

# Introducing the Net Zero Carbon Buildings Standard – a cross-industry approach to decarbonisation

**Will Arnold**, the IStructE’s Head of Climate Action, explains the background to a UK standard that defines a ‘net zero carbon-aligned’ building, and urges members to put it into practice on their projects.

The UK construction industry been on a decarbonisation journey over recent years, but the destination of this journey has not always been clear. Most now accept that we must reach ‘net zero carbon’ (NZC) by 2050, and most agree that if we are to align with this future goal, then we must change the way we design and construct our buildings. But what does it mean to be aligned with this NZC 2050 goal? How do we know if a building built today is NZC-aligned or not?

## The need for a standard

The Whole Life Carbon Network (a volunteer network of carbon specialists in the UK) describes a ‘net zero carbon’ asset as ‘one where the sum total of all asset-related GHG emissions, both operational and embodied, over an asset’s life cycle

(Modules A0–A5, B1–B8, C1–C4) are minimised, which meets local carbon, energy and water targets or limits, and with residual “offsets”, equals zero’. It also refers to decarbonisation trajectories that align the UK’s emissions with a 1.5°C future<sup>1</sup>.

This sounds straightforward, but what is included in the scope of ‘the sum total of all asset-related GHG emissions’, and which ‘carbon limits’ does it refer to?

Research by the UK Green Building Council (UKGBC) in 2021 demonstrated that the UK construction industry was not applying the term NZC consistently. Those in the industry wanted to see some form of standard written to which they could design to prove that their buildings were NZC.

In response to this, a group of industry bodies, including the IStructE,

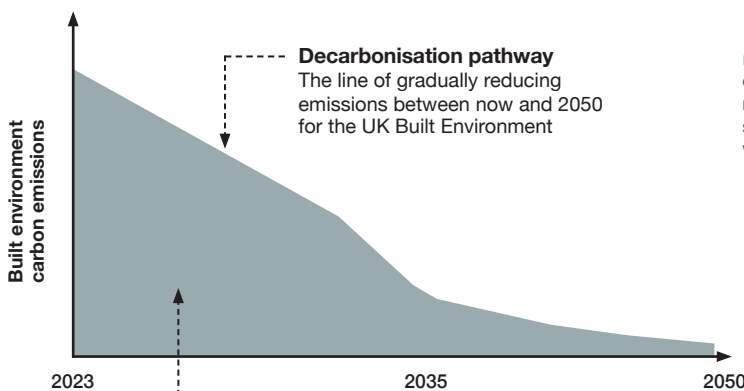
BBP, BRE, Carbon Trust, CIBSE, LETI, RIBA, RICS and UKGBC, set out to write a free standard that would define what an NZC-aligned building would look like. It would contain the scope and rules on which emissions need assessing and reporting, and what those emissions then need to be limited to. It would apply to multiple industry sectors (e.g. housing, offices, healthcare), as well as both new and retrofit projects.

I have been part of the Technical Steering Group since the Standard’s initiation, and IStructE Technical Director Patrick Hayes has been part of the Governance Board that was set up to maintain oversight and long-term stewardship of the Standard. We have since worked with more than 350 volunteers from across industry to agree the requirements on carbon and energy assessment, reporting and verification, and set out the all-important carbon and energy limits that must be met if a building is to claim that it is truly aligned with net zero carbon.

## Upfront carbon limits

The Standard requires the assessment of many things including operational energy use, renewable electricity generation, avoidance of fossil fuels, and so on. But to a structural engineer, the most pertinent aspect is the upfront carbon (A1–A5) limits that must be met. Limits were set by undertaking both a ‘bottom-up’ analysis of the upfront carbon of 500 buildings, and a ‘top-down’ dissection of the UK’s rapidly dwindling 1.5°C carbon budget (Figure 1).

The budget was then compared with the bottom-up analysis, to propose upfront carbon limits that, if adopted by enough of the industry, would reduce emissions to within the country’s budget. These proposed limits were reviewed and rebalanced until all



**FIGURE 1:** UK built environment sector must decarbonise steadily to remain with carbon budget

The above graph is indicative to explain these terms. The indicative trajectory is based on the UKGBC WLC Roadmap for the Built Environment. The decarbonisation pathway being developed for the Standard will be informed by the Roadmap

until all sectors had similar levels of ambition to their limits. A selection of some of the final set of limits in the Pilot version of the Standard are shown in **Table 1** – though it should be noted that the Standard contains limits for projects commencing on site in every single year between now and 2050.

### Using the Standard

The Standard sets out the scope of the carbon assessment required to demonstrate that the upfront carbon emissions of the constructed building are within the limits given. This builds on the scope given in the RICS Professional Standard on *Whole life carbon assessment*<sup>2</sup> and the IStructE's *How to calculate embodied carbon*<sup>3</sup> by outlining requirements around projects that must be included (e.g. treatment of external works and demolition emissions), and how to choose which carbon factor is most relevant if you're struggling to find the precise environmental product declaration for your material.

The limits shown in the Standard, and partially repeated in **Table 1**, are total limits for a whole building (i.e. all disciplines). Early on in a project, the structural engineer should agree with their collaborators what proportion of the number could be set aside for the structure – which will vary by project type, location, and broader project requirements. This figure will likely be in a range of 40–60% of the fully fitted-out buildings that will be compared to **Table 1**. Items such as basements, long spans, high loads and bare carparking structures would all increase the range. It's worth noting that the figures proposed by the 2020 SCORS article<sup>4</sup> I co-authored sit at the lower end of this range.

Meeting the limits in **Table 1**, along with the other aspects of the Standard, will allow the building to be referred to as 'net zero carbon aligned', demonstrating that emissions have been reduced to a level aligned with keeping the UK within a 1.5°C trajectory. Additionally, there is an option to demonstrate NZC at the asset level, through the optional use of offsetting.

I would encourage members to try using the Pilot version of the Standard on their projects, and to provide feedback through the form on the Standard's website. We should encourage our clients to set briefs that require conformity with the Standard. Many have supported the development of the Standard throughout its development



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**Table 1: Upfront carbon limits (as built, whole building, kgCO<sub>2</sub>e/m<sup>2</sup> GIA) taken from the UK Net Zero Carbon Buildings Standard Pilot version (2024)**

	New works		Retrofit works	
	2025	2030	2025	2030
<b>Commercial Residential</b>	580	435	460	345
<b>Culture, Worship &amp; Entertainment</b>	570	425	450	335
<b>Data Centres</b>	745	555	525	390
<b>Healthcare</b>	790	590	615	460
<b>Higher Education</b>	640	480	475	355
<b>Homes – Flats</b>	565	380	425	285
<b>Homes – Single Family Home</b>	430	290	270	185
<b>Hotels</b>	670	500	520	390
<b>Offices</b>	735	550	600	450
<b>Retail</b>	715	535	500	375
<b>School</b>	530	395	380	285
<b>Science &amp; Technology</b>	755	565	605	455
<b>Sport &amp; Leisure</b>	820	610	655	485
<b>Storage &amp; Distribution</b>	635	475	310	230

For a full set of current year-on-year limits, visit [www.nzcbuildings.co.uk](http://www.nzcbuildings.co.uk) and download the standard. Limits typically include all RICS categories except enabling works, external works, and loose FF&E (varies by sector). Dates indicate commencement on site.

([www.nzcbuildings.co.uk/contributors](http://www.nzcbuildings.co.uk/contributors)), and I would hope will be supportive of the Standard's use.

Even if your client doesn't think it possible to meet these limits (the numbers are ambitious, after all!), reporting data in accordance with the Standard will increase the consistency of the industry's approach to monitoring carbon emissions in the UK, and help drive decarbonisation across the industry.

There will be a launch webinar held

on the Standard on 31 October 2024. For more information, visit [www.nzcbuildings.co.uk](http://www.nzcbuildings.co.uk).

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### REFERENCES

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