CIBSE Briefing
Steps to net zero carbon buildings

Rev 1 – 12th August 2019

1.0 Introduction

This paper summarises CIBSE recommendations on the changes required to the regulation of energy use and carbon emissions from buildings in the UK, and how this should be reflected in Part L of Building Regulations as part of the 2019/2020 review and subsequent ones, and in other relevant regulations. It builds on previous CIBSE work, consultation with the industry, and the work of other bodies, including in particular the recent reports of the Committee on Climate Change and the BEIS Select Committee inquiry into energy efficiency. It is intended to inform MHCLG's Future Thinking piece (part of the 2019/2020 Part L review), and for wider dissemination.

2.0 Recommended changes and actions

2.1 Objectives

Recent work by the Commitee on Climate Change (CCC) and BEIS Select Committee make clear the urgent need to reduce emissions from buildings, in order to meet the new statutory target of net zero carbon UK by 2050. The Part L trajectory must respond to this requirement for action and build on the existing body of work and evidence. Given the scale of the ambition and the limited time available, this needs to begin now, and not be left to another review of Part L.

We think this should translate into the following overarching objectives:

- **all new buildings to be net zero carbon in operation from 2030**, including all energy uses
- to allow this, **all new buildings to be designed as net zero carbon from 2025**.

Whilst this is ambitious, nearly every new building constructed in the UK from now on will be part of the existing stock in 2050. The longer we delay making these new buildings net zero carbon, the bigger the retrofit challenge we are creating for the future, and retrofit is harder than building net zero from new. Building net zero carbon buildings from 2030 has to be a no regrets policy.

Moving to a regulatory regime based on operational energy performance is a major change and will be hugely challenging. However, this is in line with the challenge of meeting the statutory net zero carbon emissions target. If that target is to be met, we need to start work now on developing an operational based regime, which should be ready for full introduction by 2025.

2.2 Overview of recommendations

A number of reports and initiatives (see section 3.2) show that achieving the above objectives is **possible and cost effective**, and UK market leaders have started to learn from and adopt best practice precedents. This requires changes not only to the performance of individual building elements but, much more importantly, to the **overall approach**:

- considering all energy uses
- reconciling the Part L methodology with actual operation
- creating a culture of performance and disclosure
- developing the skills and knowledge to deliver net zero buildings at scale.

Recommendation #1: Introduce clear targets for the operational performance of buildings: this should be a voluntary compliance route from 2019/20, and mandatory from 2025 for all but a small number of exceptions (e.g. individual homes). The 2019/20 voluntary step would allow industry leaders to pioneer the approach, build capacity and skills, and help government test and evaluate the requirements for the 2025 mandatory step.

Recommendation #2: **From 2019/20, provide incentives to adopt operational targets**

Recommendation #3: From 2019/20, introduce mandatory disclosure of energy performance: this would drive better operation and provide lessons to subsequently improve energy targets

Recommendation #4: From 2019/20, strengthen and expand as-built checks and commissioning for all buildings, piloting the more extensive proposals in "Building a Safer Future"

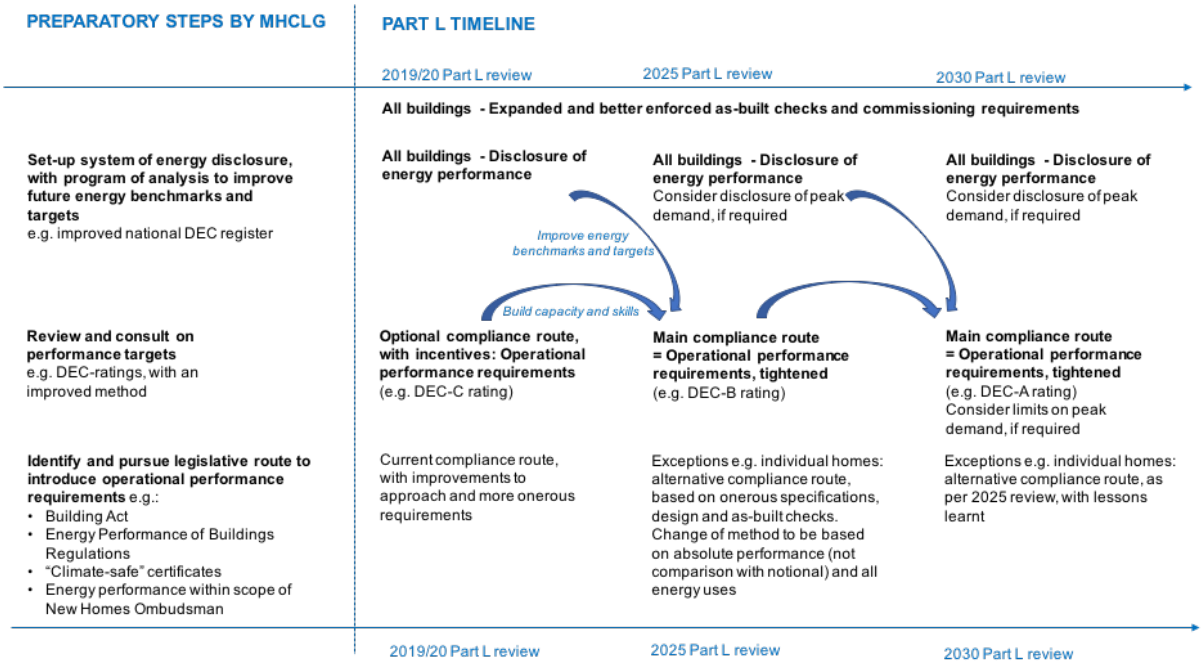
These recommendations focus on new buildings, where they are more straightforward to implement straight away. Similar proposals will need to be developed for works to existing buildings under Part L, albeit with a different implementation period. This will face challenges specific to the refurbishment sector, but will benefit from the change in culture and the skills first developed on new buildings.

2.3 Recommended actions for MHCLG

The following actions are needed in order to implement the above recommendations effectively:

- As a matter of priority, review the **legislative options** for introducing operational performance requirements. The presumption should be that this is possible, at least for the very large majority of buildings, and the focus should be on establishing the most straightforward route. We believe a number of avenues offer potential mechanisms and should be explored urgently, including:
    - modifying the Building Act to expand the scope of Building Regulations to the operational stage, possibly using the "continuing requirements" provisions of Section 2 of the Act;
    - modifying the Energy Performance of Buildings Regulations, to cover operational building performance beyond current requirements for air-conditioning inspections;
    - introducing a requirement for energy performance, in a similar way to the other aspects of "Building Safety Certificates" proposed to implement the Hackitt review
    - including operational energy performance in the scope of the proposed New Homes Ombudsman and Code of Practice for developers.
- Set up and consult on **initial energy performance targets**, for example based on the Display Energy Certificate (DEC) rating system with improvements based on industry feedback and on the latest energy benchmarks – see section 2.5. A key advantage to using DECs would be the potential to tie in with targets for improving the existing building stock.
- Set up a **system of energy disclosure** e.g. improved national DEC register, linked to a programme of data analysis to inform future energy targets.

2.4 Implementation timeline and steps



2.5 Recommendations – details

RECOMMENDATION #1: INTRODUCE REQUIREMENTS ON THE OPERATIONAL PERFORMANCE OF BUILDINGS

We recommend this should be implemented in 2 stages:

- 2019/20 review: **optional compliance route** based on operational requirements: this first step is essential to pilot and refine the methodology and to develop capacity and skills (e.g. energy prediction, setting contractual requirements across the supply chain), building on the work of current market leaders
- 2025 review:
    - main compliance route to be based on operational requirements. For dwellings, options are available to address the issues of data privacy and of variability linked to occupancy patterns e.g. anonymised data, compliance to be demonstrated by housebuilders on an aggregate basis.
    - an alternative route could remain available for a small number of exceptions (e.g. small projects and individual homes[1]). These exceptions would be subject to onerous requirements and design and as-built checks, considering all energy uses and focusing on absolute performance (not by comparison with a notional building). While onerous in its specifications, this could be a 'simple recipe' route, with a more prescriptive approach to standards for the building envelope and systems.

Operational performance targets should be based on a combination of carbon emissions, to track the effectiveness of policy at the national level, and metered energy, to be meaningful to end-users and allow year-on-year comparisons regardless of changes to the energy system. They should be based on set values per building type (i.e. $kgCO_2/ m^2/yr$ and $kWh/m^2/yr$). To account for variations such as occupancy and weather patterns, they could for example be based on the current DEC rating regime, with refinements. These refinements should build on feedback provided over the years to government about changes required to DECs (e.g. how unoccupied periods are treated in the ratings) and could benefit from the latest energy benchmarks from CIBSE (2019) and others.

Targets should include **all energy uses**. Existing methods and procurement models show that this is possible. In the residential sector, schemes such as Passivhaus and Energiesprong show that, despite variations between individual homes, the average "unregulated" (or home occupier-led) element can be confidently predicted, on an aggregate basis. In the non-residential sector, schemes such as Passivhaus and energy performance contracting offer similar evidence, and Design for Performance and NABERS provide an example for how to separate and predict landlord and tenant energy uses.

The **targets for new buildings should subsequently be tightened at each review** e.g. DEC rating of C (or equivalent) in the 2019/20 review, B in the 2025 review, and A in the 2030 review.

RECOMMENDATION #2: **FROM 2019/20, PROVIDE INCENTIVES FOR THE INDUSTRY TO ADOPT OPERATIONAL TARGETS, BUILDING CAPACITY AND SKILLS**.

As a minimum, this should include the following:

- Commit that all public sector projects will adopt mandatory operational performance targets from 2020
- Commit to the Part L trajectory under which operational compliance will be mandatory from 2025 (for all but a few exceptions, as per #1): early adoption would then help project teams get ready
- Significantly tighten the requirements under the "traditional" current compliance route, both in terms of elemental performance and whole building performance; this would provide an incentive to adopt the operational compliance route instead

[1] i.e. one-off homes where operational performance requirements could be overly onerous, as opposed to volume housebuilders who could commit to performance on an aggregate basis

- Offer the chance for early adopters to join a working group, with support on issues such as energy assessments and modelling. This group would also give MHCLG a direct conduit to gather lessons learnt and prepare the 2025 requirements.

In addition to (but not instead of) the above, other types of incentives could be reviewed e.g. tax breaks, financial incentives.

RECOMMENDATION #3: FROM 2019/20: MANDATORY DISCLOSURE OF ENERGY PERFORMANCE

This is a straightforward and necessary step to drive improvements in operational performance.

Data should be submitted on an annual basis, following the first full year of occupation. After a few years of occupation, this could link to a system relating to the performance of existing buildings.

The data should be publicly accessible to 1) create an incentive for better performance, by introducing an element of competition; 2) allow research organisations and the industry to analyse the data, gather lessons learnt, develop and refine the methodology and 3) allow government to track policy implementation and gradually improve energy benchmarks to inform future targets.

Essentially, this would build a bridge between Building Regulations and the current DEC regime, and expand the current scope of DEC requirements beyond public buildings only; such an expansion was supported by a very large majority of respondents in a consultation on this topic in 2015 [2].

Disclosure opens other benefits: demand management will become more important at the system level as buildings and transport electrify. In the 2025 review, MHCLG could consider whether to require disclosure of peak demand; this could feed into the introduction of limits to peak demand in 2030, if required for the UK system and based on data gathered from the 2025 step.

RECOMMENDATION #4: STRENGTHEN AND EXPAND AS-BUILT AND COMMISSIONING CHECKS, FOR ALL BUILDINGS.

There is ample evidence that current as-built checks and commissioning requirements are insufficient and not well enforced, as noted by the Hackitt Review of Building Regulations.

As-built checks should be reinforced, for example in the case of pressure testing, and expanded, for example thermal imaging to investigate thermal bridging. Commissioning requirements should be properly enforced, and strengthened (e.g. independent commissioning for complex buildings).

This would provide numerous benefits beyond energy and carbon performance e.g. better air quality and comfort through better installed and commissioned ventilation systems; reduced risk of condensation and mould through reduced thermal bridging, with consequent benefits to health.

This should include penalties (e.g. de-rating EPCs) unless evidence is provided of as-built checks and commissioning .

3.0 Additional information

3.1 Why changes are required, and why the time is now

The need to decarbonise buildings is well-established, and this paper does not go into the detail of this. The key contextual reports drivers that this paper seeks to respond to are the following:

- EPBD requirements, translated into 2012 Building Regulations (25B), for near zero energy buildings. This needs to translate into a meaningful reality for the public, home owners, and occupiers, both in terms of language and actual building performance

[2]The report summarising the responses to this consultation was previously available here, but seems no longer available: https://www.gov.uk/government/consultations/improving-the-display-energy-certificates-regime-for-public-buildings

- Commitee on Climate Change (CCC) Net Zero report: this highlights the necessity and cost-effectiveness for the UK to achieve net zero status by 2050. It also highlights the lack of progress in the building sector over the past decade, apart from carbon savings acheived through grid decarbonisation. We think this is evidence for the need to radically re-think the current approach to building performance.
- CCC annual progress report, 2019: this makes clear and strong recommendations for buildings, including: "*Strengthen new-build standards to ensure they are designed for a changing climate, are future-proofed for low-carbon heating and deliver high levels of energy efficiency*" , with the standard to be announced in 2019; and "*Strengthen compliance and enforcement framework so that it is outcomes-based*".
- BEIS select committee report: it reinforces recommendations from the CCC, and calls for better enforcement and more attention to operational performance.

Both committees are very clear in calling for the current review to address various aspects of their report, and not leave them until 2025. There is an imperative for early action.

There is a high level of consensus in industry that the current regulatory framework, including Building Regulations Part L, does not drive the production of buildings that are low carbon/energy in operation[3]. This is also evidenced by the poor link between operational energy use and EPC ratings[4].

3.2 Feasibility: building on previous work

Considerable work has been carried out by others recently on achieving low energy and zero carbon buildings. In particular, the CCC Net Zero report, CCC 2019 annual progress report, the Green Construction Board Buildings Energy Mission report[5] and the London Energy Transformation Initiative (LETI) have all been based on industry consultation, and all highlight the potential for significant and cost-effective energy and carbon savings, and make clear recommendations on how this can be achieved.

These reports themselves are informed by numerous examples in the UK and worldwide of initiatives that have delivered energy and carbon savings, such as Passivhaus, NABERS / Design for Performance, and energy performance contracting.

The Part L review work needs to take this background work into account in order to deliver changes effectively, and make the best use of public funds already expanded on these reports.

[3] see for example recent work by the London Energy Transformation Initiative (LETI) and 2018 CIBSE Briefing Paper on Part L and F https://www.cibse.org/getmedia/4a601f5c-a866-41a2-8cf7-1bab17f4f57e/Position-Paper-on-Building-Regulations-Part-L-F.pdf.aspx , which are based on broad consensus

[4] http://www.betterbuildingspartnership.co.uk/sites/default/files/media/attachment/Call%20for%20evidence%20-%20Energy%20Performance%20Certificates%20in%20Buildings.pdf

[5] http://www.constructionleadershipcouncil.co.uk/workstream/sustainability/ Buildings Energy Mission report and recommendations, 2019