Ministry of Housing,
Communities &
Local Government

The Future Buildings Standard

Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations for non-domestic buildings and dwellings; and overheating in new residential buildings

January 2021
Ministry of Housing, Communities and Local Government

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Scope of the consultation

Topic of this consultation:	Heating and powering buildings currently accounts for 40% of the UK's total energy usage. The UK has set in law a target to bring its greenhouse gas emissions to net zero by 2050 – one of the most ambitious targets in the world. We must ensure that standards, both in energy efficiency and in overheating, as determined by the Building Regulations, are ambitious enough to put us on the right track to meet the 2050 target and to adapt to rising temperatures over the coming years. This consultation is the second stage of our two-part consultation on proposed changes to Part L (Conservation of fuel and power) and Part F (ventilation) of the Building Regulations, as well as addressing overheating in residential buildings. It also covers the future of non-domestic standards through the Future Buildings Standard, which will deliver highly efficient non-domestic buildings which use low-carbon heat, ensuring they are better for the environment and fit for the future.
Scope of this consultation:	This is the second stage of a two-part consultation regarding proposed changes to the Building Regulations from 2021 onwards. This consultation package seeks views on the following areas: Non-domestic buildings • A vision for the Future Buildings Standard that we propose will start to apply to new non-domestic buildings from 2025 onwards; • The Government's preferred option to uplift energy efficiency standards for new non-domestic buildings in 2021 which is intended to deliver a 27% reduction in carbon emissions on average per building compared to the existing Part L standard. As well as improving the energy efficiency of new buildings in the short term, the interim uplift will ensure that construction professionals and supply chains are working to higher specifications in readiness for the proposed introduction of the Future Buildings Standard from 2025; • Improvements to the non-domestic energy modelling methodologies; • Improvements to standards when work is carried out in existing non-domestic buildings;

	• Changes to Part F (ventilation) and its associated Approved Document guidance, for both new and existing non-domestic buildings; and • Proposals to introduce a new overheating mitigation requirement in the Building Regulations for new non-domestic buildings which are classed as 'residential'. Domestic buildings • Proposals to introduce a new overheating mitigation requirement in the Building Regulations for new homes; • Improvements to standards when work is carried out in existing homes; • Reconsulting on the Fabric Energy Efficiency Standard, as well as other standards for building services in new homes and guidance on the calibration of devices that carry out airtightness testing; and • Changes to Part F (ventilation) and its associated Approved Document guidance.
Geographical scope:	This consultation relates to Building Regulations for England only.
Impact Assessment:	An Impact Assessment is published alongside this document.

Basic Information

To:	This consultation will be of interest to: • Property developers and builders • Domestic and non-domestic building owners, occupiers and property managers • Construction industry professionals, for example, installers, architects, designers, engineers, surveyors and sub-contractors • Manufacturers and suppliers of construction materials • Manufacturers of blinds, shutters and similar sun shading products • Environmental organisations • Local authorities, other building control bodies and competent person scheme operators • National representatives and trade bodies • Professional bodies and institutions • Research and academic organisations • Energy sector professionals • Public health professionals Specific elements may be of interest to members of the public.

Body/bodies responsible for the consultation:	The Energy Performance of Buildings Division within the Ministry of Housing, Communities and Local Government.
Duration:	This consultation will last for 12 weeks from 19th January 2021 until 23:45 on the 13th April 2021. All responses should be received no later than this time and date.
Enquiries:	Enquiries regarding this consultation can be raised through the following email address: FutureBuildingsStandardConsultation@communities.gov.uk
How to respond:	We strongly encourage respondents to use the online survey as it assists our analysis of the responses we receive: https://www.smartsurvey.co.uk/s/FutureBuildingsStandard/ The online survey allows respondents to save a draft response and return to the survey later. You may also submit additional information or evidence to support your response to this consultation. Further advice on how to use these features is available on the home page of the online survey. Should you be unable to respond via the online survey, responses can be sent by email to: FutureBuildingsStandardConsultation@communities.gov.uk In light of current advice on homeworking during Covid-19, we ask that you do not send in responses via post to the department at the moment, as we may not be able to access them. When replying to this survey please confirm whether you are replying as an individual or submitting an official response on behalf of an organisation and include: – your name; – your position (if applicable); – the name of organisation (if applicable); – your profession; and – an email address.

1. Introduction

1.1 Net zero emissions and climate change

1.1.1. The UK was the first major world economy to pass a net zero emissions target into law. This target, which was recommended by the Committee on Climate Change, is one of the most ambitious in the world and requires the UK to bring all greenhouse gas emissions to net zero by 2050.[1]

1.1.2. Heating and powering buildings currently accounts for 40% of the UK's total energy usage.[2] The minimum energy efficiency standards that we set for buildings must put us on the right path to achieve our net zero target. The Government believes that by improving energy efficiency and moving to cleaner sources of heat, we can reduce carbon emissions and keep energy costs down now and in the future.

1.1.3. The Clean Growth Strategy outlined how more must be done to decarbonise buildings to help us achieve our 2050 target.[3] As well as prioritising the decarbonisation of new and existing homes where there are cost-effective, practical and safe opportunities to do so, we have said that we intend to make improvements to Building Regulations requirements for new and existing non-domestic buildings.

1.1.4. Alongside work to decarbonise, we must make sure that homes are able to cope with the warmer climate of the future. Overheating in buildings has been highlighted as a key risk for the health and productivity of people and businesses in the UK. It is estimated that there are around 2,000 heat-related deaths each year in England and Wales and this number is expected to more than triple to over 7,000 by the middle of the century, as a result of climate change.[4]

1.2 The Consultation Package

1.2.1. This is the second of two linked consultations which together set out a pathway towards creating homes and buildings that are fit for the future, and a built environment with lower carbon emissions and homes adapted to the overheating

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[1] The Committee on Climate Change, 2019. Net Zero – The UK's contribution to stopping global warming. Available online: https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

[2] Department for Business, Energy & Industrial Strategy, 2019. The Grand Challenge missions. Available online: https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/missions

[3] Department for Business, Energy and Industrial Strategy, 2018. Clean Growth Strategy. Available online: https://www.gov.uk/government/publications/clean-growth-strategy

[4] House of Commons Environmental Audit Committee, 2018. Heatwaves: adapting to climate change. Available online: https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/826/826.pdf

risks caused by a warming climate. The first of these consultations, the October 2019 Future Homes Standard consultation, set out the Government's ambition for new homes to be future-proofed with low carbon heating and world-leading levels of energy efficiency.[5] This, along with the Government's Grand Challenge Buildings Mission,[6] forms the Government's strategy for the decarbonisation of new homes and supports the scaling up of low carbon technologies to decarbonise our existing building stock.

1.2.2. This consultation document builds on the Future Homes Standard consultation by setting out energy and ventilation standards proposed to be implemented from 2021 for non-domestic buildings and existing homes, and standards to mitigate against overheating in residential buildings. In this consultation we also set an ambition for non-domestic buildings called The Future Buildings Standard, to be implemented from 2025. This document also directly continues the work started on standards for new homes to be implemented from 2021 by reconsulting on the Fabric Energy Efficiency Standard, alongside other building services standards for new homes and guidance on the calibration of devices that carry out airtightness testing.

1.3 Timetable for implementation

1.3.1. The Future Homes Standard consultation set out a roadmap for implementation which included our intention, at that time, to publish this consultation early in 2020 with an implementation of new standards to follow soon after. The Department received a total of 3,310 individual responses to the consultation from a wide range of organisations, representative and trade bodies, industry professionals, academics and individual members of the public. A Government response to the consultation has been published alongside this consultation.

1.3.2. The outbreak of COVID-19 meant that much of the Department's resources were rapidly mobilised to support those in need. As a result, the timing of the interim uplift was delayed from its original 2020 date. Subject to outcome of The Future Buildings Standard consultation, our aim is to now implement the interim uplift in 2021.

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[5] Ministry of Housing, Communities and Local Government, 2019. The Future Homes Standard: changes to Part L and Part F of the Building Regulations for new dwellings. Available online: https://www.gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings

[6] Department for Business, Energy and Industrial Strategy, 2019. The Grand Challenges. Available online: https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges

1.4 The Consultation Contents

1.4.1. We believe that the Future Homes Standard, the Future Buildings Standard and the uplift in standards to be introduced in 2021 provide a pathway for buildings that are fit for the future. How these different elements are interlinked is shown in Figure 1.1 below. Those items shown in green were the subject of the first part of this two-stage consultation, the Future Homes Standard consultation, published in October 2019. Those items in orange are the subject of this consultation.

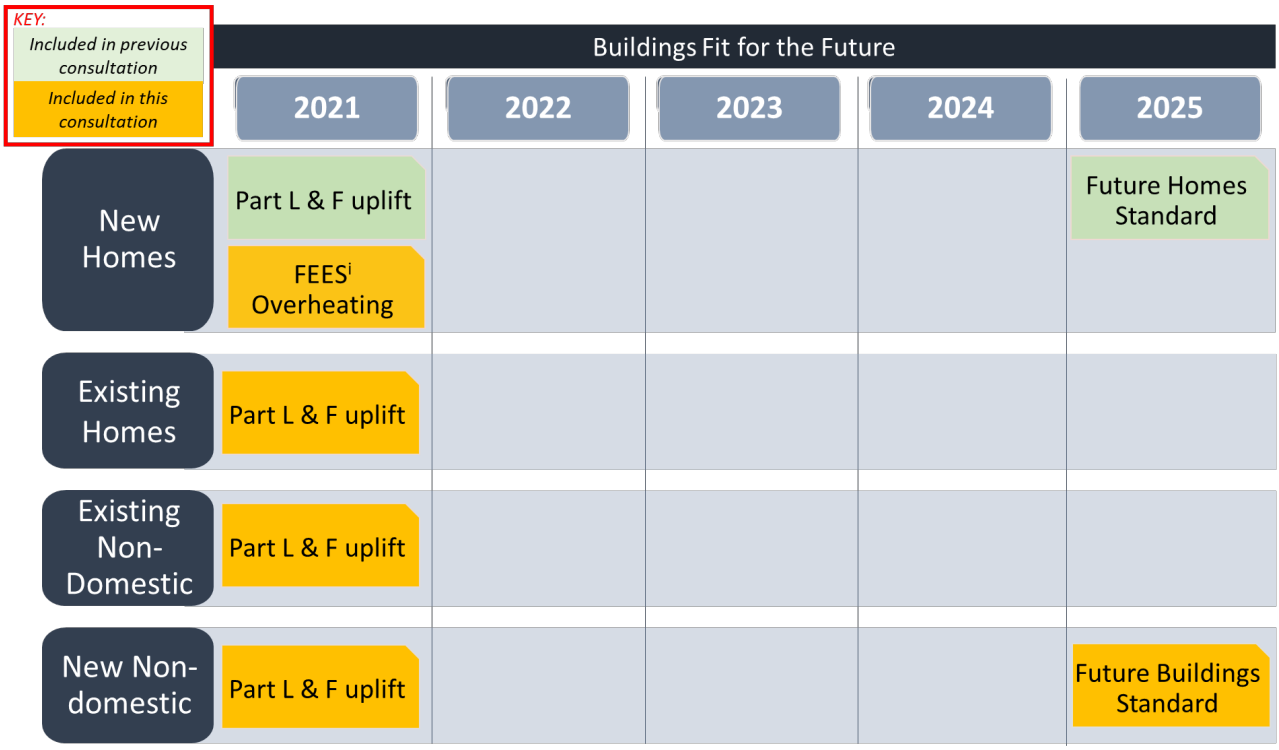

Figure 1.1: Contents of the Future Homes Standard and Future Buildings Standard consultations.
i - The Fabric Energy Efficiency Standard (FEES) is being reconsulted on in this consultation, alongside some building services standards and guidance on the calibration of devices that carry out airtightness testing.

1.4.2. This consultation document is structured in two sections: the first section (Section A) covers new and existing non-domestic buildings. This includes the interim uplifts of Part L and Part F standards for new and existing non-domestic buildings; and the roadmap for the implementation of the Future Buildings Standard from 2025. The second section (Section B) covers new and existing domestic buildings. This includes the 2021 uplift of Part L and Part F standards for existing homes as well as covering some areas for new homes, including the Fabric Energy Efficiency Standard, some standards for building services and guidance on the calibration of devices that carry out airtightness testing. It also details a new standard for mitigating overheating in new residential buildings, which is proposed to apply to domestic buildings as well as some non-domestic buildings which provide residential accommodation. Taken together with items on new homes in the first

consultation, the proposals in this document form a complete set of ambitious new energy and ventilation standards to apply across the built environment.

1.4.3. We have worked closely with industry and other external stakeholders to develop this consultation package, including industry working groups which report to a Building Regulations Advisory Committee (BRAC) technical working party. We are grateful for the advice and assistance provided by the participants in these groups, and we look forward to working with them to develop these proposals once the consultation process has concluded.

Summary of proposals in Section A (Non-domestic buildings)

The Future Buildings Standard

1.4.4. Our vision for the Future Buildings Standard is designed to transition non-domestic buildings to use low-carbon heat sources for heating and hot water. This in turn means that new buildings constructed to the standard will be fit for the future with the ability to become carbon neutral over time as the electricity grid and heat networks decarbonise. This chapter will set out what we think the Future Buildings Standard will look like, as well as providing the technical specification of the standard, and outlines our envisaged timeline for the implementation of the standard.

Interim uplift of energy and ventilation standards (Part L and Part F) for new and existing non-domestic buildings

1.4.5. In order to support the introduction of the Future Buildings Standard from 2025, we are consulting on two ambitious options to uplift the energy efficiency and ventilation standards for new non-domestic buildings in 2021. The Government's preferred option will deliver a 27% reduction in carbon emissions on average per building compared to the existing standard. It will also ensure that construction professionals and supply chains are working to higher specifications in readiness for the introduction of the Future Buildings Standard.

1.4.6. Many of the non-domestic buildings that will exist in 2050 have already been built. The Building Regulations provide an important opportunity to raise standards in existing buildings under certain circumstances, such as during the major refurbishment of an office building. We believe that we can make significant carbon savings by uplifting standards that apply when this type of work is carried out, and this consultation sets out proposed uplifts in these standards.

Summary of proposals in Section B (Homes)

1.4.7. This consultation, in conjunction with the Future Homes Standard consultation, outlines our intentions for energy and ventilation standards in homes, as well as delivering our commitment to consult on standards to mitigate overheating in new residential buildings.

Introduction of overheating standards for new residential buildings in 2021

1.4.8. The Future Homes Standard consultation set out the Government's ambition for increasing the energy efficiency of new homes, including increasing the standards for insulation. We need to ensure that improving the energy efficiency of new homes does not have unintended consequences by increasing the risk of overheating. This consultation sets out our proposals to reduce the risk of overheating in new residential buildings. This definition of 'residential' includes new homes and flats, schools or other establishments where people sleep on the premises (including living accommodation for care of maintenance for older or disabled people and people under the age of 5 years), and residential colleges and halls of residence. It should be noted that residential colleges and halls of residence are considered under some definitions as non-domestic buildings, but remain in scope for the proposed regulations.

2021 uplift of energy and ventilation standards (Part L and Part F) for homes

1.4.9. The potential for achieving carbon savings by uplifting standards when works such as refurbishment are carried out to existing homes is substantial. This consultation sets out proposed uplifts in energy and ventilation standards when work is done to existing homes.

1.4.10. While the Future Homes Standard consultation addressed most standards in new homes, some aspects of this consultation also apply to new homes and are outlined in this chapter. This includes some standards for building services and guidance on the calibration of devices that carry out airtightness testing, and the level at which the Fabric Energy Efficiency Standard metric should be set.

1.5 Looking beyond the Future Homes and Buildings Standards

1.5.1. A significant proportion of the responses we received to the Future Homes Standard consultation were based on, or inspired by, campaign responses coordinated by external groups that had a particular focus on environmental and energy efficiency issues. Many of these responses raised issues and concerns regarding the energy

efficiency of buildings which went beyond the scope of our consultation proposals and the existing Building Regulations. These topics included: embodied carbon; Modern Methods of Construction; suggestions for how we can further address the performance gap of new buildings; and the actions that will be required to ensure consumers are familiar with and have the confidence to use the products and the spaces that they occupy, in smarter, greener ways.

1.5.2. The Future Homes Standard and Future Buildings Standard, from 2025, will deliver highly energy efficient buildings. We recognise that there is still more work to be done beyond these standards in order to realise the potential for decarbonising new buildings, and that the Building Regulations will play an important role in achieving this.

1.5.3. Alongside our work on the Future Homes Standard, we will carry out wider work to consider the future of energy efficient and low carbon buildings, looking beyond the scope of Building Regulations. This will examine some of the broader and more fundamental questions around how we can ensure that all new buildings are designed and constructed to be fit for a zero carbon future, including those raised through the consultation process, such as the role of Modern Methods of Construction and low carbon materials, including timber, in delivering low carbon construction where these can be used safely.

Section A: Non-Domestic Buildings

2. The Future Buildings Standard

2.1 Chapter Summary

2.1.1. This chapter includes proposals on the following:

- What the Future Buildings Standard should look like, introducing low carbon heating within non-domestic buildings and an outline specification of the standard; and
- Proposals for implementing the Future Buildings Standard.

2.2 Background

2.2.1. The Future Buildings Standard will deliver highly efficient non-domestic buildings which use low-carbon heat, ensuring they are better for the environment and fit for the future.

2.2.2. Heating and powering buildings currently accounts for 40% of the UK's total energy usage.[7] By making our buildings more energy efficient and embracing smart technologies, we can cut energy bills, reduce demand for energy, and boost economic growth while meeting our targets for carbon reduction. The Committee on Climate Change has stated that achieving the UK's net zero target will require the full decarbonisation of buildings by 2050.[8]

2.2.3. **This chapter sets out a high-level vision for what we think the Future Buildings Standard could look like and the steps required to introduce this, with implementation proposed as starting in 2025.** We recognise that the construction industry will need to develop the necessary supply chains, skills and practices to deliver low-carbon heat and highly energy efficient buildings to this timescale. To support this, we have set out two ambitious options for an interim uplift in energy performance requirements to reduce carbon and encourage developers to introduce low carbon heating now. This interim standard will act as a stepping stone to the Future Buildings Standard. Further detail regarding these options can be found in Chapter 3 of this consultation document.

[7] Department for Business, Energy & Industrial Strategy, 2019. The Grand Challenge missions. Available online: https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/missions
[8] The Committee on Climate Change, 2019. Net Zero: The UK's contribution to stopping global warming. Available online: www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf

2.3 What should the Future Buildings Standard look like?

2.3.1. Compared to homes, non-domestic buildings are more diverse in type, size, complexity and function. The Future Buildings Standard needs to reflect the diversity of non-domestic buildings. While we anticipate that some categories of building will be able to transition to the new standard relatively quickly, others will need more time for building practices and technology to adapt.

2.3.2. Chapter 3 of this consultation details an interim uplift to the Building Regulations in 2021. This represents a significant increase to energy efficiency standards in preparation for introducing the Future Buildings Standard, which we propose is introduced in 2025. We expect that the increase in carbon and primary energy targets in the 2021 standard will drive a large proportion of developers to phase out fossil-fuels now, ahead of the introduction of the Future Buildings Standard.

2.3.3. In order to decarbonise new non-domestic buildings, all heat and hot water needs should be met through low-carbon sources. Buildings constructed to the Future Buildings Standard will need to use low-carbon heating and hot water systems to meet its carbon and primary energy targets in almost all circumstances. The potential applications of these technologies are discussed in paragraphs 2.3.9 to 2.3.17.

2.3.4. A large proportion of this low-carbon heat will come from the national grid. The national grid has significantly decarbonised over recent years and will continue to decarbonise to become net zero over time. The transition to low-carbon heating and hot water systems means that new buildings constructed to the standard will be zero carbon ready, with the ability to decarbonise over time alongside the national grid and will not need to be retrofitted to meet our net zero commitment.

2.3.5. The diversity of non-domestic buildings means that the solutions required to meet the Future Buildings Standard will vary across the building mix.

2.3.6. We intend to continue to allow developers the flexibility to innovate and select the most practical and cost-effective solutions. However, we expect that a low carbon heating system will be integral to the specification of the Future Buildings Standard.

2.3.7. The outcome of this consultation is intended to define the high-level vision for the Future Buildings Standard. Based on this outcome, and before we begin to introduce the Future Buildings Standard, we will consult further on its implementation with a full technical consultation on the standard. This will include more specifics on aspects such as implementation and metrics to be used, and an assessment of the associated cost and impact.

Fabric standards

2.3.8. Regardless of the non-domestic building type, we believe that providing the best fabric standards possible should be essential to buildings constructed to the Future Buildings Standard. The relationship between building fabric and energy demand in non-domestic buildings is complicated, and often a balance needs to be struck between heating, cooling demands, and daylight provision. In some circumstances, providing extremely high levels of insulation can increase overall building energy use, and it is important that we encourage designers to seek the right specifications.

Low carbon heating technologies

2.3.9. There are a number of existing low carbon heating technologies which could support the scale of change that is required to meet our ambition for highly efficient non-domestic buildings which use low-carbon heat. The following section discusses the potential application of different technologies in non-domestic buildings:

Heat pumps

2.3.10. We anticipate that the installation of heat pumps will play an increasing role in delivering low carbon heat for buildings built to the Future Buildings Standard. Heat pumps come with the same low-carbon benefits as direct electric heating (paragraphs 2.3.14 to 2.3.15) but deliver heat much more efficiently as they capture renewable heat from the atmosphere. Heat pumps can help to keep running costs down and reduce demand on the electricity grid.

2.3.11. Heat pumps are commonly used in non-domestic buildings to provide cooling as well as heating. The low-temperature heat produced by most heat pumps means that they may be better suited for some buildings than others. For example, it may be more appropriate for industrial buildings to provide radiant heating for processing areas rather than heating the whole space with low-temperature heat. While heat pumps are capable of providing domestic hot water, they may not always be suitable where higher temperatures are required, and therefore we do not typically see them being installed for buildings which need a reliable supply of large volumes of domestic hot water, such as in hospitals or hotels. Such applications may require more time for commercial-scale domestic hot water heat pumps to become established – of particular interest are those which use CO_2 refrigerant systems which can supply heat at higher temperatures. There are only a small number of manufacturers that currently offer these types of products.

Heat networks

2.3.12. Heat networks (also referred to as district heating) are distribution systems that take heat from a centralised source and deliver it to a number of different buildings.[9] Heat networks in non-domestic buildings will form part of our overall plan for the future of low carbon heat, particularly in cities and high-density areas. Heat networks can decarbonise more easily compared to other heat sources because new technologies can be added to the system with little disruption to individual buildings.

2.3.13. Heat networks provide a unique opportunity to exploit larger scale, renewable and recovered waste heat sources that cannot be accessed at an individual building level. Heat networks also provide system benefits such as thermal storage and reducing the energy demand of the grid at peak times.

Direct electric heating

2.3.14. Direct electric heating (e.g. electric underfloor heating or panel heaters) is a well-established technology with no emissions at the point of use and we anticipate that it will have a minor role to play in our plan for the future of low carbon heat. While it may be an appropriate technology in applications where heat demand is particularly low and a building is constructed to the very highest fabric standards, if these systems were to be deployed at scale the increased demand for electricity may have a significant effect on the national grid. With a unit of electricity costing more than an equivalent unit of gas, direct electric heating can also result in expensive running costs for consumers in some circumstances.

2.3.15. Direct electric water heating, for example instantaneous water heaters, may be an appropriate technology for heating hot water in some non-domestic buildings because there is no need to store large amounts of hot water. This is especially the case where demand for hot water is relatively low, such as in an office.

Other technologies

2.3.16. Other technologies in earlier stages of development, such as hydrogen, may have a role to play in heating systems of the future. However, for new buildings, we anticipate that heat pumps and heat networks, and to a lesser extent direct electric heating, will be the principal means of producing low-carbon heat for buildings built to the Future Buildings Standard.

2.3.17. This section focusses on low-carbon heating technologies. We believe there will also be a role, where appropriate, for other low-carbon technologies and renewable

[9] Department for Business, Energy and Industrial Strategy, 2019. Heat networks. Available online: https://www.gov.uk/guidance/heat-networks-overview

electricity generation such as solar photovoltaics. We do not consider, however, that renewable energy should replace the need to install low-carbon heating, which is essential to meeting our vision for the Future Buildings Standard.

The Future Buildings Standard technical specification

2.3.18. The energy efficiency requirements of the Building Regulations will continue to be set using performance-based standards rather than mandating or banning the use of any technologies. However, to make sure that new buildings are zero carbon ready, it is highly unlikely a new building will be able to meet the Future Buildings Standard without low carbon heating and very high levels of energy efficiency.

2.3.19. The proposed National Calculation Method Modelling Guide for 2021, described in Section 3.6, sets out notional building specifications for the following low-carbon fuels:

- Biofuel
- Electricity (heat pump)
- Electricity (direct)
- Waste heat
- Certain district heating systems

We believe that these specifications provide a reasonable starting point for the Future Buildings Standard where the notional building uses any one of these fuels. We will also consider whether minimum fabric standards also need to be reviewed for the Future Buildings Standard.

Question 1): **Our aim is that buildings constructed to the Future Buildings Standard will be capable of becoming carbon neutral over time as the electricity grid and heat networks decarbonise.**
Do you agree that the outline of the Future Buildings Standard in this chapter meets this aim?

a) Yes
b) No

Please explain your reasoning and provide supporting evidence or alternative suggestions.

Question 2): **We believe that developers will typically deploy heat pumps and heat networks to deliver the low carbon heating requirement of the Future Buildings Standard where practical. What are your views on this and in what circumstances should other low carbon technologies, such as direct electric heating or hydrogen, be used?**

2.4 Implementing the Future Buildings Standard

2.4.1. The Future Buildings Standard will be implemented through the Building Regulations. We are committed to moving at pace and will implement higher energy efficiency standards to the fastest achievable timeline, while ensuring that new standards are introduced in a way that takes how buildings are constructed and procured into account and which act as a set of achievable minimum standards. Implementation of the standard needs to reflect this and the diversity of the non-domestic building stock affected by the regulations.

2.4.2. When considering the best way to implement the Future Buildings Standard, we can split non-domestic buildings into three broad types of space and water heating demand:

- **Type 1 demand:** space heating demand more suitable for heat pumps. Domestic hot water demand more suitable for point-of-use or heat pump.
- **Type 2 demand:** space heating demand more suitable for heat pumps. High domestic hot water demand, which may be less suitable to be provided using point-of-use or heat pumps.
- **Type 3 demand:** space heating demand less suitable for heat pumps. Domestic hot water demand more suitable for point-of-use or heat pump.

2.4.3. Our ambition is for the Future Buildings Standard to be implemented in 2025, but we recognise that there may be different timelines for implementation that may be more suitable for different building types with different heat and hot water demand characteristics.

2.4.4. We believe that buildings with **Type 1** and **Type 2** levels of demand should be ready to adopt heat pumps or other forms of low-carbon space heating in 2025. There may be more challenges for buildings with **Type 3** demand, for example because they are made up of large spaces which are more suited to radiant or spot-heating for which heat pumps are not the most appropriate technology. Buildings with demand of this type include, for example, warehouses. Further examples are given in Table 2.1.

2.4.5. We believe that buildings with **Type 1** and **Type 3** demand should be ready to adopt either electric point-of-use domestic hot water heating or heat pump domestic hot water heating in 2025. Buildings with **Type 2** demand are likely to require high volume low-carbon domestic hot water production, which could include some types of heat pumps. While some suitable heat pump domestic hot water systems already exist, a longer lead-in time may be required so that these systems can become more established before adopting these system types as part of the minimum standard for buildings with **Type 2** demand. Buildings with demand of this type include, for example, large clinical hospitals. Further examples are given in Table 2.1.

2.4.6. We welcome views from industry about appropriate timelines for introduction of the Future Buildings Standard for different types of buildings given their respective space heating and hot water demand characteristics.

2.4.7. Table 2.1 indicates which broad building types may fall into each category of demand described in paragraph 2.4.2. We are seeking views on whether these building types have been assigned correctly to these demand types.

Table 2.1: Demand types identified for specific building types

Demand type	**Building type**
Type 1 demand: space heating demand more suitable for heat pumps. Domestic hot water demand more suitable for point-of-use or heat pump.	Offices, multi-residential buildings, prisons, primary schools, secondary schools, retail units, community centres, courts, libraries, museums, airport terminals, data centres, theatres
Type 2 demand: space heating demand more suitable for heat pumps. High domestic hot water demand, which may be less suitable to be provided using point-of-use or heat pumps.	Hotels, hospitals, other health care buildings, restaurants
Type 3 demand: space heating demand less suitable for heat pumps. Domestic hot water demand more suitable for point-of-use or heat pump.	Retail warehouses, distribution warehouses, industrial process buildings, sports halls

2.4.8. To support implementation of the Future Buildings Standard we propose that the implementation of the Future Buildings Standard is supported by two workstreams of targeted research and engagement with industry:

- The **first workstream** would support and initiate the full adoption of the Future Buildings Standard for buildings which are more suitable for the adoption of low carbon heating and/or hot water. This will include low carbon space heating for buildings with **Type 1** and **Type 2** space heating demand and low carbon hot water heating for buildings with **Type 1** and **Type 3** water heating demand.

- The **second workstream** would provide specific support to the full adoption of the Future Buildings Standard for more challenging demand types. This will include low carbon space heating for buildings with **Type 3** space heating demand and low carbon hot water heating for buildings with **Type 2** hot water demand.

2.4.9. The Future Buildings Standard will continue to offer developers flexibility and the scope to innovate. We recognise that some in the sector are already leading the way by building highly efficient, low carbon buildings and investing in the skills and supply chains that are needed in support of net zero ambitions. By working with the sector, we will celebrate good practice and innovation, and encourage industry to identify opportunities to deploy these approaches at a larger scale.

The transition to low carbon heating

2.4.10. The Government recognises the challenges of transitioning to low carbon heating, in particular for the replacement heating sector. However, we agree with the Committee on Climate Change that there is an opportunity to start to establish a mass market solution for low carbon heating with new buildings.[10] The introduction of the Future Buildings Standard and Future Homes Standard will facilitate this.

2.4.11. The Department of Business, Energy and Industrial Strategy (BEIS) and the Department of Education (DfE) are launching a 'green jobs taskforce' together with industry to ensure the UK has the skills it needs to deliver net zero. This will ensure the skills are available both for a near-term green recovery and a longer-term transition towards net zero buildings. It will also identify further opportunities to aid the transition of workers in high-carbon jobs to low-carbon ones.

[10] Committee on Climate Change, 2019. Net Zero – The UK's contribution to stopping global warming. Available online: https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/

2.4.12. In addition, BEIS is working with DfE to develop a construction sector skills plan, with No.10 and Treasury, to support 'Project Speed – Construction'. This will focus on delivering the skills needed for construction, including new recruits to the industry; reskilling and upskilling those already in the sector; and filling the skills gaps the sector needs to build greener.

2.4.13. In the longer term, and as part of the potential DfE National Skills Fund 'skills bootcamp' expansion from April 2021, Government is looking at proposals from industry to support priority skills training to meet demand, such as the upskilling/qualifying of Electrical Installers, Retrofit Assessors and Installers, Specialist Plasterers as well as digital skills training for construction (e.g. Building Information Modelling). This will help boost the supply of qualified, skilled electrical technicians to meet new demands for things like smart homes and low-carbon technology.

2.4.14. On apprenticeships, BEIS is working with the Institute for Apprenticeships and Technical Education, which is convening a Sustainability Advisory Group to guide the Institute in encouraging trailblazers to align apprenticeships to net zero and wider sustainability objectives. The group will identify potential opportunities to create new green apprenticeships. It will also develop guidance to encourage employers to include sustainable knowledge, skills and behaviours across existing apprenticeships.

2.4.15. Another crucial step we are taking to help inform our approach to skills reform in the face of big changes in technology is to set up the Skills Productivity Board, which will bring together leading experts to offer independent analysis on skills gaps and identify new and emerging skills needs, including the green recovery.

2.4.16. Industry is also taking decisive action. The Construction Leadership Council recently published its construction Industry Recovery Plan. Skills are highlighted as a key element across the three phases of the plan with a focus on: maintaining investment in training and retraining workers to support recovery and the adoption of new technologies; ensuring investment contributes to net zero, resource efficiency and shared prosperity; and modernising the training and qualifications system for construction to support the delivery of net zero skills.

2.4.17. Alongside this, BEIS is also engaging with heating installers to understand the ability of existing supply chains to deliver low carbon heat installations. A recently conducted survey of heating installers aimed to give a voice to installers, plumbers and heating engineers to ensure Government understands the opportunities and

risks that face installers in the transition to low carbon heating.[11] An Installer and Non-Domestic Consumer Social Research Project, which builds on the results of this survey, has been commissioned. The research project aims to understand how both installers and non-domestic consumer organisations will be affected by and respond to forthcoming regulations, the appetite for financial incentives and information provision, and to identify important policy design considerations to support such measures. The outcomes of this project will determine the crucial roles for Government, installers and the wider supply chain in ensuring supply is able to meet demand for low carbon heat installation.

2.4.18. Furthermore, BEIS has published research into the heat pump manufacturing supply chain,[12] which concluded that manufacturers could adapt flexibly to the level of demand required and increase supply into the UK market relatively quickly (by a minimum of 25% to 30% year-on-year for the next 15 years). The research also indicated that the UK could increase domestic production of heat pumps from around 30% today to 60% by 2030.

Question 3): **Do you agree that some non-domestic building types are more suitable for low carbon heating and hot water, and that some non-domestic building types are more challenging?**

a) Yes
b) No

If you answered no, please explain your reasoning.

Question 4): **Do you agree with the allocation of building types to space and water heating demand types, as presented in Table 2.1 of this consultation document?**

a) Yes
b) No

If you answered no, please explain your reasoning, including how different building types should be allocated.

[11] The heating installer survey ran until 30 September 2019. Chartered Institute of Plumbing and Heating Engineering (CIPHE), 2019. Heating Installer Survey. Available online: https://www.ciphe.org.uk/newsroom/Latest_News/heating-installer-survey/
[12] BEIS (2020), 'Heat Pump Manufacturing Supply Chain Research Project', https://www.gov.uk/government/publications/heat-pump-manufacturing-supply-chain-research-project

Question 5): **We would like to introduce the Future Buildings Standard for all buildings as quickly as possible. When do you think the Future Buildings Standard should introduce low carbon *space heating* for buildings with Type 1 or Type 2 demand (buildings that have space heating demand more suitable for heat pumps)?**

a) **2025 – our proposed date**
b) **Another date (please specify)**

Please explain your reasoning.

Question 6): **We would like to introduce the Future Buildings Standard for all buildings as quickly as possible. When do you think the Future Buildings Standard should introduce low carbon *space heating* for buildings with Type 3 demand (buildings that have space heating demand less suitable for heat pumps)?**

a) **2025**
b) **Another date (please specify)**

Please explain your reasoning.

Question 7): **We would like to introduce the Future Buildings Standard for all buildings as quickly as possible. When do you think the Future Buildings Standard should introduce low carbon *water heating* for buildings with Type 1 or Type 3 demand (buildings that have water heating demand more suitable for point-of-use heaters or heat pumps)?**

a) **2025 – our proposed date**
b) **Another date (please specify)**

Please explain your reasoning.

Question 8): **We would like to introduce the Future Buildings Standard for all buildings as quickly as possible. When do you think the Future Buildings Standard should introduce low carbon *water heating* for buildings with Type 2 demand (buildings that have water heating demand less suitable for point-of-use heaters or heat pumps)?**

a) **2025**
b) **Another date (please specify)**

Please explain your reasoning.

3. Interim uplift to Part L standards for non-domestic buildings

3.1 Chapter Summary

3.1.1. This chapter includes the following proposals in respect to Part L, for both new and existing non-domestic buildings:

- Introduce primary energy as the principal performance metric for new non-domestic buildings, with the continued use of CO_2 as a secondary metric;
- Uplift minimum energy efficiency standards for whole building energy performance;
- Technical updates for the 'notional building' used in the National Calculation Methodology, including a proposal to balance the need to encourage the use existing heat networks in non-domestic buildings with the need to incentivise new heat networks to be low carbon;
- Uplift minimum standards for thermal elements (i.e. walls, floors, roofs) and controlled fittings (e.g. windows, rooflights and doors);
- Uplift minimum standards for replacement thermal elements (i.e. walls, floors, roofs) and controlled fittings (e.g. windows, rooflights and doors);
- Changes to minimum standards for building services for new and existing non-domestic buildings, including proposals to introduce a new regulation to ensure buildings have self-regulating devices when a heating appliance is installed and the installation of building automation and control systems;
- Recalibrate relaxation factors applied to modular and portable buildings;
- Introduce a new airtightness testing methodology;
- Update energy sub-metering in monitoring the as-built performance of non-domestic buildings; and
- Seek views on what transitional arrangements should apply to new non-domestic buildings;

3.2 Background

3.2.1. Part L of the Building Regulations is used to set minimum energy performance standards for buildings to drive reductions in carbon emissions.

3.2.2. The Future Buildings Standard will be implemented through an uplift to Part L. **This chapter proposes an interim uplift in the energy efficiency standards in 2021 to encourage low carbon systems and high levels of insulation in the interim,**

and support industry to be in a position where it can deliver the Future Buildings Standard proposed to start from 2025.

3.2.3. Our proposals balance an ambition to reduce the carbon and energy impact of new buildings against the desire for standards to be cost-effective, affordable, practical and safe, and to reflect the diverse and complex nature of non-domestic buildings.

3.2.4. This chapter sets out two potential options for the interim uplift in 2021 in the minimum energy efficiency standards for new non-domestic buildings. The Government's preferred option takes us as far towards the Future Buildings Standard as we believe is possible in 2021, with a 27% reduction in CO_2 on average per building over the current Part L 2013 standard.

3.2.5. As set out in Chapter 2, we recognise that the transition to low carbon heat requires the market for technologies such as heat pumps to be significantly developed. While it may not be feasible to introduce low carbon heating for all new buildings now, some developers will be ready to adopt low carbon systems sooner. We also need to make sure that any uplift to energy efficiency standards introduced in 2021 means that new buildings can be easily adapted for low carbon heat in the future, minimise heat loss and are affordable to run.

3.2.6. In addition to the impact an uplift in standards can have on new non-domestic buildings, to meet our net zero target in 2050 we will need to uplift standards in existing buildings. This chapter also sets out our proposals to increase the energy efficiency standards for work carried out in existing non-domestic buildings, taking account of cost-effectiveness, carbon savings, and the ability of the market to respond.

3.2.7. The Building Regulations provide an important opportunity to improve standards when works take place in existing buildings. The Government sets standards in the following areas:

- Minimum efficiencies and controls for building services;
- Commissioning requirements when installing building services;
- Minimum fabric standards when installing new thermal elements or replacing/renovating existing thermal elements; and
- Consequential improvements when particular types of work are carried out in non-domestic buildings.

3.2.8. Since standards for work in existing buildings were last revised in 2013, advancements have been made in many types of building services equipment, controls, and building elements. For example, lighting has seen rapid improvement through the commercialisation of LED technology, and heating and cooling systems

have become more efficient. These advancements mean that the cost-effectiveness of many measures has improved. In addition, Ecodesign requirements have, in some cases, overtaken the minimum requirements of Building Regulations guidance.[13]

3.3 Building Performance

3.3.1. The energy efficiency requirements of the Building Regulations set the rules and standards for when building work is carried out. This includes setting requirements for the efficiencies and controls of fixed building services installed in new or existing buildings and setting out the expected performance of the building fabric at the point of construction.

3.3.2. Despite these requirements being in place, there is evidence that suggests there is often a significant difference, or a 'performance gap', between the outputs from design calculations and the measured energy performance of buildings. The reasons for this can be split into several categories.:

- Buildings being poorly built or commissioned.
- Buildings being incorrectly used or poorly maintained.
- Poor design choices being made – which might be driven by a 'design-for-compliance' approach or energy calculation tools encouraging inappropriate solutions

3.3.3. A 2016 Innovate UK study suggests that this issue is widespread,[14] and that:

- There is no single, simple recipe for a successful building with low energy use and carbon emissions
- Buildings with poor control of space and water heating and/or lighting often had high emissions
- Some low-carbon technologies can be problematic to operate
- Controls are often too complicated
- Building management systems often lead to confusion and wasteful energy use

3.3.4. There is some anecdotal evidence of a 'design-for-compliance' approach, where buildings are designed to meet the target emission ratings of the compliance

[13] Department for Business, Energy and Industrial Strategy & Office for Product Safety and Standards, 2018. Regulation: Ecodesign of energy consuming products. Available online: https://www.gov.uk/guidance/placing-energy-related-products-on-the-uk-market

[14] Innovate UK, Building Performance Evaluation Programme: Findings from non-domestic projects – Getting the best from buildings, 2016 https://www.gov.uk/government/publications/low-carbon-buildings-best-practices-and-what-to-avoid

modelling tool without proper regard for how the building will be used in reality. This can lead to poor design choices and inappropriate systems being fitted, which waste energy. This effect can be made worse if compliance tools do not represent energy end-uses as well as they could. Similarly, if compliance tools do not properly recognise the energy-saving potential of certain design solutions then energy-saving opportunities may be missed.

3.3.5. The outputs of compliance tools are sometimes used incorrectly as a benchmark for in-use performance, which can lead to missed opportunities for carbon savings. Another common issue is that building owners and occupiers often do not have sufficient information about how the building is expected to perform.

3.3.6. For non-domestic buildings the performance gap issue is particularly complex, as many energy end-uses are not controlled for through the Building Regulations. This includes small power use (e.g. personal computers), process energy use (e.g. factory processes, or computer servers), lifts and escalators, catering, and energy uses not connected with the building (e.g. car park lighting). These non-regulated energy uses can add up to a large proportion of a building's energy use. The way that buildings are used and maintained can also have a very large effect on the energy use of non-domestic buildings.

3.3.7. As well as increasing energy bills for building occupants, poorly performing buildings can adversely affect the reputation of the construction industry and have wider implications for the Government's progress in achieving our net zero target.

3.3.8. 'Design-for-Performance' is an industry-funded and backed initiative which was established to tackle the performance gap and create a building-rating scheme based on measurable performance outcomes. We welcome industry taking the lead and creating innovative ways to bridge the gap between design and operation. Within the proposals we have set out in this consultation, we are proposing to mandate energy forecasting calculations as part of the Building Regulations process and make changes to minimum standards for sub-metering. Both of these changes should facilitate a design-for-performance approach. The Government has also committed to consulting on introducing mandatory in-use energy performance ratings for non-domestic buildings, which we plan to publish in due course[15].

3.3.9. Although some of the solutions to the performance gap lie outside the scope of the Building Regulations, we are proposing a number of steps to address the inconsistency between the modelled and actual performance of buildings. These

15 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/839362/future-trajectory-non-dom-prs-regulations-consultation.pdf

Building Regulations changes are designed to work alongside potential interventions in the operational performance of buildings.

3.3.10. The non-domestic sector is far more diverse than the domestic sector, and the performance issues here are likely to involve a wider range of technical challenges. However, the Government believes there is further scope to improve the performance of buildings within the scope of the Building Regulations, and this consultation includes the following proposals:

- Seeking wider feedback through this consultation on making improvements to the national calculation methodology, including:
  - Revising the outputs from SBEM to enable easier checking by building control on building completion
  - Changing default assumptions on thermal bridging in the national calculation methodology to encourage designers to undertake better design detailing.
- Developing SBEM and the national calculation methodology to better account for energy uses and to incentivise appropriate design solutions, which includes:
  - Providing more accurate ventilation calculation assumptions.
  - Improved lighting calculation to better reflect actual use.
  - Reviewing the activity database to better reflect actual building use
  - Revising the way that hot water demand is calculated to better match real-life demand.
- Introducing more challenging energy efficiency standards and improving compliance:
  - Requiring developers of large buildings (over 1000m^2) to carry out energy- forecasting at design-stage, to provide appropriate benchmarks for in-use energy performance, rather than incorrectly using compliance outputs.
  - Updated minimum standards to improve the efficiency of services and fabric specification and reference to the latest standards.
  - Making the legal requirement for adequate commissioning much clearer within the guidance and referring to more specific standards which should be followed.
  - Enhancing the regulations and guidance for assessing the energy performance of building services systems during commissioning.
  - Introducing guidance for appropriate sizing of systems and avoiding over/under-sizing.
  - Improving the guidance for more accurately calculating insulation performance (U-values) and referring to the latest industry standard.
- Supporting building owners to better understand how to use their building efficiently:

- Improving standards for energy metering to allow building occupiers to better understand the energy they are using in their buildings.

3.3.11. These proposals focus on ensuring that buildings are well-designed and well-commissioned and therefore capable, under standard operating conditions, of meeting the carbon targets set by the new standards. They should also mean that the energy performance of new buildings can be more accurately monitored, allowing building occupiers to identify and target energy-saving potential in their own buildings.

3.3.12. Section 1.5 of this consultation sets out our commitment to publish a vision for the energy efficiency and carbon emissions of homes and non-domestic buildings beyond 2025. In looking to the longer term, we will examine wider proposals for how to both address the performance gap when buildings are designed and constructed and improve the performance of buildings in operation. We anticipate that the suggestions made by consultation respondents will be helpful in informing the direction of this work.

Question 9): **We would welcome any further suggestions, beyond those provided in this consultation, for improving the modelling process; Part L and Part F compliance; and the actual energy performance of non-domestic buildings. Please provide related evidence.**

3.4 Level of interim uplift to Part L minimum standard for new non-domestic buildings

3.4.1. For new non-domestic buildings, we are proposing to set performance targets on the basis of primary energy and CO_2, which is outlined in section 3.5. We have carried out modelling and analysis to determine what a reasonable level of energy and CO_2 performance might be for a range of non-domestic building types, taking account of carbon savings, running costs, capital costs, and buildability. The modelling considered improvements to the minimum energy efficiency standards in the following areas:

- improving fabric and services;
- introducing low-carbon heat;
- heat recovery technologies; and
- on-site generation.

3.4.2. To identify two optimised options for CO_2 and primary energy targets for 2021, we carried out a modelling exercise using a series of theoretical building specifications

which tested different combinations of building services and fabric using representative non-domestic building types. These combinations of building services and fabric were refined and reduced in number over time. The two options presented here for consultation are designed to improve the carbon performance of non-domestic buildings and to stimulate a market-led approach to increasing the amount of low-carbon heat in non-domestic buildings. The standards have also been chosen to be affordable, practical and safe. Further information can be found in the Impact Assessment which accompanies this consultation.

3.4.3. The options below are presented in terms of CO_2 reduction to aid comparison with current standards and the percentage improvements are expressed as an average per building across the build-mix.[16] Figure 3.1 shows the estimated relative carbon savings set out by some common building types.

3.4.4. We plan to use either Option 1 or Option 2 as the basis of the new primary energy and CO_2 targets for new buildings.

i) **Option 1 is intended to deliver an average 22% improvement** in CO_2 emissions per building, compared to the current Part L standard, across the build-mix of non-domestic buildings. We expect this would typically be delivered by an increase in the efficiency of building services, and through on-site low carbon technology such as heat pumps or photovoltaic panels.

ii) **Option 2 is intended to deliver an average 27% improvement** in CO_2 emissions per building, compared to the current Part L standard, across the build-mix of non-domestic buildings. **This is the Government's preferred option**, and we expect this would typically be delivered by very high fabric standards, resulting in lower levels of heat loss from windows, walls, floors and roofs, improved services such as lighting, and low carbon technologies such as heat pumps or photovoltaic panels.

3.4.5. We propose that the targets will continue to be performance-based. The specifications on which both options are based only represent one way of meeting the primary energy and CO_2 targets for each of the options; we expect developers will find a wide variety of ways to meet these targets, using many different technologies. Alongside this consultation, we have provided an interface to a draft Simplified Building Energy Model (cSBEM) so that consultees can better understand the impact of proposals on sample buildings. cSBEM can be found on the following website:

http://www.uk-ncm.org.uk/

[16] Mean percentage CO_2 emissions reduction per building, weighted by the projected build-rates for different building types used in the accompanying Impact Assessment.

3.4.6. The Impact Assessment that accompanies this consultation includes indicative modelling of the cost-benefits of each option. This takes into account the average increase in build-costs for each building type. For example, meeting the Option 2 specification is estimated to add an average 0.7% to the average build-cost of an air-conditioned office. For a school, Option 2 is estimated to add an average 1.2% to the build cost.

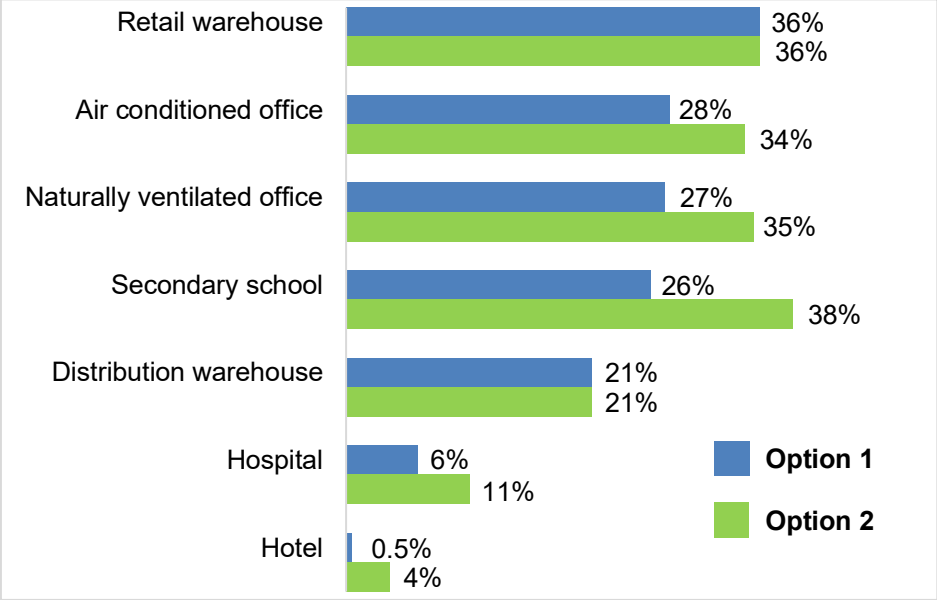

Figure 3.1: Percentage carbon reduction by non-domestic building type for proposed Options 1 and 2.

3.4.7. For hospitals and hotels, Figure 3.1 shows a much smaller carbon reduction than for other building types. Although we are proposing to significantly increase the building services and fabric efficiency of the energy performance targets, the energy profiles for these buildings are still dominated by domestic hot water. For buildings with large domestic hot water loads, larger reductions in carbon are not feasible until they switch to low carbon water heating sources as part of adopting the full Future Buildings Standard.

3.4.8. In practice, we anticipate that the standards will encourage developers to install low-carbon heating in new developments. For example, installing a heat pump for heating in an air-conditioned office could be a lower capital cost solution than installing gas boilers and photovoltaic panels. Adopting this approach allows the low-carbon heating sector to grow at a sustainable pace before becoming part of the minimum standard proposed to be introduced in 2025.

3.4.9. Section 2 of the impact assessment outlines how the new requirements may be met for different building types. It is important to note, however, that it is possible to meet the performance standards through a variety of mechanisms and technologies allowing flexibility in design to meet the individual circumstances of the building and that these examples are not intended to be prescriptive.

Question 10): **What level of uplift to the energy efficiency standards for non-domestic buildings in the Building Regulations should be introduced in 2021?**

a) **Option 1 – average 22% CO_2 reduction**
b) **Option 2 – average 27% CO_2 reduction (this is the Government's preferred option)**
c) **No change**
d) **Other level of uplift (please specify)**

Please explain your reasoning and provide supporting evidence or alternative suggestions where applicable.

3.5 Performance metrics for the interim uplift to Part L minimum standard for new non-domestic buildings

3.5.1. The existing 2013 Part L standard sets performance targets for new buildings based on the modelled CO_2 emissions of that building. While the Government believes that CO_2 emissions remain important, they are not a direct measure of a building's energy efficiency.

3.5.2. The United Kingdom has already made considerable progress in reducing the carbon intensity of the electricity grid in recent years and has committed to becoming carbon neutral by 2050. This means that when a new building uses electricity, CO_2 will become a less important measure of performance because it will ultimately come from an electricity grid that is zero carbon. The energy in the national grid will, however, still be a limited resource that we should use carefully. Reducing demand for energy will reduce electrical infrastructure needs and make it more likely that our electrical demand can be met through zero carbon sources in future.

3.5.3. We are therefore proposing the following three performance metrics for new buildings to be measured against:

i) Primary energy target;
ii) CO_2 emission target; and
iii) Minimum standards for fabric and fixed building services.

3.5.4. Primary energy is energy from renewable and non-renewable sources which has not undergone any conversion or transformation process. It is a measure of the total energy used including energy losses from extraction, processing, conversion and transportation. Primary energy is a new measure and is discussed in more detail in the following section.

Setting the energy target for new buildings using primary energy and CO_2 targets

3.5.5. From 2021 we are proposing to introduce primary energy as the principal metric against which the energy efficiency of new buildings should be assessed, as the basis for the Part L performance target. A primary energy target would enable us to set an energy performance target which prioritises the energy efficiency of the building by driving efficiency in building technological solutions, and the energy efficiency of the building fabric regardless of the heat source.

3.5.6. Despite a new focus on primary energy, reducing the CO_2 emissions of new buildings remains a key objective for the Government. Although we consider primary energy to be a good means of driving energy efficiency, it may not drive low carbon choices in all scenarios. For this reason, we propose to continue to use CO_2 targets for buildings alongside the primary energy target to encourage low-carbon fuel choices and the use of on-site renewable technologies. The consultation version of SBEM shows how we propose to apply primary energy to the compliance calculations in the future.

3.5.7. More information on our proposals for primary energy and CO_2, including an explanation of what primary energy is, how it is calculated and an explanation of carbon factors can be found in the *Briefing Note – Derivation and use of Primary Energy factors in SBEM*, and the draft National Calculation Methodology Modelling Guide which can both be found on the SBEM website:

http://www.uk-ncm.org.uk/.

Question 11): Do you agree with the way that we are proposing to apply primary energy as the principal performance metric?

a) Yes
b) No

If you answered no, please explain your reasoning.

Question 12): Do you agree with using CO_2 as the secondary performance metric?

a) Yes
b) No

If you answered no, please explain your reasoning.

Question 13): **Do you agree with the approach to calculating CO_2 and primary energy factors, referred to in paragraph 3.5.7 of this consultation document?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide supporting evidence or alternative suggestions.

3.6 National Calculation Methodology for new non-domestic buildings

3.6.1. To determine the energy performance of a non-domestic building, calculations must be carried out according to a methodology approved by the Secretary of State; this is the National Calculation Methodology (NCM). Two routes are available for assessing buildings, both of which must be compliant with the NCM:

i) For most simple buildings, using the Simplified Building Energy Model (SBEM)
ii) For more complex buildings, using an approved Dynamic Simulation Method

3.6.2. This chapter sets out several proposals for improving and updating the National Calculation Method, SBEM and its associated software interface (iSBEM). An interface to a draft Simplified Building Energy Model (cSBEM) and a draft NCM modelling guide can be found on the following website:

http://www.uk-ncm.org.uk/

Space heating fuel type in the notional building

3.6.3. In the Clean Growth Strategy, the Government made a commitment to phase out the installation of high-carbon forms of fossil fuel heating in new and existing buildings during the 2020s, starting with new build.

3.6.4. Currently, for non-domestic buildings, the water and space heating for each zone in both the actual building and the notional building,[17] which is used to set the

[17] The National Calculation Methodology takes a theoretical building of the same size and shape as the actual building and assigns standardised properties for fabric and services - this is known as the 'notional building'. The carbon and primary energy rate of the notional building set the targets for the actual building. UK NCM, 2021. UK's National Calculation Method for Non Domestic Buildings. Available online: http://www.uk-ncm.org.uk/

performance target, are modelled using the same fuel type.[18] We propose to modify this approach to discourage the use of high-carbon fossil fuels in new buildings, while allowing for diversity and flexibility in the specification of heating systems. This approach is set out in detail in the draft NCM Modelling Guide (see paragraph 3.6.2 of this consultation document and Table 7 of the NCM Modelling Guide).

3.6.5. We propose to continue with the notional building approach but to reduce the number of notional building space heating types, as part of a transition to low carbon heating fuels. The notional building approach allows the setting of standards for non-domestic buildings in a way which allows for a range of technical solutions for the design of buildings and which reduces the risk of unintended consequences.

3.6.6. In our proposed approach, natural gas has been assigned as the space heating fuel for the notional building for any fuel in the actual building with a worse CO_2 emission factor than natural gas, for example, oil or LPG. In all other cases, with the exception of electric heating, the fuel used for space heating is proposed to be the same for the notional and actual building.

3.6.7. The proposed CO_2 emission factor for electricity is now lower than for fossil fuels, including fuel oil and natural gas, but setting electricity as the heating fuel for the notional building would likely result in a high primary energy impact, and may result in high heating bills likely to be of concern for businesses, particularly smaller enterprises. For these reasons, we consider that electric heating should not be installed without mitigating measures.

3.6.8. We propose to encourage this by adjusting the notional building such that, where electric heating is specified for space heating in the actual building, the notional building is modelled as having a hybrid electric/heat pump heating system. In this way, the actual building will need to include additional measures to enhance energy performance. Details of this proposal are included in the NCM modelling guide.

Question 14): Do you agree with the proposals for natural gas being assigned as the heating fuel for any fuels with a worse CO_2 emission factor than natural gas?

a) Yes
b) No

If you answered no, please explain your reasoning and provide supporting evidence or alternative suggestions.

[18] With a particular exception for direct-electric heating which is compared to a nominal fuel-oil heat source.

Question 15): Do you agree with our proposal of using a hybrid electric/heat pump heating system in the notional building when electricity is specified as a heating fuel?

a) Yes
b) No

If you answered no, please explain your reasoning and provide supporting evidence or alternative suggestions.

Domestic hot water in the notional building

3.6.9. Point-of-use electric water heating can have a lower primary energy and CO_2 impact than systems that store hot water and is to be encouraged where appropriate. We recognise, however, that these systems may not be a suitable means of meeting the needs of some buildings and their users. Where the actual building uses gas for water heating, we propose that the notional building is modelled with electric point-of-use water heating if the volume of water heated is low (less than or equal to 200 litres per m^2 floor area per year). Where buildings use gas for water heating and have large hot water needs (greater than 200 litres per m^2 floor area per year), such as changing rooms or hospital wards, we propose that the notional building is modelled with a gas-fired hot water system. More details are provided in the draft NCM modelling guide.

Question 16): Do you agree with the proposal for the treatment of domestic hot water in the notional building?

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

District heating

3.6.10. The current Part L 2013 approach to district heating is to compare the actual building to a notional building employing a gas-fired Combined Heat-and-Power (CHP) district heating system and works on a sliding scale depending on the carbon intensity of the heat network.

3.6.11. The significant decarbonisation of the electricity grid since 2013 has resulted in electricity produced from gas-fired CHP often being more carbon intensive than grid-electricity when calculated using the proposed 2021 carbon emission factors. As a result, there is a strong argument for this approach to be revised.

3.6.12. Heat networks form part of the Government's overall plan for the future of low-carbon heat, particularly in cities and high-density areas. Heat networks can often decarbonise more easily compared to other heat sources because new technologies can be added to the system with little disruption to individual buildings. Heat networks provide a unique opportunity to exploit larger scale, renewable and recovered heat sources that cannot be accessed at an individual building level. They also provide system benefits such as thermal storage and reducing the energy demand of the grid at peak times, which have carbon benefits which are not fully accounted for in energy modelling.

3.6.13. Significant investment has been made into heat networks in England and we will need to balance the need to continue to use existing heat networks, with the need to incentivise new heat networks to be low carbon. Where there is potential for decarbonising, we consider that new connections to existing heat networks may be appropriate, and part of our transition to low carbon heating.

3.6.14. We propose that, where a building connects to an existing district heating system, the notional building will be served by a district heating system supplied by a gas-fired CHP with an electrical efficiency of 30% and a heat efficiency of 50%, supplying 70% of the heating load (with a 15% uplift to the emission factor to account for network heat losses). This is described in the draft NCM modelling guide.

3.6.15. We propose that this standard should be even more stringent when connecting to a new heat network. Our proposal is that new heat networks should be compared to a better notional building district heating system.[19] We are seeking views on what this should look like, but suggest that a new district heating system could assume a proportion of low-carbon heat, for example, by using the specification in paragraph 3.6.14, with 20% of heat delivered by heat pumps.

Question 17): Do you agree with the proposal for connecting to an existing heat network, as presented in the draft NCM modelling guide?

a) Yes
b) No, they give too much of an advantage to heat networks
c) No, they do not give enough of an advantage to heat networks
d) No, I disagree for another reason

If you answered no (b, c or d), please explain your reasoning and provide supporting evidence or alternative suggestions.

[19] Note that this is not represented in the draft SBEM tool.

Question 18): **Do you agree with the proposal for connecting to a new heat network, as presented in the draft NCM modelling guide?**

a) Yes
b) No, they give too much of an advantage to heat networks
c) No, they do not give enough of an advantage to heat networks
d) No, I disagree for another reason

If you answered no (b, c or d), please explain your reasoning and provide supporting evidence or alternative suggestions.

Other changes to the National Calculation Methodology

3.6.16. The National Calculation Methodology is accompanied by an 'activity database', which contains assumptions about the end-use of spaces within buildings, including hot water use, occupancy, lighting and heating set-points. We have reviewed the NCM Modelling Guide and the activity database and identified the following changes, which we propose to adopt:

- Added new classifications of high and low hot water demand activities, to better reflect the anticipated hot water use in certain spaces;
- revised the activity database to reflect the latest standards and evidence on how buildings are used (e.g. hot water demand in schools has been reduced);
- modified the water heating demand calculation in SBEM to allow the definition of showers with different flow rates, to credit the energy saving from reduced hot water use;
- reviewed the assumptions for the level of lighting in each of the activities in the activity database and updated these according to the latest industry guidance;
- revised the approach for calculating the fan energy associated with demand-controlled ventilation;
- changed default assumptions on thermal bridging, to encourage designers to undertake better design detailing; and
- added photovoltaics to the notional building unless a heat pump meets 100% of the actual building's space heating demand. This is intended to discourage excessive levels of photovoltaics in the actual building being used to reduce fabric performance.

3.6.17. These changes can be seen in full in the draft NCM Modelling Guide which accompanies this consultation, and can be found at the following website:

http://www.uk-ncm.org.uk/

3.6.18. We are also considering how the outputs of calculation tools could be improved to provide better information to energy assessors, building control bodies, and building owners. In particular, the outputs should make it easier to check the characteristics of the building energy model against the completed building. This might include a list of building services equipment and fabric specifications. We welcome views on how the outputs of compliance tools can be improved.

Question 19): Do you agree with the proposed changes to the National Calculation Methodology Modelling Guide and activity database?

a) Yes
b) Yes, but additional changes should be made
c) No

If you answered b or c, please explain your reasoning and provide alternative suggestions.

Question 20): We would welcome any further suggestions for revising the outputs from SBEM, which would enable easier checking by building control on building completion. Please provide related evidence.

Limiting heat gains in non-domestic buildings

3.6.19. The current Part L guidance for non-domestic buildings includes standards for the maximum solar gain of a building (i.e. heat gains from the sun through windows). The intention of this is to reduce the use of any comfort cooling systems in place and reduce the need for cooling being installed if it is not already present.

3.6.20. In the current guidance, limiting solar gain can be shown by demonstrating that solar gains are no greater than would occur through a reference glazing system. We are proposing to increase the solar performance requirements by improving the performance of the reference glazing in reducing solar gains (the performance measurement for this is known as a 'g-value'). While we recognise that solar control glass can reduce visible light transmission, many modern glazing systems can still achieve high levels of solar control while being very transparent to visible light. The

details of this can be found in the draft NCM modelling guide and in Table 4.3 of the draft *Approved Document L, volume 2: buildings other than dwellings*.

Question 21): Do you agree with the proposals for limiting heat gains in non-domestic buildings?

a) Yes
b) No, they go too far
c) No, they do not go far enough
d) No, I disagree for another reason

If you answered no (b, c or d), please explain your reasoning and provide alternative suggestions.

3.7 Minimum standards for thermal elements, windows and doors in new non-domestic buildings

3.7.1. To reflect the importance of providing a thermally efficient building, we propose that standards for new non-domestic buildings should continue to include minimum levels of fabric performance. We are proposing to increase the minimum standards for roofs, walls, floors, windows, and external doors.

3.7.2. Although we expect that good fabric performance will principally be driven by the need to meet carbon and primary energy targets, we have reviewed the standards for each fabric element in order to identify reasonable improvements which can be made to eliminate the least efficient construction types. We also propose to consolidate standards which apply for new builds and those that apply for new elements in existing buildings (described in section 3.8).

3.7.3. The diverse range of non-domestic building types, and the wide variety of servicing strategies and activities in the non-domestic stock, means that setting a generic set of minimum standards is challenging. However, there are common minimum standards that we believe can be applied to non-domestic buildings under normal circumstances. Our proposed standards for new non-domestic buildings can be found in Section 4 of draft *Approved Document L, volume 2: buildings other than dwellings* in paragraphs 4.5 and 4.6 and are summarised in Table 3.2.

Table 3.2: Standards for new thermal elements, windows, doors and air permeability for new non-domestic buildings		
	2013 U-values in new non-domestic buildings ($W/m^2.K$)	**Proposed U-values for new non-domestic buildings ($W/m^2.K$)**
Pitched roof – insulation at ceiling level	0.25	0.16
Pitched roof – insulation at rafter level	0.25	0.16
Flat roof or roof with integral insulation	0.25	0.18
Wall	0.35	0.26
Floors	0.25	0.18
Swimming pool basin	0.25	0.25
Windows in buildings similar to dwellings	2.2	1.6 or Window Energy Rating Band B
Rooflight [i]	2.2	2.2 (horizontal plane)
All other windows, roof windows and curtain walling	2.2	1.6
Pedestrian doors (including glazed doors)	2.2	1.4
High usage entrance doors	3.5	3.0
Vehicle access or similar large doors	1.5	1.3
Roof ventilators (including smoke vents)	3.5	3.0
Air Permeability	10 $m^3/ (h.m^2)$ @50Pa	8 $m^3/ (h.m^2)$ @50Pa or 1.57 $m^3/ (h.m^2)$ @ at 4Pa
Notes: i. Section 3.9 of this consultation sets out our proposal to adopt the latest version of BR 443 for calculating U-values for rooflights. In current standards, the limiting U-value is based on a rooflight in a vertical position. The proposed standard is based on a rooflight in a horizontal position.		

Question 22): **Do you agree with the proposed minimum standards for fabric performance in new non-domestic buildings as presented in Table 3.2 of this consultation document?**

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough
d) No, I disagree for another reason

If you answered no (b, c or d), please explain your reasoning and provide supporting evidence or alternative suggestions.

3.8 Minimum standards for new and replacement thermal elements, windows and doors in existing non-domestic buildings

3.8.1. The Building Regulations sets energy efficiency standards for new and replacement thermal elements in existing non-domestic buildings. These standards apply:

- when providing a new element in an existing building;
- when providing a new element as part of an extension of an existing building;
- when replacing a controlled fitting (e.g. windows and doors); or
- when completely removing and replacing a thermal element (i.e. walls, floors, roofs).

3.8.2. To reflect the importance of providing a thermally efficient building, we propose that that standards for existing non-domestic buildings should continue to include minimum levels of fabric performance. We are proposing to uplift the minimum standards for roofs, walls, floors, windows, and external doors.

3.8.3. Paragraph 3.7.2 of this consultation provides an overview of our approach to reviewing each fabric element, which includes consolidating standards for new build and new elements in existing buildings. We are proposing that the same minimum standards for new non-domestic buildings, which represents an uplift to most building elements, should also be applied for new elements in existing buildings. The common minimum standards for fabric elements are set in Table 4.1 of draft *Approved Document L, volume 2: buildings other than dwellings* and are summarised in Table 3.3 below for new elements.

Table 3.3: Standards for new thermal elements, windows, doors for existing non-domestic buildings

	2013 U-values for new elements in existing non-domestic buildings ($W/m^2.K$)	**Proposed U-values for new elements in existing non-domestic buildings($W/m^2.K$)**
Pitched roof – insulation at ceiling level	0.16	0.16
Pitched roof – insulation at rafter level	0.18	0.16
Flat roof or roof with integral insulation	0.18	0.18
Wall	0.28	0.26
Floors	0.22	0.18
Swimming pool basin	0.25	0.25
Windows in buildings similar to dwellings	1.6 or Window Energy Rating Band C	1.6 or Window Energy Rating Band B

	2013 U-values for new elements in existing non-domestic buildings (W/m^2.K)	Proposed U-values for new elements in existing non-domestic buildings(W/m^2.K)
Rooflight [i.]	1.8 (vertical plane)	2.2 (horizontal plane)
All other windows, roof windows and curtain walling	1.8	1.6
Pedestrian doors (including glazed doors)	1.8	1.4
High usage entrance doors	3.5	3.0
Vehicle access or similar large doors	1.5	1.3
Roof ventilators (including smoke vents)	3.5	3.0

Notes:

i. Section 3.9 of this consultation sets out our proposal to adopt the latest version of BR 443 for calculating U-values for rooflights. In current standards, the limiting U-value is based on a rooflight in a vertical position. The proposed standard is based on a rooflight in a horizontal position.

3.8.4. For work to existing buildings, we have considered possible design constraints for work when these standards apply, for example changes in finished floor level, or differences in thicknesses of wall. We believe that the proposed standards in Table 3.3 are appropriate in most cases. However, where further design flexibility is needed, we propose that the two alternative methods of demonstrating compliance for extensions should still be available. Details can be found in Section 10 of draft *Approved Document L, volume 2: buildings other than dwellings* in paragraphs 10.10 to 10.12 which accompanies this consultation.

Question 23): Do you agree with the proposed minimum standards for fabric performance of new thermal elements in existing non-domestic buildings as presented in Table 3.3 of this consultation document?

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough
d) No, I disagree for another reason

If you answered no (b, c or d), please explain your reasoning and provide supporting evidence or alternative suggestions.

3.8.5. Paragraph 4.15 of draft *Approved Document L, volume 2: buildings other than dwellings*, that accompanies this consultation, includes some new guidance on reducing unwanted air infiltration when carrying out work to existing non-domestic buildings.

Question 24): **Do you agree with the draft guidance in paragraph 4.15 of the draft *Approved Document L, volume 2: buildings other than dwellings* on reducing unwanted air infiltration when carrying out work to existing non-domestic buildings?**

a) Yes
b) No

If you answered no, please explain your reasoning.

3.9 Limiting U-value calculations for rooflights in non-domestic buildings

3.9.1. The Future Homes Standard consultation proposed:

- That the limiting U-value for rooflights in new domestic buildings should be based on a rooflight in a horizontal position, rather than a vertical position; and
- To adopt the new version of BR 443, which provides guidance on conventions for U-value calculations.

3.9.2. We are also proposing to incorporate these changes for U-value calculations in all non-domestic buildings. As outlined in the Future Homes Standard consultation, most rooflights are tested and installed in the horizontal position, and this proposed change reduces the need for conversion factors, which add unnecessary complexity. The new version of BR 443 is an update to the previous 2006 edition, and primarily reflects changes in British and International standards; industry practice; and industry publications. This new version of BR 443 is available online, where all the changes can be viewed:

www.bregroup.com/sap/sap10/

Question 25): **Do you agree that the limiting U-value for rooflights in new and existing non-domestic buildings should be based on a rooflight in a horizontal position, as detailed in paragraph 4.4 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

Question 26): **Do you agree that we should adopt the latest version of BR 443 for calculating U-values in new and existing non-domestic buildings, as detailed in paragraph 4.1 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

3.10 Building services in new non-domestic buildings

3.10.1. This section covers standards for building services in new non-domestic buildings only. The equivalent standards for building services in existing non-domestic buildings is covered in section 3.11.

Natural gas, LPG and oil boilers and domestic hot water

3.10.2. For natural gas-fired boilers, we are proposing to increase the minimum seasonal efficiencies for boilers in new non-domestic buildings. We are also proposing to increase the minimum system efficiencies for LPG and oil-fired boilers. These changes are proposed for space heating and domestic hot water systems. More detail can be found in Section 6 the draft *Approved Document L, volume 2: buildings other than dwellings*.

Question 27): **Do you agree with the newly proposed minimum efficiencies for natural gas, oil and LPG boiler and domestic hot water system installations in new non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough

If you answered no (b or c), please explain your reasoning.

Air distribution

3.10.3. We are making several proposals for simplifying and consolidating the minimum standards for air distribution systems. There are some areas where technological advancements or improved design and installation practices mean that we can

improve minimum standards, to prevent the least efficient systems from being installed in buildings. We recognise that the standards still need to allow for flexibility for specialist ventilation system applications, or where achieving very low specific fan powers would not be practical (e.g. due to space constraints). We have also proposed changes to make it easier to install active chilled beam systems, which are an efficient way of providing cooling.

3.10.4. We have simplified and incorporated the requirements for air distribution from the Non-domestic building services Compliance guide into the *Approved Document L, volume 2: buildings other than dwellings* including the following revisions to minimum standards for air distribution units:

- All supply and extract systems should have heat recovery where technically feasible.
- Maximum specific fan power for zonal supply and extract ventilation units, such as ceiling void or roof units serving single room or zone with heating and heat recovery is set at 2.3W/(l.s) (including allowance for heat recovery and return air filter);
- Other systems have had a value of 0.4W/(l.s) incorporated into the maximum specific fan power as an allowance for heat recovery.
- Fan assisted terminal variable air volume unit maximum specific fan power reduced to 0.5W/(l.s);
- Fan coil unit maximum specific fan power reduced to 0.3W/(l.s).
- For air distribution systems using active chilled beams, an additional allowance of 0.3 W/(l.s) is provided.

Question 28): Do you agree with the proposed set of standards for air distribution systems for new non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough

If you answered no (b or c), please explain your reasoning.

Self-regulating devices

3.10.5. We plan to introduce a new regulation in the Building Regulations to ensure that new non-domestic buildings must have self-regulating devices when a heating or cooling system is installed.

3.10.6. Technically, this is achieved by including devices for the separate regulation of the temperature in each room or designated heating zone (where this is justified) of the building. One way of achieving this in practice would be to have Thermostatic Radiator Valves (TRVs) on radiators in each room.

3.10.7. Proposed guidance for new non-domestic buildings is provided in Sections 5 and 6 of draft *Approved Document L, volume 2: buildings other than dwellings,* which accompanies this consultation.

Question 29): **Do you agree with the proposals for self-regulating devices for new non-domestic buildings, as set out in Sections 5 and 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

Lighting

3.10.8. The performance of LED lighting has improved considerably in recent years, with many products achieving efficacies in excess of 100lm/W.[20] LED lights are now competitively priced compared to fluorescent and halogen lighting products and are suitable for nearly all indoor lighting applications including display lighting. Because of this, our analysis suggests that it is cost-effective and practical to increase the minimum efficacy of lighting installations. We propose that the minimum efficacy for lighting installed in new non-domestic buildings should be:

- 95 luminaire lumens per circuit watt for general lighting; and
- 80 luminaire lumens per circuit watt for display lighting.

3.10.9. LED lighting is now routinely installed in non-domestic buildings, and we expect the proposed changes to minimum lighting efficacy will mean that less efficient lighting technologies will not be able to be installed.

3.10.10. We propose to continue to provide guidance for the alternative Lighting Energy Numeric Indicator route to compliance, but to recalibrate this to effectively the same standard as the standard above.

[20] International Energy Agency, 2019. Tracking Buildings. Available online: https://www.iea.org/tcep/buildings/lighting/

Question 30): **Do you agree with the minimum efficacy proposals for lighting in new non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough

If you answered no (b or c), please explain your reasoning.

Cooling

3.10.11. Air conditioning systems are an area where considerable improvements have been made in efficiencies. In part, this has been driven by Ecodesign requirements, which have overtaken Building Regulations standards in many areas.

3.10.12. As part of our support for a highly energy efficient and decarbonised building stock by 2050 and to enable consumers and businesses to make more informed choices to save energy and save money, the inspection regime for air conditioning systems was the subject of a consultation in May 2020. The Government response to the consultation was published on 19 November and concluded that the existing threshold for the inspection of the energy efficiency of air-conditioning systems that have an effective rated output of more than 12kW should be retained.[21]

3.10.13. We propose to increase minimum efficiencies (seasonal energy efficiency ratios) for all of the comfort cooling systems in the statutory guidance. In many cases these align with Ecodesign requirements, although we have identified opportunities to go further for some product types. We understand from market research and discussion with industry that split cooling and variable refrigerant flow system types have the potential to provide cooling at much higher efficiencies. We propose that the following system types should have a minimum energy efficiency ratio which goes significantly beyond the minimum Ecodesign requirements:

- split and multi-split air conditioners (of any capacity/size); and
- variable refrigerant flow systems.

[21] Response to the Consultation on Changes to The Energy Performance of Buildings (England and Wales) Regulations 2012, No 3118. Available online: https://www.gov.uk/government/consultations/energy-performance-of-buildings-changes-to-the-energy-performance-of-buildings-regulations-2012-no-3118

3.10.14. The proposed minimum full-load energy efficiency ratios for comfort cooling systems and associated guidance can be found in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*, which accompanies this consultation.

Question 31): Do you agree with the proposals for cooling in new non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough

If you answered no (b or c), please explain your reasoning.

Building Automation and Control Systems

3.10.15. A Building Automation and Control System (BACS) is a centralised system used to monitor and control a building's environment and services (i.e. heating, ventilation, air conditioning, lighting and other systems such as security alarms and lifts). There is currently no requirement for installing BACS in new buildings. Our analysis suggests that BACS are a cost-effective way of saving energy in buildings. We propose that new non-domestic buildings that have a heating or air conditioning system[22] with an effective rated output over 290kW, should be equipped with a BACS. The details of the specification of these systems are set out in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings,* provided alongside this consultation.

3.10.16. We recognise that setting a standard for BACS using a heating or air conditioning system size threshold for new buildings could result in unintended outcomes, such as building designers under-sizing systems to avoid the requirement. We welcome views on how to set this standard in a way that reduces this risk.

3.10.17. We have proposed to set the specification of BACS as a 'Class A' system using EN 15232, on the understanding that this is the necessary specification to meet ISO 16484. It also provides a high level of control, and our analysis suggests it is cost-effective.

[22] Including combined heating and ventilation systems, or combined air conditioning and ventilation systems

Question 32): **Do you agree with the proposals to require building automation and control systems in new non-domestic buildings, when such buildings have a heating or air-conditioning system over 290kW?**

a) **Yes**
b) **No, a different trigger point should be used**
c) **No, I do not agree that building automation and control systems should be required in new buildings**
d) **No, I disagree for another reason**

If you answered no (b, c or d), please explain your reasoning and provide alternative suggestions. Please also highlight any unintended consequences that may result from setting this standard.

Question 33): **Do you agree with the technical specification for new building automation and control systems as EN 15232, Class A?**

a) **Yes**
b) **No, the requirements go too far**
c) **No, the requirements do not go far enough**

If you answered no (b or c), please explain your reasoning.

Commissioning and providing information

3.10.18. Specifying high performing services in buildings can only be effective if these services and controls are tested and adjusted properly after installation (a process known as 'commissioning'). The Building Regulations already recognise the importance of commissioning through requirement L1(b)(iii) of Schedule 1. In addition, Regulation 44 sets out requirements that the relevant local authority must be provided with a notice confirming that the fixed building services have been commissioned in accordance with an approved procedure.

3.10.19. We propose to extend the commissioning requirements for new non-domestic buildings to both BACS, and on-site electricity generation systems.

3.10.20. The Government wants to ensure that commissioning is carried out as effectively as possible. We are therefore proposing to make the requirements for commissioning much clearer by providing a dedicated section in *Approved Document L, volume 2: buildings other than dwellings*, which will set out the legal requirement as well as guidance on how to meet the legal requirements in normal circumstances. We also

propose to expand the guidance on commissioning by referencing specific commissioning guidance beyond the currently referenced CIBSE Guide M.

3.10.21. We welcome suggestions for how the guidance could be improved, including what evidence should be provided to building control bodies and energy assessors to demonstrate that commissioning has been carried out effectively.

3.10.22. We are proposing to introduce requirements for when a new system is installed in a new non-domestic building.[23] We propose that the overall energy performance of the system is assessed and documented, with the results passed on to the building owner, as part of the commissioning process. We also propose that a copy of the completed commissioning sheet, which includes commissioning information and results, should be provided to the building owner. For non-domestic buildings, the details of these proposals can be found in Sections 8 and 9 of *Approved Document L, volume 2: buildings other than dwellings*.

Question 34): **Do you agree with the proposals for improving the commissioning guidance for new non-domestic buildings in Section 8 and 9 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough
d) No, I disagree for another reason

If you answered no (b, c, or d), please explain your reasoning and provide alternative suggestions.

Question 35): **Do you agree with the proposals for requirements relating to the assessment of overall energy performance of building services installations and providing information to building owners for new non-domestic buildings given in sections 8 and 9 of *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

[23] Including fixed building services, building automation and control systems, and on-site electricity generation

Sizing building services systems

3.10.23. We are proposing to introduce new requirements and associated guidance on sizing and controls for building services systems. The intention is to reduce the risks from under or oversizing systems. For example, a significantly oversized condensing boiler may not regularly run in condensing mode, and therefore will not be able to fulfil its energy-saving potential. We have proposed guidance in the Sections 5 and 6 of draft *Approved Document L, volume 2: buildings other than dwellings* for the following building services systems:

Table 3.4: Guidance on sizing and controls for building services systems	
Service type	***Approved Document L, volume 2: buildings other than dwellings***
Space heating	Paragraph 5.8
Domestic hot water	Paragraph 6.23 and 6.25
Comfort cooling	Paragraph 6.33 and 6.38
Mechanical ventilation	Paragraph 6.45, 6.52 and 6.53
Lighting	Paragraph 6.57
Building automation and control systems (BACS)	Paragraph 6.68
On-site electricity generation	Paragraphs 6.69 to 6.72

Question 36): Do you agree with the guidance proposals for adequate sizing and controls of building services systems in new non-domestic buildings, as detailed in Sections 5 and 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?

a) Yes
b) No, I do not agree with providing guidance on this
c) No, the guidance should be improved

If you answered no (b or c), please explain your reasoning.

Making buildings fit for installing low carbon heat

3.10.24. The Future Homes Standard consultation proposed to introduce measures for new homes that would make it easier to install low carbon heating in future. Although new non-domestic buildings are more diverse in end-use and services, the same principle of ensuring that the buildings are suitable for future low-carbon heat still applies.

3.10.25. The diverse possibilities for low carbon heat in future means that it is not possible to futureproof for every scenario. However, one proposal that would provide benefits now and make it easier to install heat pumps or district heating in future, is for new

buildings to have a space heating system which operates at a low temperature. Heat pumps operate best at temperatures of 55°C or lower. This flow temperature would also have benefits of increasing the efficiency of condensing boilers, giving an immediate energy saving to the consumer. It would also reduce losses and improve system efficiencies in district heating and facilitate the transition to low carbon technologies.

3.10.26. We propose that wet space heating systems in non-domestic buildings should be designed to operate with a flowrate temperature of 55°C or lower in the final heating circuit. To encourage this, we could either:

- design the notional building in the National Calculation Methodology to give carbon and primary energy credit for heating systems designed to operate at temperatures of 55°C or lower; or
- set a minimum standard in the *Approved Document L, volume 2: buildings other than dwellings* that heating systems should be designed to operate at temperatures of 55°C or lower.

3.10.27. The proposal for low-temperature heat may result in larger heat emitters (e.g. larger radiators or underfloor heating) in new buildings. The proposal aims to provide low cost and low disruption to building tenants when low-carbon heat is installed in the future, because they will not need to have new heat emitters or larger radiators installed.

3.10.28. We are conscious that domestic hot water must be stored at temperatures necessary to control legionella growth. We are not therefore proposing that the standard should be applied to domestic hot water systems.

Question 37): Do you agree with the proposal that wet space heating systems in new buildings should be designed to operate with a flow temperature of 55°C or lower?

a) Yes, through a minimum standard set in paragraph 5.9 of the *Approved Document L, volume 2: buildings other than dwellings*
b) Yes, through carbon and primary energy credit in SBEM
c) Yes, by another means
d) No, the temperature should be below 55°C
e) No, this standard should not be applied to all new buildings
f) No, I disagree for another reason

Please explain your reasoning.

Restructure of guidance

3.10.29. We are proposing to clarify, rationalise and simplify the guidance for new non-domestic building services as follows:

- incorporate the standards in the Non-Domestic Building Services Compliance Guide into the main body of the *Approved Document L, volume 2: buildings other than dwellings*;
- the revised *Approved Document L, volume 2: buildings other than dwellings* guidance has been updated to relate only to the minimum standards of the Building Regulations. It also includes other guidance which may be necessary to follow in order to meet these minimum standards. 'Best practice' guidance has been removed;
- the revised *Approved Document L, volume 2: buildings other than dwellings* guidance has been updated to generally no longer cite non-Building Regulations requirements;
- where the same principles apply to different building system types (e.g. heating controls for oil boilers and for gas boilers) the guidance has been consolidated; and
- the pipework and ductwork heat loss criteria has been simplified to make this easier for designers to understand, and for building control bodies to check.

3.10.30. For new buildings, we expect that the efficiencies of building services will be principally driven by the need to meet the CO_2 and primary energy targets. We propose to continue to set minimum building services efficiencies, even where the Building Regulations proposals do not go significantly beyond the Ecodesign requirements. This provides an additional information source for designers and installers, and a mechanism for setting or increasing standards in future, potentially further than the Ecodesign mechanisms.

Question 38): **Do you agree with the proposals to clarify, rationalise and simplify the guidance for building services in new non-domestic buildings, and to incorporate the standards of the Non-Domestic Building Services guidance into the main body of the *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

Consideration of high-efficiency alternative systems

3.10.31. Regulation 25A of the Building Regulations deals with high-efficiency alternative systems. It requires the person who is carrying out the work of constructing a new building to analyse and consider the technical, environmental and economic feasibility of using high-efficiency alternative systems in the construction. The Future Homes Standard consultation proposed to simplify these requirements by:

- removing the list of example systems at 1(a)-(d) of Regulation 25A; and
- removing the requirement to give notice to the local authority that states the analysis has been carried out.

3.10.32. We propose to apply the same principle for non-domestic buildings. These proposed amendments do not change the need for the analysis of high-efficiency alternative systems to be undertaken, nor does it prevent local authorities from requiring evidence of such an analysis having been carried out.

Question 39): Do you agree with the proposals to simplify the requirements in the Building Regulations for the consideration of high-efficiency alternative systems in new non-domestic buildings?

a) Yes
b) No

If you answered no, please explain your reasoning.

3.11 Building Services in existing non-domestic buildings

Replacement services

3.11.1. If replacing a fixed building service involves a fuel switch, we propose that the new services should not emit more CO_2 emissions and also should not have higher primary energy demand than the service being replaced. This would, for instance, mean a gas-fired boiler should not generally be replaced with an electric flow boiler, even though it may be lower carbon. Guidance and an example are provided alongside this consultation in Section 5 of draft *Approved Document L, volume 2: buildings other than dwellings*.

Question 40): **Do you agree with the proposals for replacement of fixed building services in existing non-domestic buildings as detailed in paragraphs 5.4 to 5.7 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

Natural gas, LPG and oil boilers and domestic hot water

3.11.2. We propose that the increases in minimum seasonal efficiencies in new non-domestic buildings, detailed in paragraph 3.10.2, also apply to installations in existing non-domestic buildings.

Question 41): **Do you agree with the newly proposed minimum efficiencies for natural gas, oil and LPG boiler and domestic hot water system installations in existing non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough

If you answered no (b or c), please explain your reasoning.

3.11.3. The Non-Domestic Building Services Compliance Guide 2013 edition allowed heating appliances installed in existing buildings to have lower seasonal efficiencies if these were compensated for by the addition of other energy efficiency measures. These allowances are known as heating efficiency credits. We are proposing to no longer provide this alternative guidance because the efficiency of appliances has been improved since these were published and these relaxations are no longer needed.

3.11.4. The revised guidance also clarifies the minimum expectations for controls when installing a heating appliance in an existing building.

3.11.5. We are proposing that the minimum efficiency of services installed in existing buildings should remain part of the functional requirement of conservation of fuel

and power, and therefore alternative means of demonstrating this would still be permissible.

Question 42): **Should minimum boiler efficiency standards in existing non-domestic buildings still benefit from relaxations through the use of heating efficiency credits?**

a) Yes, boiler installations should continue to benefit from heating efficiency credits
b) No, boiler installations should no longer benefit from heating efficiency credits (the Government's proposal)

If you answered yes, please explain your reasoning.

Air distribution

3.11.6. We propose that the minimum standards for air distribution in new non-domestic buildings detailed in paragraphs 3.10.3 to 3.10.4 also apply for installations in existing non-domestic buildings.

Question 43): **Do you agree with the proposed set of standards for air distribution systems for existing non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough

If you answered no (b or c), please explain your reasoning.

Self-regulating devices

3.11.7. We propose that the new regulations in the Building Regulations 2010 requiring self-regulating devices in new buildings outlined in paragraphs 3.10.5. to 3.10.7, which specify that buildings must have self-regulating devices when a heating or cooling system is installed, also apply to the replacement of a heating appliance in an existing building.

3.11.8. In cases where it is not technically or economically feasible to install such controls in an existing building, we propose that the requirement would not apply. Economic feasibility for self-regulating devices is defined as a simple payback period of 7 years

or less. Paragraph 5.15 of draft *Approved Document L, volume 2: buildings other than dwellings* gives some examples of when measures may not be technically feasible.

3.11.9. Proposed guidance for self-regulating devices in existing non-domestic buildings is provided in Sections 5 and 6 of draft *Approved Document L, volume 2: buildings other than dwellings,* which accompanies this consultation.

Question 44): **Do you agree with our proposed approach and guidance to mandating self-regulating controls in existing non-domestic buildings, including technical and functional feasibility, as detailed in Sections 5 and 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

Lighting

3.11.10. We estimate that improving the minimum energy performance standard for lighting would be one of the most cost-effective means of saving carbon and energy in existing buildings.

3.11.11. We propose that the minimum standards for lighting in new non-domestic buildings detailed in paragraphs 3.10.8 to 3.10.10 also apply for installations in existing non-domestic buildings.

3.11.12. The standards for existing buildings would only apply when the Building Regulations are triggered by relevant building works, such as a building refurbishment. They would not be applicable in other scenarios, such as when replacing an individual lamp within an existing luminaire.

Question 45): **Do you agree with the minimum efficacy proposals for lighting in existing non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough

If you answered no (b or c), please explain your reasoning.

Cooling

3.11.13. We propose that the minimum standards for comfort cooling systems in new non-domestic buildings detailed in paragraphs 3.10.11 to 3.10.14 also apply for installations in existing non-domestic buildings.

Question 46): Do you agree with the proposals for cooling in existing non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough

If you answered no (b or c), please explain your reasoning.

Building Automation and Control Systems

3.11.14. We propose that when a Building Automation and Control System (BACS) is installed in an existing building with heating or air conditioning systems over 290kW it should meet the same minimum standard as new non-domestic buildings, detailed in paragraphs 3.10.15 to 3.10.17. The details of the specification of these systems is set out in Section 5 of draft *Approved Document L, volume 2: buildings other than dwellings,* provided alongside this consultation.

Question 47): Do you agree with the proposals that when Building Automation and Control System is installed in an existing non-domestic building with a heating or air-conditioning system over 290 kW, it should meet the same minimum standards as new non-domestic buildings?

a) Yes
b) No, a different trigger point should be used
c) No, a different standard should be used
d) No, for another reason

If you answered no (b, c or d), please explain your reasoning and provide alternative suggestions.

Commissioning and providing information

3.11.15. Our proposals for commissioning in new non-domestic buildings are designed to also apply to work on existing non-domestic buildings. Our proposed changes for extending commissioning requirements to Building Automation and Control systems, and on-site electricity generation systems, and for providing clearer commissioning requirements are detailed in paragraphs 3.10.18 to 3.10.22.

3.11.16. We are proposing to introduce requirements for when work is carried out to a building services system,[24] or a new system is installed in an existing non-domestic building. We propose that the overall energy performance of the altered part, and where relevant of the complete altered system, is assessed and documented, with the results passed on to the building owner. We propose that a copy of the completed commissioning sheet, which includes commissioning information and results, should be provided to the building owner. For non-domestic buildings, the details of these proposals can be found in Section 8 and 9 of *Approved Document L, volume 2: buildings other than dwellings*.

Question 48): Do you agree with the proposals for requirements relating to the assessment of overall energy performance of building services installations and providing information to building owners for existing non-domestic buildings?

a) Yes
b) No, I do not agree with providing this guidance
c) No, the guidance should be improved

If you answered no (b or c), please explain your reasoning, including any further suggestions.

Sizing building services systems

3.11.17. We propose that the new requirements and associated guidance for the sizing and controls of building services systems, detailed in paragraph 3.10.23, also apply in new non-domestic buildings also apply to installations in existing non-domestic buildings.

[24] Including fixed building services, building automation and control systems, and on-site electricity generation.

Question 49): **Do you agree with the guidance proposals for adequate sizing and controls of building services systems in existing non-domestic buildings, as detailed in Sections 5 and 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, do not agree with providing this guidance**
c) **No, the guidance should be improved**

If you answered no (b or c), please explain your reasoning.

Making buildings fit for installing low carbon heat

3.11.18. We propose that measures for new non-domestic buildings that would make it easier to install low carbon heating in future, detailed in paragraphs 3.10.24 to 3.10.28, also apply to existing non-domestic buildings. In existing non-domestic buildings, we are proposing that when a whole wet space heating system is replaced, including both the heating appliance (e.g. a boiler) and the emitters (e.g. a radiator), that the new system is designed to run at 55 °C. The proposal would ensure that the existing non-domestic building is ready for low carbon heat, such as heat pumps or district heating.

Question 50): **Do you agree with the proposal that when whole wet space heating systems (i.e. boiler and radiators) are replaced in existing non-domestic buildings the replacement system should be designed to operate with a flow temperature of 55°C or lower?**

a) **Yes, through a minimum standard set in paragraph 5.9 of *Approved Document L, volume 2: buildings other than dwellings***
b) **Yes, through carbon and primary energy credit in SBEM**
c) **Yes, by another means**
d) **No, the temperature should be below 55°C**
e) **No, this standard should not be applied to all existing buildings**
f) **No, I disagree for another reason**

Please explain your reasoning.

Restructure of guidance

3.11.19. Our proposals to simplify, rationalise and clarify the guidance for new non-domestic building services set out in paragraph 3.10.29 also apply to guidance for existing non-domestic buildings.

Question 51): Do you agree with the proposals to restructure the guidance for building services in existing non-domestic buildings, and to incorporate the standards of the Non-Domestic Building Services guidance into the main body of the *Approved Document L, volume 2: buildings other than dwellings*?

a) Yes
b) No

If you answered no, please explain your reasoning.

Question 52): Do you agree the Government should continue to provide guidance for minimum building services efficiencies in existing non-domestic buildings, if the standard does not go significantly further than the Ecodesign regulations?

a) Yes
b) No, the Ecodesign regulations are sufficient
c) No

If you answered no (b or c), please explain your reasoning.

3.12 Part L guidance for non-domestic buildings

3.12.1. The new *Approved Document L, volume 2: buildings other than dwellings* is provided alongside this consultation document, with major technical changes highlighted in yellow. The new guidance aims to be clearer about what is expected of builders and installers in complying with the regulatory requirements. Approved Documents deal with complex information and are an essential resource relied upon by those who enforce the regulations, advise on compliance or need to comply with the regulations. *The Independent Review of the Building Regulations and Building Safety* highlighted that the complexity of the current regulations and Approved Documents guidance "can lead to confusion and misinterpretation in their application…regulations and guidance must be simplified and unambiguous."[25] In

[25]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/707785/Building_a_Safer_Future_-_web.pdf

line with this recommendation, and to make the minimum standard as clear as possible, supplementary information has been removed. Sections 3.10.29 and 3.11.19 set out some proposals to simplify, rationalise and clarify the guidance for new and existing non-domestic building services. This is a comprehensive, but not exhaustive, list of other guidance that has been simplified, rationalised or clarified:

- inclusion of cavity wall insulation in renovating a thermal element;
- removal of guidance on Energy Performance Certificates;
- removal of advice on low and zero carbon technologies;
- removal of advice on upgrading windows and doors when only replacing glazing panes or the door leaf;
- removal of advice on weather stripping secondary glazing;
- removal of guidance that an approach to demonstrate thermal bridging has been limited is to adopt Accredited Construction Details at www.gov.uk;
- removal of design considerations for swimming pool basins;
- removal of advice on cost-effective renovations of thermal elements as a compensating measure for the thermal performance of an extension;
- removal of examples of renovating a thermal element on the inside or outside of the building;
- removal of example of economic payback for consequential improvements;
- updates to external references in Appendix E and Appendix F;
- removal of advice on the building control body failing to receive a commissioning notice; and
- removal of a summary of the notional building specifications.

Question 53): **Do you agree with the changes made to simplify, rationalise and clarify the guidance, and the updates to external references in Appendix E and Appendix F, in *Approved Document L, volume 2: buildings other than dwellings*, as outlined in paragraph 3.12.1 of the consultation document?**

a) Yes
b) Yes, but not with the changes to the supplementary guidance
c) Yes, but not with the external references
d) No

If you answered no, please explain your reasoning. Please do not repeat comments on the changes made to simplify, rationalise and clarify the guidance for Building Services which you have already provided under Questions 38, 51 and 52.

3.12.2. Current guidance in *Approved Document L2B: Conservation of fuel and power in existing buildings other than dwellings (2010 edition incorporating 2010, 2011, 2013 and 2016 amendments)* requires that if am existing building has over 1000m^2 floor area and proposed building work meets certain criteria, further work may need to be undertaken to improve the energy efficiency of the entire building. We have restructured and simplified this existing guidance in the new draft *Approved Document L, Volume 2: Buildings other than dwellings* in **Section 12,** and updated and moved the text and tables which outlines measures which are considered technically, functionally and economically feasible under normal circumstances to Appendix D. We are seeking views on whether the measures listed in this Appendix are indeed technically, functionally and economically feasible.

Question 54): Do you agree that the measures in Tables D.1 and D.2 of Appendix D of *Approved Document L, volume 2: buildings other than dwellings* are likely to be technically, functionally and economically feasible under normal circumstances?

a) Yes
b) No

If you answered no, please explain your reasoning.

3.13 Modular and portable buildings

3.13.1. A proportion of non-domestic buildings are constructed using off-site methods involving either buildings constructed through the linking together of modular construction units or using portable buildings which can be relocated to new sites. Portable buildings and building modules are often re-used and relocated to different sites and hired for a fixed period rather than purchased outright by a landowner or building occupier. The opportunities for achieving the same energy efficiency standards for these buildings may be fewer than for other types of construction.

3.13.2. In recognition of this, the current guidance for Part L allows modular and portable buildings to meet a lower performance standard, depending on the age of the building sub-components and whether the building is on a short-term hire. The relaxation factors for short-term hire contracts reflects the fact that such buildings are often needed at short notice, and that delivering a building to site quickly would not be possible if significant fit-out and refurbishment works were required each time a modular or portable building is relocated.

3.13.3. For new buildings constructed from older building sub-components, the relaxation factors reflect the difficulty and expense of improving the insulation standards of

existing building sub-components, including the height and width restrictions due to modules needing to be transported via road. Constructing a permanent or long-term hire building, however, still presents an opportunity to upgrade building services and in some cases improving insulation standards and any relaxation factors should reflect this.

3.13.4. In light of the proposals for uplifting the Part L minimum standard for new buildings, and the introduction of primary energy targets, we have reviewed the relaxation factors given to modular and portable buildings. We are proposing that the relaxation factors should continue to apply, but that we should use this opportunity to recalibrate these factors in such a way that:

- encourages older and less efficient building modules to be upgraded when used for buildings on short-term hire, and;
- sets a higher standard for long-term hire or permanent buildings constructed using refurbished modules, recognising the greater potential for improvements to these building applications.

3.13.5. A set of revised factors are included in Tables 2.2 and 2.3 of draft *Approved Document L, volume 2: buildings other than dwellings*, provided alongside this consultation.

Question 55): Do you agree with the proposals for relaxation factors for modular and portable buildings, as detailed in Tables 2.2 and 2.3 of draft *Approved Document L, volume 2: buildings other than dwellings*?

a) Yes
b) No, the requirements go too far
c) No, the requirements do not go far enough

If you answered no (b or c), please explain your reasoning and provide supporting evidence or alternative suggestions.

3.14 Airtightness

Introduction of the Pulse airtightness methodology

3.14.1. Airtightness is currently tested using the blower door method to meet the regulatory requirements of the Building Regulations. In the Future Homes Standard consultation response, we set out that we intend to allow Pulse testing as an

approved methodology for determining the airtightness of dwellings.[26] The Pulse test dynamically measures building air leakage directly at low pressure, with the test performed at a pressure differential of 4Pa as opposed to 50Pa.

3.14.2. The Pulse test has been developed for application in smaller buildings, particularly dwellings, although may in theory be used in larger buildings. We are seeking views on whether this method would also be appropriate for use in non-domestic buildings and whether we should allow Pulse to be used to determine airtightness for complying with the energy efficiency requirements for buildings other than dwellings. Details on the Pulse measurement system can be found at: https://buildtestsolutions.com/air-leakage-testing/pulse/ (technical reports can be accessed via the downloads tab).

Question 56): **Do you think that the Pulse methodology should be an approved means of demonstrating airtightness for non-domestic buildings?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide supporting evidence.

Revising the approved methodology for airtightness testing

3.14.3. In the Future Homes Standard consultation response, we set out that we intend to adopt a CIBSE's TM23 as the new approved methodology for airtightness testing for dwellings.[27] We are proposing to also adopt the standard as the approved airtightness testing methodology for buildings other than dwellings. A draft consultation version of this methodology is available on the following website:

https://www.cibse.org/airtightness

3.14.4. If the Pulse method is introduced as an approved method for performing an airtightness test, the revised *Approved Document L, volume 2: buildings other than*

[26] Ministry of Housing, Communities and Local Government, 2019. The Future Homes Standard: changes to Part L and Part F of the Building Regulations for new dwellings. Available online: https://www.gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings

[27] Ministry of Housing, Communities and Local Government, 2019. The Future Homes Standard: changes to Part L and Part F of the Building Regulations for new dwellings. Available online: https://www.gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings

dwellings will include a section on the Pulse methodology alongside other methods of airtightness testing.

Question 57): **Do you agree that we should adopt an independent approved airtightness testing methodology such as the CIBSE draft methodology for non-domestic buildings?**

a) Yes, and the CIBSE methodology is appropriate
b) Yes, but with a methodology other than CIBSE
c) No, an independent approved airtightness methodology shouldn't be adopted.

If you answered no, please explain your reasoning.

3.14.5. In the Future Homes Standard consultation, guidance in the *Approved Document L, volume 1* was inconsistent with what was written in the CIBSE methodology on when calibration of devices that carry out airtightness testing should take place. We propose to clarify this guidance on the calibration of devices that carry out airtightness testing in new and existing non-domestic buildings to state that it should be calibrated either within the previous 12 months, or in accordance with the manufacturer's guidance. This is detailed in paragraph 7.2 of *draft Approved Document L, volume 2: buildings other than dwellings,* provided alongside this consultation.

Question 58): **Do you agree with the proposal for guidance on the calibration of devices that carry out airtightness testing in new and existing non-domestic buildings?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

3.15 Monitoring the as-built performance of non-domestic buildings

3.15.1. The ability to accurately monitor the in-use performance of non-domestic buildings is important for targeting and achieving energy savings in practice and reducing the performance gap. A valuable component of assessing as-built performance is the ability to compare actual metered results with energy forecasting carried out at

design/build stage. In October 2019 the Government announced its intention to consult on introducing mandatory in-use energy ratings for private non-domestic buildings.[28]

3.15.2. It is important that new non-domestic buildings have the right level of metering to measure performance accurately. We are proposing to continue to reference CIBSE's TM39 as the standard to which new buildings should be sub-metered. As well as meeting CIBSE's TM39, we are proposing that the sub-metering installation should allow a useful comparison to be made between design-stage energy forecasts, such as TM54, and measured results. This should make it easier for buildings to diagnose and fix issues relating to their in-use monitored energy performance. Further detail can be found in section 5 of draft *Approved Document L, volume 2: buildings other than dwellings*.

Question 59): **Do you agree with the proposed approach to energy sub-metering, as detailed in Section 5 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

3.15.3. Monitoring and targeting the operational performance of buildings relies on having appropriate benchmarks with which to compare the energy use of the building. While some benchmark datasets exist for non-domestic buildings, many of these are either out-of-date or not applicable for new non-domestic buildings. It is important that energy benchmarks are tailored to the characteristics of the particular building.

3.15.4. The outputs of Part L compliance calculations are not suitable for energy benchmarking, as they do not include all energy uses, and use standardised usage patterns rather than the actual usage pattern of the building. We are proposing that, as well as the Part L compliance calculations, the forecast energy performance of non-domestic buildings should be modelled and handed to the building owner at completion stage for the purposes of energy benchmarking. We propose to introduce this requirement for buildings with a floor area of over 1,000m^2.

[28] https://www.gov.uk/government/consultations/non-domestic-private-rented-sector-minimum-energy-efficiency-standards-future-trajectory-to-2030

3.15.5. We are proposing that the energy forecast should be based on the CIBSE TM54 framework and should present monthly energy usage figures in metered energy (kWh) broken down into fuel type and energy end-use category.

3.15.6. For the success of this policy it will be important that the energy forecast is as accurate as possible. This may require multiple updates to the TM54 assessments throughout the design of the building. There is a risk that some TM54 assessments are performed in as a tick-box exercise, perhaps at low cost or without regard to the intention of improving as-built performance. These assessments may be compliant with this requirement but may not produce results that can be usefully compare to as-built performance. We welcome views on how to mitigate this risk and ensure that energy forecasts are completed accurately and appropriately and are as useful as possible for this purpose.

Question 60): **Do you agree with the proposed approach to energy forecasting, as detailed in paragraph 9.4 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) Yes
b) No, I do not agree with the proposed approach
c) No, energy forecasting should not form part of the Building Regulations

If you answered no (b or c), please explain your reasoning and provide alternative suggestions.

3.16 Transitional arrangements

3.16.1. Whenever changes to the Building Regulations or approved standards take place, transitional arrangements apply. When a developer submits a building notice, initial notice or full plans application to the local authority, the Building Regulations standards in place at the time of the application will apply, so long as work under the building notice or full plans application has already started or starts within a specified period of the notice being given. The transitional arrangements exist for good reason – they mean that developers have assurance about the standards to which they must build, and that they should not have to make material amendments to work which is already underway when new regulations are implemented.

3.16.2. We propose that where a building notice, initial notice or full plans application is submitted to the local authority, transitional arrangements should apply. This means that the existing energy efficiency requirements and guidance would apply to that work. We propose that work must commence on individual buildings within the building notice/plans to benefit from the transitional arrangements, rather than apply

site wide as they have in the past. We also propose that transitional arrangements would apply to work to a building other than a dwelling within that notice/plans so long as work on that building has commenced within 12 months of new regulations coming into effect.

3.16.3. These proposals would align the standards for new non-domestic buildings with those for new homes, which we have set out in the Future Homes Standard consultation response.[29] For homes, there was evidence of some developments being built to energy efficiency requirements that had been superseded more than twice. For buildings other than dwellings, we do not have evidence that buildings being built to old standards is a significant issue. However, we believe that there is benefit in applying a consistent approach across all types of building. This is particularly the case for mixed-use buildings (i.e. buildings which contain both dwellings and non-dwellings) where differing approaches could cause unnecessary complexity.

Question 61): Do you agree with the proposals for transitional arrangements for buildings other than dwellings?

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

[29] Ministry of Housing, Communities and Local Government, 2021. The Future Homes Standard: 2019 Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations for new dwellings, Summary of responses received and Government response. Available online: https://www.gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings

4. Interim Uplift to Part F standards for non-domestic buildings

4.1 Chapter Summary

4.1.1. This chapter includes the following proposals in respect of all non-domestic buildings:

- changes to *Approved Document F - Ventilation (2010 edition incorporating 2010 and 2013 amendments)* to simplify the guidance in line with the principles presented in the Future Homes Standard consultation; and
- measures to mitigate the transmission of infection via aerosols in certain non-domestic buildings.

4.2 Background

4.2.1. Part F of the Building Regulations sets out requirements for adequate means of ventilation,[30] which is important in order to ensure good air quality for people in buildings. **This chapter outlines our proposals for ventilation standards for new and existing non-domestic buildings.** Views are sought on creating a separate volume of the *Approved Document F guidance* for non-domestic buildings, on referencing appropriate industry standards to meet the Part F requirements and updating standards to increase fresh air rates, and for monitoring of indoor air quality to reduce the transmission of airborne infectious agents in offices and other non-domestic buildings.

4.3 Guidance

4.3.1. *Approved Document F - Ventilation (2010 edition incorporating 2010 and 2013 amendments*) consists of one volume referring to both domestic and non-domestic buildings. We propose to split this into two separate volumes, one each for domestic and non-domestic buildings. This will align the structure of Approved Document Part F with Approved Document Part L, and we believe will provide greater clarity for users.

4.3.2. The Future Homes Standard consultation response sets out our approach and guidance on minimising the ingress of external pollutants in new dwellings. We are proposing to take a similar approach for guidance for new non-domestic buildings,

[30] Ventilation is the supply and removal of air to and from a space or spaces in a building, whether through natural or mechanical means.

which can be found in sections 1 and 2 of the draft *Approved Document F, volume 2: buildings other than dwellings*, provided alongside this consultation. The draft Approved Document also sets out our approach to limiting noise from ventilation systems installed in non-domestic buildings in paragraphs 1.5 to 1.8. We are seeking views on what noise standards may be appropriate to reference for non-domestic buildings.

4.3.3. In the draft *Approved Document F, volume 2: buildings other than dwellings*, we have guidance, based on guidance from the Domestic Ventilation Compliance Guide, on the installation of ventilation systems in non-domestic buildings. This is shown in paragraphs 1.18 to 1.26. We are seeking views on this guidance.

4.3.4. The Future Homes Standard consultation response sets out our policy to retain a performance-based approach as an appropriate basis for determining ventilation rates for dwellings. It also incorporated the latest scientific evidence from Public Health England (PHE) that details a list of pollutants for consideration when designing healthy indoor environments.[31] For homes, we proposed an option for designers to assess ventilation strategies against volatile organic compounds informed by empirical evidence from Public Health England, as an alternative to using total volatile organic compounds. We propose to take the same approach for non-domestic buildings, as presented in Appendix B of the draft *Approved Document F, volume 2: buildings other than dwellings*. To improve the clarity of Appendix B we also propose the removal of background information on the calculations used to create some tables in the guidance, and consolidation of references from Appendix B into Appendix C and Appendix D.

Question 62): **Do you agree with the proposed guidance in Section 1 and Section 2 of *Approved Document F, volume 2: buildings other than dwellings* on minimising the ingress of external pollutants and on the proper installation of ventilation systems in non-domestic buildings?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

[31] PHE (2019). IAQ guidelines for selected volatile organic compounds in the UK. Available online: https://www.gov.uk/government/publications/air-quality-uk-guidelines-for-volatile-organic-compounds-in-indoor-spaces

Question 63): **Do you agree with the proposed guidance for reducing noise nuisance for ventilation systems in non-domestic buildings?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 64) **Do you agree with the additional guidance provided in paragraphs 1.18 to 1.26 of the draft *Approved Document F, volume 2: buildings other than dwellings* on the installation of ventilation systems?**

a) Yes
b) No

If you answered no, please explain your reasoning.

Question 65): **Do you agree that the guidance in Appendix B of the draft *Approved Document F, volume 2: buildings other than dwellings* provides an appropriate basis for setting minimum ventilation standards?**

a) Yes
b) No

If you answered no, please explain your reasoning.

4.3.5. The *Approved Document F, volume 2: buildings other than dwellings* for non-domestic buildings includes a table of industry guidance (Table 1.1 in the Approved Document) for buildings other than offices. This guidance may be used by building professionals to design and install adequate means of ventilation in non-domestic buildings. We have proposed a number of updated guidance documents in the equivalent table in the new Approved Document, and we are seeking views on which external standards may be appropriate.

Question 66): **Do you agree with the list of industry guidance presented in Section 1 of draft *Approved Document F, volume 2: buildings other than dwellings*?**

a) Yes
b) Yes, but additional guidance should be provided
c) No

Please explain your reasoning and where relevant provide alternative suggestions for guidance.

4.3.6. The revised *Approved Document F, volume 2: buildings other than dwellings* document proposes to update references for British Standards, CIBSE guides and other sources in Appendix C and Appendix D. This aims to reflect current industry practice in delivering adequate means of ventilation for buildings and are seeking views on whether these sources adequately do this. We also welcome views on whether it is useful for Government to still provide this list of guidance.

Question 67): **Do you agree with the list of references to industry guidance presented in Appendix C and Appendix D in the draft *Approved Document F, volume 2: buildings other than dwellings*?**

a) Yes
b) No, the Government should amend the list of references
c) No, for another reason

If you answered no (b or c), please explain your reasoning and provide alternative suggestions.

4.3.7. The new *Approved Document F, volume 2: buildings other than dwellings* aims to be clearer about what is expected of builders and installers in complying with the regulatory requirements. Approved Documents deal with complex information and are an essential resource relied upon by those who enforce the regulations, advise on compliance or need to comply with the regulations. *The Independent Review of the Building Regulations and Building Safety* highlighted that the complexity of the current regulations and Approved Documents guidance "can lead to confusion and misinterpretation in their application…regulations and guidance must be simplified and unambiguous."[32] In line with this recommendation, and to make the minimum

[32]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/707785/Building_a_Safer_Future_-_web.pdf

standard as clear as possible, some of the supplementary text has been removed, new information has been added, and relevant external guidance has been referenced. This is a comprehensive, but not exhaustive, list of the information that has been simplified, rationalised or clarified:

- additional advice on ventilation through infiltration;
- additional guidance on providing clear, non-technical information;
- change in terminology to background ventilators;
- removal of guidance which is either only applicable to dwellings or does not form part of the Part F minimum standard, including the following:
    - general information on the purpose and effectiveness of ventilation, fire precautions and modular and portable buildings
    - advice on measures to avoid legionella contamination
    - advice on recirculated air in air-conditioning, available from HSE
    - guidance on adequate space for plant maintenance
    - advice on food and beverage preparation areas
    - advice that workplace regulations apply to most places where people work
    - advice on complex urban layouts in ventilation provision
    - advice on trickle ventilators, available at: www.ggf.org.uk
    - guidance on ductwork leakage testing, available on www.hvca.org.uk
    - some defined terms which only apply to the dwellings guidance such as closable opening, gross internal volume, permanent opening and wet room.

Question 68): **Do you agree with the proposals to simplify, rationalise and clarify the Approved Document guidance in *Approved Document F, volume 2: buildings other than dwellings* as outlined in paragraph 4.3.7 of the consultation document?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions

Ventilation of car parks and offices

4.3.8. At present, *Approved Document F - Ventilation (2010 edition incorporating 2010 and 2013 amendments)* provides guidance for the ventilation of car parks and offices. We propose to update and clarify this guidance in *Approved Document F, volume 2: buildings other than dwellings*. Some changes relate to reducing the risk of

transmission of infection, detailed in Section 4.4 which includes specific questions on these items. Other proposed clarifications in the Approved Document include on the requirements for purge ventilation in offices, with a rate of 4 air changes per hour proposed (in line with guidance for domestic buildings). We are seeking views on whether there are other improvements which can be made to guidance for offices and car parks generally, including whether additional industry guidance should be referenced.

Question 69): Do you agree that purge ventilation in offices should be designed to provide at least four air changes per hour?

a) Yes
b) No, this standard goes too far
c) No, this standard does not go far enough

If you answered no (b or c), please explain your reasoning and provide alternative suggestions.

Question 70): Do you agree with the guidance for the ventilation of car parks and offices, as detailed in Section 1 of *Approved Document F, volume 2: buildings other than dwellings*?

a) Yes
b) Yes, but some improvements can be made
c) No, the guidance should be significantly changed

If you answered b or c, please explain your reasoning and provide alternative suggestions. Please note that the appropriate questions on measures to prevent the spread of infection are detailed in section 4.4 of this consultation document.

Replacing windows in existing non-domestic buildings

4.3.9. At present, *Approved Document F - Ventilation (2010 edition incorporating 2010 and 2013 amendments)* states that if an original window has no ventilation openings, it would be good practice to fit trickle ventilators in the replacement window. Aligning with domestic buildings, we are proposing to clarify this guidance to state that if replacing windows is likely to make the building less compliant with the ventilation requirements than it was before the work was carried out, then additional ventilation should be provided in the form of background ventilators. The proposed minimum equivalent areas of background ventilators for domestic-type environments align

with the revised sizes set out the Government response to the Future Homes Standard consultation.

Question 71): **Do you agree with the proposals in Section 3 of draft *Approved Document F, volume 2: buildings other than dwellings,* when replacing an existing window with no background ventilators?**

a) Yes
b) No, the standards do not go far enough
c) No, the standards go too far

If you answered no, please explain your reasoning and provide alternative suggestions.

Providing information and commissioning in non-domestic buildings

4.3.10. At present, *Approved Document F - Ventilation (2010 edition incorporating 2010 and 2013 amendments)* requires that commissioning of ventilation systems is completed by the installer of the ventilation system. As part of supporting owners with information about how their ventilation system performs in practice, we propose to require that a commissioning sheet should be given to the building owner, as a notice that commission has been carried out in accordance with the procedure detailed in the Approved Document. We also propose to provide additional clarity on what operation and maintenance information should be provided to building owners. These proposals are detailed in Section 4 of draft *Approved Document F, volume 2: buildings other than dwellings*.

Question 72): **Do you agree with the proposal to provide a completed commissioning sheet to the building owner and associated guidance in Section 4 of draft *Approved Document F, volume 2: buildings other than dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

4.4 Reducing the risk of transmission of infection via aerosols in non-domestic buildings

4.4.1. The Building Regulations may have a role in helping to reduce the transmission of airborne illnesses in offices and other non-domestic buildings. In particular, it is

possible for infectious agents to be disseminated via aerosols, which may be transmitted over large distances and remain infectious for extended periods of time.

4.4.2. We are consulting on a number of possible courses of action to enhance the ventilation standards in new non-domestic buildings which may help to mitigate this risk. Our current proposals relate to office buildings, rooms where singing, loud speech or aerobic exercise may take place, where low temperature and low humidity environments may exist, or where members of the public may gather in large groups. The proposals are included in Section 1 of the draft *Approved Document F, volume 2: buildings other than dwellings*, provided alongside this consultation.

4.4.3. We propose to require ventilation provision in offices to be designed with additional fresh air capacity, which can be employed in circumstances where additional ventilation may be required. We propose that each occupiable room in the building should be capable of providing fresh air at rates 50% higher than the Approved Document F minimum standard. This may necessitate larger mechanical ventilation systems, which then operate below full capacity in normal conditions. It should be noted that oversizing ventilation equipment is likely to reduce energy consumption in normal operation, providing an additional benefit. Our impact assessment takes account of this. We welcome views on whether oversizing systems would result in any other secondary benefits or result in any unforeseen issues, including how it might affect the ability for mechanical ventilation systems to meet the regulations and guidance set out in the proposed *Approved Document L volume 2: buildings other than dwellings.* Alongside this requirement, minimum fresh air rates for circulation spaces in offices are also proposed. We have also included proposals to set additional minimum standards for ventilation in offices as a rate per m^2 of floor area (as well as per person). This is to ensure that ventilation rates are maintained for variable levels of occupation. Furthermore, we have provided new guidance for ventilation rates in common spaces in offices, for which we have now expanded our definition to include areas such as corridors and lift lobbies.

4.4.4. Further to this, we also propose to set new standards for systems that recirculate air in offices as outlined in paragraph 1.46 in draft *Approved Document F, volume 2: buildings other than dwellings*. The standards are intended to require a functionality to be present within systems to, if required, operate in a mode which prevents the ventilation system recirculating air within spaces or between different spaces, rooms or zones within offices, unless suitable filtering or cleaning systems are in place. In addition, we propose that extract ventilation in bathrooms, WCs and other sanitary accommodation should be capable of operating in a continuous mode, as outlined in paragraph 1.31 of the draft approved document F, volume 2.

4.4.5. We also propose to require that all new ventilation systems in offices have a means of monitoring the performance of the system. We are proposing and welcome views on a new requirement to install air quality monitoring (for example, CO_2 monitoring)

as a means of monitoring ventilation performance, either in the office space or as part of the ventilation management system.

4.4.6. To mitigate against the risk of infection, we also propose introducing a minimum ventilation standard of 15 litres of fresh air per person in occupiable rooms in all types of non-domestic buildings where singing, loud speech or aerobic exercise are likely to take place, where low temperature and low humidity environments may exist, or where members of the public may gather in large groups.

Question 73): Do you agree with requiring increased capacity of 50% within new ventilation systems in offices shown in paragraph 1.38 of the draft *Approved Document F, volume 2: buildings other than dwellings*?

a) **Yes**
b) **Yes, but with qualifications**
c) **No, the standard is too high**
d) **No, the standard is too low**
e) **No, I disagree for another reason**

If you answered b, c, d or e, please explain your reasoning.

Question 74): Do you agree with the proposed standards for provision of outdoor air for offices, shown in paragraphs 1.35 to 1.36 of draft *Approved Document F, volume 2: buildings other than dwellings?*

a) **Yes**
b) **Yes, but with qualifications**
c) **No**

If you answered b or c, please explain your reasoning.

Question 75): Do you agree that extract ventilation in bathrooms, WCs, and other sanitary accommodation should be capable of operating in a continuous mode if necessary?

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 76): **Do you agree with the proposal for indoor air quality monitoring in offices as outlined in paragraphs 1.39 to 1.41 of draft *Approved Document F, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **Yes, but with qualifications**
c) **No**

If you answered b or c, please explain your reasoning and provide any suggestions for guidance if applicable.

Question 77): **If applicable, please provide any suggestions for guidance for indoor air quality monitoring (e.g. CO_2 monitoring) in non-domestic buildings.**

Question 78): **Do you agree with the proposals for systems that recirculate air as outlined in paragraph 1.46 of draft *Approved Document F, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 79): **Do you agree with the proposed minimum ventilation standard in occupiable rooms in all types of non-domestic buildings where singing, loud speech or aerobic exercise may take place, where low temperature and low humidity environments may exist, or where members of the public may gather in large groups? These are outlined in paragraphs 1.27 and 1.28 of draft *Approved Document F, volume 2: buildings other than dwellings*.**

a) **Yes**
b) **Yes, with qualifications**
c) **No**

If you answered b or c, please explain your reasoning and provide any suggestions for guidance if applicable.

Question 80) **Do you think the mitigating measures to protect against infection via aerosols would be suitable for any non-domestic buildings other than those stated in the Approved Document guidance?**

a) Yes
b) No

If you answered yes, please explain your reasoning and provide evidence to support this.

Section B: Domestic Buildings

5. Standards for overheating in new residential buildings in 2021

5.1 Chapter Summary

5.1.1. This chapter includes the following proposals in respect to new residential buildings:

- proposals to reduce the risk of overheating in new residential buildings, including houses, flats, care homes and residential educational buildings (the full list of building types within the scope of this proposed regulation can be found in the draft *Overheating Approved Document* and below in Table 5.1);
- two potential methods of complying with the proposed new requirement of the Building Regulations and acceptable strategies for each method;
- proposals to take account of factors such as noise and security to ensure the overheating strategy is usable for occupants;
- requirements to provide occupants with information in order for them to understand their overheating strategy;
- any policy interactions with the new overheating requirement; and
- transitional arrangements for the new requirement.

5.2 Background

5.2.1. The Future Homes Standard consultation set out the Government's ambition to increase the energy efficiency of new homes, including increasing insulation standards. It is important that alongside these improvements to the energy efficiency of the building fabric, we consider the potential impacts of buildings overheating in summer and the effect this has on the people that occupy them.

5.2.2. Overheating occurs in buildings when indoor temperatures are too high for the health, welfare or comfort of occupants. While there is currently no formal Government guidance for individuals or organisations on how to identify overheating risk in buildings or apply effective preventative measures, there is provision within Part L of the Building Regulations 2010 for limiting heat gains.

5.2.3. The second Climate Change Risk Assessment, published in 2017, identified six priority risk areas where action is needed in the next five years.[33] One of these areas

[33] HM Government, 2017. UK Climate Change Risk Assessment 2017. Available online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584281/uk-climate-change-risk-assess-2017.pdf

is the risk to health, well-being and productivity from high temperatures. This is key due to the increased rate of all-cause mortality during hot weather.

5.2.4. The second National Adaptation Programme (NAP), published in 2018, covers overheating in buildings, including homes, hospitals, care homes, schools and prisons. It also considers the delivery of health and social care services and the role of green infrastructure in relation to overheating.[34] It set out actions for Government and arm's-length bodies on these areas, including taking measures to minimise overheating in homes and other buildings, and completing research into overheating in new homes. The NAP's section on care homes noted that older people are more vulnerable to the ill effects of high temperatures.

5.2.5. The Environmental Audit Committee (EAC) completed its enquiry into heatwaves in July 2018. In its final report the Committee recommended that the risk of overheating should be included in the Building Regulations.[35]

5.2.6. In response to the EAC's enquiry, the Government made a commitment to consult on a method for reducing overheating risk in new homes alongside the review of Part L of the Building Regulations, which is the focus of this consultation and the Future Homes Standard consultation.[36] **This chapter outlines our proposals for reducing overheating risk in new residential buildings.**

The case for change

5.2.7. In line with our response to the Climate Change Committee's statutory report in 2015,[37,38] the Government carried out research into overheating in new homes.[39] The research was published alongside the Future Homes Standard consultation in October 2019 and demonstrated that during warm years, overheating will occur in most new homes in most locations in England, particularly in London. The research

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[34] HM Government, 2018. The National Adaptation Programme and the Third Strategy for Climate Adaptation Reporting. Available online: https://www.gov.uk/government/publications/climate-change-second-national-adaptation-programme-2018-to-2023

[35] Parliament UK, 2018. Heatwaves: adapting to climate change. Available online: https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/826/826.pdf

[36] Parliament UK, 2018. Heatwaves: adapting to climate change: Government Response to the Committee's Ninth Report. Available online: https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/1671/1671.pdf

[37] The Committee on Climate Change, 2015. Reducing emissions and preparing for climate change: 2015 Progress Report to Parliament, Summary and recommendations. Available online: https://www.theccc.org.uk/wpcontent/uploads/2015/06/6.738_CCC_ExecSummary_2015_FINAL_WEB_250615.pdf

[38] HM Government, 2015. Government response to the Committee on Climate Change. Available online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/467818/DECC_CCC_Summary.pdf

[39] HM Government, 2019. Research into overheating in new homes. Available online: https://www.gov.uk/government/publications/research-into-overheating-in-new-homes

also showed that mitigation techniques, such as solar shading and increased ventilation, are highly effective at reducing indoor temperatures, which in turn reduces the risk of mortality and the impact on productivity associated with sleep loss.

5.2.8. The cost-benefit analysis for this research was also published alongside the Future Homes Standard consultation within the 'Research into overheating in new homes Phase 2 Report'. This showed that there is a net benefit to mitigating overheating in London, but a net cost in the rest of the country, in part because of the higher temperatures found in London.

5.2.9. In preparing this consultation, we undertook further research to find additional cost-effective options to reduce overheating in new residential buildings. We have:

- changed the assessment to assume 'normal occupancy', representative of the general population, instead of 'sensitive occupancy', which includes older people, to be more reflective of the general population;
- changed the window opening assumptions in the daytime to assume that windows can be fully opened within the modelling, to better reflect the potential of the dwelling design in mitigating the overheating risk;
- changed the window opening assumptions in the night-time to assume that windows can be fully opened on the basis that safety measures, such as the height of window guarding, have been added into the draft *Overheating Approved Document*; and
- modelled a new solution, package 6, in addition to packages 1 to 5 found in the research. Package 6 reduces window size, without applying any shading to the windows; this is a lower cost means of reducing overheating risk.

5.2.10. This is also detailed in paragraphs 3.86 to 3.95 in the Impact Assessment that accompanies this consultation, alongside other assumptions made.

5.3 Policy aims

5.3.1. Having taken account of the findings of our research, we are proposing to introduce a new regulatory requirement for overheating mitigation, alongside new statutory guidance, with the aim of reducing overheating risk in new-build residential buildings.

5.3.2. The evidence base we developed through our 2016 research was related to overheating risk in new dwellings. However, the scope of this proposal includes other types of residential buildings, because we believe that there are sufficient similarities between homes, care homes and residential educational buildings to also capture these types of building. Given the increasing risk of overheating in

future years as a result of climate change, the Government is keen to minimise overheating in new residential buildings as far as possible, particularly for those with vulnerable occupants who may be more at risk.

5.3.3. We do not currently have strong evidence on the severity or prevalence of overheating risk for buildings in the existing residential stock or other non-domestic buildings. The Government is undertaking research to understand the prevalence and magnitude of overheating in existing residential buildings. This includes the English Housing Survey, in which occupants are asked for their experience of overheating and the Energy Follow-Up Survey (EFUS), in which we measure temperatures in people's homes. Public Health England are also undertaking a systematic literature review on indoor overheating thresholds, which has been accepted for publication.

5.4 A new legal requirement

5.4.1. Based on our engagement with the industry working group, we believe that the most clear and effective method for tackling overheating in new residential buildings is to introduce a new legal requirement to create a 'level playing field' for the industry, requiring all developers to meet the same overheating standard.

5.4.2. We propose that the new legal requirement is a new part of Schedule 1 of the Building Regulations. The functional requirement would require the person carrying out the work to reduce overheating risk by limiting solar gains and removing excess heat. A draft Approved Document that provides guidance on how to meet the requirement has been provided alongside this consultation. Overheating is a new issue for many developers to manage and they will need clear and comprehensive guidance. We are seeking views on this draft Approved Document to ensure it as clear and comprehensive as possible.

5.4.3. Alternative options were identified but were not the Government's preferred option for the purposes of this consultation. These included:

- **Functional Requirements in Part L and F of the Building Regulations** - A maximum solar gain limit and a minimum ventilation provision could be required through Parts L and F of the Building Regulations respectively to reduce overheating risk.

  This option would have meant little or no change to the legislation of the Building Regulations 2010 and less transition for industry to manage. Additionally, SAP would have continued to be the only tool required, so designers would experience no change in the process of having energy assessments produced. This was not the Government's preferred option

because we do not believe that Part L and Part F of the Building Regulations are appropriate for reducing overheating risk for the purposes of health and welfare. Additional work would be needed on SAP to make it suitable for assessing overheating risk, which is best done using a dynamic tool. Proving compliance across two parts of the Building Regulations, which together would be used to reduce overheating risk, would be challenging and may not result in optimal solutions.

- **Government guidance** - Government guidance, with no legal framework to underpin it, could be produced from the results of the overheating research. This would have the intention of encouraging house builders to mitigate overheating risk. The guidance could be referred to in the new *Approved Document L, volume 1: dwellings*.

  This was not the Government's preferred option because there is already industry guidance on reducing overheating risk in new residential buildings which is not widely used. We believe that guidance may have little impact if it is not underpinned by a legal requirement.

Question 81): How should the Government address the overheating risk?

a) Through a new requirement in the Building Regulations and an Approved Document, as proposed in this consultation
b) Through Parts L and F of the Building Regulations
c) Through government guidance
d) I have an alternative approach
e) It isn't an issue that needs addressing

Please explain your reasoning and provide alternative suggestions where applicable.

5.5 Residential buildings in scope

5.5.1. The buildings in scope of this new requirement are detailed in Section 0 of the draft *Overheating Approved Document*. The new requirement will only apply to the buildings summarised in Table 5.1 below. We have gathered evidence about the benefits of introducing a new legal requirement for overheating in new dwellings, including how it can prevent the loss of life and productivity associated with overheating. We believe that there are sufficient similarities between dwellings and the other types of residential buildings in Table 5.1 for the standard to be applied to all of them.

Table 5.1: Residential buildings in scope of this Regulation	
	Purpose for which the building is intended to be used
Residential (dwellings)	Dwellings, which includes both houses and flats.
Residential (institutional)	Home, schools or other similar establishments, where people sleep on the premises. The building may be living accommodation for care or maintenance of any of the following: a. Older and disabled people, due to illness or other physical or mental condition. b. People under the age of 5 years.
Residential (other)	Residential college, halls of residence, living accommodation for children aged 5 years and older.

5.5.2. While there may be other buildings where the introduction of an overheating standard is beneficial, we currently do not have strong evidence about the prevalence of overheating risk for buildings in the existing residential stock or other non-domestic buildings. Paragraph 5.3.3 details the current research Government is undertaking to examine the overheating risk in existing buildings. However, we do not want to delay the implementation of the overheating standard in new residential buildings by waiting for this evidence, particularly when vulnerable building occupants may be at risk.

Question 82): Do you agree with the buildings that are in scope of this new part of the Building Regulations?

a) Yes
b) Yes, but they should be expanded to include more building types and/or existing buildings
c) No, they should be reduced to only include flats and houses
d) No, I disagree for another reason

Please explain your reasoning.

5.6 Compliance methods

5.6.1. Two potential methods of complying with the new requirement of the Building Regulations have been identified and are provided in the draft *Overheating Approved Document*, which are summarised below:

i) **The simplified method**. This method is described in detail in section 1 of the draft *Overheating Approved Document*.
ii) **The dynamic thermal analysis method**. This method is described in detail in section 2 of the draft *Overheating Approved Document*.

Simplified method

5.6.2. The simplified method has been developed using dynamic thermal analysis as described in the research into overheating in new homes published in 2019 and paragraph 5.2.9 above. It uses a combination of limiting unwanted solar gains and removing excess heat in order to reduce overheating risk. The requirement depends on the location of the new residential building.

5.6.3. The simple method provides guidance based on the location of the new building. England has been split into two areas. These are:

i) England, excluding Greater London (*moderate* risk of overheating)
ii) Greater London (*significant* risk of overheating)

5.6.4. The geographical division of England was developed using the external summer temperature data in CIBSE's weather files. Comparison of the mean maximum, minimum and average summer external temperatures, from met office data, of locations across England also enabled the division. We would welcome further evidence to support different geographical divisions. It is noted in Section 2 of the Approved Document that dynamic thermal modelling could be utilised where the site conditions mean that the building is not well represented by the two locations above.

Question 83): Do you agree that the division of England based on overheating risk detailed in paragraph 5.6.3 of this consultation document is correct?

a) Yes
b) No, there should be one area
c) No, there should be more areas

If you answered no (b or c), please explain your reasoning and provide supporting evidence.

5.6.5. The guidance provided is based on both location and type. Houses and parts of residential buildings have been separated into two groups based on their characteristics, these two groups are:
i) Group A, which will include most houses, and will have both of the following

characteristics:

a. more than two fabric elements
b. openings on opposite facades, allowing for cross ventilation

ii) Group B, which will include most flats, residential units in care homes and residential units in student halls of residence, and will have both of the following characteristics:

a. have two or fewer fabric elements
b. openings on facades which are not opposite

5.6.6. The two groups were developed by assessing the characteristics of a building that increases overheating risk. The first characteristic that was assessed was the number of exposed fabric elements that can increase heat loss at night and/or store coolth. The second characteristic that was assessed was whether or not openings allow for cross ventilation, thereby increasing the effectiveness of the openings' ability to remove heat.

Question 84): Do you agree with the categorisation of buildings into Group A and Group B as detailed in paragraph 5.6.5 of this consultation document?

a) Yes
b) No

If you answered no, please explain how buildings should be re-categorised.

5.6.7. The measures in the simplified method have been chosen as the lowest cost method of keeping occupants cool while not requiring air conditioning. The proposed requirement for overheating is met by designing and constructing the building to limit unwanted solar gains and by removing excess heat from the building.

5.6.8. Within the simplified method, unwanted solar gains are limited by setting maximum glazing areas, which are different based on the location and group of building. For buildings in Greater London, a minimum shading requirement is also proposed in addition to the maximum glazing areas. For the simplified method the shading should be provided using shutters, low-g glazing, or overhangs. Further detail can be seen in the draft *Overheating Approved Document*.

5.6.9. Within the simplified method, a minimum standard to remove excess heat is proposed. It requires a minimum free area (i.e. the area that air can pass unobstructed between the outside of the building and the inside), which could be provided by windows. The standard is different depending on the glazing area

chosen and the group the building is in. It requires that windows can be opened to 60 degrees. Further detail can be seen in the draft *Overheating Approved Document*.

Question 85): Do you agree with the simplified method as a means of compliance with the proposed new requirement to reduce overheating risk?

a) Yes
b) No, the method should be more sophisticated
c) No, the method is too easy to pass
d) No, for another reason

If you answered no (b, c or d), please explain your reasoning and provide supporting evidence.

Question 86) Do you agree with the maximum glazing area and shading standards for limiting solar gains in the simplified method as detailed in paragraphs 1.6 to 1.9 of the draft *Overheating Approved Document?*

a) Yes
b) No

If you answered no, please explain your reasoning and provide supporting evidence.

Question 87) Do you agree with the approach to removing excess heat in the simplified method as detailed in paragraphs 1.10 to 1.13 of the draft *Overheating Approved Document?*

a) Yes
b) No

If you answered no, please explain your reasoning and provide supporting evidence.

5.6.10. There is no requirement to provide specific levels of daylight in the Building Regulations or in the National Planning Policy Framework. The method of reducing solar gains proposes smaller window sizes in flats compared to many common designs, which we believe will continue to provide adequate daylight for occupiers of the buildings and avoid the need for excess lighting use in winter. While too many

windows can cause a home to overheat, we recognise that larger windows can make new homes more attractive to potential buyers and solar gains are important for designing low energy buildings. Below in Figure 5.1 is a potential design for a house in England (not Greater London) with the maximum glazing areas under the simplified method. It can be seen that the glazing is still generous and is similar to the style of many new build homes. The solutions provided in the simplified method are the lowest cost options. More architectural freedom is available by using dynamic thermal analysis, described in the following section.

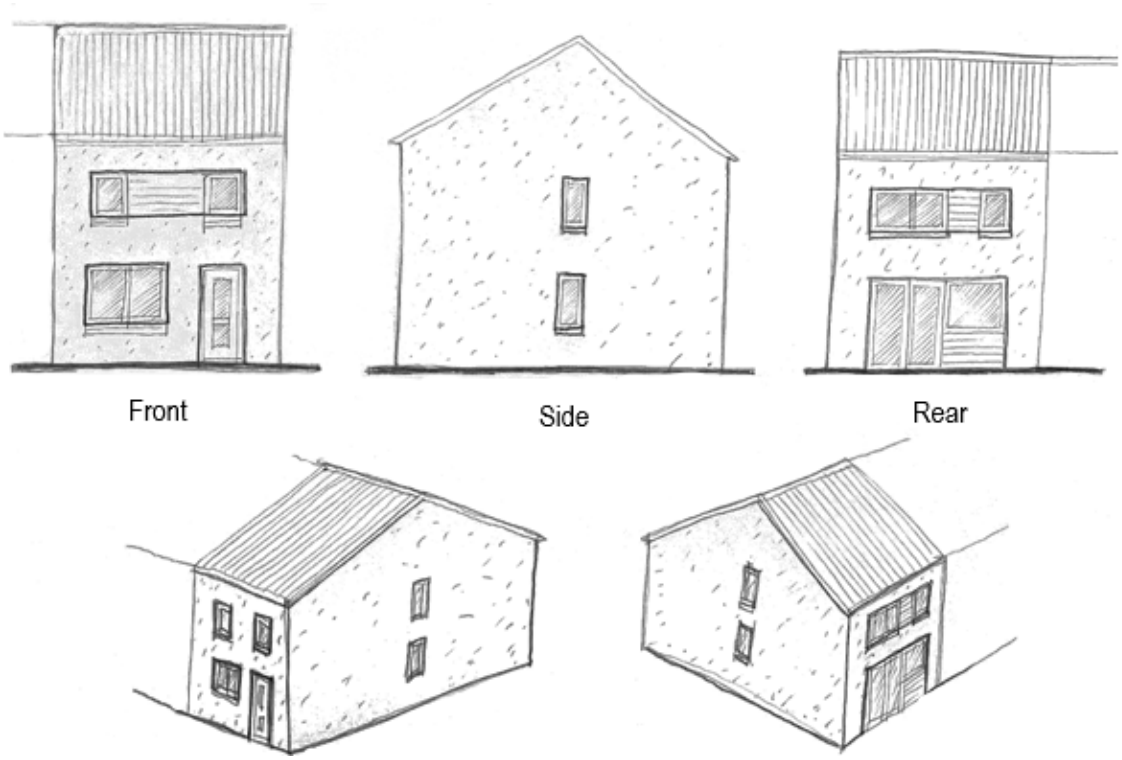

Figure 5.1: Sketch drawing of a house in England built to the standards of the simplified method (note that the standard for Greater London is different).

Question 88): Do you think that adequate levels of daylight will be provided and that homes will be acceptable to purchasers while meeting these proposed standards?

a) Yes
b) No

Please explain your reasoning.

Dynamic thermal analysis method

5.6.11. The dynamic thermal analysis method uses CIBSE's *TM59 Design methodology for the assessment of overheating risk in homes* to demonstrate compliance with the

new regulation for overheating. The CIBSE TM59 method uses the location, materials' properties, orientation, air change rates and an occupancy scenario to calculate the risk of overheating. This overheating risk is assessed both during the day and at night. When dynamic thermal analysis is used, weather data closest to that region can be used. The dynamic thermal analysis method allows more sophisticated analysis of complex buildings. We are interested in views on whether there are building types or locations where only the dynamic thermal analysis method should be permitted as a means of compliance.

5.6.12. There are some decisions to be made by the modeller within the TM59 method, which means that designers could choose less stringent targets. We have therefore reduced the scope for decision making in the modelling process, to ensure that the overheating mitigation measures are likely to be used by occupants. This will also ensure a level playing field across those using the dynamic thermal analysis method and with those using the simplified method.

5.6.13. One restriction that has been proposed is keeping doors and windows shut when rooms are unoccupied and easily accessible, such as those on the ground floor. Our proposals include openings being open at night on the first floor and above, both in the day and at night. We would be particularly interested in receiving information about the likelihood of occupants opening doors and windows at night in unoccupied first floor and above rooms. The way we expect modellers to use the TM59 method is set out in section 2 of the accompanying draft *Overheating Approved Document*.

Question 89): Do you agree with offering dynamic thermal analysis as a means of compliance with the proposed new requirement to reduce overheating risk?

a) Yes, as described in the draft *Overheating Approved Document*
b) Yes, but not as described in the draft *Overheating Approved Document*
c) No

Please explain your reasoning and provide alternative suggestions where applicable.

Question 90): Please detail any information you have about the likelihood of occupants opening doors and windows at night in unoccupied rooms.

5.6.14. Section 2 of the draft *Overheating Approved Document* details the acceptable strategies for reducing the overheating risk in residential buildings when following the dynamic thermal analysis method. This includes guidance on limiting unwanted solar gains in the summer through shading and providing a means to remove excess heat from the indoor environment. The acceptable means for reducing overheating risk have been developed using dynamic thermal analysis as described in the Research into overheating in new homes published in 2019 and paragraph 5.2.9 above.

5.6.15. We consider any combination of the following to be acceptable means of limiting solar gains. We believe that these options are the best evidenced means of reducing solar gain which are reliable in practice. We would be interested to receive any further suggestions for acceptable means of limiting solar gains.

- **Fixed shading devices**, for example shutters, external blinds, overhangs and awnings;
- **Glazing design**, for example size, orientation, g-value and size of window reveal;
- **Building design**, for example the placement of balconies; and
- **Shade of adjacent permanent buildings, structures or landscape**

5.6.16. Internal curtains and blinds are not part of the building fabric and can be changed or removed by each occupant. While it might be possible to make assumptions in the calculation methodology about the presence of curtains or blinds, not all occupants choose to have curtains or blinds and when they are present internal curtains and blinds offer a varying degree of shading dependent on the properties of the material. For these reasons for the purposes of meeting the requirement we propose that the effect of curtains and blinds are not to be accounted for as a means of shading in the overheating calculation.

5.6.17. Tree cover can offer shading for buildings and green infrastructure can provide a cooler outdoor environment, reducing overheating risk. However, trees can be easily removed or trimmed to make them less effective as a means of shading. Furthermore, in the context of an area the occupant of the building may not have control over the tree that provides the necessary shade. For these reasons for the purposes of meeting the requirement we propose that trees are not to be accounted for as a means of shading in the overheating calculation.

5.6.18. Section 2 of the draft *Overheating Approved Document* also includes guidance on acceptable strategies for removing excess heat from the indoor environment. We believe that the options listed below are the only acceptable means of sufficiently removing excess heat, but we would be interested to receive any further suggestions for other means beyond the below:

- opening windows;
- ventilation louvres in external walls; and
- a mechanical ventilation system.

5.6.19. Given the Government's net zero commitment, our preferred means of mitigating overheating is through passive means, (i.e. low or no energy needed), as far as practicable. By placing restrictions on the type of overheating mitigation used (i.e. passive means first), a widespread uptake of air conditioning in new builds can be avoided. Continuing to account for mechanical cooling through Part L of the Building Regulations should also discourage mechanical cooling installation. Within the Government's Standard Assessment Procedure for the Energy Rating of Dwellings (SAP), energy used for mechanical cooling must be compensated for through other energy efficiency measures.

5.6.20. Mechanical cooling, such as air conditioning, is effective at reducing indoor temperatures. However, it is not a desirable or financially efficient solution to the issue of overheating because of its energy use. An important part of reaching net zero emissions by 2050 is avoiding the unnecessary use of energy. Mechanical cooling methods powered by electricity will produce carbon emissions until the electricity grid fully decarbonises. Any additional energy demand on the grid, such as for unnecessary cooling, will slow the transition to a zero-carbon grid and require further generation capacity.

5.6.21. Mechanical cooling may also have implications for fuel poverty. At present, fuel poverty is primarily an issue in the winter when people cannot afford to heat their homes, but there is potential for affordability issues to become more prominent in warmer months if mechanical cooling is the only available option. This potentially exacerbates the social inequality of fuel poverty if only more affluent households are able to afford to cool their homes. The policy therefore aims to avoid the unintended consequence of encouraging developers to install mechanical cooling.

Question 91): **Do you agree with the proposed acceptable strategies for shading and the removal of excess heat, when following the dynamic thermal analysis method, as found in Section 2 of the draft *Overheating Approved Document*?**

a) **Yes, I agree with both sets of acceptable strategies**
b) **Yes, but with amendments to the acceptable shading strategies**
c) **Yes, but with amendments to the acceptable strategies to remove excess heat**
d) **Yes, but with amendments to both sets of acceptable strategies**
e) **No, I do not agree with the acceptable strategies**

Please explain your reasoning and provide any suggested amendments where applicable.

Question 92): **Do you agree that the overheating standard should not account for the effect of curtains, blinds and tree cover?**

a) **Yes, curtains, blinds and tree cover should be excluded**
b) **Yes, but only curtains and blinds should be excluded**
c) **Yes, but only tree cover should be excluded**
d) **No, none of these should be excluded**

If you answered b, c or d, please explain your reasoning.

Question 93): **Do you agree that the building should be constructed to meet the overheating requirement without the need for mechanical cooling?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

5.7 Usability for occupants

5.7.1. Overheating strategies should be usable for occupants under normal scenarios. This usability is dependent on many site factors including noise, pollution, safety and security. For example, it is not reasonable to expect occupants of a ground floor

dwelling to keep their windows fully open at night with no guarding, due to the risk of crime. Neither is it reasonable to expect people living on a noisy main road to keep their windows open when they are trying to sleep. Guidance is provided in section 3 of the *draft Overheating Approved Document* on noise, pollution, security, protection from falling and protection from entrapment.

5.7.2. To ensure that people are able to sleep, a room must be both sufficiently cool and quiet. We propose that the overheating strategy should not introduce unacceptable levels of noise into bedrooms. We define an unacceptable level of noise as 40 dB $L_{Aeq,T}$ over 8 hours during the sleeping hours of 23.00 - 7.00 and 55 dB $L_{AFmax,}$ for more than 10 times a night, when openings are in use to remove excess heat as part of the overheating strategy. There is an alternative limit of 30 dB $L_{Aeq,T}$ over 8 hours when a mechanical system is used to remove excess heat.

5.7.3. The existing planning system considers noise during the planning and design of new residential buildings, including building orientation, layout and how external noise control measures could be used. Building control bodies may accept documentation to demonstrate that the local planning authority did not consider external noise to be an issue at this site, as evidence that this requirement is satisfied. Where noise was considered an issue, we propose that dwellings are measured or modelled and compared to the proposed thresholds above. Proposed guidance is detailed further in the draft *Overheating Approved Document* that accompanies this consultation.

Question 94): Do you agree with limiting noise in new residential buildings when the overheating strategy is in use, and the proposed guidance in Section 3 of the draft *Overheating Approved* Document?

a) Yes
b) Yes, but with amendments to the guidance
c) No, I do not agree with limiting noise when the overheating strategy is in use

If you answered b or c, please explain your reasoning and provide alternative suggestions.

5.7.4. Windows fully open in polluted areas are more likely to bring in external pollution, impacting indoor air quality. Guidance is provided in the draft *Approved Document F Volume 1: Dwellings* accompanying this consultation on minimising the ingress of external pollutants. We propose that, where the threshold criteria apply, this guidance is followed where practicable for windows that are used for removing excess heat as part of the overheating mitigation strategy.

Question 95): **Do you agree with minimising the ingress of external pollutants when the overheating strategy is in use, and that the external pollutants guidance in *Approved Document F, volume 1: dwellings* should be followed where practicable?**

a) Yes
b) Yes, but with amendments to the guidance
c) No, I do not agree with minimising the ingress of external pollutants when the overheating strategy is in use

If you answered b or c, please explain your reasoning and provide alternative suggestions.

5.7.5. There may be an increased risk of crime on the ground floor of buildings or in other easily accessible rooms. Occupants should be able to use their overheating strategy while feeling safe. Therefore, additional guidance on security has been provided for any openings which are used for the removal of excess heat at night as part of the overheating mitigation strategy. This is in addition to the security requirements of *Approved Document Q*.

Question 96): **Do you agree with the proposals on security in Section 3 of the draft *Overheating Approved Document* in new residential buildings?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

5.7.6. There is a safety risk that people could fall out of open windows where the windows are used for the removal of excess heat as part of the overheating mitigation strategy. This is a particular risk for small children in bedrooms alone at night. We have therefore proposed higher guarding heights than the 800mm required in *Approved Document K*. This risk of serious injury or death is worse from a fall from upper floors. The guidance considers this risk and therefore sets the guarding heights accordingly. There is also a risk that people could over-reach and fall out of windows when opening and closing them. We have therefore also proposed a maximum distance between the inside face of the wall and the maximum position of the window handle of 600 mm.

Question 97): **Do you agree with the protection from falling guidance proposed in Section 3 of the draft *Overheating Approved Document*?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

5.7.7. There is a safety risk that people can get body parts trapped in guarding or ventilation grills. This is a particular risk for small children, who may get their head or fingers trapped. We have therefore proposed size requirements for holes that prevent head and finger entrapment and that looped cords should be fitted with child safety devices.

Question 98): **Do you agree with the guidance on protection from entrapment proposed in Section 3 of the draft *Overheating Approved Document*?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 99): **Are there any further issues which affect usability that should be included in the *Overheating Approved Document*?**

a) Yes
b) No

Please explain your reasoning and provide supporting evidence.

5.8 Providing information

5.8.1. In order for occupants to use the overheating strategy, they must understand it. There are already requirements in Part 8 of the Building Regulations for the purposes of energy efficiency and ventilation (Regulations 39 and 40) that developers should provide information about the building so that it can be operated effectively. We propose that there should be a new requirement in Part 8 of the

Building Regulations to provide the building owner with information on the overheating strategy.

5.8.2. Guidance is provided in section 5 of the draft *Overheating Approved Document* on what information should be provided to the building owner. Guidance is also given that for dwellings this should be provided within the Home User Guide format within *Approved Document L, volume 1: Dwellings*.

Question 100): Do you agree with the proposed requirement to provide information on the overheating strategy to the building owner?

a) Yes, I agree with the requirement, the list provided and that this should be within a Home User Guide
b) Yes, I agree with the requirement, but think that the list provided should be changed or that this should not be provided within a Home User Guide
c) No, I do not agree with providing information

Please explain your reasoning and provide alternative suggestions where applicable.

5.9 Policy interactions

Planning policies

5.9.1. Some Local Planning Authorities already require overheating mitigation within their local plans. In particular, the Greater London Authority require overheating mitigation through the London Plan. We intend to work with the Greater London Authority to ensure that this new Building Regulation and the existing and emerging requirements in the London Plan work together and do not result in requirements which are contradictory or unduly difficult for developers to meet.

Question 101): How do you see this new Building Regulation interacting with policies in local plans?

Interaction with Part L

<u>Heat gains and losses from pipes</u>

5.9.2. We recognise that poorly insulated heating or hot water pipes can increase the risk of overheating in some residential buildings, particularly in communal systems. There is a requirement in Part L of the Building Regulations to limit heat gains and

losses from pipes, ducts and vessels. Proposed revised guidance was consulted on as part of the Future Homes Standard consultation on limiting heat losses from pipework, storage vessels or heat interface units in new dwellings. This draft guidance can be seen in paragraphs 4.16 to 4.24 of *Approved Document L, volume 1: dwellings* that accompanies this consultation.

Solar gains

5.9.3. This new requirement seeks to limit solar gains in summer to reduce overheating risk. There is a requirement in Part L of the Building Regulations on limiting heat gains through thermal elements and other parts of the building fabric. There is guidance provided on limiting the effects of solar gains in summer in the current *Approved Document L1A, Criterion 3* and in *Approved Document L, volume 1: conservation of fuel and power in dwellings sections 4.9 and 4.10,* that accompanied the Future Homes Standard consultation. Additionally, for non-domestic buildings, there is guidance on limiting the effects of solar gains in summer in the current *Approved Document L2A, Criterion 3* and 4.16-4.17 in the *draft Approved Document L, volume 2: conservation of fuel and power in buildings other than dwellings,* that accompanies this consultation. The more detailed method provided in the draft Overheating Approved Document, would overlap with this guidance. Due to the method in the draft Overheating Approved Document being more stringent we propose that the Part L guidance on Limiting the effects of heat gains in summer for new dwellings can be removed. The guidance in *Approved Document L, volume 2* will remain, because it is for all non-domestic buildings.

5.9.4. SAP Appendix P is used to demonstrate compliance with the current guidance on limiting the effects of heat gains in summer in *Approved Document L1A*. The proposed methods in the draft Overheating Approved Document could replace this method. We therefore propose that SAP Appendix P is removed.

Question 102): Do you agree that this guidance on limiting the effects of heat gains in summer, in both Approved Document L guidance for new dwellings and SAP Appendix P, can be removed?

a) Yes
b) No

If you answered no, please explain your reasoning.

5.10 Transitional arrangements

5.10.1. Where a building notice, initial notice or full plans deposit is submitted to the local authority, building work carried out under the building notice, initial notice or full

plans approval must meet the regulations in place at the time it was submitted. Normally, this would apply to all work under the same notice/plans, so long as building work had started before the new regulations are implemented.

5.10.2. In the Future Homes Standard consultation response, we have set out our intention to provide more stringent transitional arrangements for the 2021 Part L standard for new homes. This includes how transitional arrangements will only apply to individual homes and not entire developments, with a transitional period of one year.[40]

5.10.3. In setting the transitional arrangements for the overheating requirement, there are two options available. We could have transitional arrangements apply to entire developments, or all work under the same notice or plans, as is usually the case. However, given the importance of appropriately considering overheating risk when setting higher building insulation standards that would be seen under the 2021 uplift to Part L, it may be more appropriate to instead align the transitional arrangements for overheating with that of the 2021 uplift to Part L and F of the Building Regulations as described in the *Future Homes Standard consultation response*. This would match the transitional arrangements and the date the requirements for Part L and Part F come into force in 2021, which would also help to prevent confusion.

5.10.4. We are seeking views on what an appropriate set of transitional arrangements would be for the new overheating requirement.

Question 103): Should the transitional arrangements that apply to the overheating requirements align with the proposed transitional arrangements for Part L and F 2021 for new dwellings, as described in paragraph 5.10.2 of this consultation document?

a) Yes
b) No

Please explain your reasoning and provide alternative suggestions where applicable. If you answered no, please also propose an alternative reasonable period that could apply.

[40] Ministry of Housing, Communities and Local Government, 2021. The Future Homes Standard: 2019 Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations for new dwellings, Summary of responses received and Government response. Available online: https://www.gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings

6. Part L standards for domestic buildings in 2021

6.1 Chapter Summary

6.1.1. This chapter includes the following proposals for Part L in respect of existing domestic buildings:

- uplift to minimum standards for new and replacement thermal elements (i.e. walls, floors, roofs) and controlled fittings (e.g. windows, rooflights and doors);
- uplift to minimum standards for when a thermal element is being renovated;
- changes to minimum standards for building services, including proposals to introduce a new regulation to ensure buildings have self-regulating devices when a heating appliance is replaced, and to incorporate standards from the Building Services Compliance Guides into *Approved Document L, volume 1: dwellings*.; and
- guidance on the calibration of devices that carry out airtightness testing.

6.1.2. The Future Homes Standard consultation, which launched in October 2019, consulted on energy standards exclusively in newly built domestic buildings. This chapter includes the following additional proposals for Part L in respect of new domestic buildings, which should be considered alongside these original proposals and the Government response:

- the level at which the Fabric Energy Efficiency Standard should be set;
- some changes to minimum standards for building services; and
- guidance on the calibration of devices that carry out airtightness testing.

6.2 Background

6.2.1. The Future Homes Standard consultation, which launched in October 2019, consulted on energy standards exclusively for newly built domestic buildings. However, the homes that make up our existing housing stock are, on the whole, less energy efficient than newly constructed homes, and many existing homes will continue to be in use for years to come. In order to meet our net zero target in 2050, we will need to address the energy efficiency of existing homes.

6.2.2. When works take place in an existing building, such as an extension to a property, the Building Regulations apply. The types of work in existing buildings, to which the energy efficiency requirements of the Building Regulations apply, are described in paragraph 6.3.1 and 6.5.1 of this chapter. For the purposes of improving the energy

efficiency of existing homes, we do not intend to introduce new requirements or regulations into the Building Regulations through the 2021 Part L uplift beyond those that are set out in this consultation and the Future Homes Standard consultation, including extending where consequential improvements may apply. Improving the energy efficiency of the existing housing stock will be the subject of other government consultations.

6.2.3. In line with commitments made in the Clean Growth Strategy, we believe it is important that any work is done to a high standard of energy efficiency. This will ensure that consumers receive good value for money and that their homes are fit for the future.

6.2.4. **This chapter sets out our proposals to update guidance and increase the energy efficiency standards for work carried out in existing domestic buildings from 2021.** When developing these standards, we have taken into account cost-effectiveness, carbon savings, and the ability of the market to respond.

6.2.5. **This chapter also features some changes to standards for new homes, not already covered in the Future Homes Standard consultation response.** Specifically, the minimum standards for services section asks questions for both new and existing homes, as well as the final section on airtightness testing. Building on what was consulted in on the Future Homes Standard consultation, this chapter also includes proposals for the level at which a reintroduced Fabric Energy Efficiency Standard should be set.

6.3 Minimum standards for new and replacement thermal elements, windows and doors in existing homes

6.3.1. The Building Regulations sets energy efficiency standards for when a new and replacement part of an existing building is built. These standards apply when:

- providing a new element in an existing building, for example as part of an extension;
- replacing a controlled fitting (e.g. windows and doors); or
- completely removing and replacing a thermal element (i.e. walls, floors, roofs).

6.3.2. We have reviewed the standards for each fabric element in order to identify improvements, with the aim of consolidating standards between new builds and existing buildings as far as possible and eliminating inefficient practices. We considered a range of uplifts for each element, which broadly ranged from the current standard in *Approved Document L1B: 2010* to the 'option 1 notional building fabric for new homes' set out in the Future Homes Standard consultation. The proposal below is the highest standard for each element which is still cost-effective

using a simple measure of payback for investment over the life of the product or work. Further details on costs and benefits can be found in the Impact Assessment that accompanies this consultation.

6.3.3. We are proposing to improve the standards for new thermal elements in the guidance as set out in Section 4 of draft *Approved Document L, volume 1: dwellings*, which accompanies this consultation, and summarised below in Table 6.1.

Table 6.1: Standards for new thermal elements, windows and doors in existing dwellings

	Current standard's U-values ($W/m^2.K$)	**Proposed standard's U-values ($W/m^2.K$)**
Pitched roof – insulation at ceiling level	0.16	0.15
Pitched roof – insulation at rafter level	0.18	0.15
Flat roof or roof with integral insulation	0.18	0.15
Wall	0.28	0.18
Floors	0.22	0.18
Swimming pool basin	0.25	0.25
Window, roof window	1.6 or Window Energy Rating Band C	1.4 or Window Energy Rating Band B
Rooflight [1]	1.6 or Window Energy Rating Band C	2.2
Doors with >60% of internal face glazed	1.8 or Doorset Energy Rating Band E	1.4 Or Doorset Energy Rating Band C
Other doors	1.8 or Doorset Energy Rating Band E	1.4 or Doorset Energy Rating Band B

Notes:

i. Section 6.4 of this consultation sets out our proposal to adopt the latest version of BR 443 for calculating U-values for rooflights. In current standards, the limiting U-value is based on a rooflight in a vertical position. The proposed standard is based on a rooflight in a horizontal position.

6.3.4. We have considered possible design constraints for work when these standards apply (e.g. changes in finished floor level, differences in thicknesses of wall). We believe that the proposed standards in Table 6.1 are appropriate in most cases. However, where further design flexibility is needed, we propose that the two alternative methods of demonstrating compliance for extensions should still be available. Detail can be found in Section 10 of draft *Approved Document L, volume 1: dwellings,* which accompanies this consultation and below in 6.3.6.

Question 104): **Do you agree with the proposed minimum fabric standards for existing domestic buildings set out in Table 6.1 of this consultation document?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide supporting evidence.

6.3.5. The draft *Approved Document L, volume 1: dwellings* that accompanies this consultation, includes some new guidance on reducing unwanted air infiltration when carrying out work to existing homes. We welcome views on this guidance.

Question 105): **Do you agree with the draft guidance in section 4 of the draft *Approved Document L, volume 1: dwellings* on reducing unwanted air infiltration when carrying out work to existing homes?**

a) Yes
b) No

If you answered no, please explain your reasoning.

6.3.6. We currently offer three approaches to determining compliance with the energy efficiency requirements for thermal elements in a new extension to an existing dwelling. These are set out in paragraphs 10.7 – 10.10 of draft *Approved Document L, volume 1: dwellings,* which accompanies this consultation. The method with the most flexibility is to use the Standard Assessment Procedure (SAP) to show that the CO_2 emissions from the home and extension are no more than the CO_2 emissions from the home plus a notional extension of the same size and shape as the proposed extension. While this consultation recognises the imperative to move toward lower carbon heating systems in order to meet our goal of net zero emissions by 2050, it is also important that fabric standards are not compromised, and our homes remain energy efficient. Under the current method, with new emissions factors in SAP 10.1, extensions with poor fabric efficiency could be built if a heat pump is installed. Therefore, we are proposing that the SAP method of compliance for a new extension evaluates, in addition to the CO_2 emissions, the primary energy and fabric energy efficiency of the proposed home plus notional extension. Full detail can be found in paragraph 10.10 of the draft *Approved Document L, volume 1: dwellings.*

Question 106): **Do you agree that we should control the primary energy and fabric energy efficiency of new extensions to existing homes when using the SAP method of compliance?**

a) Yes
b) No

If you answered no, please explain your reasoning.

6.4 Limiting U-value calculations for rooflights in existing homes

6.4.1. The Future Homes Standard consultation proposed:

- that the limiting U-value for rooflights in new domestic buildings should be based on a rooflight in a horizontal position, rather than a vertical position; and
- to adopt the new version of BR 443, which provides guidance on conventions for U-value calculations.

6.4.2. We are proposing to do the same for all work to existing homes. As outlined in the Future Homes Standard consultation,[41] most rooflights are tested and installed in the horizontal position, and this proposed change reduces the need for conversion factors, which add unnecessary complexity. The new version of BR 443 is an update to the previous 2006 edition, and primarily reflects changes in British and International standards, industry practice, and industry publications. This new version of BR 443 is available online, where all of the changes can be viewed:

https://www.brebookshop.com/details.jsp?id=328041

[41] Ministry of Housing, Communities and Local Government, 2019. The Future Homes Standard: changes to Part L and Part F of the Building Regulations for new dwellings. Available online: https://www.gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings
Our response to this consultation, including our final position on these policies, can also be found using the above link.

Question 107): **Do you agree that the limiting U-value for rooflights in existing domestic buildings should be based on a rooflight in a horizontal position, as detailed in Section 4 of draft *Approved Document L, volume 1: dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

Question 108): **Do you agree that we should adopt the latest version of BR 443 for calculating U-values in existing domestic buildings, as detailed in Section 4 of draft *Approved Document L, volume 1: dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

6.5 Minimum standards for the renovation of thermal elements in existing homes

6.5.1. The Building Regulations set standards for when a thermal element (i.e. walls, floors, roofs) in an existing building is renovated. These standards apply when:

- A material change of use takes place (e.g. an office to flat conversion);
- An existing fabric element becomes a thermal element (e.g. a cold roof in a loft conversion) or a change of energy status takes place; or
- A thermal element is being renovated.

In considering whether it would be appropriate to uplift the U-values for all thermal elements, we have considered technical feasibility, thermal performance, practicality, and potential risks.

Roofs

6.5.2. The Ministry of Housing, Communities and Local Government's recently published Cost Optimal report stated that it is cost optimal for roofs to be renovated to a U-

value of 0.11 W/m^2.K.[42] This evaluation was based on pitched roofs with insulation at the ceiling level.

6.5.3. After further review of the renovation standards for roofs, we are not proposing to uplift the improved U-value when renovating pitched roofs with insulation at ceiling level. Further investigation found that the higher level of thermal performance of 0.11 W/m^2.K increases moisture risk significantly. This risk may be poorly managed in practice, which would risk mould growth and degradation of building fabric. While the moisture risk could be mitigated by reducing moisture movement into the loft through the use of vapour barriers and sealing of gaps, it is likely that the extra work required would make the level of performance of 0.11 W/m^2.K not cost optimal.

6.5.4. We are proposing to uplift the standard for pitched roofs insulated at rafter level and for flat roofs to 0.16 W/m^2.K (see Table 6.2). This uplift aligns with the standard for pitched roofs with insulation at ceiling level. At a U-value of 0.16 W/m^2.K, roofs could be renovated at rafter level using several different insulating products. Uplifting this value further would mean that mineral batt insulation between rafters may no longer be practical due to the extra thickness of material needed below rafter level. This uplift results in a reduction in headspace of between 10 and 15mm, which we consider to be a reasonable reduction. Flat roofs do not have the same issues and we consider an uplift to 0.16 W/m^2.K to be reasonable.

Walls and floors

6.5.5. If building work is being done to a thermal element and its U-value is worse than the threshold U-value, the thermal element should be improved. The improved U-value is the U-value the element should meet once the work is completed. We are proposing that the threshold values and the improved U-values for walls are reasonable and should not be uplifted for the 2021 standard. This is on the basis that:

- lowering the threshold would bring filled cavity walls into scope. There would be little uplift in thermal performance by filling the remaining cavity and it increases moisture risk; and
- lowering the 0.7 W/m^2.K threshold U-value for a solid wall will capture very few additional walls, therefore the impact of any change would be negligible.

6.5.6. The Government also believes that the threshold values and the improved U-values for floors are reasonable and should not be uplifted for the 2021 standard. This is

[42] Ministry of Housing, Communities and Local Government, 2019. Energy Performance of Buildings Directive: Second Cost Optimal Assessment for the United Kingdom (excluding Gibraltar). Available online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770783/2nd_UK_Cost_Optimal_Report.pdf

because many of the floors with a U-value of less than 0.7 W/m^2.K will be solid. Very little solid floor work is currently undertaken, which means that the impact of any change would be negligible.

6.5.7. The proposed uplifts can be found in Sections 4 and 11 of draft *Approved Document L, volume 1: dwellings* and in Table 6.2.

Table 6.2: Upgrading retained thermal elements in existing dwellings

Element	Current standard's U-values (W/m^2.K)		Proposed standard's U-values (W/m^2.K)	
	Threshold U -value	Improved U-value	Threshold U-value	Improved U-value
Pitched roof – insulation at ceiling level	0.35	0.16	0.35	0.16
Pitched roof – insulation between rafters	0.35	0.18	0.35	**0.16**
Flat roof or roof with integral insulation	0.35	0.18	0.35	**0.16**
Wall - cavity insulation	0.70	0.55	0.70	0.55
Wall - external or internal wall insulation	0.70	0.30	0.70	0.30
Floor	0.70	0.25	0.70	0.25

Question 109): Do you agree with the proposed minimum fabric standards set out in Table 6.2 of this consultation document, and Sections 4 and 11 of draft *Approved Document L, volume 1: dwellings*?

a) Yes
b) No

If you answered no, please explain your reasoning provide supporting evidence.

6.6 Setting the Fabric Energy Efficiency Standard in New Homes

6.6.1. The Future Homes Standard consultation detailed our plans for an interim uplift to the energy efficiency standards of the Building Regulations for new homes. In the Future Homes Standard consultation, we proposed to remove the Fabric Energy Efficiency Standard (FEES) in order to reduce complexity that might occur if the standard was in place alongside other new metrics the consultation proposed to introduce. A Government response to the Future Homes Standard consultation has been published alongside this consultation.

6.6.2. The Government response explains that many stakeholders expressed concern about the proposal to remove the FEES metric. It was highlighted that under some circumstances, including when heat pumps are installed, the lack of the FEES metric could lead to lower fabric energy efficiency than we had intended.

6.6.3. We consider the principle of a fabric first approach to be sound and this will inform our approach as we introduce Part L 2021 and transition to the Future Homes Standard in 2025. While we will need to encourage low carbon heating systems, it is also important that we get the fabric standards of homes right. Our initial proposals aimed to broadly encourage low carbon heating in order to put us on the path to the Future Homes Standard. However, we did not want to achieve this at the expense of good fabric. We therefore intend to retain the Fabric Energy Efficiency Standard as a performance metric in Part L 2021.

6.6.4. In Part L 2013, the Target Fabric Efficiency Rate was calculated using the fabric specification of the notional dwelling and multiplying this by 1.15. As higher U-values means lower performing fabric, this makes the specification less stringent and easier to meet.

6.6.5. While we could retain the existing 2013 FEES metric for Part L 2021, there is scope to introduce a more stringent target. A more demanding FEES target would produce a better fabric uplift, a better contribution to our net-zero target and a future proofed home. The better fabric would also support a smoother transition to the Future Homes Standard by preparing industry to build better fabric now. It would also give the highest CO_2 saving when a heat pump is installed.

6.6.6. For Part L 2021 we are implementing the Option 2, 31% uplift that was detailed in the Future Homes Standard consultation; the fabric specification that will be used in the notional building for the Primary Energy and CO_2 targets is in Table 6.3. Using this fabric specification, we have developed two consultation options for FEES:

- **Option 1** (Government's preferred option) is to set FEES at the full fabric specification below in Table 6.3. This will ensure a meaningful uplift to the fabric of new homes and will ensure that developers are progressing towards the fabric standard that we will expect under the Future Homes Standard.
- **Option 2** is to set FEES using the fabric specification below in Table 6.3 and multiply this target by 1.15. This is in line with the current approach in Part L 2013.

Table 6.3: Fabric specifications for the Part L 2021 notional building	
Fabric Element	Specification
Windows	1.2 W/m^2.K
Doors	1.0 W/m^2.K
External Walls	0.18 W/m^2.K
Roof	0.11 W/m^2.K
Floor	0.13 W/m^2.K
Air Permeability	5m^3/(h.m^2) @50Pa
Party Wall	0 W/m^2.K

6.6.7. Although Option 1 would support a smooth transition to the Future Homes Standard by increasing the skills of people building fabric elements of homes, it may also make it less appealing for some developers to install heat pumps under Part L 2021. This is because the difference between the costs of installing heat pumps and the notional building specification, which has a gas boiler and solar panels, will be reduced. However, a home built under this specification with a heat pump will still have a lower capital cost than one built with a gas boiler and solar panels, at £3134 and £4847 respectively. The capital cost and specification of Option 1 was also outlined in the original Future Homes Standard consultation, to demonstrate the capital cost of the standard when a heat pump is installed.[43] We would be interested in whether the level of FEES and the associated cost of building would impact on developers' decision to build with low-carbon heat.

Question 110): What level of FEES should be used for Part L 2021?

a) Option 1, full fabric specification
b) Option 2, fabric specification x1.15
c) Neither, it should be higher
d) Neither, it should be lower

Please explain your reasoning and provide supporting evidence, including whether you think a higher level of FEES will make it more or less likely for a home to be built with low carbon heat.

[43] Ministry of Housing, Communities and Local Government, 2019. The Future Homes Standard: changes to Part L and Part F of the Building Regulations for new dwellings. Available online: https://www.gov.uk/government/consultations/the-future-homes-standard-changes-to-part-l-and-part-f-of-the-building-regulations-for-new-dwellings

6.7 Building Services in new and existing homes

6.7.1. Part L of the Building Regulations requires minimum standards for the efficiency and controls for building services such as heating, lighting and hot water. At present, *Approved Document L1B* is supported by the *Domestic Building Services* Compliance *Guide*. In the Future Homes Standard consultation, we consulted on incorporating the minimum standards from the Compliance Guides into the revised draft *Approved Document L, volume 1: dwellings*.

Replacement services

6.7.2. In April 2018, we increased the performance standards in the *Domestic Building Services Compliance Guide* for replacement gas boilers and required further controls and additional energy efficiency measures in homes in the UK. These changes were known as 'Boiler Plus'.[44] Due to these recent changes we are not proposing to uplift the efficiencies of gas boilers.

6.7.3. The Ecodesign for Energy-Related Products Regulations 2010 were amended in 2018. In some cases, these standards exceed those in the Domestic Building Services Compliance Guide, and the minimum efficiency in the new draft *Approved Document L, volume 1: dwellings* has been updated to reflect the Ecodesign 2018 standards.

6.7.4. We are making several proposals for simplifying and consolidating the minimum standards for air distribution systems. There are also some areas where technological advancements or improved design and installation practices mean that we can improve minimum standards for building services, to prevent the least efficient systems from being installed in homes.

6.7.5. In this context, we are proposing the following changes to building services standards and to prevent the least efficient systems being installed:

- For oil-fired boilers, to set the minimum seasonal efficiency at 91% ErP;
- For solid-fuel appliances, to remove guidance for appliances which are rarely installed, such as open fires and anthracite boilers;
- For heat pumps, to increase the minimum seasonal coefficient of performance (SCOP) of a heat pump installed in an existing dwelling to meet the minimum Ecodesign requirements for direct expansion units, and for all other systems a minimum SCOP of 3.0 for heating and 2.0 for domestic hot water;

[44] Department for Business, Energy and Industrial Strategy, 2017. Heat in Buildings: Boiler Plus. Available online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/651853/Boiler_Plus_final_policy_and_consultation_response.pdf.

- For cooling systems, to increase the seasonal energy efficiency ratio (SEER) to 4.0;
- For supply and extract ventilation systems, to have heat recovery at a minimum 73% efficiency, with packaged systems also being fitted with a summer bypass and variable speed controller; and
- For lighting efficacy of fixed lighting, to have a minimum of 75 lamp lumens per circuit-watt for both internal and external lighting.

Question 111): Do you agree that we have adequately covered matters which are currently in the Domestic Building Services Compliance Guide in draft *Approved Document L, volume 1: dwellings* for existing homes?

a) Yes
b) No

If you answered no, please explain which matters are not adequately covered.

Question 112): Do you agree with the proposed minimum standards for building services in existing homes, as detailed in Sections 5 and 6 of draft *Approved Document L, volume 1: dwellings*?

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough

If you answered no (b or c), please explain your reasoning.

6.7.6. Current guidance states that the efficiency of a replacement heating appliance should not be worse than 2 percentage points lower than that of the appliance being replaced. To compare the efficiencies of appliances with different fuels, a conversion with CO_2 emission factors is given. We now propose that when a replacement service uses a different fuel, the new services should not emit more CO_2 emissions and should not have higher primary energy demand than the service being replaced. This would, for instance, mean a gas-fired boiler should not generally be replaced with an electric flow boiler, even though it may be lower carbon. Guidance and an example are provided alongside this consultation in Section 5 of draft *Approved Document L, volume 1: dwellings*.

Question 113): **Do you agree with the proposals for replacement fixed building services in existing homes, as detailed in Section 5 of draft *Approved Document L, volume 1: dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

Self-regulating devices

6.7.7. We plan to introduce a new regulation in the Building Regulations 2010 to ensure that existing domestic buildings must have self-regulating devices when a heating appliance, such as a boiler, is replaced. Technically this means including devices for the separate regulation of the temperature in each room, or designated heating zone (where this is justified) of the building. A common way of achieving this in practice for homes would be to have thermostatic radiator valves (TRVs) on radiators in each room, which are often already present in people's homes.[45]

6.7.8. There may be some rare cases where it is not technically or economically feasible to install self-regulating devices in an existing home. We propose that the requirement would not apply if it can be shown that the measure would not be technically or economically feasible. Economic feasibility for self-regulating devices is defined as a simple payback period of 7 years of less. Section 5 of the approved document gives some examples of when measures may not be technically feasible. We expect that the majority of installations would not qualify for this exemption. Further details are provided in the Impact Assessment that accompanies this consultation. Suggested guidance is provided in Sections 5 and 6 of draft *Approved Document L, volume 1: dwellings*.

[45] Department of Energy and Climate Change, 2014. How heating controls affect domestic energy demand: A Rapid Evidence Assessment. Available online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/277552/FINALHow_heating_controls_affect_domestic_energy_demand_-_A_Rapid_Evidence_Assessment.pdf and National Statistics, 2019. English Housing Survey 2017 to 2018: energy. Available online: https://www.gov.uk/government/statistics/english-housing-survey-2017-to-2018-energy

Question 114): **Do you agree with our proposed approach to mandating self-regulating controls in existing domestic buildings, including technical and economic feasibility, as detailed in Sections 5 and 6 of draft *Approved Document L, volume 1: dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

Building Automation and Control Systems

6.7.9. A Building Automation and Control System (BACS) is a centralised system used to monitor and control a building's environment and services (i.e. heating, ventilation, air conditioning, lighting and other systems such as security alarms and lifts). There is currently no guidance for the installation of BACS in a new or existing home. We propose to provide guidance for these systems, which are set out in Section 6 of draft *Approved Document L, volume 1: dwellings* provided alongside this consultation.

Question 115): **Do you agree with the proposed specifications for building automation and control systems installed in a new or existing home, as detailed in Section 6 of *draft Approved Document L, volume 1: dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning.

Commissioning and providing information

6.7.10. The Building Regulations already recognises the importance of commissioning as detailed in sections 3.10 and 3.11. We propose to extend the commissioning requirements for new and existing homes to both Building Automation and Control Systems, and on-site electricity generation systems.

6.7.11. Additionally, we are proposing to introduce requirements for when work is carried out to a building services system[46] or a new system is installed in an existing home. We propose that the overall energy performance of the altered part, and where relevant the complete altered system, is assessed and documented, with the results passed on to the homeowner. For domestic buildings, the details of this proposal can be found in section 9 of *Approved Document L, volume 1: dwellings*.

6.7.12. To inform occupiers about how their services perform in practice, we propose for both new and existing homes, that a copy of the commissioning sheet should be provided to the homeowner. Guidance for this proposal can be found in Sections 8 and 9 of draft *Approved Document L, volume 1: dwellings.*

Question 116): Do you agree with the proposals for extending commissioning requirements to Building Automation and Control Systems and on-site electricity generation systems, as detailed in Sections 8 and 9 of draft *Approved Document L, volume 1: dwellings*?

a) Yes
b) No

If you answered no, please explain your reasoning.

Question 117): Do you agree with the proposals for requirements relating to the assessment of overall energy performance of building services installations and providing information to homeowners, as detailed in Sections 8 and 9 of draft *Approved Document L, volume 1: dwellings*?

a) Yes
b) No, I do not agree with providing this guidance
c) No, the guidance should be improved

If you answered no (b or c), please explain your reasoning.

Other building services changes

6.7.13. The Future Homes Standard consultation proposed to incorporate the minimum standards from the Building Services Compliance Guides into *Approved Document L, volume 1: dwellings* and included some draft minimum standards for building

[46] Including fixed building services, building automation and control systems, and on-site electricity generation.

services in new dwellings. Some parts of the standards, which are more appropriate to existing buildings, were not set out in that consultation.

6.7.14. We are proposing to update guidance on water treatment on boiler installation to reference BS 7593. We are proposing to remove specific guidance on water softening within the approved document, as it is not directly an energy efficiency measure.

6.7.15. We propose to introduce new requirements and associated guidance on sizing and controls for building services systems, the aim of which is to reduce the risks involved in under or oversizing systems. For example, a significantly oversized condensing boiler may never be able to run in condensing mode in reality and therefore, will not be able to fulfil its energy-saving potential. We have proposed guidance in Sections 5 and 6 of draft *Approved Document L, volume 1: dwellings* for the following building services systems:

Table 6.4: Guidance on sizing and controls for building services systems

Service type	***Approved Document L, volume 1: dwellings***
Space heating	Paragraph 5.7
Domestic hot water	Paragraph 5.9
Comfort cooling	Paragraph 6.42 and 6.45
Mechanical ventilation	Paragraph 6.48 to 6.51
Lighting	Paragraph 6.52 and 6.55
Building Automation and Control Systems (BACS)	Paragraph 6.56 to 6.58
On-site electricity generation	Paragraphs 6.59 to 6.62

6.7.16. As discussed in paragraph 3.10.24 to 3.10.28 of this consultation and paragraphs 3.39 to 3.42 of the Future Homes Standard consultation, we are proposing measures to ensure that buildings are fit for the future with the ability to adopt low-carbon heat. We would also like to prepare homes in the existing domestic stock for low-carbon heat, when there is appropriate work being done.

6.7.17. We are proposing to introduce a new requirement that when a whole wet heating system is replaced, including both the heating appliance (e.g. a boiler) and the emitters (e.g. radiators), that the new system is designed to run at 55°C. This requirement would not apply if only replacing the heating appliance. This would mean that the radiators are of a large enough size to transfer heat quickly into the room, when low temperature water is run through them. This proposal would ensure that an existing home is ready for low carbon heat, such as heat pumps or district heating. Designing the system in this way when work is already being done should reduce cost and disruption to householders if low carbon heat is later installed. In addition, if a consumer opted to install a traditional condensing boiler, the efficiency

of this boiler would be improved by this proposal, therefore offering an immediate energy saving to the consumer.

6.7.18. This proposal for low-temperature heat would likely result in larger heat emitters (e.g. radiators). Where this is not feasible the guidance recommends providing the largest emitter possible. We have proposed guidance in Section 5, paragraph 5.8, of the draft *Approved Document L, volume 1: dwellings*.

Question 118): Do you agree with the proposed changes to water treatment guidance and removing formal guidance on water softening?

a) Yes
b) No

If you answered no, please explain your reasoning.

Question 119): Do you agree with the guidance proposals for adequate sizing and controls of building services systems in domestic buildings, as detailed in Sections 5 and 6 of draft *Approved Document L, volume 1: dwellings*?

a) Yes
b) No, I do not agree with providing this guidance
c) No, the guidance should be improved

If you answered no (b or c), please explain your reasoning.

Question 120): Do you agree with the guidance proposals on sizing a system to run at 55°C when a whole heating system is replaced, as detailed in Section 5 of draft *Approved Document L, volume 1: dwellings*?

a) Yes
b) No, I do not agree with providing this guidance
c) No, the guidance should be improved

If you answered no (b or c), please explain your reasoning.

6.8 Part L guidance changes for existing homes

6.8.1. The new *Approved Document L, volume 1: dwellings* is provided alongside this consultation document. The document contains the previously consulted on guidance for new homes which has been updated to reflect our final policy positions, and now contains new guidance on work to existing homes. This guidance in the approved document for this consultation is highlighted in blue, with any technical changes highlighted in yellow.

6.8.2. The new guidance in *Approved Document L, volume 1: dwellings* aims to be clearer about what is expected of builders and installers in complying with the regulatory requirements. Approved Documents deal with complex information and are an essential resource relied upon by those who enforce the regulations, advise on compliance or need to comply with the regulations. *The Independent Review of the Building Regulations and Building Safety* highlighted that the complexity of the current regulations and Approved Documents guidance "can lead to confusion and misinterpretation in their application…regulations and guidance must be simplified and unambiguous."[47] In line with this recommendation, and to make the minimum standard as clear as possible, Supplementary information has been removed, clarifications made and some new information has been added. This is a comprehensive, but not exhaustive, list of the information that has been changed:

- Inclusion of cavity wall insulation in renovating a thermal element;
- Additional clarity on installing a boiler interlock in existing systems;
- Additional clarity on operating and maintenance information;
- Additional clarity on the commissioning notice of completion for dwellings;
- Removal of advice on upgrading windows and doors when only replacing glazing panes or the door leaf;
- Removal of advice on weather stripping secondary glazing;
- Removal of guidance that an approach to demonstrate thermal bridging has been limited is to adopt Accredited Construction Details at: www.gov.uk;
- Removal of design considerations for swimming pool basins;
- Removal of guidance that there may be poor levels of daylight in extensions if there is too little glazing;
- Removal of advice on cost-effective renovation of thermal elements as a compensating measure for the thermal performance of an extension;
- Removal of guidance on flexibility on areas of glazing to maintain the character of an existing building;
- Removal of examples of fixed building services that do not need commissioning; and

[47]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/707785/Building_a_Safer_Future_-_web.pdf

- Removal of advice on the building control body failing to receive a commissioning notice and issuing a final certificate.

Question 121): **Do you agree with the proposed changes to the supplementary guidance and the external references in Appendix D and Appendix E, in the draft *Approved Document L, volume 1: dwellings* as outlined in paragraph 6.8.2.?**

a) Yes
b) Yes, but not with the changes to the supplementary guidance
c) Yes, but not with the external references
d) No

If you answered b, c or d, please explain your reasoning.

6.9 Airtightness testing

6.9.1. Paragraph 3.14.5 detailed proposals to clarify guidance on the calibration of devices that carry out airtightness testing in new and existing non-domestic buildings. It states that in the Future Homes Standard consultation, guidance in the Approved Document was inconsistent with what was written in the CIBSE methodology on when calibration of devices that carry out airtightness testing should take place. We propose to clarify this guidance on the calibration of devices to state that it should be either be calibrated in the previous 12 months or according to the manufacturer's guidance. This aligns with what was proposed in Chapter 3 and is detailed in Paragraph 7.2 of *draft Approved Document L, volume 1: dwellings,* provided alongside this consultation.

Question 122): **Do you agree with the proposal for guidance on the calibration of devices that carry out airtightness testing in new and existing domestic buildings?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

7. Part F standards for existing domestic buildings in 2021

7.1 Chapter Summary

7.1.1. This chapter includes the following proposals in respect of existing domestic buildings:

- Proposed changes to guidance in *Approved Document F - Ventilation (2010 edition incorporating 2010 and 2013 amendments)* to make the document clearer;
- Proposed guidance on ventilation solutions and standards;
- Proposed guidance when undertaking energy efficiency measures;
- Proposed guidance on replacing windows;
- Proposed guidance on refurbishing a kitchen or bathroom; and
- Proposed guidance on commissioning and providing information.

7.2 Background

7.2.1. As previously outlined in Chapter 4, Part F of the Building Regulations sets out requirements for adequate means of ventilation, which is important in order to ensure good air quality for people in buildings. The Future Homes Standard consultation set out proposals for ventilation standards in new homes.

7.2.2. **This chapter focuses on existing homes, and as for Part F for non-domestic buildings, proposes changes to Approved Document guidance to simplify the guidance in line with the principles presented in the Future Homes Standard consultation.**

7.3 Guidance

7.3.1. *Approved Document F - Ventilation (2010 edition incorporating 2010 and 2013 amendments)* is supported by the *Domestic Ventilation compliance Guide.* In the Future Homes Standard consultation, we consulted on incorporating the minimum standards from the Compliance Guides into the Approved Documents.

7.3.2. The new draft *Approved Document F, volume 1: dwellings* is provided alongside this consultation document. The document contains the previously consulted on guidance for new homes and now also contains draft guidance on work to existing homes. This guidance for this consultation is highlighted in blue, with any technical changes highlighted in yellow.

7.3.3. The new guidance in *Approved Document F, volume 1: dwellings* aims to be clearer about what is expected of builders and installers in complying with the regulatory requirements. Approved Documents deal with complex information and are an essential resource relied upon by those who enforce the regulations, advise on compliance or need to comply with the regulations. *The Independent Review of the Building Regulations and Building Safety* highlighted that the complexity of the current regulations and Approved Documents guidance "can lead to confusion and misinterpretation in their application…regulations and guidance must be simplified and unambiguous".[48] In line with this recommendation, and to make the minimum standard as clear as possible, some of the supplementary text has been removed, some new information has been added, and relevant external guidance has been referenced. This is a comprehensive, but not exhaustive, list of the information that has been changed:

- Additional advice on ventilation through infiltration
- Additional guidance for existing devices in a kitchen or bathroom
- Additional guidance on providing clear, non-technical information
- Change in terminology to background ventilators
- Removal of guidance which does not form part of the Part F minimum standard, including the following:
    - General information on the purpose and effectiveness of ventilation, fire precautions and modular and portable buildings
    - Advice on trickle ventilators, available at www.ggf.org.uk
    - Defined terms such as closable opening, gross internal volume and permanent opening

Question 123): Do you agree that we have adequately covered matters for existing dwellings which are currently in the Domestic Ventilation Compliance Guide in draft *Approved Document F, volume 1: dwellings*?

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

[48]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/707785/Building_a_Safer_Future_-_web.pdf

Question 124): **Do you agree with the proposed changes to supplementary guidance and the external references used in Appendix E and Appendix F, for existing domestic buildings from the draft *Approved Document F, volume 1: dwellings*?**

a) Yes
b) Yes, but not with the changes to the supplementary guidance
c) Yes, but not with the external references
d) No

If you answered b, c or d, please explain your reasoning.

7.4 Work on existing homes

Ventilation solutions and standards

7.4.1. *Approved Document F - Ventilation (2010 edition incorporating 2010 and 2013 amendments)* currently provides guidance on the following ventilation solutions for new and existing dwellings:

i) System 1: Background ventilators and intermittent extract fans;
ii) System 2: Passive stack ventilation;
iii) System 3: Continuous mechanical extract ventilation; and
iv) System 4: Continuous mechanical supply and extract with heat recovery.

7.4.2. The Future Homes Standard consultation proposed that guidance should be provided for natural ventilation (formerly system 1), continuous mechanical extract ventilation (formerly system 3) and continuous mechanical supply and extract ventilation (formerly system 4). The proposals included discontinuing passive stack ventilation guidance. A consultation response has been published alongside this document which outlines our decision to adopt these proposals.

7.4.3. Currently, guidance for carrying out work on existing homes refers to the system-specific guidance for systems 1 to 4. We propose a simplified approach, where guidance on work to existing homes is aligned with that of new homes. Therefore, guidance on passive stack ventilation in existing homes would be discontinued, for example when a wet room is added to an existing property. We have removed this guidance in the draft *Approved Document F, volume 1: dwelling,* provided alongside this consultation.

7.4.4. The Future Homes Standard consultation also proposed a revised set of simplified guidance. This included proposed changes to minimum ventilation equivalent areas

and guidance on noise, location, controls, performance testing and minimising the ingress of external pollutants. We are proposing that guidance for work on existing homes aligns with these proposed standards. This will include updating equivalent areas for background ventilators which is outlined in the draft *Approved Document F, volume 1: dwellings*, provided alongside this consultation document.

Question 125): Do you agree with the proposal to align the guidance and standards for work to existing homes to that outlined in Chapter 4 of the Government Response to the Future Homes Standard consultation?

a) Yes
b) No

If you answered no, please explain your reasoning and provide supporting evidence.

Guidance when undertaking energy efficiency measures

7.4.5. When building work is carried out on an existing home, the ventilation provision of the home should not be made less satisfactory with respect to the requirements of the Building Regulations than before the work was carried out. This includes making sure that the building, after the work is complete, is no less compliant with Part F. The current guidance on work to existing homes is limited, but includes the following scenarios:

- Replacing windows, specifically trickle ventilators;
- Addition of a habitable room;
- Addition of a wet room;
- Addition of a conservatory or porch; and
- Refurbishing a kitchen or bathroom.

7.4.6. The installation of energy efficiency measures is likely to reduce the amount of air entering the home, for example, if adding wall or roof insulation. This may lead to dwellings becoming under-ventilated and less compliant with Part F of the Building Regulations. We are therefore proposing to expand the current guidance on work to existing homes to address the issue of ventilation when installing common energy efficiency measures.

7.4.7. As common energy efficiency measures are likely to have varying effects on reducing ventilation levels, we are proposing two methods that will determine what further ventilation provisions could be employed to meet the requirements of the

Building Regulations. These are detailed in Section 3 of draft *Approved Document F, volume 1: dwellings*, provided alongside this consultation.

i) Method one categorises different energy efficiency measures as having a major or minor effect on a building's ventilation levels. Depending on how many major or minor measures are installed, a flow diagram and checklist aids the user in determining a way in which the Building Regulations requirements may be met.
ii) Method two suggests seeking expert advice, which may include carrying out an air permeability test or complying with a referenced industry standard (*PAS 2035: Retrofitting Dwellings for improved energy efficiency).*

7.4.8. In the Future Homes Standard consultation response, we have explained that for new homes we are providing guidance for continuous mechanical extract ventilation and mechanical supply and extract ventilation at all levels of airtightness and guidance for natural ventilation for less airtight dwellings only. For existing homes, we are proposing to reference the same guidance to improve ventilation provision when energy efficiency measures are carried out which are likely to make the home more airtight. For renovations to existing homes, we believe that housebuilders would likely choose mechanical ventilation, as it can be installed with fewer building alterations than natural ventilation using background ventilators.

Question 126): Do you agree with the proposed guidance for installing energy efficiency measures in existing homes, as detailed in Section 3 of draft *Approved Document F, volume 1: dwellings*.

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 127): Do you agree with the content of the proposed checklist for ventilation provision detailed in Appendix D of draft *Approved Document F, volume 1: dwellings*?

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

Replacing windows in dwellings

7.4.9. At present, *Approved Document F - Ventilation (2010 edition incorporating 2010 and 2013 amendments)* states that if an original window has no ventilation openings, it would be good practice to fit trickle ventilators in the replacement window. We are proposing to provide clarify this with guidance that states, if replacing windows is likely to make the building less compliant with the ventilation requirements than it was before the work was carried out, then additional ventilation should be provided in the form of background ventilators. The proposed minimum equivalent areas of background ventilators align with those set out in the Future Home Standard consultation for new dwellings.

7.4.10. We recognise that for some renovation work in existing buildings, it may be challenging to meet the proposed minimum standards. Therefore, we propose to add an additional note in Section 3 of *Approved Document F, volume 1: dwellings* which states that if it is not technically or functionally feasible to adopt the equivalent areas for new dwellings, the background ventilators should adopt equivalent areas as close to the minimum value as is feasible.

Question 128): Do you agree with the guidance in Section 3 of draft *Approved Document F, volume 1: dwellings* when replacing an existing window with no background ventilators?

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough

If you answered no (b or c), please explain your reasoning.

Refurbishing a kitchen or bathroom

7.4.11. *Approved Document F - Ventilation (2010 edition incorporating 2010 and 2013 amendments)* currently states that if a kitchen or bathroom with no ventilation system is refurbished, it is not necessary to provide a ventilation system in the refurbished room. Although we recognise that kitchen ventilation is important, the Building Regulations do not generally mandate improvement works in existing buildings. We propose to clarify this guidance to state that additional ventilation is necessary if refurbishment work is likely to make the building less compliant with the ventilation requirements of the Building Regulations than it was before the work was carried out. This is detailed in paragraphs 3.29 to 3.31 of *Approved Document F, volume 1: dwellings* which accompanies this consultation.

Question 129): **Do you agree with the proposals in paragraphs 3.29 to 3.31 of draft *Approved Document F, volume 1: dwellings* in 7.4.11 of this consultation document on work to existing kitchens or bathrooms?**

a) Yes
b) No, the standards go too far
c) No, the standards do not go far enough

If you answered no (b or c), please explain your reasoning and provide alternative suggestions.

Commissioning and providing information in domestic buildings

7.4.12. At present, regulation 44 of the Building Regulations requires that ventilation systems are commissioned. To inform occupiers about how their ventilation system works in practice, we propose that a copy of the completed commissioning sheet in Appendix C of the draft *Approved Document F, volume 1: dwellings*, which includes commissioning information and results, should be provided to the building owner. This is detailed in Section 4 of draft *Approved Document F, volume 1: dwellings*, which accompanies this consultation. Note that paragraph 6.7.11 of this consultation document contains proposals for providing energy efficiency information when installing services in existing homes.

Question 130): **Do you agree with the proposal to provide a completed commissioning sheet to the homeowner, as detailed in Section 4 of draft *Approved Document F volume 1: dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

Impact and Equalities Assessment

i. Building Regulations greatly influence how our buildings are constructed and used. As such, they help to deliver significant benefits to society. Regulation can also impose costs on both businesses and individuals. We have published an Impact Assessment which considers the costs and benefits of the proposed changes to the Building Regulations detailed in this consultation. The Impact Assessment is an important part of the consultation, as its analysis has shaped the proposals, and we are keen to test the results. As such, consultees are encouraged to read the impact assessment and respond to the question below.

ii. To note, the impact assessment only covers the proposed changes to the Building Regulations to be implemented in 2021. A separate Impact Assessment will be produced for the Future Buildings Standard when we consult in the future on its detailed implementation.

Question 131): Please provide any feedback you have on the impact assessment here, including the assumptions made and the assessment of the potential costs and benefits of the proposed options we have made.

iii. The Public Sector Equality Duty requires ministers to have due regard to the need to eliminate discrimination and other conduct prohibited under the Equality Act 2010, and to advance equality of opportunity and foster good relations between persons who share protected characteristics and those who do not.

iv. We are interested in views as to the potential impacts of any of the proposals in this consultation document on persons who have a protected characteristic. Protected characteristics as defined by the Equality Act 2010 are:

- Age
- Disability
- Gender reassignment
- Marriage and Civil partnership
- Pregnancy and Maternity
- Race
- Religion or belief
- Sex
- Sexual orientation

Question 132): **Please provide any feedback you have on the potential impact of the proposals outlined in this consultation document on persons who have a protected characteristic. Please provide evidence to support your comments.**

Annexes

About this consultation

This consultation document and consultation process have been planned to adhere to the Consultation Principles issued by the Cabinet Office.

Representative groups are asked to give a summary of the people and organisations they represent, and where relevant who else they have consulted in reaching their conclusions when they respond.

Information provided in response to this consultation, including personal data, may be published or disclosed in accordance with the access to information regimes (these are primarily the Freedom of Information Act 2000 (FOIA), the Data Protection Act 2018 (DPA), the General Data Protection Regulation, and the Environmental Information Regulations 2004.

If you want the information that you provide to be treated as confidential, please be aware that, as a public authority, the Department is bound by the Freedom of Information Act and may therefore be obliged to disclose all or some of the information you provide. In view of this 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 as binding on the Department.

The Ministry of Housing, Communities and Local Government will process your personal data in accordance with the law and in the majority of circumstances this will mean that your personal data will not be disclosed to third parties. A full privacy notice is included at Annex A.

Individual responses will not be acknowledged unless specifically requested.

Your opinions are valuable to us. Thank you for taking the time to read this document and respond.

Are you satisfied that this consultation has followed the Consultation Principles? If not or you have any other observations about how we can improve the process please contact us via the complaints procedure.

Annex A - Privacy notice

Personal data

The following is to explain your rights and give you the information you are be entitled to under the Data Protection Act 2018.

Note that this section only refers to your personal data (your name address and anything that could be used to identify you personally) not the content of your response to the consultation.

1. **The identity of the data controller and contact details of our Data Protection Officer**
   The Ministry of Housing, Communities and Local Government (MHCLG) is the data controller. The Data Protection Officer can be contacted at dataprotection@communities.gov.uk

2. **Why we are collecting your personal data**
   Your personal data is being collected as an essential part of the consultation process, so that we can contact you regarding your response and for statistical purposes. We may also use it to contact you about related matters.
   We will collect the following personal info for analysis in the Future Buildings Standard consultation:
   - Name
   - Email
   - The organisation that you work for
   - Your job title

3. **Our legal basis for processing your personal data**
   The Data Protection Act 2018 states that, as a Government department, MHCLG may process personal data as necessary for the effective performance of a task carried out in the public interest. i.e. a consultation. We have a statutory duty to consult.

4. **With whom we will be sharing your personal data**
   Any personal data collected will not be shared outside of MHCLG or for any purpose other than matters relating to the consultation. Any data that will be shared with organisations outside of MHCLG will be anonymised.

5. **For how long we will keep your personal data, or criteria used to determine the retention period.**
   Your personal data will be held for two years from the closure of the consultation

6. **Your rights, e.g. access, rectification, erasure**
   The data we are collecting is your personal data, and you have rights that affect what happens to it. You have the right to:
   a. see what data we have about you
   b. ask us to stop using your data, but keep it on record
   c. ask to have all or some of your data deleted or corrected
   d. lodge a complaint with the independent Information Commissioner (ICO) if you think we are not handling your data fairly or in accordance with the law. You can contact the ICO at https://ico.org.uk/, or telephone 0303 123 1113.

7. **Your personal data will not be sent overseas.**

8. **Your personal data will not be used for any automated decision making.**

9. **Your personal data will be stored in a secure Government IT system. We are using a third-party system, Smart Survey, to collect consultation responses. We will move the data from there to MHCLG internal systems within two weeks of the consultation closing on 13/04/2021.**

10. **Complaints and more information**

    When we ask you for information, we will keep to the law, including the Data Protection Act 2018 and General Data Protection Regulation.

    If you are unhappy with the way the department has acted, you can make a complaint.

    If you are not happy with how we are using your personal data, you should first contact dataprotection@communities.gov.uk.

    If you are still not happy, or for independent advice about data protection, privacy and data sharing, you can contact:

    The Information Commissioner's Office
    Wycliffe House
    Water Lane
    Wilmslow, Cheshire,
    SK9 5AF

    Telephone: 0303 123 1113 or 01625 545 745
    https://ico.org.uk/

Annex B - Consultation questions

We strongly encourage responses via the online survey, particularly from organisations with access to online facilities such as local authorities, representative bodies and businesses. Consultations receive a high level of interest across many sectors. Using the online survey greatly assists our analysis of the responses, enabling more efficient and effective consideration of the issues raised.

To respond to the consultation through the online survey, please access this link:

https://www.smartsurvey.co.uk/s/FutureBuildingsStandard/

Details on how to submit a response through other methods are detailed at the beginning of this consultation.

Respondent Details

Please provide the following details about the respondent:

a) **Name**

b) **Email**

c) **Whether you are responding on behalf of an organisation or as an individual**

d) **Which description below best identifies you or the organisation you are responding to this consultation on behalf of:**

- ☐ **Builder/Developer**
- ☐ **Installer/Specialist sub-contractor**
- ☐ **Designer/Engineer/Surveyor**
- ☐ **Architect**
- ☐ **Local Authority**
- ☐ **Building Control Approved Inspector**

☐ **Competent Persons Scheme Operator**

☐ **Manufacturer/Supply Chain**

☐ **Property Management**

☐ **National Representative/Trade Body**

☐ **Professional Body or Institution**

☐ **Research/Academic Organisation**

☐ **Energy Sector**

☐ **Member of the Public**

☐ **Other (please specify)**

If you are responding on behalf of an organisation, please also answer the following questions:

a) **What is the name of the organisation you are responding on behalf of?**

b) **What is your position in the organisation you are responding on behalf of?**

Section A: Non-Domestic Buildings

The Future Buildings Standard

Question 1): **Our aim is that buildings constructed to the Future Buildings Standard will be capable of becoming carbon neutral over time as the electricity grid and heat networks decarbonise.**
Do you agree that the outline of the Future Buildings Standard in this chapter meets this aim?

a) **Yes**
b) **No**

Please explain your reasoning and provide supporting evidence or alternative suggestions.

Question 2): **We believe that developers will typically deploy heat pumps and heat networks to deliver the low carbon heating requirement of the Future Buildings Standard where practical. What are your views on this and in what circumstances should other low carbon technologies, such as direct electric heating or hydrogen, be used?**

Question 3) **Do you agree that some non-domestic building types are more suitable for low carbon heating and hot water, and that some non-domestic building types are more challenging?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 4): **Do you agree with the allocation of building types to space and water heating demand types, as presented in Table 2.1 of this consultation document?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning, including how different building types should be allocated.

Question 5): **We would like to introduce the Future Buildings Standard for all buildings as quickly as possible. When do you think the Future Buildings Standard should introduce low carbon *space heating* for buildings with Type 1 or Type 2 demand (buildings that have space heating demand more suitable for heat pumps)?**

a) **2025 – our proposed date**
b) **Another date (please specify)**

Please explain your reasoning.

Question 6): **We would like to introduce the Future Buildings Standard for all buildings as quickly as possible. When do you think the Future Buildings Standard should introduce low carbon *space heating* for buildings with Type 3 demand (buildings that have space heating demand less suitable for heat pumps)?**

a) **2025**
b) **Another date (please specify)**

Please explain your reasoning.

Question 7): **We would like to introduce the Future Buildings Standard for all buildings as quickly as possible. When do you think the Future Buildings Standard should introduce low carbon *water heating* for buildings with Type 1 or Type 3 demand (buildings that have water heating demand more suitable for point-of-use heaters or heat pumps)?**

a) **2025 – our proposed date**
b) **Another date (please specify)**

Please explain your reasoning.

Question 8): **We would like to introduce the Future Buildings Standard for all buildings as quickly as possible. When do you think the Future Buildings Standard should introduce low carbon *water heating* for buildings with Type 2 demand (buildings that have water heating demand less suitable for point-of-use heaters or heat pumps)?**

a) **2025**
b) **Another date (please specify)**

Please explain your reasoning.

Interim uplift to Part L standards for non-domestic buildings

Question 9): **We would welcome any further suggestions, beyond those provided in this consultation, for improving the modelling process; Part L and Part F compliance; and the actual energy performance of non-domestic buildings. Please provide related evidence.**

Question 10): **What level of uplift to the energy efficiency standards for non-domestic buildings in the Building Regulations should be introduced in 2021?**

a) **Option 1 – average 22% CO_2 reduction**
b) **Option 2 – average 27% CO_2 reduction (this is the Government's preferred option)**
c) **No change**
d) **Other level of uplift (please specify)**

Please explain your reasoning and provide supporting evidence or alternative suggestions where applicable.

Question 11): **Do you agree with the way that we are proposing to apply primary energy as the principal performance metric?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 12): **Do you agree with using CO_2 as the secondary performance metric?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 13): **Do you agree with the approach to calculating CO_2 and primary energy factors, referred to in paragraph 3.5.7 of this consultation document?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide supporting evidence or alternative suggestions.

Question 14): **Do you agree with the proposals for natural gas being assigned as the heating fuel for any fuels with a worse CO_2 emission factor than natural gas?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide supporting evidence or alternative suggestions.

Question 15): **Do you agree with our proposal of using a hybrid electric/heat pump heating system in the notional building when electricity is specified as a heating fuel?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide supporting evidence or alternative suggestions.

Question 16): **Do you agree with the proposal for the treatment of domestic hot water in the notional building?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 17): **Do you agree with the proposal for connecting to an existing heat network, as presented in the draft NCM modelling guide?**

a) **Yes**
b) **No, they give too much of an advantage to heat networks**
c) **No, they do not give enough of an advantage to heat networks**
d) **No, I disagree for another reason**

If you answered no (b, c or d), please explain your reasoning and provide supporting evidence or alternative suggestions.

Question 18): **Do you agree with the proposal for connecting to a new heat network, as presented in the draft NCM modelling guide?**

a) **Yes**
b) **No, they give too much of an advantage to heat networks**
c) **No, they do not give enough of an advantage to heat networks**
d) **No, I disagree for another reason**

If you answered no (b, c or d), please explain your reasoning and provide supporting evidence or alternative suggestions.

Question 19): **Do you agree with the proposed changes to the National Calculation Methodology Modelling Guide and activity database?**

a) **Yes**
b) **Yes, but additional changes should be made**
c) **No**

If you answered b or c, please explain your reasoning and provide alternative suggestions.

Question 20): **We would welcome any further suggestions for revising the outputs from SBEM, which would enable easier checking by building control on building completion. Please provide related evidence.**

Question 21): **Do you agree with the proposals for limiting heat gains in non-domestic buildings?**

a) **Yes**
b) **No, they go too far**
c) **No, they do not go far enough**
d) **No, I disagree for another reason**

If you answered no (b, c or d), please explain your reasoning and provide alternative suggestions.

Question 22): **Do you agree with the proposed minimum standards for fabric performance in new non-domestic buildings as presented in Table 3.2 of this consultation document?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**
d) **No, I disagree for another reason**

If you answered no (b, c or d), please explain your reasoning and provide supporting evidence or alternative suggestions.

Question 23): **Do you agree with the proposed minimum standards for fabric performance of new thermal elements in existing non-domestic buildings as presented in Table 3.3 of this consultation document?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**
d) **No, I disagree for another reason**

If you answered no (b, c or d), please explain your reasoning and provide supporting evidence or alternative suggestions.

Question 24): **Do you agree with the draft guidance in paragraph 4.15 of the draft *Approved Document L, volume 2: buildings other than dwellings* on reducing unwanted air infiltration when carrying out work to existing non-domestic buildings?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 25): **Do you agree that the limiting U-value for rooflights in new and existing non-domestic buildings should be based on a rooflight in a horizontal position, as detailed in paragraph 4.4 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 26): **Do you agree that we should adopt the latest version of BR 443 for calculating U-values in new and existing non-domestic buildings, as detailed in paragraph 4.1 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 27): **Do you agree with the newly proposed minimum efficiencies for natural gas, oil and LPG boiler and domestic hot water system installations in new non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**

If you answered no (b or c), please explain your reasoning.

Question 28): **Do you agree with the proposed set of standards for air distribution systems for new non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**

If you answered no (b or c), please explain your reasoning.

Question 29): **Do you agree with the proposals for self-regulating devices for new non-domestic buildings, as set out in Sections 5 and 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 30): **Do you agree with the minimum efficacy proposals for lighting in new non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**

If you answered no (b or c), please explain your reasoning.

Question 31): **Do you agree with the proposals for cooling in new non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**

If you answered no (b or c), please explain your reasoning.

Question 32): **Do you agree with the proposals to require building automation and control systems in new non-domestic buildings, when such buildings have a heating or air-conditioning system over 290kW?**

a) **Yes**
b) **No, a different trigger point should be used**
c) **No, I do not agree that building automation and control systems should be required in new buildings**
d) **No, I disagree for another reason**

If you answered no (b, c or d), please explain your reasoning and provide alternative suggestions. Please also highlight any unintended consequences that may result from setting this standard.

Question 33): **Do you agree with the technical specification for new building automation and control systems as EN 15232, Class A?**

a) **Yes**
b) **No, the requirements go too far**
c) **No, the requirements do not go far enough**

If you answered no (b or c), please explain your reasoning.

Question 34): **Do you agree with the proposals for improving the commissioning guidance for new non-domestic buildings in Section 8 and 9 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**
d) **No, I disagree for another reason**

If you answered no (b, c, or d), please explain your reasoning and provide alternative suggestions.

Question 35): **Do you agree with the proposals for requirements relating to the assessment of overall energy performance of building services installations and providing information to building owners for new non-domestic buildings given in sections 8 and 9 of *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 36): **Do you agree with the guidance proposals for adequate sizing and controls of building services systems in new non-domestic buildings, as detailed in Sections 5 and 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, I do not agree with providing guidance on this**
c) **No, the guidance should be improved**

If you answered no (b or c), please explain your reasoning.

Question 37): **Do you agree with the proposal that wet space heating systems in new buildings should be designed to operate with a flow temperature of 55°C or lower?**

a) **Yes, through a minimum standard set in paragraph 5.9 of the *Approved Document L, volume 2: buildings other than dwellings***
b) **Yes, through carbon and primary energy credit in SBEM**
c) **Yes, by another means**
d) **No, the temperature should be below 55°C**
e) **No, this standard should not be applied to all new buildings**
f) **No, I disagree for another reason**

Please explain your reasoning.

Question 38): **Do you agree with the proposals to clarify, rationalise and simplify the guidance for building services in new non-domestic buildings, and to incorporate the standards of the Non-Domestic Building Services guidance into the main body of the *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 39): **Do you agree with the proposals to simplify the requirements in the Building Regulations for the consideration of high-efficiency alternative systems in new non-domestic buildings?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 40): **Do you agree with the efficiency proposals for replacement fixed building services in existing non-domestic buildings as detailed in paragraphs 5.4 to 5.7 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 41): **Do you agree with the newly proposed minimum efficiencies for natural gas, oil and LPG boiler and domestic hot water system installations in existing non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**

If you answered no (b or c), please explain your reasoning.

Question 42): **Should minimum boiler efficiency standards in existing non-domestic buildings still benefit from relaxations through the use of heating efficiency credits?**

a) **Yes, boiler installations should continue to benefit from heating efficiency credits**
b) **No, boiler installations should no longer benefit from heating efficiency credits (the Government's proposal)**

If you answered yes, please explain your reasoning.

Question 43): **Do you agree with the proposed set of standards for air distribution systems for existing non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**

If you answered no (b or c), please explain your reasoning.

Question 44): **Do you agree with our proposed approach and guidance to mandating self-regulating controls in existing non-domestic buildings, including technical and functional feasibility, as detailed in Sections 5 and 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 45): **Do you agree with the minimum efficacy proposals for lighting in existing non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**

If you answered no (b or c), please explain your reasoning.

Question 46): **Do you agree with the proposals for cooling in existing non-domestic buildings in Section 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**

If you answered no (b or c), please explain your reasoning.

Question 47): **Do you agree with the proposals that when Building Automation and Control System is installed in an existing non-domestic building with a heating or air-conditioning system over 290 kW, it should meet the same minimum standards as new non-domestic buildings?**

a) **Yes**
b) **No, a different trigger point should be used**
c) **No, a different standard should be used**
d) **No, for another reason**

If you answered no (b, c or d), please explain your reasoning and provide alternative suggestions.

Question 48): **Do you agree with the proposals for requirements relating to the assessment of overall energy performance of building services installations and providing information to building owners for existing non-domestic buildings?**

a) **Yes**
b) **No, I do not agree with providing this guidance**
c) **No, the guidance should be improved**

If you answered no (b or c), please explain your reasoning, including any further suggestions.

Question 49): **Do you agree with the guidance proposals for adequate sizing and controls of building services systems in existing non-domestic buildings, as detailed in Sections 5 and 6 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, do not agree with providing this guidance**
c) **No, the guidance should be improved**

If you answered no (b or c), please explain your reasoning.

Question 50): **Do you agree with the proposal that when whole wet space heating systems (i.e. boiler and radiators) are replaced in existing non-domestic buildings the replacement system should be designed to operate with a flow temperature of 55°C or lower?**

a) **Yes, through a minimum standard set in paragraph 5.9 of *Approved Document L, volume 2: buildings other than dwellings***
b) **Yes, through carbon and primary energy credit in SBEM**
c) **Yes, by another means**
d) **No, the temperature should be below 55°C**
e) **No, this standard should not be applied to all existing buildings**
f) **No, I disagree for another reason**

Please explain your reasoning.

Question 51): **Do you agree with the proposals to restructure the guidance for building services in existing non-domestic buildings, and to incorporate the standards of the Non-Domestic Building Services guidance into the main body of the *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 52): **Do you agree the Government should continue to provide guidance for minimum building services efficiencies in existing non-domestic buildings, if the standard does not go significantly further than the Ecodesign regulations?**

a) **Yes**
b) **No, the Ecodesign regulations are sufficient**
c) **No**

If you answered no (b or c), please explain your reasoning.

Question 53): **Do you agree with the changes made to simplify, rationalise and clarify the guidance, and the updates to external references in Appendix E and Appendix F, in *Approved Document L, volume 2: buildings other than dwellings*, as outlined in paragraph 3.12.1 of the consultation document?**

a) **Yes**
b) **Yes, but not with the changes to the supplementary guidance**
c) **Yes, but not with the external references**
d) **No**

If you answered no, please explain your reasoning. Please do not repeat comments on the changes made to simplify, rationalise and clarify the guidance for Building Services which you have already provided under Questions 38, 51 and 52.

Question 54): **Do you agree that the measures in Tables D.1 and D.2 of Appendix D of *Approved Document L, volume 2: buildings other than dwellings* are likely to be technically, functionally and economically feasible under normal circumstances?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 55): **Do you agree with the proposals for relaxation factors for modular and portable buildings, as detailed in Tables 2.2 and 2.3 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, the requirements go too far**
c) **No, the requirements do not go far enough**

If you answered no (b or c), please explain your reasoning and provide supporting evidence or alternative suggestions.

Question 56): **Do you think that the Pulse methodology should be an approved means of demonstrating airtightness for non-domestic buildings?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide supporting evidence.

Question 57): **Do you agree that we should adopt an independent approved airtightness testing methodology such as the CIBSE draft methodology for non-domestic buildings?**

a) **Yes, and the CIBSE methodology is appropriate**
b) **Yes, but with a methodology other than CIBSE**
c) **No, an independent approved airtightness methodology shouldn't be adopted.**

If you answered no, please explain your reasoning.

Question 58): **Do you agree with the proposal for guidance on the calibration of devices that carry out airtightness testing in new and existing non-domestic buildings?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 59): **Do you agree with the proposed approach to energy sub-metering, as detailed in Section 5 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 60): **Do you agree with the proposed approach to energy forecasting, as detailed in paragraph 9.4 of draft *Approved Document L, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, I do not agree with the proposed approach**
c) **No, energy forecasting should not form part of the Building Regulations**

If you answered no (b or c), please explain your reasoning and provide alternative suggestions.

Question 61): **Do you agree with the proposals for transitional arrangements for buildings other than dwellings?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions.

Interim uplift to Part F standards for non-domestic buildings

Question 62): **Do you agree with the proposed guidance in Section 1 and Section 2 of *Approved Document F, volume 2: buildings other than dwellings* on minimising the ingress of external pollutants and on the proper installation of ventilation systems in non-domestic buildings?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 63): **Do you agree with the proposed guidance for reducing noise nuisance for ventilation systems in non-domestic buildings?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 64) **Do you agree with the additional guidance provided in paragraphs 1.18 to 1.26 of the draft *Approved Document F, volume 2: buildings other than dwellings* on the installation of ventilation systems?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 65): **Do you agree that the guidance in Appendix B of the draft *Approved Document F, volume 2: buildings other than dwellings* provides an appropriate basis for setting minimum ventilation standards?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 66): **Do you agree with the list of industry guidance presented in Section 1 of draft *Approved Document F, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **Yes, but additional guidance should be provided**
c) **No**

Please explain your reasoning and where relevant provide alternative suggestions for guidance.

Question 67): **Do you agree with the list of references to industry guidance presented in Appendix C and Appendix D in the draft *Approved Document F, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No, the Government should amend the list of references**
c) **No, for another reason**

If you answered no (b or c), please explain your reasoning and provide alternative suggestions.

Question 68): **Do you agree with the proposals to simplify, rationalise and clarify the Approved Document guidance in *Approved Document F, volume 2: buildings other than dwellings* as outlined in paragraph 4.3.7 of the consultation document?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions

Question 69): **Do you agree that purge ventilation in offices should be designed to provide at least four air changes per hour?**

a) **Yes**
b) **No, this standard goes too far**
c) **No, this standard does not go far enough**

If you answered no (b or c), please explain your reasoning and provide alternative suggestions.

Question 70): **Do you agree with the guidance for the ventilation of car parks and offices, as detailed in Section 1 of *Approved Document F, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **Yes, but some improvements can be made**
c) **No, the guidance should be significantly changed**

If you answered b or c, please explain your reasoning and provide alternative suggestions. Please note that the appropriate questions on measures to prevent the spread of infection are detailed in section 4.4 of this consultation document.

Question 71): **Do you agree with the proposals in Section 3 of draft *Approved Document F, volume 2: buildings other than dwellings,* when replacing an existing window with no background ventilators?**

a) **Yes**
b) **No, the standards do not go far enough**
c) **No, the standards go too far**

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 72): **Do you agree with the proposal to provide a completed commissioning sheet to the building owner and associated guidance in Section 4 of draft *Approved Document F, volume 2: buildings other than dwellings*?**

c) **Yes**
d) **No**

If you answered no, please explain your reasoning.

Question 73): **Do you agree with requiring increased capacity of 50% within new ventilation systems in offices shown in paragraph 1.38 of the draft *Approved Document F, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **Yes, but with qualifications**
c) **No, the standard is too high**
d) **No, the standard is too low**
e) **No, I disagree for another reason**

If you answered b, c, d or e, please explain your reasoning.

Question 74): **Do you agree with the proposed standards for provision of outdoor air for offices, shown in paragraphs 1.35 to 1.36 of draft *Approved Document F, volume 2: buildings other than dwellings?***

a) **Yes**
b) **Yes, but with qualifications**
c) **No**

If you answered b or c, please explain your reasoning.

Question 75): **Do you agree that extract ventilation in bathrooms, WCs, and other sanitary accommodation should be capable of operating in a continuous mode if necessary?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 76): **Do you agree with the proposal for indoor air quality monitoring in offices as outlined in paragraphs 1.39 to 1.41 of draft *Approved Document F, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **Yes, but with qualifications**
c) **No**

If you answered b or c, please explain your reasoning and provide any suggestions for guidance if applicable.

Question 77): **If applicable, please provide any suggestions for guidance for indoor air quality monitoring (e.g. CO_2 monitoring) in non-domestic buildings.**

Question 78): **Do you agree with the proposals for systems that recirculate air as outlined in paragraph 1.46 of draft *Approved Document F, volume 2: buildings other than dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 79): **Do you agree with the proposed minimum ventilation standard in occupiable rooms in all types of non-domestic buildings where singing, loud speech or aerobic exercise may take place, where low temperature and low humidity environments may exist, or where members of the public may gather in large groups? These are outlined in paragraphs 1.27 and 1.28 of draft *Approved Document F, volume 2: buildings other than dwellings*.**

a) Yes
b) Yes, with qualifications
c) No

If you answered b or c, please explain your reasoning and provide any suggestions for guidance if applicable.

Question 80) **Do you think the mitigating measures to protect against infection via aerosols would be suitable for any non-domestic buildings other than those stated in the Approved Document guidance?**

a) Yes
b) No

If you answered yes, please explain your reasoning and provide evidence to support this.

Section B: Domestic Buildings

Standards for overheating in new residential buildings in 2021

Question 81): **How should the Government address the overheating risk?**

a) **Through a new requirement in the Building Regulations and an Approved Document, as proposed in this consultation**
b) **Through Parts L and F of the Building Regulations**
c) **Through government guidance**
d) **I have an alternative approach**
e) **It isn't an issue that needs addressing**

Please explain your reasoning and provide alternative suggestions where applicable.

Question 82): **Do you agree with the buildings that are in scope of this new part of the Building Regulations?**

a) **Yes**
b) **Yes, but they should be expanded to include more building types and/or existing buildings**
c) **No, they should be reduced to only include flats and houses**
d) **No, I disagree for another reason**

Please explain your reasoning.

Question 83): **Do you agree that the division of England based on overheating risk detailed in paragraph 5.6.3 of this consultation document is correct?**

a) **Yes**
b) **No, there should be one area**
c) **No, there should be more areas**

If you answered no (b or c), please explain your reasoning and provide supporting evidence.

Question 84): **Do you agree with the categorisation of buildings into Group A and Group B as detailed in paragraph 5.6.5 of this consultation document?**

a) **Yes**
b) **No**

If you answered no, please explain how buildings should be re-categorised.

Question 85): **Do you agree with the simplified method as a means of compliance with the proposed new requirement to reduce overheating risk?**

a) **Yes**
b) **No, the method should be more sophisticated**
c) **No, the method is too easy to pass**
d) **No, for another reason**

If you answered no (b, c or d), please explain your reasoning and provide supporting evidence.

Question 86) **Do you agree with the maximum glazing area and shading standards for limiting solar gains in the simplified method as detailed in paragraphs 1.6 to 1.9 of the draft *Overheating Approved Document?***

a) Yes
b) No

If you answered no, please explain your reasoning and provide supporting evidence.

Question 87) **Do you agree with the approach to removing excess heat in the simplified method as detailed in paragraphs 1.10 to 1.13 of the draft *Overheating Approved Document?***

a) Yes
b) No

If you answered no, please explain your reasoning and provide supporting evidence.

Question 88): **Do you think that adequate levels of daylight will be provided and that homes will be acceptable to purchasers while meeting these proposed standards?**

a) Yes
b) No

Please explain your reasoning.

Question 89): **Do you agree with offering dynamic thermal analysis as a means of compliance with the proposed new requirement to reduce overheating risk?**

a) **Yes, as described in the draft *Overheating Approved Document***
b) **Yes, but not as described in the draft *Overheating Approved Document***
c) **No**

Please explain your reasoning and provide alternative suggestions where applicable.

Question 90): **Please detail any information you have about the likelihood of occupants opening doors and windows at night in unoccupied rooms.**

Question 91): **Do you agree with the proposed acceptable strategies for shading and the removal of excess heat, when following the dynamic thermal analysis method, as found in Section 2 of the draft *Overheating Approved Document*?**

a) **Yes, I agree with both sets of acceptable strategies**
b) **Yes, but with amendments to the acceptable shading strategies**
c) **Yes, but with amendments to the acceptable strategies to remove excess heat**
d) **Yes, but with amendments to both sets of acceptable strategies**
e) **No, I do not agree with the acceptable strategies**

Please explain your reasoning and provide any suggested amendments where applicable.

Question 92): **Do you agree that the overheating standard should not account for the effect of curtains, blinds and tree cover?**

a) **Yes, curtains, blinds and tree cover should be excluded**
b) **Yes, but only curtains and blinds should be excluded**
c) **Yes, but only tree cover should be excluded**
d) **No, none of these should be excluded**

If you answered b, c or d, please explain your reasoning.

Question 93): **Do you agree that the building should be constructed to meet the overheating requirement without the need for mechanical cooling?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 94): **Do you agree with limiting noise in new residential buildings when the overheating strategy is in use, and the proposed guidance in Section 3 of the draft *Overheating Approved* Document?**

a) **Yes**
b) **Yes, but with amendments to the guidance**
c) **No, I do not agree with limiting noise when the overheating strategy is in use**

If you answered b or c, please explain your reasoning and provide alternative suggestions.

Question 95): **Do you agree with minimising the ingress of external pollutants when the overheating strategy is in use, and that the external pollutants guidance in *Approved Document F, volume 1: dwellings* should be followed where practicable?**

a) **Yes**
b) **Yes, but with amendments to the guidance**
c) **No, I do not agree with minimising the ingress of external pollutants when the overheating strategy is in use**

If you answered b or c, please explain your reasoning and provide alternative suggestions.

Question 96): **Do you agree with the proposals on security in Section 3 of the draft *Overheating Approved Document* in new residential buildings?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 97): **Do you agree with the protection from falling guidance proposed in Section 3 of the draft *Overheating Approved Document*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 98): **Do you agree with the guidance on protection from entrapment proposed in Section 3 of the draft *Overheating Approved Document*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 99): **Are there any further issues which affect usability that should be included in the *Overheating Approved Document*?**

a) **Yes**
b) **No**

Please explain your reasoning and provide supporting evidence.

Question 100): **Do you agree with the proposed requirement to provide information on the overheating strategy to the building owner?**

a) **Yes, I agree with the requirement, the list provided and that this should be within a Home User Guide**
b) **Yes, I agree with the requirement, but think that the list provided should be changed or that this should not be provided within a Home User Guide**
c) **No, I do not agree with providing information**

Please explain your reasoning and provide alternative suggestions where applicable.

Question 101): **How do you see this new Building Regulation interacting with policies in local plans?**

Question 102): **Do you agree that this guidance on limiting the effects of heat gains in summer, in both Approved Document L guidance for new dwellings and SAP Appendix P, can be removed?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 103): **Should the transitional arrangements that apply to the overheating requirements align with the proposed transitional arrangements for Part L and F 2021 for new dwellings, as described in paragraph 5.10.2 of this consultation document?**

a) **Yes**
b) **No**

Please explain your reasoning and provide alternative suggestions where applicable. If you answered no, please also propose an alternative reasonable period that could apply.

Part L standards for domestic buildings in 2021

Question 104): **Do you agree with the proposed minimum fabric standards for existing domestic buildings set out in Table 6.1 of this consultation document?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide supporting evidence.

Question 105): **Do you agree with the draft guidance in section 4 of the draft *Approved Document L, volume 1: dwellings* on reducing unwanted air infiltration when carrying out work to existing homes?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 106): **Do you agree that we should control the primary energy and fabric energy efficiency of new extensions to existing homes when using the SAP method of compliance?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 107): **Do you agree that the limiting U-value for rooflights in existing domestic buildings should be based on a rooflight in a horizontal position, as detailed in Section 4 of draft *Approved Document L, volume 1: dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 108): **Do you agree that we should adopt the latest version of BR 443 for calculating U-values in existing domestic buildings, as detailed in Section 4 of draft *Approved Document L, volume 1: dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 109): **Do you agree with the proposed minimum fabric standards set out in Table 6.2 of this consultation document, and Sections 4 and 11 of draft *Approved Document L, volume 1: dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning provide supporting evidence.

Question 110): **What level of FEES should be used for Part L 2021?**

a) **Option 1, full fabric specification**
b) **Option 2, fabric specification x1.15**
c) **Neither, it should be higher**
d) **Neither, it should be lower**

Please explain your reasoning and provide supporting evidence, including whether you think a higher level of FEES will make it more or less likely for a home to be built with low carbon heat.

Question 111): **Do you agree that we have adequately covered matters which are currently in the Domestic Building Services Compliance Guide in draft *Approved Document L, volume 1: dwellings* for existing homes?**

a) **Yes**
b) **No**

If you answered no, please explain which matters are not adequately covered.

Question 112): **Do you agree with the proposed minimum standards for building services in existing homes, as detailed in Sections 5 and 6 of draft *Approved Document L, volume 1: dwellings*?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**

If you answered no (b or c), please explain your reasoning.

Question 113): **Do you agree with the proposals for replacement fixed building services in existing homes, as detailed in Section 5 of draft *Approved Document L, volume 1: dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 114): **Do you agree with our proposed approach to mandating self-regulating controls in existing domestic buildings, including technical and economic feasibility, as detailed in Sections 5 and 6 of draft *Approved Document L, volume 1: dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 115): **Do you agree with the proposed specifications for building automation and control systems installed in a new or existing home, as detailed in Section 6 of *draft Approved Document L, volume 1: dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 116): **Do you agree with the proposals for extending commissioning requirements to Building Automation and Control Systems and on-site electricity generation systems, as detailed in Sections 8 and 9 of draft *Approved Document L, volume 1: dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 117): **Do you agree with the proposals for requirements relating to the assessment of overall energy performance of building services installations and providing information to homeowners, as detailed in Sections 8 and 9 of draft *Approved Document L, volume 1: dwellings*?**

a) **Yes**
b) **No, I do not agree with providing this guidance**
c) **No, the guidance should be improved**

If you answered no (b or c), please explain your reasoning.

Question 118): **Do you agree with the proposed changes to water treatment guidance and removing formal guidance on water softening?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning.

Question 119): **Do you agree with the guidance proposals for adequate sizing and controls of building services systems in domestic buildings, as detailed in Sections 5 and 6 of draft *Approved Document L, volume 1: dwellings*?**

a) **Yes**
b) **No, I do not agree with providing this guidance**
c) **No, the guidance should be improved**

If you answered no (b or c), please explain your reasoning.

Question 120): **Do you agree with the guidance proposals on sizing a system to run at 55°C when a whole heating system is replaced, as detailed in Section 5 of draft *Approved Document L, volume 1: dwellings*?**

a) **Yes**
b) **No, I do not agree with providing this guidance**
c) **No, the guidance should be improved**

If you answered no (b or c), please explain your reasoning.

Question 121): **Do you agree with the proposed changes to the supplementary guidance and the external references in Appendix D and Appendix E, in the draft *Approved Document L, volume 1: dwellings* as outlined in paragraph 6.8.2.?**

a) **Yes**
b) **Yes, but not with the changes to the supplementary guidance**
c) **Yes, but not with the external references**
d) **No**

If you answered b, c or d, please explain your reasoning.

Question 122): **Do you agree with the proposal for guidance on the calibration of devices that carry out airtightness testing in new and existing domestic buildings?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions.

Part F standards for existing domestic buildings in 2021

Question 123): **Do you agree that we have adequately covered matters for existing dwellings which are currently in the Domestic Ventilation Compliance Guide in draft *Approved Document F, volume 1: dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 124): **Do you agree with the proposed changes to supplementary guidance and the external references used in Appendix E and Appendix F, for existing domestic buildings from the draft *Approved Document F, volume 1: dwellings*?**

a) **Yes**
b) **Yes, but not with the changes to the supplementary guidance**
c) **Yes, but not with the external references**
d) **No**

If you answered b, c or d, please explain your reasoning.

Question 125): **Do you agree with the proposal to align the guidance and standards for work to existing homes to that outlined in Chapter 4 of the Government Response to the Future Homes Standard consultation?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide supporting evidence.

Question 126): **Do you agree with the proposed guidance for installing energy efficiency measures in existing homes, as detailed in Section 3 of draft *Approved Document F, volume 1: dwellings*.**

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 127): **Do you agree with the content of the proposed checklist for ventilation provision detailed in Appendix D of draft *Approved Document F, volume 1: dwellings*?**

a) Yes
b) No

If you answered no, please explain your reasoning and provide alternative suggestions.

Question 128): **Do you agree with the guidance in Section 3 of draft *Approved Document F, volume 1: dwellings* when replacing an existing window with no background ventilators?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**

If you answered no (b or c), please explain your reasoning.

Question 129): **Do you agree with the proposals in paragraphs 3.29 to 3.31 of draft *Approved Document F, volume 1: dwellings* in 7.4.11 of this consultation document on work to existing kitchens or bathrooms?**

a) **Yes**
b) **No, the standards go too far**
c) **No, the standards do not go far enough**

If you answered no (b or c), please explain your reasoning and provide alternative suggestions.

Question 130): **Do you agree with the proposal to provide a completed commissioning sheet to the homeowner, as detailed in Section 4 of draft *Approved Document F volume 1: dwellings*?**

a) **Yes**
b) **No**

If you answered no, please explain your reasoning and provide alternative suggestions.

Impact and Equalities Assessment

Question 131): **Please provide any feedback you have on the impact assessment here, including the assumptions made and the assessment of the potential costs and benefits of the proposed options we have made.**

Question 132): **Please provide any feedback you have on the potential impact of the proposals outlined in this consultation document on persons who have a protected characteristic. Please provide evidence to support your comments.**