Department for
Business, Energy
& Industrial Strategy

Phasing out the installation of fossil fuel heating systems in businesses and public buildings off the gas grid

Closing date: 12 January 2022

October 2021

Any enquiries regarding this publication should be sent to us at:
nondomesticheat@beis.gov.uk

Executive Summary

Achieving net zero will require almost all buildings in the UK to transition to low carbon heating by 2050. Around a third of commercial, industrial, and public buildings ("non-domestic buildings"') off the gas grid currently have a fossil fuelled heating system in use for producing heating and hot water, making a significant contribution to their carbon emissions. The government committed in the Clean Growth Strategy[1], published in 2017, to phase out the installation of these systems in new and existing businesses off the gas grid during the 2020s.

This consultation sets out our proposed approach to deliver on that commitment by phasing out the installation of new oil, liquefied petroleum gas (LPG), and coal heating systems in non-domestic buildings off the gas grid. These fuels have a negative impact on our environment by emitting high levels of carbon and lowering the quality of our air. We propose to use the natural replacement cycle as the trigger to transition around 100,000 buildings[2] that are in scope; at the point their existing system requires replacement, they will install a low carbon one instead.

We believe that we will need to introduce this policy for the largest buildings in the mid-2020s to ensure those organisations are on the pathway to decarbonise their buildings by 2050. Our package of policies to grow heat pump deployment in the coming years, as set out in the Heat and Buildings Strategy[3], will enable smaller buildings to be brought in scope from 2026.

The government proposes to favour heating technologies that are energy efficient and compatible with net zero, and electrification offers the most realistic pathway to achieving this. We recognise that there may be a strategic role for other low carbon heating systems, including bioenergy, hybrid heat pumps, solar technologies, and heat networks. We expect a greater mix of technologies to be necessary for non-domestic buildings than for homes, due to their more varied uses of heat and hot water.

While some cost reductions are likely, the overall cost trajectory for low carbon heating technologies is uncertain; and this consultation invites evidence from respondents on the likely trajectory for non-domestic heating systems. Even with reductions in upfront costs and a flourishing green finance market, the cost of moving to a low carbon heating system is likely to be higher than what businesses have become accustomed to when installing fossil fuel heating. This means businesses must start to consider the cost of transitioning to low carbon heating in the coming years as part of their long-term decarbonisation plans.

Setting out our proposals for these buildings is part of our plan to provide a long-term framework for the decarbonisation of heat, which we believe will support market development and enable businesses to make informed investment decisions when planning improvements to their buildings.

[1] BEIS (2017), 'Clean Growth Strategy' (https://www.gov.uk/government/publications/clean-growth-strategy)
[2] See accompanying Impact Assessment
[3] BEIS (2021), 'Heat and Buildings Strategy' (https://www.gov.uk/government/publications/heat-and-buildings-strategy)

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General information

Why are we consulting?

This consultation sets out policy proposals for phasing out the installation of fossil fuel heating systems in businesses and public buildings off the gas grid. We invite stakeholder views on our approach and seek further evidence in specific areas to help shape the design of the policy, including on our proposals to:

- Use the natural replacement cycle to phase out oil, LPG or coal heating systems in businesses and public buildings off the gas grid.
- Take a heat pump first approach to the replacement of those fossil fuel systems.
- Allow the limited use of alternative low carbon systems, such as solid biomass, where a heat pump is not suitable.
- Introduce the policy using a phased approach with the largest buildings first (from 2024 at the earliest), followed by smaller buildings (from 2026).
- Consider whether it may be appropriate to end the use of fossil fuel heating in all non-domestic buildings off the gas grid, potentially in the 2040s.

Consultation details

Issued: 19 October 2021

Respond by: 12 January 2022

Enquiries to: nondomesticheat@beis.gov.uk

Please do not send responses by post to the department.

Consultation reference: Phasing out the installation of fossil fuel heating systems in businesses and public buildings off the gas grid.

Audiences: This consultation will be of interest to stakeholders operating in the heat sector, business representative bodies, and those with a wider interest in the UK's net zero ambition.

Territorial extent: This consultation is for England. It does not include Scotland, Wales, or Northern Ireland.

Related consultations: Phasing out the installation of fossil fuel heating in homes off the gas grid (https://www.gov.uk/government/consultations/phasing-out-fossil-fuel-heating-in-homes-off-the-gas-grid)

How to respond

Respondents are encouraged to make use of the online e-consultation platform, Citizen Space, to respond to this consultation wherever possible. This is the department's preferred method of receiving responses. However, responses submitted by email will be accepted.

Respond online at: https://beisgovuk.citizenspace.com/heat/phasing-out-fossil-fuel-heating-businesses-public

Email to: nondomesticheat@beis.gov.uk

Please do not send responses by post to the department.

When responding, please state whether you are responding as an individual or representing the views of an organisation.

Your response will be most useful if it is framed in direct response to the questions posed. There is an opportunity to provide further comments and evidence which are not related to the questions asked, at the end of the consultation.

Confidentiality and data protection

Information you provide in response to this consultation, including personal information, may be disclosed in accordance with UK legislation (the Freedom of Information Act 2000, the Data Protection Act 2018, and the Environmental Information Regulations 2004).

If you want the information that you provide to be treated as confidential, please tell us, but be aware that we cannot guarantee confidentiality in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not be regarded by us as a confidentiality request.

We will process your personal data in accordance with all applicable data protection laws. See our privacy policy.

We will summarise all responses and publish this summary on GOV.UK. The 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 consultation has been carried out in accordance with the government's consultation principles. If you have any complaints about the way this consultation has been conducted, please email: beis.bru@beis.gov.uk.

Introduction

The UK was the first major economy in the world to set a legally binding target to achieve net zero greenhouse gas emissions by 2050. In April 2021, we enshrined an ambitious target to reduce emissions by 78% by 2035 on 1990 levels into UK law. The UK has already shown that environmental action can go hand-in-hand with economic success, having grown our economy by more than three-quarters while cutting emissions by over 40% since 1990. The sixth carbon budget is another indication of this government's dedication to Britain's green industrial revolution, positioning the UK as a global leader in the green technologies of the future[4].

Decarbonising buildings is central to the challenge of meeting our carbon budgets, and ultimately, net zero. For us to meet these targets, we need to urgently address the carbon emissions produced in heating our homes, businesses, and public buildings. We use energy for heating and cooling, cooking, hot water, and a host of energy-using products in buildings. While the electricity that powers our lighting and appliances is decarbonising fast, most buildings still rely on burning fossil fuels for their heating and hot water.

Buildings are responsible for around 30% of our national greenhouse gas emissions and generating heat accounts for the vast majority of this[5]. Heat decarbonisation is therefore recognised as one of the most important challenges we face in meeting our climate targets and we must take significant steps to address it. This inevitably comes at a time when the UK faces significant difficulties arising from the COVID-19 pandemic. The government sees the opportunity to place decarbonisation at the heart of our plans to build back better.

Alongside the 23 million homes in England, there are approximately 1.55 million commercial, industrial, and public buildings[6], referred to hereafter as "non-domestic buildings". While non-domestic buildings make up a small proportion of the total building stock, the generation of heating and hot water in these buildings was responsible for around 10% of our national greenhouse gas emissions in 2018[7]. Transitioning these heating systems to low carbon technologies and improving the overall energy performance of buildings is a necessary and vital step in meeting net zero and our preceding carbon budgets.

We are continuing to conduct further research and development on the most effective measures to decarbonise buildings connected to the gas grid, including the potential use of hydrogen for heating. However, for those buildings that are off the gas grid and heated by oil, LPG, or coal, it is clear that we can act now. That is why in the Clean Growth Strategy[8], the

[4] We have set a series of targets to reduce greenhouse gas emissions through legally-binding 'carbon budgets'. The sixth carbon budget covers the period 2033-2037
[5] BEIS (2021), 'Final UK greenhouse gas emissions national statistics: 1990 to 2019' (https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019)
[6] BEIS (2020), 'Non-domestic National Energy Efficiency Data Framework' (https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data-framework-nd-need-2020)
[7] BEIS (2020), 'Final UK greenhouse gas emissions national statistics: 1990 to 2018' (https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2018)
[8] BEIS (2017), 'Clean Growth Strategy' (https://www.gov.uk/government/publications/clean-growth-strategy)

government committed to phase out the installation of high-carbon forms of fossil fuel heating in new and existing businesses off the gas grid during the 2020s. This was reaffirmed in the government response to A Future Framework for Heat in Buildings: Call for Evidence[9].

Electrification of these heating systems is the leading pathway, as in the absence of an existing pipe network, the use of hydrogen as a heating fuel does not offer a cost-effective route to decarbonisation. These buildings, particularly the approximately 100,000 that use oil, LPG, or coal for heating[10], are significant contributors to carbon emissions. Decarbonising these heating systems could deliver approximately 0.6 $MtCO_2e$ in annual emissions savings, on top of savings from energy efficiency policies[11]. Phasing out the installation of fossil fuel heating off the gas grid is consistent with our net zero commitment and will play an important part in reaching our aim to install 600,000 heat pumps a year by 2028, as announced by the Prime Minister in his ten point plan for a green industrial revolution[12].

It was clear in the feedback we received in the Future Framework for Heat in Buildings: Call for Evidence[13] that the heat sector requires long-term clarity on the regulatory framework to support market development and to enable businesses to make informed investment decisions when planning improvements to their buildings. The evidence shows that energy efficiency improvements and the electrification of heat offer the greatest decarbonisation opportunities for most off-gas grid buildings.

We know the cost and practical implications of retrofitting buildings can be higher and more difficult than installing low carbon heating systems in newly built buildings. For this reason, the government proposes to introduce the Future Buildings Standard (FBS)[14] from 2025 which will provide a pathway to highly efficient non-domestic buildings that use low carbon heat and have the best fabric standard possible. The FBS will be delivered through changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations.

For existing off-gas grid buildings, this consultation seeks views on the government's commitment to transition them to low carbon heating systems. This policy will include approximately 100,000 existing buildings[15] in England that use heating systems fuelled by oil, LPG, or coal. The proposed policy would prevent buildings from installing a new high carbon fossil fuel heating system when their existing system reaches end-of-life and would favour heat pumps as a replacement. We are pleased to see many businesses already considering the environmental impact of their heating system in advance of a regulatory requirement; in recent

[9] BEIS (2018), 'A future framework for heat in buildings: Call for Evidence' (https://www.gov.uk/government/consultations/a-future-framework-for-heat-in-buildings-call-for-evidence)
[10] See accompanying Impact Assessment
[11] See accompanying Impact Assessment
[12] HMG (2020), 'The Ten Point Plan for a Green Industrial Revolution' (https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution)
[13] BEIS (2018), 'A future framework for heat in buildings: Call for Evidence' (https://www.gov.uk/government/consultations/a-future-framework-for-heat-in-buildings-call-for-evidence)
[14] MHCLG (2021), 'The Future Buildings Standard' (https://www.gov.uk/government/consultations/the-future-buildings-standard)
[15] See accompanying Impact Assessment

research we saw a growing number of businesses with off-gas grid buildings considering a switch to low carbon heat for when their existing heating system requires replacement[16].

We invite stakeholder views on a phased approach to implementation, introducing this policy for large buildings first (those with a floor area of 1,000m^2 or above), followed by smaller buildings a few years later. We believe it will be necessary to introduce this policy for the largest buildings in the mid-2020s, to ensure that those businesses are on the pathway to decarbonise by 2050. The actual date of implementation would be dependent on the legislative vehicle used to implement the policy and future heat pump market conditions; however, we expect it to be no earlier than 2024. We believe that our package of policies to significantly grow heat pump deployment in the coming years will enable the rest of the off-gas grid building stock (both homes and smaller non-domestic buildings) to be brought into scope from 2026. Ahead of that date, we intend to launch a further consultation on the technical changes to existing regulations or guidance, or other legislation, needed to deliver this policy. We intend to use that exercise to review the heat pump market conditions and consider what additional support may be needed for businesses at that time.

Beyond space heating and hot water production, we know many businesses also have high energy use due to industrial heat processes. Although we have seen an acceleration in the development of low carbon technologies suitable for industrial heat requirements, we recognise the scale of the challenge in decarbonising these processes. Therefore, the generation of heat using fossil fuel systems for industrial purposes will not be included in this policy. The government is supporting industry to overcome barriers to decarbonising industrial heat through past initiatives such as the Industrial Heat Recovery Support Programme[17] and the ongoing Industrial Energy Transformation Fund (£315 million of funding).[18]

The government will lead the way in decarbonising its buildings, which is why we have set out our ambitions to halve greenhouse gas emissions from public sector buildings by 2032, compared to 2017 levels. Around 5%[19] of public buildings are off the gas grid and are in scope of this policy. Our investment into decarbonising public buildings will continue to grow the market for low carbon heating technologies, develop the skills and expertise of the workforce, and unlock innovation in the heat sector.

Decarbonising non-industrial heat and hot water in off-gas grid businesses is an important and necessary part of the government's ambitious commitment to reaching net zero by 2050. The government recognises this transition to low carbon heating systems will be challenging for some businesses, but it will also unlock many opportunities, such as skilled jobs, innovation, and a cleaner environment for us to live and work in. Our transition to a low carbon economy is

[16] BEIS (2021), 'Social research with non-domestic consumers in buildings in off-gas grid areas of England and Wales' (https://www.gov.uk/government/publications/heating-non-domestic-buildings-in-off-gas-grid-areas-consumer-experiences-and-attitudes-towards-low-carbon-heating)
[17] BEIS 'Industrial Heat Recovery Support Programme' (https://www.gov.uk/guidance/industrial-heat-recovery-support-programme-how-to-apply)
[18] BEIS 'Industrial Energy Transformation Fund' (https://www.gov.uk/government/collections/industrial-energy-transformation-fund)
[19] BEIS (2016), 'Building Energy Efficiency Survey' (https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees)

being delivered in close partnership with industry and business; this consultation is the next part of this important conversation.

The government expects to provide a response to this consultation in spring 2022. We intend to consult again prior to the introduction of the policy to engage stakeholders on the technical details. In addition to setting out our approach to tackling off-gas grid buildings in this consultation, the government recognises the need to provide long-term strategic direction on how to decarbonise the heating systems in businesses connected to the gas grid. The Heat and Buildings Strategy[20], published alongside this consultation, considers the potential pathways for these buildings.

The non-domestic off-gas grid building stock

There are around 280,000[21] non-domestic off-gas grid buildings in England and approximately 100,000[22] use oil, LPG, or coal to fuel their heating systems. We recognise how diverse these buildings are in shape, size, and energy use. It is estimated that the full decarbonisation of the systems used to produce heating and hot water in these buildings can deliver approximately 0.6 $MtCO_2e$ of annual emissions savings[23], on top of savings from energy efficiency policy.

A significant portion of these carbon emissions come from a relatively small number of large buildings; those with a floor area of 1,000m^2 and above account for 60% of the potential carbon savings across the non-domestic off-gas grid building stock.

We see a much larger number of buildings with a floor area between 150m^2 and 1,000m^2 and these account for approximately 35% of the potential carbon savings. The average carbon emissions per building drop significantly for the smallest non-domestic buildings; many of these will have similar characteristics, including size and energy use, to domestic buildings. Although it is necessary to phase out fossil fuel systems in every non-domestic building, these statistics demonstrate the value in considering whether the small number of large buildings that account for the greatest quantity of carbon emissions, could transition to low carbon heating first.

Building Size	Proportion of Carbon Savings	Floor Area (m^2)	Proportion of Buildings
Large	60%	>1,000	10%
Medium	35%	150-1,000	60%

[20] BEIS (2021), 'Heat and Buildings Strategy' (https://www.gov.uk/government/publications/heat-and-buildings-strategy)
[21] BEIS (2020), 'Non-domestic National Energy Efficiency Data Framework' (https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data-framework-nd-need-2020). This does not include buildings that are on the gas grid but choose not to be connected.
[22] See accompanying Impact Assessment
[23] See accompanying Impact Assessment

Small	5%	<150	30%

Table 1 – Carbon savings (from decarbonising heat) by building size in the non-domestic off-gas grid building stock[24].

In addition to varying levels of carbon emissions, it is also important to recognise that other characteristics in the building stock may have a bearing on the approach that we take, and the wider enabling measures needed to decarbonise their heating systems:

- There is roughly an even split between businesses that own the building they occupy and those that rent it[25]. We recognise that there may be specific challenges to consider for buildings that are rented, depending on how responsibility for the heating system is set out in the lease. We are conducting research to consider how the costs associated with this policy would be allocated in rented non-domestic buildings.
- Small and medium sized enterprises (SMEs) occupy around 80% of the buildings in scope of this policy. Our modelling suggests that most large buildings with a floor area of 1,000m^2 and above are occupied by large businesses with over 250 employees. Of all non-domestic buildings, less than 5% are both large (>1,000m^2) and occupied by SMEs. Of those large buildings, there are very few, if any, occupied by micro businesses (under 9 employees)[26].
- Of the approximately 100,000 non-domestic buildings which use oil, LPG, or coal, the public sector occupies around 5%, of which around half are 1,000m^2 or above[27]. The use of these large public buildings is incredibly varied, ranging from hospitals to prisons, and is likely to present significant challenges to decarbonisation. Phases 1 and 2 of the Public Sector Decarbonisation Scheme have made over £1 billion in funding available to public buildings to support them in the transition to low carbon heating[28]. We have now published guidance on Phase 3, which will fund projects from 2022/23 to 2024/25. We expect to see significant growth and innovation in the supply chains for large low carbon heating technologies due to the decarbonisation projects taking place in public buildings. We are working across the public sector, including with local government organisations, to develop this policy.

[24] See accompanying Impact Assessment and BEIS (2016), 'Building Energy Efficiency Survey' (https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees)
[25] BEIS (2016), 'Building Energy Efficiency Survey' (https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees)
[26] BEIS (2020), 'Non-domestic National Energy Efficiency Data Framework' (https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data-framework-nd-need-2020)
[27] BEIS (2016), 'Building Energy Efficiency Survey' (https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees)
[28] BEIS, 'Public Sector Decarbonisation Scheme' (https://www.gov.uk/government/collections/public-sector-decarbonisation-scheme)

The proposals

Achieving net zero will require almost all buildings in the UK to transition to low carbon heating by 2050. Around a third of non-domestic buildings off the gas grid currently have a fossil fuelled heating system in use for producing heating and hot water, which contributes to carbon emissions. This consultation seeks views on our proposals to:

- Use the natural replacement cycle to phase out oil, LPG or coal heating systems in businesses and public buildings off the gas grid. This means that when a heating system comes to the end of its life, it will be replaced with a low carbon one.
- Take a heat pump first approach to the replacement of those fossil fuel systems.
- Allow the limited use of alternative low carbon systems, such as solid biomass, where a heat pump is not suitable.
- Introduce the policy using a phased approach with the largest buildings first (from 2024 at the earliest), followed by smaller buildings (from 2026).
- Consider whether it may be appropriate to end the use of fossil fuel heating in all non-domestic buildings off the gas grid, potentially in the 2040s.

The government will legislate to introduce this policy and we are considering different options for doing so. This includes the use of performance standards in the Building Regulations, such as those around carbon emissions and the energy efficiency of buildings. We are also considering whether, as an alternative, creating new powers in primary legislation would be more appropriate. We will publish a second consultation to invite stakeholder views on the technical detail of the policy, ahead of it coming into effect.

1. **Do you agree with the principle of using the natural replacement cycle to phase out the installation of fossil fuel heating systems in non-domestic buildings off the gas grid? Yes/No. Please explain your response.**

Timelines for implementing the proposals

Setting a long-term framework for the decarbonisation of heating in non-domestic buildings is vital to support market development and to enable businesses to make informed investment decisions, when planning improvements to their buildings. This consultation seeks views on a suitable timeline for transitioning non-domestic buildings to low carbon heating based on the natural replacement cycle of heating systems.

We are mindful that the Climate Change Committee in its Sixth Carbon Budget analysis identified the potential to begin phasing out fossil fuel systems in non-domestic buildings in advance of homes[29]. The challenges facing us because of climate change mean we must act as soon as possible to decarbonise our buildings. However, we recognise the need to provide

[29] CCC (2020), 'Sixth Carbon Budget' (https://www.theccc.org.uk/publication/sixth-carbon-budget/)

businesses with sufficient lead-in time and the need to stimulate further growth in the low carbon heating market, before compelling a transition to low carbon heating. The scale of the transition challenge will be different for each business, although it seems logical to target those who account for the largest proportion of carbon emissions and who we believe are most able to finance their transition, first. We are therefore proposing to begin the transition to low carbon heating off the gas grid with the largest buildings, before extending the policy to the wider non-domestic building stock.

It is apparent that larger buildings disproportionately account for a higher amount of carbon emissions. While setting the parameters for what constitutes a large building is difficult, the evidence suggests that there are a small number of buildings with a floor area of 1,000m^2 and above that are responsible for a significant proportion of carbon emissions; roughly, the largest 10% of buildings account for 60% of carbon emissions coming from heat in the non-domestic off-gas grid building stock (Table 1).

We recognise that there is significant variety in the use of heat and hot water in these large buildings which may impact the feasibility of transitioning away from fossil fuels. However, our modelling suggests that the vast majority are suitable for low carbon heating with improvements to the building's energy efficiency and that some of the barriers that may be experienced in smaller buildings, such as limited space, are less prevalent. In our engagement with heat pump manufacturers, we understand that the technology exists to produce heating systems with the capacity to manage these high and varying heat demands, and we have seen many such systems supported through the Non-Domestic Renewable Heat Incentive[30].

We propose to phase out the installation of fossil fuel heating systems using the natural replacement cycle to make it the least disruptive for consumers. For this policy to be effective, we must be confident that most heating systems currently installed will reach the end of their life well in advance of our 2050 net zero commitment. There is evidence, gathered through our stakeholder engagement, to suggest that the systems in use in the largest buildings tend to have longer natural lifespans (20 years or more) than those used in smaller non-domestic buildings. This adds to the case for transitioning the largest buildings to low carbon heat, first.

Starting the off-gas grid transition in buildings with a floor area of above 1,000m^2 would complement our proposals for an annual performance-based energy rating for large commercial and industrial buildings[31], which will also focus on large businesses. The policy will recognise and incentivise these buildings to make improvements to their energy performance, including their heating system, and allocate a star rating accordingly. This will be a valuable mechanism for rewarding off-gas grid businesses who transition to low carbon heating systems, and we expect to see many voluntarily install these systems in advance of being required to do so. It will also provide businesses with a more accurate view on the positive impact their transition will have on running costs and carbon savings, in addition to providing

[30] Non-Domestic Renewable Heat Incentive (https://www.gov.uk/non-domestic-renewable-heat-incentive)
[31] BEIS (2021), 'Introducing a performance-based policy framework in large commercial and industrial buildings' (https://www.gov.uk/government/consultations/introducing-a-performance-based-policy-framework-in-large-commercial-and-industrial-buildings)

government with better data on these large buildings. The government will publish more details about the rating scheme later this year.

The government is mindful of the financial challenge this policy may have on SMEs (organisations with fewer than 250 employees). Therefore, our ability to bring forward the date of introduction for large buildings is contingent on the policy having a minimal impact on SMEs that may occupy those large buildings. We believe that this is possible as less than 5% of non-domestic buildings are both large (>1,000m^2) and occupied by SMEs.

Research on non-domestic consumer awareness of low carbon heating off the gas grid showed that of those surveyed, large businesses were more likely to be planning to transition to low carbon heat and are already putting money aside for this[32]. We are also aware that large businesses are more likely to have access to a wider range of financing options than SMEs, although we acknowledge that this is dependent on the financial standing of the individual business. Access to finance and transition costs are discussed later in this consultation.

Considering these factors, we believe it may be necessary and sensible to introduce this policy for the largest buildings in the mid-2020s to ensure businesses are on the pathway to decarbonise their buildings by 2050. This is contingent on the evidence continuing to show that the technological solutions will be available for buildings with high and varied energy demand. The actual date of implementation would be dependent on the legislative vehicle used to implement the policy and future heat pump market conditions; however, we expect it to be no earlier than 2024.

We believe that our package of policies to significantly grow heat pump deployment in the coming years will enable the rest of the off-gas grid building stock (both homes and smaller non-domestic buildings) to be brought into scope from 2026. Some of these enabling policies include the:

- Non-Domestic Renewable Heat Incentive[33]: Since November 2011, this financial incentive has provided thousands of businesses across Great Britain with payments based on a tariff model for installing low carbon heating. Although the scheme is closed to new applications, it will continue to provide financial support throughout the 2020s and 2030s to accredited installations.
- Public Sector Decarbonisation Scheme[34]: Phases 1 and 2 of this scheme offered over £1 billion in grant funding to publicly owned buildings for heat decarbonisation and energy efficiency projects. Phase 3 will fund further projects from 2022/23 to 2024/25. Many of these buildings will require large heat pumps due to their size and energy use and we expect this demand to stimulate the low carbon heating sector, and in particular the development of large heat pumps.

[32] BEIS (2021), 'Heating non-domestic buildings in off gas grid areas: consumer experiences and attitudes towards low carbon heating' (https://www.gov.uk/government/publications/heating-non-domestic-buildings-in-off-gas-grid-areas-consumer-experiences-and-attitudes-towards-low-carbon-heating)
[33] Non-Domestic Renewable Heat Incentive (https://www.gov.uk/non-domestic-renewable-heat-incentive)
[34] BEIS, 'Public Sector Decarbonisation Scheme' (https://www.gov.uk/government/collections/public-sector-decarbonisation-scheme)

- Boiler Upgrade Scheme[35]: The Boiler Upgrade Scheme (previously named the Clean Heat Grant) will provide financial support for the installation of low carbon heating systems, following the closure of the Domestic Renewable Heat Incentive in March 2022. This £450 million scheme will provide homes and small non-domestic buildings with upfront capital grants of £5,000 for air source heat pumps and biomass boilers, and £6,000 for ground source heat pumps. System thermal capacity will be limited to 45 kilowatts. Our analysis suggests over 50% of businesses off the gas grid will be suitable for a heat pump of that size[36]. We encourage eligible businesses to consider utilising this funding to transition to low carbon heating in advance of this policy mandating it.
- Market-Based Mechanism, from 2024[37]: In parallel to this consultation, we are consulting on proposals for a market-based mechanism to be introduced in 2024 which would create a market incentive for industry to accelerate growth in the sales of heat pumps. It will underpin investment and innovation throughout the supply chain, helping to reduce costs, improve and expand the consumer offer and consumer journeys, and grow the base of skilled installers capable of installing heat pumps quickly and efficiently across a broader range of properties.
- Private Rented Sector minimum energy efficiency standards[38], by 2030: We will require privately rented, non-domestic buildings to improve their EPC score to Band B by 2030. This will improve the energy efficiency of these buildings, paving the way for the installation of low carbon heat, and in some instances recommending low carbon heating. We expect that around 60% of buildings that are in scope of this off-gas grid policy will also be in scope of the EPC B energy efficiency requirement. The cumulative effective of both policies on landlords is discussed later in this consultation.
- Small Business Energy Efficiency Scheme[39](SBEES): In 2019 we ran a call for evidence on proposals for an energy efficiency scheme focused on SMEs, to help remove the historic and well documented barriers to improving energy efficiency performance in buildings. Improvements in the energy efficiency of a building will also likely make it more suitable for the installation of low carbon heat. We plan to publish a consultation on SBEES in due course.

We strongly encourage businesses, particularly SMEs, to consider the benefit of engaging with current and future financial support schemes to enable them to fund their transition to low carbon heating in advance of our off-gas grid proposals coming into effect.

[35] BEIS (2021) Future support for low carbon heat: Boiler Upgrade Scheme Government Response (https://www.gov.uk/government/consultations/future-support-for-low-carbon-heat)
[36] See accompanying Impact Assessment
[37] BEIS (2021), 'Market-Based Mechanism for Low Carbon Heat' (https://www.gov.uk/government/consultations/market-based-mechanism-for-low-carbon-heat)
[38] BEIS (2021), 'Non-domestic Private Rented Sector minimum energy efficiency standards: EPC B implementation' (https://www.gov.uk/government/consultations/non-domestic-private-rented-sector-minimum-energy-efficiency-standards-epc-b-implementation)
[39] BEIS (2020), 'Energy efficiency scheme for small and medium sized businesses: Call for Evidence' (https://www.gov.uk/government/consultations/energy-efficiency-scheme-for-small-and-medium-sized-businesses-call-for-evidence)

This consultation therefore seeks views on the case for introducing this policy for the largest buildings as soon as possible, but no earlier than 2024, and the remaining stock from 2026.

2. **Do the 2024 and 2026 timescales for introducing this policy provide sufficient lead in time for non-domestic off-gas grid consumers to prepare for their transition to low carbon heat? Yes/No. Please provide evidence to support your response where possible.**

3. **Would an implementation date of 2024 (for large buildings) and 2026 (for smaller buildings) provide sufficient lead in time for industry to prepare for the increase in demand? Yes/No. Please provide evidence to support your response where possible.**

4. **Do you agree with our proposal to introduce this policy for the largest buildings first? Yes/No. If not, please explain your reasoning, using evidence to support your response where possible.**

Proposed low carbon technologies

The government consulted on the role that a range of technologies can play in the decarbonisation of heat off the gas grid in the 'A Future Framework for Heat in Buildings' Call for Evidence[40]. We must favour technologies that are energy efficient and compatible with net zero. We have established that electrification offers the most realistic pathway to achieve this, as supported by respondents to the call for evidence and the Climate Change Committee[41]. We recognise that there may be a strategic role for other low carbon heating systems, including bioenergy, hybrid heat pumps, solar technologies, and heat networks; we expect a greater mix of technologies to be necessary for non-domestic buildings due to their varied uses of heat and hot water. This policy will be designed to discourage the transition to direct electric heating systems as these have a lower efficiency compared to heat pumps and are likely to increase energy running costs for non-domestic building occupants.

The government recognises the diverse use of heat and hot water in non-domestic buildings. For instance, offices generally have steady heat and hot water use, while the hospitality sector sees far more peaks in demand, particularly in hotels. We are alive to these sector variations in demand and welcome views from respondents on the technical solutions that will be necessary to overcome these challenges and how we can best support different sectors.

Favouring heat pumps

Heat pumps are the current leading market solution due to being highly efficient and commercially available at scale. Based on available evidence, we believe that heat pumps offer the greatest decarbonisation opportunity (noting the need to move to non-

[40] BEIS (2018), 'A future framework for heat in buildings: Call for Evidence' (https://www.gov.uk/government/consultations/a-future-framework-for-heat-in-buildings-call-for-evidence)
[41] CCC (2020), 'Sixth Carbon Budget' (https://www.theccc.org.uk/publication/sixth-carbon-budget/)

hydrofluorocarbon-based refrigerants[42]) and are suitable for a large proportion of non-domestic buildings. Our evidence shows most buildings in scope currently use a boiler and a central hot water distribution system. These types of buildings are well-equipped for a retrofit to an air (specifically air to water) or ground source heat pump.

The government has supported the growth of heat pumps through the Non-Domestic Renewable Heat Incentive[43] since 2011 and the Domestic Renewable Heat Incentive[44] since 2014, and its deployment has consistently proven successful at significantly reducing carbon emissions in a variety of buildings. Large heat pump systems reaching several megawatts in capacity will be required for many non-domestic buildings and, in most cases, will require a ground or water source. These large systems may be standalone or form part of a cascaded system. Cascaded units may connect multiple domestic-sized systems and be turned on and off based on the peak demand of the building. We have some evidence from industry that the market is moving towards a focus on cascading units as opposed to the production of larger standalone systems but recognise this may be in response to a lack of demand for bespoke systems. We believe such a market for large bespoke systems may develop as demand is created through this policy. We welcome views from manufactures on their ability to meet this demand and the potential lead-in times they would require.

Of the approximately 100,000 non-domestic buildings that are in scope of this policy[45], our analysis indicates that most are technically suitable for a heat pump in their current state, although we acknowledge that it would be cost effective for many to carry out improvements to their building fabric prior to transitioning. This assessment has been determined by considering the fabric, energy use, and floor area of the non-domestic building stock. We have limited evidence on other factors, such as fluctuations in heat demand and space constraints for installing the systems, which may impact the suitability of heat pumps across the building stock. We acknowledge that there will be some buildings where planning constraints may make it more challenging to make the building suitable for a heat pump, although it should be noted that there are permitted development rights which enable the installation of ground or water source heat pumps in non-domestic premises without applying for planning permission. There are, however, important limits and conditions which must be met to benefit from the permitted development rights.

Installing a heat pump will add to the electricity demand of a building and, as we see significant growth in the electrification of heat, additional electricity generation and reinforcement of the electricity distribution network will be necessary for some buildings. We are working with Distribution Network Operators, the Energy Networks Association and Ofgem to consider the costs and timescales for local network reinforcement and to determine further actions necessary for electrification of heat. Smart systems will be of fundamental importance to shift electricity demand away from peaks. That is why we are committed to ensuring more building

[42] Many heat pumps use hydrofluorocarbon (HFC)-based refrigerants, which are themselves greenhouse gases. The UK is committed to reducing HFC use by 85% by 2036, and future heat pump deployment will need to reflect this by ensuring that use of HFCs is phased out in favour of alternative technologies.
[43] Non-Domestic Renewable Heat Incentive (https://www.gov.uk/non-domestic-renewable-heat-incentive)
[44] Domestic Renewable Heat Incentive (https://www.gov.uk/domestic-renewable-heat-incentive)
[45] See accompanying Impact Assessment

occupants have visibility of their energy use through our smart meter roll-out programme. This opens the door for non-domestic building occupants to take a smarter, more flexible approach to energy use through time of use tariffs, smart heat pump controls and energy storage which we would expect to reduce energy bills. We discuss energy bills later in the consultation.

5. **Do you agree with our proposals to take a heat pump first approach to the replacement of fossil fuel heating systems in off-gas grid non-domestic buildings? Yes/No. Please explain your response.**

6. **Do you agree that most non-domestic off-gas grid buildings will be suitable for a heat pump? Yes/No. Please provide evidence to support your response, including examples of situations where the heat and hot water demand could not be met by a heat pump.**

Alternative low carbon systems

Due to the diverse nature of non-domestic buildings, we acknowledge that the installation of a heat pump may not be technically feasible or cost effective compared to other low carbon heating systems in some buildings. We characterise these buildings as ‘hard to treat’, meaning the building experiences heat losses that cannot be effectively treated with energy efficiency improvements due to unreasonable costs, technical constraints or controls placed on the buildings, such as it being listed. In such instances it will be necessary to enable the use of alternative low carbon heating solutions, provided they are consistent with wider government objectives on net zero, environmental sustainability and air quality. The exact details of these criteria will be consulted upon prior to the implementation of this policy to ensure they are current, considerate of the technologies available at the time, and reflective of government commitments. In the interim, though, we broadly expect this to mean the systems use fuels that:

- Are fully renewable or can demonstrate a clear and rapid trajectory to becoming so.
- Are produced using sustainable sources, meaning their impact on biodiversity, the wider environment, and the level of carbon emissions in supply chains will be considered.
- Minimise any negative impact on air quality that may occur as a result of harmful pollutant emissions.
- Offer a positive experience for the consumer. For example, we must be confident that supply chains are able to meet demand and there are sufficient competent installers for the relevant technology.

We propose a technology agnostic approach for these alternatives built on standards to ensure compatibility with the wider government objectives set out above. Based on the current evidence we have available there are a variety of low carbon heat technologies that we believe have the potential to play a role in ‘hard to treat’ buildings with further development and innovation. We are keen to hear views on this approach, and in particular whether there are sectors or building types with specific needs that should be taken into account, for example, heritage buildings or those occupied by voluntary sector organisations.

Solid biomass

The government recognises that solid biomass fuelled heating systems will have a strategic role in the wider decarbonisation of the economy. However, we believe that the role of solid biomass in heating buildings should be niche and limited, in line with advice from the Climate Change Committee[46]. Although this technology has a lower efficiency than a heat pump, it may provide a suitable alternative for 'hard to treat' buildings which are unable to undergo fabric improvements to make them suitable for electrification. This may be due to high energy use, space constraints and in instances where high heat losses in buildings cannot be reduced cost effectively through energy efficiency improvements, such as insulation.

The government has ongoing commitments to support over 17,000 solid biomass installations accredited through the Non-Domestic Renewable Heat Incentive[47]. These installations have been subject to high standards for the type and origin of biomass fuel used. This ensures the biomass feedstock follows stringent sustainability criteria based on land use, greenhouse gas emissions and air quality requirements. The government is considering the introduction of additional measures to improve the air quality emitted from biomass boilers. These include the introduction of annual maintenance checks for all participants on future government schemes and ensuring that the quality of fuel used is of an approved standard.

For this policy, and as similarly seen in the Future Support for Low Carbon Heating consultation[48], we will aim to ensure biomass is not burned in or close to urban areas. The uses of solid biomass will be targeted at 'hard to treat' buildings in rural, off-gas grid areas where there is less potential for concern regarding local air quality. The long-term role of solid biomass in the heat sector will be informed by the Biomass Strategy, due to be published in 2022, which will consider how this resource should be best utilised across the economy. To inform the development of the Biomass Strategy, the government published a call for evidence on the role of biomass in achieving net zero[49] in April 2021.

Liquid biofuels

Liquid biofuels today are predominately used in the decarbonisation of transport, although the government is aware of a small number of bespoke biofuel heating systems being used in the non-domestic heating sector. In buildings currently fuelled by LPG, modification to the boiler system will not be required for the use of bioLPG since the fuels are chemically identical. There is therefore no additional upfront cost outlay associated with a transition from LPG to a bio-blend. However, this does bring to our attention some uncertainties about consumer behaviour and potential risk of gaming if boilers are compatible with both fuels. Initial engagement with industry has indicated that the market has an ambition to deliver 100% bioLPG by 2040.

[46] Climate Change Committee (2016), 'Next Steps for UK Heat Policy' (https://www.theccc.org.uk/publication/next-steps-for-uk-heat-policy/)
[47] BEIS (2021), 'Official Statistics: RHI monthly deployment data' (https://www.gov.uk/government/statistics/rhi-monthly-deployment-data-march-2021-quarterly-edition)
[48] BEIS (2021), 'Future support for low carbon heat' (https://www.gov.uk/government/consultations/future-support-for-low-carbon-heat)
[49] BEIS (2021), 'Role of biomass in achieving net zero: Call for Evidence' (https://www.gov.uk/government/consultations/role-of-biomass-in-achieving-net-zero-call-for-evidence)

Current global volumes are very low and significant amounts of investment and research would be needed before this could be delivered at scale.

Alongside bioLPG, the oil industry is working towards biofuel alternatives to heating oil which are 100% bio-derived. Industry is exploring the potential of several types of liquid biofuel in the decarbonisation of heating, including biodiesel fuels such as hydrogenated vegetable oil, which is used today in the transport sector. Some liquid biofuels can be considered 'drop in' fuels, where no or very little change is needed to an existing fossil fuel heating system, whereas others may require a new boiler or tank to be installed. For some liquid biofuels, whether it is a 'drop-in' will depend on the age and condition of the existing heating system or tank.

With several bio-derived fuels already being used to decarbonise transport and heavy industry, the deployment of liquid biofuels for off-gas grid heating, like solid biomass, will be limited by constraints on the global availability of sustainable feedstocks. For this reason, government will seek to give priority to sectors which have fewer alternatives to decarbonisation, for example the aviation industry.

Further evidence is needed to consider what role biofuels could play in the future low carbon heating mix off the gas grid, and to develop the policy framework which would support such a role. In gathering further evidence, we are giving consideration to the availability and sustainability of biofuel feedstocks, the total lifecycle emissions for different fuels, and the best uses of biofuels across the economy.

The department recently published a call for evidence[50] to inform the development of a Biomass Strategy. This strategy will review the amount of sustainable biomass available to the UK, including liquid biofuels, and how this could be best used across the economy to achieve our net zero target. It will also assess the UK's current biomass sustainability standards, which are some of the most stringent in the world, to see where and how we can improve them even further.

Hybrids

Heat pumps can also be used as part of a hybrid system using more than one technology (such as an air source heat pump and a combustion boiler) within the same heating system. Hybrid heat pumps are available today, combined with fossil fuel boilers. However, for hybrids to play a long-term role in the decarbonisation of buildings off the gas grid, the fuel used by the boiler must be net zero-consistent. This creates a clear synergy between hybrid heat pumps and the use of biofuels which are 100% bio-derived or which can demonstrate a clear and rapid trajectory to removing all fossil fuel content. In buildings off the gas grid, deployment of hybrids will likely be constrained by the overarching need to conserve and prioritise biomass feedstocks and the limited commercial availability of biofuels, as set out above.

[50] BEIS 'Role of biomass in achieving net zero: Call for Evidence' (2021), https://www.gov.uk/government/consultations/role-of-biomass-in-achieving-net-zero-call-for-evidence

Where this can be achieved, we recognise the benefit that hybrids could have in alleviating the pressure placed on the electricity grid during peak periods and in turn the impact this could have on reducing running costs.

Solar

We believe there is a role for solar technologies, including solar thermal and solar photovoltaic, in complementing the installation of a heat pump. The benefits of these technologies can be realised through helping with peaks in heating or hot water demand and addressing variations in outside temperature when combined with a heat pump. In addition, where a heat pump is run on or supplemented by electricity generated from solar photovoltaic panels, a reduction in running costs could be expected.

Heat networks

Heat networks supply heat from a central source to multiple consumers, via a network of pipes often carrying hot water. This avoids the need for individual heat generating systems in every unit or building. Heat networks can provide heat for multiple buildings at once and can cover a large area or even an entire city (known as district heating). Heat networks can also deliver heat for multiple customers in one building, for example in a mixed-use building (known as communal heat networks). Heat networks are one of the most cost-effective ways of reducing carbon emissions from heating and can be particularly efficient where there is a lot of heat demand close together. We have supported projects that bring together multiple businesses and homeowners to develop their own low carbon heat networks which ultimately decarbonise their heating systems and reduce the cost of their energy bills. As well as developing new heat networks, we recognise that many existing heat networks require further decarbonisation to meet our net zero commitments.

We believe there may be the opportunity for off-gas grid buildings that are situated in areas with high levels of heat density to form a heat network. The government is investing up to £320 million of capital investment through the Heat Networks Investment Project[51] to increase the deployment of heat networks and has confirmed a further £270 million for 2022 to 2025 through the Green Heat Network Fund[52].

In addition, we are consulting on proposals for heat network zoning in England[53], which is intended to ensure that heat networks are deployed where they are most appropriate. Our proposals are for central and local government, industry, and local stakeholders, to work together to identify areas where heat networks are the lowest cost, low carbon solution for decarbonising heat. We propose that certain buildings within a heat network zone would be required to connect to a heat network within a prescribed timeframe, with exemptions available to avoid sub-optimal outcomes.

[51] BEIS, 'Heat Networks Investment Project' (https://www.gov.uk/government/collections/heat-networks-investment-project-hnip-overview-and-how-to-apply)
[52] BEIS (2021), 'Green Heat Network Fund (GHNF) Transition Scheme' (https://www.gov.uk/government/publications/green-heat-network-fund-ghnf-transition-scheme)
[53] BEIS, 'Proposals for heat network zoning' (2021), (https://www.gov.uk/government/consultations/proposals-for-heat-network-zoning)

Projects benefiting from the Public Sector Decarbonisation Scheme will consider where the creation of or connection to a heat network is technically feasible and how this can act as a trigger for supporting businesses in the local area to transition to low carbon heating as part of that network. We expect these networks to unlock economies of scale and greater carbon savings while reducing the individual upfront and on-going costs for those businesses connected to it.

7. **What types of buildings are likely to fall into the 'hard to treat' category? Please provide evidence to support your response.**

8. **What low carbon heating systems do you foresee being used as alternatives to heat pumps in 'hard to treat' buildings? Please provide evidence to support your response.**

9. **Will these alternative low carbon heating systems align with the net zero, sustainability, air quality and consumer experience criteria set out in the 'Alternative low carbon systems' section? Please provide evidence to support your response.**

Untreatable buildings

There is not a compelling case for considering sector-wide exemptions from the requirement to transition to low carbon heat as this is incompatible with our net zero commitments. It is recognised that there are diverse uses of space heating and hot water across the non-domestic building stock. For example, hotels have significantly higher hot water usage than offices, while some particularly large buildings will only have small areas of the building heated. The specific use varies from building to building, therefore, where a building is 'hard to treat' with a heat pump, we propose to take a technology agnostic approach to alternative heating systems (on the basis they are compatible with the wider government objectives on net zero, sustainability, air quality and the consumer experience). In addition, we expect the number of buildings requiring alternative heating technologies to reduce over time as the heat pump market becomes more established and innovative.

We believe this approach will enable most buildings to transition to a low carbon heating technology. However, considering the ambitious timescales we are proposing, it is recognised that there may be some instances in the initial years of the policy where a building is untreatable with the available low carbon technologies. We welcome evidence from industry on specific uses of space heating and hot water where heat pumps or alternative low carbon technologies will be unsuitable for the demand. Equally, we encourage the manufacturers of low carbon systems to share their views on the development of their technologies and how we can overcome the challenges associated with 'hard to treat' buildings. Like the approach set out in the Future Buildings Standard consultation[54], we will consider the case for specific building types following different implementation timelines should the evidence demonstrate this is necessary.

[54] MHCLG (2021), 'The Future Buildings Standard' (https://www.gov.uk/government/consultations/the-future-buildings-standard)

10. **Are there instances where both heat pumps and alternative low carbon heating technologies will be unsuitable for meeting a building's space heating and hot water demands – i.e., 'untreatable buildings'? Yes/No. If yes, how and when do you foresee low carbon heating technologies developing to overcome these challenges? Please provide evidence to support your response.**

The cost of transitioning

For most businesses, the upfront cost of transitioning to a low carbon heating system is currently higher than reinstalling a fossil fuel system. In the past, we have supported businesses with these higher costs through the Non-Domestic Renewable Heat Incentive, which provided thousands of businesses across Great Britain with payments for installing low carbon heating. This has helped develop the supply chains across a range of technologies, facilitate innovative development with the aim of driving down costs, and grow consumer confidence. Our evaluation has shown that during the scheme's lifetime, the cost of a heat pump installation decreased, although we are aware that changes to the scheme led to larger systems being installed, which are generally cheaper per kilowatt.

We recognise high costs are a significant barrier to encouraging transition to low carbon heat, as demonstrated in social research with non-domestic consumers where 55% cited cost as a reason for not replacing their fossil fuel system with a low carbon one[55]. As mentioned earlier, we expect to see further significant downward pressure on the price of domestic-sized heat pumps. As part of the Heat and Buildings Strategy[56], we are setting an ambition of working with industry to reduce the upfront costs of installing domestic-sized heat pumps by 25 to 50% by 2025, however, there is uncertainty as to the level of cost reduction that may be achieved for larger systems, particularly those which are specialised and tailored to the specific usage of a building. We would like to understand the potential for these bespoke systems to become more readily available as demand for them increases because of this policy. We particularly welcome views from heat pump manufacturers on the likely cost trajectory for installations across a range of system sizes. We recognise that other low carbon technologies, aside from heat pumps, may have lower upfront transition costs, however we must consider other additional factors, such as carbon emissions, supply chain sustainability and air quality.

The diversity of non-domestic buildings makes modelling the likely costs of installing a low carbon heating system instead of a like-for-like fossil fuel replacement particularly challenging. Based on the cost of heat pumps today, our indicative analysis suggests the typical additional upfront cost for businesses could be between 1.5 to 4 times higher than reinstalling a fossil fuel system[57]. The precise nature of these costs is dependent on the size of the building and its energy use. For example, we expect small buildings with low energy use to see additional

[55] BEIS (2021), 'Social research with non-domestic consumers in buildings in off-gas grid areas of England and Wales' (https://www.gov.uk/government/publications/heating-non-domestic-buildings-in-off-gas-grid-areas-consumer-experiences-and-attitudes-towards-low-carbon-heating)
[56] BEIS (2021), 'Heat and Buildings Strategy' (https://www.gov.uk/government/publications/heat-and-buildings-strategy)
[57] See accompanying Impact Assessment

costs ranging from around £3,000 to £4,000 which would represent a 1.5 to 2.5 times increase. We strongly encourage businesses, particularly SMEs, to consider the benefits of engaging with current and future financial support schemes to obtain funding towards these upfront costs.

The additional costs stated above include items such as the new heating system, removing the redundant one, pipework, replacing heating emitters, testing and design fees. Our modelling does not include the potential for costs arising from upgrading a building's electricity connection to the network as we know this varies significantly from building to building. It also does not consider the cost of energy efficiency upgrades. We recognise there will be outliers which see costs above or below what we have provided, and this reflects the varied nature of non-domestic buildings. This cost analysis is based on a relatively small sample size of off-gas grid buildings and scaled up to a national level and therefore we encourage respondents to consider how reflective this analysis is of the reality of transitioning to low carbon heating systems. The submission of evidence, such as quotations and invoices, to support areas where there may be differences is welcomed.

We recognise that the costs for landlords need to be considered alongside their obligations under the Private Rented Sector Regulations on minimum energy efficiency standards[58]. It should be noted that, as modelling suggests, the transition to low carbon heating will currently have a negligible impact on a building's EPC score. We are exploring how to reflect the low carbon heat requirement for off-gas grid buildings in the EPC process to ensure landlords are equipped to make an informed decision on both improving energy efficiency and decarbonising heating in their buildings.

It is important that businesses improve the wider energy efficiency of their building to ensure the low carbon heating system runs cost-effectively once installed. We expect businesses that own and occupy their building to be naturally incentivised to do this to reduce their on-going running costs, however this may not be the case for landlords who are generally not responsible for fuel bills. That is why the Private Rented Sector minimum energy efficiency standards are vital to ensure these buildings reach levels of efficiency that are suitable for the cost-effective use of low carbon heat by the tenant.

Using the price of fuel and projections from March 2021[59], we estimate most businesses who transition to a heat pump will see modest savings of up to 10% on their energy bills, however this will vary significantly depending on fuel use and the level of energy efficiency improvements undertaken in the building[60]. Any reduction in energy bills will mean some of the higher upfront costs can be partially offset by those savings over the life of the system. We expect this will unlock a range of finance models to help businesses fund their transition. A developed green finance market could provide a realistic avenue for businesses to overcome

[58] BEIS (2021), 'Non-domestic Private Rented Sector minimum energy efficiency standards: EPC B implementation' (https://www.gov.uk/government/consultations/non-domestic-private-rented-sector-minimum-energy-efficiency-standards-epc-b-implementation)
[59] BEIS (2021), 'Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal' (https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal)
[60] See accompanying Impact Assessment

higher upfront costs. We saw in responses to 'A Future Framework for Heat in Buildings: Call for Evidence'[61] the range of models that could benefit the individual financial needs of businesses, including spreading the upfront cost of their transition over time and arrangements where the business loans the heating system. More encompassing models include the supply and maintenance of heat as a service and some combine the cost of preparing a building for low carbon heating with energy efficiency measures within the package of borrowing. The government is committed to supporting the development of a thriving market for green finance products and has published its approach in the Heat and Buildings Strategy[62].

We understand that compliance with this policy will typically fall to the freeholder, however we are aware of some commercial lease arrangements which see the tenant take responsibility for the cost of the heating system either during the lease or at the end through the dilapidation process. We are mindful of the variety of commercial leasing arrangements in use and the potential for the terms to allocate responsibility in a manner which may not seem equitable. The government is commissioning a piece of research to better understand this and will consider whether action is required to facilitate the fair allocation of cost.

Even with reductions in upfront costs and a flourishing green finance market, the move to low carbon heating systems is likely to be more expensive than the costs businesses have become accustomed to when installing fossil fuel heating. The government is committed to reducing emissions at the lowest possible cost to business but recognises that everyone needs to play their part in tackling climate change. This means businesses must start to consider the cost of transitioning to low carbon heating in the coming years as part of their long-term decarbonisation plans. The government acknowledges, however, the need to take a fair and proportionate approach to supporting businesses on their path to net zero.

11. How do you foresee the costs associated with installing a heat pump in non-domestic buildings changing over the next 10 years? Please consider a range of system sizes in your response and provide evidence to support your answer.

12. How do you foresee the costs associated with installing alternative low carbon heating systems in non-domestic buildings changing over the next 10 years (i.e., other than heat pumps)? Please consider a range of system sizes in your response and provide evidence to support your answer.

13. How can the government support cost reductions in low carbon heating technologies suitable for non-domestic buildings, particularly heat pumps? Please consider buildings of differing sizes and energy use.

14. How accurate is our indicative modelling for the cost of transitioning to low carbon heat? Please provide evidence to support your response. This should include details

[61] BEIS (2018), 'A future framework for heat in buildings: Call for Evidence' (https://www.gov.uk/government/consultations/a-future-framework-for-heat-in-buildings-call-for-evidence)
[62] BEIS (2021). 'Heat and Buildings Strategy' (https://www.gov.uk/government/publications/heat-and-buildings-strategy)

on the types of buildings the costs are associated with, including its floor area (m^2), energy use (kWh) and the type of heating system it currently uses.

15. **How can we support the green finance market to develop the products and investor demand that businesses will need to fund their transition to low carbon heat?**

Back-up heating systems

This policy will apply to primary fossil fuel heating systems. We are minded to expand this to secondary heating systems, often referred to as 'back-up systems'. Our understanding is most businesses rely on direct electric heating when their primary heating source fails, but we are aware of some instances where these back-up systems are fuelled by oil and LPG. Direct electric heating may be of limited value where the business is using a heat pump for their primary system as their continuity plan is likely to look for an alternative fuel source. We expect businesses may consider retaining elements of their fossil fuel heating system for back-up purposes when they transition to low carbon technologies, which would make it challenging to verify that a building is only using such a system as a back-up.

We recognise the important role back-up systems have in ensuring business continuity, although we are mindful that it will be necessary to remove almost all fossil fuels used for heating to meet our net zero commitments and the likely compliance issues that will exist if they are permitted.

16. **In what situations are fossil fuel back-up systems common and how frequently are they used? Please provide evidence to support your response.**

17. **What low carbon back-up solutions are available for buildings with a heat pump as their primary system? Please provide evidence to support your response.**

Consumer protection

We need to ensure that installers are trained to deliver quality work and that businesses are protected when something goes wrong. Government schemes currently require installers to be certified by the Microgeneration Certification Scheme (MCS), which is an internationally recognised quality assurance scheme. MCS certifies products, installation companies and installations to help ensure that products, with a capacity of up to 45-kilowatts, are installed to the highest of standards. MCS-certified businesses are required to be members of a consumer code which provides additional protections to consumers if something goes wrong. We do, however, recognise that there are some limitations for businesses and public buildings due to the domestic customer focus of the consumer codes. Many non-domestic buildings will also require a heating system with a capacity over 45-kilowatts and we need to consider how consumers in these instances are protected against poor quality installations.

The government is mindful of the need to balance protecting businesses with the potential for additional cost and red tape which can harm competition and innovation. We are therefore

considering whether it would be more appropriate to expand consumer protection to businesses who require systems above 45-kilowatts. We will work with MCS and wider industry to consider the level of protection for installations in non-domestic premises.

The government worked with industry to develop PAS 2038[63], which provides a standard for energy efficiency retrofit coordination. As part of our consumer protection work, we are considering how to improve the standards available for large heat pump installations and will consider the inclusion of it in future iterations of PAS 2038.

18. **Taking into consideration existing certification schemes, are businesses adequately protected when installing a low carbon heating system up to 45-kilowatts? Please provide evidence to support your response.**

19. **Do businesses that install low carbon heating systems with a capacity over 45-kilowatts require consumer protection? Yes/No. If Yes, how should this differ from standards available for installations up to 45-kilowatts?**

Managing compliance

The government recognises that this policy will require a degree of enforcement to ensure businesses comply. The exact nature of this will be shaped by the final design of the policy and the legislative vehicles used to deliver it. The use of the Building Regulations to implement this policy would place responsibility on everyone involved in carrying out the work, for example, designers, builders, installers, and the building owner. Local authorities have a duty to enforce the Building Regulations and can take formal action in line with Sections 35 and 36 of the Building Act. The creation of new powers to deliver this policy, if required, may necessitate the development of compliance measures separate to those used in the Building Regulations.

20. **Do you have any views on how best to ensure compliance with the proposed regulations laid out through this consultation? Please provide evidence to support your answer.**

Other trigger points to reinforce the policy

The use of the natural replacement cycle presents a risk that some businesses 'patch-up' their systems to extend their life and avoid compliance with this policy. Importantly, this could present a significant safety risk, but it also means we cannot guarantee all buildings will decarbonise in advance of our net zero 2050 commitment. Based on a 15-year natural replacement cycle, we estimate around 750 large buildings would initially transition each year, expanding to roughly 8,000 buildings once small and medium sized buildings are introduced from 2026. We would therefore expect that by the early 2040s most fossil fuel heating systems in businesses and public buildings off the gas grid will have been replaced with low carbon

[63] BSI (2021), 'PAS 2038:2021' (https://shop.bsigroup.com/products/retrofitting-non-domestic-buildings-for-improved-energy-efficiency-specification?_ga=2.110789900.840313719.1632501939-865666535.1632501935)

alternatives. However, we are aware that as system sizes increase it is sometimes the case that the life of those systems is longer than 15 years. There is limited data in this area and engagement with stakeholders has presented us with a variety of average figures for larger systems ranging from 20 to 30 years. While this adds weight to introducing this policy for the largest buildings first, it also means we cannot be confident that all fossil fuel heating systems will naturally be replaced before our 2050 net zero commitment.

We are considering whether it may be appropriate to reinforce the regulatory framework described above to ensure all non-domestic buildings' remaining fossil fuels systems are replaced by the early 2040s at the latest. We are therefore seeking views on whether we should consider introducing an end date by which all buildings must have transitioned to low carbon heating. We are keen to understand the extent to which market forces and the end to new installations during the 2020s could deliver this. In addition, we are also considering whether policies designed around other significant points in a building's lifecycle, such as the point of let or sale, could deliver this goal.

21. **What is the typical lifespan of a non-domestic heating system used in an off-gas grid building? How does this vary by system capacity? Please provide evidence to support your response, which should include the type and size of heating systems.**

22. **What are the potential implications for businesses of introducing an end date by which all buildings must have transitioned to low carbon heating (e.g. in the early 2040s)?**

23. **What are the potential implications for businesses of introducing trigger points for installing a low carbon heating system, in addition to the natural replacement cycle, such as at the point of let or sale?**

Equality Act 2010

Under the Public Sector Equality Duty, government must take steps to understand how policies will affect different groups in society in different ways, with a particular focus on removing or minimising disadvantages suffered by people due to the following protected characteristics: age; gender reassignment; being married or in a civil partnership; being pregnant or on maternity leave; disability; race including colour, nationality, ethnic or national origin; religion or belief; sex; and sexual orientation.

24. **Do you have any evidence on how groups protected under the Public Sector Equality Duty may be affected by our proposals to phase out high carbon fossil fuel heating in non-domestic buildings off the gas grid?**

25. **Do you have any views on what more could be done to ensure businesses and communities affected by our proposals experience a smooth transition to low carbon heat? Please provide evidence to support your answer.**

End of consultation

This is the end of the consultation on phasing out the installation of new fossil fuel heating systems in businesses and public buildings off the gas grid.

26. Please use this space to provide any further views not already captured in your responses to the previous consultation questions.

Consultation Questions

The proposals

1. Do you agree with the principle of using the natural replacement cycle to phase out the installation of fossil fuel heating systems in non-domestic buildings off the gas grid? Yes/No. Please explain your response.

Timelines for implementing the proposals

2. Do the 2024 and 2026 timescales for introducing this policy provide sufficient lead in time for non-domestic off-gas grid consumers to prepare for their transition to low carbon heat? Yes/No. Please provide evidence to support your response where possible.
3. Would an implementation date of 2024 (for large buildings) and 2026 (for smaller buildings) provide sufficient lead in time for industry to prepare for the increase in demand? Yes/No. Please provide evidence to support your response where possible.
4. Do you agree with our proposal to introduce this policy for the largest buildings first? Yes/No. If not, please explain your reasoning, using evidence to support your response where possible.

Proposed low carbon technologies

5. Do you agree with our proposals to take a heat pump first approach to the replacement of fossil fuel heating systems in off-gas grid non-domestic buildings? Yes/No. Please explain your response.
6. Do you agree that most non-domestic off-gas grid buildings will be suitable for a heat pump? Yes/No. Please provide evidence to support your response, including examples of situations where the heat and hot water demand could not be met by a heat pump.
7. What types of buildings are likely to fall into the ‘hard to treat’ category? Please provide evidence to support your response.
8. What low carbon heating systems do you foresee being used as alternatives to heat pumps in ‘hard to treat’ buildings? Please provide evidence to support your response.
9. Will these alternative low carbon heating systems align with the net zero, sustainability, air quality and consumer experience criteria set out as bullet points in the ‘Alternative low carbon systems’ section? Please provide evidence to support your response.
10. Are there instances where both heat pumps and alternative low carbon heating technologies will be unsuitable for meeting a building’s space heating and hot water demands – i.e., ‘untreatable buildings’? Yes/No. If yes, how and when do you foresee low carbon heating technologies developing to overcome these challenges? Please provide evidence to support your response.

The cost of transitioning

11. How do you foresee the costs associated with installing a heat pump in non-domestic buildings changing over the next 10 years? Please consider a range of system sizes in your response and provide evidence to support your answer.

12. How do you foresee the costs associated with installing alternative low carbon heating systems in non-domestic buildings changing over the next 10 years (i.e., other than heat pumps)? Please consider a range of system sizes in your response and provide evidence to support your answer.

13. How can the government support cost reductions in low carbon heating technologies suitable for non-domestic buildings, particularly heat pumps? Please consider buildings of differing sizes and energy use.

14. How accurate is our indicative modelling for the cost of transitioning to low carbon heat? Please provide evidence to support your response. This should include details on the types of buildings the costs are associated with, including its floor area (m^2), energy use (kWh) and the type of heating system it currently uses.

15. How can we support the green finance market to develop the products and investor demand that businesses will need to fund their transition to low carbon heat?

Back-up systems

16. In what situations are fossil fuel back-up systems common and how frequently are they used? Please provide evidence to support your response.

17. What low carbon back-up solutions are available for buildings with a heat pump as their primary system? Please provide evidence to support your response.

Consumer protection

18. Taking into consideration existing certification schemes, are businesses adequately protected when installing a low carbon heating system up to 45-kilowatts? Please provide evidence to support your response.

19. Do businesses that install low carbon heating systems with a capacity over 45-kilowatts require consumer protection? Yes/No. If Yes, how should this differ from standards available for installations up to 45-kilowatts?

Managing compliance

20. Do you have any views on how best to ensure compliance with the proposed regulations laid out through this consultation? Please provide evidence to support your answer.

Other trigger points to reinforce the policy

21. What is the typical lifespan of a non-domestic heating system used in an off-gas grid building? How does this vary by system capacity? Please provide evidence to support your response, which should include the type and size of heating systems.

22. What are the potential implications for businesses of introducing an end date by which all buildings must have transitioned to low carbon heating (e.g. in the early 2040s)?

23. What are the potential implications for businesses of introducing trigger points for installing a low carbon heating system, in addition to the natural replacement cycle, such as at the point of let or sale?

Equality Act 2010

24. Do you have any evidence on how groups protected under the Public Sector Equality Duty may be affected by our proposals to phase out high carbon fossil fuel heating in non-domestic buildings off the gas grid?

25. Do you have any views on what more could be done to ensure businesses and communities affected by our proposals experience a smooth transition to low carbon heat? Please provide evidence to support your answer.

End of consultation

26. Please use this space to provide any further views not already captured in your responses to the previous consultation questions.

Next steps

We want to engage with the owners and users of non-domestic off-gas grid buildings on the policy approach set out in this consultation; their input is essential for shaping its final design. In social research with non-domestic consumers around 50% were unaware of the government's commitment to phase out the installation of fossil fuel heating systems in off-gas grid buildings[64]. Although there will be several years before the policy is introduced, we intend to use the consultation process as a valuable opportunity to increase awareness and encourage businesses to consider transitioning to low carbon heat in advance.

This consultation will close on 12 January 2022, after which responses will be analysed and we expect to provide a response to this consultation in spring 2022.

As stated earlier, this will be followed by a further consultation to engage stakeholders on the technical details of the policy in advance of its introduction.

[64] BEIS (2021), 'Social research with non-domestic consumers in buildings in off-gas grid areas of England and Wales' (https://www.gov.uk/government/publications/heating-non-domestic-buildings-in-off-gas-grid-areas-consumer-experiences-and-attitudes-towards-low-carbon-heating)

This consultation is available from: https://www.gov.uk/government/consultations/phasing-out-fossil-fuel-heating-systems-in-businesses-and-public-buildings-off-the-gas-grid

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