

# Response ID ANON-CXDN-XV7Z-C

Submitted to Future Homes and Building Standards 2023 consultation  
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## Introduction

What is your name?

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## 1 Scope of Consultation

Question 1 Are you responding as / on behalf of (select all that apply):

Professional body or institution

Question 2 If you are responding as a member of the public/ a building professional, what region are you responding from?

Not Answered

Question 3 If you are responding as a member of the public, are you a:

Not Answered

Question 4 If you are responding on behalf of a business/organisation, what is the name of your business/organisation?

Please provide the name of your business/organisation here.:

CIBSE (Chartered Institution of Building Services Engineers)

Question 5 If you are responding on behalf of a business/organisation, where is your business/organisation based/registered?

g. London

Question 6 When you respond it would be useful if you can 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), an address (including post-code), an email address, and a contact telephone number. (Your personal data is being collected so that we can contact you regarding your response and for statistical purposes, an essential part of the consultation process. We may also use it to contact you about related matters. Please see the Privacy Notice in Annex A of the consultation paper for further information on how we use this data.)

Please provide details here.:

on behalf of an organisation.  
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## 2 Acronyms

## 3 Introduction

## 4 Performance requirements for new buildings

Question 7 Which option for the dwelling notional buildings (for dwellings not connected to heat networks) set out in The Future Homes Standard 2025: dwelling notional buildings for consultation do you prefer?

a. Option 1 (higher carbon and bill savings, higher capital cost)

Question 8 What are your priorities for the new specification? (select all that apply)

lower bills, carbon savings, other (please provide further information)

Please provide any additional comments to support your view on the notional building for dwellings not connected to heat networks.:

All are important to various stakeholders, and all are associated with policy objectives. We do not understand the purpose of this question.

Others include low energy use, low space heating demand, residents comfort, not adding to the legacy of homes needing retrofit in the future, health and indoor air quality.

Capital costs should reduce over time, given certainty in the regulatory trajectory and with development of industry skills and technical solutions.

Comments on Options 1 and 2:

The proposals in terms of fabric efficiency and services (Options 1 and 2) do not represent a sufficient level of ambition:

□ The proposals are even less ambitious than in the previous consultation, despite 84% respondents recommending that these previous proposals were not demanding enough. The previous commitment that the FHS would deliver “world leading standards of energy efficiency” seems to have been lost in the current proposals.

□ The resulting space heating demand would be unlikely to meet that recommended by the Climate Change Committee.

□ By DLUHC’s own assessment, Option 2 would result in higher energy bills than the Part L 2021 requirements.

□ The proposals correspond broadly to the 2 least ambitious “contender specifications” put forward by the Future Homes Hub, out of 5. No justification is given why the FHH more ambitious proposals have not been taken into account.

If a clear and stable direction is set, the FHS is the opportunity to set high standards of comfort, indoor air quality and build quality, as well as low energy use and carbon emissions:

- There needs to be more ambition regarding airtightness & MVHR in the notional dwelling. This would not mean mandating MVHR for all buildings, but would set a direction and support the development of supply chains, skills etc. More ambitious airtightness levels would also support DLUHC’s aim of improving build quality.

- We also recommend a review of evidence of air quality in homes served by “natural ventilation with intermittent extract fans”, as included in Option 2. While attention has been given in recent years to better installation and commissioning of central ventilation systems, which is welcome, similar attention should be given to “natural ventilation with intermittent extract fans”. Such systems often lead to poor air quality, as noted by DLUHC’s (then MHCLG) own research published in 2019

([https://assets.publishing.service.gov.uk/media/5d91be8040f0b65e62c6cfb0/Research\\_-\\_ventilation\\_and\\_indoor\\_air\\_quality.pdf](https://assets.publishing.service.gov.uk/media/5d91be8040f0b65e62c6cfb0/Research_-_ventilation_and_indoor_air_quality.pdf)) e.g. non-compliance issues, or they may be poorly installed and therefore noisy, and switched off by occupants.

See also comments on the use of weather files, in response to Q68 .

In addition, we note that embodied carbon is out of scope of this consultation. CIBSE continue to support Part Z, and we urge government to come forward with proposals as soon as possible, as supported by a large cross-section of industry.

Question 9 Which option for the dwelling notional buildings for dwellings connected to heat networks set out in The Future Homes Standard 2025: dwelling notional buildings for consultation do you prefer?

a. Option 1 (higher carbon and bill savings, higher capital cost)

Please provide any additional comments on the specification of the heat network in the notional building.:

In theory, comparing “network to network”, using a notional one, may be acceptable if this was used to set high performance by having high-performance notional plant, is the case for on-site plant. However, this is not the case with the current proposals, and CIBSE strongly disagrees with the proposed notional network:

- The consultation states, as one reason for encouraging heat networks, that they can run heat pumps at high SCOPs, for example through ambient loops or by making use of waste heat sources. However, the notional network SCOP (i.e. 3) currently proposed is lower than that in the notional dwelling with on-site plant. For the potential benefits of heat networks to be realised, then the notional building should reflect their potential, and drive performance.
- It is not clear how the losses in the notional network have been set; CP1 recommends 10% as best practice primary losses, why is the notional network proposed to be worse than this (i.e. 12%)?
- Setting targets using a notional network means that the on-site options and networks are not compared on the same basis, and the assessment does not necessarily drive the most efficient and lowest carbon choice.

Question 10 Which option do you prefer for the proposed non-domestic notional buildings set out in the NCM modelling guide?

a. Option 1

Question 11 What are your priorities for the new specification?

Please provide additional information to support your view on the proposed non-domestic notional buildings set out in the National Calculation Methodology modelling guide.:

All are important to various stakeholders, and all are associated with policy objectives. We do not understand the purpose of this question.

Others include low energy use, low space heating demand, occupant comfort, not adding to the legacy of buildings needing retrofit in the future, health and indoor air quality. In addition, for many non-domestic buildings, peak load should be an important factor e.g. peak demand in summer (driven by cooling), which could place significant demand on the grid.

Capital costs should reduce over time, given certainty in the regulatory trajectory and with development of industry skills and technical solutions.

Comments on Q10 Options 1 and 2:

We have received comments that in some healthcare buildings, compliance is already difficult to achieved due to the assumptions in the notional building. For example, in clinical areas in hospitals, NCM assumes VAV systems, which in reality cannot be specified. This often results in hospitals relying on large PV arrays to achieve Part L compliance. This makes hospitals above 2 storeys struggling to comply.

## 5 Metrics

Question 12 Do you agree that the metrics suggested in Section 5 'Metrics' of the consultation paper (TER, TPER and FEE) should be used to set performance requirements for the Future Homes and Buildings Standards?

c. No, I think delivered energy should be used

If you selected answer options b or e, please provide further information here.:

CIBSE disagree for several reasons.

As in previous consultations, CIBSE has concerns about the reliance on primary energy as key metric. We acknowledge its usefulness in driving energy efficiency at the system level, but:

- to some extent, variations in energy sources and system impacts are already taken into account by carbon as a metric
- it is really important to have a metric which addresses building performance independently from the system
- energy use breakdown into energy sources can still be reported (as it needs to be for carbon), allowing separate tracking by policy makers of primary energy use at the system level
- primary energy is not understood by most consumers, reducing an opportunity to engage and drive efficient operation
- primary energy relies on conversion factors, which makes year-on-year comparisons difficult.

On balance, we think a more appropriate combination of metrics would be energy use (total delivered, not just regulated, and from all sources including on-site renewables) alongside carbon. Together, these two metrics would:

- Address decarbonisation, while primary energy doesn't in its assessment of gas
- Address energy efficiency at the building level (and therefore also benefit it at the system level: direct electric is not encouraged by total energy use, compared to heat pumps)
- Be easily understood by consumers.

The consultation document states that the DLUHC analysis concluded primary energy delivered more against its objectives – this analysis is not provided in the consultation document, we would like more information to understand the rationale.

In addition, and as in previous consultations, CIBSE supports the use of a fabric efficiency requirement in homes, but have concerns about the Fabric Energy Efficiency Standard as that metric, because it is theoretical, a moving target (set by the notional building), and not measurable in use, so it cannot be checked. The rationale for not using Heat Transfer Coefficient or space heating demand is not explained in the consultation. This would much better meet the government's intent to improve actual in-use performance.

## 6 Updated guidance and minimum standards

Question 13 Do you agree with the proposed changes to minimum building services efficiencies and controls set out in Section 6 of draft Approved Document L, Volume 1: Dwellings?

b. Yes, and I want to provide additional suggestions or information to support my view

If you selected answer options b or c, please provide further information here.:

While we support the assumption that heat pumps will be the most likely system in most cases, there is support in industry for not prescribing solutions, and setting the performance requirements instead e.g. in some buildings with a very small thermal load (heat and hot water), direct electric heating may be the most suitable in terms of capital costs and embodied carbon, and only results in small loads on the system and on energy bills.

We have received some suggestions that it would be useful to incorporate guidance on space for thermal storage in a new build.

We would welcome reference to CIBSE TM51 on heat pumps.

Question 14 Do you agree with the proposal to include additional guidance around heat pump controls for homes, as set out in Section 6 of draft Approved Document L, Volume 1: Dwellings?

Not Answered

If you selected answer options b or c, please provide further information here.:

We have received suggestions that ADL should include the following:

- Additional guidance on the control strategy, i.e. if the space heating is constantly on or if it is run intermittently. Constant heating (with weather compensation) is generally the better route with Heat Pumps without thermal storage (although some research literature suggests the potential for higher energy consumption depending on occupant lifestyle), but the intermittent and zoned strategies are what most homeowners are used to (and may require oversizing of the HP): additional guidance to the designers and homeowners would be useful.
- Guidance on, or a reference to, setback temperatures (used with intermittent control strategies) should probably be included to help mitigate HP over/under sizing. This is particularly relevant to reheating domestic hot water cylinders, as without a period of setback, the heat generator may have to be oversized to meet the combined DHW and space heating loads
- Guidance on usability of the controls and the need for simple guidance for users, otherwise controls will not be used properly.
- A reference to CIBSE TM51.

Question 15 Do you agree that operating and maintenance information should be fixed to heat pump units in new homes?

Not Answered

If you selected answer options b or c, please provide further information here.:

Possibly, but this may be of significant size, so it is not clear how practical this would be. Perhaps a sticker saying maintenance information is in the handover information, then extra emphasis on it actually being included in handover information, the handover information being explained to and left with the customer, and the customer storing it near the unit – as well as links to online information.

Question 16 Do you think that the operating and maintenance information set out in Section 10 of draft Approved Document L, Volume 1: Dwellings is sufficient to ensure that heat pumps are operated and maintained correctly?

b. Yes, and I want to provide additional suggestions or information to support my view

If you selected answer options b or c, please provide further information here.:

- 10.2.a.iv more emphasis on ensuring the owner/occupier understands why advanced control functionalities (weather compensation, set-back temps, etc) are being used and how they are setup - modern control systems are more than just operation of timers and sensors
- 10.6 and 10.5 should be applicable to all types of heat generator, and where installing a new heat generator/system, not just for new builds
- 10.6 additional essential design criteria should be documented - recommend referencing the draft DHDG specification/step-by-step design checklist/critical design criteria sheet (section 1)

Question 17 Do you agree with the proposed changes to Section 4 of draft Approved Document L, Volume 1: Dwellings, designed to limit heat loss from low carbon heating systems?

Not Answered

If you selected answer options b or c, please provide further information here.:

We have received queries about the need for the added complexity in selecting U-values in existing dwellings (sections 4.4 and 4.5), but this may specifically address a known issue.

Question 18 Do you agree with the proposed sizing methodology for hot water storage vessels for new homes?

c. No (please provide justification)

If you selected answer options b or c, please provide further information here.:

5.9: The previous version of ADL referenced the CIBSE DHDG as a method of sizing a space heating system, but this was replaced by the CIPHE guide under the current version. The DHDG should be reinstated at least alongside the CIPHE guide.

5.10 Similar to the above, the DHDG could be referenced alongside FB59, specifically section 4.

5.16 A reheat time of 60 minutes is not appropriate for a heat pump or potentially any low-temperature heating system - particularly unnecessary when the cylinder size is being specified for a full day's consumption. A suggestion would be: something a bit less specific, such as "able to be satisfied during an extended period of space heating setback - such as overnight"- or a period such as 4, 6 or 8 hours, with the caveat that the DHW reheat should not significantly impact the indoor space temperature

5.16, BS 8558 is a relatively old standard now and has largely been superseded by BS EN 12831-3. The calculation shown is potentially useful for a simplified indication of the reheat time, but a full BS EN 12831-3 calculation should be done – this will be addressed in the upcoming revised Domestic Heating Design Guide section 3.

5.17 Unless it has recently been updated, we do not think the CIPHE Heating Engineering's Plumbing Engineering Services Design Guide includes the BS EN 12831-3 calculation.

The previous version of ADL referenced the CIBSE DHDG, but this was replaced by the CIPHE guide under the current version. The DHDG should be reinstated at least alongside the CIPHE guide (if not in place of).

Section 3 of the draft DHDG was specifically rewritten (with contributions from CIPHE) to allow users to size cylinders using a BS EN 12831-3 calculation, but in a simplified way that domestic installers will be able to undertake.

Table 5.1 is suitable for a cylinder with a target temperature of 60degC, but for cylinders where the non-pasteurisation day target temperature is less, the volumes shown are not sufficient - use of lower temps is growing specifically with low flow temperature systems (such as heat pumps) in owner-occupied private dwellings (with a suitable pasteurisation routine in place) - ref section 3 of draft DHDG. For example, a 3.7 kWh demand from a cylinder at 60degC would be satisfied by a 165l cylinder, but a 210l cylinder would be required to satisfy the same demand at 55degC.

5.20.b It would be good to see guidance recommending installing thermostats in the primarily occupied space in each zone, i.e. not in hallways and away from windows/doors/heat-emitters

Clearer guidance on this is required in general.

Question 19 Do you agree with the proposed changes to minimum building services efficiencies and controls set out in Section 6 of draft Approved Document L, Volume 2: Buildings other than dwellings?

b. Yes, and I want to provide additional suggestions or information to support my view

If you selected answer options b or c, please provide further information here.:

In general, yes, but please see our comments re controls and heat pumps in Q 14, 18 and 69, which can equally be applied to controls for all types of heat generators.

Question 20 Do you agree with the proposed guidance on the insulation standard for building heat distribution systems in Approved Document L, Volume 2: Buildings other than dwellings?

Not Answered

If you selected answer options b or c, please provide further information here.:

Question 21 Do you agree that the current guidance for buildings with low energy demand which are not exempt from the Building Regulations, as described in Approved Document L, Volume 2: Buildings other than dwellings should be retained without amendment?

Not Answered

If you selected answer options b or c, please provide further information here.:

Question 22 Do you agree that lifts, escalators and moving walkways in new buildings (but not when installed withing a dwelling) should be included in the definition of fixed building services?

b. Yes, and I want to provide additional suggestions or information to support my view

If you selected answer options b or c, please provide further information here.:

Lifts, escalators and walkways are clearly fixed services, inherent to the design. Other uses which are very arguably "fixed" and very often designed in, and therefore could be regulated through building regulations rather than not regulated or regulated through product standards, include:

- commercial catering: while some of the equipment is addressed by product standards, this would help the treatment of commercial kitchens as a system
- swimming pools
- spa.

Question 23 Do you agree with the proposed guidance for passenger lifts, escalators and moving walkways in draft Approved Document L, Volume 2: Buildings other than dwellings?

Not Answered

If you selected answer options b or c, please provide further information here.:

Question 24 Do you have any further comments on any other changes to the proposed guidance in draft Approved Document L, Volume 2: Buildings other than dwellings?

a. Yes (please provide comments)

If you selected answer option a, please provide comments here.:

The guidance on energy metering should acknowledge the common landlord – tenant situations in non-domestic buildings, and ensure that metering is suitable for these situations. Metering simply by end uses or areas can be a significant hurdle to the evaluation and understanding of energy use in practice, in the case of tenanted buildings. We strongly encourage considering this. NABERS UK provides a very useful example a very useful example to address this, with a delineation between base build an tenancy uses, which was designed to allow this understanding (and improvement) of energy use and is already adopted by large parts of the commercial office sector.

## 7 Material Change of Use

Question 25 Should we set whole-building standards for dwellings created through a material change of use?

a. Yes

If you selected answer option c, please provide further information here.:

CIBSE strongly supports the proposal to increase requirements on homes created by material change of use. We have repeatedly asked for this in the past, highlighting the well-evidenced poor standards of these homes. We support the proposal that airtightness testing would be required. We are reviewing the other proposals in more detail, to ensure that opportunities for a whole house retrofit are captured as part of the MCU. Members feedback on this would be welcome, including on the option to apply a whole building performance requirement.

Potentially some flexibility in rare cases where the building cannot meet a whole building standard, but this should be on the basis of evidence (e.g. heritage constraint, not "if the designer prefers"

We also strongly support the proposed extension of Part O to homes created by change of use (see Q 82).

Question 26 Should the proposed new MCU standard apply to the same types of conversion as are already listed in Approved Document L, Volume 1: Dwellings?

Not Answered

If you selected answer option c or d, please provide further information here.:

Question 27 Should different categories of MCU buildings be subject to different requirements?

a. Yes

If you selected answer option b, please provide further information here.:

Question 28 Which factors should be taken into account when defining building categories? (check all those that apply)

whether the conversion is a part- or whole-building conversion, Other (please state)

Please provide additional information to support your view.:

genuine constraints e.g. heritage, safety; possibly building form, depending on how the MCU standard is set

Question 29 Do you agree with the illustrative energy efficiency requirements and proposed notional building specifications for MCU buildings?

Not Answered

Question 30 If you answered no to the previous question, please provide additional information to support your view. Select all that apply. The requirements are:

If you selected answer option "other", please provide further information here.:

Question 31 Do you agree with using the metrics of primary energy rate, emission rate and fabric energy efficiency rate, if we move to whole dwelling standards for MCU buildings?

Not Answered

If you selected answer option b or c, please provide further information here.:

same response as for new build dwellings: see Q12

Question 32 Under what circumstances should building control bodies be allowed to relax an MCU standard?

b. Building control bodies should be able to relax under the following circumstances (please provide further details)

If you selected answer option b, please provide further information here.:

genuine constraints e.g. heritage, safety

Question 33 Do you have views on how we can ensure any relaxation is applied appropriately and consistently? Please select all that apply:

there should be guidance on circumstances where relaxation of the notional standard may be appropriate, there should be monitoring of how relaxation is applied, only formal relaxation or dispensation through the local authority should be possible, other (please provide further details)

If you selected answer option "other", please provide further information here.:

relaxations should be in a publicly available register. This should be stated in the home information pack for prospective tenants.

Question 34 Should a limiting standard be retained for MCU dwellings?

Not Answered

If you selected answer option a or e, please provide further information here.:

Question 35 If a limiting standard is retained, what should the limiting standard safeguard against? Please select all that apply:

risk of moisture, damp and mould, high energy demand and energy bills (please provide recommended values referring to ADL volume 1 Table 4.3)

If you selected "high energy demand and energy bills" or "other", please provide further information here.:

Question 36 Do you wish to provide any evidence on the impacts of these proposals including on viability?

Not Answered

If you selected answer option a, please provide further information here.:

Question 37 Do you agree that a BREL report should be provided to building control bodies if we move to energy modelling to demonstrate compliance with MCU standards

Not Answered

If you selected answer options c or d, please provide further information here.:

Question 38 Do you agree that consumers buying homes created through a material change of use should be provided with a Home User Guide when they move in?

a. Yes

If you selected answer options b or c, please provide further information here.:

Question 39 Do you agree that homes that have undergone an MCU should be airtightness tested?

b. Yes, and I'd like to provide further information

If you selected answer options b or c, please provide further information here.:

MCU implies reasonably significant works, which justifies airtightness testing.

## 8 Real-world performance of homes

Question 40 Do you think that we should introduce voluntary post occupancy performance testing for new homes?

b. Yes, and I'd like to provide further information

If you selected answer options b or c, please provide further information here.:

CIBSE strongly supports the increased attention to post-completion testing. We have been advocating for this for a number of years, and are signatories of the cross-industry Building Performance Network Joint Position Statement on Operational Performance:

<https://building-performance.network/advocacy/building-performance-joint-position-statement> .

However, alongside the introduction of this voluntary testing, and to really drive improvements, we recommend the introduction of a government commitment and timeline for turning these into mandatory requirements, so that delivering build quality and in-use performance become the norm. We have had suggestions that in the meantime (i.e. when post-completion testing is voluntary, not yet mandatory), one way to encourage take-up, feedback loops and skills development could be to incorporate post occupancy performance testing into the scope of the 'pre-completion inspection' regime under the New Homes Quality Code.

It is not clear in the consultation what constitutes "performance testing". The types of tests that could be included and would be of value include:

- heat transfer coefficient testing e.g. using methods from the SMETER programme
- other measures of energy use for heating
- on larger schemes, aggregate metered total energy use across the scheme would also be useful, as it would provide an average performance relatively independently from occupant behaviour (i.e. "smoothing" the extreme high & low users).

It would be really valuable for this data to be captured centrally, in an appropriate way that allows feedback loops.

CIBSE would be very happy to work with DESNZ and DLUHC on this, including the metrics that could be used and testing methodologies.

See also our response to Q42-43 and Q47 on air quality: the provision of basic monitoring equipment and performance testing for key indoor air quality parameters should be considered.

Question 41 Do you think that the government should introduce a government-endorsed Future Homes Standard brand? And do you agree permission to use a government-endorsed Future Homes Standard brand should only be granted if a developer's homes perform well when performance tested? Please include any potential risks you foresee in your answer.

d. No (please provide justification)

If you selected answer options b or d, please provide further information here.:

There are risks in a Government-endorsed brand, including:

1. consumer confusion with other brands such as Trustmark and Home Quality Mark (to name just two among a wide range), and with what is being rewarded: what would it imply about a non-branded "Future Home Standard" home...?
2. rewarding regulatory compliance: instead, under-performance and lack of compliance should be addressed.

Government should instead provide the requirements and the incentives, with a trajectory from voluntary to mandatory performance checks (see Q40). To do this, CIBSE recommend that Government should provide a rating scheme based on measured in-use performance, which would allow homes to be differentiated and would give a clear direction and incentive for improvements, from any current performance to the highest. This could be applied to the whole stock (whether new or not) and would act as a much stronger incentive, as well as more comprehensive support to householders when looking to rent, buy, or improve their home. This is a significant topic, which merits proper analysis and consultation, and CIBSE would be very happy to engage with DLUHC and DESNZ on this. Several metrics could be used for the rating scale, and potentially several could be used e.g.:

- in all homes, a metric that is independent from occupant behaviour, but reflects overall fabric performance e.g. Heat Transfer Coefficient
- in larger schemes, the average total energy use intensity, averaged over the scheme i.e. negating the effects of individual variations in occupant behaviour. For this, the upcoming Net Zero Carbon Buildings Standard could be a very useful source of information: its new build limits could be used as the top rating (or one band down, to encourage even further improvements), its retrofit limits as 1 or 2 bands down, and its assessment of median energy use as the middle of the scale). The National Building Database could also be used as reference.

The creation of such a rating scheme is our strong recommendation. However, if Government did go ahead with the idea of a government-endorsed brand:

- it should be with extensive stakeholder engagement on the details and implementation.
- "perform well when performance tested" is vague and would need to be defined. It should at the very least mean not only regulatory compliance against minimum standards, but matching or bettering the assumptions entered in the as-built energy calculation.

Question 42 Do you agree with the proposed changes to Approved Document F, Volume 1: Dwellings to improve the installation and commissioning of ventilation systems in new and existing homes?

c. No (please provide justification)

If you selected answer options b or c, please provide further information here.:

1. CIBSE strongly supports the aim to improve the installation and commissioning of systems, both for new homes and for new systems in existing homes. However, as we did in the previous consultation, and as has been shown to be the case, we do not think that guidance is sufficient. As previously, we recommend that further measures are considered, for example a penalty on the energy efficiency of systems used in the energy calculations, unless evidence of commissioning is provided. Ensuring good commissioning would also benefit indoor air quality, and often acoustics. As with other measures, the improvements in commissioning, testing and reporting need to be meaningfully enforced to be effective.
2. The Approved Document still assumes that compliance of ventilation provision will result in adequate air quality in terms of pollutant concentrations set out in Table B.1. There are, however, no required checks whether that is likely to be the case based on the design, nor any required checks at completion, nor any requirement for ongoing monitoring or spot-checks of a building in use against the air quality performance criteria. CIBSE recommends that air quality should be more strongly supported by Approved Document F e.g.:
  - recommendations to the applicants and Building Control for situations where pre-occupation baseline testing of air quality would be expected, after pressure testing and system commissioning.
  - Commissioning should include provision or demonstration of the ventilation system manual or guidelines to users or occupants, so that they are able to make appropriate alterations to the system such as in different seasons, in order that the system is set up to maximise both energy and indoor air quality.
  - DLUHC should explore options to introduce a requirement for basic IAQ measuring equipment to be provided, to promote awareness and ownership by building users of their IAQ.
3. CIBSE supports the changes to commissioning measurements and records in Appendix C, including the system tests, identification of measurement devices by location, evidence of the calibration certificate, and the requirement for air flow devices and hoods to be calibrated together.
4. CIBSE welcomes the inclusion of the requirement for performance measurements in the commissioning notice, and requirement of competence for the commissioning and testing person(s).
5. In S4.18, summer bypass has been added as a specific control setting. It would future-proof the document if a more generic term was used to capture other setting options.
6. CIBSE welcomes the intent behind the requirement for ventilation devices not to make 'abnormal noise', and the range of settings for testing. We refer to the Institute of Acoustics for how that could best be defined and enforced.
7. CIBSE welcomes the restrictions on the use of flexible ductwork.
8. CIBSE repeats a comment made in the 2021 consultation that in existing dwellings, allowing for ventilation provision to be 'no worse' after replacement of windows without mechanical ventilators does not assure that ventilation provision afterwards is adequate, as the provision in some buildings is inadequate before window replacement. The ventilation strategy should be considered on a whole-building basis, rather than on an elemental basis, and an appropriate decision made based on that dwelling's assessment.

Question 43 Do you agree with the proposal to extend Regulation 42 to the installation of mechanical ventilation in existing homes as well as new homes?

a. Yes

If you selected answer options b or c, please provide further information here.:

CIBSE agree that the installation of cMEV and cMVHR ventilation systems in existing homes deserves as much attention as in new homes.

Question 44 Do you think the guidance on commissioning hot water storage vessels in Section 8 of draft Approved Document L, Volume 1: Dwellings is sufficient to ensure they are commissioned correctly?

b. Yes, and I'd like to provide further information

If you selected answer options b or c, please provide further information here.:

- 8.2 - there should be something about commissioning a system to the system design (specifically the critical design parameters) alongside the manufacturer's requirements. This would need caveating with something along the lines of 'where there are differences between the system design parameters and/or manufacturers requirements, to the physical system as it can be installed, written agreement must be gain between all parties'.
- 8.8.b consideration could be given to allowing for other non-chemical-inhibitor based methods of corrosion prevention. Whilst VDI 2035 is a German standard, so it is unlikely to be quoted in UK guidance, many heat generator manufacturers recommend it, and some are beginning to require it. Perhaps



a little room can be made in ADL for installers to use such non-chemical-inhibitor based methods if the manufacturer recommends it. 8.9 note 2 references two documents specifically focussed towards non-domestic buildings. Whilst the document recommendations can be applied to owner-occupied domestic dwellings, they are overly burdensome. There is a general lack of guidance for domestic dwellings on this subject. Section 1 of the upcoming revised DHDG could be referenced, specifically the commissioning section and the specification/step-by-step design checklist and commissioning documentation.

Question 45 Are you aware of any gaps in our guidance around commissioning heat pumps, or any third-party guidance we could usefully reference?

Not Answered

If you selected answer option a, please provide further information here.:

Question 46 Do you think the guidance for commissioning on-site electrical storage systems in Section 8 of draft Approved Document L, Volume 1: Dwellings is sufficient to ensure they are commissioned correctly?

Not Answered

If you selected answer options b or c, please provide further information here.:

Question 47 Do you agree with proposed changes to Approved Document L, Volume 1: Dwellings and Approved Document F, Volume 1: Dwellings to (a) clarify the options for certifying fixed building services installations and (b) set out available enforcement options where work does not meet the required standard?

c. No (please provide justification)

If you selected answer options b or c, please provide further information here.:

For (a) the draft AD F1 has the two options of using the building control body (local authority or approved inspector) or self-certification by a member of a registered Competent Persons Scheme. For the former route, it may be preferable to use a generic term such as 'registered building inspector', as the regime will shortly be changing. That term would cover all registered professionals, including local authority settings, the current Approved Inspectors, and those working directly with the BSR.

For (b) we agree with the intent to introduce enforcement options, however there are no obvious new enforcement options set out in the draft where work does not meet the required standard. Existing information is in Vol 2, Chapter B, of the Manual to the Building Regulations.

Question 48 Do you think the additional information we intend to add to the Home User Guide template, outlined above, is sufficient to ensure home occupants can use their heat pumps efficiently?

b. Yes, and I'd like to provide further information

If you selected answer options b or c, please provide further information here.:

See comments in Q14 on providing information about heating controls and regimes for heat pumps, which will be different from boilers.

Question 49 If you are a domestic developer, do you use, or are you planning to use, the Home User Guide template when building homes to the 2021 uplift? Please give reasons in your response.

Not Answered

Please provide further details here. :

Question 50 Do you have a view on how Home User Guides could be made more useful and accessible for homeowners and occupants, including on the merits of requiring developers to make guides available digitally? Please provide evidence where possible.

a. Yes, (please provide further details)

If you selected answer option a, please provide further information here.:

It should be made available both digitally, and non-digitally. It should be made available for renters, not just home owners.

Question 51 Do you think that there are issues with compliance with Regulations 39, 40, 40A and 40B of the Building Regulations 2010? Please provide evidence with your answer.

Not Answered

Please provide justification here. :

We have not been made aware of issues however, as noted elsewhere in our response, the size and timing of this consultation package are such that industry has not been able to engage in depth with every aspect. We do not therefore have the confidence that there no compliance issues with these Regulations 39, 40, 40A and 40B.

Question 52 Do you think that local authorities should be required to ensure that information required under Regulations 39, 40, 40A and 40B of the Building Regulations 2010 has been given to the homeowner before issuing a completion certificate?

a. Yes

If you selected answer options b or c, please provide further information here.:

## 9 Heat Networks

Question 53 Do you agree that new homes and new non-domestic buildings should be permitted to connect to heat networks, if those networks can demonstrate they have sufficient low-carbon generation to supply the buildings' heat and hot water demand at the target CO<sub>2</sub> levels for the Future Homes or Buildings Standard?

c. No (please provide justification)

If you selected answer options b or c, please provide further information here.:

We agree in principle that if networks meet carbon performance requirements, new connections should be allowed. However, CIBSE strongly disagree with the current proposals:

- In the current methodology, the target CO<sub>2</sub> levels are not set the same for buildings connected for heat networks as for those with on-site systems
- The proposed sleeving methodology and assessment of "spare capacity", which is highly problematic. See details in our response to Q55.
- The current risks of loopholes, and no acknowledgement nor proposals to address this – see details below.
- The assessment of carbon emissions from networks: see details below.

A public register and system of independent audits and monitoring on the performance of networks

Because it is completely theoretical as an accounting method, the "sleeving" system is very open to loopholes and misleading accounting e.g. using a sleeved carbon content for new connexions at planning & in FHS / FBS calculations, and an average network carbon content when suitable elsewhere e.g. in EPC calculations for existing buildings connected to the network. In addition, it is completely unclear what will happen in practice: what if the "sleeved" low carbon does not run, and existing & new connexions are tied to high carbon plant?

CIBSE strongly recommend that sleeving must not be implemented without dedicated and careful monitoring by authorities, including auditing by independent bodies, and means of redress. As part of this, and for wider heat decarbonisation policy purposes, it is crucial that a comprehensive public register of networks be created, maintained, and regularly audited by an independent body. This public register could possibly be the fully rebuilt PCDB promised by this consultation. It should:

- Be publicly available
- Be maintained and regularly audited (from a very simple review, we have found worrying indications that the current heat register is not sufficiently audited: see details in Appendix, with clearly erroneous information on heat generation vs supply).
- Include access to data from previous years, to allow tracking of progress
- Be the single source of information for any policy relying on operational performance of networks, in order to provide full transparency and avoid loopholes and double accounting i.e. not just for FHS / FBS calculations, but also planning applications, EPC calculations, and other relevant policies and financial incentives. It should also be used for reporting linked to heat metering regulations, to reduce the reporting burden and improve consistency of information across data sources.
- Include information currently included in the heat metering register, but with additional data on individual networks, and including energy use per type (not just heat production, generation capacity and fuel type), allowing analysis of primary and secondary losses, and carbon content of heat. Details of the amount and source of "sleeved" heat should be declared.

This is far from being provided by the current (empty) PCDB and by the Heat Billing Regulations - Heat Network Register, as illustrated in Appendix A1 and A2. The upcoming regulation of heat by Ofgem creates the perfect opportunity to address this. CIBSE would be happy to support this and discuss this with DESNZ and DLUHC at the earliest opportunity.

Calculations of emissions from networks

We cannot comment on the proposed calculation of emissions from the actual networks, as the method is not available for consultation. The Part L 2021 / SAP 10.2 methodology for assessing heat networks must be reviewed, and provide an objective assessment of impacts from heat networks:

- The fact that no heat network is currently registered in the PCDB, but instead that all networks choose to be assessed using the default assumptions, clearly illustrates how advantageous these defaults are.
- The carbon emissions from CHP should NOT be assessed using the factors from SAP 10.2, as is proposed in the heat zoning consultation (p.101). These SAP 10.2 carbon factors for CHP-generated electricity are not at all representative of the current grid (see details in the CIBSE heat zoning consultation response and in Appendix B); they represent artificial support to CHP, and risk leading to 1) higher carbon emissions, and 2) misunderstanding among project teams and decision makers about design and policy choices.
- The method should reflect realistic carbon factors, now and in future years. If CHP is to be encouraged, this should be on a transparent and factual basis, for clearly explained reasons, not through the use of artificial fudge factors which lead to misleading conclusions and detrimental outcomes.

Question 54 Do you agree that newly constructed district heating networks (i.e., those built after the Future Homes and Buildings Standard comes into force) should also be able to connect to new buildings using the sleeving methodology?

c. No (please provide justification)

If you selected answer options b or c, please provide further information here.:

If some form of sleeving was implemented, this should only be as a means of decarbonising existing networks. We must not add to the legacy of networks which will require decarbonisation in the future. New networks must deliver on the promise that networks offer a large-scale decarbonisation option. The current pipeline of new networks (see Appendix C) shows that this is still a problem, with continuing additions to the legacy of gas networks which will

continue relying on fossil fuels for decades. This must be addressed:

- a majority of new networks (around 75%) have heat pumps as primary plant. This is welcome, although operational data remains to be seen and these networks could still significantly rely on gas, if they have gas back-up.

- Another 16% of new networks are planning to use gas as primary fuel. This must be addressed.

New networks should simply be assessed on the basis of their average content of heat, against a realistic but ambitious network (see recommendations in Q9 on the notional network).

The analysis that not letting new networks benefit from sleeving would lead to earlier than planned decarbonisation should be welcome, not a reason to dismiss it (§9.2 "This would, in effect, decarbonise the heating supply for many existing buildings far in advance of wider government commitments on decarbonising heat in buildings"). The CCC regularly highlights the need for more policy and delivery on heat decarbonisation, so deliberately restraining action is very hard to comprehend.

Question 55 Do you agree with the proposed guidance on sleeving outlined for Heat Networks included in Approved Document L, Volume 1: Dwellings and Approved Document L, Volume 2: Buildings other than dwellings?

c. No (please provide justification)

If you selected answer options b or c, please provide further information here.:

CIBSE disagrees with the proposed methodology for assessing "spare capacity" i.e. that which can be "sleeved". The proposed method is based on total generation capacity vs diversified demand. This is very misleading: most networks which have a low carbon plant (e.g. a heat pump, biomass boiler) will also have gas boilers of much higher capacity operating alongside for peak and back-up. This means that, even if in reality the low carbon plant already operates for long hours, it could easily be notionally marked "spare capacity" and therefore "sleeved" i.e. allocated to the new connexion. In practice, the network would then not on average decarbonise, in fact it is likely that its back-up gas plant would instead operate longer hours to serve the expanded network i.e. leading to higher total emissions, and higher average carbon content i.e. go counter the stated objective of encouraging decarbonisation of existing networks.

The decarbonisation of networks which are currently in operation or being planned must be addressed. This is a very real issue: the very large majority of heat networks operating in the UK (10,766 of the 11,847 networks, i.e. 91%) use natural gas or oil as their primary fuel (see Appendix A3). In addition, the current pipeline of expansion also includes a large proportion (46%) with gas as primary fuel (see Appendix C).

CIBSE's strong recommendation is that, if some form of sleeving is used, it should be on the basis of demonstrably meeting the intended purpose of encouraging decarbonisation i.e.:

- being associated with additional low-carbon heat capacity, or genuinely additional contribution, which could not be used to feed the existing connections (for the avoidance of doubt, by low carbon we do NOT meet CHP, which runs on fossil fuels), and
- reducing the average carbon content of heat across the network, based on actual annual fuel use and supply of heat across the network.

Question 56 Do you agree that heat networks' available capacity that does not meet a low carbon standard should not be able to supply heat to new buildings?

a. Yes

If you selected answer option b, please provide further information here.:

Question 57 What are your views on how to ensure low-carbon heat is used in practice?

Please provide any comments here.:

See recommendations in Q53 for the creation of a public register, which is regularly and independently audited. In addition, the regulator (whether Ofgem or the Building Control Authorities) must have means of redress if networks do not perform in line with the required performance. Basing the sleeving methodology of peak capacity obviously creates this risk, hence our recommendations for changes, to base it on actual decarbonisation of the network i.e. current carbon content of heat, and proposed – which should be lower, based on realistic running hours, and could be monitored.

Question 58 Are there alternative arrangements for heat networks under the Future Homes and Building Standards that you believe would better support the expansion and decarbonisation of heat networks?

Please provide any comments here.:

The expansion of heat networks should not be an objective in itself; the objective is the decarbonisation of heat, at low capex and operational costs. Low carbon heat networks would be encouraged if the performance expected of them was ambitious, (e.g. a carbon content of heat similar to that applied for on-site plant) with a clear and fact-based methodology rather than artificial loopholes and long (or uncertain) implementation timescales.

CIBSE would like to see the evidence base for encouraging heat networks and aiming for them to provide around 18% of heat by 2050, a very significant increase compared to the current 2% (as stated in the recent Heat Network Zoning consultation). Our understanding is that this 18% figure relates to the 2015 report for the CCC (Research on district heating and local approaches to heat decarbonisation, Element Energy,

<https://www.theccc.org.uk/publication/element-energy-for-ccc-research-on-district-heating-and-local-approaches-to-heat-decarbonisation/>); however, the aim of this 2015 report was to evaluate the effect of various policy interventions on the deployment of heat networks. It was NOT an assessment of whether these levels of deployment would be the lowest cost and /or lower carbon solution, against non-network alternatives. Given how central this figure of "18% of heat from networks" has become in a number of policies and support programmes, we recommend that the 2015 analysis should be reviewed including an assessment of alternatives, using recent data on the potential for demand reduction, energy efficiency and on-site low carbon heating, with associated benefits including energy costs, air quality, and comfort.

10 Smart Meters

Question 59 Do you agree that the draft guidance provides effective advice to support a successful smart meter installation in a new home, appropriate to an audience of developers and site managers?

Not Answered

If not, please provide suggestions for how the draft guidance could be improved. Please provide evidence and sources for your statements where appropriate. :

Question 60 Do you agree that voluntary guidance referenced in draft Approved Document L, Volume 1: Dwellings is the best approach to encouraging smart meters to be fitted in all new domestic properties?

Not Answered

If not, is there anything else you think the government should be doing to ensure that smart meters are fitted in all new build properties? :

## 11 Accounting for exceptional circumstances

Question 61 Do you agree that it should be possible for Regulation 26 (CO2 emission rates) to be relaxed or dispensed with if, following an application, the local authority or Building Safety Regulator concludes those standards are unreasonable in the circumstances?

b. No (please provide justification)

If you selected answer option b, please provide further information here.:

The proposals are not much more onerous than Part L 2021, so we do not understand nor have we been given the rationale for this exemption: what evidence is this based on? Do DLUHC have substantial evidence that compliance with the proposals could not be achieved?

As a matter of consistency, why would this be available, when on the other hand DLUHC are seeking to seriously limit the ability of local authorities to go the other way i.e. set more ambitious standards?

The term "unreasonable" is extremely vague and open to interpretation. In what circumstances would DLUHC propose this to be relaxed, and how would this be monitored?

Question 62 If you responded yes to the previous question, please share any examples of circumstances where you think it may be reasonable for a local authority to grant a relaxation or dispensation.

Please share any examples here. :

Question 63 Do you think that local authorities should be required to submit the applications they receive, the decisions they make and their reasoning if requested?

a. Yes

If you selected answer options b or c, please provide further information here.:

Question 64 Are there any additional safeguards you think should be put in place to ensure consistent and proportionate use of this power?

Please provide any comments here.:

As per Question 62, we recommend against this, but if this does go ahead:

- Exemptions should be subject to consultation e.g. as per planning process
- Exemptions must be closely monitored
- The list of exemptions should be made available in a public register, with the reasons provided for the exemptions

## 12 Legislative changes to the energy efficiency requirements

Question 65 Do you agree that Part L1 of Schedule 1 should be amended, as above, to require that reasonable provision be made for the conservation of energy and reducing carbon emissions?

b. Yes, and I'd like to provide further information

If you selected answer options b or c, please provide further information here.:

If Part L1 of Schedule 1 is amended, is this the opportunity to extend the scope of regulations towards the in-use stage? We recommend that this should be explored.

Question 66 Do you agree that regulations 25A and 25B will be redundant following the introduction of the Future Homes and Buildings Standards and can be repealed?

Not Answered

If you selected answer options b or c, please provide further information here.:

### 13 A review of our approach to setting standards

Question 67 Do you agree that the Home Energy Model should be adopted as the approved calculation methodology to demonstrate compliance of new homes with the Future Homes Standard?

b. Yes, and I'd like to provide further information

If you selected answer options b or c, please provide further information here.:

please see our response to the DESNZ HEM and HEM:FHS consultations

Question 68 Please provide any comments on the parameters in the notional building.

Please provide any comments here.:

See our response to Q7. In addition, CIBSE strongly supports the use of local weather files, rather than a single location (East Pennines) currently used for all dwellings. However, we are concerned that the proposed application is far too limited: the local weather file would also be applied to the notional building i.e. applying a moving target rather than a consistent level of performance throughout England: as the consultation itself states, it will be possible to comply with the same fabric specifications regardless of location, the only change being the estimated heat pump sizing. We understand this is seen as a simplification benefit to housebuilders, however this means that residents in the North of England will have higher heat demand and energy bills than those in the South. It would be useful if the Government could share their assessment of the different levels of space heating demand, energy use and energy bills a house built to the Future Homes Standard would lead to depending on where it is built in England.

Question 69 Minimum standards already state that heat pumps should have weather compensation and we would like to understand if stakeholders think this is enough to ensure efficiency of heat pumps under the varying weather conditions across England. Should the notional building use local weather?

Not Answered

Please provide any evidence you have on the unintended consequences that could arise as a result of using local weather in the notional building. If possible, please comment on the impact on the construction industry in terms of design and building feasibility. We also welcome views on whether weather compensation is sufficient to ensure heat pump efficiency.:

In general, weather compensation control should probably be a minimum recommendation for all heat generators, not just heat pumps. There are caveats though, as other options, such as load compensation, offer similar functionality and may be recommended over weather compensation by a manufacturer. In addition, the overall control strategy (constant heating or intermittent - see comments for Questions 14 and 18) is a more overarching control decision, as depending on the strategy selected, and if functionality such as optimum stop/start, setback, DHW reheating are used, weather compensation may negatively affect system performance.

Regarding the use of local weather: please see our response to Q68 The actual building should use the local weather; having the local weather also in the notional building significantly goes counter to this, by applying a moving target.

Question 70 Do you agree with the revised guidance in The Future Homes Standard 2025: dwelling notional buildings for consultation no longer includes the average compliance approach for terraced houses?

a. Yes

Please provide any evidence you have on the unintended consequences that could arise as a result of these changes.:

Question 71 Do you agree with the revised guidance in Approved Document L, Volume 1: Dwellings which states that you should not provide a chimney or flue when no secondary heating appliance is installed?

Not Answered

Please provide any further evidence.:

Question 72 Do you agree with the proposed approach to determine U-values of windows and doors in new dwellings?

Not Answered

Please provide any further evidence.:

Question 73 Do you agree with the proposal to remove the default y-value for assessing thermal bridges in new dwellings?

Not Answered

If you selected answer options b or c, please provide further information here.:

Question 74 Do you have any information you would like to provide on the homes built to the Future Homes Standard using curtain walling?

Please provide any comments here.:

Question 75 Do you agree with the methodology outlined in the NCM modelling guide for the Future Buildings Standard?

b. No (please provide justification)

If you selected answer option b, please provide further information here.:

CIBSE-LETI provided a response to the call for evidence in 2022. Ideally, our comments would check whether the evidence submitted has been taken into account : <https://www.cibse.org/policy-insight/consultations/closed-consultations/ncm-call-for-evidence-joint-submission-by-cibse-and-leti>  
CIBSE welcomes the acknowledgement that NCM tends to under-estimate space heating demand, and the statements that changes have been made to address this (section 13.4.1). However, we think that the changes are far from sufficient. From a review of the research report, it seems that the evidence we provided jointly with LETI, in response to the call for evidence, was not given suitable weight.

Our initial analysis is that the changes do not go as far as needed to address the substantial issues raised in our submission to the call for evidence, and we recommend a more substantial review, similar to that carried out in the SAP scoping review.

Additional comments include:

- SBEM shouldn't drive the DSM process. There should be improved design approaches for DSM. More sophisticated modelling approaches could be required in more situations, and/or encouraged through the use of targets and requirements.
- Air systems are not modelled properly (also highlighted in our response to the call for evidence)
- The activities database needs reviewing. Consideration needs to be given to how modelling could reflect the huge variations that exist in how non-domestic buildings are used, and how these greatly affect heating demand. NCM activities for some building types are not well defined, resulting in assessors choosing them intuitively (or to suit the results). They need to be updated and based on the most common space types, and there needs to be more guidance on how to choose the right activity. The space types should match the most common space types, as defined in sector specific guidance (e.g. the NHS Net Zero Building Standard for healthcare facilities)
- Lighting is not modelled properly. Daylight factors are a poor representation of daylight. Designers are not encouraged to model it properly (i.e. include shading) as this would give worse results.
- DHW is becoming the dominant thermal load as space heating reduces, so it is important to model more accurately, not through simple flat rates. Again, the activities database needs reviewing.
- The NCM formula for calculating secondary circulation length should be revised. (currently 4 x square-root of the floor area served by the HW system – aka the whole building). This pushes design to PoU systems, that are not applicable in all cases.
- NCM system definitions should be updated to reflect all common system arrangements. Some system types are obsolete and need to be replaced.

Question 76 Please provide any further comments on the cSBEM tool which demonstrates an implementation of the NCM methodology.

Please provide any comments here.:

As noted in our response to the HEM consultation, given the huge size and impact of the parallel consultations from DLUHC and DESNZ, we have found it very challenging to receive substantial comments from industry on this. This by no means reflects lack of interest and engagement in the topic, but sheer resources, timescale, and size of the consultation packages.

Question 77 Please provide any further comments on the research documents provided alongside the cSBEM tool and which support the development of the NCM methodology, SBEM and iSBEM.

Please provide any comments here.:

See comments above in Q75. In many cases, the research documents seem to show only limited attention to the evidence of NCM issues provided in response to the call for evidence. We think that a more substantial review needs to be carried out.

## 14 Transitional Arrangements

Question 78 Which option describing transitional arrangements for the Future Homes and Buildings Standard do you prefer (page 83)? Please use the space provided to provide further information and/or alternative arrangements.

Not Answered

Please provide further information or suggest alternative transitional arrangements with your rationale and supporting evidence.:

Question 79 Will the changes to Building Regulations proposed in this consultation lead to the need to amend existing planning permissions? If so, what amendments might be needed and how can the planning regime be most supportive of such amendments?

Not Answered

If you selected answer option a, please provide further information here.:

Question 80 Do you agree that the 2010 and 2013 energy efficiency transitional arrangements should be closed down, meaning all new buildings that do not meet the requirements of the 2025 transitional arrangements would need to be built to the Future Homes and Buildings Standards?

Not Answered

If you selected answer option b, please provide further information here.:

Question 81 What are your views on the proposals on page 85 and do you have any additional evidence to help us reach a final view on the closing of historical transitional arrangements?

Please provide any comments here.:

## 15 Part O – Call for Evidence

Question 82 Part O does not apply when there is a material change of use. Should it apply?

a. Yes

Please provide more details about why Part O should/should not apply to a material change of use and, if possible, point to existing evidence/examples that demonstrates your view.:

Conversions of different building uses into homes have as much (if not more) potential for increased overheating risk as new build homes.

Existing buildings can have significant overheating risk factors, these may include:

- Often highly glazed, as originally designed for commercial activity and potentially inadequate or inappropriate shading
- Large windows with limited, restricted or no openable panes
- Locations often in noisier areas more likely to have constraints on using natural ventilation (noise, air quality, security etc.)
- Frequently designed with mechanical cooling present
- Deep floor plates commonly lead to single aspect units, and spaces without windows/natural ventilation once subdivided
- Poor provision of natural ventilation as openings are not sized for the greater levels of sub-division in domestic buildings, or for 24/7 occupancy

For these reasons we believe it is important to extend Part O to cover material change of use.

In the Climate Change Committees report entitled “Progress in Adapting to Climate Change 2021 Progress report to Parliament”, they highlighted how there “...is evidence that permitted development conversions seem to create a worse quality residential environment than conversions that occur through regular planning permission in relation to several factors widely linked to health, well-being and quality of life for future occupants” (pg. 160). This report can be found here: [www.theccc.org.uk/wp-content/uploads/2021/06/Progress-in-adapting-to-climate-change-2021-Report-to-Parliament.pdf](http://www.theccc.org.uk/wp-content/uploads/2021/06/Progress-in-adapting-to-climate-change-2021-Report-to-Parliament.pdf).

The supporting evidence refers to a study carried out on a London single-aspect block of flats that were converted from offices in 2016 per 2010 Building Regulations. The study observed internal operative temperatures of 47.5°C during a heat wave event. These high internal temperatures were reached due to a combination of factors overlooked at the design stage, making it problematic to resolve post-construction. This study can be found here:

<https://journals.sagepub.com/doi/abs/10.1177/0143624419840768>

Specifically on the issue of ‘permitted development rights (PDR), MHCLG research carried out by UCL and University of Liverpool in 2020 highlighted the high risk nature of converting offices to residential dwellings in urban city centres. This covered 11 local authority areas and highlighted, among other things, the far greater incidence of single-aspect ventilation in PDR projects. This research can be found here:

[https://www.gov.uk/government/publications/quality-standard-of-homes-delivered-through-change-of-use-permitted-development-rights?utm\\_source=90808469-](https://www.gov.uk/government/publications/quality-standard-of-homes-delivered-through-change-of-use-permitted-development-rights?utm_source=90808469-)

Question 83 Apart from material change of use, is there anything missing from the current scope of Part O?

a. Yes, (please provide justification)

Please provide further information here.:

Overheating checks for retrofit projects. Please see our response to question 82, as many of the same arguments also apply. As the climate warms, all homes should be as comfortable and energy efficient as possible throughout the year. Building Regulations should nudge improvements in thermal comfort when work is undertaken to improve homes, as home owners may not be aware of the potential for improvements in summer comfort in tandem with energy efficiency.

Evidence presented to the Environmental Audit Committee led them to recommendation 54 which states “We support the extension of Part O of the Building Regulations not only to cover material changes of use to residential, but also for refurbishments of existing properties. This report can be found here: <https://committees.parliament.uk/publications/43103/documents/214494/default/>. We recommend that the Government clarify whether it is intended that Part O of the Building Regulations be expanded to refurbishments. If that is indeed the case, we recommend that Ministers, in their response to this report, set out when, and by what mechanism, this is to be achieved. If it is not the case, we recommend that Ministers explain how the UK is to achieve Commitment M5 of the Global Cooling Pledge.” Commitment M5 of the Global Cooling Pledge states that the government will - “...establish national model building codes that incorporate market-appropriate passive cooling measures and energy efficiency strategies by 2030 for new and refurbished buildings”.

Furthermore, the Environmental Audit Committee also recommended “...that measures taken under Part O should be subject to post-occupancy evaluation within the first year of their installation” [recommendation 56]. While question 40 and 41, asks about this and performance testing, it provides no context as to the purpose of the testing/ evaluation. We would welcome overheating being evaluated as part of this post-occupancy evaluation to evaluate mitigation methods, share best practices, and improve methods and regulations moving forward.

Noise affecting the use of opening windows in the daytime, in bedrooms and living rooms. Some people use the omission of daytime noise constraints within Part O as evidence that noise need not be considered in the daytime (for planning noise assessments). Evidence of the burden of disease from noise can be found here: <https://www.sciencedirect.com/science/article/pii/S0160412023002398>. The evidence for the effectiveness of facade sound insulation to protect people indoors with windows closed is summarised here: <https://doi.org/10.3390/ijerph14080873>

Hotels. Hotels are included under Part E (Sound insulation) on the basis that people may be housed in hotels for temporary housing. The same notion should also apply to mitigating overheating.

Question 84 Can you provide evidence on how the addition of extensions or conservatories to domestic buildings can impact overheating risk on an existing building?

a. Yes, (please provide justification)

If you selected answer option a, please provide further information here.:

Conventional extensions and conservatories incorporate greater levels of glazed areas which commonly feature sky lights and full height glazed areas to enhance views out and provide additional daylight into the extended floor plan. These modifications result in increased solar gains which are absorbed and re-emitted internally. Additionally, the extended floor plan can diminish the performance of natural ventilation (i.e., make it more difficult to effectively cross ventilate). Therefore, we feel the risks of overheating needs close attention when modifying the existing build with an extension or conservatory.

Modelling results (and anecdotal experience) always show increased overheating hours for highly glazed features such as conservatories.

If conservatories are thermally separated from the main dwelling (i.e., include external performance level doors in the build) then the risk should be reduced, but there could still be a knock-on impact on rooms that no longer have external windows.

Extensions with full-glazed patio doors and skylights would likely incur higher risks unless mitigation methods are included at the design stage (e.g., shading, and adequate opening areas).

The English Housing Survey 2020-21 found that homes with conservatories (17%) experienced higher overheating risk than those without (7%):

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1088933/EHS\\_2020-21\\_Subjective\\_Overheating\\_and\\_Construct](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1088933/EHS_2020-21_Subjective_Overheating_and_Construct)

Question 85 We are currently reviewing Part O and the statutory guidance in Approved Document O. Do you consider there to be omissions or issues concerning the statutory guidance on the simplified method for demonstrating compliance with requirement O1, for buildings within the scope of requirement O1

a. Yes (please provide justification)

If you selected answer option a, please provide further information here.:

The simplified method is not very simple. The Future Homes Hub (FHH) spreadsheet helps to ensure calculations are done correctly and consistently, but it is still a time-consuming process. A calculation tool should be provided for Part O (simplified method). The Home Energy Model (HEM) should be expanded to include a simplified method checker to streamline this process.

The 'free area' calculator is not built for purpose and needs to be adapted and made easier for Part O use.

At night, the calculation only assumes bedroom windows can open. When external air temperatures reduce at night, there are benefits to opening as many windows in the home as possible to remove heat built up during the day and cool the fabric. As bedroom windows are assumed to be occupied at night these should be easier to secure, and greater concern should be given to securing the remaining windows within homes, enabling them to be utilised too.

The simplified method is hard to meet. This feels appropriate for higher risk locations such as London and the South East and other urban centres, but overly onerous for lower risk locations such as the north east of England and the majority of Wales. We recommend the addition of a low risk location type with reduced requirements.

We recommend that the simplified method is only applicable in medium and lower risk locations, and the dynamic thermal modelling should be the only compliance method allowed for higher risk locations. The Greater London Authority (GLA) already require TM59 assessments for all referred projects. The higher land values in London and the South-East (where overheating risk is greater) should support the additional costs for the more involved assessment.

Question 86 Do you consider there to be omissions or issues concerning the statutory guidance on the dynamic thermal modelling method for demonstrating compliance with requirement O1 for all residential buildings?

a. Yes, (please provide justification)

If you selected answer option a, please provide further information here.:

Bedroom windows that qualify as 'easily accessible' need better solutions that enable natural ventilation options. Locks that enable 100mm openings should be a valid option given that bedrooms are assumed to be occupied at night. (These locks might not be sufficiently secure to leave open when occupants are not at home but would be noisy and challenging to break so a much lower security risk in occupied rooms at night).

The Part O rules on how bedroom windows should be modelled are problematic for these reasons:

It is unhelpful that these rules are different to those stated in CIBSE TM59 as this causes confusion and increases the likelihood of error in how models are set up.

The rationale for why Part O deviates from CIBSE TM59 is not provided which makes it hard to defend. For example, why is the threshold for bedroom windows to open at night 23°C whilst it is 22°C during the day? If some rationale could be provided Part O and CIBSE TM59 could become better aligned.

The Part O rule that requires bedroom windows to stay closed all night if temperatures at 11pm are < 23°C increases the likelihood of overheating in East facing bedrooms in the early morning (after the sun rises and before the model is allowed to open the window again at 8am). This is exacerbated in the modelling results as bedrooms are not allowed to model the shading effects of blinds/curtains.

In other examples we have observed the impact of bedroom windows being WIDE open all night if the 11pm internal temperature is > 23°C and this can have a significant cooling impact on the internal temperatures next day due to the night cooling. Temperatures can decrease significantly overnight to below what would usually be considered comfortable when windows are opened to the maximum extent all night until 8am.

We think this rule should be changed either to follow the same opening protocols as are modelled during the day, representing occupants' adaptive behaviour to window openings, or an additional control should be applied that requires windows to be closed if bedroom temperatures are below 23°C at 11pm, but if bedroom temperatures subsequently exceed 25°C during the night then windows will open.

No advice is given on how to calculate the impact of the maximum reach limitation (650mm) on equivalent areas for opening windows and apply it within models. The FHH simplified method spreadsheet does a good job of factoring this in, but we recommend a better tool for calculating the equivalent areas based on this and the Class cool calculation for model inputs would be really helpful. This would ideally calculate discharge coefficients rather than equivalent areas to use as this is a confusing area. See <https://inklingllp.com/2022/11/18/part-o-4/>

Question 87 Do you consider there to be omissions or issues concerning the statutory guidance on ensuring the overheating mitigation strategy is usable for buildings within the scope of requirement O1?



a. Yes, (please provide justification)

If you selected answer option a, please provide further information here.:

a. Yes

CIBSE are aware of some developers proposing MEV solutions to bedrooms with 'easily accessible' windows. Where these solutions require 10+ l/s of mechanical extract is not clear whether this makeup air can be provided through trickle vents or via internal door undercuts effectively and without causing noise issues (e.g., whistling).

Is mechanical cooling allowed? The AD doesn't make it clear whether failing the simplified method criteria for removing excess heat is sufficient qualification for providing mechanical cooling (in which case this could apply to A LOT of homes) or if dynamic modelling is needed to demonstrate this. Noise or air quality concerns are often valid reasons for not relying on window openings, but at what point do these prevent passive means being "reasonably practicable"?

When mechanical cooling is deemed to be required this is often in forfeit of passive mitigation methods (e.g., natural ventilation and shading). Where natural ventilation may not be feasible due to noise requirements, shading should still be viewed as a "reasonably practicable" solution to lowering the energy requirement on mechanical cooling systems. However, in practice it is common for other mitigation methods to be forfeited for mechanical cooling. We do not feel this was the intention of Part O so further enforcement/control is needed on this.

There should be greater clarity on how the cooling hierarchy should be applied and prioritised. Please see our response to question 93 for how CIBSE TM59 is being updated.

In Switzerland they have a clearer approach with a major focus on passive design, and the cooling hierarchy is more strictly followed. If over 100 hours of overheating occurs in a year, only then are you allowed to use comfort cooling, and only sourced using Ground Source Heat Pumps (GSHP) system (not air source). Please note that GSHPs are widely used in Switzerland. When cooling is used, passive measures such as reduced glazing, external shading, thermal mass must be applied first. Please note it is also standard practice to use automated external blinds. This rule applies to both homes and non-domestic buildings.

There are no noise limits for mechanical services used to mitigate overheating. Noise limits should apply to both mechanical ventilation and mechanical cooling, otherwise occupants have to choose between thermal or acoustic comfort. Noise limits for mechanical services should be different from noise limits for environmental noise ingress because people respond differently to these different sources of noise. See Acoustics, Ventilation, Overheating: Residential Design Guide for more information which can be found here:

[https://www.ioa.org.uk/sites/default/files/anc\\_-\\_ioa\\_avo\\_residential\\_design\\_guide\\_january\\_2020\\_v1.1\\_12\\_feb\\_2020\\_0.pdf](https://www.ioa.org.uk/sites/default/files/anc_-_ioa_avo_residential_design_guide_january_2020_v1.1_12_feb_2020_0.pdf).

Question 88 Do you consider there to be omissions or issues concerning the statutory guidance on protection from falling?

a. Yes, (please provide justification)

If you selected answer option a, please provide further information here.:

There is still confusion about whether restrictors are needed in addition to raised sill heights. This is not helped by the overlap between Part K and Part O. It is unclear whether the rules on guarding rails are applicable only for outwards opening windows. Architects have pushed back on this when windows open inwards.

There is a lack of clarity around the definition of 'easily accessible' bedroom windows. This includes:

- Whether ground floor bedroom windows that open on to private and inaccessible gardens can be deemed secure
- Whether there are any kinds of locks that would enable occupied bedroom windows to be secured in an open position (say <100mm) at night
- Whether the 3.5m from the ground can be exceeded courtesy of the additional height of a (solid) balustrade to 1st floor balconies.

These questions are referred to building control but it would be helpful to have some guidelines for early design decisions.

Question 89 Are you aware of ways that Approved Document O could be improved, particularly for smaller housebuilders?

a. Yes, (please provide justification)

If you selected answer option a, please provide further information here.:

CIBSE are currently updating TM59 to reflect the latest research on night temperatures on sleep quality. The new version (2024) should be adopted once it is published as CIBSE guidance represents best practice, and to require an outdated methodology is confusing and unhelpful. Please also see our response to Q93.

CIBSE plan to publish a checklist aimed at improving Quality Assurance (QA) on TM59 assessments, especially when the methodology is being used for Part O compliance purposes. This will highlight the variances between the CIBSE publications and what Part O requires. This is aimed at building control officers responsible for assessing compliance reports, but will also be useful for project team QA. This should be referenced as a supporting document within the AD.

In AD-O section 2.7 the term "Fixed shading devices" implies that products cannot be moveable (i.e. tilt, extend/retract). It is also assumed that "shutters" refers to only external shutters whereas on enquiry with DLUHC, installed internal shutters are also considered an appropriate means to limit solar gains. Evidence of this misunderstanding can be found here

<https://secure.toolkitfiles.co.uk/clients/41164/sitedata/files/Whitepapers/-Sustainable-Liveable-Homes.pdf> on pg. 6 under the sub-heading CIBSEs TM59 and pg.10 Fixed and Passive Solutions.

At the bottom of pg. 9 of AD-O it refers to BR364 Solar Shading of Buildings for examples of solar shading. This should be supplemented with the recent publication from the Good Homes Alliance entitled Shading for Housing Design guide for a changing climate

<https://goodhomes.org.uk/news/shading-for-housing>. This guide provides a more holistic view on the impact of different shading products on building design and is also freely downloadable

Confusing terminology

There is confusion around the terminology used. The text in paragraph 1.10 and table 1.3 refers to achieving minimum free areas, whilst Appendix D that

should be referred to for calculating these areas uses the term equivalent area.

Appendix D gives tables listing the equivalent areas to use based on a range of opening heights and widths for opening angles of 10°, 20°, 30°, 40°, 50°, 60°, 70°, 80° and 90°. It also gives the option to calculate the equivalent areas using the Classcool spreadsheet downloadable from the government website.

In addition the guidance defines 'free area' as "The geometric open area of a ventilation opening." in Appendix A, but the second half of the definition is the definition of Equivalent area ("This area assumes a clear sharp-edged orifice that would have a coefficient of discharge (Cd) of 0.62"), but the Classcool spreadsheet appears to use a different definition as it calculates the whole window area (height x width) in this field.

Free area is not a defined term anywhere ( and the description in Appendix A of AD-O is contradictory and confusing). However, this is explained here: <https://doi.org/10.1016/j.enbuild.2016.02.053> which is available here: <https://core.ac.uk/download/pdf/162661223.pdf>

Please note that the Appendix D tables and Classcool use side-hung and top-hung examples respectively which adds to the confusion.

This confusion can be resolved if every reference to "free area" is replaced with "equivalent area", with the exception of the second reference in the note to paragraph 1.12, where it refers to "free areas in Approved Document F...".

The approved document does not specify whether Appendix Ds advice on calculating equivalent areas should override any software guidance on modelling window openings.

Appendix D does not factor in the position of the window sash in relation to reveal depth etc which can also impact on the actual equivalent area available for ventilation.

One year after the introduction of Part O, Pilkington carried out independent research with 'Censuswide' between 13th-17th July 2023. 100 Architects responded. 71% of respondents said that it was a missed opportunity to limit the strictest measures to London and Manchester. This supports a 3 tier/ weather locations approach with low-risk locations introduced within the simplified method (please see our response to Q85).

14% of respondents are commonly incorporating A/C whereas only 7% are using shading, suggesting that the cooling hierarchy is not working effectively enough.

It is very positive that solar control glazing is being more commonly specified in homes since the introduction of Part O. Has any research been commissioned to monitor the impact on overheating incidence in homes built under Part O?

<https://www.pilkington.com/en-gb/uk/news-insights/latest/pilkington-uk-hosts-webinar-on-part-o-one-year-on#>

See also the series of blogs published by Susie Diamond on the Inklng website:

<https://inklingllp.com/2022/02/15/part-o-the-inkling-appraisal/>

<https://inklingllp.com/2022/03/29/part-o-part-2/>

<https://inklingllp.com/2022/07/25/part-o-part-3/>

<https://inklingllp.com/2022/11/18/part-o-4/>

Question 90 Does Regulation 40B require revision?

Not Answered

If you selected answer option a, please provide further information here.:

Question 91 Do you consider there to be omissions or issues concerning the statutory guidance on providing information?

Not Answered

If you selected answer option a, please provide further information here.:

Question 92 Are there any improvements that you recommend making to the information provided about overheating in the Home User Guide template?

Not Answered

If you selected answer option a, please provide further information here.:

Question 93 Are there any omissions or issues not covered on page 90 with the statutory guidance in Approved Document O that we should be aware of?

a. Yes

If you answered yes, please provide more details including suggestions on ways to improve the statutory guidance and point to existing evidence/examples that demonstrates why the gaps or issues you have identified should be reviewed as a priority.:

If you answered yes, please provide more details including suggestions on ways to improve the statutory guidance and point to existing evidence/examples that demonstrates why the gaps or issues you have identified should be reviewed as a priority.

CIBSE TM59 is being updated in the following areas:

To modify the nighttime criteria for bedrooms in line with research carried out by Loughborough university (available here:

<https://journals.sagepub.com/doi/full/10.1177/01436244231183113>).

To update the way in which the effect of ceiling fans are incorporated into the TM59 methodology as a mitigation method in line with ASHRAE guidance

Improved guidance on when homes should be determined to be 'predominantly naturally ventilated'

Improved guidance when mechanical cooling solutions are proposed

The recommended weather files used for TM59 assessments will be updated to reflect future weather data following the publication of TM59 based on more recent UKCP18 projections (scheduled for October 2024).

The new version of TM59 (2024) should be adopted by Part O and the simplified method reviewed in the light of these changes.

The forthcoming TM59 update on how ceiling fans should be modelled will increase the benefit of including fans within models and more accurately reflect their impact on comfort. To support this adoption we would like to highlight the Environmental Audit Committee (EAC) inquiry into Heat resilience

and sustainable cooling recommendation 48 which states " ..that the Government evaluate the case for amending Part L of the Building Regulations to encourage the use of ceiling fans (for example, by including locally controlled air movement in the definition of comfort)" and feel this should also be extended to Part O in terms as an offered mitigation method in the Dynamic Thermal Modelling route to compliance. Both the Green Alliance and Chris Twinn advocated for ceiling fans within the inquiry. Mr Twinn stated that they could deliver around 3°C of cooling for about 10% of the energy use, 5% of the embodied carbon and 15% of the cost of AC. He concluded that "allowing ceiling fans may well be the largest influence for providing heat resilience for us in the context of most UK buildings not currently needing AC". The EAC report can be found here:

<https://committees.parliament.uk/publications/43103/documents/214494/default/>.

The new version of TM59 sets clearer guidance for when mechanical cooling is proposed. This requires that assessments are demonstrated to comply without the cooling running and with all constraints to opening windows removed, to encourage good passive design. This is intended to ensure that mechanical cooling is provided only to optimise comfort or to overcome constraints on opening windows such as due to noise rather than to mitigate poor passive design. This approach should also be adopted within Part O.

## 16 Equalities and Impact Assessments

Question 94 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. If possible, please provide evidence to support your comments.

Please provide any comments here.:

Question 95 Please provide any feedback you have on the impact assessments.

Please provide any comments here.:

- As always, some assumptions are built into the impact assessment which make it difficult to understand and interpret. In particular, results shown only in carbon emissions or running costs, rather than kWh, and without the in-built assumed carbon factor and energy prices, make it very difficult to analyse the results.

- Table 5: the justification of costs per building typology is unclear. The cost difference from mid-rise (£400) to other building typologies (£4.5 -6k) seems very high and is not explained. In addition, it seems the comparison is not comparing like for like dwellings.