, as new information on the state of the world (including on the availability of new technologies) comes to light.

²³ Cambridge Econometrics and Verco (2014), *Building the Future: The economic and fiscal impacts of making homes energy efficient*, <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>

²⁴ See Figure 6.

²⁵ HMT (2016), *Autumn Statement*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/571559/autumn_statement_2016_web.pdf

²⁶ Association for the Conservation of Energy (2016), *Home Energy Efficiency 2010-2020*, <http://www.ukace.org/wp-content/uploads/2016/03/ACE-briefing-note-2016-03-Home-energy-efficiency-delivery-2010-to-2020.pdf>

²⁷ Policy Exchange (2015), *Warmer Homes*, <https://policyexchange.org.uk/publication/warmer-homes-improving-fuel-poverty-and-energy-efficiency-policy-in-the-uk/>

would allow the fourth and fifth carbon budgets to be met.^{28,29} Analysis by the Association for the Conservation of Energy and the Regulatory Assistance Project in 2016 suggested the emissions limits in the fifth carbon budget with respect to buildings would be exceeded by 18%³⁰. The Government's latest projections for emissions abatement, published in March 2017, indicate that the UK is not on track to meet its fourth and fifth carbon budgets, and that emissions from the domestic residential sector are set to rise by 10% by 2035³¹.

An infrastructure programme would fill this gap

Given this, there is a major opportunity for a comprehensive Buildings Energy Infrastructure Programme. Indeed, the Government has made it clear that delivering affordable home energy and opportunities for clean growth will be central to energy policy³². Action now would also come at exactly the right time to dovetail with the recent recommendations in the *Each Home Counts* review³³, whose work this report draws on, and the National Infrastructure Commission's National Infrastructure Assessment.

An overarching Action Plan is required to deal with the well-known, multiple barriers and market failures that must be overcome to raise the energy performance of buildings. Seven principles underpin the proposed Plan:

- **high quality and safe:** ensuring the Programme draws on high standards of workmanship and delivery to inspire consumer confidence and ensuring that safety is a foundation for the Programme by applying and monitoring world-leading safety standards for retrofitting and constructing homes;
- **professionally managed:** using an Infrastructure Agency or Unit to ensure a high quality business-focused approach is taken to maximise Programme efficiency and coordination;
- **long term:** leveraging the maximum amount of private capital and giving the market and consumers real confidence by setting targets to make all homes perform to an acceptable energy standard by a fixed date in the future;
- **big picture:** recognising that minimising energy costs requires integrated and coordinated energy infrastructure investment covering power, heat and energy efficiency, across all buildings in the domestic and non-domestic sectors;

²⁸ Building energy performance improvements are currently running at 1% per annum, rather than the 2-3% required to meet carbon budgets. Janette Webb (2016), *Heat and Energy Efficiency: Making Effective Policy, Advisory Group Report*, <https://www.theccc.org.uk/wp-content/uploads/2016/10/Heat-and-Energy-Efficiency-Advisory-Group-Report-Making-Effective-Policy.pdf>

²⁹ CCC (2017) *Meeting Carbon Budgets: Closing the policy gap*, <https://www.theccc.org.uk/wp-content/uploads/2017/06/2017-Report-to-Parliament-Meeting-Carbon-Budgets-Closing-the-policy-gap.pdf>

³⁰ ACE (2016), *Buildings and the Fifth Carbon Budget*, <http://www.ukace.org/wp-content/uploads/2016/09/ACE-RAP-report-2016-09-Buildings-and-the-5th-Carbon-Budget.pdf>

³¹ BEIS (2017), *Updated energy and emissions projections: 2016*, <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2016>

³² BEIS (2017), *Building our industrial strategy*, <https://www.gov.uk/government/consultations/building-our-industrial-strategy>

³³ Bonfield (2016), *Each Home Counts*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/578749/Each_Home_Counts_December_2016_.pdf

- **focused on delivering a return:** recognising the Programme delivers benefits to the UK economy comparable to other infrastructure projects;
- **targeted at those most in need:** ensuring the poorest with the highest energy costs are prioritised for assistance; and
- **informed:** drawing on best practice in heat and energy efficiency programme planning.

1.2 What does this report cover?

This report recommends the creation of an Action Plan for delivering a comprehensive Buildings Energy Infrastructure Programme, and outlines a Plan to deliver it in the domestic sector. It describes each of the policies that make up the Action Plan, and, broadly, who should be responsible for taking forward the actions. The Plan includes actions for both Government and industry, demonstrating a shared responsibility.

To put this Plan together we have built on the wide body of policy proposals that have been developed in recent years³⁴. Working with the EEIG, we have assessed different options and selected those that work together to provide a cost-effective, coherent and integrated policy package. Each element will need further development ahead of implementation, in consultation with stakeholders, but there are many bodies (such as the EEIG) that are ready to help with this next stage.

This report does not repeat work that has already been done to set out the benefits of home energy performance improvements in detail, or the many barriers to take-up that exist, since this has been well researched and understood in many other recent papers^{35,36}.

The rest of this report is set out as follows:

- Section 2 provides an overview of the Programme and the recommended Infrastructure Action Plan to deliver it.
- Sections 3-11 provide further explanation of each action, in a question and answer format.
- Section 12 summarises the Programme and sets out the next steps.

³⁴ For example: SEA (2017), *Energy Efficiency – A Policy Pathway Addressing the Able to Pay Sector*, http://www.sustainableenergyassociation.com/wp-content/uploads/2017/03/SEA_Energy-Efficiency-A-Policy-Pathway_Final.pdf; Policy Exchange (2016), *Efficient Energy Policy*, <https://policyexchange.org.uk/wp-content/uploads/2016/09/efficient-energy-policy.pdf>; UK GBC (2013), *Retrofit Incentives*, http://www.ukgbc.org/sites/default/files/130705%2520Retrofit%2520Incentives%2520Task%2520Group%2520-%2520Report%2520FINAL_1.pdf

³⁵ A high-level discussion of the benefits is set out in Section 5.

³⁶ For example, Frontier Economics (2015), *Overcoming barriers to smarter heat solutions in UK homes*; <http://www.eti.co.uk/programmes/smart-systems-heat>; DECC (2012), *Energy Efficiency Strategy*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65602/6927-energy-efficiency-strategy--the-energy-efficiency.pdf; Pollitt, Shaorshadze (2011), *The Role of Behavioural Economics in Energy and Climate Policy*, <https://www.repository.cam.ac.uk/bitstream/handle/1810/242021/cwpe1165.pdf?sequence=1>

2 OVERVIEW OF THE PROGRAMME

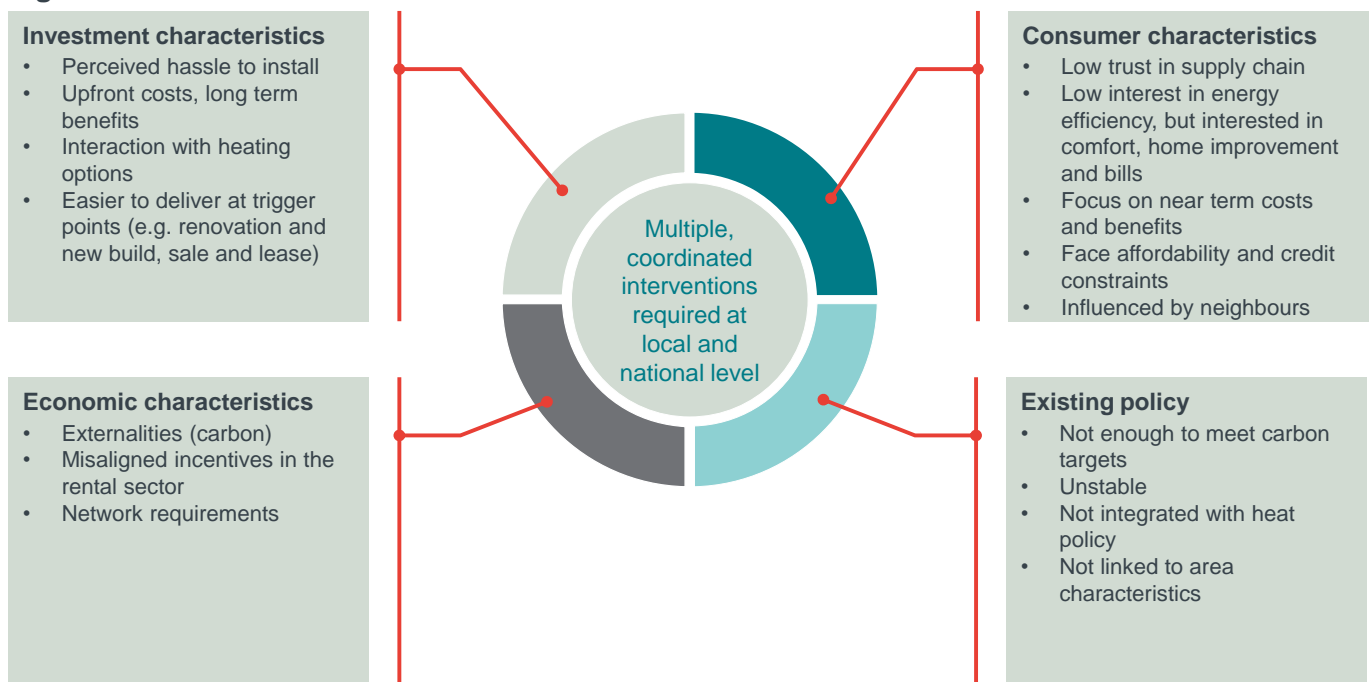
A new Buildings Energy Infrastructure Programme is in line with the Government’s priorities.

The Government has signalled that delivering affordable home energy and opportunities for clean growth will be central to energy policy³⁷. The new Programme would make a major contribution to delivering clean growth, and minimising costs to taxpayers and consumers. It would also help reduce fuel poverty and deliver benefits to people’s health and wellbeing³⁸. By providing an environment in which the building energy performance supply chain can thrive, it will support businesses to start and grow, developing skills in the construction and service sectors and supporting growth across the country.

To be successful, the Programme must overcome multiple complex barriers and market failures.

Barriers and market failures have reduced the effectiveness of some previous policies (Figure 1)³⁹.

Figure 1 Barriers and market failures



Source: Frontier Economics

³⁷ BEIS (2017), *Building our industrial strategy*, <https://www.gov.uk/government/consultations/building-our-industrial-strategy>

³⁸ For example, Hills, John (2011) *Fuel poverty: the problem and its measurement*, <http://eprints.lse.ac.uk/39270/1/CASEREport69%28Isero%29.pdf>

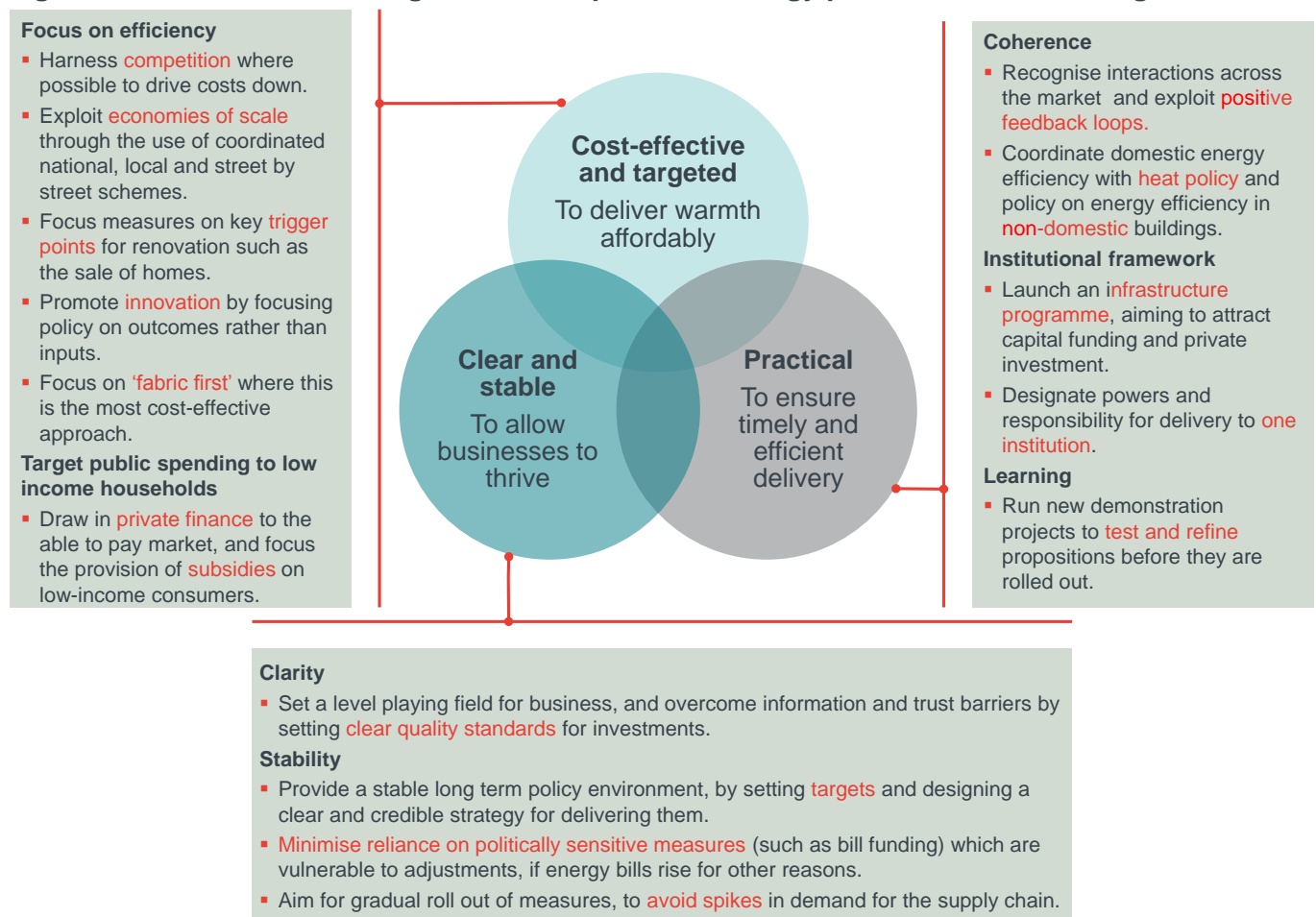
³⁹ These barriers are well documented. For example, Frontier Economics (2015), *Overcoming barriers to smarter heat solutions in UK homes*; : <http://www.eti.co.uk/programmes/smart-systems-heat>, DECC (2012), *Energy Efficiency Strategy*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65602/6927-energy-efficiency-strategy--the-energy-efficiency.pdf

Given these priorities, and the barriers that need to be overcome, what should be the focus of the Programme?

To select policies, and combine them into the Programme, we considered three key attributes (Figure 2).

- **Cost-effective and targeted.** The combination of measures chosen have been designed to be cost-effective, and to ensure that net benefits are delivered to the UK economy. In addition, public spending is targeted primarily at low income households.
- **Clear and stable.** Long term energy performance targets and quality standards are at the heart of the Action Plan. These will provide stability and clarity to consumers and to the supply chain.
- **Practical.** As well as describing the policies that need to be introduced, we have also outlined a delivery framework.

Figure 2 Vision for the Programme to improve the energy performance of buildings



Source: Frontier Economics

Core elements of the Programme

Based on this framework, the Programme must have the following core elements (Figure 3). Further detail on each element is presented in the remainder of the report.

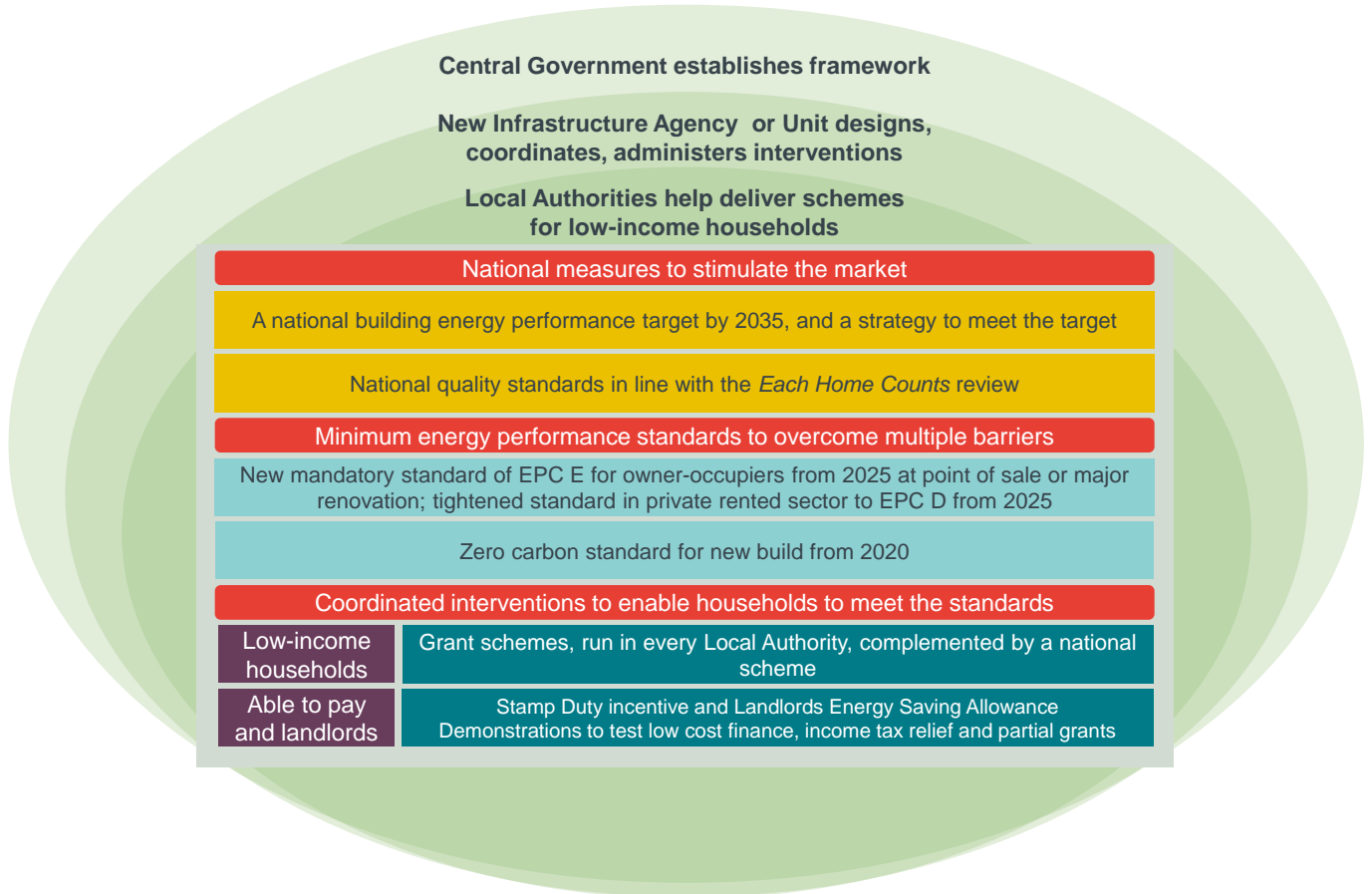
This includes:

- **National policies to stimulate the market.**
 - To signal long term ambition and create a stable policy environment, a National Building Energy Performance Target (“the Target”) should be set in line with fuel poverty and carbon targets, based on all homes in the UK reaching a target standard by 2035, such as EPC Band C⁴⁰.
 - Quality processes and standards, in line with the *Each Home Counts* review’s recommendations and related programmes, should be fully implemented to overcome barriers associated with consumer trust in home energy performance investments, and to provide a level playing field for the supply chain.
 - Home retrofits and construction projects must be carried out in accordance with world-leading safety standards. A professional, centrally-coordinated, well-resourced infrastructure programme should help to ensure this is achieved.
- **Minimum energy performance standards for homes (in line with the Target) should be introduced.** Introducing interim mandatory minimum standards is important, given market failures and barriers, and limited public funding resources.
 - **New buildings.** The minimum energy (and carbon) performance standard should be raised for new homes being constructed from 2020 (in effect, readopting a Zero Carbon Homes standard).
 - **Owner occupied sector.** A minimum standard equivalent to EPC E should be introduced from 2025 at point of sale or major renovation to support progress in improving home energy performance towards the 2035 Target.
 - **Private rented sector.** Minimum standards should be raised from current levels to EPC D from 2025, to deliver further progress in the sector and to help meet England’s 2030 fuel poverty target.
 - **Social housing sector.** Energy performance has long been highest in social housing, and it continues to improve faster than in the other sectors. However, an appropriate minimum performance standard should be considered from 2025 if the sector is not on track to meet the Target.
- **Programmes to help households and landlords meet the Target.** Programmes will also be required to help households meet the new mandatory minimum energy performance standards and the longer-term targets.
 - For households that are able to pay and landlords these should include:

⁴⁰ Existing evidence suggests that a Target of EPC C by 2030 may be a cost-effective level, and that it would be in line with meeting carbon budgets. We discuss this further in Section 5.

- **Stamp duty incentive.** Variable stamp duty should be introduced to give home buyers and sellers an incentive to invest in energy performance improvements before and after sale – a key trigger point.
- **Financial incentives.** Demonstration-scale programmes of a range of low cost finance and preferential borrowing offers should be undertaken, to ensure households that are able to pay can access finance to meet new targets and minimum standards. An income tax relief measure, along the lines of the ‘Cycle to Work’ scheme, should also be trialled. As part of the demonstration programme, the impact of these offers should be compared to the impact of providing a partial upfront grant.
- **Landlord’s Energy Saving Allowance (LESA).** Until 2015, the LESA allowed landlords to deduct up to £1.5k from taxable profit for approved energy saving expenditure on each of their rental properties. This should be reintroduced, with the level of the allowance increased to £3k to support private landlords in making improvements to their properties.
- **Grants.** For low income households, the emphasis should be on locally administered and delivered grant schemes from 2022 (after the current ECO period), complemented by a national scheme to safeguard against gaps in provision and achieve economies of scale.
- **An institutional framework for delivery.** The delivery framework for the Buildings Energy Infrastructure Programme would include an Agency or Unit, preferably within an existing organisation, working with Central and Local Government to develop and run the programmes.

Figure 3 Overview of the Buildings Energy Infrastructure Programme

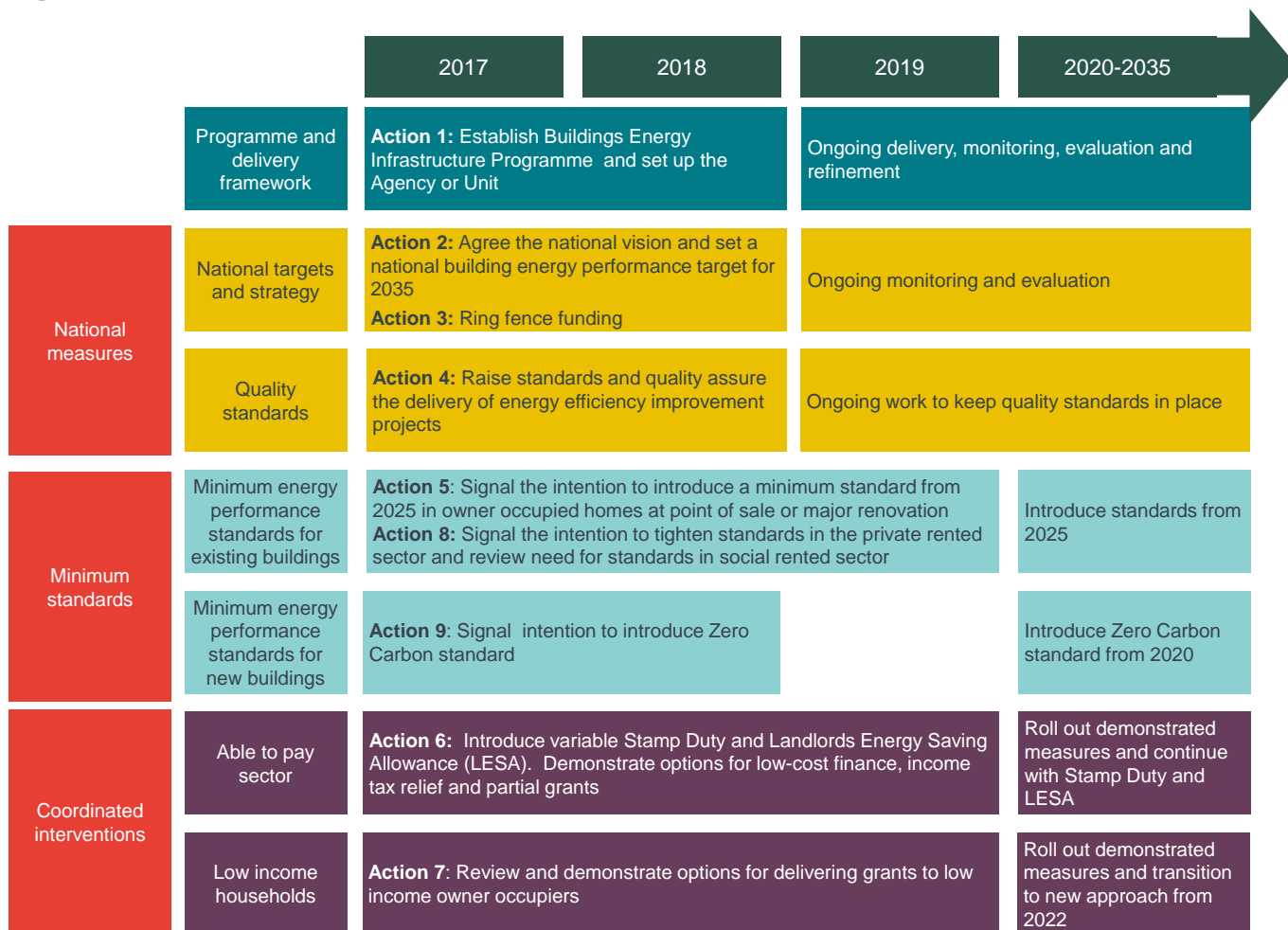


Source: Frontier Economics

2.2 Action Plan

Our proposed Action Plan to deliver the Programme is described in Figure 4. The remainder of the report discusses each of these actions in turn.

Figure 4 Action Plan



Source: Frontier Economics

3 ACTION 1: ESTABLISH THE PROGRAMME

Action		Timing
Create a long term Buildings Energy Infrastructure Programme		2017-2018
Key elements		
<ul style="list-style-type: none"> Set out the Programme to 2035. Establish an independent Buildings Energy Infrastructure Programme Agency or Unit to coordinate, communicate and oversee the Programme's delivery, monitoring and evaluation. 		
Next steps for industry	Next steps for Government	
<ul style="list-style-type: none"> Provide input and support in setting up the Programme's functions. 	<ul style="list-style-type: none"> Designate improvement of the energy performance of the building stock as a national infrastructure investment priority. 	

The questions and answers in this section describe the Buildings Energy Infrastructure Programme and its rationale at a high level and describe the institutional framework required for its delivery.

3.1 Overview of the Programme

What should be the scope of the Programme?

The Programme should aim to raise the quality and energy performance of all domestic and non-domestic buildings in the UK that are currently below a rating of EPC C (or equivalent), encompassing energy efficiency improvements and efficient low carbon heat. This scope makes sense because:

- it is often most cost-effective to install low carbon heat and energy efficiency measures together, minimising disruption to households and businesses;
- investment decisions across energy efficiency and heat need to be coordinated, to maximise performance improvements at least cost; and
- it makes sense to roll out domestic and non-domestic buildings energy improvements in a 'twin track' approach to benefit from economies of scale and to allow the supply chain to grow and mature where synergies exist (such as between homes and SMEs, and heat network infrastructure across different buildings sectors).

Although the scope of the Programme should encompass domestic, commercial and public buildings, as set out in Section 1, the focus of this report is on housing.

Why is the improvement of buildings' energy performance an 'infrastructure programme'?

Our previous research⁴¹ for the Energy Bill Revolution concluded that a programme of energy performance investments in buildings should be considered to be an infrastructure programme.

This is because by reducing energy consumption, energy performance investments free up energy sector capacity to be used elsewhere in the economy, reducing the need to invest in new energy system capacity, such as new generation plants, networks or energy storage. Energy performance investments also provide public services: by reducing energy bills, they decrease the exposure of consumers to volatile energy prices, and by enabling consumers to heat buildings more effectively, they increase health and wellbeing.

The role of energy efficiency in infrastructure provision is acknowledged by the National Infrastructure Commission. Alongside its analysis of the physical infrastructure needed in the UK to 2050, the National Infrastructure Commission is considering how the capacity of existing assets to provide infrastructure services can be increased through measures to increase energy efficiency⁴².

Our previous work also found that a building energy performance programme would meet the criteria HM Treasury applies for determining its top 40 infrastructure requirements⁴³.

Why should a Buildings Energy Infrastructure Programme be prioritised?

The new Programme would deliver lower bills for households, increased comfort and reduced emissions. It would also help the country to meet fuel poverty targets (including England's 2030 fuel poverty target⁴⁴) and deliver benefits to people's health⁴⁵. A well-designed infrastructure programme, could do this while minimising costs to the tax payer.

By providing an environment in which the building energy performance supply chain can thrive, it will also support businesses to start and grow, developing skills in the construction and service sectors and supporting growth across the country.

⁴¹ Frontier Economics (2015), *Energy Efficiency: An Infrastructure Priority*, <http://www.frontier-economics.com/publications/energy-efficiency-an-infrastructure-priority/>

⁴² NIC (2016), *The National Infrastructure Assessment Consultation*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/525950/National_Infrastructure_Assessment_Consultation.pdf

⁴³ Frontier Economics (2015), *Energy Efficiency: An Infrastructure Priority*, <http://www.frontier-economics.com/documents/2015/09/energy-efficiency-infrastructure-priority.pdf>

⁴⁴ Action to meet this target currently faces a major funding shortfall. Government is spending less than half of what is required. Policy Exchange (2015), *Warmer Homes*, <https://policyexchange.org.uk/publication/warmer-homes-improving-fuel-poverty-and-energy-efficiency-policy-in-the-uk/>

⁴⁵ For example, Hills, John (2011) *Fuel poverty: the problem and its measurement*, <http://eprints.lse.ac.uk/39270/1/CASEREport69%28Isero%29.pdf>

Our 2015 report illustrated that a programme to improve building energy performance could have comparable benefits to other major infrastructure investments. It presented analysis which showed that a programme to make buildings more energy efficient running from 2013-2022 could generate £8.7 billion of net benefits⁴⁶. This is comparable to the benefits projected to be delivered by the first phase of HS2, Crossrail, smart meter roll out, or investment in new roads. This finding holds, even without quantifying many of the key social benefits of energy efficiency measures (for example health and wellbeing improvements)⁴⁷.

A further discussion on the benefits of energy performance investments is presented in Section 5.

Why can't we just rely on current policy?

As described in Section 1, current policy will not be enough to meet the fourth and fifth carbon budgets and England's fuel poverty targets, or to deliver the full range of net benefits to society that would be associated with the Programme.

Progress in Scotland has been strong (see Box 1). Energy efficiency has already been declared an infrastructure priority and a detailed programme to improve buildings has been established. The new UK-wide Programme would need to build on that progress.

BOX 1: SCOTLAND'S ENERGY EFFICIENCY PROGRAMME (SEEP)

The Scottish Government has already implemented some of the measures recommended in this report, and is consulting on others.

The Scottish Government designated energy efficiency and heat decarbonisation as a National Infrastructure Priority in 2015, committing to a 15 to 20 year programme to deliver investments. Scotland's Energy Efficiency Programme (SEEP) aims to help Local Authorities to pilot new approaches to energy efficiency, working with local partners and obligated energy suppliers, with the aim of delivering near zero carbon buildings, where feasible and practical, by 2035.

The Scottish Government has committed half a billion pounds to SEEP over the next four years to support the initial phase of the programme.

The programme is currently in the design phase and the Government is consulting on the detail of the schemes. In the meantime, a range of interventions are being demonstrated including 0% interest loans, equity based loans (where homeowners can borrow against the value of their home) and grant support delivered through area-based schemes.

The Government is already consulting on regulation of the private rented sector, heat regulations and phased regulations of other existing buildings to tighten minimum energy efficiency standards.

⁴⁶ This figure relates to both domestic and non-domestic buildings. The analysis was based on the Department for Energy and Climate Change's (DECC) final impact assessment of the Green Deal and ECO, published in 2012.

⁴⁷ Frontier Economics (2015), *Energy Efficiency: An Infrastructure Priority*, <http://www.frontier-economics.com/publications/energy-efficiency-an-infrastructure-priority/>

Why is a planned and coordinated Buildings Energy Infrastructure Programme needed?

A planned and coordinated Programme is needed for the following reasons.

- **Multiple interventions are needed.** Multiple barriers and market failures have reduced the effectiveness of some previous policies (Figure 1). These barriers are well documented^{48,49}. Their presence means that there is no single solution that will deliver the required step change in home energy performance investment.
- **Households and buildings are diverse, so diverse interventions are needed across sub-groups.** Households differ in their needs, the opportunities they have for investment and in their ability to pay. This means that a suite of interventions is required, targeted at different groups. This diversity of requirements is likely to be even greater in the non-domestic sector.
- **Coordination can enhance quality and safety standards.** It is clear that strong safety standards are needed when retrofitting and constructing homes. A well-coordinated infrastructure approach can help to ensure that safety is put at the heart of the Programme and that world-leading regulations are fully enforced.
- **Coordination can help drive the supply chain and minimise costs.** Individual measures should not be applied in a piecemeal fashion. Coordination and phasing are essential to help build a thriving supply chain with associated employment benefits around the UK, to deliver a culture of trust, to exploit economies of scale and to ensure that measures are delivered where they can make the biggest impact on affordability and emissions. For example, it is very important that new quality standards are in place before the renewed drive to improve buildings is fully implemented (though we note that preparation for implementation will need to start before the standards are in place). It is also important that interventions are phased, to avoid ‘feast or famine’ situations for consumers and the supply chain.

What are the specific delivery and procedural benefits of the infrastructure designation?

Structuring the delivery of building energy performance as an infrastructure programme has several important advantages.

- It recognises the potential for strong economic returns.
- It recognises the scale of the challenge and the focus, coordination and planning required across energy and climate, public health, fuel poverty, industrial strategy and housing policy for its delivery.

⁴⁸ For example, For example, Frontier Economics (2015), *Overcoming barriers to smarter heat solutions in UK homes*; : <http://www.eti.co.uk/programmes/smart-systems-heat>; DECC (2012), Energy Efficiency Strategy, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65602/6927-energy-efficiency-strategy--the-energy-efficiency.pdf.

⁴⁹ This topic is also well covered in the academic literature, for example: Pollitt, Shaorshadze (2011), *The Role of Behavioural Economics in Energy and Climate Policy*, <https://www.repository.cam.ac.uk/bitstream/handle/1810/242021/cwpe1165.pdf?sequence=1>

- It enables a comprehensive programme that doesn't just target fuel poor households, but that also helps drive cost and energy savings for the 'able to pay'.
- It provides a clear blueprint for action to 2035, which enables supply chain businesses to plan and invest, and to create sustainable employment.
- It allows us to learn from the successful delivery of other infrastructure programmes.

Does the timing align with the National Infrastructure Assessment (NIA), due in 2018?

Yes, the timing aligns with the NIA, as the National Infrastructure Commission has already stated its intention to consider energy efficiency alongside other infrastructure options in its work⁵⁰. Later in 2017, the National Infrastructure Commission will set out a vision of the UK up to 2050, and identify the infrastructure required to meet this vision. In 2018, it will recommend how the identified infrastructure needs should be addressed.

Why is 2035 being recommended as the potential end date for the Programme?

Previous research suggests that significant progress on building energy performance could be made by 2035⁵¹. Importantly, it also takes the Programme just beyond the end of the fifth carbon budget period, so that the energy and carbon savings delivered by it can be fully factored in.

The Buildings Energy Infrastructure Programme will also need to build in an evaluation framework and milestones to determine the nature of further required improvements after 2035, when new technology and innovative approaches to upgrading buildings may change the costs and benefits of different options⁵².

Why are we recommending a public announcement of the intention to create a Buildings Energy Infrastructure Programme?

For the Programme to be credible, it will be essential that there is widespread support and understanding of its aims, the impacts that it will have on households and the net benefits that it will deliver.

⁵⁰ NIC (2016), *The National Infrastructure Assessment Consultation*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/525950/National_Infrastructure_Assessment_Consultation.pdf

⁵¹ Cambridge Econometrics and Verco (2014), *Building the Future: The economic and fiscal impacts of making homes energy efficient*, <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>

⁵² We note that 2032 is the end of the fifth carbon budget period, so an alternative would be to align the programme's timetable with that.

3.2 Delivery

Why is a Buildings Energy Infrastructure Programme Agency or Unit needed?

We recommend that an Agency or Unit, preferably within an existing organisation, is given the mission to develop and implement a strategy to meet energy efficiency and low carbon heat targets cost-effectively, promoting quality and affordability for households and enabling relevant industries to develop and grow.

The success of the Programme requires a coordinated, stable and credible approach to delivery. If policies are applied in a piecemeal fashion, and adjusted as short term political priorities change, it will be difficult for the supply chain to plan and grow.

But the current institutional framework makes such an approach difficult: frequent changes to policies and a patchwork of different interventions across the low carbon heat and energy efficiency sectors has led to higher than necessary costs, and progress that is not in line with fuel poverty targets and carbon budgets.

To deliver a stable, coordinated approach, it will be important to grant powers and responsibility for meeting the Target to a single body that also has responsibility for low carbon heat, chaired by a recognised expert in infrastructure planning and delivery. Central and Local Government would remain key players in the delivery landscape, with Central Government setting the overall targets, providing the funding and leading on the tax incentives, and Local Government working on the area-based schemes and enforcement.

What kind of tasks would the Buildings Energy Infrastructure Agency or Unit carry out?

The Buildings Energy Infrastructure Agency or Unit would carry out the following tasks.

- **Policy and strategy.** In its first year, the Agency or Unit would build on the recommendations in this report to produce a national strategy setting out the package of policies to meet targets, including detailed design of the schemes or demonstration programmes across the low income, able to pay, private rented, social housing and new build sectors. It would continue to refine the detailed design of schemes as results from the demonstration programmes come in.
- **Quality and safety standards for industry.** It would work with industry and Local Authorities to ensure national standards for the design and installation of measures and the quality assurance framework recommended by the *Each Home Counts* review and other relevant programmes, are fully incorporated into and used by the Programme, including at the local level.
- **Administration of support for the able to pay market.** It would administer the planned interventions to encourage able to pay households to invest in

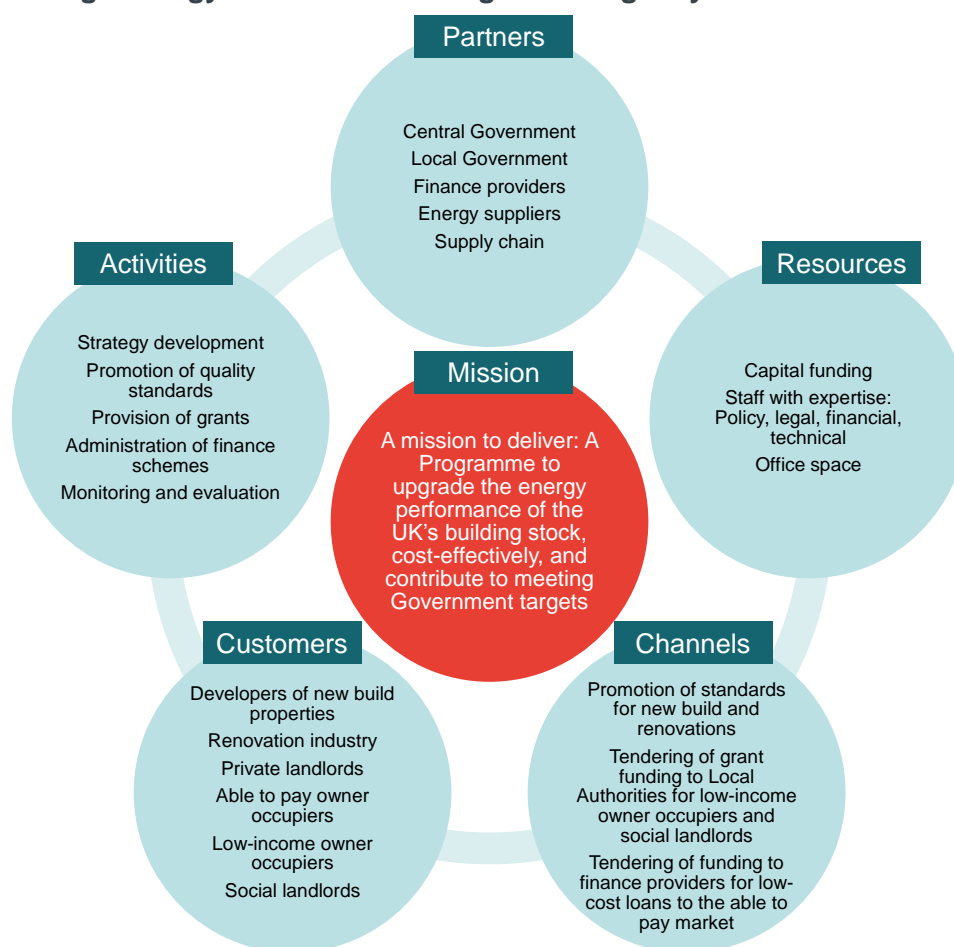
energy performance. This could involve, for example, tendering contracts to financial institutions for the issuing of low cost loans.

- **Provision of grants for area-based schemes (e.g. street-by-street projects, focussed in small areas within Local Authorities).** It would administer a scheme to fund locally led schemes for low income households in every Local Authority.
- **Supporting Local Authorities.** It would provide wider support to Local Authorities, including helping those who need to build new skills and capacity. It could review experience and provide advice on the best scheme designs. It would also provide specific services, where these can be done most cost-effectively at a central level (for example, providing legal advice on state aid issues).
- **Advice on minimum (regulatory) energy performance standards.** This would include the ongoing review of minimum energy performance standards, i.e. EPC requirements for rental properties and in the owner occupied sector. Local Authorities currently enforce such standards⁵³, and we would expect this to continue, with the Agency or Unit providing support where required.
- **Monitoring and evaluation.** The Agency or Unit would also have responsibility for submitting progress reports to Central Government.

These activities are summarised in Figure 5.

⁵³ DECC (2014), *Private Rented Sector Minimum Energy Efficiency Standard Regulations (Domestic)*, [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/401381/Dom_PRS_Energy_Efficiency_Regulations - Gov Response FINAL_04_02_15_.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/401381/Dom_PRS_Energy_Efficiency_Regulations_-_Gov_Response_FINAL_04_02_15_.pdf)

Figure 5 Buildings Energy Infrastructure Programme Agency or Unit



Source: Frontier Economics

Why not set up a delivery unit within BEIS?

Based on principles set out by the Cabinet Office,⁵⁴ there are good reasons for setting up an arm's length body to undertake these functions. There are three particular advantages this model could bring to the Programme.

- **External technical expertise.** The activities required to run the Programme require specific expertise in several areas (for example technical knowledge of the supply chain, commercial experience and legal and financial expertise). It may make sense to recruit this specific expertise to a Non-Departmental Public Body, rather than to central government.
- **Political impartiality.** While the overall long term targets should be set by the Secretary of State, there may be an advantage to granting powers to deliver on those targets to an independent agency. In particular, building a thriving building energy performance industry, with associated employment benefits, requires long term, stable policy.

⁵⁴ Cabinet Office (2015), *Classification of Public Bodies: Guidance for Departments*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/519571/Classification-of-Public-Bodies-Guidance-for-Departments.pdf

- **Separation of sponsor and delivery function.** In the delivery of major infrastructure programmes such as HS2, the National Audit Office has pointed out the advantage of separating out the delivery function from the sponsor department. This allows the programme sponsor to challenge and oversee the programme, while a new agency can focus on delivery⁵⁵.

However, setting up a unit in BEIS may be more practical. This should not be out of the question, and experience with BEIS's Heat Networks Delivery Unit has been generally positive (although its remit is comparatively small).

Which existing organisations could potentially house the Agency or Unit?

Using an existing organisation has the potential to keep costs down, as well as having the potential to leverage existing relationships or providing specific expertise.

One example would be the Homes and Communities Agency. This is an executive non-departmental public body, sponsored by the Department for Communities and Local Government (DCLG). It aims to make more homes and business premises available to the residents and businesses that need them. It also regulates social housing providers in England. It may therefore come with existing relationships in the building industry and specific expertise in relation to grant provision. In addition, the Government has announced that this Agency will be relaunched in 2017 as Homes England, with developing infrastructure to unlock housing capacity being added to its remit⁵⁶. This may therefore be an opportune time to grant new powers and responsibilities to the Agency.

The HCA focuses on England and there is currently no equivalent organisation covering housing policy implementation in all parts of the UK. However, the Programme could be taken forward by separate organisations in each country across the UK. The Energy Saving Trust already administers several elements of the Scotland Energy Efficiency Programme.

How much might the Agency or Unit cost to set up and run?

The Agency or Unit might cost in the region of £10-15m a year to run.

This estimate is based on the following assumptions⁵⁷.

- The new body employs around 100-150 staff. These staff would include a mix of technical, commercial, legal and policy experts, as well as a relatively large team of administrative staff to run the grant programmes⁵⁸.

⁵⁵ National Audit Office (2014), *Lessons from major rail infrastructure programme*, <https://www.nao.org.uk/wp-content/uploads/2014/10/Lessons-from-major-rail-infrastructure-programmes.pdf>

⁵⁶ DCLG (2017), *Fixing our broken housing market*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/590464/Fixing_our_broken_housing_market_-_print_ready_version.pdf

⁵⁷ We have drawn on the following annual reports: HCA (2016) *Annual Report*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/536617/HCA_AR16_online.pdf; HS2 Ltd (2016) *Annual Report*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/540103/ARA_2016_WEB_FINAL_22072016.pdf; CCC (2016), *Annual Report*, <https://www.theccc.org.uk/wp-content/uploads/2016/07/CCC-Annual-Report-Accounts-2015-16.pdf>

⁵⁸ We have assumed that the Agency or Unit would need less staff than the HCA and HS2 Ltd. Both of these organisations have wider responsibilities and employ over 900 full time equivalent staff. On the other hand,

- The cost of the staff (including non-wage elements such as tax and pensions) is within the range of the average cost of staff in the HCA, HS2 Ltd and in the CCC, at around £75k per full time equivalent, per year. All of these organisations employ a mix of experts and administrative staff, therefore the salary range is likely to be broadly applicable.
- Other organisational costs (such as office accommodation, shared services, training, and travel) are around £25k per full time equivalent, per year (similar to the level of the CCC).⁵⁹ Since the CCC is based in London, these costs could be lower if the Agency was located outside the South East.

We note that the cost of a new Agency or Unit is likely to be small relative to the overall costs and benefits of the Programme.

Is the alternative to set up a new body?

To the extent that some overheads can be shared, it is likely to be more cost-effective to incorporate these functions into an existing body. However, if an existing body cannot be found, an alternative would be to set up a new one. The remit is sufficiently broad and important to justify the creation, given it covers the energy efficiency of the whole building stock as well as low carbon heat.

Who would be responsible for setting up the Agency or Unit?

Central Government would be responsible for setting up the Agency or Unit. However, industry (coordinated via the EEIG) has signalled its intention to help, providing advice, and potentially helping to secure secondees and/or funding.

How should the Programme be monitored?

It will be important to monitor progress so that policies can be evaluated and adjusted to improve efficiency.

Monitoring should track progress towards the Target. It should also cover the total cumulative energy and carbon emissions savings (taking into account rebound and in use effects) that can be attributed to the Programme. This will help allow wider benefits, such as energy security and reductions in the cost of providing energy supply infrastructure, to be fully understood and communicated.

The Agency or Unit would be responsible for monitoring the Programme and presenting progress reports for review by Government and industry. Evaluation should be linked directly to the proposals set out in the *Each Home Counts* review.

the Programme would need more staff members than the CCC, which focusses on analysis rather than delivery and employs 30 full time equivalents. For example, unlike the CCC, the Programme would require administrative staff to run the grant and low carbon finance programmes.

⁵⁹ Data broken down in this way was not available for the other two organisations.

4 ACTION 2: SET THE TARGET

Action		Timing
Set a clear long term target for the energy performance of all homes in the UK		2017-2018
Key elements		
<ul style="list-style-type: none"> Set a National Energy Performance Target, commensurate with fuel poverty and carbon targets, based on all homes in the UK reaching a standard (potentially EPC Band C) by 2035. Confirm in detail the gap between current activity to improve energy performance in homes and the investment needed to meet the Target. 		
Next steps for industry	Next steps for Government	
<ul style="list-style-type: none"> Support the Government by providing information on cost-effective ramp-up rates, and potentially contribute to the cost of delivering modelling work. 	<ul style="list-style-type: none"> Commission detailed analysis, modelling and a review of recent literature to determine the appropriate level and form of the national Target. 	

The questions and answers in this section describe the rationale for the Target, and the process for setting it.

4.1 Rationale for the Target

Why does there need to be a target for buildings at all?

The Target is an integral part of the Programme. It is important because it underpins stable, long term policy involvement, allowing:

- the heat and energy efficiency supply chain to invest in capacity and build capability over time towards a clear goal, to grow sustainably, and avoid exposure to the risks of changing political priorities; and
- households and landlords to plan their investments in energy performance and undertake them when it is most cost-effective (e.g. when they are already undertaking renovations).

4.2 Setting the Target

Why is it important for the Target to set a level of ambition higher than the present level of delivery/performance?

Targets should be set at a level of ambition significantly higher than the present level of delivery and performance, which is geared towards addressing only a small proportion of homes.

- **A higher level of ambition will deliver greater benefits.** Recent research has shown that there is significant potential for additional cost-effective energy efficiency investment (see Section 1)⁶⁰. Failing to undertake this investment will leave benefits unrealised.
- **The current rate of delivery is too low to meet carbon budgets.** The CCC's analysis has shown that investment in buildings' energy performance is not progressing at a rate that would allow the Government's legally binding fourth and fifth carbon budgets to be met⁶¹, so a step change in effort is required.
- **A higher level of ambition will help tackle fuel poverty.** Recent figures for Scotland and Wales put the fuel poverty rate at 35% and 23% respectively^{62,63}. In Northern Ireland, the rate is 42%⁶⁴. In England, where a different definition is used⁶⁵, 11% of households are estimated to be in fuel poverty⁶⁶.

How should the Target be set?

The Target should be set at a level where it contributes a cost-effective solution to meeting carbon budgets to 2050 and fuel poverty targets to 2030 (in England). The following factors should be included in the analysis:

- the private and public investment costs;
- the benefits in terms of energy and emissions savings, comfort, health, wellbeing and air quality⁶⁷; and
- the option value associated with a programme made up of incremental investments (relative to alternatives that consist of large indivisible investments)⁶⁸.

It would also be useful to consider wider economic benefits, such as the impact on jobs and productivity from the increased activity associated with the investments. These are covered in more detail in Section 5.

⁶⁰ UKERC (2017) *Unlocking Britain's First Fuel*, <http://www.ukerc.ac.uk/news/unlocking-britains-first-fuel.html>

⁶¹ Building energy performance improvements are currently running at 1% per annum, rather than the 2-3% required to meet carbon budgets. Janette Webb (2016), *Heat and Energy Efficiency: Making Effective Policy*, Advisory Group Report, <https://www.theccc.org.uk/wp-content/uploads/2016/10/Heat-and-Energy-Efficiency-Advisory-Group-Report-Making-Effective-Policy.pdf>

⁶² We note that the Scottish Government is planning to review their definition of fuel poverty. Scottish Government, <http://www.gov.scot/Topics/Statistics/Browse/Housing-Regeneration/TrendFuelPoverty>

⁶³ Welsh Government, <http://gov.wales/topics/environmentcountryside/energy/fuelpoverty/?lang=en>
⁶⁴ <https://www.communities-ni.gov.uk/topics/housing/fuel-poverty>

⁶⁵ In Scotland and Wales households are considered to be fuel poor if they would need to spend more than 10% of their income to maintain a satisfactory heating regime. In England, a household is considered to be fuel poor if it has higher than typical energy costs and would be left with a disposable income below the poverty line if it spent the required money to meet those costs.

⁶⁶ DECC (2016) *Fuel Poverty Statistics*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/557400/Annual_Fuel_Poverty_Statistics_Report_2016_-_revised_30.09.2016.pdf

⁶⁷ As per Government guidance for policy appraisal, including: BEIS (2017) *Green Book Supplementary Guidance: Valuation of Energy Use and Green House Gas Emissions for Appraisal* <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

⁶⁸ Because the Programme involves multiple, small incremental investments, the scale and focus of the programme can be adjusted over time, as new information on the state of the world (including on the availability of new technologies) comes to light.

How do we ensure that the Target is credible?

The Target will only be effective if it is credible. The Target must therefore be:

- technically feasible⁶⁹;
- be accompanied by a strategy that sets out how it will be met and who is responsible for meeting it, alongside an indicator and monitoring framework for communicating and managing progress transparently and with accountability;
- sufficiently long term to allow supply chain businesses to invest in skills and capacity; and
- realistic in terms of the pace of installation possible with a thriving supply chain and skilled workforce around the country.

Why should the Target be 'energy performance' related, rather than focusing on the number of homes improved or measures installed?

It is important to set targets on the desired outcomes (i.e. more energy efficient buildings with improved overall energy performance) rather than on the means of achieving these outcomes. Focussing on outcomes allows:

- space for innovative and potentially more cost-effective approaches to meeting these outcomes; and
- measures to improve building fabric and efficient low carbon heating systems to be installed in tandem.

How should the action required to meet the Target be determined?

The CCC already assesses actions required to meet carbon budgets. Its analysis could be extended to assess the gap required to meet the new Target.

The gap assessment should include a review of actions that may improve building energy performance, independent of any Government action. For example, it should include an assessment of the contribution that initiatives such as the LENDERS project on Green Mortgages⁷⁰ and the Green Deal Finance Company could play.

Has industry already recommended an energy performance target?

Yes, the Energy Bill Revolution⁷¹ and the Energy Efficiency Infrastructure Group have both recommended that all buildings should reach an EPC C standard by 2035. The Target could be based on this, with adjustments made according to new cost-effectiveness analysis, and existing requirements under carbon budgets and fuel poverty targets.

⁶⁹ To ensure the target is feasible, exemptions may be required for certain buildings and in certain situations, for example those that are listed, or where the characteristics of the building means it is inappropriate to raise the energy performance all the way to the level of the national target.

⁷⁰ LENDERS (2017) Core Report, <http://www.ukgbc.org/resources/publication/lenders-core-report>

⁷¹ <http://www.energybillrevolution.org/>

4.3 The metric for the Target

Is using an energy performance rating (i.e. EPCs) the best method/metric?

EPCs have a number of advantages:

- they are already in place in the majority of homes with 16m EPCs lodged in England and Wales⁷²;
- the cost of EPC assessments is relatively low⁷³;
- the use of EPCs has already been established as a way to set minimum standards in the private rented sector; and
- public awareness of EPCs is rising. Energy Saving Trust research shows that awareness of EPCs as a requirement at the point of buying and selling increased from 16% in 2011 to 35% in 2014.⁷⁴

However, there are concerns over the accuracy of EPCs⁷⁵, and risks of fraud and gaming around EPC scores⁷⁶. The Government should therefore consider routes to strengthening the quality of EPCs (consistent with the recommendations of the *Each Home Counts* review). It will also be important to improve enforcement of the production and availability of EPCs where they are legally required. It would also be worth reviewing whether Individual Retrofit Roadmaps – an enhanced form of EPC – could play a role⁷⁷.

How many households would be covered by a Target set at EPC C?

We estimate that 19m properties in the UK have an EPC of D, E, F or G (Figure 6).

⁷² A total of 15,944,953 EPCs covering domestic properties have been lodged on the Domestic Register between 2008 and the quarter ending on 31 December 2016. DLGG (2017), *Energy Performance of Buildings Certificates: Statistics Release Q1 2008 to Q4 2016 England and Wales*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/587160/EPB_Register_-_Official_Statistics_Release_-_2016_Q4.pdf

⁷³ EPCs are generally range from £35 to over £100, <https://www.moneysupermarket.com/gas-and-electricity/energy-performance-certificate/>

⁷⁴ Energy Savings Trust (2015), *Energy Saving Trust response to the Public consultation on the Energy Performance of Buildings Directive*, <http://www.energysavingtrust.org.uk/sites/default/files/reports/Consultation%20response%20Energy%20Performance%20of%20Buildings%20Directive.pdf>

⁷⁵ Different assessors can come up with different EPC ratings. DECC (2014), *Green Deal Assessment Mystery Shopping Research*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/388197/Green_Deal_Assessment_Mystery_Shopping_FINAL_PUBLISHED.pdf

⁷⁶ DECC (2016) *ECO Impact Assessment*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/586260/ECO_Help_to_Heat_Government_response_FINAL_26_Jan_17.pdf

⁷⁷ Individual Home Retrofit Roadmaps set out a pathway for improving a home to 2050, with the aim of avoiding lock in to inadequate performance or unnecessarily increasing the cost of later required improvements. These roadmaps have been introduced in the state of Baden-Wuerttemberg in Germany. ACE (2015), *Delivering the best deal for energy consumers*, <http://www.ukace.org/wp-content/uploads/2015/07/ACE-position-paper-150724-Options-for-the-next-supplier-commitment.pdf>

Figure 6 Number of homes below EPC C

	England	Scotland	Wales	Northern Ireland	UK
Proportion of homes below EPC C	72%	63%	75%	71%	71%
Numbers of homes below EPC C (000s)	16,294	1,542	1,052	497	19,262

Source: Frontier Economics, based on analysis by E3G (see Annex A)

However, we anticipate that there may need to be some clearly defined exclusions from, or softening of, the Target, for example, where the physical characteristics of properties make it inappropriate to raise the energy performance all the way to the national level, where properties are exceptionally costly to treat, or are listed. The approach being taken for exceptions under the private rented sector minimum energy efficiency standard in England may involve capping the investment required from landlords to meet the minimum standard⁷⁸.

⁷⁸ Cambridge Econometrics and Verco found that 15-16% of homes will not achieve EPC C by 2035 if a cap of £10k per house is set. Cambridge Econometrics and Verco (2014), *Building the Future: The economic and fiscal impacts of making homes energy efficient*, <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>

5 ACTION 3: RING FENCE FUNDING

Action		Timing
Ring fence an appropriate level of infrastructure funds for the 2018-2035 period		2017-2018
Key elements		
<ul style="list-style-type: none"> Assess the overall investment required to meet the Target and determine an appropriate balance of contributions to the required investment from the public sector, industry and consumers. The guiding principle should be that energy performance upgrades for low income households are fully funded at the point of delivery (via national infrastructure funds and/or a successor to ECO, plus private or social landlord contributions), and that the contribution made by households in the able to pay sector is maximised. 		
Next steps for industry	Next steps for Government	
<ul style="list-style-type: none"> Review the Government's cost estimates. 	<ul style="list-style-type: none"> Estimate the required public expenditure contribution to meeting the Target. 	

The questions and answers in this section describe the potential level of investment needed to meet the Target. They also describe the benefits that justify this investment.

5.1 The costs of meeting the Target

How much could it cost to meet the Target per year?

Cambridge Econometrics and Verco estimate that if all homes were upgraded to EPC C, the average investment per home would be £4.6k⁷⁹ (including the cost of a new EPC). This average assumes a capped investment of £10k per home. Application of a £10k cap means that 15-16% of homes may not fully achieve EPC C through the Programme by 2035, due to the cost of bringing them up to Band C in the timescale, though they would improve from their current level.

Assuming that investment will be needed for 71% of the UK's housing stock, this implies a total capital investment requirement averaging £5.2bn per year to 2035 to meet the Target⁸⁰.

⁷⁹ Cambridge Econometrics and Verco (2014), *Building the Future: The economic and fiscal impacts of making homes energy efficient*, <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>. Costs cited in the report have been updated to 2016 prices.

⁸⁰ This cost has been calculated based on the cost per home of £4.6k, the 19m homes that need upgrading and the fact that the programme will run from 2018-2035. In line with Cambridge Econometrics and Verco

Would all of these costs be borne by Government/tax payers?

No. £5.2bn a year represents the estimated average annual investment required to upgrade 19 million homes to EPC C. Much of this would be met by households in full or in part in response to new demand drivers and by accessing new incentives. As we discuss later in this report, we expect Government funding to be focused on low income households to 2030 and on providing stimulus to the able to pay sector and landlords, for example through a Stamp Duty incentive, access to low cost finance options, income tax relief or other partial subsidies for a time-limited period.

We estimate the Government budget required is £1.7bn a year.

- If Government fully provides the investment capital for low income⁸¹ owner occupier households to reach a level of energy performance equivalent to EPC C by 2030, this would amount to £0.6bn a year to 2030⁸².
- If grants or subsidies are provided to fund 50% of the cost of investment in socially rented properties (assuming social landlords provide the remaining funding), this would cost £0.5bn a year to 2030⁸³.
- If grants or subsidies are provided to fund 33% of the cost of investment in privately rented properties, where tenants are low income (assuming landlords provide the remaining funding), this would cost £0.2bn a year to 2030⁸⁴.
- If 20% of owner occupied able to pay households took up low interest loans, this could require Government funding of an additional £0.2bn a year to 2035⁸⁵.
- If all private landlords took up a Landlord's Energy Saving Allowance of £3k per property, this would cost £0.2bn per year⁸⁶. This assumes that those landlords taking up grants would not be eligible for this tax incentive.

In Sections 8-11 we describe these programmes and the estimation of the numbers in more detail.

How does the potential cost of the Buildings Energy Infrastructure Programme compare to other national infrastructure projects?

The 2016 Autumn Statement announced total spending on housing, economic infrastructure and R&D of £170bn over the next five years⁸⁷. This is equivalent to £34bn a year.

(2014), it assumes that work is undertaken up to a £10k cap. This is also in line with the principle outlined in Section 4 above, that certain exclusions from the Target may be granted on the basis of cost.

⁸¹ We define households as low income where their income is below 60% of median income after housing costs and energy costs are taken into account. See Section 9.1.

⁸² See Section 9

⁸³ See Section 10

⁸⁴ See Section 10

⁸⁵ See Section 8

⁸⁶ See Section 10

⁸⁷ HMT (2016), *Autumn Statement*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/571559/autumn_statement_2016_web.pdf

How does the potential cost of the Buildings Energy Infrastructure Programme compare to current spending on energy efficiency programmes?

The total public funding required is around £1.7bn per year. The Government has stated its intention to reduce spending under ECO from the current level of £0.8bn a year to £0.6bn⁸⁸, therefore annual funding would need to more than double. This puts funding broadly in line with the level seen as recently as 2012 and 2013⁸⁹.

5.2 The benefits of the Buildings Energy Infrastructure Programme

Why are these costs worth incurring?

Two recent reports have illustrated the substantial benefits of major home energy performance investment programmes with similar ambition.

Cambridge Econometrics/Verco 2014⁹⁰

This research models the macroeconomic benefits that would be associated with improving the energy performance of the whole UK housing stock to EPC C by 2035, by introducing grants for low income homes and interest free loans to able to pay homes. This found that the programme would deliver:

- 0.6% relative GDP improvement by 2030, increasing annual GDP in that year by £13.9bn;
- £1.27 in tax revenues per £1 of Government investment, through increased economic activity, such that the scheme has paid for itself by 2024, and generates net revenue for Government thereafter;
- increased employment peaking at 108,000 net jobs per year, mostly in the service and construction sectors. These jobs would be spread across every region and constituency of the UK;
- £8.61 billion per annum in total energy bill savings across the housing stock, once comfort taking⁹¹ has been accounted for; and
- a 26% reduction in imports of natural gas by 2030.

UK Energy Research Centre (2017)⁹²

This research assesses the remaining potential for cost-effective improvements in domestic energy efficiency and low carbon heating in the existing housing

⁸⁸ DECC (2016) *ECO Impact Assessment*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/586260/ECO_Help_to_Heat_Government_response_FINAL_26_Jan_17.pdf

⁸⁹ Over £1.5bn was invested annually under Government subsidised programmes in 2012 and 2013. ACE (2016), *Home energy efficiency 2010-2020*, <http://www.energybillrevolution.org/wp-content/uploads/2016/05/ACE-briefing-note-2016-03-Home-energy-efficiency-delivery-2010-to-2020.pdf>

⁹⁰ Cambridge Econometrics and Verco (2014), *Building the Future: The economic and fiscal impacts of making homes energy efficient*, <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>. Note all figures in this report are in 2013 prices.

⁹¹ Comfort taking of 40% was assumed for low income households.

⁹² UKERC (2017) *Unlocking Britain's First Fuel*, <http://www.ukerc.ac.uk/news/unlocking-britains-first-fuel.html>

stock to 2035. The level of investment assessed as cost-effective is approximately the same as that required to achieve EPC C in all homes. Using data collected by the CCC and following HM Treasury's guidance on policy appraisal, it finds the following:

- Cost-effective investments in domestic energy efficiency and low carbon heating to 2035 could save around one quarter of the energy currently used in UK homes. The magnitude of this saving in energy terms is significant: equivalent to the output of six nuclear power stations the size of Hinkley Point C and equivalent to an average saving of £270 per year on household energy bills at today's prices.
- Net of the total capital investment required (£85.2bn), this saving would deliver net present benefits of £7.5bn to the UK, even before the value of improved householders' health has been included.
- Annual full-time equivalent employees required to deliver the energy efficiency and low carbon heat programmes could average 95,000 to 2035.

What assumptions were made in these reports? How do the assumptions made differ?

While each of these reports demonstrates a major benefit associated with continued investment in domestic energy performance, the approach and the detailed assumptions differ (Figure 7).

Figure 7 Summary of assumptions

	Type of modelling	Key assumptions
Cambridge Econometrics/Verco (2014)	Macroeconomic assessment aimed at quantifying the wider economic benefits of an investment programme	<ul style="list-style-type: none"> ■ All homes reach EPC C by 2035, and low income homes reach EPC C by 2025. ■ Grants are provided to low income homes and all able to pay homes receive low interest loans. ■ Assumptions in line with Government guidance made on comfort taking and in-use factors.
UKERC (2017)	Microeconomic assessment, following HM Treasury guidelines	<ul style="list-style-type: none"> ■ All measures that are cost-effective across the housing stock as a whole to 2035 are undertaken.

Source: *Frontier Economics*

Why could an energy efficiency programme lead to GDP growth?

There are three main routes.

- Energy efficiency allows the economy to do more with the same amount of resources. Therefore, it allows the economy to be more productive.
- Reduced fuel imports as a result of energy efficiency can improve the balance of trade.

- The practical work required to upgrade the building stock creates economic activity in itself. This can create employment directly, and also has knock-on impacts, as those with new jobs have more to spend in local economies. Because improvements would need to be made to 71% of all homes, the economic activity and the associated jobs would be dispersed across the country.

6 ACTION 4: RAISE QUALITY

Action		Timing
Implement world-leading quality and safety standards.		2017-2018
Key elements		
<ul style="list-style-type: none"> ■ Use the framework being created under the <i>Each Home Counts</i> review and related programmes to ensure good quality workmanship and customer satisfaction standards are achieved under the Buildings Energy Infrastructure Programme. ■ Require all contractors delivering retrofit which involves Programme support to have gained the new home Quality Mark. ■ Adopt and guarantee world-leading safety standards 		
Next steps for industry	Next steps for Government	
<ul style="list-style-type: none"> ■ Provide full support to the process of implementation and help to publicise the new Quality Mark to customers. 	<ul style="list-style-type: none"> ■ Coordinate with the implementation of the <i>Each Home Counts</i> review so that its recommendations are fully embedded across the sector. 	

This section describes the rationale for including new quality standards and how they should be introduced.

Why is it so important to raise standards and quality in conjunction with driving energy performance of buildings?

Overcoming barriers associated with consumer trust in energy efficiency investments is a crucial early step in the Buildings Energy Infrastructure Programme.

Safety is crucial. A better coordinated, professional infrastructure approach to retrofitting homes is an opportunity to ensure that world-leading safety standards, including fire safety standards, are adopted and applied at the heart of the Programme. Resources should be made available by Government to ensure the Infrastructure Agency or Unit and other relevant Government and Local Government agencies are able to assist in rigorously implementing and policing those standards.

Quality is also extremely important. The *Each Home Counts* review acknowledged that there are many examples of good practice in the energy efficiency and renewables sector, but that at present, the quality of installation can vary. For example, of those ECO measures that were inspected in the first period (2013-2015), 10% did not meet necessary installation standards and

required additional work⁹³. There is also evidence that relationships with installers are sometimes characterised by low levels of trust.⁹⁴

If customers do not have the information that allows them to choose reliable contractors, they may take no action at all. Therefore, even a small number of poor quality installations is bad for the whole supply chain, and will impact on the likelihood and cost of new energy performance targets being met.

This problem can be overcome by setting clear and fully enforceable quality standards. Without this as an early step, many of the other parts of the Programme are unlikely to have the desired impact and the aim of stimulating the market to take up energy efficiency and low carbon heat measures will not be achieved.

How will implementation of the *Each Home Counts* review lead to higher quality workmanship?

The *Each Home Counts* review has recommended that a Quality Mark for the domestic retrofit sector is established⁹⁵. The Quality Mark will apply to assessors, designers and installers and would be underpinned by an approved certification body and meet the requirements of three key elements of the Quality Mark: a Code of Conduct; defined Codes of Practice and standards; and a Consumer Charter. As recommended by the review, it will also be important to ensure that the Quality Mark is a prerequisite for obtaining any Government funding for energy performance improvement measures⁹⁶.

Requiring the Quality Mark for retrofit works carried out under the auspices of the Buildings Energy Infrastructure Programme has the potential to transform the market for energy retrofit and drive up the overall quality, safety and resilience of the housing stock.

High quality outcomes require property-specific advice, high quality design and specification of retrofit projects, as well as best practice installation and aftercare. The design function in particular ensures that the choice of products and systems for the retrofit project are suitable for the building and properly address all relevant standards, including Building Regulations, the Publicly Available Specification (PAS) 2030, Competent Person Schemes and the Microgeneration Certification Scheme.

In particular, the *Each Home Counts* review recommends that the design and specification process must give careful attention to ensure the choice of products

⁹³ “Ofgem’s Technical Monitoring Report showed that 6.9% of the almost 1.5 million measures installed during the first ECO period between January 2013 and March 2015 were inspected. Of these, 9.9% did not meet the necessary installation standards” Bonfield (2016), *Each Home Counts*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/578749/Each_Home_Counts_December_2016_.pdf

⁹⁴ Consumer Focus (2012), *What’s in it for me? Using the benefits of energy efficiency to overcome the barriers*

⁹⁵ Bonfield (2016), *Each Home Counts*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/578749/Each_Home_Counts_December_2016_.pdf

⁹⁶ It should be noted that the new *Each Homes Counts* quality framework has the potential to apply to all installations, including those completed outside of Government programmes.

and systems suitable for the building, and their subsequent installation and maintenance, takes account of:

- its features and construction details;
- the management of moisture, provision of adequate ventilation for good internal air quality and minimised condensation risk;
- minimised thermal bridging and bypass;
- strong resilience against rainwater ingress, reduced risk of summer overheating, and maintenance provision to ensure installed systems' integrity;
- protection against fire risk; and
- resilience to flood risk.

Applying and enforcing the recommendations of the *Each Home Counts* review will be essential. This will include working with industry to establish the Quality Mark, and ensuring that all work which involves Buildings Energy Infrastructure Programme support is carried out by Quality Marked contractors.

By ensuring high quality standards which focus attention on good design and installation, the Programme can, for example, help to prevent overheating in homes in the summer, as well as keeping occupants warm enough in winter. Certain energy efficiency measures can be used to help to limit the amount of unwanted heat in homes, e.g. roof insulation and low energy lighting. By setting targets for the housing stock in terms of the energy performance of the whole house, heating, ventilation and cooling strategies can be better linked. Better quality standards can also help to prevent the risk of damp and mould that can be associated with poor refurbishment work. The Programme should therefore ensure standards are met that lead to better health outcomes for all homes treated.

What resources and critical activities are now required to ensure the full and effective implementation of the *Each Home Counts* review?

It is now essential that the recommendations are fully implemented, including setting up the physical architecture such as the Data Warehouse and governance arrangements that are needed to track progress on quality issues and to take prompt and firm action if poor performance is discovered.

As the industry and the Government have a shared responsibility in securing a high quality, safe, low carbon, energy efficient building stock, it is important that both are involved in implementing the new quality assurance framework. Industry is currently contributing to the implementation working groups and has already improved technical standards, such as strengthening the PAS 2030.

It is also essential for the Government to continue to have a leadership role, driving forward progress and ensuring the recommendations do not stall, at least until the new framework is in place and running smoothly.

7 ACTION 5: STRENGTHEN MINIMUM ENERGY PERFORMANCE STANDARDS

Action		Timing
Strengthen mandatory minimum energy performance standards for buildings in the run up to meeting the overall EPC C target in 2035.		Signal the intention in 2018
Key elements		
<ul style="list-style-type: none"> Introduce a mandatory minimum standard of EPC Band E (or equivalent) for owner occupied homes from 2025, required at both point of sale and major renovation. This aims to drive demand for home energy performance improvements in the worst performing homes. Raise existing mandatory minimum energy performance standards in the private rented sector from EPC Band E to Band D (or equivalent) from 2025. Subject to progress towards the Target, review the need for further mandatory minimum energy performance standards over time and set out an indicative timetable for decision points in 2018. 		
Next steps for industry	Next steps for Government	
<ul style="list-style-type: none"> Raise consumer awareness of the Target (and timing of regulation) to drive energy efficiency improvement projects in good time and in the most cost-effective way. 	<ul style="list-style-type: none"> Develop a framework for deciding on any further mandatory minimum standards. 	

The questions and answers in this section describe the rationale for minimum performance standards and how they could be implemented.

7.1 Rationale for minimum energy performance standards

What are minimum energy performance standards?

Minimum energy performance standards specify the minimum energy performance level that buildings would need to achieve between now and 2035. Such mandatory standards already exist in the private rented sector: from 2018 landlords will not be allowed to grant new tenancies where properties have an EPC level of F or G.

As noted in Section 4, clearly defined exemptions or modified standards could be allowed for certain types of buildings and in certain situations.

What are we recommending?

Government should state its intention now that it will introduce minimum energy performance standards from 2025 in the owner occupied sector, and that it will tighten minimum standards in the private rented sector.

- **Owner occupied sector.** A minimum standard equivalent to EPC E should be introduced from 2025 at point of sale or major renovation to underpin demand for home energy performance improvements towards the 2035 Target⁹⁷.
- **Private rented sector.** Minimum standards in the domestic sector should be raised from current levels to EPC D (or equivalent) from 2025, to support progress towards England's 2030 fuel poverty target, and the proposed Target for 2035.
- **Social housing sector.** Energy performance has long been highest in social housing, and it continues to improve faster than in the other sectors. However, an appropriate minimum performance standard should be considered from 2025 if the sector is not on track to meet the Target.

Subsequent evaluation of progress should inform any decision to introduce more rigorous standards over time.

It will be important to give householders and the supply chain enough time to react to regulation by clearly communicating its possible timetable. This would ensure that companies have enough time to invest and grow and that householders can plan their improvements at a time that is most convenient and cost-effective.

Why are we recommending minimum energy performance standards as part of the Programme?

Minimum energy performance standards should be introduced where barriers to undertaking sufficient levels of energy performance investment remain.

- **Multiple barriers hold down the rate of investment action, even when other incentives are in place.** Regulation is likely to be required to overcome the complex set of barriers and market failures in the energy efficiency market (Section 2). Even when quality standards, financial incentives and measures to overcome credit barriers are introduced (as we propose in Section 6 below), barriers relating to interest, i.e. the extent to which consumers want to think about energy, and perceived hassle are likely to remain. These barriers may be significant. In the owner occupier sector for example, DECC (now BEIS) research found that most consumers who had not replaced a heating system to date, had never considered doing so⁹⁸. Evidence from how heating systems are marketed suggests that consumers see them as functional rather than aspirational items⁹⁹. There are additional barriers in the private rental

⁹⁷ The Scottish Government has announced its intention to consult on minimum standards for owner occupiers. Scottish Government (2017), *Energy Strategy – Scotland's Energy Efficiency Programme* <http://www.gov.scot/Resource/0051/00513248.pdf> ,

⁹⁸ DECC (2013) *Homeowners' Willingness to Take up More Efficient Heating Systems*

⁹⁹ For example, kitchens are marketed using phrases such as "buy the kitchen of your dreams, " or "be inspired. This is in contrast to boiler marketing which tends to focus on finance, safety and efficiency.

sector, in the form of the split incentive between tenants and landlords, which is why mandatory minimum standards have been introduced in this sector first. Without minimum standards to drive demand, the rate of retrofit driven by the other elements of the Buildings Energy Infrastructure Programme is unlikely to meet the proposed 2035 Target.

- **The very worst energy performance poses a health hazard to households.** An EPC level of F or G (a low energy efficiency rating) is a signifier that a home poses an ‘excess cold hazard’ to its occupants under the Housing Health & Safety Rating System. Local Authorities have powers to enforce remedial action against this hazard in the rented sector. An EPC rating of E is therefore an appropriate level for mandatory minimum standards in any housing tenure as an initial step to protect health.
- **Reliance on financial incentives alone for the whole market would have a large cost to the Exchequer.** Providing financial incentives of sufficient strength to gain the necessary level of take up across the majority of households could be prohibitively expensive. In addition, given most of the benefits of home energy performance investments accrue directly to the householders, it would also not necessarily be fair.
- **Regulation has been very effective.** For example, CCC research has found that improved appliance, lighting and boiler efficiency driven through product standards has substantially reduced energy consumption. These standards contributed significantly to the energy and bill savings realised since 2004¹⁰⁰.

7.2 Implementation

How could minimum energy performance standards be introduced and enforced?

Our recommendation is that minimum standards apply at the point of sale, rental or major refurbishment.

- Meeting a mandatory minimum EPC level could be reconsidered as a condition of granting planning permission for renovations, extensions and conversions, with Local Authorities taking responsibility for enforcement. This policy has the advantage of incentivising measures to be undertaken at a time when work that substantially alters the building is being undertaken anyway. A number of countries already apply standards at the point of renovation (e.g. Denmark, Sweden and Germany)¹⁰¹, and the UK specifies minimum performance standards for replacement windows and boilers. However, planning permission is not required for many types of

Frontier Economics (2015), *Overcoming barriers to smarter heat solutions in UK homes*; <http://www.eti.co.uk/programmes/smart-systems-heat>

¹⁰⁰ CCC (2017) *Energy Prices and Bills*, <https://www.theccc.org.uk/publication/energy-prices-and-bills-report-2017/>

¹⁰¹ CCC (2016), Annex 3 - Best practice in residential energy efficiency policy: A review of international experience, <https://www.theccc.org.uk/wp-content/uploads/2016/10/Annex-3-Best-practice-in-residential-energy-efficiency-policy-Committee-on-Climate-Change-October-2016.pdf>

renovations and so only a small proportion of homes would be impacted¹⁰².

- Building on the signal provided by a Stamp Duty-based incentive for home energy improvement (Section 8), a requirement could be introduced that buildings meet a minimum EPC level at point of sale. There is international precedent for this type of scheme: for example, in France, the sale of F and G-rated homes will be outlawed from 2025, with further tightening of standards planned in later years¹⁰³.

We appreciate that focussing on sales, rentals and renovations means that the transition to more efficient homes will be slower, since only a subset of homes will be affected each year (see Section 8). However, measures that would widen the pool of homes affected (such as regulating to link minimum standards to mortgage refinancing or buildings insurance) risk distorting existing competitive markets, and do not align as well with key trigger points.

If minimum energy performance standards were mandated for all buildings, would householders be expected to pay for the work needed to meet the requirement?

Minimum standards would bring costs to building owners, who would be required to incur costs to make improvements at point of sale, rental or major renovation. The level of these costs would vary by property, but recent research found that 80% of F rated properties could reach EPC E at a cost of less than £1k¹⁰⁴.

Standards should be introduced with care, ensuring that householders are given plenty of time to meet them, the supply chain is fit for purpose, and that financial offers and measures to overcome any credit constraints are in place.

In Sections 8-10 below, we describe potential measures to help households pay for improvements across the market.

¹⁰² The number of extensions and conversions in England has been estimated at 200,000 per year; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/8388/2077834.pdf

¹⁰³ CCC (2016), Annex 3 - Best practice in residential energy efficiency policy: A review of international experience, <https://www.theccc.org.uk/wp-content/uploads/2016/10/Annex-3-Best-practice-in-residential-energy-efficiency-policy-Committee-on-Climate-Change-October-2016.pdf>

¹⁰⁴ Parity Projects (2014) *Analysis for WWF and UK-GBC: achieving minimum EPC standards in housing*, <http://www.ukgbc.org/sites/default/files/Minimum%20EPC%20standards%20report%20WWF%20%26%20UK-GBC.pdf>

8 ACTION 6: SUPPORT THE ABLE TO PAY MARKET

Action		Timing
Initiate a programme of incentives and demonstrations for able to pay households, the largest consumer sector.		2017-2019
Key elements		
<ul style="list-style-type: none"> ■ In 2017 announce the introduction of a revenue neutral Stamp Duty incentive that varies according to the energy performance of the property to trigger action by sellers or buyers around the point of sale. ■ Launch a coordinated demonstration programme – capable of being scaled up nationally as results come in – to test the most effective ways of deploying public infrastructure funds to leverage private investment into the sector. 		
Next steps for industry	Next steps for Government	
<ul style="list-style-type: none"> ■ Fully support the demonstration programme, for example, by funding market campaigns that raise awareness of the Stamp Duty incentive and low cost finance demonstrations, including incentives linked to on site performance. 	<ul style="list-style-type: none"> ■ Initiate a time-limited (2-3 years) demonstration programme of low cost finance, income tax relief and partial upfront grants for energy efficiency improvements. ■ Announce the introduction of the Stamp Duty incentive. 	

The questions and answers in this section define the able to pay market, describe the proposal for a Stamp Duty incentive and outline the low cost finance demonstration programme.

8.1 The able to pay market

What is the recommended strategy for delivering improvements in this part of the market?

Existing Government policy on home energy performance will be focussing mainly on low income households from 2018 to 2022. This means there is a particularly significant policy gap in relation to the “able to pay” sector.

As set out in Section 7, we recommend that minimum energy performance standards should apply to the able to pay sector from 2025. In addition, the following policies should be introduced to support the achievement of the 2035 target.

- **Stamp Duty incentive.** Tax incentives can link property values more closely to building energy performance, and provide a financial incentive for improvements. We recommend that a tax incentive is introduced via Stamp Duty. Linking Stamp Duty to the energy performance of homes could be an

effective way of driving take-up of home energy improvements, providing an incentive to invest at a key trigger point for renovations¹⁰⁵.

- **Low cost finance, income tax relief or partial upfront grants.** The provision of low or zero cost loans, income tax relief or partial upfront grants could help enable investment in the able to pay market. We recommend a nationally coordinated demonstration programme to develop propositions for low interest and equity loans and partial upfront grants that could be rolled out nationally¹⁰⁶.

How is the able to pay market defined, and how many households fall into this group?

We define able to pay households as owner occupiers above low income.

- We focus on owner occupiers for this set of policies and set out separate policies for the private and social rented sectors in Section 10. 63% of households in the UK are owner occupiers¹⁰⁷.
- We define households as low income where their income is below 60% of median income after housing costs and energy costs are taken into account. 13% of owner occupiers are low income in the UK, based on this definition¹⁰⁸.

Applying this definition, we estimate that 55% of households or 15.0m households across the UK fall into the able to pay group.¹⁰⁹

What proportion of homes in this group has an EPC rating lower than C?

An estimated 75% of homes in the able to pay owner occupier sector fall below EPC C in the UK¹¹⁰. This equates to 11.2 million households.

How does the recommended Target compare to current national targets?

There are currently no national targets focussed specifically on the able to pay market. However, the UK's legally binding carbon budgets apply across all sectors and include significant action on domestic and non-domestic energy efficiency and low carbon heat. Analysis by ACE and RAP suggests that the recommended level of investment in housing energy improvements to meet the fifth carbon budget at least cost is approximately the same as is required for all homes to achieve an EPC rating of C¹¹¹.

¹⁰⁵ This is covered in more detail in Section 8.2 below.

¹⁰⁶ This is covered in more detail in Section 8.3 below.

¹⁰⁷ DCLG (2016), *Live tables on household projections*, <https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections>

¹⁰⁸ Based on E3G analysis (Annex A)

¹⁰⁹ "Able to pay" is a commonly used term for those households falling outside the low income definition. In reality, the ability to pay for energy efficiency measures may vary greatly across this group.

¹¹⁰ Based on E3G analysis (Annex A)

¹¹¹ ACE & RAP (2016), *Buildings and the 5th Carbon Budget*, <http://www.ukace.org/wp-content/uploads/2016/09/ACE-RAP-report-2016-10-Buildings-and-the-5th-Carbon-Budget.pdf>

Why are able to pay households included in the Programme? Why do they also need support?

As described in Section 3, there are a range of market failures and behavioural barriers in relation to take-up of energy performance improvements¹¹². Action is required to overcome these barriers and increase take-up and investment in the able to pay sector.

Why introduce additional incentives for the able to pay market alongside regulation (minimum energy performance standards)?

As well as acting as demand drivers in their own right, these incentives also support minimum energy performance standards, helping to provide consumers with a means to pay.

8.2 Stamp Duty

What would the Stamp Duty incentive involve?

The rate of Stamp Duty paid would vary not just by the price paid for the home, but also by its energy performance. It would be designed to be revenue neutral.

Currently, Stamp Duty is applied on properties worth over £125k in England, Wales and Northern Ireland. A similar Land and Buildings Transaction Tax applies in Scotland on properties over £145k. At present the marginal rate varies (from 2%-12%) according to the value of the home being purchased¹¹³.

Stamp Duty could be varied in line with the EPC rating, however, as others have pointed out, this may lead to distortions around the boundaries of the bands¹¹⁴. An alternative would be to base the banding on the SAP score, which underpins the EPC. For example, a proposal has been modelled by the Sustainable Energy Association that includes an adjustment on Stamp Duty of 1% for every 1 point improvement in the SAP score¹¹⁵.

Would vendors have to undertake renovations before sale so that their property would qualify for a reduced rate?

The reduction could be applied if vendors undertake work before the sale. However, buyers could also be given a year after purchase to complete any improvement works, to gain a new EPC (or other energy assessment), and to claim a discount on Stamp Duty. This would allow improvements to be

¹¹² These barriers and market failures are already well recognised by Government. For example, DECC (2012), Energy Efficiency Strategy, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65602/6927-energy-efficiency-strategy--the-energy-efficiency.pdf

¹¹³ HMRC, <https://www.gov.uk/stamp-duty-land-tax>

¹¹⁴ For example, UK GBC (2013), *Retrofit Incentives*, http://www.ukgbc.org/sites/default/files/130705%2520Retrofit%2520Incentives%2520Task%2520Group%2520-%2520Report%2520FINAL_1.pdf

¹¹⁵ SEA (2017), Energy Efficiency – A Policy Pathway Addressing the Able to Pay Sector, http://www.sustainableenergyassociation.com/wp-content/uploads/2017/03/SEA_Energy-Efficiency-A-Policy-Pathway_Final.pdf

undertaken at the same time as general renovations that often take place shortly after purchase.

Why would variable Stamp Duty lead to improvements in energy performance?

Vendors would have an incentive to undertake improvements as a home that attracts lower Stamp Duty would be a more attractive proposition for buyers. Those purchasing homes would have the incentive to undertake improvements so they could claim a rebate. Since Stamp Duty is a very visible and well-known tax, this reform could also promote a cultural shift towards seeing good energy performance as adding value to the home.

How many dwellings/households would potentially be impacted by this policy?

Figure 8 sets out the transactions in the residential sector that occurred in 2015-16. Based on these figures, buyers or sellers of 0.9m homes would have faced an incentive to invest in 2015/16. Assuming the average number of transactions remains constant to 2035, around 16 million homes could be incentivised by 2035.

Figure 8 Transactions of dwellings in the residential sector

	England	Scotland	Wales	Northern Ireland	UK
Total transactions in 2015-16 (000s)	1,144	105	55	25	1,329
Estimated number below EPC C (000s)	818	66	41	18	943

Source: Frontier Economics, based on HMRC¹¹⁶ Proportions below EPC C are based on E3G analysis (see Annex A).

What level of reduction/rebate should be offered?

Relatively small adjustments in Stamp Duty rates could provide a strong signal. A number of options have been considered in previous reports (Figure 9).

¹¹⁶ HMRC (2017), *Monthly property transactions completed in the UK with value of £40,000 or above*, <https://www.gov.uk/government/statistics/monthly-property-transactions-completed-in-the-uk-with-value-40000-or-above>

Figure 9 Stamp duty variations and estimated impacts

Study	Stamp duty variation	Estimated impact on retrofits
Dresner and Ekins (2004) ¹¹⁷	1% of the value of the property.	Over 27% of households would be reached within 10 years. It will bring forward measures in those households by two years on average.
UK Green Building Council (2013) ¹¹⁸	0.5%-2% penalty per SAP point, depending on the value of the home, with a maximum rebate to £10k.	Between 0.1m-0.3m additional retrofits.
Policy Exchange (2016) ¹¹⁹	An adjustment in the Stamp Duty liability of 1% per SAP point.	Not modelled.
Sustainable Energy Association (2017) ¹²⁰	For each point of improvement in the SAP score the stamp duty was adjusted by 1%.	The policy could impact on 1.2m households in the UK, but a specific estimate on the number of retrofits was not provided.

Source: Frontier Economics

Would the policy be simple to implement?

We recognise that this measure would introduce some additional complexity into the tax system, and that administration costs will be incurred. However, costs will be lower than for the introduction of a new tax, given procedures are already in place to collect Stamp Duty.

How could the policy be designed to be revenue neutral?

The policy could be designed to be revenue neutral by increasing the Stamp Duty paid on inefficient properties and decreasing the level paid on efficient properties. As the efficiency of the housing stock improves, the rates would need to be adjusted to maintain revenue neutrality.

When should the Stamp Duty policy come into effect?

The Stamp Duty policy should be announced at the Autumn Budget in 2017 and introduced as soon as it is practical thereafter.

¹¹⁷ Dresner and Ekins (2004), *Economic Instruments for a Socially Neutral National Home Energy Efficiency Programme*, <http://www.psi.org.uk/docs/rdp/rdp18-dresner-ekins-energy.pdf>

¹¹⁸ UK GBC (2013), *Retrofit Incentives*, http://www.ukgbc.org/sites/default/files/130705%2520Retrofit%2520Incentives%2520Task%2520Group%2520-%2520Report%2520FINAL_1.pdf

¹¹⁹ Policy Exchange (2016), *Efficient Energy Policy*, <https://policyexchange.org.uk/wp-content/uploads/2016/09/efficient-energy-policy.pdf>

¹²⁰ SEA (2017), *Energy Efficiency – A Policy Pathway Addressing the Able to Pay Sector*, http://www.sustainableenergyassociation.com/wp-content/uploads/2017/03/SEA_Energy-Efficiency-A-Policy-Pathway_Final.pdf

While ideally the policy would be trialled before its introduction, piloting this measure would entail challenges associated with housing market distortions, political acceptability and trial design. These challenges would have to be overcome in the design of any pilot.

Why prioritise Stamp Duty, rather than, for example, Council Tax incentives?

We recommend prioritising a Stamp Duty incentive as moving home is often a key trigger point for undertaking home improvements. By focussing on a time when sellers and buyers may be undertaking home improvements anyway, variable Stamp Duty could provide a financial incentive for households to undertake improvements at a time when measures are likely to be easier and cheaper to implement (for example, if scaffolding is already in place to facilitate general renovations, this would reduce the incremental cost of some efficiency measures).

An effective tax incentive could also be given through Council Tax, for example by providing a rebate on rates, when evidence of improvement is shown. This would have the advantage of providing an incentive to all households, rather than just those that are buying or selling homes. However, it would be difficult to do this in a revenue neutral way, as increasing Council Tax for those who do not undertake improvements may be politically difficult.

8.3 Low cost finance

What do we mean by 'low cost finance' and how does this link to improving the energy performance of buildings?

Investments in energy performance entail upfront costs, which are either fully or partially paid back over time through lower energy bills. Many households will need to access finance to allow them to cover the upfront costs. Providing households with access to low cost finance will be important, both as a potential demand driver and also ahead of the introduction of minimum standards.

A wide range of measures to provide low cost finance have been suggested by other organisations. These include subsidised low or zero interest loans, subsidised equity loans (secured against homes), or subsidised ISAs¹²¹.

Why are new financial offers needed for this market?

Able to pay households may find it difficult to access credit to fund upfront costs associated with energy performance upgrades at present.

Unsecured loans are often perceived as expensive and fixed administration costs mean that mortgage providers tend not to offer secured loans for amounts below £10k, which is more than the finance required for many upgrades (the report assumes £4.6k will be required per home on average). Therefore, if homeowners

¹²¹ For example, the 'Help to Improve' ISA. Bright Blue (2016), *Better Homes*, <https://static1.squarespace.com/static/56d9b584f8baf31e9937bd55/t/57c93ae8579fb35c8fbc026e/1472805610761/Better+Homes+-+incentivising+home+energy+improvements+%28FINAL%29.pdf>

do not raise the finance at the time of taking out the initial mortgage, or as part of a larger re-financing, this avenue may not be available.

What form could financial incentives take?

Two types of low cost loans are currently being demonstrated in Scotland¹²².

- **Low interest or zero % finance.** 0% finance (or other levels of subsidised finance) is used in many retail industries to attract consumers. In the energy efficiency context, this would involve a Government subsidy to the market interest rate so that consumers face a nominal rate of 0% (or a significantly reduced rate) for an unsecured loan.
- **Equity Loans.** Equity loans are secured against homes, there are no ongoing repayments and the loan will generally only be repaid when the property is sold. Approval from the existing mortgage provider would generally be required. In the Scottish trial of subsidised equity loans, repayments are based on the minimum of the equity share of the property's sale price, or the value of the original amount borrowed at a 2.5% APR¹²³.

Have similar financial incentives been implemented in other countries?

Yes, for example, in Germany, the KfW's low cost loans for energy efficiency measures have been highly successful, resulting in the retrofitting of 9 million homes by 2010, and €9 in loans and private investment for every €1 of subsidy. General refurbishments were also covered under some of these loans, which may have helped their take-up¹²⁴.

How much would it cost Government to subsidise low interest loans?

Low cost loans generally involve costs to Government, for example through an explicit subsidy to the rate of the loan or through the cost Government takes on by underwriting the risks of the loans.

For example, if the market interest rate is 6%, the cost to the Government of taking this down to 0% for a £4.6k loan over 10 years would be £1.4k¹²⁵. Assuming 20% of able to pay households took up the option of the low interest finance, this would require a Government investment of around £179m per year between 2018-2035¹²⁶.

¹²² The Scottish Government has recently announced £30m of additional funding to help up to 8,000 homes with interest free loans and cash back. <https://news.gov.scot/news/gbp-30-million-announced-to-help-makes-homes-warmer>

¹²³ <http://www.energysavingtrust.org.uk/scotland/grants-loans/heeps/heeps-equity-loan-scheme>

¹²⁴ Schröder, Ekins, Power, Zulauf, and Lowe (2011), *The KfW experience in the reduction of energy use in and CO2 emissions from buildings: operation, impacts and lessons for the UK*, <http://sticerd.lse.ac.uk/dps/case/cp/KfWFullReport.pdf>

¹²⁵ This assumes the Government pays the difference between a 0% and 6% loan each year. The net present value of this difference is calculated using the social discount rate of 3.5%.

¹²⁶ This assumes that private finance covers the residual between the Government subsidy to the loan and the total cost of the measure. The number of able to pay households is based on Figure 7. If take up was higher than 20%, the costs would rise proportionately.

Are there options for low cost loans that do not impose costs on Government?

An alternative to a subsidy from Government is to impose the costs on other parties, for example putting additional costs on lenders through increased regulation, or by increasing the risk that the primary creditor will not get paid. For example, Local Authorities can use land charges to fund energy efficiency projects. These charges are recovered from the homeowners when the property is sold. However, these approaches may be less transparent than directly funding the subsidies for loans from Government.

What would the Government's role be in terms of funding and facilitating the provision of such offers?

The Government subsidy could be competitively tendered to allocate delivery to those finance providers that can provide the cheapest lending to households.

Why not subsidise the measures directly instead?

Providing low interest or zero-interest loans would be cheaper to the Exchequer than fully subsidising the energy efficiency measures for able to pay customers. Where access to low cost credit is the main barrier, then subsidised finance may be a useful solution.

We note that if upfront costs, rather than the long run benefits, are the issue, then providing an upfront partial subsidy may be more effective than subsidising a loan.

When these schemes are tested, they should therefore be compared to a control where a direct subsidy, equivalent to the costs of subsidising a loan, is paid upfront (on the condition that the householder funds the remaining cost themselves). Partial upfront subsidies have been offered before and have been popular. For example, the Green Deal Home Improvement Fund included a subsidy for 67% of the costs of solid wall insulation (up to a cap of £4k)¹²⁷.

Why is this approach different to the Green Deal?

Low interest loans are different to the Green Deal in four important aspects.

- The interest rates offered to consumers would be lower (because they would be subsidised by Government).
- The detailed design of the scheme would be demonstrated, and then refined, at a larger scale. This would greatly reduce the risk of lower take-up¹²⁸.
- The Golden Rule would not be applied. This was a rule which stated that expected savings made from the home improvement must be at least as great as the cost of implementing the improvement. Applying this rule meant that

¹²⁷ <https://www.gov.uk/government/news/green-deal-home-improvement-fund-details-announced>

¹²⁸ Analysis of problems encountered on the Green Deal suggests simple loans and finance offers are likely to be preferred by consumers. Green Deal finance, which linked the amount of credit available directly to the estimated energy savings the household should realise, was suited to some, but complicated in practice. Also, as the loan repayments took the form of a charge on the electricity bill, it was also difficult for consumers to see immediate, tangible cost savings.

some more costly measures did not qualify for full financing under the Green Deal.

- The types of financial offers for consumers would be less complex and therefore simpler to understand.

Should the Government also take action on Green Mortgages?

At present, mortgage providers in the UK tend not to factor the energy performance of homes into their affordability calculations¹²⁹. Green mortgages are more widespread in the USA, where these have been backed by a government insurance scheme,¹³⁰ although take-up has still been relatively low¹³¹.

Industry initiatives are investigating the opportunities around green mortgages in the UK. For example, the LENDERS¹³² project (involving mortgage providers and construction industry experts) investigated how the energy performance of UK homes could be factored into the value of mortgages that providers are willing to offer. While these industry initiatives show promise, and should be encouraged by Government, they should not be seen as a substitute for a large-scale infrastructure programme.

8.4 Income tax relief

Why are we recommending trialling an income tax relief scheme?

Income tax relief could provide an effective and highly visible incentive for energy efficiency investments in homes. There is precedent for this kind of scheme - for example, the *Cycle to Work* scheme and Childcare Vouchers.

In 2016 there were over 180,000 individuals enrolled in the *Cycle to Work* scheme¹³³. Over 50,000 employers, employing 15 million people offer Childcare Vouchers and there are more than 600,000 users of these vouchers¹³⁴.

How would the scheme work?

The income tax relief scheme could work in a similar way to the current *Cycle to Work* scheme. A payment for the energy efficiency upgrade work (up to a capped level) could be made by the employer to the contractor (potentially through an intermediary¹³⁵), while the employee would pay back this sum in monthly

¹²⁹ UCL (2015), *The role of energy bill modelling in mortgage affordability calculations*, <http://www.ukgbc.org/sites/default/files/The%20role%20of%20energy%20bill%20modelling%20in%20mortgage%20affordability%20calculations.pdf>

¹³⁰ https://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/eem/energy-r

¹³¹ Palmer, Walls and Gerarden (2012), *Borrowing to save energy: an assessment of energy-efficiency financing program*, <http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-Rpt-Palmeretal%20EEFinancing.pdf>

¹³² LENDERS (2017) Core Report, <http://www.ukgbc.org/resources/publication/lenders-core-report>

¹³³ Institute for Employment Studies (2016), *Impact of the Cycle to Work Scheme*, <http://www.employment-studies.co.uk/system/files/resources/files/509.pdf>

¹³⁴ Childcare Vouchers Providers Association, <http://www.cvpa.org.uk>

¹³⁵ The intermediary would act as a platform, having the primary role of connecting potential customers with contractors. It would reduce search costs by providing a list of approved contractors based on useful criteria such as geographical proximity or fee range. It would also provide additional information about the scheme

instalments through a salary sacrifice¹³⁶. This would allow the employer to save on National Insurance contributions, and allows the employee to save on both National Insurance and income tax contributions.

Could the scheme be designed so that it didn't favour those on the higher income tax band?

Yes, the Childcare Voucher scheme provides an example of an income tax relief scheme that is designed to avoid a regressive outcome. Under this scheme, basic rate tax payers are entitled to apply for a higher level of salary sacrifice than those on the higher income tax rate.

Why would employers want to get involved?

Employers would have an incentive to join the scheme as they would save on National Insurance contributions for workers (up to 14% of the salary sacrifice made by their employees). In addition, employer participation could improve employee relationships as well as have a positive impact on the reputation of the company.

What would be the cost to Government of this scheme?

The cost to Government would depend on the capped level of energy efficiency upgrade work eligible for tax relief. For example, to provide relief of £1.4k,¹³⁷ the cap for a basic rate tax payer would be set at £4.3k, and the cap for a higher rate tax payer would be set at £3.2k.

8.5 Overview of the demonstration programme

What should be the focus of the demonstration programme?

A demonstration programme should be established to test (and grow as appropriate) the following:

- **Low cost finance.**
 - **The impact of 0% (and low interest) finance and equity loans once national quality level measures are in place.** Among the factors driving the success of the German KfW were the expert advice and installation standards associated with the scheme, as well as an overall supportive policy environment for energy efficiency¹³⁸. Therefore, the demonstration

and could create 'packages', bundling different types of services together. This could simplify the process for many employees, increasing take-up. While the use of intermediaries would not be mandatory, they could reduce administrative costs for both the employee and the employer, as well as speed up the process.

¹³⁶ A salary sacrifice represents an arrangement between the employer and the employee to reduce the monthly salary from the sum stipulated in the contract for an agreed-upon period of time, in return for a non-cash benefit.

¹³⁷ In line with the estimated cost of subsidising a low interest loan of £4.6k from a 6% market rate to a 0% rate (Section 8.3).

¹³⁸ Mark Schröder, Paul Ekins, Anne Power, Monika Zulauf, Robert Lowe (2011), *The KfW experience in the reduction of energy use in and co2 emissions from buildings: operation, impacts and lessons for the UK*, <http://sticerd.lse.ac.uk/dps/case/cp/KfWFullReport.pdf>

programme should be fully launched once the quality standards are in place and seen to be working.

- **The impact of allowing wider measures to be covered in the loans (such as aesthetic or structural improvements).** If other barriers, such as lack of interest in energy efficiency dominate, then measures that tie in other types of home improvement may be most useful. For example, some KfW schemes allowed the subsidised loans to be put towards general improvements in the home as well as towards energy efficiency investments. There is also an example in Scotland, where the Home Energy Efficiency Programme (HEEP) offers a loan of up to £40,000. 55% of the loan must be spent on improving energy efficiency while the remaining 45% can be used for any exterior repairs or improvements (excluding new bathrooms and kitchens)¹³⁹. Instead of providing 0% loans for energy efficiency alone, Government could provide a smaller subsidy to the interest rate¹⁴⁰, but widen the set of measures to which it could be applied¹⁴¹. In demonstrating this type of loan, the benefits in terms of take up should be weighed against the additional costs to Government of the loans¹⁴².
- **The potential for providing more favourable rates where projects include monitoring and/or verification of on site energy performance.** The energy performance of buildings is often predicted using modelling – e.g. ‘RdSAP’ calculations are used in the domestic sector to produce EPCs. However, actual energy performance can differ significantly from the predicted performance for many reasons. While EPCs are very useful benchmarks, and they (or any similar successor) will remain essential for setting national targets, the demonstration programme could test the potential for using the financial incentives to encourage suppliers to measure and verify the actual energy performance of buildings.
- **Measures to minimise delivery costs.** The administrative costs of smaller loans can be quite high in proportion to the value of the loan. For example, the administration fee for the Scottish HEEP Equity Loan scheme is £671¹⁴³, and the applicant may face additional costs associated with property valuation and solicitor fees. It will therefore be important to trial different designs for the administration of loans to try to minimise these costs.
- **Income tax relief.** Income tax relief could also be demonstrated alongside the low cost loans. As described in Section 8.4, this could take a similar form to the current *Cycle to Work* scheme.

¹³⁹ SEA(2017) *Energy Efficiency- A Policy Pathway*, http://www.sustainableenergyassociation.com/wp-content/uploads/2017/03/SEA_Energy-Efficiency-A-Policy-Pathway_Final.pdf

¹⁴⁰ In practice, this could be set up so that only the finance used for energy improvements is subsidised, while the finance for general renovations is provided at a market rate. Under this system, overall, the average rate of the loan would be lower than the market rate.

¹⁴¹ Though there may be state aid issues.

¹⁴² It may even be that the cost is lowered because, even if the loan value is higher, it may be possible to apply a lower level of discount on the loan rate applied.

¹⁴³ <http://www.energysavingtrust.org.uk/scotland/grants-loans/heeps/heeps-equity-loan-scheme>

- **Partial upfront grants.** As described above, the provision of low cost loans and income tax relief should be compared to an upfront subsidy of equivalent cost to Government.

Why are we recommending a demonstration programme instead of pilots?

While pilots tend to be controlled, time-limited experiments, demonstration schemes are designed to run for longer periods and to evolve with experience. A demonstration programme could start small, but could be designed to be easily scaled up and if successful could become a part of the delivery landscape. The demonstration programme should also take place within the wider framework of a long term infrastructure programme. The current demonstration schemes in Scotland are a good example.

8.6 Overall costs

What level of public and private investment would be needed to bring all homes in the able to pay market up to EPC C?

The total public and private costs of bringing homes in the able to pay market up to EPC C would be £3.0bn per year on average out to 2035, assuming an average cost per home of £4.6k.

If we assume that 20% of the able to pay market take up low cost loans, and the rest of the market receives no subsidy, the cost to Government would be £179m per year from 2018-2035. Under these assumptions, Government would meet 6% of the costs of improvements for this sector (Figure 10)¹⁴⁴.

Figure 10 Estimated annual costs in the able to pay sector

	Annual investment (2018-2035)
Estimated total cost of bringing homes in the able to pay market to EPC C (£m)	3,006
Estimated cost to Government (£m)	179
Estimated private investment (£m)	2,827
Proportion publicly funded	6%

Source: *Frontier Economics*

¹⁴⁴ This is based on the assumption that the Stamp Duty incentive is revenue neutral.

9 ACTION 7: DESIGN GRANT SCHEMES FOR LOW INCOME HOUSEHOLDS

Action		Timing
Design new grant support schemes to enable low income households to meet the Target (based on EPC Band C) by 2030.		2019-2020
Key elements		
<ul style="list-style-type: none"> Allocate the lion's share of the national Buildings Energy Infrastructure Programme budget to pay directly for home energy performance improvements in low income households, enabling these households to meet the Target by 2030. Using that funding, in 2022 launch a new coordinated programme of locally-led, area-based schemes for low income households in every Local Authority area. Alongside this, continue to provide a nationwide referrals network and programme offering grant support to low income households who miss out on the area-based programme (based on a continuation of the ECO, and/or funded directly by the Buildings Energy Infrastructure Programme from 2022). This should have at least the same budget as the current ECO. 		
Next steps for industry	Next steps for Government	
<ul style="list-style-type: none"> Fully support the design process, for example, by developing proposals and contributing to consultations. 	<ul style="list-style-type: none"> Initiate a Review of how to deliver the future grant schemes for low income homes no later than 2019 to allow plenty of time to implement the findings by 2022. 	

The questions and answers in this section cover the definition of the low income part of the market and the recommended approach.

9.1 The low income sector

How is the low income and fuel poor part of the market defined?

We define households as low income where their income is below 60% of median income after housing costs and energy costs are taken into account. Based on this definition, 26% of households are low income in the UK (Figure 11).

Figure 11 Estimated proportion of households that are low income by country

	England	Scotland	Wales	Northern Ireland	UK average
Proportion of households with low income	26%	26%	23%	26%	26%

Source: E3G analysis (Annex A)

Figure 12 shows the proportion of low income households by tenure in the UK.

Figure 12 Income and tenure in the UK

	Owner occupier	Private rented	Social rented
Proportion of households with low income by tenure	13%	45%	49%

Source: E3G analysis (Annex A)

Fuel poor households are defined differently.

- In Scotland, Wales and Northern Ireland households are considered to be fuel poor if they would need to spend more than 10% of their income to maintain a satisfactory heating regime. In 2014 the estimated rate of fuel poverty in Scotland was 35% or around 845,000 households¹⁴⁵. In Wales, the corresponding figure is 23% (291,000 households)¹⁴⁶. In Northern Ireland, the rate is 42% (around 300,000 households)¹⁴⁷.
- In England, a household is considered to be fuel poor if it has higher than typical energy costs and would be left with a disposable income after housing costs below the poverty line if it spent the required money to meet those costs. In 2014, the number of households in fuel poverty in England was estimated at 2.38 million, representing 11% of all English households¹⁴⁸.

The next version of the ECO is expected to focus exclusively on targeting the fuel poor. Since it is expected to contribute to 1 million home energy improvements, it is also clear that its scope will not be sufficient to support all fuel poor households.

Why should low income households in general be directly supported?

Energy costs are a particular burden for low income households since they form a high proportion of their monthly outgoings. Providing direct support to them to reduce their bills through energy performance investment is therefore a priority.

¹⁴⁵ Scottish Government, <http://www.gov.scot/Topics/Statistics/Browse/Housing-Regeneration/TrendFuelPoverty>

¹⁴⁶ Welsh Government, <http://gov.wales/topics/environmentcountryside/energy/fuelpoverty/?lang=en>

¹⁴⁷ <https://www.communities-ni.gov.uk/topics/housing/fuel-poverty>

¹⁴⁸ DECC (2016) *Fuel Poverty Statistics*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/557400/Annual_Fuel_Poverty_Statistics_Report_2016_-_revised_30.09.2016.pdf

In addition, low income households are those that are least able to meet the upfront costs of energy improvements.

Moreover, by including all low income households in the group eligible for direct grant funding, it may be possible to reduce search costs for the supply chain as the problem of identifying such households should be minimised (i.e. the definition is less narrow/technical and therefore the amount of evidence needed to prove eligibility should be lower).

9.2 Recommended approach

What approach is being proposed for this sector?

We recommend allocating a portion of the national Buildings Energy Infrastructure Programme budget to cover the cost of making the home energy improvements required to allow low income households in the UK to meet the Target, e.g. EPC Band C by 2030. Government already has a target in England to ensure that as many fuel poor homes as is reasonably practicable achieve a minimum energy performance rating of Band C, by 2030, with a number of interim steps. The inclusion of all low income households in the UK would build on that target.

In 2022, a new coordinated programme of locally-led, area-based schemes for low income households in every Local Authority area should be launched. Alongside this, a nationwide referrals network and programme offering grant support to low income households who miss out on the area-based programme should be in place. The national and the local schemes would complement each other and would be underpinned and guided by the same quality standards and targets.

By operating both schemes in tandem at different scales, certain risks and issues associated with each would be mitigated. For example, in a purely locally-led delivery model, there is a risk of patchy implementation, as it is to be expected that Local Authorities will differ in their capacity to run or procure such schemes. The addition of the nationally delivered scheme, which includes a referrals process, would mitigate this. Equally, a purely nationally-led model would not on its own deliver to all the households that most need support.

How should these schemes be funded and delivered?

During the period to 2022, while the current ECO is still in place, we recommend taking the opportunity to review in detail what form the successor grant/subsidy programme should take, ensuring there is no policy hiatus in the meantime.

The review should give serious consideration to a continuation of the ECO from 2022, as well as options for new delivery models including:

- **Buildings Energy Infrastructure Programme funded model.** This would see the Programme funding both the locally-led, area-based schemes for low income households in every Local Authority and the new nationwide referrals programme providing grant support for low income households who miss out on the area-based programme.

- **Hybrid scheme.** This would see energy supply companies continuing with national delivery (at similar expenditure levels to now), but complemented by the new coordinated UK-wide, Buildings Energy Infrastructure Programme funded, programme of locally-led schemes.

There will just be 8 years from 2022 to meet the Target in low income homes, so the new scheme should make the best use of existing delivery capacity. With this in mind, it is envisaged that schemes in Scotland, Wales and Northern Ireland (HEEPS, Arbed and Nest, and Affordable Warmth), continue and each devolved Government gain a pro rata share of any additional funding from the Exchequer to deploy in this way.

What principles and evidence should guide the design and the development of options?

The design and development process should draw on lessons both from promising schemes (such as Affordable Warmth in Northern Ireland, Arbed and Nest in Wales and the HEEPS area-based programmes in Scotland) as well as those that have been less successful in terms of take-up (such as the Green Deal Communities Fund in England).

The delivery model options for providing grants/subsidies to low income households should also consider how to:

- **Maximise benefits and minimise costs.**
 - There are examples of the benefits from energy performance investments at the local level being maximised by aligning schemes with initiatives to promote local training and employment, and looking for opportunities to embed community cohesion, positive neighbourhood perception and other related benefits¹⁴⁹.
 - Competitive tendering for delivery partners should be used, where possible, to keep costs down. For example, in options with a strong element of local delivery, Local Authorities would need to bid to the Buildings Energy Infrastructure Programme Agency or Unit to access funds (see Section 3). Strict standards would be applied to ensure the push for lower costs is not at the expense of quality. This is particularly important where the supply chain is less mature – for example, where schemes are focussed on solid wall insulation. Tender schemes should also be designed to enable innovation and local tailoring, by focussing the assessments on outcomes rather than means.
 - Costs should be minimised by providing advice centrally, where appropriate. For example, costs of the Green Deal Communities Fund could have been reduced if multiple Local Authorities had not sought separate legal advice regarding State Aid rules.
 - Projects that roll out low carbon heating and energy efficiency measures together should be prioritised.

¹⁴⁹ CAG and Centre for Sustainable Energy (2015), *Closer to Home*, <http://www.ukace.org/wp-content/uploads/2015/06/150528-Closer-to-home-final-report.pdf>

- Schemes should be sized to maximise the potential for economies of scale, which may often involve Combined Authority coordination. The opportunity for exploiting these economies will vary with the housing stock and geographical scope.
- **Use the best information to identify low income households.** Where future delivery options have a greater focus on locally-led delivery, local knowledge should be combined with data analysis to identify the households most in need, to enable staged delivery over the period to 2030. For example, in the Northern Ireland Affordable Warmth Scheme, census, weather data and oil prices were used very effectively to identify those in the most severe fuel poverty¹⁵⁰. This is particularly useful in identifying households in need who do not claim benefits. In addition, best practice and the data architecture for identifying households in the current delivery landscape should be retained and built upon. Moreover, the new data-matching opportunities created by the Digital Economy Act should be used to improve targeting, tailor advice and establish effective referral routes.
- **Make it easy for all eligible households to access the schemes.**
 - The future scheme should be designed with a focus on household needs, building in flexibility on how the measures are applied, for example, minimising paperwork¹⁵¹, and, importantly, ensuring all eligible households are actually able to access the support.
 - Learning from the experience in Scotland, local partners should be encouraged to carry out an awareness campaign through local press/radio, schools, community groups, Local Authority departments, and events. Marketing should include past examples of success and be endorsed by a trusted and impartial organisation¹⁵².
- **Design the scheme with the characteristics of the supply chain in mind.** The supply chain will vary in its ability to respond to new schemes quickly. For example, the Green Deal Communities Fund gave Local Authorities less than a year to complete interventions. This was particularly challenging, given the focus on solid wall insulation, and the seasonal restrictions on when this could be installed.

What do we mean by a 'hybrid' scheme?

Energy supplier obligations such as the ECO (and CERT and CESP before it), have become well-established delivery models for energy efficiency measures. Although they have some disadvantages (see below) they are regarded as being reasonably efficient and, under the current ECO, reasonably well targeted.

A new hybrid approach would mean a continuation of the ECO (or a similar form of supplier obligation), alongside the programme of nationally coordinated, but locally delivered area-based schemes. In short, the hybrid option would be

¹⁵⁰ Brenda Boardman, personal communication.

¹⁵¹ The need to sign lengthy contracts put some households off in the Northern Ireland Affordable Warmth Scheme. Brenda Boardman, personal communication.

¹⁵² CAG (2010), *Energising Communities*, Scotland's Consumer Council.

funded by a combination of Buildings Energy Infrastructure Programme funds, plus consumer funding via a levy on energy bills.

Why are we in favour of a review period, with ECO continuing in its current (new) form until 2022?

Time is needed to fully develop options. It would be unwise to strongly advocate one model before that work is done. A sufficient transition period is also needed to provide time for delivery agents to prepare and build up capacity, and also for new scheme rules to be developed and an efficient procurement framework to be set up.

ECO is already in place and is the main mechanism for delivering home energy performance improvements to low income households in the period to 2022. This allows progress on the housing stock to continue during the review period, during which there should be a focus on learning from current schemes (particularly in Scotland and also from energy suppliers) and capacity building through demonstration programmes, sharing of experience and training.

Why is the achievement of the Target for low income households recommended for 2030, five years earlier than the Target for the Programme as a whole?

There are three reasons that this group should meet the Target earlier:

- Low income households stand to gain the most from an intervention to improve their homes' energy performance, in terms of the proportional impact on their disposable income.
- The roll out of measures to this group to a shorter timeline will allow the supply chain to phase its capacity for meeting the Target across the much larger able to pay group.
- England has a target for all fuel poor households to reach an EPC Band C by 2030.

Approximately how many dwellings in this group have an EPC which is lower than Band C?

67% of low income households in the UK live in a home with an EPC below C (Figure 13).

Figure 13 Proportion of low income households living in homes with an EPC below C

	England	Scotland	Wales	Northern Ireland	UK average
Proportion of low income households in homes below EPC C	68%	62%	73%	66%	67%

Source: E3G analysis (Annex A)

93% of fuel poor households in England have an EPC below C (Figure 14).

Figure 14 EPC level of fuel poor households in England

% of fuel poor households at Band C or above	7%
% of fuel poor households at Band D or above	59%
% of fuel poor households at Band E or above	88%

Source: DECC¹⁵³

What would be the cost of grants to improve homes in the low income sector?

Figure 15 shows the public cost of grant funding to low income households would be £1.1bn a year, based on our proposals for support across different tenures (assuming all funding is from the Programme, rather than via a levy on bills). Further details on the schemes in the private and social rented sectors are provided in Section 10.

Figure 15 Grants to low income households by tenure

	Grant funding as a proportion of investment cost	Annual (£m)
Owner occupiers	100%	645
Private rented sector	33%	221
Social rented sector	50%	235 ¹⁵⁴
Total		1,100

Source: Frontier Economics

How would local delivery agents access funding from 2022?

The Buildings Energy Infrastructure Programme Agency or Unit would be responsible for holding funds ring-fenced by the Government for the Programme, and distributing the appropriate amounts to delivery leads. Before accessing the funding, bidders would have to demonstrate, at least, the following:

- knowledge of the low income and fuel poor homes in their area, and a plan for accessing them;
- a delivery model for bringing these homes up to EPC C (which may include partnerships with local organisations and charities, or private contractors); and
- an assessment of the costs associated with bringing each of these homes up to EPC C, and why the figure is considered appropriate/cost-effective.

The Buildings Energy Infrastructure Programme Agency or Unit could benchmark the cost estimates, and only grant the funding where cost-effective approaches

¹⁵³ DECC (2016) *Help to Heat, ECO final impact assessment*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/586266/ECO_Transition_Final_Stage_IA_For_Publication.pdf

¹⁵⁴ While the grant-funding for social housing is available to all households living in social housing, the cost shown in this table relates only to low income households.

are put forward, encouraging re-application by any organisations whose bids do not meet this test the first time.

10 ACTION 8: RAISE ENERGY PERFORMANCE IN THE RENTED SECTOR

Action		Timing
Raise energy performance in the rented sector to meet the Target (e.g. EPC C) by 2030, and introduce incentives for private and social landlords.		2020
Key elements		
<ul style="list-style-type: none"> Reintroduce the Landlord’s Energy Saving Allowance to provide an incentive for landlords in the private rented sector. Allow private landlords to access grants for low income tenants that partially cover the investment cost. Allow social landlords to access grants for their tenants that partially cover the investment cost. As described in Section 7, minimum energy performance standards should be raised from current levels to EPC D from 2025 in the private rented sector, and a minimum standard should also be considered for the social rented sector from 2025, if the sector is not on track to meet the 2035 Target. 		
Next steps for industry	Next steps for Government	
<ul style="list-style-type: none"> Work with landlords to understand how to make the best use of the financial support on offer. 	<ul style="list-style-type: none"> Announce the intention to raise existing mandatory minimum energy performance standards from EPC E to EPC D from 2025 in the private rented sector. 	

The questions and answers in this section cover the rationale for acting in this sector, and the measures being proposed.

10.1 The private rented sector

How many households fall into the private rented sector group, and what proportion of households in the UK does this represent?

The private rental sector is a significant and growing part of the market. These households make up around 19% of households (5.2 million), up from 10% in 2002.¹⁵⁵

¹⁵⁵ The latest data is for 2014. DLG (2017) *Table 102: by tenure, Great Britain (historical series)*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/519497/LT_102.xls

How many private rented homes have an energy performance rating lower than EPC C?

An estimated 73% of homes in the private rented sector fall below EPC C in the UK (Figure 16).

Figure 16 Homes below EPC C in the private rented sector

	England	Scotland	Wales	Northern Ireland	UK
Proportion of private rented below EPC C	74%	66%	77%	72%	73%

Source: E3G analysis (Annex A)

What proportion of private rented households could also be in the fuel poor/low income group?

An estimated 45% of households in the private rented sector fall into the low income group (Figure 17).

Figure 17 Households with low incomes in the private rented sector

	England	Scotland	Wales	Northern Ireland	UK average
Proportion of households in the private rented sector with low incomes	45%	44%	45%	47%	45%

Source: E3G analysis (Annex A)

The fuel poor are also likely to be disproportionately represented in the private rented sector. For example, in England, the level of fuel poverty is highest in the private rented sector, with an estimated 20% of households in fuel poverty, compared to 11% across all tenures¹⁵⁶.

10.2 The social housing sector

How many households fall into the social housing group?

An estimated 18% of households, or 4.8 million households, rent from social landlords in the UK¹⁵⁷.

Approximately how many homes in this group have an energy performance rating lower than Band C?

An estimated 52% of homes in the socially rented sector fall below EPC C in the UK (Figure 18)

¹⁵⁶ DECC (2016) *Fuel Poverty Statistics*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/557400/Annual_Fuel_Poverty_Statistics_Report_2016_-_revised_30.09.2016.pdf

¹⁵⁷ E3G analysis (Annex A)

Figure 18 Homes below EPC C in the socially rented sector

	England	Scotland	Wales	Northern Ireland	UK average
Proportion of socially rented households in homes below EPC C	52%	50%	61%	50%	52%

Source: E3G analysis (Annex A)

What proportion of households in socially rented accommodation are in the low income group?

49% of households in socially rented accommodation fall into the low income group¹⁵⁸.

Figure 19 Households with low incomes in the socially rented sector

	England	Scotland	Wales	Northern Ireland	UK average
Proportion of households in the socially rented sector with low incomes	49%	49%	49%	52%	49%

Source: E3G analysis (Annex A)

Many of those homes in the social housing sector have benefitted from previous investment programmes, such as programmes aimed at meeting the Decent Homes Standard. Consequently, only 18% of the fuel poor in England are in social housing¹⁵⁹. However, there are 0.5m households in social housing that live in homes with an EPC of E or below¹⁶⁰.

10.3 Proposed approach

Why is action required in the rented sector?

The Government has stated its commitment to driving up safety and general standards in the rented sector, and to delivering a fairer deal for renters¹⁶¹.

It is difficult for households living in the rented sector to invest in energy performance upgrades. While tenants usually pay energy bills (and therefore can benefit from upgrades), it is generally landlords who have responsibility for

¹⁵⁸ Based on DWP data adjusted for energy costs using E3G analysis of data from the 2013 English Housing Survey. DWP data is from DWP (2017), *Households Below Average Income*, <https://www.gov.uk/government/statistics/households-below-average-income-199495-to-201516>

¹⁵⁹ DECC (2016) *ECO Impact Assessment*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/586260/ECO_Help_to_Heat_Government_response_FINAL_26_Jan_17.pdf

¹⁶⁰ DECC (2016) *ECO Impact Assessment*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/586260/ECO_Help_to_Heat_Government_response_FINAL_26_Jan_17.pdf

¹⁶¹ DCLG (2017), *Fixing our broken housing market*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/590464/Fixing_our_broken_housing_market_-_print_ready_version.pdf

making improvements to the home. Even where tenants can make the investments, they often move too frequently for their investments to payback.

Why should minimum standards be strengthened in the private rented sector?

In 2011, the Government introduced minimum standards for private rented properties in England and Wales, with cross party support. From April 2018, landlords cannot grant a new tenancy for a property with an EPC rating below E; and from April 2020, landlords cannot let any property with an EPC rating below E. Local Authorities will enforce these new standards, and fines of up to £5k can be charged to landlords if they fail to comply.

These standards will address the very worst performing properties. However, they will have a limited impact on the wider sector. Only around 400,000 homes in the private rented sector are estimated to have an EPC below E, and therefore this policy is likely to result in improvements to less than 10% of the private rented sector in England and Wales¹⁶².

Therefore, while the current regulation is an essential first step, we recommend that it is tightened and that minimum standards for EPC D are introduced from 2025 (with clearly defined exemptions where appropriate¹⁶³).

In the social rented sector, we recommend that minimum standards are introduced if, in 2020, it is judged that progress is not at a sufficient rate or scale to meet the Target. However, as progress on improving social housing is already ahead of other sectors, minimum standards may not be necessary.

Why is 2030 proposed for achieving the Target in the rented sector, five years earlier than the date for delivering the Target across all sectors?

It makes sense for the Target to be applied to rented properties by 2030 (before owner occupied properties) because of:

- the lower than average quality and energy performance of privately rented housing¹⁶⁴, and the lower than average levels of income, and higher than average level of fuel poverty of tenants;
- the lower than average levels of income in the social rented sector; and
- fuel poverty targets, which require all fuel poor households to achieve an EPC of C by 2030 in England;

Meeting the Target by 2030 would give landlords enough time and flexibility to improve properties at the same time as planned refurbishment works.

¹⁶² DECC (2015), *Final Stage Impact Assessment for the Private Rented Sector Regulations*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/401382/150202_PRS_Final_Stage_Revised_For_Publication.pdf

¹⁶³ As noted in Section 7, to ensure the target is feasible, exemptions may be required for certain buildings and in certain situations, for example those that are listed, or where the characteristics of the building means it is inappropriate to raise the energy performance all the way to the level of the national target.

¹⁶⁴ "Standards in the private rented sector remain below those in the social and owner occupied sectors, but are improving: just 28% of homes are now non-decent compared to 37% in 2010". DCLG (2017), *Fixing our broken housing market*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/590464/Fixing_our_broken_housing_market_-_print_ready_version.pdf

What financial assistance would private landlords be able to access to assist them in meeting requirements?

Our cost calculations assume that private landlords making improvements to the homes of low income tenants should be eligible for grants covering 33% of the cost of investments (up to a cap) to improve building energy performance. This could be introduced to help landlords cover the costs of meeting the required standards, subject to an analysis of any distortionary impact that this would have on the market for private rented homes. The annual cost of this measure to Government would be £221m.

There is an argument for providing no subsidy to private landlords, given the installation of measures should increase the value of their properties¹⁶⁵, especially once a variable Stamp Duty incentive has been introduced. However, under the ECO, private landlords can receive funding for 100% of eligible measures, where they have low income tenants. Therefore, instead of moving immediately to a 0% subsidy, we suggest moving to a 33% subsidy. The precise level of the subsidy to private landlords should be investigated as part of the detailed development of the Buildings Energy Infrastructure Programme.

We also recommend that the Landlord's Energy Savings Allowance is reintroduced for private landlords that have not taken up the grant (i.e. it would be focussed on landlords with able to pay tenants). This could provide tax relief on investments of up to £3k per property (though the exact level should be the subject of further research) Assuming a marginal tax rate of 40%, and a cap of £3k on tax relief this would mean a maximum cost to the Exchequer of £1.2k per property¹⁶⁶. The annual cost of this to Government would be £208m¹⁶⁷.

What financial assistance would social landlords be able to access to assist them in meeting requirements?

We recommend that social landlords can access grant funding to cover 50% of the costs of measures required to bring their properties up to EPC C by 2030.

The ability of social landlords to achieve economies of scale and lever in other funding sources means that it is likely to be optimal to provide only partial funding through this mechanism. We have suggested that funding is provided at 50% but, again, this is something that will need to be investigated further as part of the detailed work associated with developing and implementing the Buildings Energy Infrastructure Programme.

Assuming all social landlords take up this incentive, this would have an annual cost to Government of £477m to 2030.

¹⁶⁵ For example, DECC (2013), *An investigation of the effect of EPC ratings on house prices*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/207196/20130613_-_Hedonic_Pricing_study_-_DECC_template_2_.pdf

¹⁶⁶ Under this proposal, the value of the tax break to landlords would be at a similar level to the value of subsidy offered to able to pay households through low cost loans (described in Section 8.3).

¹⁶⁷ This assumes all private landlords with properties currently below EPC C (excluding those who take up the grant), take up the full allowance to 2035,

11 ACTION 9: RAISE THE ENERGY PERFORMANCE OF NEW DWELLINGS

Action		Timing
Raise the energy performance of new dwellings to 'Zero Carbon'		2018-19
Key elements		
<ul style="list-style-type: none"> ▪ Tighten Building Regulations to require that all new dwellings being constructed¹⁶⁸ from 2020 are 'Zero Carbon', using the analysis and definition previously proposed by the Zero Carbon Hub¹⁶⁹. 		
Next steps for industry	Next steps for Government	
<ul style="list-style-type: none"> ▪ Continue to invest in demonstrator projects and innovative techniques for achieving the standard. 	<ul style="list-style-type: none"> ▪ Take forward Zero Carbon Homes policy and begin to implement new, tougher standards¹⁷⁰. 	

Why is it important to continue raising standards for new dwellings?

Applying strict standards of energy performance when designing and constructing properties is much more cost-effective than paying to retrofit buildings to a similar standard at a later date. Practically, it may also not be possible to achieve the same level of energy and carbon savings through retrofitting that could have been realised by good design at the outset. The opportunity to raise standards in new homes is significant: 275,000 or more new homes will be required per year to keep up with population growth, although rates of completion are currently lower than this¹⁷¹.

However, since the implementation of the planned Zero Carbon Homes standard was halted in 2015, progress has stalled in this area. If energy performance standards stay below the levels that the former Zero Carbon Hub found to be technically feasible and cost-effective, then consumers will be buying properties with running costs and carbon emissions that are higher than the efficient level.

¹⁶⁸ The definition of "being constructed" will need to be settled e.g. whether it means the date planning permission is granted, or some other point.

¹⁶⁹ <http://www.zerocarbonhub.org/>

¹⁷⁰ A successful amendment was tabled at Report stage of the Housing and Planning Bill 2015-16 in the House of Lords. This would require the Government to put in place regulations for a carbon compliance standard for new homes by 2018. The amendment was removed in the House of Commons and replaced by a commitment to a review the energy performance requirements under Building Regulations. <http://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN06678#fullreport>

¹⁷¹ DCLG (2017), *Fixing our broken housing market*, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/590464/Fixing_our_broken_housing_market_-_print_ready_version.pdf

What are we recommending?

The following measures should be introduced.

- The fabric efficiency measures from the Zero Carbon Homes standard should be introduced first in the next update to Building Regulations expected in 2018-19. These were estimated to have a cost of around £2k in 2014, with the potential to be paid back in bill savings in less than 10 years¹⁷².
- The ‘carbon compliance’ elements of the Zero Carbon Homes standard should be implemented, once cost-effectiveness tests are confirmed. This part of the standard would usually involve installing renewable energy measures in new dwellings. Costs are likely to have fallen further since the Zero Carbon Hub’s cost analysis in 2014¹⁷³.
- ‘Allowable Solutions’¹⁷⁴, or a similar alternative, should also be considered as part of the package, as a cost-effective means to bring net regulated emissions down to zero.
- Commercially viable testing, measurement and assessment techniques should be developed to enable the industry to demonstrate, from a specified date, that at least 90% of all new homes meet or perform better than the designed energy or carbon performance standard¹⁷⁵.
- The potential to tighten these standards over time should be considered.

Could raising energy performance standards for new homes make them more expensive?

Raising standards would usually add to the upfront costs of homes, while significantly reducing ongoing energy costs. For example, analysis by the Zero Carbon Hub, published in 2014, suggested that the additional cost of implementing the full Zero Carbon Standard in a typical three-bedroom semi-detached house would be less than £5k. Given the reduction in the costs of technologies such as solar PV since this work was carried out, these costs could be significantly lower today¹⁷⁶.

¹⁷² CCC (2016), *Next steps for UK heat policy*, <https://www.theccc.org.uk/wp-content/uploads/2016/10/Next-steps-for-UK-heat-policy-Committee-on-Climate-Change-October-2016.pdf>

¹⁷³ Zero Carbon Hub (2011), *Carbon Compliance*, http://www.zerocarbonhub.org/sites/default/files/resources/reports/Carbon_Compliance-Setting_an_Appropriate_Limit-Findings_and_Recommendations.pdf and http://www.zerocarbonhub.org/sites/default/files/resources/reports/Cost_Analysis-Meeting_the_Zero_Carbon_Standard.pdf

¹⁷⁴ Through Allowable Solutions, the carbon emissions associated with new buildings which cannot be cost-effectively off-set onsite, are tackled through nearby or remote measures. Zero Carbon Hub, <http://www.zerocarbonhub.org/zero-carbon-policy/allowable-solutions>

¹⁷⁵ Zero Carbon Hub (2014), *Closing the gap between design & as-built performance* http://www.zerocarbonhub.org/sites/default/files/resources/reports/Design_vs_As_Built_Performance_Gap_End_of_Term_Report_0.pdf

¹⁷⁶ Zero Carbon Hub (2014), *Cost Analysis: Meeting the Zero Carbon Standard*. http://www.zerocarbonhub.org/sites/default/files/resources/reports/Cost_Analysis-Meeting_the_Zero_Carbon_Standard.pdf

Why are we recommending regulating to raise standards from 2020 rather than a later date?

Industry was preparing to implement a Zero Carbon standard for New Homes in 2016, and should therefore be in a position to mobilise to implement these standards from 2020.

12 CONCLUSIONS AND NEXT STEPS

12.1 Conclusions

Investment in energy efficiency has delivered major benefits to date. Between 2004 and 2015, gas consumption for a typical dual fuel household fell 37% and electricity consumption fell 18%¹⁷⁷, despite a significant increase in the number of household appliances¹⁷⁸. This saving was driven substantially by energy efficiency improvements – including in lighting, appliances, heating systems and insulation¹⁷⁹.

Further action is now needed to bring additional benefits and realise the UK's energy saving potential. Cost-effective investments in domestic energy efficiency and low carbon heating to 2035 could save around one quarter of the energy currently used in UK homes, and deliver net benefits of £7.5bn to the UK¹⁸⁰. Fuel bills could be on average £270 lower per household per year at today's prices.

To realise such benefits, this report recommends the development of a Buildings Energy Infrastructure Programme aimed at driving energy performance improvements in the building stock, and outlines an Infrastructure Action Plan to deliver it in the domestic sector. The Programme would include the following key elements.

- Public investment for low income households and households in the socially rented sector constituting:
 - fully subsidised retrofits for bringing the homes of low income owner occupiers up to an energy performance rating of C;
 - 50% capital subsidy for council housing and housing association homes to upgrade properties to a C rating; and
 - 33% capital subsidy for achieving a C rating for private landlords' properties that are let to low income tenants.
- Measures aimed at driving investment and providing support for 'able to pay' households to 2035, including:
 - a revenue neutral adjustment to the Stamp Duty regime, which rewards a higher energy performance through a lower charge compared with a home with lower energy performance;
 - a demonstration of subsidised loan interest rates, partial upfront grants and income tax relief for home owners seeking to retrofit to a C rating; and

¹⁷⁷ CCC (2017) *Energy Prices and Bills – impacts of meeting carbon budgets*, <https://www.theccc.org.uk/wp-content/uploads/2017/03/Energy-Prices-and-Bills-Committee-on-Climate-Change-March-2017.pdf>.

¹⁷⁸ BEIS (2017) *Energy Consumption in the UK*, Table 3.12 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/586245/ECUK_Tables_2016.xlsx

¹⁷⁹ BEIS (2016) *Energy Consumption in the UK*, Tables 3.13, 3.19, 3.21-3.27

¹⁸⁰ UKERC (2017) *Unlocking Britain's First Fuel*, <http://www.ukerc.ac.uk/news/unlocking-britains-first-fuel.html>

- a reintroduction of the Landlords Energy Saving Allowance for energy upgrades of properties.
- A stable regulatory environment for encouraging investment in all homes to 2035:
 - a tightening of the minimum energy performance standard in the private rented sector from EPC E to EPC D from 2025; and
 - the introduction of a minimum energy performance standard of E from 2025 applying to owner occupied homes, at point of sale or major renovation.
- An institutional framework to ensure delivery, including a dedicated and independent Buildings Energy Infrastructure Agency or Unit to be established within a suitable existing body.

12.2 Next steps

Near term action is required to kick off the delivery of the Buildings Energy Infrastructure Programme.

The following steps will be required before 2020:

- **Action 1: Establish the Programme (pages 24-34).** Announce the Programme and establish an independent Buildings Energy Infrastructure Agency or Unit to coordinate, communicate and oversee the Programme's delivery, monitoring and evaluation. The new body should have a remit to cover heat and energy efficiency, across all buildings in the domestic and non-domestic sectors.
- **Action 2: Agree the national vision in detail and set a clear long term target for the energy performance of all homes in the UK (pages 34-39).** Set a National Energy Performance Target, in line with fuel poverty and carbon targets, based on all homes in the UK reaching a target standard (EPC Band C) by 2035.
- **Action 3: Ring fence an appropriate level of infrastructure funds for the 2018-2035 period (pages 39-44).** Allocate funding based on an assessment of the overall investment required to meet the Target and determine the appropriate balance of contributions from the public sector, industry and consumers.
- **Action 4: Raise quality and safety standards (pages 44-47).** Use the framework being created under the *Each Home Counts* review and related programmes to ensure good quality workmanship, safety and high customer satisfaction standards are achieved.
- **Action 5: Strengthen minimum energy performance standards for buildings (pages 47-51).** Introduce standards for owner occupied homes in 2025 (mandatory at point of sale or major renovation) and raise existing energy performance standards in the private rented sector. Set out an indicative timetable for when decisions about any further tightening of minimum standards will be made.

- **Action 6: Initiate a programme of incentives and demonstrations for able to pay households, the largest consumer sector (pages 51-63).** This would include a revenue neutral Stamp Duty incentive that varies according to the energy performance of the property and a coordinated demonstration programme for other incentives (including low interest loans, income tax relief and partial upfront grants).
- **Action 7: Design new grant support schemes for low income households to enable them all to meet the Target (pages 63-71).** From 2022, introduce a coordinated programme of locally-led, area-based schemes for low income households in every Local Authority, funded through the Buildings Energy Infrastructure Programme budget. Alongside this, maintain or introduce a new nationwide referrals programme providing grant support for low income households who miss out on the area-based programme for any reason. By 2020 decide whether the national scheme should continue to be delivered via an obligation on energy suppliers, or be funded directly by the Programme.
- **Action 8: Raise the energy performance of housing in the private and social rented sectors to meet the Target by 2030 and introduce incentives and support for private and social landlords (pages 71-76).** Reintroduce the Landlord's Energy Saving Allowance to provide a tax incentive for private landlords to invest. In addition, allow private landlords to access grants for low income tenants that partially cover the investment cost and allow social landlords to access grants for all of their tenants that partially cover the investment cost.
- **Action 9: Raise the energy performance of new dwellings under construction to 'Zero Carbon' (pages 72-79).** Tighten Building Regulations to require that all new dwellings being constructed from 2020 are 'Zero Carbon', using the Zero Carbon Hub's analysis and definition.

13 ANNEX A: HOUSEHOLD NUMBERS

The figures produced in this Annex were produced by E3G, based on analysis of published data. Definitions of able to pay and low income are consistent with those used elsewhere in the report.

13.1 England

Figure 20 England: All households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	10,941	745	14,330	76.40%	5.20%
Private rented	3,331	288	4,528	73.60%	6.40%
Social rented	2,022	33	3,918	51.60%	0.80%
Total	16,294	1,066	22,776	71.50%	4.70%

Source: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/595787/2015-16_Section_2_Housing_Stock_Annex_Tables.xlsx;
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/595786/2015-16_Section_1_Households_Annex_Tables.xlsx

Figure 21 England: Low income households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	1,437	120	1,882	76.40%	6.40%
Private rented	1,527	129	2,015	75.80%	6.40%
Social rented	994	19	1,914	51.90%	1.00%
Total	3,958	268	5,811	68.10%	4.60%

Source: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/595787/2015-16_Section_2_Housing_Stock_Annex_Tables.xlsx;
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/595786/2015-16_Section_1_Households_Annex_Tables.xlsx

Figure 22 England: Able to pay households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	9,504	625	12,448	76.40%	5.00%
Private rented	1,804	159	2,513	71.80%	6.30%
Social rented	1,028	14	2,004	51.30%	0.70%
Total	12,336	798	16,965	72.70%	4.70%

Source: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/595787/2015-16_Section_2_Housing_Stock_Annex_Tables.xlsx;
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/595786/2015-16_Section_1_Households_Annex_Tables.xlsx

13.2 Scotland

Figure 23 Scotland: All households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	1,019	71	1,502	67.80%	4.70%
Private rented	226	30	342	66.10%	8.80%
Social rented	297	13	589	50.40%	2.20%
Total	1,542	114	2,433	63.40%	4.70%

Source: <http://www.gov.scot/Publications/2016/12/1539/downloads>

Figure 24 Scotland: Low income households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	137	12	197	69.60%	6.00%
Private rented	106	14	152	69.90%	9.10%
Social rented	149	8	287	52.10%	2.70%
Total	393	33	636	61.90%	5.20%

Source: <http://www.gov.scot/Publications/2016/12/1539/downloads>

Figure 25 Scotland: Able to pay households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	882	59	1,305	67.60%	4.50%
Private rented	120	16	190	63.00%	8.50%
Social rented	148	5	302	48.90%	1.80%
Total	1,149	81	1,797	63.90%	4.50%

Source: <http://www.gov.scot/Publications/2016/12/1539/downloads>

13.3 Wales

Figure 26 Wales: All households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	754	51	974	77.40%	5.30%
Private rented	161	14	208	77.40%	6.90%
Social rented	137	3	224	61.20%	1.30%
Total	1,052	69	1,406	74.80%	4.90%

Source: <http://gov.wales/docs/statistics/2016/160420-dwelling-stock-estimates-2014-15-en.pdf>
<https://discover.ukdataservice.ac.uk/catalogue/?sn=7202>

Figure 27 Wales: Low income households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	99	8	128	77.40%	6.50%
Private rented	74	6	93	79.80%	7.00%
Social rented	67	2	109	61.50%	1.50%
Total	240	16	330	72.80%	5.00%

Source: <http://gov.wales/docs/statistics/2016/160420-dwelling-stock-estimates-2014-15-en.pdf>
<https://discover.ukdataservice.ac.uk/catalogue/?sn=7202>

Figure 28 Wales: Able to pay households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	655	43	846	77.40%	5.10%
Private rented	87	8	115	75.50%	6.90%
Social rented	70	1	115	60.80%	1.10%
Total	812	52	1,076	75.40%	4.90%

Source: <http://gov.wales/docs/statistics/2016/160420-dwelling-stock-estimates-2014-15-en.pdf>
<https://discover.ukdataservice.ac.uk/catalogue/?sn=7202>

13.4 Northern Ireland

Figure 29 Northern Ireland: All households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	345	29	465	74.10%	6.20%
Private rented	92	11	128	71.90%	8.30%
Social rented	60	-	120	50.10%	0.00%
Total	497	39	713	70.50%	5.50%

Source: http://www.nihe.gov.uk/nihcs_2016_preliminary_report.pdf
http://www.nihe.gov.uk/2011_house_condition_survey_annex_tables_published_october_2012_.pdf

Figure 30 Northern Ireland: Low income households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	47	5	64	73.50%	7.60%
Private rented	44	5	60	73.50%	8.30%
Social rented	31	-	62	50.00%	0.00%
Total	122	10	186	65.70%	5.30%

Source: http://www.nihe.gov.uk/nihcs_2016_preliminary_report.pdf
http://www.nihe.gov.uk/2011_house_condition_survey_annex_tables_published_october_2012_.pdf

Figure 31 Northern Ireland: Able to pay households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	297	24	401	74.20%	6.00%
Private rented	48	6	68	70.50%	8.30%
Social rented	29	-	58	50.20%	0.00%
Total	375	30	527	71.10%	5.60%

Source: http://www.nihe.gov.uk/nihcs_2016_preliminary_report.pdf
http://www.nihe.gov.uk/2011_house_condition_survey_annex_tables_published_october_2012_.pdf

13.5 United Kingdom

Figure 32 UK: All households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	12,913	896	17,245	74.90%	5.20%
Private rented	3,836	343	5,246	73.10%	6.50%
Social rented	2,513	49	4,849	51.80%	1.00%
Total	19,262	1,288	27,340	70.50%	4.70%

Source: Based on Sections 13.1-13.4

Figure 33 UK: Low income households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	1,698	145	2,268	74.90%	6.40%
Private rented	1,761	154	2,337	75.30%	6.60%
Social rented	1,236	28	2,372	52.10%	1.20%
Total	4,695	328	6,977	67.30%	4.70%

Source: Based on Sections 13.1-13.4

Figure 34 UK: Able to pay households (000s)

	Below Band C	Below Band E	Total	% below C	% below E
Owner occupied	11,215	751	14,977	74.90%	5.00%
Private rented	2,075	189	2,909	71.40%	6.50%
Social rented	1,277	21	2,477	51.50%	0.80%
Total	14,567	961	20,363	71.50%	4.70%

Source: Based on Sections 13.1-13.4

