



Department for  
Business, Energy  
& Industrial Strategy

# A FUTURE FRAMEWORK FOR HEAT IN BUILDINGS

Call for Evidence

19 March 2018

# A FUTURE FRAMEWORK FOR HEAT IN BUILDINGS

## Call for Evidence

The call for evidence can be found on the BEIS section of GOV.UK:

<https://www.gov.uk/government/consultations/a-future-framework-for-heat-in-buildings-call-for-evidence>

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Any enquiries regarding this publication should be sent to us at [buildingheat@beis.gov.uk](mailto:buildingheat@beis.gov.uk).

# Ministerial Foreword from Claire Perry

Last year I took great pride in launching the Clean Growth Strategy. The Strategy had fifty major policies and plans that will cut the cost of energy, drive economic growth, create high value jobs right across the UK, and improve our quality of life. Our Industrial Strategy built upon this, by setting out the Clean Growth Grand Challenge: the Government's ambition to lead the world in development, manufacture and use of low carbon technologies, systems and services that cost less than high carbon alternatives. This will cut the cost of energy, drive economic growth, create high value jobs right across the UK and improve our quality of life.



This call for evidence is an important next step in delivering on those ambitions, focusing on how we heat our homes, and will be vital in realising our ambition set out in the Clean Growth Strategy to phase out the installation of high carbon fossil fuel heating in buildings off the gas grid, during the 2020s. This document explains what we hope to achieve and seeks evidence on how we could implement it.

This is an ambitious change to the way millions of people heat their homes and businesses and presents a significant market opportunity. However, this is also something that must be done if we are to meet our legally binding carbon targets, improve air quality and ensure that everyone has warm, comfortable home. This call for evidence is the beginning of a long journey, and I am committed to bringing everyone with us.

The UK has shown repeatedly that cutting carbon emissions goes hand in hand with a growing economy. Since 1990, emissions have fallen by 40% while the economy has grown by two thirds. Phasing out high carbon fossil fuel heating may be a challenge, but it is also an opportunity for new jobs, new skills, and investment in innovation, as well as greater comfort and convenience for the end user. Moreover, what we do now to decarbonise buildings off the gas grid may pave the way for future decarbonisation of the wider building stock.

I believe it is imperative that we collaborate with industry through this heating transition. It is essential for installers, suppliers and manufacturers in the coal and oil sectors to show leadership. Government will listen to, and work with, our experienced heating experts from all sectors of the heating industry.

However, it must be understood that we will not be heating our buildings in 2050 by setting fire to the same substances people burned in the Victorian era. Progress is a crucial part of our Industrial Strategy: it keeps UK businesses at the cutting edge. Our heating industry must

retain its position as a world leader, seeing this process as an opportunity to lead the change that is necessary, and not let the world change without them.

This document is the first step, and in it I seek to explore the options available to take action during the 2020s and build consensus for action. I want to ensure that we understand what government, industry and consumers can do to reduce the barriers to the installation of clean heating systems. I want to reduce the reliance on subsidy, and I want to prepare the ground for the future.

A handwritten signature in black ink, consisting of a large, stylized 'C' followed by a 'P' and a long horizontal flourish.

**CLAIRE PERRY, MINISTER OF STATE FOR ENERGY AND CLEAN GROWTH**

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# General information

## Purpose of this call for evidence

The Clean Growth Strategy (CGS), published in October 2017, was very clear on the challenges and opportunities involved in decarbonising heat in buildings. We need to move to cleaner and smarter ways of heating our homes, keeping household energy costs down and maximising comfort, whilst reducing carbon emissions and improving air quality.

The pathway to the 2032 carbon budget set out in the CGS makes it clear that action on decarbonising heat must be increased during the 2020s. In line with this, the government set out an ambition to phase out the installation of high carbon fossil fuel heating off the gas grid during the 2020s, starting with new build.

As set out in the CGS, we are carrying out work to consolidate and improve the evidence base on different approaches to the long term decarbonisation of heat, out to 2050, and plan to publish a report on this work in summer 2018. This call for evidence focusses on action that can be taken sooner to build on the gains made by the Renewable Heat Incentive and decarbonise off gas grid buildings, heated by high carbon fossil fuels such as oil and coal. Such buildings represent an opportunity for credible action in the nearer term towards the 2032 carbon budget.

This call for evidence is the first phase. In it the government seeks to explore the options available to take action during the 2020s and build consensus for action. We seek to understand what government, industry and consumers can do to reduce the barriers to installation of clean heating, reducing reliance on subsidy, while preparing the ground for future policy approaches that could include regulation.

Evidence provided and responses received will be used to inform policy development ahead of more detailed consultation on, or announcement of, specific policy instruments.

**Issued:** 19 March 2018

**Respond by:** 11 June 2018

**Enquiries to:**

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Consultation reference: Future Framework for Heat in Buildings

### **Territorial extent:**

This call for evidence applies predominantly to England and Wales, however some of the potential policy options proposed in the document would only apply in England, while others could have wider applicability.

## How to respond

Your response will be most useful if it is framed in direct response to the questions posed, though further comments and evidence are also welcome.

Electronic responses are preferred and should be submitted through the consultation hub (<https://beisgovuk.citizenspace.com/heat/future-framework-heat-in-buildings>), emailed to [buildingheat@beis.gov.uk](mailto:buildingheat@beis.gov.uk), or sent to the address on page 5.

### **Additional copies:**

You may make copies of this document without seeking permission. An electronic version can be found at <https://www.gov.uk/government/consultations/a-future-framework-for-heat-in-buildings-call-for-evidence> or through the consultation hub at <https://beisgovuk.citizenspace.com/heat/future-framework-heat-in-buildings>.

## Confidentiality and data protection

Information provided in response to this call for evidence, including personal information, may be subject to publication or disclosure in accordance with the access to information legislation (primarily the Freedom of Information Act 2000, the Data Protection Act 1998 and the Environmental Information Regulations 2004).

If you want information that you provide to be treated as confidential please say so clearly in writing when you send your response to the consultation. It would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded by us as a confidentiality request.

We will summarise all responses and place this summary on the [GOV.UK](#) website. This summary will include a list of names or organisations that responded but not people's personal names, addresses or other contact details.

## Quality assurance

This call for evidence has been carried out in accordance with the [Government's Consultation Principles](#).

If you have any complaints about the call for evidence process (as opposed to comments about the issues which are the subject of the consultation) please address them to:

Email: [beis.bru@beis.gov.uk](mailto:beis.bru@beis.gov.uk)

# Executive Summary

The shift to cleaner growth and low carbon technologies is one of the most significant changes for the global economy. It affects every country and every part of our economy, from our heavy industry to our homes. This shift is at the heart of our Industrial Strategy: under our Clean Growth Grand Challenge we aim to lead the world in the development, manufacture and use of these technologies, systems and services.

Decarbonising heat in buildings and industry is one of the most significant parts of this shift. Heating our homes and businesses causes almost a third of UK emissions and reducing them was a key focus of our Clean Growth Strategy. Whilst it will not be easy, it comes with opportunities to grow our economy. The innovation and investment required to drive these emissions down can create jobs and export opportunities. If done in the right way, cutting emissions relating to heating can benefit everyone through reduced energy bills, which will help improve the UK's productivity, and improved air quality.

This is also key legal obligation for the Government. Meeting our legally binding target of reducing emissions by at least 80% by 2050 implies decarbonising nearly all heat in buildings and most industrial processes. To do this we need to start phasing out the highest carbon forms of heating during the 2020s. In the CGS the government therefore committed to phasing out the installation of high carbon fossil fuel heating in both domestic and non-domestic buildings off the gas grid during the 2020s, starting with new build.

In this document we examine different aspects of decarbonising heat in buildings. This includes setting out the government's long term plan to phase out high carbon fossil fuel heating, considering how we smooth the transition from the Renewable Heat Incentive and support industry in leading delivery of this ambitious energy transition, as well as the future potential for regulation that may be necessary to ensure the transition happens.

We also consider clean heating technologies for off gas grid properties, both domestic and non-domestic. The government wishes to continue to develop the evidence base we have on the technologies that can be used as alternatives to oil and coal heating systems, examine the barriers to uptake, and gain an understanding of what further innovation and cost reduction is possible for new and existing technologies. Technologies considered in this call for evidence include biomass, bioliquids and biopropane, hybrids and gas driven heat pumps, electric heating including heat pumps, and the potential for rural heat networks

Innovation will be key to improving these technologies, making them more attractive and suitable for householders and businesses, and reducing costs. A £10 million innovation fund to support low carbon heating is in the process of being allocated and we are keen to understand what further opportunities there are for innovation.

In the document consideration is given to what more can be done to enable the uptake of clean heating, seeking input on what would encourage consumers to replace their high carbon fossil fuel heating systems with cleaner alternatives, and how best to target key barriers. We are also gathering views on early stage proposals to encourage uptake, unlock private sector finance and support new market approaches. We would also welcome evidence on the effectiveness of nearer term regulatory approaches, the benefits of local approaches and how we can build the consensus around cleaner heating.

In the CGS we stated that we would start phasing out the installation of high carbon fossil fuels in new buildings of the gas grid, however over time action to decarbonise heating in all new buildings will be essential. We therefore seek evidence to understand why oil is being installed in some buildings and the costs of installing cleaner systems. We also consider futureproofing all new homes for installation of clean heating systems. We are seeking evidence on the relative costs and benefits of installing those heating systems in new build compared to installing futureproofing measures.

We will use the evidence received in response to this document to design and implement a clear framework that will follow on from the Renewable Heat Incentive, once it closes to new applicants, for domestic and non-domestic buildings through to the 2030s.

The UK government has worked closely with the devolved administrations in the past and we intend to continue to work with them as we move forward, while taking into account the devolved status of heat as appropriate.

# Chapter 1: Introduction

Overcoming the challenges and realising the opportunities of the shift to clean growth was at the heart of our Industrial Strategy<sup>1</sup> and decarbonising heat will be a key part of this. We need to move to cleaner and smarter ways of heating our homes, keeping household energy costs down and maximising comfort, whilst reducing carbon emissions and improving air quality.

1.1. Meeting our target of reducing emissions by at least 80% by 2050 implies decarbonising nearly all heat in buildings and most industrial processes. The pathway to the 2032 carbon budget set out in the Clean Growth Strategy (CGS)<sup>2</sup> that we published in October 2017 makes it clear that action must be taken to start decarbonising heat during the 2020s.

1.2. The CGS included commitments on heat in buildings to:

- Improve standards of the 1.2 million new boilers installed every year in England and requiring control devices to help people save energy<sup>3</sup> from April this year;
- Phase out the installation of high carbon fossil fuel heating in new and existing buildings (domestic and non-domestic) off the gas grid during the 2020s, starting with new build;
- Consult on:
  - Improving the energy efficiency of new and existing buildings where the evidence shows this is cost effective and affordable and it is safe to do so (subject to the conclusions of the independent Review of Building Regulations and Fire Safety);
  - Ensuring new buildings are futureproofed for the installation of cleaner heating systems where this is cost-effective and affordable;
  - Raising minimum standards of energy efficiency for rented buildings.
- Exploration of voluntary building standards and how these might support improvements in the energy efficiency performance of business buildings.

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<sup>1</sup> <https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future>

<sup>2</sup> <https://www.gov.uk/government/publications/clean-growth-strategy>

<sup>3</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/651853/Boiler\\_Plus\\_final\\_policy\\_and\\_consultation\\_response.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/651853/Boiler_Plus_final_policy_and_consultation_response.pdf)

- 1.3. There are a range of heating technologies with the potential to support the scale of change needed to meet our 2050 targets. These include decarbonising the gas grid using hydrogen or biogas, increased use of heat networks and electrification of heating. At present it is not clear which approaches, or combinations of approaches, will work best at scale. We are carrying out work to consolidate and improve the evidence base on different approaches and plan to publish a report on this work in summer 2018. We need to lay the groundwork in this Parliament to set up decisions in the first half of the next decade about the long term future of heat.
- 1.4. In the meantime we intend to design and implement a clear framework that follow on from the Renewable Heat Incentive (RHI), once it closes to new applicants, for domestic and non-domestic buildings through to the 2030s, ensuring a smooth transition takes place. This aims to reduce barriers to the take up of cleaner heating and cooling while reducing reliance on subsidy and sustaining a viable supply chain for clean heating systems. At the same time, it needs to keep options for the longer term decarbonisation pathway open. This call for evidence informs this first phase.
- 1.5. The 2020s are a key time for action on decarbonisation of heat and uptake of energy efficiency. Alongside the CGS, the government published a call for evidence on building a market for energy efficiency,<sup>4</sup> aiming to kick start the owner occupier market for energy efficiency. A programme of work will be published in response to this call for evidence later this year. In England and Wales the Private Rented Sector (PRS) regulations come into force on 1<sup>st</sup> April 2018, which will mean that buildings rented out by private landlords will have to secure an Energy Performance Certificate of at least Band E before the landlord can enter into a new tenancy agreement, or renew or extend an existing one, except in some limited, specific circumstances. The government has a fuel poverty reduction target in England to ensure that as many homes of fuel poor<sup>5</sup> households as is reasonably practicable achieve a minimum energy efficiency rating of Band C by 2030, and in the CGS published an aspiration for all homes to be Band C by 2035. In the CGS, government also committed to consult on a future trajectory for the PRS regulations. These interventions could be the catalyst to also consider changes to the heating system.
- 1.6. The RHI currently supports the deployment of renewable and low carbon heating technologies. The scheme helps to bridge the gap between the cost of renewable heating systems and the conventional alternatives. The Non-domestic RHI opened in November 2011. It supports the installation of renewable and low carbon heating by businesses, charities and the public sector, as well as systems supplying heat to more than one domestic property. The Domestic RHI, which provides support to individual households, opened in April 2014. In November 2015, the government renewed its commitment to the transition to cleaner heating by confirming a continued budget for the RHI out to 2020/21.
- 1.7. The RHI has been successful at supporting the roll out of cleaner heating technologies, including biomass boilers, heat pumps and installations producing biogas. There have been payments made to 61,372 domestic and 17,409 non-domestic installations, resulting in 2.373 TWh and 20.368 TWh of heat generated and paid for respectively, and we are spending £4.5 billion on the scheme between 2016 and 2021.

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<sup>4</sup> <https://www.gov.uk/government/consultations/building-a-market-for-energy-efficiency-call-for-evidence>

<sup>5</sup> A household is considered to be fuel poor if: a) they have required fuel costs that are above average (the national median level) and b) were they to spend that amount, they would be left with a residual income below the official poverty line.

- 1.8. However after almost 10 years of new installations supported under the non-domestic scheme and 7 years of new installations supported under the domestic scheme (by April 2021), government is now considering how to transition support for these technologies away from direct subsidy.
- 1.9. From December 2016 to January 2017, the government consulted on the future of heating in domestic and non-domestic buildings.<sup>6</sup> This included a question asking what action the government should take to reduce the use of coal and oil in all buildings, and over what timeframe. A large number of diverse responses were received, suggesting a role for renewable or hybrid technologies, opportunities in new build developments, and a possible role for tax and/or subsidy incentives. Few respondents commented on timeframes, but of those who did, 69% recommended taking action within the next ten years. We have also heard from many industry stakeholders that a clear, long term strategy is needed to create a stable environment for investment and allow impacted sectors to grow, develop and diversify. We have listened to stakeholder views and taken them into account when preparing this document.
- 1.10. The non-domestic call for evidence also asked questions focussed on building standards and performance. On the limited evidence we had on non-domestic off gas grid oil and coal heated buildings, we asked a specific question about any connection between the use of heat for process use and space and water heating and how that might impact on any future options to reduce the use of high carbon fossil fuels. We did not receive many responses to these questions and there were mixed responses on potential actions, which included suggestions on:
- The role of local heat networks, biomass and other alternative fuels;
  - Carbon tax and pricing;
  - Regulation and subsidy.
- 1.11. In this call for evidence government seeks to explore the options available to take action during the 2020s. We seek to build the consensus for action and understand what government, industry and consumers can do to reduce the barriers to installation of clean, low carbon heating. This will reduce future reliance on subsidy, and create the right conditions for investment, while preparing the ground for future policy approaches that could include regulation.

## Heat across the UK

- 1.12. The UK government has worked closely with the devolved administrations in the past, with England, Wales and Scotland sharing one RHI scheme and Northern Ireland running their own scheme independently.
- 1.13. In Scotland and Northern Ireland, responsibility for heat policy is completely devolved. Further heat policy will be developed as part of the longer term Energy Strategy for Northern Ireland.

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<sup>6</sup> <https://www.gov.uk/government/consultations/heat-in-buildings-the-future-of-heat>; and <https://www.gov.uk/government/consultations/heat-in-buildings-the-future-of-heat-non-domestic-buildings>

- 1.14. The Scottish Energy Strategy<sup>7</sup> outlines the Scottish government's actions to support energy efficiency and heat in buildings. Scotland's Energy Efficiency Programme (SEEP)<sup>8</sup> Routemap is due to be published later in 2018.
- 1.15. In Wales the UK government has reserved powers to legislate on the production, distribution and supply of heat and cooling, including the regulation of heating and cooling networks. The exceptions to this are schemes supporting the generation and production of heat and cooling, responsibility for which are devolved to Welsh Ministers.
- 1.16. Some of the specific options discussed are likely to have different applicability across the UK. However at this stage of policy thinking it is too early to set out this level of detail. We will set out further information about the applicability to devolved administrations for specific policies, when we consult on or announce those policies. The call for evidence is also intended to be helpful to devolved administrations in developing policies in areas where they do have competence.

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<sup>7</sup> <http://www.gov.scot/energystrategy>

<sup>8</sup> <http://www.gov.scot/Topics/Business-Industry/Energy/SEEP>

## Chapter 2: A pathway to regulation?

Government's long term aim is that no one should install a high carbon fossil fuel heating system. However this is an ambitious energy transition which will require industry leadership to deliver. In the future, regulation may be necessary to ensure this happens.

### Long term plan to phase out high carbon heating

- 2.1. There are around one million oil heated households in England and Wales, around 1.1 million in Great Britain.<sup>9</sup> Oil heated households, are typically owner occupied and wealthier than average, although approximately 20% of oil heated households are living in fuel poverty and are more likely to be in severe fuel poverty.<sup>10</sup> The buildings are more likely to be larger, rural, detached properties. Cavity walls are less prevalent than in the wider building stock, with just over half having cavity walls. Oil heated households have a higher average heat demand, due to a combination of larger size and poorer insulation.<sup>11</sup>
- 2.2. There are also about 62,000 non-domestic buildings heated with oil or liquid petroleum gas (LPG). Oil fuel use represents about 9% by end use for space/water heating and cooking across the non-domestic sector (service and industry) in the UK.<sup>12</sup>
- 2.3. Modern oil installations have become more efficient, however progress has been made at a similar rate across all heating technologies, meaning that oil remains the most carbon intensive option commonly used by those who do not have access to the gas grid (the exception being the circa 170,000 households using coal and other solid fuels as their main heating fuel in Great Britain).
- 2.4. Oil has been a mainstay of British heating for well over 100 years, although its use fell into steep decline during the 20th century as consumers chose to replace it with convenient, cleaner gas wherever possible.<sup>13</sup> Historically, transitions of this nature and scale have progressed over a period of years with major roles for both industry and government.<sup>14</sup> When industry has played a leading role in driving change, those participants have profited

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<sup>9</sup> BEIS analysis based on the English Housing Survey and devolved equivalents:

<https://www.gov.uk/government/collections/english-housing-survey>

<sup>10</sup> This is approximately double the usual rate of fuel poverty found in the general population. The average fuel poverty gap for this group is also in excess of £900, three times the average. See BEIS Fuel poverty detailed tables: 2014.

<sup>11</sup> Information based on analysis of data in the English Housing Survey:

<https://www.gov.uk/government/collections/english-housing-survey>

<sup>12</sup> ECUK, 2016: <https://www.gov.uk/government/statistics/energy-consumption-in-the-uk>

<sup>13</sup> <https://www.sciencedirect.com/science/article/pii/S0301421512006957>

<sup>14</sup> Such as the transition from manufactured gas to natural gas in the second half of the 20<sup>th</sup> century.

from the opportunity to shape emerging markets and remain at the forefront of an industrially modern society.<sup>15</sup>

- 2.5. When industry has played a smaller role in driving change, major transitions have required a strong legislative basis to drive progress. Robust, far-reaching legislation has ensured stability in an evolving energy market, enabling long term investment confidence. In recent years the low carbon heating industry has been very clear that a long term pathway is needed today to de-risk private investment for the future.
- 2.6. It is very likely that this transition will be no different. The timing and nature of any regulations that phase out the installation of high carbon fossil fuel heating systems will depend on the level of commitment shown by industry. If the market is able to drive progress then regulation may be light touch, to ensure standards are maintained and capture late movers so that no one is left behind. We are committed to working hand in hand with the heating industry to achieve this. This includes working with both the existing fossil fuel market and the low carbon heating market. We wish to collaborate to prepare the industry and the wider economy, to enable a smooth transition that works for industry and consumers.
- 2.7. We have already begun discussions with key industry stakeholders and undertaken consumer research. Those discussions have informed the content of this call for evidence. We will continue to engage through the period of this call for evidence and as we move into final policy development. The policy framework will be designed to minimise the need for regulation, and ultimately, to facilitate compliance when regulation is needed.

### Call for evidence questions

1.	Do you agree that the policy framework should focus initially on enabling the market to drive the transition away from high carbon fossil fuels, and in the longer term on helping consumers and industry to comply with regulations?
2.	How should government best engage with existing and emerging heating markets, consumers and other stakeholders, to ensure regulations are designed in a way that works for everyone?
3.	How could a firm end date for high carbon fossil fuel installations be delivered through regulations? How much time do manufacturers, suppliers and installers trading in high carbon fossil fuels need to prepare for a firm end to new installations?

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<sup>15</sup> <https://www.sciencedirect.com/science/article/pii/S0301421512006957>

## Chapter 3: Cleaner heating technologies for off gas grid properties

The government wants to continue to develop its evidence base on technologies that can be used as alternatives to oil and coal heating systems, including the barriers to uptake. We seek to understand what further innovation and cost reduction is possible for existing technologies, and whether there are innovative new technologies we should be considering.

### Non-domestic buildings

- 3.1. Alongside the ambition to phase out the installation of high carbon forms of fossil fuel heating in new and existing businesses off the gas grid, the CGS also set out the development of a package of measures to support businesses to improve their energy efficiency by at least 20% by 2030. Business and industry are responsible for 25% of UK emissions. The proposed measures include our intentions to consult on improving the energy efficiency of new and existing non-residential buildings in England through Building Regulations, the role and influence of voluntary building standards and raising minimum energy efficiency standards for rented buildings. These consultations are proposed for later in 2018.
- 3.2. Through this call for evidence we want to progress our thinking on non-domestic buildings and how to transition away from the installation of high carbon forms of fossil fuel heating. There are about 62,000 premises in England and Wales using oil or LPG as their main heating fuel, and oil fuel use represents about 9% by end use for space/water heating and cooking across the non-domestic sector (service and industry) in the UK.<sup>16</sup> The sectors with the largest number of premises using oil are: industrial, storage, retail and hospitality.

### Call for evidence questions

- |    |  |
|----|--|
| 4. | What is the potential for non-domestic buildings to transition away from the use of high carbon of fossil fuel heating? Is the use of high carbon forms of fossil fuel driven by process heating requirements, with space and water heating requirements secondary to this? Are different solutions required for different heat uses and are there cleaner |
|----|--|

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<sup>16</sup> ECUK.

alternatives?

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## Alternatives to oil and coal systems in domestic and non-domestic buildings

- 3.3. There are a variety of cleaner technologies that may be suitable for off gas grid properties (both domestic and non-domestic). These include electric heating, heat networks (with a low carbon heat source), bioliquids, biopropane, biomass and hybrids.<sup>17</sup> Most independent commentators suggest that heat pumps are the leading solution for decarbonising properties off the gas grid. The following sections ask for more evidence on these technologies.
- 3.4. We are particularly keen to better understand what government can do to reduce barriers to the roll out of those alternatives. Equally, industry can, and must, do more to drive down cost reductions and improve the performance of key technologies. We want to understand how quickly these savings can be realised to drive the sustainable roll out.

### Call for evidence questions

- |    |   |
|----|---|
| 5. | What do you think are the main technology choices for reducing heating emissions from off gas grid households, businesses and public sector organisations (eg transitional technologies)? |
| 6. | What do you think are the main technology choices for achieving near zero emissions from off gas grid heating (technologies which are consistent with our 2050 targets)?                  |

### Biomass, bioliquids and biopropane

- 3.5. The government recognises that biomass may play a role in decarbonising heating in some properties, and in particular dwellings that are unable to undertake improvements to the building fabric and which might otherwise be using carbon intensive fuels, such as coal. However, there are other technologies, such as heat pumps, which government expects to have a more important role in the long term decarbonisation of heat.
- 3.6. Solid biomass is currently being deployed under the RHI. We did not wish to detract from the key role of liquid fuels in transport<sup>18</sup> so a decision was taken not to support bioliquids

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<sup>17</sup> A hybrid in this context is likely to combine an electric heat pump with an oil or LPG boiler.

<sup>18</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/48337/5142-bioenergy-strategy-.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48337/5142-bioenergy-strategy-.pdf)

under the RHI in order not to compete with transport biofuels.<sup>19</sup> The case for introducing an RHI tariff for biopropane has also been considered. Whilst an RHI tariff could encourage imported biopropane, new UK production was unlikely in the lifetime of the RHI and it was therefore decided that biopropane should also be excluded from the scheme.<sup>20</sup>

- 3.7. In the post-RHI landscape, however, we are considering whether these forms of biomass would be suitable for some properties. Building on the research conducted for the RHI scheme, we are seeking to explore whether they would enable consumers to have more choice, whilst still decarbonising off gas grid properties in the most cost effective way. The use of biomass (either solid or as biopropane or a bioliquid) could: benefit hard-to-heat properties which have limited choices for heat and are more vulnerable to fuel poverty; provide alternatives to solutions such as heat pumps which may be a good choice for some properties, but are less suitable for others, and; reduce the cost of moving to a cleaner heating system for those already using LPG or heating oil compared to a full conversion to an entirely different heating system.
- 3.8. Bioliquids may be of interest in the transition away from oil as they could be used as a 'drop-in' fuel for oil-heated buildings. Biopropane may also be of interest, both as a replacement for oil and, in the future, as an option where liquid petroleum gas is currently used. These might also both be used in hybrid systems (see next section). In light of the commitments set out in the Clean Growth Strategy, we therefore want to consider new evidence on the advantages and disadvantages of solid biomass, biopropane and bioliquids. We wish to understand more about the suitability, air quality, sustainability and consumer impacts of using these fuels.
- 3.9. In order for the forms of biomass listed above to be viable for wider roll out for heating in properties off the gas grid, they must be:
- Cost-effective to buy and produce – Both the equipment and the fuel must be value-for-money for the consumer with appropriate margins for manufacturers;
  - Sustainable – The entire supply chain must be sustainable. As a minimum the fuels must meet EU and UK sustainability criteria and greenhouse gas savings criteria as set out in the Renewable Energy Directive<sup>21</sup> and Fuel Quality Directive<sup>22</sup> (both as amended by the ILUC Directive);<sup>23</sup>
  - Consistent with government's position on air quality - Air quality may be a particular concern as the use of biomass can result in the production of particulate matter. Domestic use of solid biomass may therefore result in increased impacts on personal exposure to particulate matter. The government will be publishing a Clean Air Strategy

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<sup>19</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/265855/Non-Domestic\\_Renewable\\_Heat\\_Incentive\\_-\\_Improving\\_Support\\_Increasing\\_Uptake\\_-\\_PUBLISHED.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265855/Non-Domestic_Renewable_Heat_Incentive_-_Improving_Support_Increasing_Uptake_-_PUBLISHED.pdf); and [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/371698/RHI\\_Evidence\\_Report\\_-\\_Bioliquids\\_for\\_Heat.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/371698/RHI_Evidence_Report_-_Bioliquids_for_Heat.pdf)

<sup>20</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/577024/RHI\\_Reform\\_Government\\_response\\_FINAL.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/577024/RHI_Reform_Government_response_FINAL.pdf)

<sup>21</sup> Renewable Energy Directive: <http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32009L0028>

<sup>22</sup> Fuel Quality Directive: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32015L1513>

<sup>23</sup> ILUC Directive: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0030>

later this year. Careful consideration is needed to ensure biomass is only used in a way that is consistent with the government's clean air commitments;

- In good supply - There must be a sufficient supply of the fuel and equipment to meet increasing demand from the heating sector (bearing in mind other sectors where there are fewer options, such as transport, the obligation to use biofuels alongside standard forms of road transport fuel has been increased). Imports can only be relied upon if they meet sustainability requirements and if the extra demand will not distort the market.

## Call for evidence questions

7.	What evidence is there that bioliquids can provide an affordable and sustainable alternative to fossil fuel heating? What are the technical barriers and what might the impacts on domestic and business consumers be? How scalable are sustainable supply chains and is there a maximum amount of bioliquids which can be supplied?
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8.	What evidence is there that biopropane can provide an affordable and sustainable alternative to fossil fuel heating? What are the technical barriers and what might impacts on domestic and business consumers be? How scalable are sustainable supply chains and is there a maximum amount of biopropane which can be supplied?
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9.	Do you have any evidence on the air quality impacts of the use of solid biomass, bioliquids and/or biopropane?
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## Hybrids and gas driven heat pumps

3.10. Hybrid technologies<sup>24</sup> may support the transition away from high carbon heating. In particular they can be appealing to some consumers who may be keen to retain a more familiar system alongside the move to a cleaner alternative. Hybrids for off gas grid customers are likely to combine an electric heat pump with an oil or LPG boiler. This could be as two distinct units with dedicated controls to determine which is being used for heating or one combined unit.

3.11. We understand there are also examples of gas driven heat pumps or fuel cells that may be compatible with LPG as well as mains gas.

3.12. Hybrid systems can provide benefits to consumers by allowing them to switch between fuels as prices change to reduce cost, providing a back up source of heat during cold peak

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<sup>24</sup> A hybrid in this context is likely to combine an electric heat pump with an oil or LPG boiler.

periods in winter, and providing flexibility to help balance electricity networks. Although hybrid systems are not as low carbon as, for example, a heat pump, they are cleaner than a conventional system and therefore may be a positive step towards emissions reduction.

3.13. We are keen to gain a better understanding of the costs and effectiveness of hybrid systems in off gas grid properties.

### Call for evidence questions

10.	Are there any oil and heat pump hybrids currently on the market (in the UK or elsewhere), and if so how does the cost compare with conventional systems or with a heat pump? Could they be used with bioliquids? What impacts do they have for domestic and business consumers, for example in terms of ease of use and comfort levels?
11.	We understand there are gas heat pump hybrids on the market that can be used with LPG. How widespread are these (in the UK or elsewhere) and how does the cost compare? Could they be used with biopropane or other biogases? What impacts do they have for consumers, for example in terms of ease of use and comfort levels?
12.	What role might hybrids have in the short term to facilitate the longer term transition to clean heating off the gas grid?

### Electric heating, including heat pumps

3.14. The government considers that electric heating, particularly heat pumps, is likely to be a key part of the solution for decarbonisation of off gas grid heating. Most independent commentators also suggest that heat pumps are the leading solution for decarbonising these properties. Heat pumps are particularly important because:

- They are more efficient than direct electric heating so are cheaper for consumers to run;
- They are lower carbon than oil, LPG, and direct electric heating. The electricity grid has decarbonised significantly in recent years and, as this continues, electrification of heating will result in the decarbonisation of heat;
- They are likely to be suitable for more sparsely populated areas where low heat density will reduce viability of heat networks;
- They are an established technology, with the potential for increased deployment within the required timescales;

- They do not require a feedstock that may be better used elsewhere or have negative air quality impacts like some biomass, bioliquids or biopropane and no fuel deliveries are needed;
  - With the roll out of smart meters and the addition of smart functionality, heat pumps and other electric heating such as storage heaters, may be able to offer flexibility to consumers by maximising their use when electricity prices are low and minimising when high.
- 3.15. Storage heaters are used in some domestic properties and are usually significantly cheaper to install than heat pumps. Being electric, they share some advantages with heat pumps, and more modern smart versions give consumers better control than storage heaters have had historically. However they are significantly less efficient than heat pumps, and therefore cost more for consumers to run. Modern storage heaters combined with smart functionality are likely to be an option for smaller properties, however multiple storage heaters may be required to meet the larger heat loads typically found in the rural off gas grid housing stock, increasing costs.
- 3.16. Heat pumps are currently more expensive to buy and install than oil boilers. Reduction of that cost differential is a key part of driving the roll out of clean heating systems. For example ground source heat pumps may be used with shared ground loops on a row of cottages in a hamlet, which may result in lower cost installations per dwelling.
- 3.17. We have been carrying out analysis of the off grid housing stock using current available evidence and data from the English Household Survey<sup>25</sup> and the devolved equivalents. The analysis aims to understand the approximate proportion of homes in off gas grid areas that are suitable for heat pumps, and in which heat pumps can provide sufficient levels of comfort. In some circumstances the installation of a heat pump would need to happen alongside improvements to the building fabric but not in every case. We intend to publish the outcomes of this analysis in due course.
- 3.18. Our knowledge of non-domestic buildings and the way heat is used within them is less complete than our knowledge of domestic and therefore we are not currently able to consider the suitability of particular technologies in the same way we have done for residential buildings above. We seek to improve our understanding of non-domestic heat use off the gas grid, and have asked some evidence questions earlier in this chapter.

### Call for evidence questions

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| 13. | To what extent are space requirements an issue during a heat pump installation? How often are heating distribution systems replaced (hot water tanks, radiators and/or pipework)? How often are additional thermal efficiency measures for the building required? |
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<sup>25</sup> <https://www.gov.uk/government/statistics/english-housing-survey-2015-to-2016-headline-report>

14.	What potential is there for heat pump costs to come down (both kit and installation)? How can industry show leadership in making this happen?
15.	Are there any drawbacks of smart/more efficient storage heaters, vs other types of electric heating? And, if so, how are these to be overcome? What are the benefits of smart and more efficient storage heater products compared to traditional storage heaters? In which types and tenure of buildings are storage heaters most likely to be useful? Would storage heaters be a likely solution where electric heating is not currently used? How about where electric heating is currently the secondary heating source?

### Rural heat networks

3.19. Heat networks distribute heat from a common source to multiple properties. The pipe network can accommodate heat from a variety of sources including recovered and renewable sources. In the current market conditions (before we have achieved deployment at scale), heat networks are generally more cost effective in dense urban areas with high density of heat demand.

3.20. In some rural areas heat networks are already viable, as the costs of the alternative heating provision (for example oil heating with fuel delivered by road) outweigh the costs of installing the network, or because the fuel for the network is available cheaply locally, for example as a waste product from local businesses. An example of this is included as a case study below.<sup>26</sup>

#### Case Study – Blore Place

At Blore Place in Kent, biomass boilers provide heat for a milking parlour, conference centre, education centre and three other buildings, connected to the heat network displacing previous separate oil, biomass and electric heating systems.

Approximately 50% of the wood is supplied from the site's own coppiced woodland.

3.21. Rural heat networks might supply domestic properties and/or community buildings such as a school, shop, community centre or church. The Community Heat Network Toolkit<sup>27</sup> is available to help community energy groups and local authorities understand some of the opportunities associated with delivering a community-led heat network project.

3.22. In the right circumstances, and where efficiently operated, heat networks can provide a cheaper, clean heating solution than separate heating systems in individual dwellings. The government is supporting the growth of the heat networks market through the Heat

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<sup>26</sup> <https://www.gov.uk/government/publications/heat-network-case-studies>

<sup>27</sup> <http://hub.communityenergyengland.org/resources/resource/151/community-led-heat-projects-a-toolkit-for-heat-net/>

Network Investment Project (HNIP)<sup>28</sup>. This capital support programme will help create the conditions necessary for a sustainable heat network market to emerge in the 2020s.

- 3.23. Aside from “formal” heat networks as set out above, there are opportunities for systems where ground loops provide the source of energy to multiple heat pumps (communal systems). The ground loop itself could be owned by a separate organisation to the heat pumps (for example using a model more like the gas grid).

### Call for evidence questions

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| 16. | Is there scope for more use of rural heat networks and communal heating systems? What are the barriers and how might they be overcome?     |
| 17. | Are there specific ownership and funding models that may be suitable for heat networks and communal heating systems in off gas grid areas? |

### Innovation

- 3.24. As announced alongside the Clean Growth Strategy, we are investing £10 million in an innovation fund to support clean heating. This funding will be used to drive improvements and cost reductions in heating technologies. Government is keen to understand what further opportunities there are for innovation and whether there is a need for further support in the future. We are also keen to ensure that future policies take account of innovation in technologies, ensuring that where technologies are effective and beneficial for consumers they are supported by government policy.

### Call for evidence questions

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| 18. | What evidence is available about further innovations to improve the performance, efficiency and customer proposition of heat pumps? Are there opportunities for innovation in delivery and installation, particularly those innovations that might reduce kit and installation costs or hassle for consumers? |
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<sup>28</sup> <https://www.gov.uk/government/publications/heat-networks-investment-project-hnip>

19.	What is the role of the heating industry in delivering cost reduction through innovation? What steps is the industry already taking and what more could be done?
20.	What other innovation opportunities and innovative technologies are available for rural homes off gas grid? At what technology readiness level are they and do they require government support to move them towards the market?
21.	What can government do to ensure that future policy encourages and supports future innovations and cost reductions in technologies?

## Chapter 4: Enabling uptake of clean heating

The government is keen to understand what can be done to support domestic and non-domestic consumers to replace their high carbon fossil fuel heating systems with clean alternatives. We are seeking evidence and views on early stage proposals to encourage uptake, unlock private sector finance and support new market approaches.

### Targeting the key barriers

4.1. A key barrier to the uptake of clean heating technologies, for both domestic and non-domestic consumers, is the difference in cost between incumbent technologies and clean alternatives. However government understands that this is not the only barrier. Other barriers<sup>29</sup> include:

- Researching alternative heating systems not being a priority for consumers;
- Consumers being happy with their existing technology/system and adverse to change;
- Lack of information about clean heating;
- Hassle of installing an alternative system;
- Perception that the building is unsuitable for anything other than the current heating systems;
- Uncertainty about performance of different technologies;
- Clean heating systems being seen as too complicated;
- Not planning to stay in a particular property for the long term.

4.2. To ensure future regulations for ending high carbon installations are achievable, we will need to work closely with stakeholders to address these barriers, before and alongside that regulation.

4.3. We have set out high level options in the sections below, based on responses to our previous engagement and call for evidence on this topic. However, we are keen to understand what further options there might be and where industry can show leadership in driving this transition. With the right support this transition is an opportunity for the

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<sup>29</sup> DECC, (2013), Homeowners' Willingness to Take Up More Efficient Heating Systems; and BEIS, (2017), RHI Evaluation: Synthesis.

traditional heating industry to show real leadership, develop in new directions and maintain its position as a global leader for heating technology and clean growth. We are eager to draw insight from the market on how best to turn that opportunity into a reality.

- 4.4. Please make clear in your responses to the questions in this section what barriers you think a particular option might target and whether it is appropriate for domestic or non-domestic consumers (or both).

### Nearer term regulatory approaches

- 4.5. The government is considering how obligation/specific types of regulation might be used as part of the wider framework to drive the transition to clean heating during the early 2020s. This could reduce specific barriers and/or manage where the cost of decarbonisation falls during the transition. Some examples that could be considered are set out below. They should not be considered either as an indication of firm policy nor an exhaustive view of the potential options available. We welcome and encourage views on alternative arrangements that might smooth the transition to our desired aims.

#### **Example 1 - Information provision obligation on fossil fuel boiler installers**

- 4.6. Government could place a regulatory obligation on fossil fuel boiler installers to provide information to consumers about alternative technologies, or to require them to provide a reasonable quote (using a defined format) for an alternative technology, alongside any boiler quote. This would ensure consumers are aware of all their options before making a decision, even when it is a distress purchase, so that they can choose the heating solution that is right for them.
- 4.7. While some installers are already able to do this, many traditional installers would require training to be able to meet this obligation. However this could help the transition to installing alternatives that will be necessary to meet the ambition set out by government. Alongside this type of obligation the government would consider putting in place support for getting the necessary skills to be able to meet this requirement.

#### **Example 2 – Funding for energy efficiency of homes**

- 4.8. In the CGS, the government announced that support for home energy efficiency improvements would be extended from 2022 until 2028 at the current level of funding under the Energy Company Obligation (£640 million a year). We will review the best form of support beyond 2022 recognising the need to both save carbon and meet the government's commitment to upgrade all fuel poor homes in England to EPC Band C by 2030. A potential focus, to help make progress towards both of these objectives would be for this scheme to enable low income and vulnerable households to transition to cleaner heating systems, as well as ensuring these homes are appropriately insulated, if this has not been previously installed.

#### **Example 3 – A role for Distribution Network Operators (DNOs) or Gas Distribution Networks (GDNs) in supporting the takeup of clean heating**

- 4.9. There may be a role for network companies (DNOs and GDNs) in the delivery of clean heating systems. It makes sense to involve DNOs in the transition as this is likely to involve electric heating, and deployment of electric heating is likely to have associated network costs. Ensuring the DNOs are properly engaged means this can be delivered at

least cost to consumers. However, the key role for DNOs must be to ensure that the grid is able to cope with the demands of increased use of electric heating.

- 4.10. Following the direction set out in the Smart Systems and Flexibility Plan, DNOs are already embedding Distribution System Operator (DSO) roles, which will involve more active management of their networks and better coordination of activities across the whole system. In particular, this will see the opening up of the delivery of network requirements to the market so new solutions (such as storage or demand-side response) can compete directly with traditional network reinforcement. DNOs will therefore be able to better manage the forecasted increase in demand on their networks from increased use of electric heating at least cost to consumers.
- 4.11. As we transition away from fossil fuels to alternative technologies, there could also be a role for GDNs to deliver alternatives in some situations.

### **Example 4 - Obligation on manufacturers or suppliers of oil systems**

- 4.12. Government could require larger companies (to be defined) who produce/sell oil systems to move towards the sale of alternatives. This could be done through setting a target. The target could be based on either numbers of systems sold or on the carbon associated with the products sold and would increase over time.
- 4.13. Some manufacturers already produce a cleaner system, or own a company that does, so the aim of the regulation would be that they encourage installers to put the same (or more) effort into selling those products as they do into conventional oil systems. An obligation of this type would require exemptions, ways of contracting the target out to others, or a means of buying out of the target such as through contributing to a fund that could be used to subsidise installations.
- 4.14. This option is likely to be a high burden on companies, and would also require some form of regulator to enforce and manage the targets, and ensure that it does not result in mis-selling. However it could result in a step change in the way the technologies are sold and a significant increase in the uptake of clean heating systems.
- 4.15. Government could also consider a voluntary target, which would be lower burden but would have less impact.

### **Example 5 – Obligation on suppliers of oil**

- 4.16. Government could require those who sell oil to support the move to alternatives. This could offer a range of options for compliance including selling a certain amount of bioliquid, selling renewable heating or paying into a fund to support clean heating installs. This option is likely to be a high burden on those who sell oil but could be high impact in terms of reducing the carbon intensity of the oil heating market.

## Call for evidence questions

22.	Please provide views and evidence on how different obligation approaches could be used to drive the transition to clean heating during the early 2020s? Are there any areas worth specifically targeting? Are there situations in which obligations would be counter-productive? Do you have any views on other short term regulatory options that could be pursued, besides those considered above?
23.	What do you think about the options set out above for an obligation? Do you have any evidence as to potential impacts, burdens or unintended consequences?
24.	What further options for short term regulation exist that we have not considered in this call for evidence? Do you have any evidence as to the associated impacts or burdens of any further options suggested?
25.	How can DNOs or GDNs take a leading role in deploying clean heating?

## Financing clean heating

- 4.17. As set out above, clean heating installations are usually more expensive to buy and install than fossil fuel technologies, particularly when retrofit. Even with action to reduce costs through innovation and policy, there is likely to be a gap. This means there is a role for finance for those who are able to pay, and potentially subsidy for those who are less able to pay.
- 4.18. There are projects that have considered the links between mortgages and energy efficiency. For example, the LENDERS project<sup>30</sup> considered the link between energy costs, affordability assessments and borrowing. If used in affordability assessments this could enable mortgage lenders to offer higher borrowing on more energy efficient properties. In Europe the EeMAP project<sup>31</sup> aims to develop a standardised energy efficient mortgage product across Europe, based on the idea that more efficient homes have a lower risk of default. These are based on energy efficiency measures but, in time, might also be available for heating systems as clean heating becomes more common, as higher and

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<sup>30</sup> [http://www.epcmortgage.org.uk/assets/Lenders\\_Core\\_Report.pdf](http://www.epcmortgage.org.uk/assets/Lenders_Core_Report.pdf)

<sup>31</sup> <http://energyefficientmortgages.eu/>

higher energy efficiency standards become the norm, as running costs change from current levels, or as part of systems combined with insulation and storage.

- 4.19. In October 2017, BEIS published a call for evidence on building a market for energy efficiency.<sup>32</sup> Some of the ideas set out in the call for evidence could have relevance to heating, as part of a “whole house” approach installing both insulation and clean heating. For example, a range of proposals for supporting green mortgages are discussed, including setting voluntary targets for lenders to improve the energy performance of properties they lend to; as are incentives or requirements for DNOs to pursue energy efficiency, in particular in off gas grid homes to prepare them for a transition to clean heat. Finally, there are proposals to support the supply chain integration necessary to deliver high quality wholehouse retrofit. This could also potentially include clean heating if there was consumer demand for this.
- 4.20. It is possible to combine the RHI with finance, and non-domestic installations in particular have often been financed, with the RHI income being used as part of the return on the project. There is also evidence of some finance in the domestic scheme, where the finance provider relies on the RHI income to enable the consumer to meet their repayments. There is also considerable interest in the potential for Assignment of Rights whereby the RHI is paid directly to a third party, who finances the installation costs. This demonstrates that there is interest from consumers in such finance, and that there are finance providers willing to fund clean heat projects. The challenge will be unlocking that finance in the absence of a subsidy.
- 4.21. The Green Deal is available for low carbon heating. In practice, however, as the cost of the technology is high and the bill savings relatively low, the amount of finance available is insufficient in most cases. The government is reviewing the Green Deal and towards the end of last year we published a Call for Evidence on the Green Deal Framework. This received over 100 responses that are currently being reviewed. We will consult on proposals before making any significant changes, however it may be that future changes to the framework could increase availability of financing for low carbon heating.
- 4.22. There may be a role for targeted subsidy, subject to the evidence supporting this approach. However it should be noted that any subsidy would be highly targeted both in terms of technology it supported, technology it replaced, and the recipient of the subsidy.

### Call for evidence questions

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|-----|---|
| 26. | How can we encourage and unlock private sector finance in the absence of a subsidy? |
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<sup>32</sup> [Call for Evidence - Building a Market for Energy Efficiency Final.pdf](#)

27.	If there was some targeted subsidy, such as for low income or vulnerable households or for building local supply chains, what would this need to look like? Do you have any evidence that subsidy is necessary?
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## New market approaches

4.23. The way energy tariffs evolve may provide opportunities to help ensure that electric heating becomes more favourable than oil heating. While some time of use tariffs are available (such as Economy 7 or Economy 10), more sophisticated future time of use tariffs enabled by the functionality provided by smart meters<sup>33</sup> could prove attractive to consumers with electric heating.

4.24. This could involve, for example, a smart heat pump being programmed to respond to tariff information held on the smart meter that reflects the variations in the cost of generating and transporting electricity at different periods of the day. The heat pump could use this information to boost hot water at times of day when electricity is plentiful and cheap, or use stored hot water to provide heating at times of day when electricity is scarce/more expensive. The heat pump could also be part of a system with electricity generation technologies such as solar panels, or with a backup heating system, so that it could be turned off for short periods when there is high demand for electricity.

4.25. This may help smooth the demand profile for electricity for that property and deliver benefits both for consumers and the energy system. This approach fits with the direction of travel for the smart energy system as set out in the government and Ofgem's July 2017 Smart Systems and Flexibility Plan, which committed to a number of actions to remove barriers to suppliers offering, and consumers taking up, time of use tariffs and similar innovative products and services.<sup>34</sup>

4.26. Novel approaches are being developed in the heating market to sell clean heating systems, such as heat pumps. Some of these approaches were set out in a Delta-ee report.<sup>35</sup> These include:

- Heat as a service - The supplier contracts with the consumer to provide heat (with the supplier providing the heating equipment). This can involve a per kWh charge or a flat service charge. The supplier will often provide insulation if a flat charge is involved, to reduce usage; and/or,
- Demand management - Allowing aggregation services to manage peak electricity demand in return for lower tariffs; and/or,

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<sup>33</sup> See: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/579774/291116 - Smart meters Demand Side Response leaflet - DR - FINAL.PDF](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/579774/291116_-_Smart_meters_Demand_Side_Response_leaflet_-_DR_-_FINAL.PDF)

<sup>34</sup> See: <https://www.gov.uk/government/publications/upgrading-our-energy-system-smart-systems-and-flexibility-plan>

<sup>35</sup> Delta-ee Electrification of Heat Service- A Delta-ee Heat Pump Research Service Deliverable – Feb 2017.

- Leasing models – Where the consumer pays for the equipment as part of their heating bill over time; and/or,
- Bundling – Where the company acts as an intermediary and provides a range of services to the consumer, such as heating, electricity, internet, telephone, cable. Providing a number of services to numerous households results in efficiency savings and the ability to negotiate lower prices with suppliers, that can be passed onto the consumer.

### **Example: Best Green (Denmark) - Heat as a Service**

#### Key features

- Bulk purchase of residential heat pumps through competitive bid allows *Best Green* to secure units at lower cost than individual end users (~25% discount);
- Monoblock heat pumps are used, allowing Best Green to repossess most of the equipment if the customer ends their contract;
- High heat pump performance is key to ensuring ongoing revenue per heat pump and remaining competitive with alternative technologies. Currently achieving SPF 2.9 on average (residential end users). Good installation is required.

#### Successes:

- Achieving volume sales of heat pumps and (as at February 2017) heat sales of 5,000MWh a year, with the aim of doubling the volume of heat contracted over the succeeding 12 months;
- Have extended from residential end users (heat pump only source of heat) to small commercial sites/schools, where existing gas boiler meets peak loads;
- Partnering with district heating companies and municipalities to raise awareness.

Source: Best Green via Delta-ee Electrification of Heat Service– A Delta-ee Heat Pump Research Service Deliverable – Feb 2017

4.27. These models are not common in the UK, although there are some cases of companies moving into this area. There has also been some interest in models where the consumer does not pay the upfront cost of the heating system alongside the RHI. Consumers use service and bundling models like this to pay for things other than heating (TV, phone and broadband for example, mobile phones), so the approach should not be unfamiliar to UK consumers and businesses.

4.28. The prevalence of these models may in part be due to market maturity. In European countries with higher levels of heat pump use and more competition, innovative approaches are needed to capture customers, so companies may be more prepared to try novel approaches. Prevalence may also be affected by the typical size of companies involved in the market. Larger energy supply companies may be more able to offer combined approaches like this. In particular, approaches which involve the provision of finance may be difficult for SME/sole trader installers (typical in the UK market) as a Consumer Credit Licence is required.

4.29. Often novel approaches like this rely on a number of different technologies and stacking of revenue streams, something which will be easier to implement as costs reduce. We understand that some companies are beginning to move towards this type of model in the

UK but our understanding is that it is not yet prevalent in the market. It is also the case that some of the European models rely on a regulatory or tax/subsidy driver to monetise the system and social benefits of installing clean heating technologies and drive demand.

### Call for evidence questions

28.	Novel business models for selling clean heating have not taken off in the UK market, why is this? What is needed to stimulate the development of this market in the UK?
29.	What could be done, apart from subsidies, to encourage new approaches? Are there any approaches that have worked particularly well in other countries and that could be replicated in the UK?
30.	What could be done to support a whole-house approach of combining interventions and technologies?

### Local approaches

- 4.30. Rural communities such as those on oil may be well placed for local delivery. Projects run locally that benefit locally, and may be of more interest to the community than national schemes. Local people, and local governments, have a deep understanding of the needs and opportunities in the area, making it possible to meet those opportunities in a way that central government can't always.
- 4.31. Deploying a number of systems locally (or a large system as part of a shared loop or heat network) reduces search costs for installers and enables bulk purchase of kit, meaning that individual costs are reduced. This type of approach could also benefit and build up local supply chains. By creating hubs of activity, outside investment can be drawn in, creating opportunities for training, new businesses, and a new source of revenue for the local authority. This is also a valuable learning opportunity, as once the benefits and opportunities are realised in trailblazing communities, others will be able to build on the same model.
- 4.32. Local planning requirements may drive better energy efficiency or installation of clean heating and it may be possible to encourage that sort of local leadership. Some local authorities are incorporating requirements for sustainable or low carbon energy into their local plans by adding sustainability requirements that require the use of renewable and/or low carbon energy sources.
- 4.33. Areas with suitable planning requirements, or with projects already aimed at improving fuel poverty, health, air quality or infrastructure, or decarbonisation, may be good places to support action on heat. This could involve working with local authorities to create a hub,

offering support for local authorities or communities to develop projects, or offering subsidy through local authorities as a way of managing and targeting any future subsidy. Future reviews of the National Planning Policy Framework and the Planning Policy Guidance may provide an opportunity to encourage this sort of action at a local level.

### Call for evidence questions

31.	How can government best tap into and support community and local authority efforts? Are there any successful examples that can be build upon?
32.	What could be done to drive action from local planning? What are the pros and cons of approaches that rely on local planning? What evidence is there that such approaches produce desired outcomes?
33.	Do local approaches provide a possible model for delivering a firm end to fossil fuel installations through regulation? For example, by establishing oil free zones starting where it is most deliverable, and joining them up over time.

### Building the consensus around clean heating

4.34. Whilst support for clean technologies generally remains high,<sup>36</sup> the barriers to installing them can prevent this from translating into widespread changes to consumer behaviours and choices.<sup>37</sup> It will be key to build on existing support to grow the market.

4.35. Many people (around 45%) are positive towards the idea of having a renewable heating system in their home, although only a small proportion claim to know a lot about these heating systems.<sup>38</sup> However customers who have installed renewable heating technologies have expressed high levels of satisfaction.<sup>39</sup>

4.36. Consumers tend to replace like for like when purchasing a new heating system, which limits their options and can be a missed opportunity. We will be working with consumers to increase awareness and interest in the benefits of clean heating technologies. We are keen to help them engage with the alternative options and empower everyone to make

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<sup>36</sup> <https://www.gov.uk/government/statistics/energy-and-climate-change-public-attitudes-tracker-wave-24>

<sup>37</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/191541/More\\_efficient\\_heating\\_report\\_2204.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/191541/More_efficient_heating_report_2204.pdf)

<sup>38</sup> <https://www.gov.uk/government/statistics/energy-and-climate-change-public-attitudes-tracker-wave-24>

<sup>39</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/642097/Domestic\\_Census\\_waves\\_1-24.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/642097/Domestic_Census_waves_1-24.pdf)

informed decisions that are right for their homes. It is important that our energy system works for everyone, including vulnerable consumers and in all circumstances.

- 4.37. Last year we asked for views on consumer engagement in the context of Boiler Plus.<sup>40</sup> Feedback highlighted the roles that government, industry and consumer advocacy groups have in supporting a well-informed consumer base. We have been working closely with industry and a range of advice providers, including the development of a new and improved Energy Saving Advice Service, EST, Which? and Citizens Advice, to ensure their advice has been updated to incorporate the new standards and is consistent and accurate.
- 4.38. We wish to expand this work to include all heating options for both domestic and non-domestic buildings. We will work with installers and a variety of other organisations and consumers directly to build a positive narrative and improve consumer awareness of clean heating. In conjunction with other methods, we will be using focus groups and internet engagement. We will also talk to consumer advocacy and local organisations so we can really engage with the most affected groups.

### Call for evidence questions

34.	How can we increase consumer awareness and interest in clean heating technologies?
35.	What are the best methods of engaging directly affected consumers?
36.	How can we best work with heating engineers to benefit from their knowledge and experience, and their access to customers?

### Sector skills

- 4.39. The Industrial Strategy white paper recognised that people, and the skills they have, are a key driver of productivity.<sup>41</sup> While there are many skilled installers who are familiar with fossil fuel heating, most have not been given the opportunity to broaden their experience and their offer to their customers, by including alternative forms of heating. As set out in the Industrial Strategy, “we will equip citizens for jobs shaped by next generation technology. As the economy adapts, we want everyone to access and enjoy good work”.
- 4.40. BEIS will continue to work with the Department for Education to build on changes to formal training in technical skills over the next decade. The new technical education opportunities being created include retraining for experienced professionals and modern

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<sup>40</sup> <https://www.gov.uk/government/consultations/heat-in-buildings-the-future-of-heat>

<sup>41</sup> <https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future>

skills for young people entering the market. This will keep our valuable workforce current and maintain our world-leader status in engineering, and ensure clean growth is part of the overall package.

4.41. We will work with employers and training providers who can provide installers with access to new skills that build on their existing capabilities. The UK has many skilled and experienced boiler installers, and we should seek to maintain our professional excellence. The transition towards clean heating must happen at a pace that recognises the need for new skills to be adopted.

4.42. We know from previous engagement that many installers see on going skills development as a natural part of their work, reflecting on going developments in their trade. Not all installers hold this view, which may make it harder for some individuals to remain productive as technologies progress with the modern age. This energy transition is an opportunity for engaged individuals to become leaders for their profession, making the UK a leader in this market on the global stage.

### Call for evidence questions

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37.	What steps are needed to ensure installers, manufacturers and the entire supply chain have access to new skills frameworks?
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38.	What should the respective roles be for the fossil fuel market and the low carbon heating market in ensuring installers have the skills they need for the future?
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### Other Options

### Call for evidence questions

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39.	What other options should we be considering to target key barriers to taking up clean heating?
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40.	What intervention would make the biggest difference ahead of any regulation?
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## Chapter 5: New build

There are a range of opportunities for the decarbonisation of new build. This chapter seeks evidence on options to prevent all installation of high carbon heating fuels in off gas grid new build. It also explores options for encouraging the uptake of clean heating systems, including through futureproofing. This would help to avoid the high costs and hassle of retrofit in the future.

- 5.1. We expect that all buildings will need to be nearly zero carbon by 2050 if we are to meet our Climate Change Act target. Action on new build is important to maintain a credible pathway to future carbon budgets.
- 5.2. The Committee on Climate Change (CCC) report, “Next steps for UK heat policy”<sup>42</sup> sets out that action now on new build is sensible regardless of the longer-term heat decarbonisation pathway. The Committee suggests that, “Buildings constructed now should not require retrofit in 15 years' time. Rather, they should be highly energy efficient and designed to accommodate low carbon heating from the start”.

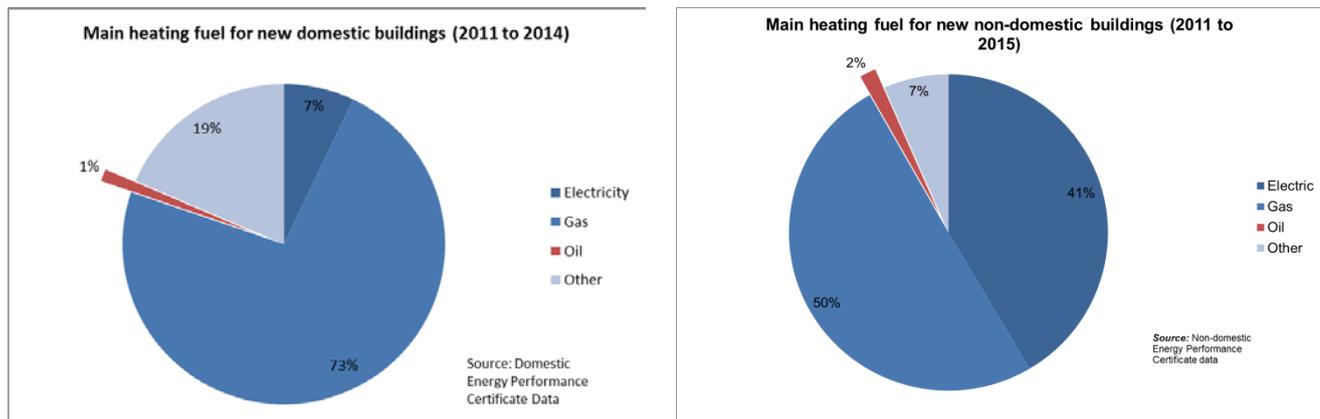
### Phasing out high carbon fossil fuels in new build

- 5.3. The announcement was made in the Clean Growth to phase out the installation of high carbon forms of fossil fuel heating in new and existing buildings off the gas grid during the 2020s, starting with new build. Standards for new build properties are fully devolved, and we will work with Wales, Scotland and Northern Ireland to encourage a similar level of ambition across the United Kingdom.
- 5.4. In England, annual new build homes completed totalled 154,220 in the year to September 2017.<sup>43</sup> Based on historic statistics, approximately 28% of these homes do not use mains gas as their main heating fuel. The charts below show the proportion of main heating fuels in new build properties.
- 5.5. Only a very small proportion of new buildings have oil boilers installed (1% of domestic and 2% of non-domestic). However, it makes sense to start phasing out oil in new build, as it is easier and cheaper to install clean heating in new build than retrofitting existing buildings. This may also help pave the way for phasing out new oil boiler installations in existing buildings.

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<sup>42</sup> <https://www.theccc.org.uk/publication/next-steps-for-uk-heat-policy/>

<sup>43</sup> <https://www.gov.uk/government/statistics/house-building-new-build-dwellings-england-july-to-september-2017>



5.6. The reasons for phasing out oil in new build are:

- New build is much more thermally efficient than the existing housing stock, so low temperature heating, such as that provided by heat pumps, is able to operate more efficiently and offer the user better bill savings;
- We would expect relative installation costs to be lower where installers are putting in a system from scratch. They will also benefit from bulk savings as they will be installing more than one clean heating technology in a number of buildings.

5.7. Installing clean heating in any new building removes the need for more costly and inconvenient retrofit later on, carried out at the expense of the owner, taxpayer or bill payer.

### Futureproofing new build homes

5.8. The announcement was made in the Clean Growth Strategy that, subject to the outcome of the independent review of Building Regulations, the government will consult on ensuring new homes in England are futureproofed for the installation of lower carbon heating systems where this is cost-effective, affordable and safe to do so. A review of Part L of the Building Regulations commenced in Wales this year.

5.9. It can be expensive to retrofit buildings for clean heating. We are keen to explore options for including clean heating when built or to include measures suited to clean heating - 'futureproofing.' Consideration needs to be given to the relative costs and benefits of these.

5.10. Examples of measures that could be included to futureproof new build are:

- Require larger heat emitters to make dwellings suitable for low-temperature heating;
- Include space for hot water storage;
- Require buildings to be smart ready;
- Require a hot water tank and/or a battery to be installed;
- Tighten fabric efficiency standards to lower the heat demand.

5.11. Factors to be considered with these measures are cost-effectiveness, affordability, ability to enable and apply to the range of future heat decarbonisation options and whether there are benefits to be realised prior to the installation of a clean heating system. They should also be compared to the costs and benefits of simply installing the clean heating system when built.

## Call for evidence questions

41.	Why is oil being installed in some new buildings currently? Are there particular factors or characteristics that are leading to oil being chosen over lower carbon alternatives? What are the barriers to installing a clean heating technology in these buildings?
42.	Do you have any evidence of the cost of retrofitting clean heating in current new build, compared to the cost of building to that standard now?
43.	What are the relative costs and benefits of installing clean heating systems in new build compared to installing futureproofing measures?
44.	What would be the most cost-effective and affordable measures to decarbonise new buildings? Please make reference to specific forms of clean heating or futureproofing measures.

