

## The Sixth Carbon Budget and Welsh emissions targets – Call for Evidence

### **CIBSE RESPONSE**

**SUBMITTED 5<sup>TH</sup> FEBRUARY 2020.**

The Chartered Institution of Building Services Engineers, CIBSE, is the professional engineering institution that exists to ‘support the Science, Art and Practice of building services engineering, by providing our members and the public with first class information’

CIBSE members are engineers who design, install, operate, maintain and refurbish life safety and energy using systems installed in buildings. CIBSE members include specialists in fire safety systems and fire engineering. Others, who are belong to the Society of Façade Engineering, a Division of CIBSE, specialise in the design and installation of cladding systems.

CIBSE has over 20,000 members, with around 75% operating in the UK and many of the remainder in the Gulf, Hong Kong and Australasia. CIBSE is the sixth largest professional engineering Institution, and along with the Institution of Structural Engineers is the largest dedicated to engineering in the built environment. Our members have international experience and knowledge of life safety requirements in many other jurisdictions.

CIBSE publishes Guidance and Codes providing best practice advice and internationally recognised as authoritative. The CIBSE Knowledge Portal makes our Guidance available online to all CIBSE members, and is the leading systematic engineering resource for the building services sector. It is used regularly by our members to access the latest guidance material for the profession. Currently we have users in over 170 countries, demonstrating the world leading position of UK engineering expertise in this field.

## Question and answer form

### A. Climate science and international circumstances

**Question 1:** The climate science considered in the CCC's 2019 Net Zero report, based on the IPCC Special Report on Global Warming of 1.5°C, will form the basis of this advice. What additional evidence on climate science, aside from the most recent IPCC Special Reports on Land and the Oceans and Cryosphere, should the CCC consider in setting the level of the sixth carbon budget?

ANSWER: No answer

**Question 2:** How relevant are estimates of the remaining global cumulative CO<sub>2</sub> budgets (consistent with the Paris Agreement long-term temperature goal) for constraining UK cumulative emissions on the pathway to reaching net-zero GHGs by 2050?

ANSWER: No answer

**Question 3:** How should emerging updated international commitments to reduce emissions by 2030 impact on the level of the sixth carbon budget for the UK? Are there other actions the UK should be taking alongside setting the sixth carbon budget, and taking the actions necessary to meet it, to support the global effort to implement the Paris Agreement?

ANSWER:

CIBSE considers that a robust 6<sup>th</sup> carbon budget and a clear plan for its implementation are essential to send a strong signal of commitment by the UK at COP26 and in following years, which would help in the global effort to address climate change.

The UK needs to take very firm action to prepare for COP 26, including immediate government action to prepare the UK and also to help other countries develop their plans. The UK must come forward with a revised and updated Nationally Determined Contribution (NDC) this year, as required by the Paris Agreement, and it should use its global diplomatic capability to ensure every Paris signatory is supported to do the same. This is a pre-requisite for success at COP 26. Given current US approaches to this it is an area where the UK can advance its interests with other countries more supportive of action to reduce emissions, and potentially develop a basis for further UK involvement and exports in low carbon technology.

We would also note that there are discrepancies between actual total GHG emissions driving climate change, and what is covered in the Climate Change Act, carbon budgets, and Paris Agreement. CIBSE recommends action to address these gaps (in so far as they are addressable by the UK alone), and advocating to the international community that they should be addressed. While we understand its official scope is defined and limited by the CC Act, the CCC is in a strong advocacy position and we would recommend that it gradually makes stronger and more visible advice on those emissions NOT covered (or strongly committed to) in the CC Act. This applies to:

- emissions from international aviation and shipping: we know the CCC have recommended Net Zero report that they should be included in the 6<sup>th</sup> carbon

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budget, and Clause 30 provides a means to include them in the Climate Change Act in the future, but this was not done in the 2019 revision of the Act.

- “outsourced” emissions relating to processes and the production of goods elsewhere in the world, but ultimately serving the UK e.g. manufacture of goods purchased by UK citizens; treatment of waste exported from the UK. Across the EU it is estimated that this is equivalent to 25% of EU domestic demand(!) – see Ref1, and is estimated to have represented a significant part of emissions reductions until 2007 – see Ref2. We must ensure that outsourcing, or carbon leakage, does not lead to a false impression of progress in reducing actual climate change inducing emissions. The current discussions about an EU carbon tax on imports are a potential opportunity to encourage action in other countries, and leverage the playing field for UK- and EU-based industries which are subject to stricter standards. We recommend that the UK should engage supportively in these discussions.

These two areas are particularly important to demonstrate real commitment, at a crucial time when the UK is not only going to host COP26, but also embarking on post-Brexit trading relationships which could, if care is not taken, result in more trade with countries which are further from the UK (i.e. leading to higher transport emissions) and often with lower environmental and climate standards (i.e. leading to higher production emissions). It is crucial that the new trading relationships should allow progress towards national and global net zero status, not “trade at all cost”.

Starting to address these issues would also protect the UK from accusations of hypocrisy and “fake” savings through excessive carbon leakage, as well as contributing to genuinely global emissions reductions.

**Evidence and references:**

Ref1: EU carbon tax and estimate of foreign embodied carbon in domestic EU demand: Should the EU tax imported CO<sub>2</sub>? Centre for European Reform, December 2019 <https://www.cer.eu/insights/should-eu-tax-imported-co2>

Ref2: Carbon Brief: carbon leakage share in the UK’s carbon reductions since 1990 <https://www.carbonbrief.org/analysis-why-the-uks-co2-emissions-have-fallen-38-since-1990>

**Question 4:** What is the international signalling value of a revised and strengthened UK NDC (for the period around 2030) as part of a package of action which includes setting the level of the sixth carbon budget?

ANSWER: No answer

## B. The path to the 2050 target

**Question 5:** How big a role can consumer, individual or household behaviour play in delivering emissions reductions? How can this be credibly assessed and incentivised?

ANSWER:

Consumer, individual and householder behaviour clearly plays a role e.g. in decisions about food, local and international travel, whether to retrofit energy efficiency measures to their homes etc. In many cases, such as daily travel and food choices, encouraging low-carbon choices will also align with other policy objectives and messages already passed on to consumers about healthy lifestyles.

However, at this stage we would recommend NOT to rely on significant voluntary changes in behaviour, as this may be unreliable: in addition to growing awareness and concern about climate change, behaviours are influenced by complex combinations of factors including economics, ease, value signalling etc. Policies seeking to encourage low-carbon behaviour need to be carefully designed. Cost signals alone may not be enough. Policies will often rely on research and iterations to gather lessons and test different approaches – see Refs 1 and 2. See also Q25 on the barriers to retrofit, including lack of consumer trust.

It is also important to consider whether relying on behaviour applies to areas where individuals / consumers actually have a choice. In particular, in the housing market, the well-known issue of availability and affordability means that in most cases, whether or not consumers would like a low energy and low carbon home, they 1) do not know how to get one, or think all new homes are “low energy” (as they should be, but as is now well known are not), and 2) probably have little agency to choose one, once they have satisfied essential criteria such as location near a school and place of work. Evidence of a drive from consumers may therefore be limited (although it exists – see references), but this does not mean consumers would not opt for lower-carbon choices if they actually could.

### **Evidence and references:**

- Ref1: The work of the now-defunct Behavioural Insights Team, with an overview provided in Inside the Nudge Unit, by David Halpern. In particular, this includes the results of studies on barriers to retrofit, highlighting the “hassle factor”, and evidence of home owners attributing value to homes with good Energy Performance Certificates.
- Ref2: Work by the consultancy offshoot of the Behavioural Insights Team is available at: [www.bi.team](http://www.bi.team) ; their more recent example is “12 behavioural strategies to make diets more sustainable”, therefore very relevant to the work of the CCC
- Energy systems catapult, smart systems and heat: [https://es.catapult.org.uk/impact/projects/smart-systems-and-heat?newsletter\\_signup=true](https://es.catapult.org.uk/impact/projects/smart-systems-and-heat?newsletter_signup=true)
- The demand Centre: Dynamics of energy, mobility and demand <http://www.demand.ac.uk/>
- Project CALEBRE (2008 – 2013) brought together the multi-disciplinary expertise of six leading UK universities to address some of the many challenges associated with the energy efficiency refurbishment of the UK’s

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existing homes needed to help meet national carbon reduction targets.  
<https://www.lboro.ac.uk/microsites/enterprise/calebre/project-calebre-summary.pdf>

**Question 6:** What are the most important uncertainties that policy needs to take into account in thinking about achieving Net Zero? How can government develop a strategy that helps to retain robustness to those uncertainties, for example low-regrets options and approaches that maintain optionality?

ANSWER:

From a CIBSE perspective in respect to the sixth carbon budget the uncertainties most relevant to our work and that of our members are:

- How much can be expected from changes in behaviour – see Q5
- Savings to be achieved by retrofit: effectiveness, technical uncertainties (e.g. how to address air and moisture flows) - see our response to Q25 for best practice case studies and the CALEBRE project reports (<https://www.lboro.ac.uk/microsites/enterprise/calebre/project-calebre-summary.pdf>)
- The future availability of hydrogen and how it could contribute to gas grid decarbonisation. This particularly matters for properties with a high heat demand, which are not connected to heat networks and which may find it difficult (e.g. for technical or heritage conservation reasons) to reduce their demand and install heat pumps: relying on electric heating in those cases could prove expensive to run, and a high demand on the grid. At this stage, we would recommend signals from the CCC that the hydrogen option is retained for really hard to treat properties and uses for which gas provides a highly valuable function and which would find it hard to decarbonise in other ways (e.g. industry, heavy transport). The CCC's strong recommendation to avoid gas in new homes from 2025 was really useful at sending a strong signal; it should now develop similar signals for new non-domestic buildings and heat networks, to avoid locking buildings and areas into a gas-fired future if the hydrogen option does not materialise (or not at the scale required).
- Carbon capture and storage.

**Question 7:** The fourth and fifth carbon budgets (covering the periods of 2023-27 and 2028-32 respectively) have been set on the basis of the previous long-term target (at least 80% reduction in GHGs by 2050, relative to 1990 levels). Should the CCC revisit the level of these budgets in light of the net-zero target?

ANSWER:

It is unlikely that a 6<sup>th</sup> carbon budget putting the UK on track to net zero by 2050, with the steeper trajectory it requires, could be met as a single “catch up” step with the 4<sup>th</sup> and 5<sup>th</sup> budgets remaining the same as under the 80% target. Therefore, in an ideal world, yes, the 4<sup>th</sup> and 5<sup>th</sup> carbon budgets should be revised.

However, many of the policies and actions required to achieve the 6<sup>th</sup> carbon budget, if implemented now, will also benefit the emissions in the earlier periods, whose emissions could therefore be lower than under the 4<sup>th</sup> and 5<sup>th</sup> budget. As the CCC note in their Net Zero report, they have already identified cost-effective pathways that achieve better reductions than under the 4<sup>th</sup> and 5<sup>th</sup> budgets.

On balance therefore, and bearing in mind the resources available and the work required to do this, it may be preferable to focus on 1) setting a robust 6<sup>th</sup> carbon budget, 2) identifying which measures in that budget can be implemented now, in order to influence emissions as early as possible (effectively putting the UK onto or closer to the steeper required trajectory), 3) dedicating resources to ensure that the budgets are actually met and policies implemented and enforced – see also our response to Q10; 4) monitoring the impact of policies, gathering lessons learnt and using them to refine the effectiveness of policies and increase the changes that the 6<sup>th</sup> budget will be met.

**Question 8:** What evidence do you have of the co-benefits of acting on climate change compatible with achieving Net Zero by 2050? What do these co-benefits mean for which emissions abatement should be prioritised and why?

ANSWER:

Co-benefits are numerous, particularly in the area of health and wellbeing, and could help bring the public on board - see Appendix 1 from the upcoming CIBSE TM40 Health and Wellbeing in Building Services. This means that strategies that offer multiple benefits can and should be prioritised. However, there may be unintended consequences - see Ref3, often due to poor implementation but also on other issues (the obvious example being biomass heating and air quality – Ref4). This is one reason why we recommend caution about large-scale yet-unproven technologies, such as carbon air capture.

- **Benefits to health, comfort and fuel poverty reduction through housing retrofit:** This relies on careful design, quality construction, in-use monitoring, and good operation and maintenance to avoid unintended consequences such as poor indoor air quality and fabric degradation: refer to Appendix 2, an extract of the upcoming CIBSE TM40. See also Q25 for best practice case studies.
- **Impact of land use and transport policies** to encourage active lifestyles: these can reduce carbon emissions and bring benefits including physical and mental health, reduced noise, improved air quality and reduced urban

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heat island. Benefits could even include reduced requirements for roads and parking, with space becoming available for other uses such as cycle lanes, green spaces etc. Some can be achieved through electrification of transport (noise, heat island, partial reduction in air pollution), but the real benefits come from modal shifts to walking / cycling. We would refer to the RTPI and the TCPA for advice on available data and best practice. We would also recommend contacting NICE: their studies on the effect of transport policies on air quality are likely to contain useful data on trip reductions, which could be translated into carbon savings – see Ref2. There is however a lack of systematic monitoring of policies, which means that while the principles are sound, data and hard evidence are not widespread. We think this should also be a strong policy recommendation of the CCC. The RTPI have recently launched a research project on monitoring planning outcomes – Ref1 - the CCC could encourage that climate change and co-benefits are specifically looked at (if this is not already intended).

- Programmes encouraging **low-carbon products, systems and services could have benefits to the UK economy**, including job creation and export potential. We would refer to Wood Knowledge Wales ([woodknowledge.wales](http://woodknowledge.wales)), a programme to encourage wood-based industries, including timber construction, as well as giving attention to biodiversity and job creation. Obviously, the benefits of timber construction have to be balanced with the essential need for fire safety, and its implementation should be in the context of the Hackitt review.

#### **Evidence and references**

Ref1: RTPI, Measuring Planning Outcomes, started January 2020  
[www.rtpi.org.uk/outcomes](http://www.rtpi.org.uk/outcomes)

Ref 2: NICE guideline 70, Air pollution: outdoor air quality and health, 2017  
[www.nice.org.uk/guidance/ng70](http://www.nice.org.uk/guidance/ng70)

Ref 3: UCL research: The Unintended Consequences of Decarbonising the Built Environment  
<https://www.ucl.ac.uk/bartlett/environmental-design/research-projects/2018/nov/cbes-platform-grant-unintended-consequences-decarbonising-built>

Ref 4: Consultation on Air quality: domestic burning of house coal, smokeless coal, manufactured solid fuels and wet woods, including CIBSE response. This includes data and references on the contribution of domestic wood burning to air pollution:  
<https://www.cibse.org/News-and-Policy/Consultations/Closed-Consultations/Air-quality-domestic-burning-of-house-coal,-smokeless>

## C. Delivering carbon budgets

**Question 9:** Carbon targets are only credible if they are accompanied by policy action. We set out a range of delivery challenges/priorities for the 2050 net-zero target in our Net Zero advice. What else is important for the period out to 2030/2035?

ANSWER:

We respond to **policy recommendations** of Chapter 6 of the Net Zero report.

We very largely agree with the recommendations, and mostly reinforce them or add detail, except in the field of building performance:

**Building performance:** the CCC report states that “the foundations are in place” including “efficient buildings and low carbon heating”. We only partially agree with this. A fundamental change is needed to how building performance is addressed in regulations, otherwise the required energy and carbon savings will not be delivered. Both Building Regulations Part L and Energy Performance Certificates have significant limitations: they stop at the as-built stage, and only consider part of energy uses and carbon emissions. There is therefore a growing industry consensus calling for regulating actual in-use performance – see Ref1. This change should include incremental steps, starting from disclosure, with incentives for early adopters, and feedback loops for gradual improvements – see Ref 2.

A closely related challenge is the need for a legal framework which would allow the collection of building performance data to track progress and gather lessons, while protecting the privacy of citizens. We are pleased the CCC is already engaged on this issue and think this should inform their recommendations.

In addition, we have **strong concerns about consultation proposals for Part L and the Future Homes Standard**, which do not put us on track to zero carbon new homes: Q10 on local authority leadership, and Ref3 for details.

**“There is still no serious plan for decarbonising UK heating systems and no large-scale trials have begun for either heat pumps or hydrogen”:** we agree, with the caveat of some actions by BEIS such as the recent city decarbonisation programme, which the CCC are involved with. We would add, very importantly, that plans and large-scale trials must consider **retrofit as a whole**, not only heating systems. This is really important as retrofit is socially and technically challenging, so lessons need to be gathered to maximise energy and carbon savings and avoid unintended consequences – see also Q8 and Q25.

**“Clear leadership is needed right across Government”, and “The importance of innovation – learning by doing”:** we agree. Policy must be clear and stable, as well as ambitious – for example, by the government’s own assessment, the implementation of MEES in the domestic sector will only capture **about 55%** of the worse EPC-rated properties: we do not think this is an appropriate level of ambition and effectiveness – see ref5.

In addition, Government should show leadership across the public sector by adopting procurement policies consistent with the net zero carbon target NOW. This could achieve significant carbon savings, give confidence on policy commitments, and provide huge support to the development of skills and expertise – see Ref 4. As part of this, leadership from local planning authorities **MUST** be allowed – see Q10.

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We also stress the need for **appropriate resources**, including local authority ones, to allow proper implementation, enforcement and monitoring of policy – see Q10.

“**Investment and financing**”: we are aware a budget review has started but little information on its scope is available. See Q11 for suggested topics to look at.

### **Evidence and References**

Ref1: Building Performance Network joint position statement, signed by CIBSE and other organisations: <https://building-performance.network/advocacy/building-performance-joint-position-statement>

Ref 2: CIBSE position paper on the steps to net zero carbon: <https://www.cibse.org/getmedia/bdaf4dee-5980-4b58-871c-a24e88c010d4/CIBSE-Steps-to-net-zero-carbon-buildings.pdf.aspx> . This focuses on new builds to achieve net zero by 2030, but could inform a similar pathway for existing buildings, which would expand into the 2030-2035 period

Ref 3 – DRAFT CIBSE response to our current draft CIBSE response to the Part L & Future Homes consultation, including substantial amounts of evidence in Appendices – we will provide the CCC with our final response as soon as it is available.

Ref 4 – CIBSE response to joint committee enquiry on net zero carbon government. <https://www.cibse.org/News-and-Policy/Policy/Consultations/Closed-Consultations/Net-zero-government-inquiry>

Ref 5 – CIBSE consultation page on MEEs in the domestic sector, including links to the impact assessment and to CIBSE’s response. The final policy implemented a £3500 cap, equating to only 32% of the worse F and G stock achieving an E rating . <https://www.cibse.org/News-and-Policy/Consultations/Closed-Consultations/Amending-the-Private-Rented-Sector-Energy-Efficien>

**Question 10:** How should the Committee take into account targets/ambitions of UK local areas, cities, etc. in its advice on the sixth carbon budget?

ANSWER:

The main ways in which local authorities can influence carbon emissions include:

- As building control bodies
- As planning authorities
- Through Council activities including transport, engagement with citizens and local businesses etc.

For the first two points, they can only ensure the targeted carbon savings are delivered if they have **sufficient resources** (including training), the lack of which is currently well known. Before making any changes to the current regulation of emissions and energy related to buildings, there is an urgent need to address the

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widespread lack of proper compliance and enforcement activity for building work. Regulated or controlled work is often not compliant and the deregulatory attitude to building regulations over much of the past decade has only served to accelerate the decline in compliance and enforcement. In spite of previous calls by the CCC for better compliance, it has not been obvious that any action is being taken.

One option for the CCC to appraise the impact of this would be, for example, to assume:

- Adequate resources: full implementation, all savings delivered
- Resources as they currently are: partial savings e.g. 20% fewer savings” (we are not aware of actual quantifications of this, so this is an illustration only).

Furthermore, many local authorities have expressed a strong desire to show leadership and respond to the climate emergency, and started to develop climate action plans (a list, map and details of current actions is available at [www.climateemergency.uk](http://www.climateemergency.uk) ). Targets enforced as part of the planning system are a clear area where local authorities have direct control over local emissions and can make a significant difference. This is not only important in its direct impact on reducing emissions faster, but also in developing expertise and supply chains in areas where this is already viable, for the wider industry to ultimately benefit from.

This question is therefore extremely relevant NOW, as the current consultation on the Part L and the Future Homes Standard proposes to prevent local authorities from setting carbon targets beyond building regulations, either from 2020 or from 2025. For some local authorities, this would represent a step BACKWARDS compared to their current requirements; for many others, this would limit their plans going forward. Overall, **this could seriously put in question the ability of local authorities to deliver on their plans.**

We are aware of evidence received by the CCC about the impact of such a policy in the West of England. We would also refer to the response submitted by the Greater London Authority to the MHCLG consultation, which includes a similar impact assessment. We expect other local and regional authorities have carried out similar exercises, which will be made public as part of their response to the MHCLG consultation, and could therefore be used by the CCC for its assessment.

Broadly speaking, there will be 3 scenarios:

- No impact: MHCLG not implementing this proposal
- Medium impact: MCHLG implementing this proposal in 2025.
- High impact: MHCLG implementing this proposal in 2020.

As noted above, this would not even take account of the full impact, as early local leadership also ultimately benefits carbon savings and cost effectiveness elsewhere.

Altogether, this would create a combination of scenarios, from best to worst, taking account of local authority resources AND ability to show leadership.

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### **Evidence and references**

Submissions from local authorities to the Part L & Future Homes consultation, to be available from MHCLG after 7<sup>th</sup> February 2020.

Appendix 3: Draft CIBSE position paper on changes which could be made to the planning system NOW to improve its mitigation and adaptation strategies and maximise opportunities provided by the planning system.

**Question 11:** Can impacts on competitiveness, the fiscal balance, fuel poverty and security of supply be managed regardless of the level of a budget, depending on how policy is designed and funded? What are the critical elements of policy design (including funding and delivery) which can help to manage these impacts?

ANSWER:

This is not our area of expertise to comment on in detail, however we believe there are already measures which could be taken to support carbon reduction efforts as well as fairness, competitiveness and fuel poverty which would not require additional finances, but instead would re-allocate existing funds and financial incentives to better align them with carbon savings and fuel poverty objectives. These include:

- Carrying out an overall review of measures which, directly or not, and indirectly or not, subsidise or support the continued use of fossil fuels. This has already been recommended by the Environmental Audit Committee, in 2014 – see Ref1
- Review whether the funds available for winter fuel payments could be used to encourage energy retrofit instead. We appreciate this is a politically sensitive issue, however we think that 1) it is essential, as winter fuel payments represent on average 2 billion per year, and more on years with Cold Weather payments – Ref2, 2) currently, it effectively subsidises people to remain in inefficient and uncomfortable homes, often with health implications as well (see our response to Q8, including the references, which highlight the links between inefficient homes, fuel poverty and health). Strategies could be examined where this is not removed from households altogether, but options are presented to residents, with the co-benefits well explained, to encourage home improvements.
- Business rates: the way these are set are currently counter-incentives to energy efficiency improvements can result in increasing business rates. For evidence that this is an issue and ideas on how to address this, we would recommend contacting local authorities which are showing leadership in their climate action plans, for example the London Borough of Haringey. The methodology to set the rates could be reviewed to avoid this situation, and ideally encourage improvements (this could be revenue-neutral, if as a result more revenues were collected from the least efficient properties).
- Reduce the current VAT rate for energy retrofit, as this currently penalises works, compared to the zero rate applied to new build - see Ref 3 - and the reduced 5% rate for “energy saving measures” (VAT notice 708/6) is difficult to

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claim. Incidentally, this may also contribute to improvements in quality and chains of responsibility, as it would encourage more works to be declared rather than “cash in hand” to avoid VAT.

**References and Evidence:**

Ref 1 – Environmental Audit Committee, Energy Subsidies, Ninth Report of Session 2013-14

Ref 2 – Department for Work and Pensions, Winter fuel payments statistics

Ref 3 – UK GBC Report “Retrofit incentives”, 2013, Section 4.5

**Question 12:** How can a just transition to Net Zero be delivered that fairly shares the costs and benefits between different income groups, industries and parts of the UK, and protects vulnerable workers and consumers?

ANSWER: See our response to Q11.

## **D. Scotland, Wales and Northern Ireland**

**Question 13:** What specific circumstances need to be considered when recommending an emissions pathway or emissions reduction targets for Scotland, Wales and/or Northern Ireland, and how could these be reflected in our advice on the UK-wide sixth carbon budget?

ANSWER:

We do not have specific comments other than the obvious specific circumstances including:

- Different land use and availability characteristics, which offers challenges as well as opportunities. In terms of opportunities in the built environment, we would point to the fact that both the Scottish and Welsh governments have support programmes to forestry and the timber industry, which could generate opportunities for the whole of the UK. For Wales, we would refer in particular to Wood Knowledge Wales.
- Different socio-economic characteristics, including fuel poverty, availability of skills and supply chains, and housing market conditions (e.g. the ambitious carbon targets applied in some local planning authorities in England may not yet be viable in areas of lower housing values; this reinforces the need for these targets to be applied where they already can, to ultimately drive costs down elsewhere in the country – see our response to Q10).

**Question 14:** The Environment (Wales) Act 2016 includes a requirement that its targets and carbon budgets are set with regard to:

- The most recent report under section 8 on the State of Natural Resources in relation to Wales;
  - The most recent Future Trends report under section 11 of the Well-Being of Future Generations (Wales) Act 2015;
  - The most recent report (if any) under section 23 of that Act (Future Generations report).
- a) What evidence should the Committee draw on in assessing impacts on sustainable management of natural resources, as assessed in the state of natural resources report?
  - b) What evidence do you have of the impact of acting on climate change on well-being? What are the opportunities to improve people's well-being, or potential risks, associated with activities to reduce emissions in Wales?
  - c) What evidence regarding future trends as identified and analysed in the future trends report should the Committee draw on in assessing the impacts of the targets?
  - d) Question 12 asks how a just transition to Net Zero can be achieved across the UK. Do you have any evidence on how delivery mechanisms to help meet the UK and Welsh targets may affect workers and consumers in Wales, and how to ensure the costs and benefits of this transition are fairly distributed?

ANSWER:

a)

Beyond the obvious (Natural Resources Wales and the usual environmental organisations), we recommend contacting:

- the National Trust, who are a large landowner in Wales: they will hold substantial information on the state of natural resources and may also have carried out climate impact assessments on their properties, or be planning to do so.
- Wood Knowledge Wales, who have a work stream on biodiversity.

b)

We have commented here both on the impact of acting on climate change, but also the potential risks if NOT adapting to it. We focus on the built environment.

**This is UK-wide, not specific to Wales:**

The main impacts are risks of overheating, and (on the positive side), reduced winter deaths. Higher temperatures may be associated with air quality risks (e.g. ozone peaks), but there may also be benefits through reduced fossil fuel combustion for heating in winter. For relative impacts on excess summer and winter deaths due to climate change up to 2050, we have no additional data as we usually refer to the assessment produced by UCL for the CCC themselves.

We have also provided substantial evidence to government and parliamentary groups on overheating and the risks associated with heatwaves – see Ref1.

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  - d) Question 12 asks how a just transition to Net Zero can be achieved across the UK. Do you have any evidence on how delivery mechanisms to help meet the UK and Welsh targets may affect workers and consumers in Wales, and how to ensure the costs and benefits of this transition are fairly distributed?

For an overview of the links, co-benefits and potential unintended consequences, see our response to Q8 and Appendices 2 and 3.

**Specific to Wales:**

For an example of action which helps both acting on climate change AND helping health and wellbeing, we would refer to the Warm Homes programme, which for years has sought to jointly tackle fuel poverty, energy efficiency, comfort and health concerns in homes in Wales – see Ref 2.

d)

No additional evidence to that provided in response to Q12, and the examples of programmes targeted to fuel-poor households in our response to b).

**References and evidence:**

Ref 1 – CIBSE submission to heatwaves inquiry, 2018 <https://gov.wales/impact-health-welsh-government-warm-homes-schemes-html>

Ref 2 – The impact on health of the Welsh Government Warm Homes Schemes, published October 2019 <https://gov.wales/impact-health-welsh-government-warm-homes-schemes-html>

**Question 15:** Do you have any further evidence on the appropriate level of Wales' third carbon budget (2026-30) and interim targets for 2030 and 2040, on the path to a reduction of at least 95% by 2050?

ANSWER: No answer

**Question 16:** Do you have any evidence on the appropriate level of Scotland's interim emissions reduction targets in 2030 and 2040?

ANSWER: No answer

**Question 17:** In what particular respects do devolved and UK decision making need to be coordinated? How can devolved and UK decision making be coordinated effectively to achieve the best outcomes for the UK as a whole?

ANSWER:

We have no specific comments except to refer to the obvious aspects of land availability and renewable generation potential, which differ widely across the nations of the UK: these are areas where clearly coordination is crucial to maximise opportunities and minimise overall costs; ideally, coordination would also include more specific areas such as

- shared or mutually-recognised product and supply chain accreditation (e. g. product standards, competence schemes etc), where these are acknowledged to be crucial challenges to delivering zero carbon (e.g. relating to heat pumps, or to building retrofit works)
- Mechanisms for lessons sharing on technical issues and the implementation of policies.

In that respect (and appreciating the Environment Bill does not focus on climate change, but there are still relevant aspects and principles), the recent re-introduction of the Environment Bill to Parliament offers opportunities. The previous Bill was lacking in its commitments on climate change and on coordination across the nations, something that many organisations, including CIBSE, have stressed in our scrutiny of the Bill – see Ref 1, in particular §2.5, §12 and §18-20.

**Evidence and references:**

Ref 1: CIBSE response to the joint committee inquiry “Scrutiny of the draft (Principles and Governance) Environment Bill , 2019 <https://gov.wales/impact-health-welsh-government-warm-homes-schemes-html>

## E. Sector-specific questions

**Question 18 (Surface transport):** As laid out in Chapter 5 of the Net Zero Technical Report (see page 149), the CCC's Further Ambition scenario for transport assumed 10% of car miles could be shifted to walking, cycling and public transport by 2050 (corresponding to over 30% of trips in total):

- a) What percentage of trips nationwide could be avoided (e.g. through car sharing, working from home etc.) or shifted to walking, cycling (including e-bikes) and public transport by 2030/35 and by 2050? What proportion of total UK car mileage does this correspond to?
- b) What policies, measures or investment could incentivise this transition?

ANSWER: No answer

**Question 19 (Surface transport):** What could the potential impact of autonomous vehicles be on transport demand?

ANSWER: No answer

**Question 20 (Surface transport):** The CCC recommended in our Net Zero advice that the phase out of conventional car sales should occur by 2035 at the latest. What are the barriers to phasing out sales of conventional vehicles by 2030? How could these be addressed? Are the supply chains well placed to scale up? What might be the adverse consequences of a phase-out of conventional vehicles by 2030 and how could these be mitigated?

ANSWER: No answer

**Question 21 (Surface transport):** In our Net Zero advice, the CCC identified three potential options to switch to zero emission HGVs – hydrogen, electrification with very fast chargers and electrification with overhead wires on motorways. What evidence and steps would be required to enable an operator to switch their fleets to one of these options? How could this transition be facilitated?

ANSWER: No answer

**Question 22 (Industry):** What policy mechanisms should be implemented to support decarbonisation of the sectors below? Please provide evidence to support this over alternative mechanisms.

- a) Manufacturing sectors at risk of carbon leakage
- b) Manufacturing sectors not at risk of carbon leakage
- c) Fossil fuel production sectors
- d) Off-road mobile machinery

ANSWER:

a)

We are commenting here on industrial processes related to the production of construction materials and products. We have included it under (a) as UK construction products and materials include a large share of imports, i.e. they are at risk of carbon leakage, but there may also be an opportunity to reduce leakage in some areas - See Q3 for our view on the need to account for outsourced emissions. Support mechanisms could include:

- Supporting UK-based forestry and timber construction (including the manufacture of construction elements) could reduce the embodied impact of construction products AND reduce the current carbon leakage through import of construction materials manufactured elsewhere. For insight on forestry and timber industries, we would refer to Wood Knowledge Wales.
- Gradually including more emphasis of embodied carbon in building regulations and the planning system, starting with requiring assessments of embodied carbon in new buildings, moving to voluntary targets & incentives, and finally possibly regulation.
- Requirements to assess embodied and whole life impacts could also be incorporated at the planning stage when new building projects involve the demolition of existing buildings, instead of retrofitting them.
- This should be accompanied by a programme of public sector leadership, including consideration of embodied carbon in public procurement projects to support expertise and supply chains, including the production of Environmental Product Declarations (or similar standardised product assessments).

We would highlight that as data on embodied carbon, and knowledge of solutions, are still very much evolving, and as they are typically very context-specific and subject to many assumptions (e.g. the future lifetime of buildings) the first step must be data gathering, and a focus on “no regrets” or “win-win” solutions which are not detrimental to operational carbon. CIBSE have produced guidance on this for our members (Ref1, Ref2) and are now hoping to work with other institutions to produce joint industry guidance on this. We are also supporting research projects on the topic, and encouraging our members to gather data (including through the gathering of EPDs, which are currently rare for HVAC equipment and therefore a barrier to making informed low-carbon decisions.

As an aside but on a related matter: CIBSE are unclear how (or whether) the embodied carbon impact of works related to climate mitigation efforts (e.g. retrofit works) has been taken into account in its modelling and budgeting. It would be useful if this was confirmed in future reports.

**Question 22 (Industry):** What policy mechanisms should be implemented to support decarbonisation of the sectors below? Please provide evidence to support this over alternative mechanisms.

- a) Manufacturing sectors at risk of carbon leakage
- b) Manufacturing sectors not at risk of carbon leakage
- c) Fossil fuel production sectors
- d) Off-road mobile machinery

d)

Taking account of co-benefits would help: in particular, in the construction sector, electrification of plant, equipment and vehicles is now sometimes required by local authorities for air quality purposes, as the current solutions are otherwise often diesel-based. This has clear benefits for both carbon and air pollution.

Best practice examples in construction are available from the London Low Emission Construction Partnership ([www.clec.uk](http://www.clec.uk)).

Again, the public sector could lead by example by requiring this in the projects it procures.

#### **Evidence and references**

Ref 1 – CIBSE TM56 Resource Efficiency of Building Services, 2014

<https://www.cibse.org/Knowledge/knowledge-items/detail?id=a0q2000000817fO>

Ref 2 – LETI Embodied Carbon Primer, 2020, including contribution from CIBSE:

[www.leti.london/publications](http://www.leti.london/publications)

**Question 23 (Industry):** What would you highlight as international examples of good policy/practice on decarbonisation of manufacturing and fossil fuel supply emissions? Is there evidence to suggest that these policies or practices created economic opportunities (e.g. increased market shares, job creation) for the manufacturing and fossil fuel supply sectors?

ANSWER: No answer

**Question 24 (Industry):** How can the UK achieve a just transition in the fossil fuel supply sectors?

ANSWER: No answer

**Question 25 (Industry):** In our Net Zero advice, the CCC identified a range of resource efficiency measures that can reduce emissions (see Chapter 4 of the Net Zero Technical Report, page 115), but found little evidence relating to the costs/savings of these measures. What evidence is there on the costs/savings of these and other resource efficiency measures (ideally on a £/tCO<sub>2</sub>e basis)?

ANSWER: No answer

**Question 26 (Buildings):** For the majority of the housing stock in the CCC's Net Zero Further Ambition scenario, 2050 is assumed to be a realistic timeframe for full roll-out of energy efficiency and low-carbon heating.

- a) What evidence can you point to about the potential for decarbonising heat in buildings more quickly?
- b) What evidence do you have about the role behaviour change could play in driving forward more extensive decarbonisation of the building stock more quickly? What are the costs/levels of abatement that might be associated with a behaviour-led transition?

ANSWER:

Under “decarbonising heat”, we cover here both decarbonising the heat supply and, importantly, reducing demand in the first place through deep retrofit: this is an essential step.

(a)

It is technically possible:

For case studies, see Refs1-2-3-4 (some of these are non-residential but showcase best practice in challenging environments). We would also recommend speaking to the following key players:

- Historic England – Technical Conservation Team, for advice on measures, potential savings, and current energy consumption data
- Historic Environment Scotland
- The National Trust: not only have they reduced their carbon emissions in the past two decades (including very largely moving away from oil, a challenge when much of their stock is off the gas grid), they have recently committed to achieve net zero carbon by 2030.

It could happen faster if opportunities to drive deep retrofit through regulations and incentives were captured:

Incentives for energy efficiency measures are currently insufficient and have suffered from “chop and change”, as illustrated by the demise of the Green Deal. The rate of installation of some measures has even dropped see Ref5.

The main regulatory instruments to improve the energy and carbon performance of the existing stock are Building Regulations Part L and Minimum Energy Efficiency Standards, MEES, and to a smaller extent ECO, which only apply to part of the housing stock. There are serious limitations with these, in summary:

- the requirements are not onerous enough
- they do not require measures to be part of a long-term plan for zero-carbon, and therefore do not prevent “locking in” buildings i.e. measures may be implemented which make further, deeper retrofit at a later stage more expensive and difficult, or even impossible
- they do not encourage a whole-building approach, which creates risks of unintended consequences.
- there is a well-known gap between these assessments and actual performance, as illustrated in Appendix 5. As a result, there is growing industry consensus

**Question 26 (Buildings):** For the majority of the housing stock in the CCC's Net Zero Further Ambition scenario, 2050 is assumed to be a realistic timeframe for full roll-out of energy efficiency and low-carbon heating.

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that in-use performance should be subject to regulatory requirements – see Ref6.

Please see Appendix 4 for more information on these limitations, as well as Ref7 and Ref8 for our recent recommendations on MEES.

All of this relies on getting new buildings right:

Part of the 2050 stock will be today's new buildings. CIBSE do not think that the current consultation proposals for Part L 2020 and the Future Homes Standard put us on the right path to fully decarbonise the stock by 2050 – see details in Ref9. This must be addressed to avoid having to extensively retrofit this new generation of buildings by 2050.

It could happen faster through increased consumer demand and awareness:

A very important issue behind the current low take-up of energy retrofit is lack of trust in supply chains, and poor knowledge amongst home owners about what to do to improve the energy and carbon performance of their homes (or indeed, about whether it could and should be improved at all). Home owners may also not be aware of the full benefits, including the co-benefits (some of them discussed in Q8).

Following the Each Home Counts review, PAS 2035 and 2030 and TrustMark aim to build consumer trust, as well as building skills and expertise. However, they are only required on ECO works, which have a limited application. One driver could be a requirement to use them on all publically funded retrofit works, alongside a target for deep retrofit (PAS and TrustMark on their own do not set a target for deep savings).

We would also refer the CCC to the Greater London Authority, who have commissioned a review of existing building renovation passports (in the UK and abroad), what they could entail, and how they could be encouraged to achieve market penetration.

Evidence that it could happen through the development of skills and expertise:

There certainly needs to be care applied in the deep retrofit of the existing stock to avoid unintended consequences and deliver carbon savings and co-benefits – see Q26.

(b)

Behaviour change:

See Q5, including references.

**Question 26 (Buildings):** For the majority of the housing stock in the CCC's Net Zero Further Ambition scenario, 2050 is assumed to be a realistic timeframe for full roll-out of energy efficiency and low-carbon heating.

- a) What evidence can you point to about the potential for decarbonising heat in buildings more quickly?
- b) What evidence do you have about the role behaviour change could play in driving forward more extensive decarbonisation of the building stock more quickly? What are the costs/levels of abatement that might be associated with a behaviour-led transition?

### **Evidence and references:**

- Ref 1 – Marion Baeli, Residential Retrofit: Twenty Case Studies, 2013: based on the Technology Strategy Board programme to achieve 80% reduction in carbon emissions, on 20 case study homes: <https://www.architecture.com/riba-books/books/conservation-restoration/product/residential-retrofit-twenty-case-studies.html>
- Ref 2 – Enerphit: [https://www.passivhaustrust.org.uk/competitions\\_and\\_campaigns/passivhaus-retrofit/](https://www.passivhaustrust.org.uk/competitions_and_campaigns/passivhaus-retrofit/)
- Ref3: Fit for Future network – case studies (often in the non-domestic sector)
- Ref4: Trinity College Student Halls, Cambridge: <https://www.cibsejournal.com/case-studies/cambridge-first-exemplary-retrofit-of-grade-i-listed-halls-of-residence-at-trinity-college/> : exemplar retrofit of a Grade I-listed building, including the installation of internal insulation, with monitoring of the impact on moisture movement and fabric conditions.
- Ref 5: National Statistics, Household Energy Efficiency Statistics, headline release July 2019
- Ref6: BPN Joint Position Statement, 2019: <https://building-performance.network/advocacy/building-performance-joint-position-statement>
- Ref 7 – CIBSE response to MEES consultation in the domestic sector, 2018 <https://www.cibse.org/News-and-Policy/Consultations/Closed-Consultations/Amending-the-Private-Rented-Sector-Energy-Efficien>
- Ref 8 – CIBSE response to MEES consultation in the non-domestic sector, 2020 <https://www.cibse.org/News-and-Policy/Policy/Consultations/Closed-Consultations/Proposals-for-the-minimum-energy-efficiency-standa>
- Ref 9 – CIBSE response to Part L and Future Homes consultation, 2020 – to be available online from 10<sup>th</sup> February 2020: <https://www.cibse.org/News-and-Policy/Policy/Consultations/Current-Consultations/Changes-to-Part-L-and-Part-F-of-the-Building-Regul>
- CALEBRE project reports: <https://www.lboro.ac.uk/microsites/enterprise/calebre/project-calebre-summary.pdf>

**Question 27 (Buildings):** Do we currently have the right skills in place to enable widespread retrofit and build of low-carbon buildings? If not, where are skills lacking and what are the gaps in the current training framework? To what extent are existing skill sets readily transferable to low-carbon skills requirements?

ANSWER:

There are gaps in skills and expertise, partly because some solutions are not widespread yet but also because of the current low rate of retrofit, as detailed in our response to Q24. Support to increase this rate now would help gradually build expertise and supply chains.

**Retrofit:**

We need retrofit which is of quality, avoids unintended consequences, and either delivers deep savings now, or is part of a longer-term plan for deep retrofit. Please see our response to Q25 on PAS 2035 (and the expected PAS 2038, its equivalent for non-domestic buildings), TrustMark and how to driver their wider adoption.

We would also refer to the programmes funded by BEIS to develop retrofit skills and expertise in the supply chain, including those led by Urbed and Parity Projects: Ref 1.

**Low carbon heating:**

The MicroGeneration Certification Scheme supported the development of supply chain skills and expertise, but only covers installations of small size. In addition, CIBSE has produced Codes of Practice for the most complex heat pump, which are typically those facing more uncertainty and complexity (compared to air source heat pumps). There is a need to develop further guidance on systems such as large scale air source heat pumps, ambient loops, and the retrofit of existing heat networks initially designed for gas systems, to run with lower carbon systems (which will often require lower temperatures).

As other systems become more common, such as demand management and the integration of electric vehicles with buildings, so will the need for guidance, skills and expertise.

CIBSE are planning to produce guidance on this, including collaborations with other organisations, and we would be happy to discuss this with the CCC. We would however strongly recommend that, at the very least for small-scale installations and the domestic sector, attention should be given to retaining the MCS or an equivalent, regardless of what happens to the RHI. This has proved very useful in developing skills and expertise, as well as allowing the gathering of data and lessons learnt.

We are also aware (via the CCC) of a CITB –BEIS programme on skills for energy efficiency, but are not aware of the details and cannot therefore comment on this.

**Evidence and References:**

Ref 1: Energy efficiency demonstration projects, 2019

<https://www.gov.uk/government/publications/energy-efficiency-improvement-rates-local-supply-chain-demonstration-projects/local-supply-chain-demonstration-projects-summaries>

**Question 28 (Buildings):** How can local/regional and national decision making be coordinated effectively to achieve the best outcomes for the UK as a whole? Can you point to any case studies which illustrate successful local or regional governance models for decision making in heat decarbonisation?

ANSWER:

A very important point is to **allow local and regional leadership**, particularly on the issue of planning, in order to deliver carbon savings earlier and develop expertise and supply chains for the rest of the country – this must be allowed – see Q10.

Overall **coordination of key elements**, and how they translate from the national to the local levels, would be useful in order to share lessons, help cost effectiveness, standardise assumptions and align them with those used in CCC budgeting, and avoid double-accounting (particularly in the case of tree planting and carbon “offsets”). We recommend the following would be useful:

- Tree planting: Clear assumptions used in the national budgeting scenarios, accompanied with guidance, which would include:
  - Areas of tree planting in each region, or ideally per local authority; approximate figures both in numbers of trees and in ha would be useful. It should also be made clear whether these are net additional trees (or areas of forest), not just “gross” tree planting as part of the existing replacement cycles. Experts have also advised CIBSE that rather than talking purely in terms of tree planting, natural growth should also be considered, as happens in forests.
  - Carbon capture assumed per trees planted and/or per hectare, ideally explaining how factors such as variations in carbon capture based on trees’ maturity have been taken into account (e.g. do they align with the guidance and assumptions of Forest Research? See Ref 1, Ref2, Ref3), and whether any allowance has been made for non-survival rates after planting
  - Species assumed, and how they fit with other objectives, in particular biodiversity and flood prevention.
- Recommended assumptions for local and regional authorities who are producing zero carbon plans, including the approach to offsets, what can be expected from new and retrofitted buildings, and grid decarbonisation scenarios. Ideally, this would be accompanied by a central resource for lessons sharing and tracking of policy implementation and associated carbon emissions, so that best practice can be identified and progress can be assessed.
- **Local authority resources** will be crucial to actually deliver on the policy intent – see our response to Q10. Anecdotally, CIBSE attended a recent Green Building Council workshop on city-scale retrofit, where several local authorities reported that while a support and financing model such as the Heat Network Delivery Unit is useful, this is only the case for those local authorities who already have the capacity to deliver these projects, should they be successful at funding.

**Question 28 (Buildings):** How can local/regional and national decision making be coordinated effectively to achieve the best outcomes for the UK as a whole? Can you point to any case studies which illustrate successful local or regional governance models for decision making in heat decarbonisation?

**Examples:**

- We would suggest referring to [www.climateemergency.uk](http://www.climateemergency.uk), which has a list of local authorities having declared an emergency, with reference to their zero carbon plans and other related actions. Examples of local authorities showing leadership and developing plans to achieve zero carbon earlier than 2050 include the Greater London Authority, a number of London Boroughs (e.g. Haringey, Tower Hamlets, Islington, Camden), the Greater Manchester Combined Authority, and Bristol. All will have different challenges and opportunities (e.g. land availability, industry, budgets etc) and different models for their action plans, including varying levels of focus on job creation, health co-benefits, citizens and other stakeholder engagement, financing etc. A collective exercise would probably be useful (if this is not already happening) to share lessons and gather their key “asks” from central government.
- Greater London Authority: this is a great example of leadership in driving heat networks through coordinated actions including data gathering, guidance, policy, and funding. However, we would now recommend that the policy needs reviewing so that connections to heat networks are only required subject to actual carbon performance of the networks; existing gas-fired networks should also be required to develop transition plans towards low-carbon heat, or otherwise risk locking large areas of the city into a gas-fired future.
- BEIS-funded city heat decarbonisation trials: we are aware the CCC have a representative on the steering group.

**Evidence and references:**

Ref 1: Forest Research, Research Note, Understanding the role of urban tree management on ecosystem services, 2019

<https://www.forestresearch.gov.uk/research/understanding-role-urban-tree-management-ecosystem-services/>

Ref 2: Forest Research, Report, Ecosystem services delivery by large stature urban trees, 2019 <https://www.forestresearch.gov.uk/research/ecosystem-services-delivery-large-stature-urban-trees/>

Ref 3: Forest Research, Report, Ecosystem services delivery by small and medium stature urban trees, 2019 <https://www.forestresearch.gov.uk/research/ecosystem-services-delivery-small-and-medium-stature-urban-trees/>

**Question 29 (Power):** Think of a possible future power system without Government backed Contracts-for-Difference. What business models and/or policy instruments could be used to continue to decarbonise UK power emissions to close to zero by 2050, whilst minimising costs?

ANSWER: No answer

**Question 30 (Power):** In Chapter 2 of the Net Zero Technical Report we presented an illustrative power scenario for 2050 (see pages 40-41 in particular):

- a) Which low-carbon technologies could play a greater/lesser role in the 2050 generation mix? What about in a generation mix in 2030/35?
- b) Power from weather-dependent renewables is highly variable on both daily and seasonal scales. Modelling by Imperial College which informed the illustrative 2050 scenario suggested an important role for interconnection, battery storage and flexible demand in a future low-carbon power system:
  - i. What other technologies could play a role here?
  - ii. What evidence do you have for how much demand side flexibility might be realised?

ANSWER: No answer

**Question 31 (Hydrogen):** The Committee has recommended the Government support the delivery of at least one large-scale low-carbon hydrogen production facility in the 2020s. Beyond this initial facility, what mechanisms can be used to efficiently incentivise the production and use of low-carbon hydrogen? What are the most likely early applications for hydrogen?

ANSWER:

As mentioned earlier, the BEIS city heat decarbonisation project should provide useful lessons from the pilots, particularly the Leeds case study.

Apart from that, we are only commenting here on early applications: we would recommend that instead of the most likely, we think about the most valuable applications and where hydrogen could be recommended and “safeguarded” for use, i.e. where it fulfils a need that would be most difficult and/or expensive to meet through other means e.g.:

- heating of properties of very high heritage values which do not have access to a low-carbon heat network, where there are huge constraints to reduce heat demand, where electric heating would be prohibitively expensive, and where heat pumps would be unacceptable for heritage reasons or technically unfeasible. This should only be a very small number of properties.
- some industrial uses
- some heavy-duty vehicles and equipment, until electric alternatives are available.

Should hydrogen actually become financially viable and with proven carbon benefits (accounting for the carbon impacts of production), then obviously it would become an attractive option for existing properties connected to the gas grid and/or to gas-fed heat networks.

**Question 32 (Aviation and Shipping):** In September 2019 the Committee published advice to Government on international aviation and shipping and Net Zero. The Committee recognises that the primary policy approach for reducing emissions in these sectors should be set at the international level (e.g. through the International Civil Aviation Organisation and International Maritime Organisation). However, there is still a role for supplementary domestic policies to complement the international approach, provided these do not lead to concerns about competitiveness or carbon leakage. What are the domestic measures the UK could take to reduce aviation and shipping emissions over the period to 2030/35 and longer-term to 2050, which would not create significant competitiveness or carbon leakage risks? How much could these reduce emissions?

**ANSWER:**

As detailed in our response to Q3, we support the CCC's recommendation on aviation and shipping and are disappointed that this has not been taken into account in the Climate Change Act; we would encourage continued CCC advocacy on this, and consideration of the potential EU carbon tax on imports.

Refer to our response to Q22 on construction, embodied impacts and carbon leakage.

**Question 33 (Agriculture and Land use):** In Chapter 7 of the Net Zero Technical Report we presented our Further Ambition scenario for agriculture and land use (see page 199). The scenario requires measures to release land currently used for food production for other uses, whilst maintaining current per-capita food production. This is achieved through:

- A 20% reduction in consumption of red meat and dairy
- A 20% reduction in food waste by 2025
- Moving 10% of horticulture indoors
- An increase in agriculture productivity:
  - Crop yields rising from the current average of 8 tonnes/hectare for wheat (and equivalent rates for other crops) to 10 tonnes/hectare
  - Livestock stocking density increasing from just over 1 livestock unit (LU)/hectare to 1.5 LU/hectare

Can this increase in productivity be delivered in a sustainable manner?

Do you agree that these are the right measures and with the broad level of ambition indicated? Are there additional measures you would suggest?

**ANSWER:** No answer

**Question 34 (Agriculture and Land use):** Land spared through the measures set out in question 33 is used in our Further Ambition scenario for: afforestation (30,000 hectares/year), bioenergy crops (23,000 hectares/year), agro-forestry and hedgerows (~10% of agricultural land) and peatland restoration (50% of upland peat, 25% lowland peat). We also assume the take-up of low-carbon farming practices for soils and livestock. Do you agree that these are the key measures and with the broad level of ambition of each? Are there additional measures you would suggest?

ANSWER:

We cannot comment on the assumptions re take-up of low carbon practices, and the outcomes. However, we would recommend liaising with the National Trust, who are carrying out research of carbon absorption in soils related to changes in land use and farming practices.

See also our response to Q28 on the need for communicating the assumptions re tree planting at the national and local level.

**Question 35 (Greenhouse gas removals):** What relevant evidence exists regarding constraints on the rate at which the deployment of engineered GHG removals in the UK (such as bioenergy with carbon capture and storage or direct air capture) could scale-up by 2035?

ANSWER: No answer

**Question 36 (Greenhouse gas removals):** Is there evidence regarding near-term expected learning curves for the cost of engineered GHG removal through technologies such as bioenergy with carbon capture and storage or direct air capture of CO<sub>2</sub>?

ANSWER: No answer

**Question 37 (Infrastructure):** What will be the key factors that will determine whether decarbonisation of heat in a particular area will require investment in the electricity distribution network, the gas distribution network or a heat network?

ANSWER:

- **Electricity networks:** we cannot comment in detail and have received conflicting feedback from our members on how much pressure on the network the electrification of heat could represent (once heat demand has been reduced and demand management has been applied, including heat storage). From our understanding, the adoption of electric vehicles is likely to be a more significant driver, and anecdotal evidence suggests that priority areas needing reinforcement will include those likely to host early adopters of electric vehicles (i.e. typically, affluent areas). We recommend that a useful area of research in behaviour change would be how to incentivise delayed charging, to avoid peak demand from simultaneous charging when people go home at the end of the working day.
- **Gas distribution network:** it would seem reasonable to defer significant investment, if possible, until more certainty is available on the options for

**Question 37 (Infrastructure):** What will be the key factors that will determine whether decarbonisation of heat in a particular area will require investment in the electricity distribution network, the gas distribution network or a heat network?

producing hydrogen at scale in a financially viable and low-carbon way, so that investment can be made with the confidence that the grid could decarbonise (we understand other options are available and indeed already used, including the injection of bio-methane, but that they are not expected to have huge decarbonisation potential overall).

- Heat networks: these can be useful for decarbonisation in areas where interventions to significantly reduce heat demand are considered unacceptable (i.e. highly valuable and sensitive heritage buildings) and where there is enough density of suitable uses to generate a significant hot water demand (regardless of the demand for heat) e.g. housing, hotels, leisure centres, student halls. This typically leads to urban areas and clusters such as large campuses. Ideally, there would also be a mix of cooling-dominated buildings, allowing an ambient loop maximising the benefits of balancing the demands for heat and for cooling. Investment should also be subject to the availability of a source of low-carbon heat (e.g. ground, aquifer, waste heat from transport or other processes): heat networks as such have the POTENTIAL to take in a variety of sources, including low-carbon ones, but 1) currently, they most often are gas-fired, 2) the source needs to be very low carbon, since there are inherent inefficiencies in distribution and storage.

**Question 38 (Infrastructure):** What scale of carbon capture and storage development is needed and what does that mean for development of CO<sub>2</sub> transport and storage infrastructure over the period to 2030?

ANSWER: No answer

# APPENDIX 1 – CO-BENEFITS OF ACTING ON ENVIRONMENTAL (INCLUDING CLIMATE CHANGE) AND HEALTH AND WELLBEING FACTORS: EXTRACT FROM CIBSE TM40 HEALTH AND WELLBEING IN BUILDING SERVICES

Publication is expected early spring 2020.

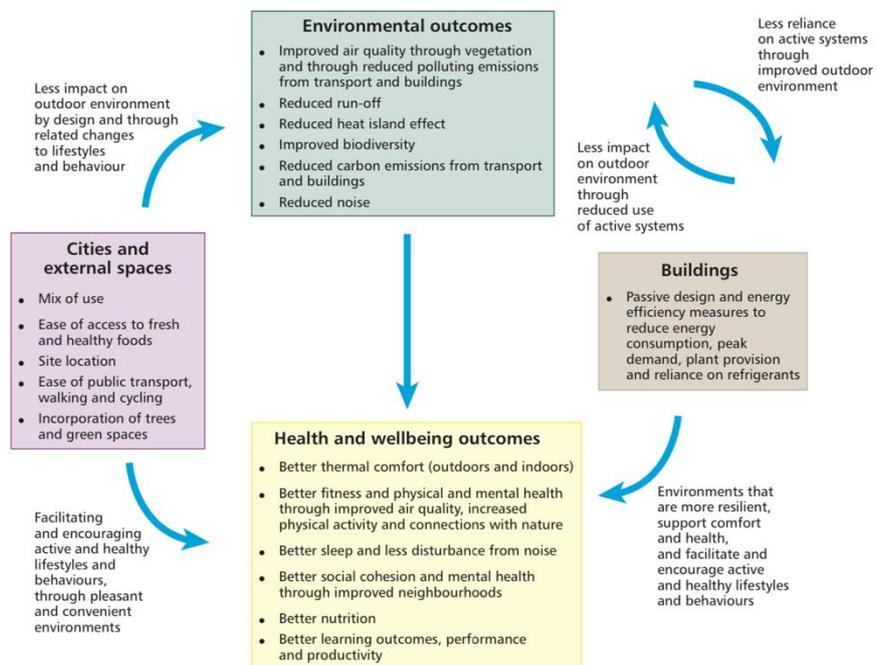


Figure 3.8 Examples of built environment influence on health and wellbeing, also showing synergies and potential conflicts with environmental issues (non-exhaustive, for illustration only)

## APPENDIX 2 - DOMESTIC REFURBISHMENT: POTENTIAL BENEFITS AND UNINTENDED CONSEQUENCES: EXTRACT FROM CIBSE TM40 HEALTH AND WELLBEING IN BUILDING SERVICES

Publication is expected early spring 2020.

### Thematic Box 8.1: Residential refurbishment

Energy efficiency improvements to the existing housing stock have been recommended for a number of years for energy savings and carbon reduction purposes. Regulations are increasingly put in place to this effect, for example in the UK the Minimum Energy Efficiency Standards for rented properties in England and Wales (TSO, 2015b), the government's ambition that all homes in fuel poverty should have an Energy Performance Certificate (EPC) at level C by 2030, and as many homes as possible by 2035 (HM Government, 2017).

In addition, housing conditions such as cold and damp are linked to negative health outcomes, particularly for people on low incomes; see sections 3.3, 7.1 and 8.1. Energy efficient homes in Europe, whether new or retrofitted, are on average linked to better health (Kephalopoulos et al., 2017), and home energy efficiency improvements are therefore recommended by recent EU EPBD amendments (OJEU, 2018; see section 3.8) and by public health professionals (NICE, 2015).

Reviews of energy efficiency improvements to UK homes have usually found small but significant positive impacts on health, particularly for households on low incomes, children, the elderly, and people in poor health. The benefits can be wide-ranging but are particularly noticeable in those with specific medical conditions, especially respiratory symptoms and mental health conditions (Maidment et al., 2013; Liddell and Morris, 2010; Thomson et al., 2013), as well as general comfort and living conditions (Poortinga et al., 2015).

There is, however, also evidence of potential unintended adverse impacts, chiefly from insufficient ventilation rates leading to high humidity levels promoting mould growth and HDM (Ucci, 2016; Bone et al., 2010), high levels of indoor pollutants (Bone et al., 2010), and increased overheating risk (DCLG, 2006b; BRE, 2014). In some cases there is also a risk of fabric degradation, particularly with solid wall insulation programmes which are poorly assessed or implemented (BRE, 2014).

Achieving energy efficiency savings as well as health benefits therefore crucially relies on the following (Ucci, 2016; Mawditt, 2017; Kephalopoulos et al., 2017; Weeks et al., 2013; BRE, 2014):

- adequate ventilation rates (energy savings would still be achievable through the overall retrofit)
- source control, to limit indoor pollutants such as combustion by-products and harmful VOCs
- careful assessment of the existing fabric and proposed technical solutions, including risk of thermal bridging and condensation; see guidance at the start of this section and Figure 8.3
- good workmanship and quality control procedures
- training of occupants post-refurbishment e.g. regular opening of windows, operation and maintenance of mechanical ventilation systems (see also Thematic Box 9.3).

#### Further sources of information

See list of references earlier in this section for guidance on condensation and thermal bridging risk. Guidance on energy efficiency measures is available from a large number of sources and is not covered here; see for example a review of the recent Innovate UK 'deep retrofit' programme (Baeli, 2013), and the STBA's Responsible Retrofit Guidance Wheel (<http://www.responsible-retrofit.org/greenwheel>).

Clients and design teams should investigate available incentives for energy efficiency improvements; in the UK these are increasingly seen jointly as energy and health schemes, and may therefore be available from a wide range of sources. See for example the Green Building Council's Renowiki database of incentive schemes (<http://buildupon.eu/initiatives>), Better Housing Better Health (<http://www.nef.org.uk/service/search/result/better-housing-better-health>) and Care and Repair Cymru (<http://www.nea.org.uk/wp-content/uploads/2016/03/CP741-Care-Repair-Cymru-1.pdf>).

Knowledge on impacts and solutions is still growing; see section 8.5 on emerging themes.

## APPENDIX 3 – CIBSE DRAFT POSITION PAPER ON PLANNING AND CLIMATE CHANGE

### Summary of issue

The Committee on Climate Change has highlighted that, in order for the UK to achieve its net zero carbon target by 2050, step changes are needed to decarbonise the building and transport sectors. The planning framework is central to this. It is a fundamental lever to deliver carbon mitigation and adaptation strategies from the building to the city level, as well as numerous other environmental, health and wellbeing benefits. CIBSE's recommendations for the planning framework (focusing on England and Wales) include new measures and ending policies which are currently inconsistent with the UK's climate change objectives.

### Key Points

#### 1. Environmental, health and wellbeing benefits

Low-carbon buildings and cities can deliver numerous benefits in addition to carbon emissions reduction. These include; low energy bills, high comfort levels, active lifestyles, and the multiple benefits of green infrastructure including biodiversity, improved air quality, lower run-off, and reduced urban heat island. This needs to be taken into account through a consistent system of planning requirements and incentives that truly encourage and reward the schemes which offer long-term benefits. To build widespread acceptance of low carbon policies, these multiple benefits also need to be made clear in the public discourse, when developing policy, and in decision making.

#### 2. Climate leadership from local authorities and applicants

Government should allow and encourage those who wish to adopt better carbon performance standards than Building Regulations minima, paving the way towards net zero carbon buildings. In addition to bringing direct carbon emissions benefits, this will ultimately support the whole industry by developing skills, expertise and cost efficiencies. This must include new buildings as well as works to existing buildings which are subject to planning permission. Measures should include:

2.1 Confirming that local authorities can set carbon performance standards beyond national standards, where viable.

2.2 Providing a common framework to minimise uncertainty and costs for applicants, including details of the Future Homes Standard as soon as possible. Local authorities should be allowed to set standards on that trajectory and should be encouraged to require evidence of operational performance, rather than relying on as-built standards only. See Further Information for details of our recommendations on Building Regulations.

2.3 Considering the creation of incentives for applicants to adopt net zero carbon standards e.g. reduced taxes, fast tracking of certain procedures.

2.4 Considering the creation of incentives for local authorities to require better-than-minimum standards, for example allowing them to retain a higher proportion of the proceeds from development (rather than them being

collected at the national level).

### **3. Local authority resources (staff, training, guidance)**

In addition to better implementation of current building regulations and planning policies, this could help make better use of several existing policies and tools which are currently underused. Enhancing local authority resources could deliver better carbon outcomes, as well as broader environmental, health and wellbeing benefits through the Social Value Act, policies to reduce construction waste (which reduce embodied carbon and other impacts), health impact assessments etc.

### **4. Overheating risk**

Local authorities should be required to address overheating risk in their policy and develop planning practice guidance accordingly. We must avoid creating a legacy of buildings which will need retrofitting or create risks to the health and comfort of occupants.

### **5. Retrofit for heritage buildings and conservation areas**

Government should develop planning guidelines on energy efficient, low carbon and climate adapted retrofit in collaboration with heritage bodies, the IHBC, CIBSE and other professional institutions. It is crucial that this be thought through in order to maintain the quality and integrity of our built heritage, while allowing the transition to a zero carbon built environment. This will require investment in resources and expertise, including conservation officers and energy / sustainability officers.

### **6. Permitted development rights (PDRs)**

While having a place for minor interventions, PDRs now apply to substantial developments, including housing. There are serious concerns about the consequences of this and should be reviewed by Government. These developments are a missed opportunity for local authorities to:

- 6.1 Apply higher standards than the minimum regulatory requirements, in particular on carbon reduction and adaptation measures.
- 6.2 Ensure that new development takes account of public transport and local amenities, to reduce reliance on private vehicles.
- 6.3 Receive contributions towards the local community, which could go towards carbon reduction and climate adaptation measures.

### **7. Transition towards electric vehicles and increasingly all-electric buildings**

This transition needs consideration of local infrastructure (capacity and needs) and of the interaction between buildings, infrastructure and the transport system (e.g. charging points, large-scale storage). Local authorities are well placed to consider and plan for this and Government should develop requirements and guidance to support them.

### **8. On-shore wind turbines in England and fracking**

It is not consistent with the UK's net zero carbon target to allow fracking, and therefore encourage a continued investment in fossil fuels, while since 2015 having a moratorium against onshore wind turbines. There should be a place

for large-scale renewable energy developments such as onshore wind turbines in order to allow the continued decarbonisation of the electricity grid. In order to build acceptance from the public and spread the benefits of such schemes, developments should require genuine community engagement, and encourage community energy schemes. These are proven to facilitate acceptance among local populations, who otherwise may only perceive negative local impacts.

### **CIBSE's Position**

CIBSE strongly recommend the above changes to ensure the planning framework is consistent with and helps deliver the UK's net zero target. This must be accompanied by better local authority resources to ensure the proper implementation of policy and the monitoring of outcomes.

### **Further Information**

- [CIBSE briefing notes on Building Regulations Part L – Steps to net zero, 2019](#)
- [CIBSE response to consultation on the National Planning Policy Framework, 2018](#)
- CIBSE Journal, Opinion column, Permitted Development Rights, October 2019
- [CIBSE response to Environmental Audit Committee inquiry on Heatwaves, 2018](#)

## APPENDIX 4 – LIMITATIONS OF PART L AND EPCS

### Why Part L and EPCs do not drive enough energy and carbon savings

In theory, there are incentives within Building Regulations Part L and EPC Recommendation Reports to trigger energy efficiency improvements. However, there are many issues with these methodologies:

- They only cover part of energy consumption (the 'regulated' part).
- Issues with the methodology mean that energy consumption tends to be under-estimated, particularly for non-domestic buildings but also in dwellings. In turn, this means that the possible savings achieved through interventions may also be under-estimated.
- Possible improvement measures are looked at as individual measures rather than as part of a whole building approach and a long-term plan. For example, to identify which measures are well carried out together or not, or to highlight that reduced plant could be installed if a set of efficiency measures were installed, thereby reducing the size of plant required, or the need for it altogether. This misses opportunities and potentially has negative consequences

They are based on design and as-built performance, not actual in-use performance.

#### Key issues with current requirements for retrofit

<p><b>Building Regulations Part L for existing buildings</b></p> <ul style="list-style-type: none"> <li>• Minimum standards for existing elements to be upgraded to</li> <li>• Minimum standards for new elements</li> <li>• Consequential improvements i.e. a requirement to review the feasibility of a range of measures and spend at least 10% of the project costs on their implementation, subject to their estimated payback being "reasonable"</li> </ul>	<p><i>Qualifying works to existing buildings</i></p>	<ul style="list-style-type: none"> <li>▲ Minimum standards are not onerous enough to deliver the 2050 net zero target.</li> <li>▲ Consequential improvements take a "shopping list" approach - see above.</li> <li>▲ Consequential improvements are only required subject to a "reasonable" payback period, whose calculation is flawed as savings may be under-estimated – see above.</li> <li>▲ Consequential improvements are often satisfied through measures proposed anyway for functional reasons as part of the refurbishment (e.g. new windows or heating plant), instead of really driving further energy efficiency or carbon saving measures.</li> </ul>
<p><b>Minimum Energy Efficiency Standards (MEES)</b></p> <p>All private rented properties (domestic and non-domestic) should achieve an EPC rating of E or better, unless the payback for the required measures exceeds what is considered "reasonable"</p>	<p><i>Private rented sector: at sale or new / renewed lease</i></p>	<ul style="list-style-type: none"> <li>▲ The target (EPC rating of E or better) is not onerous enough (the target may be changed to a B-rating by 2030 for non-domestic properties, under government consultation).</li> <li>▲ The target is based on EPCs: see limitations in box above.</li> </ul>
<p><b>Energy Company Obligation (ECO)</b></p>	<p><i>Low income, fuel poor and vulnerable homes</i></p>	<ul style="list-style-type: none"> <li>▲ ECO works typically consist of boiler replacement and/or energy efficiency measures; as the obligation focuses on heating affordability, it may not necessarily lead to the lowest carbon options, nor lead to deep retrofit.</li> </ul>

## APPENDIX 5 – EVIDENCE OF POOR RELATIONSHIP BETWEEN ACTUAL IN-USE ENERGY CONSUMPTION, AND EPCS

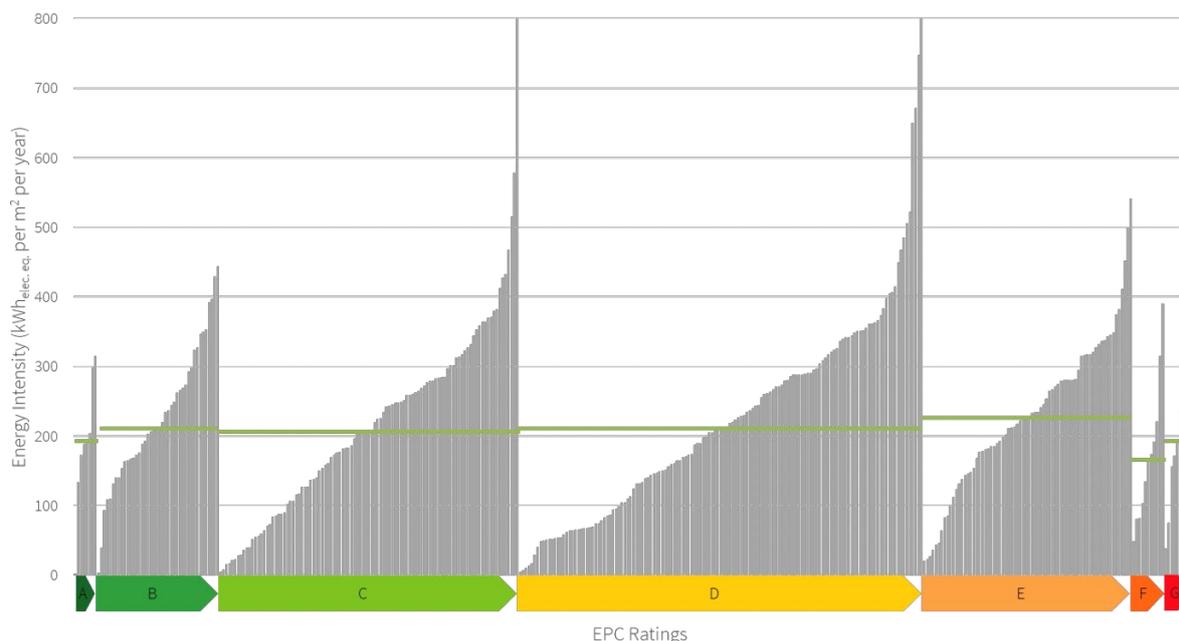


Figure 1: Illustration of disconnect between EPC bands and actual energy consumption in the office sector: Energy intensity of office buildings, by EPC rating. Each grey bar represents a single office building's energy intensity over the course of a year (credit: Better Buildings Partnership)

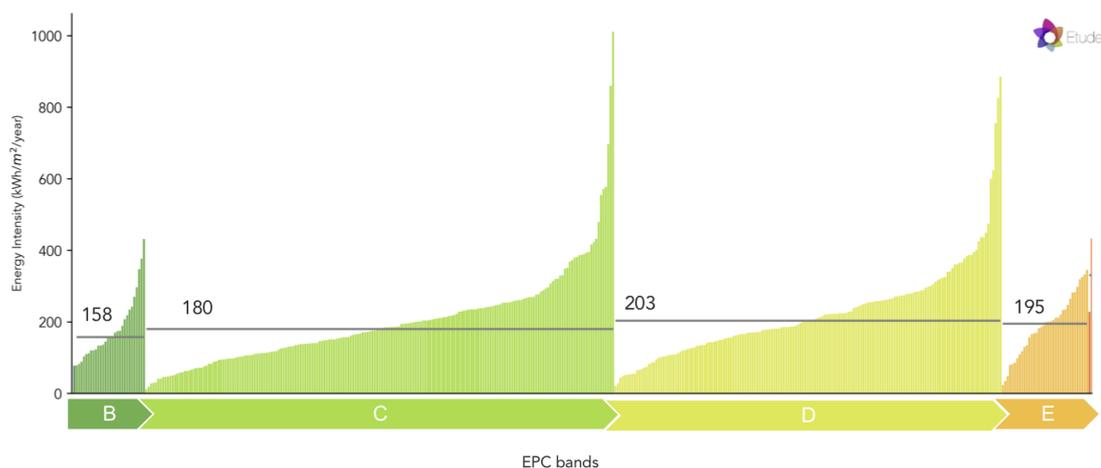


Figure 2: Illustration of disconnect between EPC bands and actual energy consumption in the domestic sector: Energy intensity of 410 homes across a local authority in England, by EPC rating. Each bar represents a single dwelling's energy intensity over the course of a year (credit: Etude)