

Intervention #7

Net zero targets for the built environment

Intervention point

Developing and aligning with accurate science-based targets for the built environment will enable the sector to decarbonise at pace, reducing its significant contributions to global carbon emissions.

Current situation

To enable and accelerate a global transition towards a net zero emission economy and society while limiting global heating to 1.5°C requires precise estimates about how much carbon can still be emitted, and how quickly current emissions need to be reduced. Such calculations are called “pathways” to net zero, from which near- and long-term science-based targets can be calculated.

The [Science Based Targets initiative \(SBTi\)](#), a collaboration between the Carbon Disclosure Project (CDP), United Nations Global Compact (UNGC), the World Resource Institute (WRI) and the World Wide Fund for Nature (WWF) has published a cross-sector pathway and corresponding annual reduction targets for the economy at large, and is now calculating sector-specific pathways for high-emission sectors including steel, chemicals and aviation.¹ For each, there is a sector decarbonisation pathway with near- and long-term targets, as well as a sector guidance advising companies how to set their targets.

Focusing on the built environment, this sector’s transformation must also move in parallel to that of the economy and society. With the built environment producing 37 percent of all energy-related carbon emissions, the sector needs to urgently decarbonise.

Getting science-based, net zero, whole life carbon targets for the near and long term is an imperative

for the decarbonisation of the building system. Besides an obvious practical need, such targets will enable a host of other activities that can assist in the faster decarbonisation of the building stock. This includes much easier detection of greenwashing, incentives for retrofitting in a building renovation passport (see *C Change Intervention #5 Building renovation passports*), as well as more accessible financing for necessary retrofits by banks or governments, as science-based targets can contribute to transition risk mitigation efforts by de-risking asset value preservation plans (see *C Change Intervention #1 Transition risk-adjusted valuation*).

However, the sector-specific decarbonisation pathway and associated science-based targets for the companies in the built environment² are still under development, as the task has been proving challenging. In general, building decarbonisation measures will likely include maximising operational efficiency and optimising development design choice, retrofitting and capital expenditure, decarbonisation of energy supplies, generating on-site green energy, buying and developing off-site green energy, and offsetting residual emissions. However, while this general approach to decarbonising appears straightforward, a number of issues for effective science-based target setting nevertheless need to be considered.

The first issue is that lack of whole life carbon data (see *C Change Intervention #6 Whole life carbon*

data) has led to difficulties in developing precise science-based near-term reduction targets aligned with a decarbonisation pathway for buildings.

Decarbonisation of the building system comprises two interacting components: operational and embodied carbon, which represent 27 percent and 10 percent of global energy-related emissions, respectively,³ and taken together are called whole life carbon.

On the operational side, it is estimated that around 80 percent of buildings standing today will exist in 2050.⁴ Because of this long lifespan and therefore very low proportion of new built stock, the majority of buildings are energy inefficient – roughly 75 percent of the building stock in the EU⁵ – and often rely on carbon intensive heating and cooling systems such as gas boilers or oil heating. Therefore, the bulk of the task of decarbonising the built environment is retrofitting inefficient and fossil fuel-reliant buildings to efficient and electrified ones, with the goal of reducing operational carbon emissions.

On the embodied carbon side, the materials used in construction and retrofitting of buildings (i.e. concrete, steel, aluminium, glass and bricks) and the transport to the building site, represent around 10 percent of global energy-related emissions.⁶ Retrofitting work can involve adding significant new embodied carbon emissions, albeit for the benefit of operational carbon reduction. A whole life carbon approach considers these two components alongside each other to avoid carbon reductions achieved from energy efficiency being undermined by additional embodied carbon emissions.

As yet, there is no widespread method for whole life carbon accounting for buildings. There is no significant legislative or industry pressure to do so, although frameworks have been proposed, for example by the World Business Council for Sustainable Development (WBCSD) in its Building System Carbon Framework, or the European Commission's Level(s) framework. This lack of whole life carbon data makes it difficult to develop science-based targets. For example, in an early 2022 Ramboll study on embodied carbon in Europe, researchers were only able to find five European countries in which more than 50 cases of whole life carbon accounting were available.⁷

Data availability is constantly growing, however, with Arup announcing a database including 1000 whole life carbon assessments at COP27 in 2022. Nevertheless, given the variety of historical building codes, climatic zones and different building types, the comparative lack of data availability still presents a serious challenge to precise target setting.

Another issue for developing science-based targets is that building decarbonisation does not stop at asset level, but is related to the wider infrastructure and supply chains. This introduces regional differences beyond merely building codes. For example, the decarbonisation of the energy grid is a crucial component of building decarbonisation but district heating systems or the availability of energy sources such as geothermal heat or solar and wind energy differ geographically and depend heavily on a wider set of inputs such as public administration. In addition, differing climatic zones, even just within Europe, necessarily mean that energy performance targets for buildings may differ for warmer and colder climates.

While precise data collection is scaled and the development of science-based net zero targets for the built environment are in their final stages, a number of certification schemes for "building quality" are often being used by the industry as proxy for "green buildings". Although there is merit in using certification schemes to build better buildings, none of the available schemes are specifically aligned with science-based net zero whole life carbon targets. This is because quality ratings focus on a number of specialised or more holistic approaches that take into account factors that are not strictly relevant for decarbonisation purposes.

These include, for example, a holistic indicator (e.g. gold or silver, or a numerical point system) based on a number of factors such as energy use, carbon, health, and water use. LEED relates only 35 percent of its credits to climate change,⁸ WELL takes a similar approach⁹ as does BREEAM but the latter is engaged in developing a certification for net zero carbon verification¹⁰ or energy performance. Also, generally energy performance metrics are estimated from design, rather than measured performance. NABERS UK has raised the focus on measured energy performance, rather than

projected, but is not designed to consider whole life carbon approaches.

What is being done

SBTi released its first draft of the building sector guidance,¹¹ as well as a draft of a building sector target setting tool, and was running a public consultation process until July 2023.

The building sector guidance development, funded by the Laudes Foundation, is structured into three expert advisory groups:

- Operational (in-use) emissions pathway for the global building sector, in collaboration with the Carbon Risk Real Estate Monitor (CRREM). The public consultation ran until November 2022 and SBTi aligned pathways were released in January 2023.¹²
- Embodied emissions pathways for the global building sector, in collaboration with Ramboll, are currently still in development and are expected to be released towards the end of 2023.
- Guidance on emissions accounting, reporting and a tool for target-setting, for stakeholders within the sector (i.e. developers, owners, architects, engineers and builders) is also still in development and is expected to be released towards the end of 2023.

While the operational emissions pathways are already published, and the embodied emissions pathways are still in development, the SBTi draft guidance for companies in the built environment includes key criteria and considerations that are relevant for the entire value chain. These are intended to introduce a sense of clarity and responsibility into this arguably fragmented space. Such criteria and considerations are, for example:¹³

- Whole building approach, by which companies are required to report all building-related in-use operations emissions together despite the scope. For example, occupier-controlled spaces traditionally fall into building owners' scope 3 emissions, but they will have to be reported on.
- Mandatory scope 3 categories also affect architects and engineers, which may be required to include lifetime emissions of buildings into their scope 3 category 11 (use of sold products), or developers, which may be required to include embodied emissions of developments into their scope 3 category 2 (capital goods).

- Location-based accounting when considering the purchased electricity for calculating a base year, setting targets or tracking performance.
- Increased transparency in divestments, whereby investment sector users of the SBTi should provide disclosure regarding emissions reductions from decarbonisation of assets alongside emissions reductions in the portfolio through divestment of assets. It is proposed that companies and financial institutions with a high turnover are allowed to set fixed intensity targets aligned to the decarbonisation pathways.
- Users are further supposed to commit to no new fossil fuel installations in buildings portfolios from 2025.

These proposals, among others, will be decided upon during the public consultation feedback integration period in Q3 of 2023, and final guidance and tools are expected to be published towards the end of 2023.

In parallel and at the country-specific level, there are a number of building certifications and labels that are aiming to embed science-based decarbonisation deeply into their labels and certifications, as well as enabling criteria that are important to have truly representative labels and certification that can be trusted on decarbonisation. These include, for example, the DGNB¹⁴ in Germany, the ILFI¹⁵ in the US, the LCBI¹⁶ in the EU and NZCBS¹⁷ in the UK.

In parallel to the SBTi and the country-specific certifications and labels, there are ongoing parallel attempts to develop targets and benchmarks for buildings. Commissioned by the European Commission and building on its previous 2022 study, Ramboll and associates are working on another support study for an EU whole life carbon reduction roadmap for the built environment.¹⁸ The goal of the study is to gather data on embodied carbon and establish a baseline for such emissions across four European climatic regions, set against science-based national carbon budgets. The impact of this work is expected to enable the development of (carbon) cost-effective solutions for retrofits and new builds that strike a sustainable balance between energy efficiency improvements and associated embodied carbon emissions, which can be used in precise whole life carbon reduction targets for buildings in Europe. A public consultation closed in September 2023 and results are expected in 2024.

At a policy level, the European Commission published a proposal for a revision of the Energy Performance of Buildings Directive (EPBD) in December 2021,¹⁹ which is expected to pass in the second half of 2023. It is an essential element of the European Commission's Renovation Wave Strategy, which aims to double annual energy renovation rates in the next ten years²⁰ as part of the EU Green Deal. The new proposal includes emission targets for individual buildings, which would be either "nearly zero-energy buildings" (nZEBs),²¹ constituted by significant improvements on energy efficiency, and then "zero-emission buildings" (ZEBs),²² which are highly efficient and electrified buildings that are powered by renewable energy.

However, the precise target definitions are left to EU member states in its mandatory National Building Renovation Plan (NBRP).²³ The key metric for this strategy is a low energy intensity of electrified heating and cooling systems and good insulation through retrofit, which delivers zero operational carbon if the energy is from sustainable sources.²⁴ The lack of embodied carbon considerations in the EPBD has been criticised by expert sustainability organisations.

Possible next steps

Once the near- and long-term targets and sector guidance from SBTi for buildings have been published, it is important to bring all the currently available standards and certifications in line with this science-based methodology, to ensure that, at the core, all players within the sector are working towards the same targets. This includes those that are already aligned, as well as the more widely used ones like BREEAM, LEED or WELL.

At the same time, stakeholders should familiarise themselves with the preferred methods of greenhouse gas (GHG) accounting for target setting. The guidance documents are:

- [Accounting and Reporting of GHG Emissions from Real Estate Operations](#) by CRREM, Partnership for Carbon Accounting Financials (PCAF) and the Global Real Estate Sustainability Benchmark (GRESB).
- [Construction CO2e Measurement Protocol](#) by the European Network of Construction Companies for Research and Development (ENCORD).
- [Guide to Scope 3 Reporting in Commercial Real Estate](#) by the UK Green Building Council (UKGBC).

Fundamentally important for the development of science-based net zero targets is the collection of whole life carbon data. Only with a sufficient database of different asset classes in different climatic zones can precise and achievable emission targets be calculated. For more information, see *C Change Intervention #6 Whole life carbon data*.

How to get involved

To learn more about SBTi building targets and guidance, and to receive updates: <https://sciencebasedtargets.org/sectors/buildings>

To learn more about the Ramboll and Laudes Foundation Embodied Carbon Reduction support study, follow this link: <https://c.ramboll.com/lets-reduce-embodied-carbon>

WBCSD's *Net-zero buildings: Where do we stand?* provides an understanding and common approach of how to account for whole life carbon emissions of buildings, and discusses emerging benchmarks the industry can align around.

<https://www.wbcsd.org/Programs/Cities-and-Mobility/Sustainable-Cities/Transforming-the-Built-Environment/Decarbonization/Resources/Net-zero-buildings-Where-do-we-stand>

About C Change

C Change is a ULI-led programme to mobilise the European real estate industry to decarbonise. We're a movement empowering everyone to work together for a sustainable future. We connect the brightest minds from across the value chain. We challenge barriers, share expertise, and champion innovation to move swiftly to accelerate solutions that will transform our industry and protect our planet. C Change means real change.

C Change was formed in late 2021 by a group of leading real estate players that was united in its aim to focus on collaboration to ensure companies large and small have access to practical solutions and education on decarbonisation.

About these intervention briefings

This is one of a suite of intervention points developed as part of the C Change programme. Intervention points are specific places within a system where we can target action, interrupting business as usual to drive transformation. Of course, systems are dynamic environments that are always in flux. We expect movement over time, and will update this document as prevailing and anticipated trends change shape. This briefing was researched in 2022 and published in 2023.

- 1 [Science Based Targets initiative: Sector Guidance](#)
- 2 [Science Based Targets initiative: Buildings](#)
- 3 p1 [Ramboll: Towards embodied carbon benchmarks for buildings in Europe](#)
- 4 [World Economic Forum: To create net-zero cities, we need to look hard at our older buildings](#)
- 5 [European Commission: In focus: Energy efficiency in buildings](#)
- 6 [GlobalABC: Tracking progress](#)
- 7 p1 [Ramboll: Towards embodied carbon benchmarks for buildings in Europe](#)
- 8 [US Green Building Council: LEED rating system](#)
- 9 [International WELL Building Institute: WELL Building Standard](#)
- 10 [BRE: Net zero carbon buildings](#)
- 11 [Science Based Targets initiative: Buildings](#)
- 12 [CRREM: Decarbonisation pathways](#)
- 13 [Science Based Targets initiative: 1.5°C science based target setting in the buildings sector](#)
- 14 [DGNB: Zertifizierung für gebäude](#)
- 15 [International Living Future Institute: Programs](#)
- 16 [Low Carbon Building Initiative](#)
- 17 [UK Net Zero Carbon Buildings Standard](#)
- 18 [Ramboll: Support study for the development of the roadmap for the reduction of whole life carbon of buildings](#)
- 19 [EUR-Lex: Proposal for a Directive of the European Parliament and of the Council on the energy performance of buildings \(recast\)](#)
- 20 [European Commission: Renovation wave](#)
- 21 p37 (EPBD Article 2) [EU-Lex: Proposal for a Directive of the European Parliament and of the Council on the energy performance of buildings \(recast\)](#)
- 22 p37 (EPBD Article 2) [Ibid](#)
- 23 p45 (EPBD, Article 3), [Ibid](#)
- 24 This is also suggested by the IEA as "net zero ready buildings" [AIA: How to design net-zero ready buildings on a budget](#)

Lead author: Valentin Wiesner

Supporting author: Kate Wolfenden

Technical reviewers: World Business Council for Sustainable Development (WBCSD)