Bristol Local Plan

Publication version: (November 2023)

Net zero and climate topic paper

Contents

Introduction

Purpose of this topic paper

This topic paper has been prepared to provide information on the council's proposed net zero and climate policies NZC1-5. These policies have been prepared as part of the local plan review process and are intended to support the council's wider ambition of creating a net zero, climate resilient city by 2030. It provides supporting information and evidence for the inclusion of these policies in the city's development plan.

The built environment and the climate emergency

The built environment is one of the key drivers of climate change. The government's heat strategy notes that the 30 million buildings in the UK were responsible for around 30% of the country's emissions in 2019.[1] This is a significant proportion of the UK's Nationally Determined Contribution as agreed at COP26, which commits the UK to a 68% reduction in CO_2 emissions by 2030 against 1990 levels. Heating requirements are by far the main source of these emissions from the built environment, particularly in the residential sector.[2]

As well as during their operational lifespan, demolitions and construction of new development has a significant climate impact in terms of waste and embodied carbon. These sources of emissions have often been neglected when considering the overall impact of the built environment on climate change. Their impact is significant however, accounting for 'some 40-50 million tonnes of CO_2 annually, more than the emissions from aviation and shipping combined.'[3]

In 2018, Bristol declared a climate emergency in response to the growing impacts of climate change both locally and globally. Bristol is already experiencing more extreme weather, including higher temperatures, a trend which is set to continue even if current commitments to mitigate climate change are successful. To meet this challenge, the council has committed to achieving a carbon neutral and climate resilient city by 2030 through the implementation of the One City Climate Strategy.

The strategy sets the objective for new buildings to be carbon neutral and climate resilient by 2030, a goal which the new local plan will support through development management policy. The local plan will also support the transition towards a more sustainable city through a range of related policy areas, including active travel and transport and biodiversity and green infrastructure.

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[1] HM Government, 'Heat and Buildings Strategy', October 2021, p.2, HM Government – Heat and Buildings Strategy (publishing.service.gov.uk)
[2] Ibid, p.29
[3] House of Commons Environmental Audit Committee, 'Building to net zero: costing carbon in construction, Final Report of Session 2022-23', May 2022, p.5, Sustainability of the built environment (parliament.uk)

Local plan review background

Bristol City Council currently has an adopted Local Plan which comprises of the following documents:

- The Bristol Core Strategy (2011).
- The Site Allocations and Development Management Policies (2014).
- The Bristol Central Area Plan (2015).
- Supplementary planning guidance.

The adopted local plan includes a number of policies which seek to address the climate impact of the built environment:

- BCS9: Green infrastructure. This policy aims to protect, provide, enhance and expand the green infrastructure assets which contribute to the quality of life within and around Bristol. It includes reference to the role green infrastructure can play in adapting to a changing climate.
- BCS13: Climate change. This policy sets out a requirement for development in Bristol to take into account the impact of climate change. Development is required, by a variety of means, to both mitigate its own impact on climate change and adapt to the effects of climate change.
- BCS14: Sustainable energy. This policy sets out a requirement for development to minimise its energy requirements and incorporate renewable and low-carbon energy supplies to reduce its carbon dioxide (CO_2) emissions. The policy also sets out broad criteria to be considered in assessing proposals for renewable and low-carbon energy development.
- BSC15: Sustainable design and construction. This policy aims to ensure new developments are designed and constructed to minimise their environmental impact and contribute to meeting targets for reductions in carbon dioxide (CO_2) emissions. The policy also includes broad criteria to be considered in the design and construction of new development and sets out principles for management of waste in new development.
- DM16: Open space for recreation. This policy highlights the importance of open space of appropriate quality and quantity. It includes reference to the role open space can play in adapting to a changing climate.
- DM27: Layout and form. This policy sets out criteria for assessing the layout, form and pattern of streets and open space and development blocks. It includes reference to the role open space can play in adapting to a changing climate.

Policies overview

Policies NZC1-5 builds on these existing requirements and addresses various aspects of the climate emergency:

- NZC1: Climate change, sustainable design and construction. This policy provides an overarching approach to mitigating and adapting to climate change, and to meeting local and national climate objectives.
- NZC2: Net zero carbon development – operational carbon. This policy requires development to achieve net zero carbon through maximising energy efficiency, utilising sustainable heating and cooling systems and incorporating onsite renewable energy generation.
- NZC3: Embodied carbon, materials and circular economy. This policy sets out how development should minimise embodied carbon, utilise sustainable materials and incorporate circular economy principles.
- NZC4: Adaptation to a changing climate. This policy sets out the council's approach to ensuring development in the city is designed to cope with the effects of climate change, both now and in the future.
- NZC5: Renewable energy and energy efficiency. This policy sets out the council's supportive stance on renewable energy generation in Bristol, particularly in the Bristol Port and Avonmouth area. The policy is also supportive of applicants seeking to improve the energy efficiency and sustainability of existing buildings.

The policy suite provides a comprehensive approach to mitigating and adapting to climate change, taking account of operational and embodied carbon, adaptation to a changing climate and its associated risks and the need for renewable energy generation and energy efficiency improvements across the city. They will support the council's ambition to make Bristol a net zero and climate resilient city by 2030.

Policy approach

National policy background

The Climate Change Act 2008

The Climate Change Act 2008 places the United Kingdom under a statutory obligation to achieve at least 100% lower emissions levels than the 1990 baseline by 2050. The duties set out in the act require the government to set carbon budgets every five years and report on their progress and the impact of climate change.

The National Planning Policy Framework

The NPPF recognises the important role of the planning system in the transition to a low carbon, sustainable future and in fulfilling the duties set out under the Climate Change Act 2008. The planning system should help to:

'Shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings and support renewable and low carbon energy and associated infrastructure.'[4]

It notes further that local plans should take a:

'Proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure.'[5]

Given the strong connection between the built environment and the drivers of climate change, promoting the energy efficiency and sustainability of new and existing buildings and increasing local renewable energy generation are key to ensuring the transition to a net zero society.

Local planning authorities and energy efficiency standards

Planning and Energy Act 2008

Local planning authorities are allowed to set energy efficiency standards that exceed Building regulations. This power is established in the Planning and Energy Act 2008:

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[4] DLUHC, 'National Planning Policy Framework', 2023, p.45 National Planning Policy Framework (publishing.service.gov.uk).
[5] Ibid.

'(1) A local planning authority in England may in their development plan documents, and a local planning authority in Wales may in their local development plan, include policies imposing reasonable requirements for—

> *(a) a proportion of energy used in development in their area to be energy from renewable sources in the locality of the development;*
>
> *(b) a proportion of energy used in development in their area to be low carbon energy from sources in the locality of the development;*
>
> *(c) development in their area to comply with energy efficiency standards that exceed the energy requirements of building regulations. …*

(4) The power conferred by subsection (1) has effect subject to subsections (5) to (7) and to—

> *(a) section 19 of the Planning and Compulsory Purchase Act 2004 (c. 5), in the case of a local planning authority in England;*
>
> *(b) section 62 of that Act, in the case of a local planning authority in Wales.*

(5) Policies included in development plan documents by virtue of subsection (1) must not be inconsistent with relevant national policies for England.'[6]

For local planning authorities to set energy efficiency and renewable energy standards they must be reasonable, not inconsistent with national policy, and compliant with the wider provisions of the Planning and Compulsory Purchase Act 2004. Setting the standards included in NZC1-5 is consistent with meeting the duties of the Climate Change Act 2008, particularly given the close alignment of the plan period (up to 2040) and the 2050 net zero target.

Deregulation Act 2015 and written ministerial statement

In 2015, the government announced an intention to amend the Planning and Energy Act 2008 through the Deregulation Act 2015. Provisions in the Deregulation Act would have removed the ability for local authorities to set standards that go beyond building regulations. A written ministerial statement was also issued that stated that local plan policies should not exceed the standards found in Level 4 of the Code for Sustainable Homes.

This provision of the Deregulation Act has never been brought into force; and in 2021, the then Ministry of Housing, Communities and Local Government, in response to the Future Homes Standard consultation noted that its implementation is not planned.[7]

The content of the written ministerial statement has been overtaken by events. At the time of writing, Level 4 of the Code for Sustainable Homes was equivalent to a 19% reduction in

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[6] Planning and Energy Act, 2008. [Planning and Energy Act 2008 (legislation.gov.uk)]

[7] Ministry of Housing, Communities and Local Government, 'The Future Homes Standards: 2019 Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the building regulations for new dwellings: Summary of responses received and government response', 2021, pp. 19-20. [The Future Homes Standards Consultation (assets.publishing.service.gov.uk)]

CO_2 from Part L 2013. The current requirement under Part L is for a 31% reduction, meaning any requirement is necessarily one that exceeds level 4 of the code.

In the response to the Future Homes Standard consultation, the government acknowledged the 'confusion and uncertainty' that this apparent inconsistency has caused:

'2.34 The Planning and Energy Act 2008 was amended in 2015 to provide Government with powers to stop local planning authorities from being able to exceed the minimum energy efficiency requirements of the building regulations, but this amendment has not been commenced. In the same year, the then Government set out in a Written Ministerial Statement an expectation that local planning authorities should not set energy efficiency standards for new homes higher than the energy requirements of Level 4 of the Code for Sustainable Homes…

2.35 While some local planning authorities are unclear about what powers they have to set their own energy efficiency standards and have not done so, others have continued to set their own energy performance standards which go beyond the building regulations minimum and in some cases beyond the Code for Sustainable Homes…

2.39 To provide some certainty in the immediate term, the government will not amend the Planning and Energy Act 2008, which means that local planning authorities will retain powers to set local energy efficiency standards for new homes.'[8]

Other local authorities in England

Policies which both use approaches similar to those proposed by Bristol City Council, and which go beyond national building regulations are already in place in England. These examples support the council's position of the ability for local authorities to set standards that exceed building regulations.

In June 2022, Bath and North East Somerset sought clarification on whether or not their approach of setting standards which exceeded building regulations was sound as part of their local plan partial update examination. In correspondence with the then Department for Business, Energy and Industrial Strategy it was again confirmed that:

- *'Plan-makers may continue to set energy efficiency standards at the local level which go beyond national building regulations standards if they wish.*
- *Local planning authorities have the power to set local energy efficiency standards through the Planning and Energy Act 2008.*
- *In January 2021, we clarified in the Future Homes Standard consultation response that in the immediate term we will not amend the Planning and Energy Act 2008, which means that local planning authorities still retain these powers.'* [9]

In the final report on the examination of Cornwall's 'Climate Emergency Development Plan', the inspector notes that:

[8] Ibid.

[9] Bath and North East Somerset, 'EXAM10: Policy SCR6: Note on the setting of local energy efficiency standards for new build development', 2022, p.3. EXAM 10 Note on Local Energy Efficiency Targets (bathnes.gov.uk)

‘166. Provisions to allow Councils to go beyond the minimum energy efficiency requirements of the building regulations are part of the Planning and Energy Act 2008. The WMS of 25 March 2015 says that in terms of energy performance, Councils can set and apply policies which require compliance with energy performance standards beyond the requirements of the building regulations until the Deregulation Bill gives effect to amendments to the Planning and Energy Act 2008. These provisions form part of the Deregulation Act 2015, but they have yet to be enacted. Further, the Government has confirmed that the Planning and Energy Act 2008 will not be amended. The result of all this is that Councils are able to set local energy efficiency standards for new homes, without falling foul of Government policy.

167. The WMS of 25 March 2015 has clearly been overtaken by events. Nothing in it reflects Part L of the Building regulations, the Future Homes Standard, or the Government’s legally binding commitment to bring all greenhouse gas emissions to net zero by 2050. In assessing the Council’s approach to sustainable energy and construction, the WMS of 25 March 2015 is of limited relevance. The Framework makes clear in paragraph 152 that the planning system should support the transition to a low carbon future in a changing climate. Whilst paragraph 154 b) of the Framework requires that any local requirements for the sustainability of buildings should reflect the Government’s national technical standards, for the reasons set out, the WMS of 25 March 2015 has been superseded by subsequent events. While it remains extant, any inconsistency with its provisions does not mean that the approach the Council has taken lacks justification. In that sense, there is nothing in the Council’s approach that raises issues of soundness.’[10]

Policy NZC1: Climate change, sustainable design and construction

This overarching policy sets out issues which need to be considered within sustainability statements. It also links through to the other detailed policies in the NZC chapter. It sets a number of requirements:

- Sustainability assessments for certain types of development based on BREEAM and BREEAM Communities.
- A water efficiency target.
- A requirement for development to be designed to be flexible and adaptable, enabling changes of use or layout and future refurbishment.
- A requirement for development to make efficient use of land and support sustainable transport choices.

[10] Planning Inspectorate, ‘Report on the examination of the Cornwall Council Climate Emergency Development Plan Document’, 2023, p.35. Cornwall Climate Emergency DPE Final Report

BREEAM

The requirement for a BREEAM 'Excellent' rating for major non-residential development has been carried over from policy BCS15. BREEAM is an established suite of validation and certification systems for a sustainable built environment. It is well understood by the industry and ensures that development addresses a range of sustainability issues, not just energy and carbon.[11] A study by the Currie & Brown and the Centre for Sustainable Energy identified that the additional costs of achieving BREEAM Excellent are likely to be in the range of a 1-2% cost uplift.[12]

The requirement for a BREEAM Communities assessment has also been carried over from policy BCS15. It is aimed at larger scale developments, and provides a framework to support planners, local authorities, developers and investors to integrate and assess sustainable design in the master planning of new communities and regeneration projects.[13]

Water efficiency

Building regulations Part G for new dwellings allows an enhanced optional standard of 110 litres/person/day to be applied by local planning policy.

The Bristol Water Final Water Resources Management Plan 2019 states that Bristol Water have a long term target to achieve average water consumption of 110 litres/person/day by 2050.[14] This target covers both existing and new development, and any new residential in the local plan period will still exist in 2050. Consequently, the council will expect new development to achieve 110 litres/person/day. The Water Resources Management Plan notes that Bristol Water's modelling indicates a 15% shortfall on the 2050 target. It states that achieving the target will require 'collaborative working with other water companies and local authorities as well as action by government' and 'enhanced water efficiency requirements for new homes.'[15]

Policy NZC2: Net zero carbon development – operational carbon

The Bristol One City Climate Strategy sets an objective for new buildings to be carbon neutral by 2030.[16] Buildings constructed during the plan period will still exist in 2050 when the UK aims to have achieved net zero. Therefore, energy standards for new building should be compatible with and support reaching this target. The UK Green Building Council (UKGBC) defines net zero carbon – operational energy as being 'when the amount of carbon

[11] How BREEAM Works - BRE Group
[12] Currie & Brown and the Centre for Sustainable Energy, 'Cost of carbon reduction in new buildings', 2018 cost_of_carbon_reduction_in_new_buildings_report_publication_version.pdf (bathnes.gov.uk)
[13] BREEAM Communities - BRE Group
[14] Bristol Water, 'Bristol Water Final Water Resources Management Plan 2019', 2019, pp.6 Microsoft Word - Bristol Water Final WRMP 2019 (August 2019) REDACTED (hubspotusercontent30.net)
[15] Ibid.
[16] Bristol One City, One City Climate Strategy, 2020, pp.15 one-city-climate-strategy.pdf (bristolonecity.com)

emissions associated with the building's operational energy on an annual basis is zero or negative. A net zero carbon building is highly energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset.'[17]

Energy use in new development

The policy requires development to calculate and report predicted energy use intensity using an energy performance model. This is a change in method from the current policy BCS14 Sustainable Energy, which uses a CO_2 metric calculated by a building regulations compliance model.

There is a growing consensus that energy use based metrics are better aligned to achieving net zero development than CO_2 metrics calculated using a building regulations compliance model. Organisations including the Chartered Institution of Building Services Engineers (CIBSE), Royal Institute of British Architects (RIBA), UKGBC, the UK Net Zero Carbon Buildings Standard and Low Energy Transformation Initiative (LETI) support the use of such metrics. The reasons for adopting this approach include:

- Building regulations compliance models only cover a proportion of energy use (regulated energy), which includes fixed services for heating, hot water, cooling, lighting, fans and pumps. However, local and national emissions targets include emissions of all energy use associated with buildings. There is the opportunity to influence and abate the emissions associated with unregulated use at the design stage.
- The methodology of building regulations compliance models is a relative improvement over a 'notional building', not an absolute performance metric. This means that a key element of energy efficient design – the building form – is not rewarded.[18]
- Building regulations compliance models significantly underestimate space heating demand. There is evidence that real world space heating demand of new dwellings is up to 100% higher than predicted by compliance models.[19]18 This is also a significant issue for non-residential buildings.[20] This devalues the effect of fabric and heating system efficiency measures.
- There is poor correlation between the results of building regulations compliance models and the likely real word performance of buildings.[21]

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[17] UKGBC, 'Net Zero Carbon Buildings: A Framework Definition', 2019 Net Zero Carbon Buildings: A Framework Definition | UKGBC

[18] CIBSE, UCL, Clarion Housing Group, Etude, Levitt Bernstein, Elementa, WSP, 'Making SAP and RdSAP 11 fit for Net Zero: A report for the Department for Business, Energy and Industrial Strategy', 2021, pp.35-37 20200344-SAP11-Scoping project report-Rev K (FULL REPORT) (cibse.org)

[19] Ibid.

[20] CIBSE, LETI, 'NCM Call for Evidence Joint Submission by CIBSE and LETI', 2022, pp.4-5 2022-ncm-call-for-evidence-joint-submission-by-cibse-and-leti.pdf

[21] Buro Happold, 'Bristol City Council Zero Carbon Heating and Cooling Study', 2022, pp.41, 70, Bristol City Council zero carbon heating and cooling study

- The carbon metric in building regulations compliance models uses short-term carbon factors which are rapidly out of date and do not reflect the lifetime carbon impact of decisions.[22] The regular updating of the carbon factors means that it is difficult to compare the performance of buildings constructed at different times, unlike an energy metric.
- There is uncertainty about the Future Homes Standard and the Future Buildings Standard. These updates to the building regulations are intended to require 'world-leading levels of energy efficiency' and net zero ready buildings and are planned to come into force in 2025. At time of writing, there are no up-to-date details on these standards and whether they will support meeting the legal duties of the Climate Change Act 2008. If these standards continue to follow the current building regulations approach, then the council considers it necessary for more net zero appropriate standards to be adopted. If the building regulations compliance models' methodologies are updated in line with the industry recommendations in 'Making SAP and RdSAP 11 fit for Net Zero: A report for the Department for Business, Energy and Industrial Strategy', then these models could be used to demonstrate compliance with Policy NZC2. [23]

The policy also includes an energy hierarchy, which aligns with standard industry approaches such as the UKGBC Net Zero Carbon Buildings: Framework Definition,[24] requiring:

- High levels of energy efficiency.
- Meeting heating and cooling needs in a sustainable manner.
- On-site renewable energy to be maximised.
- Remaining energy requirements to be offset.

Buildings cannot be viewed in isolation from the wider local and national energy system and should support decarbonisation of the city and electricity grid. The energy hierarchy supports this aim through minimising demands on the wider energy system, supporting the adoption of sustainable heating technologies in the city.

Highly energy efficient development is a vital part of the net zero energy hierarchy. It is sometimes argued that with the projected decarbonisation of the electricity grid, a building that only uses electricity can be zero carbon. However, there is a limit to the available zero carbon energy supply in the UK and if buildings are energy inefficient the UK's total energy demand will exceed the available zero carbon supply.

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[22] CIBSE, UCL, Clarion Housing Group, Etude, Levitt Bernstein, Elementa, WSP, 'Making SAP and RdSAP 11 fit for Net Zero: A report for the Department for Business, Energy and Industrial Strategy', 2021, pp.35-37 20200344-SAP11-Scoping project report-Rev K (FULL REPORT) (cibse.org)

[23] CIBSE, UCL, Clarion Housing Group, Etude, Levitt Bernstein, Elementa, WSP, 'Making SAP and RdSAP 11 fit for Net Zero: A report for the Department for Business, Energy and Industrial Strategy', 2021, 20200344-SAP11-Scoping project report-Rev K (FULL REPORT) (cibse.org)

[24] UKGBC, 'Net Zero Carbon Buildings: A Framework Definition', 2019 Net Zero Carbon Buildings: A Framework Definition | UKGBC

The UKGBC carried out a study into this as part of their work assessing net zero compatible energy efficiency targets. It shows that the UK's energy demand in 2020 would need to reduce by more than half by 2050 to match the available supply, as illustrated in Figure 1. [25] This supports the need for high levels of energy efficiency.

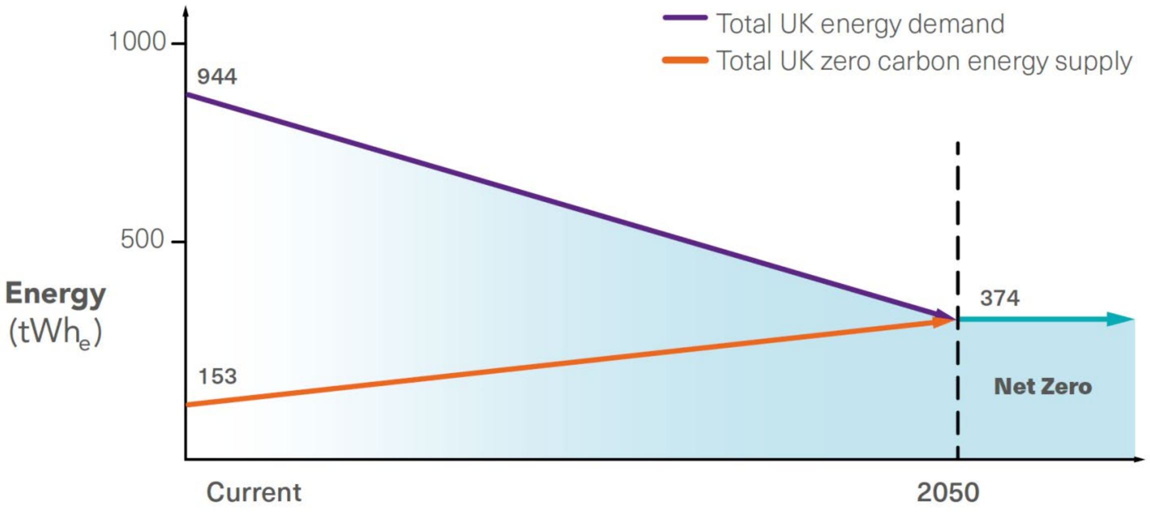

Figure 1 Illustrative energy demand and zero carbon energy supply pathways (Source: UKGBC).[25]

Specific standards for development

Space heating demand

Under current building regulations standards, space heating is one of the most significant contributors to energy demand. It can account for 40% to 65% of the total energy use of a home. [26] As discussed earlier, building regulations compliance models significantly underestimates the space heating demand. To better address the importance of space heating in overall energy demand the policy contains a limit on space heating demand. This provides a simple metric that assesses the efficiency of the building's form and fabric.

The policy sets a limit of 15-20kWh/m²/year space heating demand. This aligns with the recommendations of the CCC, who recommend that this is level of performance is required by 2025 at the latest. They also note that this 'can save consumers money on bills, provide comfort and health benefits, deliver some reduction in annual and peak electricity demand, and provide an industrial opportunity for the UK to export innovation and expertise.'[27]

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[25] UKGBC, 'Energy performance targets for net zero carbon offices: Technical report and summary of consultation responses', 2020, pp.4 Energy-performance-targets-for-offices-technical-report.pdf (ukgbc.org)

[26] Etude and Currie & Brown, 'Technical Evidence Base for Policy SEC 1 – New Housing', 2021 Technical Evidence base for policy section 1 - new housing (cornwall.gov.uk)

[27] Committee on Climate Change, 'UK housing: Fit for the future?', 2019, pp.63 UK housing: Fit for the future? - Climate Change Committee (theccc.org.uk)

The UKGBC Net Zero Whole Life Carbon Roadmap sets out a trajectory for the decarbonisation of the built environment sector to net zero by 2050. The roadmap recommends a 15kWh/m²/year space heating design limit for new homes from 2025.[28]

Modelling studies by Etude and Currie & Brown for Bristol City Council and Cornwall Council show that the 15-20kWh/m²/year space heating target is technically achievable for residential typologies. [29]

A modelling study for the West of England Combined Authority (WECA) and its constituent unitary authorities to support the development of Spatial Development Strategy and local plans tested a 15kWh/m²/year space heating target for offices and schools, two of the most common non-residential building types. [30] The cost uplift from Part L 2021 due to energy efficiency improvements, which included the building fabric specification needed to meet this, was between 0.9% and 1.9%.

Residential

Policy NZC2 requires that residential development achieves a maximum energy use intensity (EUI) of 35kWh/m²/year. This includes both regulated and unregulated energy consumption.

The target is intended to be an energy efficiency target that is compatible with the building sector achieving net zero. This target is consistent with the recommendations in the UKGBC Net Zero Whole Life Carbon Roadmap which says that new homes should target an EUI of 35-40kWh/m²/year from 2025.[31] RIBA also recommend that homes being designed now should target 35kWh/m²/year.[32] A benefit of aligning the local plan target with these organisations is that it provides a consistent target for the industry to aim for.

The EUI target is supported by modelling studies carried out by Etude and Currie & Brown for Bristol City Council and Cornwall Council.[33] These studies demonstrate that that target is technically achievable for all residential typologies and provides cost uplift figures compared to minimum building regulations standards that have been used in the viability assessment of the local plan.

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[28] UKGBC, 'Net Zero Whole Life Carbon Roadmap' 2021, pp.41 UKGBC-Whole-Life-Carbon-Roadmap-A-Pathway-to-Net-Zero.pdf

[29] Etude and Currie & Brown, 'Technical Evidence Base for Policy SEC 1 – New Housing', 2021 Technical Evidence base for policy section 1 - new housing (cornwall.gov.uk); and Etude and Currie & Brown, 'Technical Evidence Base for New Housing Policy – High Rise', 2023 Technical evidence base for new housing policy: high rise (bristol.gov.uk)

[30] WSP, 'West of England Evidence Base for Net Zero Building Policy: Operational Carbon for Non-Domestic Buildings', 2021 Spatial-Development-Strategy-Evidence-base-for-Net-Zero-Building-Policy-Operational-Carbon-for-Non-Domestic-Buildings-Jan-2022.pdf (westofengland-ca.gov.uk)

[31] UKGBC, 'Net Zero Whole Life Carbon Roadmap' 2021, pp.41 UKGBC-Whole-Life-Carbon-Roadmap-A-Pathway-to-Net-Zero.pdf

[32] RIBA, 'RIBA 2030 Climate Challenge' 2021 https://riba-prd-assets.azureedge.net/-/media/Files/Climate-action/RIBA-2030-Climate-Challenge.pdf?rev=897af1b2ca864a269c8a48c4522746b7

[33] Etude and Currie & Brown, 'Technical Evidence Base for Policy SEC 1 – New Housing', 2021 Technical Evidence base for policy section 1 - new housing (cornwall.gov.uk); and Etude and Currie & Brown, 'Technical Evidence Base for New Housing Policy – High Rise', 2023 Technical evidence base for new housing policy: high rise (bristol.gov.uk)

Non-residential

At the time of writing the policy NZC2, there was not sufficient available evidence of net zero compatible energy use intensity targets that covered the full breadth of non-residential development types. Therefore, the policy requires that non-residential development achieves the energy related minimum standards for BREEAM Excellent. BREEAM is periodically updated to reflect good practice in the industry.

Renewable energy provision

A study by Etude and Currie & Brown for the Cornwall Council Climate Emergency DPD demonstrates that it is technically feasible for residential development of up to six storeys to generate sufficient renewable electricity on-site to match its annual energy demand.[34] A supplementary study for Bristol City Council showed that high-rise residential development could generate sufficient renewable electricity on-site to match demand if façade mounted PV was used. The council recognises the fire safety challenges involved with the use of façade mounted PV on residential buildings and all policy development work assumes residential buildings have roof mounted PV only.

The council recognises that for residential development above six storeys and for some types of non-residential development, it may not be technically feasible to incorporate sufficient on-site renewable electricity generation to match the development's energy demand. In these cases, the development should maximise on-site renewable energy to generate at least 105 $kWh/m^2fp/yr$ – where m^2fp is the area of the footprint of the building(s).

This target value is based upon 60% of the building roof area being higher efficiency solar panels, allowing sufficient roof space for access and other uses (e.g. plant space). The yield for this was calculated for Bristol using PVGIS online software based upon a 21.5% efficient Sunpower Maxeon solar panel.[35] It assumed the panels were in a concertina arrangement facing east and west with a 10° slope. The UK Net Zero Carbon Buildings Standard is consulting on a target renewable energy generation figure of between 80 $kWh/m^2fp/yr$ and 120 $kWh/m^2fp/yr$ so the Local Plan's proposed figure sits in the middle of this range.[36]

Existing buildings

The UKGBC Net Zero Roadmap for The Built Environment states that 48% of emissions from the UK built environment are produced by energy usage within the existing housing stock, and 23% from the existing non-domestic building stock.[37] This situation is incompatible with the UK target of Net Zero 2050, therefore improving energy efficiency, replacing fossil fuel based heating systems and increasing renewable energy generation on existing buildings is

[34] Etude and Currie & Brown, 'Technical Evidence Base for Policy SEC 1 – New Housing', 2021 Technical Evidence base for policy section 1 - new housing (cornwall.gov.uk); and Etude and Currie & Brown
[35] Photovoltaic Geographical Information System (PVGIS) (europa.eu)
[36] UK Net Zero Carbon Buildings Standard, 'Technical Update and Consultation', 2023, pp.37 PowerPoint Presentation (nzcbuildings.co.uk)
[37] UKGBC, 'Whole life Carbon Roadmap - A Pathway to Net Zero', 2021, UKGBC-Whole-Life-Carbon-Roadmap-A-Pathway-to-Net-Zero.pdf

fundamental to achieving the targets. As such, the policy requires that the targets set for new buildings in terms of space heating demand, energy use intensity and renewable energy generation are met as far as is practicable, and that heating and cooling systems are selected in accordance with the hierarchy, to minimise energy demand and CO_2 emissions. The benefits of retaining and refurbishing existing buildings in terms of reducing embodied carbon emissions is recognised within policy NZC3.

Passivhaus buildings

Policy NZC2 offers an alternative compliance route to the specific standards – achieving Passivhaus Classic certification or higher. Achieving Passivhaus certification requires a very high level of quality assurance. Studies have shown that this results in a smaller 'performance gap', meaning that buildings in operation perform closer to their design aspiration. A large-scale study from the University of Bath found 'powerful evidence in favour of the Passivhaus standard as a reliable means of obtaining low-energy and low-carbon buildings.'[38] Smaller scale studies have found similar results. [39]

This alternative compliance route simplifies the planning submissions requirements and removes the need to demonstrate compliance with the full set of NZC2 energy standards.

Energy offsetting

In the limited instances where it can be robustly demonstrated that it is not possible to provide policy compliant renewable electricity generation on-site (e.g. in some residential development over six storeys high), then any outstanding reduction in residual energy use through energy offsetting may be acceptable. This principle is supported by LETI, who suggest the provision of 'additional' renewable energy off-site in order to achieve a net zero energy balance.[40]

It is important to be clear that this option is a last resort and developments should follow the energy hierarchy as closely as possible.

A study by CSE for the West of England local authorities recommends energy offsetting for policies based on an energy metric (e.g. EUI), as opposed to converting to carbon offsetting which would be complicated due to the carbon emissions intensity of electricity changing every year.[41]

Energy offsetting will result in additional renewable energy generation being delivered off site to match the shortfall on site, through either a financial contribution towards the council's energy offset fund; or securing the provision of acceptable directly linked or near-site new additional renewable electricity generation provision.

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[38] Mitchell, Natarajan, 'UK Passivhaus and the energy performance gap', 2020 UK Passivhaus and the energy performance gap (passivhaustrust.org.uk)

[39] Passivhaus Trust, 'The performance of Passivhaus in new construction: Post occupancy evaluation of certified Passivhaus dwellings in the UK: Early Results', 2017 The performance gap in new construction (passivhaustrust.org.uk)

[40] LETI, 'LETI Climate Emergency Design Guide', January 2020 Climate Emergency Design Guide | LETI

[41] CSE, 'Carbon offsetting report – Carbon offsetting within an energy intensity policy framing', June 2022 Carbon offsetting within an energy intensity policy framing - CSE - June 2022 (n-somerset.gov.uk)

The study considers several options for offsetting, and suggests that in order to be effective, the renewable energy plant must be genuinely new, additional plant which would not otherwise have been developed and which increases the UK's installed renewable capacity. In addition, CSE recommend that the rate at which energy is offset matches the rate at which it is being used, (which translates to the rate at which carbon is being emitted). The optimal solution for carbon offsetting projects is being explored and further information will be published in supporting guidance.[42]

In the case of a financial contribution, CSE recommend that the cost is tied to the cost of installing additional solar PV on small scale residential development including an administrative charge, since this would be genuinely additional where delivered on low-income housing where the occupier would be very unlikely to install them themselves. The charge should be applied over a period of 30 years.

The proposed charge is £99/MWh. This is tied to the most recent DESNZ solar PV cost data for small scale solar PV, and includes a 15% administrative charge**.**[43] The CSE study used data from a local solar PV installation project to inform their recommended cost (which was £90/MWh abased on 2021 prices), however we consider that tying the price to national published figures to be more transparent and more straightforward to update in the future as costs change. The costs are also very similar when inflation since 2021 is taken into account. Financial contributions will be secured by S106 agreement.

System flexibility

Buildings are not isolated from the wider energy system and have an important part to play in wider electricity grid decarbonisation. The increased use of heat pumps and electric vehicles will have a particular impact on both local and national electricity distribution, transmission and generation infrastructure. The government's 2021 Smart System and Flexibility Plan highlighted that billions of pounds could be saved through ensuring the demand side of the energy system is flexible to mirror the variability of renewable energy supply.[44] The UKGBC states that policies that reward solutions that enable flexible demand management will have a major role to play in supporting future grid resilience.[45]

Therefore, policy NZC2 asks development to demonstrate how they have incorporated measures to support the wider decarbonisation of the energy system.

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[42] Ibid.

[43] Solar photovoltaic (PV) cost data - GOV.UK (www.gov.uk)

[44] Department for Energy Security and Net Zero, Ofgem, and Department for Business, Energy & Industrial Strategy, 'Transitioning to a net zero energy system: smart systems and flexibility plan 2021', 2021 Transitioning to a net zero energy system: smart systems and flexibility plan 2021 - GOV.UK (www.gov.uk)

[45] UKGBC, 'Five key tests for a net zero and climate resilient Future Homes Standard', 2022, pp.8 Future Homes Standard | UKGBC

Heating and cooling systems

Heat hierarchy

The NZC2 heat hierarchy asks that development connects to a heat network or uses renewable heating, such as heat pumps. This is supported by Bristol specific and national evidence.

The 2018 report 'An evidence based strategy for delivering zero carbon heat in Bristol' examined the potential pathways to complete or near-complete decarbonisation of heat for space heating and hot water.[46] It recommended that:

- The council should promote the extensive development of low carbon heat networks in Bristol.
- Strengthen new planning policy to ensure all new buildings are served by low carbon heat network vs or heat pumps, or equivalent low carbon options.

The 2019 report 'Bristol net zero by 2030: The evidence base - Report to Bristol City Council of analysis of how the city can achieve net zero greenhouse gas emissions (scopes 1 and 2) by 2030' sets out an evidence-based route for Bristol to achieve net zero in its Scope 1 and Scope 2 carbon emissions.[47] This study notes that space heating and hot water currently account for 45% of the city's carbon emissions and that achieving net zero requires replacement of all the fossil-fuelled heating systems. The study undertook analysis to identify the least-cost approach for decarbonising space and water heating for all buildings in the city. The least cost route identified was for 68,000 properties to connect to a district heating network and 94,000 properties to have building level heat pumps. The report identified where in the city would have the highest proportion of buildings connected to a heat network, that can be used to identify suitable areas for heat networks.

The Bristol City Council Zero Carbon Heating and Cooling Study explored the whole life carbon and cost of different heating and cooling systems. In terms of heating, the options considered covered district heating and different types of building level heat pump technologies. This found that for residential and commercial buildings, the operational carbon performance of district heating and heat pumps systems were similar over the buildings' lifetimes, while the development level embodied carbon was lower for buildings connecting to district heating systems. It recommended that the heat hierarchy prioritises district heating connections where available.[48]

The use of direct electric heating as the primary heat source of a building is excluded from the heat hierarchy. There is both national and local evidence that supports this exclusion.

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[46] Element Energy, 'An evidence based strategy for delivering zero carbon heat in Bristol', 2018 file (bristol.gov.uk)

[47] Centre for Sustainable Energy, Ricardo and Eunomia, 'Bristol net zero by 2030: The evidence base - Report to Bristol City Council of analysis of how the city can achieve net zero greenhouse gas emissions (scopes 1 and 2) by 2030', 2019 Bristol net zero by 2030: the evidence base (bristolonecity.com)

[48] Buro Happold, 'Bristol City Council Zero Carbon Heating and Cooling Study', 2022, Bristol City Council zero carbon heating and cooling study

The impact of direct electric heating on households and the national infrastructural implications are addressed in of the government's 2019 Future Homes consultation:

'We anticipate that direct electric heating will play a minor role in our plan for the future of low carbon heat. Direct electric heating is a well-established technology that produces heat through a near-100% efficient process, with no emissions at the point of use. Despite this, direct electric heaters can be very expensive to run, and if deployed at scale may have a significant effect on the national grid.' [49]

In its 2018 report 'Clean Growth - Transforming Heating Overview of Current Evidence' the government notes that:

'The choice of electric heating system used has fundamental impact on peak demand: Direct electric resistive heating tends to operate at nearly 100% efficiency and is used much like a gas boiler (operated when heat is desired). This would result in very high peak electricity demand, adding up to 82GW to existing peak demands, compared with 49GW for heat pumps.' [50]

The same report makes it clear that the use of electric heating could also have local impacts:

'…large-scale adoption of electric heating could require more extensive infrastructure developments within communities and therefore require greater localised planning.'[51]

Echoing these conclusions, the report 'An evidence based strategy for delivering zero carbon heat in Bristol' recommends that direct electric heating is not regarded as an alternative to decarbonised heat delivered via heat network or heat pumps.[52] This report notes that:

- The carbon emissions of direct electric heat will be 2 to 5 times higher than using heat pumps.
- The additional electrical load associated with the widespread use of direct electric heating may require costly grid reinforcements.
- Bills will be higher for residents where direct electric heating is used, even when taking account of the higher maintenance and capital costs of heat pumps. Volatile electricity prices also have a more significant impacts on direct electric heating costs.

Cooling hierarchy

Policy NZC2 asks for development to eliminate the use of cooling systems through design and, where not possible, minimise the capacity and energy consumption of cooling systems through following the cooling hierarchy. This hierarchy prioritises the use of passive measures over the use of active cooling.

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[49] Ministry of Housing, Communities & Local Government, 'The Future Homes Standard - 2019 Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the building regulations for new dwellings', 2019, pp.18 The Future Homes Standard consultation (publishing.service.gov.uk)

[50] Department of Business, Energy & Industrial Strategy, 'Clean Growth - Transforming Heating Overview of Current Evidence', 2018, pp.74-75 Clean Growth - Transforming Heating - Overview of Current Evidence (publishing.service.gov.uk)

[51] Ibid, p.96.

[52] Element Energy, 'An evidence based strategy for delivering zero carbon heat in Bristol', 2018 file (bristol.gov.uk)

The UK's requirement for active cooling is expected to increase significantly over this century. A study for the Department for Business, Energy & Industrial Strategy found that a policy approach prioritising passive measures would result in this increase being 2/3 less nationally by 2100 than an unabated increase – a 2,000GWh increase versus a 6,000GWh increase.[53] A policy approach that focussed on energy efficient equipment only, would result in a 3,500GWh increase, nearly double that of a policy approach that prioritise passive measures. This supports the hierarchy's approach.

Delivering modelling performance

New buildings often perform worse than anticipated at the design stage.[54] This performance gap is a significant issue, and addressing it is a key part of ensuring the built environment is net zero in practice.

Research by Innovate UK recommends that quality regimes such as Soft Landings should be used to help address this.[55] Better Buildings Partnership, a collaboration of leading property owners, have highlighted the benefits of these schemes to property owners, which include improving customer experience, delivering performance outcomes, streamlining the completion process and fostering a culture of collaboration and communication within the project team.[56]

Policy NZC2 seeks to minimise the performance gap by asking that development follows a recognised quality regime. A range of potential quality regimes are provided in the policy explanation. Following some of the list schemes support achieving other policy requirements, such as a BREEAM Excellent rating.

Costs and viability

The increase in development costs of complying with policy NZC2 has been included in the local plan's viability assessment. Full details of the impacts on plan viability can be found within this report.

The costs used within this are based upon the Etude and Currie & Brown studies, as these represent the full suite of residential building types and have been completed by a consistent consultant team.[57] In the high-rise buildings study, the assessment included façade mounted PV to achieve net zero. For the viability assessment, the council have assumed that façade mounted PV is not included and only roof mounted PV is installed on

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[53] Department of Business, Energy & Industrial Strategy, 'Cooling in the UK', 2021, pp.104 Cooling in the UK (publishing.service.gov.uk)
[54] Innovate UK, 'Building Performance Evaluation Programme: Findings from non-domestic projects', 2016, pp.5 IUK-061221-NonDomesticBuildingPerformanceFullReport2016.pdf (ukri.org)
[55] Innovate UK, 'Building Performance Evaluation Programme: Findings from domestic projects', 2016, pp.4 IUK-071221-DomesticBuildingPerformanceReport2016.pdf (ukri.org)
[56] Better Buildings Partnership, 'Soft Landings: The Benefits to Commercial Property Owners', 2020 BBP_Soft Landings_Final.pdf (betterbuildingspartnership.co.uk)
[57] Etude and Currie & Brown, 'Technical Evidence Base for Policy SEC 1 – New Housing', 2021 Technical Evidence base for policy section 1 - new housing (cornwall.gov.uk); and Etude and Currie & Brown, 'Technical Evidence Base for New Housing Policy – High Rise', 2023 Technical evidence base for new housing policy: high rise (bristol.gov.uk)

site. The roof mounted PV provides approximately 20% of the annual energy demand and the viability assessment assumes that the remaining energy demand is met through energy offsetting payments. This increases the cost uplift of the NZC2 standards from 3.1% in the study to 4.5%, which is used in the viability assessment for developments above 6 storeys in height.

The viability assessment includes a sensitivity test, which uses a higher cost uplift, reflecting studies published by the UKGBC with allowances to full PV provision. This shows the impact on viability of costs being higher than in Etude and Currie and Brown studies.[58]

A cost uplift of 0.1% of construction costs is applied for the delivering modelled performance policy requirement, based on guidance from BSRIA.[59]

The baseline construction costs used in the viability assessment are valid for the timing of the assessment and all uplifts are applied as a percentage of these. Therefore, construction cost inflation since the date of the studies used to provide the cost uplifts is reflected in the local plan's viability assessment.

Policy NZC3: Embodied carbon, materials and circular economy

Embodied carbon refers to the greenhouse gas emissions associated with materials and construction processes throughout the whole lifecycle of a structure. It includes any processes, materials or products used to construct, maintain, repair, refurbish and demolish a building.

Addressing the carbon emissions impacts of buildings has typically focussed on reducing emissions from operational energy consumption. However, as buildings become more energy efficient, stop using fossil fuel powered heating systems, and national electricity generation decarbonises, operational energy related carbon emissions have reduced significantly. Consequently, embodied carbon emissions represent a much higher proportion of the whole lifecycle carbon emissions of a new building than before. Embodied carbon can represent 40% to 70% of the whole lifecycle emissions of a new building. For ultra-low energy buildings, as required by policy NZC2, embodied carbon makes up around 70% of whole lifecycle emissions.[60]

The increasing importance of embodied carbon is relevant across the entire sector, including existing buildings. In 2018, embodied carbon made up 24% of the built environment sector's total emissions (operational and embodied, including existing

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[58] UKGBC, 'Building the Case for Net Zero: Closing the gap towards net zero carbon new-build homes. Technical Report', 2022 Building the case for Net Zero: Closing the gap towards net zero carbon new-build homes | UKGBC; and UKGBC, 'Building the Case for Net Zero: A feasibility study into the design, delivery and cost of new net zero carbon buildings' 2020 Building-the-Case-for-Net-Zero.pdf (ukgbc.org)

[59] BSRIA, 'Soft Landings procurement and budgets', 2012 Soft Landings procurement and budgets (bsria.com)

[60] LETI, 'Embodied Carbon Primer', 2020, pp.18 Embodied Carbon Primer | LETI

buildings) and by 2030 it is projected to make up 46% of total emissions if the sector is on a net zero trajectory.[61]

A report on embodied carbon by the House of Commons Environmental Audit Committee stated that:

- The embodied carbon of construction is not assessed or controlled by policy. As a result, no progress has been made on reducing these emissions.
- The construction industry is willing and able to undertake whole-life carbon assessments and the cost of undertaking these assessments can be minimal.
- The standards, methodology and reporting framework for embodied carbon assessment exists, although there is a need for standardisation.
- There is availability of low embodied carbon building products to meet current demand but there are insufficient incentives to develop and use these products.[62]

The report recommended that a mandatory requirement to carry out whole-life embodied carbon assessments be introduced through building regulations and planning policy. At the time of writing there has been no commitment to introduce embodied carbon assessment into building regulations, just to consult on this. In the absence of this requirement, it is vital that embodied carbon be addressed by planning policy.

In addition to embodied carbon impacts, construction products often involve complex supply chains and can have a wide range of additional environment impacts. Promoting a circular economy involves prioritising the reuse of materials at their highest value for as long as possible, helping to prevent the over extraction of natural resources and minimising the amount of material sent to landfill. In the UK, construction, demolition and excavation account for 60% of material used and waste generation[63].

General principles

Policy NZC3 asks development to minimise its embodied carbon through following principles outlined in the policy. The principles are based upon industry guidance and standards, including:

- PAS 2080 Carbon Management in Building and Infrastructure.[64]
- The Institution of Structural Engineers Hierarchy for net-zero structural design.[65]
- The UK Government Infrastructure Carbon Review.[66]

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[61] UKGBC, 'Net Zero Whole Life Carbon Roadmap – Trajectory Data', 2021 https://ukgbc.org/wp-content/uploads/2022/01/20211029-UKGBC-Results-Data_For-Website-Download.xlsx
[62] House of Commons Environmental Audit Committee, 'Building to net zero: costing carbon in construction', 2022, pp.3 Building to net zero: costing carbon in construction - Environmental Audit Committee (parliament.uk)
[63] Resource Use | UKGBC
[64] British Standards Institution, 'PAS 2080:2016 Carbon management in infrastructure', 2016, pp.14
[65] Institution of Structural Engineers, 'A short guide to carbon offsetting', 2021, pp.1 A short guide to carbon offsetting - The Institution of Structural Engineers (istructe.org)
[66] HM Treasury, 'Infrastructure Carbon Review', 2013, pp.11 Infrastructure Carbon Review (publishing.service.gov.uk)

- LETI Embodied Carbon Primer.[67]

Targets for major applications

Whole life carbon assessments

Policy NZC3 introduces a requirement for major applications to undertake an embodied carbon assessment. The BS EN 15978: 2011 standard provides the overarching framework for assessment and the RICS Professional Statement: Whole Life Carbon Assessment for the Built Environment provides a more detailed methodology to enable consistent assessment and reporting.[68] Assessing embodied carbon has been part of carrying out BREEAM assessments since 2018 and the London Plan has required assessments since 2021, as part of the whole life cycle carbon requirements of Policy SI2. Locally, Bath and North East Somerset have had a requirement for embodied carbon assessment in local plan policy since January 2023. As a result, the industry is well prepared to undertake these assessments.

Carbon intensity targets

The policy includes embodied carbon intensity targets for different development types. The level of the targets is intended to balance the urgent need to reduce embodied carbon with the current technical and economic viability of achieving reductions. As noted by the House of Commons Environmental Audit Committee, assessing and controlling embodied carbon through policy is necessary to make progress towards the country's statutory net zero targets. [69] Detail on the evidence supporting the targets for each development type is in the following sections.

Recognising both the need to reduce embodied carbon emissions from development and the lack of existing regulation in this area, these targets are intended to represent current good practice and be achievable with widely available building techniques and materials. This will encourage all major development to take practicable steps to reduce embodied carbon, stimulate the industry upskilling in this area and encourage supply chain innovation.

The UKGBC Net Zero Whole Life Carbon Roadmap notes that significant reductions in supply chain carbon emissions associated with the product of construction materials will be required to achieve net zero.[70] For the emissions associated with the production of cement and concrete will need to reduce by 20% by 2030 and be fully decarbonised by 2050. The UKGBC Net Zero Whole Life Carbon Roadmap also projects reductions due to design efficiency of 8% and in transport emissions of 15% by 2030. The UK Net Zero Carbon Building Standard intends to set embodied carbon limits that reduce over time, to reflect

[67] LETI, 'Embodied Carbon Primer' 2020, pp.21 Embodied Carbon Primer | LETI
[68] Royal Institution of Chartered Surveyors, 'Professional Statement: Whole Life Carbon Assessment for the Built Environment', 2017 Whole Life Carbon Assessment for the Built Environment (rics.org)
[69] House of Commons Environmental Audit Committee, 'Building to net zero: costing carbon in construction', 2022, pp.3 Building to net zero: costing carbon in construction - Environmental Audit Committee (parliament.uk)
[70] UKGBC, 'Net Zero Whole Life Carbon Roadmap – Technical Report', 2021, pp.18 UKGBC-Whole-Life-Carbon-Roadmap-Technical-Report.pdf

the decarbonisation of the materials supply chain.[71] The embodied carbon standards within the Local Plan reflect the current state of the supply chain and will need to be updated at the 5-year review period to reflect supply chain decarbonisation.

Residential development

Low rise residential (4 storeys or fewer)

The embodied carbon targets for low rise residential in NZC3 are:

- Upfront embodied carbon - <400kg/m².
- Whole life-cycle embodied carbon <625kg/m².

RIBA, LETI, Institute of Structural Engineers and UKGBC proposed a lettered banding system to report on embodied carbon performance.[72] Within this, band B for residential buildings is represented by an upfront embodied carbon target of 400kg/m² and a whole life embodied carbon target of 625kg/m².

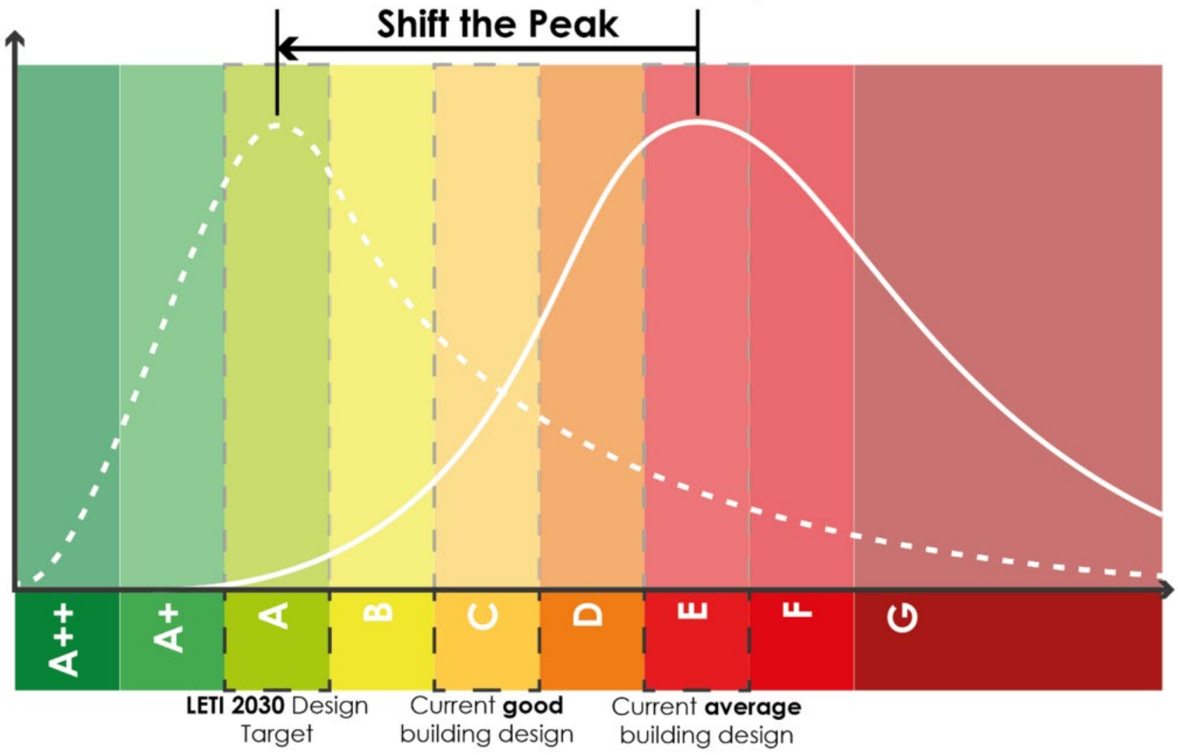

Figure 2 Embodied carbon banding system proposed by RIBA, LETI, IStructE and UKGBC

Based on the findings of the available evidence base, it was decided to align the NZC3 targets with this band as they are targets that are already recognised by a wide range of industry stakeholders. The following evidence base studies show that the proposed targets

[71] UK Net Zero Carbon Buildings Standard, 'Technical Update and Consultation', 2023, pp.25 PowerPoint Presentation (nzcbuildings.co.uk)
[72] LETI, 'Embodied Carbon Target Alignment', 2021 PowerPoint Presentation (leti.uk)

can be achieved with widely available building techniques and materials and result in little or no uplift to capital costs.

The Future Homes Hub is an initiative set up by the government to support the housing sector's contribution to statutory climate targets. They carried out a study into the embodied carbon of new homes with input from major house builders.[73] This found that the current baseline upfront embodied carbon for low rise homes was 417kg/m² and equivalent whole life embodied carbon was 615kg/m². These are below or within 5% of the targets in NZC3.

The UKGBC carried out a study that looked at the embodied carbon performance of low-rise net zero carbon new homes.[74] The study considered terraced houses, semi-detached houses, detached houses and low-rise apartments. It considered baseline, intermediate and stretch scenarios. The range of result of this study are shown in Table 1.

The intermediate scenario is slightly above the NZC3 targets and the stretch scenario is significantly below the NZC3 targets. The study found achieving the intermediate embodied carbon performance increase capital costs by 1% and achieving the stretch scenario increased costs by 4% from the baseline.

Table 1 UKGBC embodied carbon study results

Performance scenario	Upfront embodied carbon range: A1 – A5 (kg/m²)	Whole life embodied carbon range: A1-A5, B1 – B5, C1-C4 (kg/m²)
Baseline	425 – 525	680 – 800
Intermediate	425 – 505	710 - 770
Stretch	255 – 310	350 – 430

A report for WECA and the West of England unitary authorities to support the development of Spatial Development Strategy and local plans explored policy options and performances levels for embodied carbon targets.[75] This showed that a semi-detached house with low carbon concrete foundations and a timber frame could achieve a whole life embodied carbon of ~600kg/m² (lower than the NZC3 target) for a cost uplift of 3%. It also assessed the upfront embodied carbon of the same design as ~450kg/m² (~10% higher than the NZC3 target).

Mid and high rise residential (5 storeys or greater)

The embodied carbon targets for mid and high rise residential in NZC3 are:

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[73] Future Homes Hub, 'Embodied and Whole Life Carbon: 2023-2025 Implementation Plan for the Homebuilding Industry' 2023, pp.21 Embodied and WLC Implementation Plan - final.pdf (cdn-website.com)
[74] UKGBC, 'Building the Case for Net Zero: Closing the gap towards net zero carbon new-build homes. Technical Report', 2022, pp.21 Building the case for Net Zero: Closing the gap towards net zero carbon new-build homes | UKGBC
[75] WSP and Gardiner & Theobald, 'Evidence Base for West of England Net Zero Building Policy: Embodied Carbon', 2021 Spatial-Development-Strategy-Evidence-base-for-Net-Zero-Building-Policy-Embodied-Carbon-Jan-2022.pdf (westofengland-ca.gov.uk)

- Upfront embodied carbon - <500kg/m^2.
- Whole life-cycle embodied carbon <800kg/m^2.

To meet the city's housing need, there is a need for some homes to be in buildings with more than 4 storeys. Different embodied carbon targets are applied to residential buildings of 5 storeys or greater because:

- At this scale all developments are expected to be multi-dwelling apartments rather than houses, representing a different building type.
- Two criteria for higher risks buildings in the Building Safety Act are if they contain 2 or more residential dwelling and/or they are above 18m or 7 storeys tall. Buildings above 18m face stricter fire safety requirements and so are currently very unlikely to be able to use timber construction to reduce embodied carbon.

RIBA, LETI, Institute of Structural Engineers and UKGBC proposed a lettered banding system to report on embodied carbon performance.[76] Within this, band C for residential buildings of 6 storeys or above is represented by an upfront embodied carbon target of 500kg/m^2 and a whole life embodied carbon target of 800kg/m^2. Band C is noted in this document as being current good building design.

Based on the available evidence base, it was decided to align the NZC3 targets with this band as they are targets that are already recognised by a wide range of industry stakeholders. The following evidence base studies show that the proposed targets can be achieved with widely available building techniques and materials and result in little or no uplift to capital costs.

The Future Homes Hub study found the current baseline for upfront embodied carbon of medium and high rise housing was 635kg/m^2, the NZC3 target is a 20% reduction on this. The whole life embodied carbon baseline was 866kg/m^2, the NZC3 target is a 10% reduction on this. [77]

The embodied carbon policy report for the West of England unitary authorities included a study of a mid-rise apartment building.[78] This found that a mid-rise apartment constructed to typical current standards could achieve upfront embodied carbon of ~360kg/m^2 and whole life embodied carbon of ~500kg/m^2, both of which are below the NZC3 targets, for no cost uplift.

A study by the UKGBC into the embodied carbon performance of net zero buildings included a high-rise residential building.[79] It considered baseline, intermediate and stretch scenarios. The baseline scenario achieved an upfront embodied carbon of 615kg/m^2 and the intermediate scenario achieved an upfront embodied carbon of 500kg/m^2, which is equal to the NZC3 target. The changes in the intermediate scenario were the use of post-tensioned

[76] LETI, 'Embodied Carbon Target Alignment', 2021 PowerPoint Presentation (leti.uk)
[77] Future Homes Hub, 'Embodied and Whole Life Carbon: 2023-2025 Implementation Plan for the Homebuilding Industry' 2023, pp.21 Embodied and WLC Implementation Plan - final.pdf (cdn-website.com)
[78] WSP and Gardiner & Theobald, 'Evidence Base for West of England Net Zero Building Policy: Embodied Carbon', 2021 Spatial-Development-Strategy-Evidence-base-for-Net-Zero-Building-Policy-Embodied-Carbon-Jan-2022.pdf (westofengland-ca.gov.uk)
[79] UKGBC, 'Building the Case for Net Zero: A feasibility study into the design, delivery and cost of new net zero carbon buildings' 2020 Building-the-Case-for-Net-Zero.pdf (ukgbc.org)

concrete flat slabs rather than standard flat slabs, and the use of low carbon concrete. The report carried out cost analysis of the different scenarios and the increase in cost of the building elements with embodied carbon improvements (substructure, frame, upper floors and stairs) was less than a 1% increase in construction cost.

Additional evidence

LETI recommend that to achieve a net zero build environment, residential buildings should target upfront embodied carbon of 500kg/m^2 from 2020 and 300kg/m^2 by 2030.[80]

The Science Based Targets Initiative carried out a study into the pathway that the global buildings sector's embodied emissions should take to align with achieving only 1.5°C of climate change.[81] To achieve this, new residential buildings should achieve an upfront embodied carbon of less than 407kg/m^2 from 2025.

Non-residential

The embodied carbon targets for non-residential buildings in NZC3 are:

- Upfront embodied carbon - <600kg/m^2.
- Whole life-cycle embodied carbon <970kg/m^2.

The embodied carbon policy report for the West of England unitary authorities included studies on offices and schools.[82] In these studies, the baseline performance for offices was upfront embodied carbon of ~600kg/m^2 and whole life embodied carbon of ~750kg/m^2. The baseline performance for schools was upfront embodied carbon of ~550kg/m^2 and whole life embodied carbon of ~700kg/m^2. These figures are equal or less than the proposed embodied carbon targets for non-residential buildings in NZC3.

The RIBA 2030 Climate Challenge recommends that new offices built from 2025 onwards achieve a maximum whole life embodied carbon of 970kg/m^2 and that new schools built from 2025 onwards achieve a whole life embodied carbon of 675kg/m^2.[83]

LETI recommend that to achieve a net zero built environment, office and school buildings should target upfront embodied carbon of 600kg/m^2 from 2020 and 350kg/m^2 by 2030.[84]

The Science Based Targets Initiative carried out a study into the pathway that the global buildings sector's embodied emissions should take to align with achieving only 1.5°C of

[80] LETI, 'Embodied Carbon Primer', 2020, pp.24-25 Embodied Carbon Primer | LETI
[81] Science Based Targets Initiative, 'A 1.5°C Pathway for the Global Buildings Sector's Embodied Emissions', 2023, pp.27 [SBTi Format] 11052023 DRAFT_SBTi_Embodied carbon pathway development description.docx (sciencebasedtargets.org)
[82] WSP and Gardiner & Theobald, 'Evidence Base for West of England Net Zero Building Policy: Embodied Carbon', 2021 Spatial-Development-Strategy-Evidence-base-for-Net-Zero-Building-Policy-Embodied-Carbon-Jan-2022.pdf (westofengland-ca.gov.uk)
[83] RIBA, '2030 Climate Challenge', 2021 2030 Climate Challenge (architecture.com)
[84] LETI, 'Embodied Carbon Primer', 2020, pp.24-25 Embodied Carbon Primer | LETI

climate change.[85] To achieve this, new non-residential buildings should achieve the following upfront embodied carbon intensity from 2025:

- Office – 599kg/m².
- Retail - 638kg/m².
- Other non-residential – 504kg/m².

The UK Net Zero Carbon Building Standard collected upfront embodied carbon data from over 200 non-residential new-build projects.[86] This included buildings from office, logistics/warehouses, healthcare, schools, higher education, culture and entertainment, and science and technology sectors. The median upfront embodied carbon value in all but one sector was within 5% of 600kg/m². This shows that the 600kg/m² upfront embodied carbon target is achievable currently and supports the use of this as a target for all major non-residential schemes. Logistics/warehouses was the only non-residential sector with a median value further from 600kg/m², at 464kg/m².

Carbon offsetting

The policy requires any shortfall against the upfront embodied carbon targets is offset through a financial contribution towards the council's carbon offset fund. This policy is in line with the evidence provided by CSE, which recommends that carbon offsetting policies for embodied carbon focus on upfront carbon emissions over and above the target value, that a carbon metric is used for offsetting, and that funds should pay for projects other than renewable energy provision.[87]

The value of a tonne of CO_{2e} is tied to the high scenario in the Valuation of Energy Use and Greenhouse Gas supplementary guidance to the Treasury's Green Book (currently £373). Bristol City Council's current adopted offsetting policy is implemented using a value of £95/tonne CO_{2e}. This same value was used in part to set the London Plan offset rate when evidence for this offset rate was finalised in 2017.[88] The SW Energy Hub report[89] produced for Bath and North East Somerset, recommends that a price of £373/tonne CO_{2e} is now appropriate, stating that the £95/tonne figure reflects the BEIS Green Book carbon values published in 2017. BEIS have confirmed that that the value of £95/tonne is outdated and should no longer be considered for policy appraisals. The Green Book carbon values have been updated several times since this publication and in 2022 were updated to £373.

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[85] Science Based Targets Initiative, 'A 1.5°C Pathway for the Global Buildings Sector's Embodied Emissions', 2023, pp.27 [SBTi Format] 11052023 DRAFT SBTi Embodied carbon pathway development description.docx (sciencebasedtargets.org)

[86] UK Net Zero Carbon Buildings Standard, 'Technical Update and Consultation', 2023, pp.68 PowerPoint Presentation (nzcbuildings.co.uk)

[87] CSE, 'Carbon offsetting report – Carbon offsetting within an energy intensity policy framing Report to West of England Authorities' 2022, pp.29 Carbon offsetting within an energy intensity policy framing - CSE - June 2022 (n-somerset.gov.uk)

[88] AECOM 'London Carbon Offset Price', 2017, https://bit.ly/3iJrw3A

[89] SW Energy Hub, Adapting London Plan Offsetting Rates for 2022 Building Regulation Updates: Evidence for Bath & North East Somerset Council, 2022 Adapting London Plan Offsetting Rates for 2022 Building Regulation Updates - South West Net Zero Hub (swnetzerohub.org.uk)

Refrigerants

As the UK moves from the use of fossil fuel heating to heat pump systems, there will be a significant increase in the use of refrigerants in heating systems. Refrigerants often have a global warming potential (GWP) considerably higher than that of CO_2. For example, R134a is a common refrigerant that has a global warming potential 2,088 times higher than CO_2.

The F-gas regulations govern the use, containment, recovery and destruction of fluorinated greenhouse gases, which make up almost all of the commonly used refrigerants.

A study carried out for Bristol City Council found that even when using refrigerants that are allowable in all systems under the F-gas regulations post-2025, refrigerant leakage could account for up to 9% of a building's whole life carbon emissions, including both operational energy and embodied emissions. [90]

The study found that three factors influenced greenhouse gas emissions associated with refrigerant:

- The quantity of refrigerant required for the heating and/or cooling system
- The global warming potential of the refrigerant type
- The rate of refrigerant leakage expected from the heating and/or cooling system type

Of these, only the global warming potential of the refrigerant type is governed by the national F-gas regulations. The regulations do not place a limit on the GWP of refrigerants that can be used in larger scale heating and cooling equipment in buildings. Instead, the F-gas regulations limit the overall availability of higher GWP refrigerants to equipment manufacturers. Therefore, policy NZC3 asks that low GWP refrigerants are used and requires detailed justification if the GWP is above 750. This is similar to the proposed limit on refrigerant on GWP of 675 proposed by the UK Net Zero Carbon Buildings Standard.[91] The study for Bristol City Council found that systems using refrigerant with GWP of less than 750 are widely available.

The policy also asks developments to demonstrate how they have minimised the amount of refrigerant in the proposal and implemented measures to minimise leakage. The study found that systems using centralised heating and cooling generation equipment had a lower amount of refrigerant per kW capacity of the system than systems with decentralised heating and cooling generation (such as VRF system). Centralised systems also had a significantly lower risk of leakage.

Materials

The policy asks that developments should seek to minimise the wider environmental impacts arising from their sourcing, manufacture, construction, and end of life demolition and disposal. This can be demonstrated through committing to purchasing construction

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[90] Buro Happold, 'Bristol City Council Zero Carbon Heating and Cooling Study', 2022, pp.40, 84-96, Bristol City Council zero carbon heating and cooling study

[91] UK Net Zero Carbon Buildings Standard, 'Technical Update and Consultation', 2023, pp.40 PowerPoint Presentation (nzcbuildings.co.uk)

products with credible responsible sourcing certification. Research into embodied biodiversity impacts of construction materials recommended that practitioners minimised the amount of materials needed, prioritised re-use materials and utilised existing responsible sourcing and certification schemes. [92] The first two recommendations are covered by other elements of NZC3.

The use of responsible sourcing certification is widespread in the industry, with there being a specific credit covering this in BREEAM (Mat 03 Responsible sourcing of construction products). BREEAM assessments have been a requirement for major developments in Bristol since 2011.

The policy also encourages developers to avoid the use of all tropical hardwoods unless reused or reclaimed on account of the critical role in regulating regional and global climate and their ecological and cultural significance.[93]

Circular economy and construction and demolition waste

The resources and waste strategy for England sets out how the government will preserve material resources by minimising waste, promoting resource efficiency and moving towards a circular economy.[94] The strategy aims to support the commitments in the 25 Year Environmental Plan. The government plans to ‘become a world leader in using resources efficiently and reducing the amount of waste we create as a society’; looking to ‘prolong the lives of the materials and goods that we use and move society away from the inefficient “linear” economic model of “take, make, use, “throw”’. The construction sector is highlighted as a major material resource flow in the economy.

Policy NZC3 supports the aims of the resources and waste strategy for England. In developing the policy wording, the council has drawn upon construction industry specific guidance to translate the aims of the national strategy into policies appropriate for development management. In particular, it reflects the circular economy principles developed by the UKGBC and an industry task group.[95]

The policy does not set performance targets in relation to waste and the circular economy but asks that major developments set their own targets and report on them. This will help ensure accountability and facilitate data collection to inform future policy updates in the 5-year review period. The example metrics are aligned with industry standards and guidance,

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[92] Expedition Engineering, ‘Embodied Biodiversity Impacts of Construction Materials’, 2022, pp.39 230920_Embodied-Biodiversity_Report_Final_Compressed.pdf (expedition.uk.com)

[93] Ometto, J.P., K. Kalaba, G.Z. Anshari, N. Chacón, A. Farrell, S.A. Halim, H. Neufeldt, and R. Sukumar, 2022: Cross Chapter Paper 7: Tropical Forests. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change IPCC_AR6_WGII_CCP7.pdf

[94] HM Government, ‘Our Waste, Our Resources: A Strategy for England’, 2018 Resources and waste strategy for England - GOV.UK (www.gov.uk)

[95] UKGBC, ‘Circular economy guidance for construction clients’, 2019 https://ukgbc.org/wp-content/uploads/2019/04/Circular-Economy-Report.pdf

including BREEAM Credit Waste 01 Construction waste management and UKGBC Circular Economy Metrics for Buildings.[96]

Costs and viability

The cost uplifts of embodied carbon targets based upon the Evidence Base for West of England Net Zero Building Policy: Embodied Carbon report have been included in the Local Plan Viability Assessment. The other elements of the policy are qualitative and expected to be demonstratable by development in a manner that is cost neutral.

Policy NZC4: Adaptation to a changing climate

Climate change could have significant negative consequences, including financial costs, impacts to health and wellbeing and even potential loss of life. As such, it is important that development proposals adapt to climate change appropriately. Development in Bristol also provides an opportunity to improve surrounding areas and their resilience to climate change as well as multiple co-benefits that could arise through adapting the development to climate change.

The National Design Guide states that well-designed places maximise resilience to climate change, and in doing so 'contribute to community resilience and climate adaptation by addressing the potential effects of temperature extremes in summer and winter, increased flood risk, and more intense weather events such as rainstorms.'[97] Well-designed places typically include:

- Planting, structures and water to benefit comfort and reduce the urban heat island effect.
- Have sustainable drainage systems and incorporate flood resilience measures.
- Make the most of passive design strategies to minimise overheating and achieve internal comfort.

Policy NZC4 aims to ensure that development follows these principles and is resilient to a changing climate.

Vulnerability

The policy requires that vulnerability is identified in the assessment of context. Vulnerability is determined by physical, social, economic and environmental factors which increase the susceptibility of an individual, a community, assets or systems to the impacts of

[96] UKGBC, 'Circular Economy Metrics for Buildings' 2023 08757 Metrics Paper.indd (ukgbc.org)
[97] Ministry of Housing, Communities & Local Government, 'National Design Guide', 2021, pp.44 National design guide - GOV.UK (www.gov.uk)

hazards.[98] Vulnerability therefore needs to be understood when assessing the risk that a particular hazard poses for a development.

Bristol City Council have developed a Bristol specific evidence base covering vulnerability to climate chance, which includes the Keep Bristol Cool Framework and the Keep Bristol Cool mapping tool.[99] These identify how current heat vulnerability varies across different neighbourhoods and how climate change may increase temperatures in the future. This gives insights into how urban heat risk varies across the city and within communities and identifies the areas where high temperatures and heatwaves could have the biggest impact on people's health and wellbeing.

Changing levels of risk over time

There is a degree of uncertainty in climate projections which means it is not possible to predict the exact climate risks and hazards for a given development. The Climate Action Tracker diagram in Figure 3 shows the uncertainty around the extent of global temperature increase, linked to the extent of action to mitigate climate change that is undertaken.[100] It estimates global end-of-century warming based on the existing policies, actions, pledges and targets made by each country. This shows that current real-world action is likely to result in between a 2.2°C and 3.4°C global rise by 2100, while if all pledges and targets are implemented, between a 1.6°C and 2.5°C rise is likely.

[98] United Nations Office for Disaster Risk Reduction 'Terminology: Vulnerability', (2022), https://www.undrr.org/terminology/vulnerability

[99] Keep Bristol Cool Framework, ; and The Keep Bristol Cool mapping tool

[100] https://climateactiontracker.org/global/cat-thermometer/

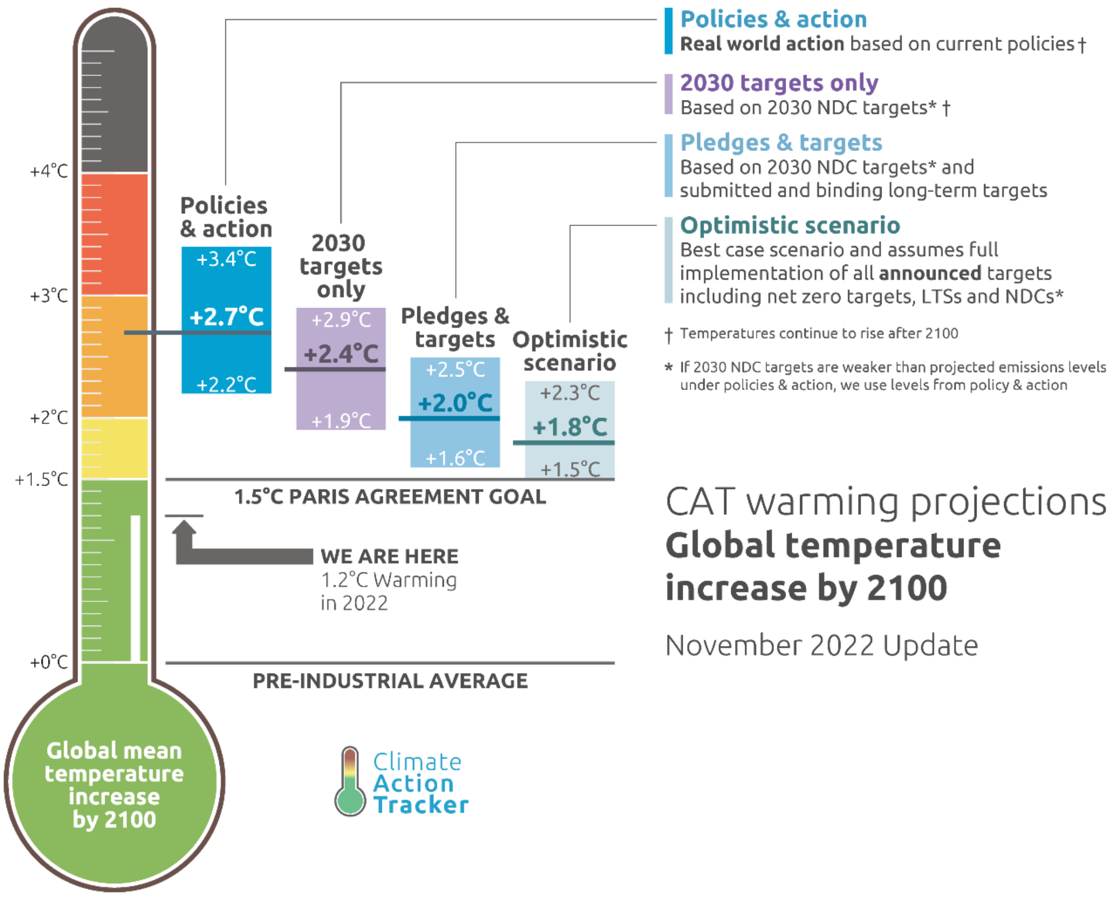

Figure 3 Climate Action Tracker Diagram,

The CCC states:

'Recent global Net Zero pledges and commitments to reduce emissions by 2030 have improved the prospect of limiting global warming to 2°C by 2100, but they must be delivered in full and extended further. Even if warming is limited to 2°C, significant alterations to the UK's climate will still take place. But global emissions are yet to fall, and effective new policies must still be implemented globally to deliver the new commitments. If global emissions do not fall, it is possible that the UK will experience much higher temperatures... This has fundamental implications for adaptation planning. The UK must adapt to a minimum average global temperature rise of between 1.5 and 2°C for the period 2050 – 2100 and consider the risks up to a 4°C warming scenario.'[101]

To reflect this uncertainty, the policy requires that the assessment of context consider changing levels of risk over time, according to various climate scenarios. Climate scenarios are projections of how the climate might change in future depending on the societal choices made, policies committed to and resulting GHG emissions remaining in the atmosphere.

[101] Climate Change Committee, 'Independent Assessment of UK Climate Risk', 2021, pp.24 [Independent Assessment of UK Climate Risk - Climate Change Committee (theccc.org.uk)]

The Met Office UK Climate Projections and local projections within the 'Bristol Climate Change Series'[102] should be referred to in the assessment of context to understand the range of likely impacts arising from different climate change scenarios.

Adaptation Pathway approach

The long-term uncertainty of the extent of global temperature increase, means that development proposals need to identify the risks and opportunities of the current climate conditions, as well as plan for future changes in climate to be adapted to change. This is known as an adaptation pathway approach. This is a widely recognised approach to managing uncertainty and is defined in British Standard BS 8631, 'Adaptation to climate change: Using adaptation pathways for decision making'[103].

To properly utilise an adaptive pathways approach, projects need to consider whether decisions taken now will make it costly, difficult or impossible to address the climate risk in the future if 4°C of global climate change occurs. An adaptation pathway approach means development takes an approach that allows incremental adjustment of resilience over time, as the potential future impacts of climate change are understood.

General Principles

The policy sets out a number of key principles that should be demonstrated within the adaptation strategy, alongside the overarching requirements for the assessment of context and informed design. Most of these follow the approach set out in the National Design Guide and so do not require further elaboration, except for the requirement for an overheating risk assessment which has been provided below.

Overheating risk assessment

Part O of the building regulations addresses overheating risk in residential development under the current climate, but does not set any requirements for non-residential development, nor for addressing overheating risk in the future, taking climate change into account. The current CIBSE weather files used only cover a period up to 2040, which is only 15 years after the construction of developments covered by this local plan. Proposals being assessed through the planning regime are assumed to have a lifetime of 100 years for residential and 60 years for non-residential. Relying on Part O of the building regulations alone, would mean there is a high risk that residential developments will overheat in the decades after construction.

To ensure this lifespan is properly considered, the policy requires proposals to consider overheating risk for the lifetime of the development. This is to ensure that proposals are designed to cope with future climate change, avoiding unnecessary impacts on health and

[102] Met Office, UK Climate Projections (UKCP) - Met Office; and Met Office, 'Bristol Climate Change: The Science', 2019, Bristol climate change; and Met Office, 'Bristol Climate Change: The Results Explained', 2019, The Results Explained (metoffice.gov.uk); and Met Office, 'Bristol Climate Change: UKCP Results', 2019, UCP Result 2019 (metoffice.gov.uk)

[103] BSI, 'Adaptation to climate change. Using adaptation pathways for decision making. Guide', 2021, BS 8631:2021 | 30 Apr 2021 | BSI Knowledge (bsigroup.com)

wellbeing of future occupants, costly and disruptive retrofit and increases to energy demand (e.g. through retrofitting of air conditioning).

The policy requires the CIBSE TM52/59 and Part O methodology to be followed for overheating risk assessments. These set clear parameters for the overheating risk assessments that can be applied to developments to ensure they are assessed consistently. The methodology is well understood by the industry since its introduction into Part O of the building regulations. For residential development, the same dynamic thermal models that are used to demonstrate compliance with Part O are used to assess overheating in future climates, meaning there is minimal additional work required by planning applicants to prepare a submission.

Policy NZC5: Renewable energy and energy efficiency

This policy sets out the council's general support for new renewable energy generation across the city. The policy also sets out the council's support for small scale renewables and energy-efficiency measures in existing buildings when they require planning permission.

Renewable energy

The NPPF states that local planning authorities should support renewable and low carbon energy and associated infrastructure as part of promoting sustainable development. In order to promote the use and supply of renewables, local plans should:

'a) provide positive strategy for energy from these sources, that maximises the potential for suitable development, and their future re-powering and life extension, while ensuring that adverse impacts are addressed appropriately (including cumulative landscape and visual impacts:;

b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbo energy supply systems and for co-locating potential heat customers and suppliers.'[104]

The policy reflects these requirements for local plans. It encourages renewable energy generation across the city, including large-scale freestanding installations and infrastructure associated with the Bristol heat network.

The policy also identifies the Avonmouth industrial and Bristol Port area being particularly well suited to renewable energy generation, including on-shore wind. This is consistent with

[104] DLUHC, 'National Planning Policy Framework', 2023, p.45-46 National Planning Policy Framework (publishing.service.gov.uk).

the approach in the NPPF which requires local authorities to identify areas suitable for such development.

It is relevant to note that the updates to the NPPF actioned in September 2023 now allow for onshore wind to be developed outside of areas identified in the local plan, If the site is identified through mechanisms such as Local Development Orders, Neighbourhood Development Orders and Community Right to Build Orders and community support for the project can be demonstrated.

Energy efficiency retrofit, sustainable heating and renewable energy systems

The policy also supports proposals for energy efficiency retrofit, the installation of heat pumps or other sustainable heating systems and building level renewable energy generation into existing buildings of all scales. Many of these measures can qualify as permitted development, allowing them to be undertaken without the need for planning permission. Where such measures do require planning permission, the council will support proposals provided they meet the other requirements of the local plan (in particular for buildings that are either in conservation areas or which are listed) and do not have an adverse impact on the building or its surroundings. This approach is consistent with the NPPF which requires local plans to take a proactive approach to mitigating and adapting to climate change.[105]

The majority of buildings that will exist in 2050 are already built, and so retrofitting the existing building stock is a critical if the government's net zero targets are to be met. This importance is compounded by the fact that the UK's housing stock is one of the oldest and least energy efficient in Europe.[106] This has implications not only for mitigating the drivers of climate change, requiring more energy to heat a property, but also has impacts relating to health and wellbeing. Less energy-efficient homes lose heat more quickly, making them colder in winter.

As such, this policy recognises the need for retrofit of existing buildings to mitigate these issues and supports applicants wishing to do so in an appropriate fashion.

[105] Ibid.

[106] Chartered Institute of Environmental Health, referencing TADO, 'UK homes losing heat up to three times faster than European neighbours', November 2022, [UK homes heat up more quickly than those in western Europe (cieh.org)](cieh.org).