IIGCC

Addressing whole life carbon in real estate portfolios: A step-by-step guide

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Contents

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Executive summary

This document provides supplementary guidance for investors utilising the Net Zero Investment Framework (NZIF) or other net zero target-setting methodologies in addressing whole life carbon (WLC) emissions in their real estate portfolios and decarbonisation strategies.

Asset owners and asset managers using NZIF for real estate are currently recommended to set targets and assess current and forward-looking alignment on their operational carbon emissions, and that embodied carbon should be considered in strategies.

The background provides an introduction to WLC, and embodied and operational emissions, and highlights why it is important for investors to take a WLC approach to address emissions in their portfolio.

Section 1 provides guidance and recommended actions for assessing WLC emissions in the property life cycle. It outlines and signposts best practices, key guidelines and methodologies to addressing emissions at production, construction, in-use and end-of-life stages, highlighting the unique opportunity that investors have by sitting across the lifecycle stages. An overview of the key principles, actions, stakeholders and metrics for investors to address WLC emissions is provided in Figure 1.

Section 2 identifies and outlines the process of developing an internal process for investors to address WLC emissions. With emissions taking place at different elements within the property and investment lifecycle, it is important that internal processes are in place to address these. This section identifies seven key challenges to developing a successful WLC decarbonisation strategy and recommendations to address these.

Key points

- This publication provides IIGCC members with guidance to address whole life carbon emissions within their real estate portfolios. Whole life carbon emissions are those emissions, both operational and embodied, that are emitted over the entire life cycle of a building.
- Investors should address WLC to decarbonise their portfolios. As investor efforts to address operational carbon emissions from their portfolio progress, embodied emissions will make up a greater share of emissions over the lifecycle of a building.
- Investors play an important role in accelerating reductions in carbon emissions from real estate, mobilising capital, influencing the design, construction, management and operation of buildings, as well as the disposal of assets. Investor action can provide a powerful incentive to shape the activities within the built environment and market participants to reduce emissions.

- It is recommended that investors undertake a fabric first approach for new developments and major retrofits, focusing on improving material efficiencies and undertaking whole life carbon assessments at key phases of the property life cycle, to understand and identify options to reduce emissions. For operational assets, less intrusive, high impact and low-cost interventions should be considered first.
- For investors using the Net Zero Investment Framework, it is encouraged that they begin to set targets for their embodied emissions for new construction and retrofit activities, alongside operational emissions.
- Ensuring data is collected and transferred seamlessly across the building life cycle is crucial to understanding and addressing a building's emission, identifying inefficiencies and areas for improvement. The use of digital twins and material passports are an important avenue for investors to do this.
- Investors should disclose operational and embodied emissions performance through the Global Real Estate Sustainability Benchmark (GRESB)
- Investors should develop strategies to address whole life carbon in their real estate portfolio. A process for developing this, outlining key considerations to setting up a successful strategy.

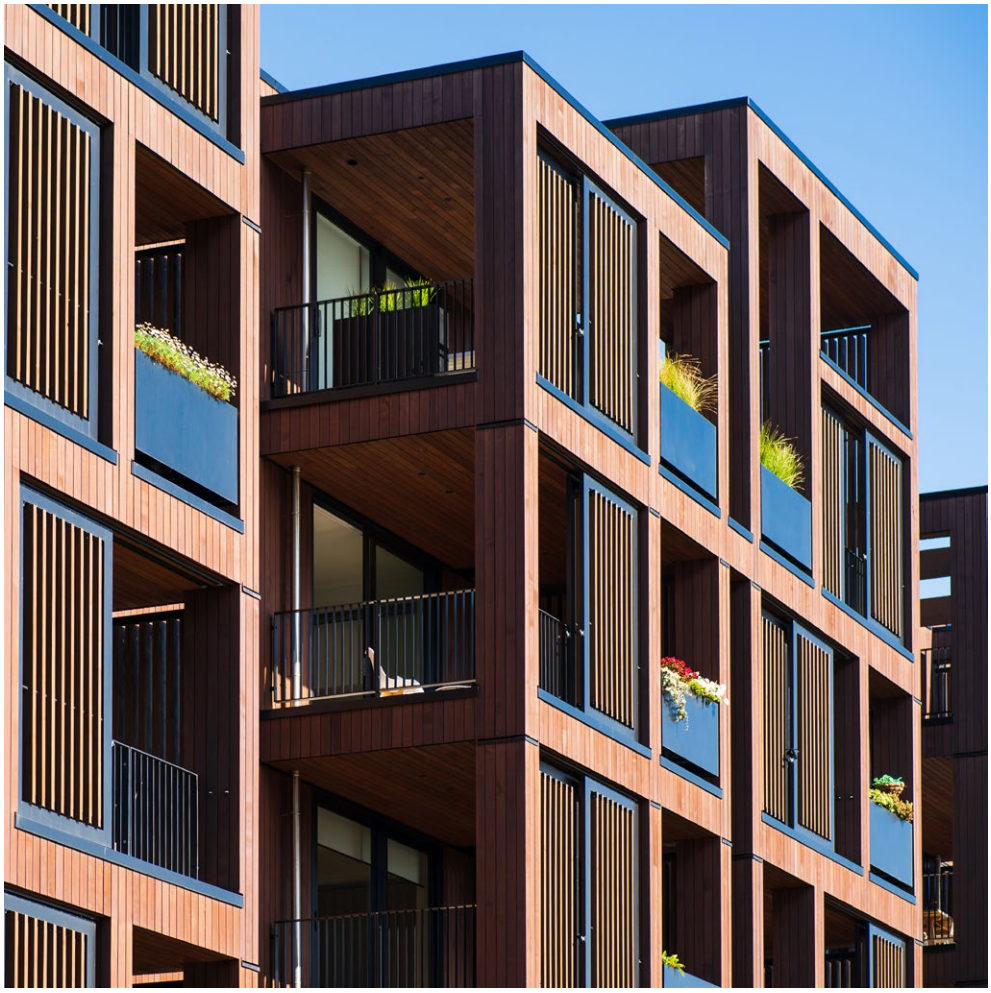


Figure 1: An overview of key actions, metrics and stakeholders across the property life cycle for investors to address whole life carbon emissions

Introduction

The real estate sector has one of the largest sectoral energy and carbon footprints across the world, representing 37% of energy and process related CO_2 emissions and over 34% of energy demand globally.[1] Given the scale of emissions from the construction and operation of buildings, addressing emissions in investors' real estate portfolios is crucial to transitioning to net zero by 2050 or sooner, in line with global efforts to limit warming to 1.5°C.

As an asset class, real estate[2] is one of the largest for institutional investors, with global real estate assets under management AUM of $4.2 trillion in 2022.[3] Non-listed real estate represents the largest share of AUM, accounting for over 84% or $3.9 trillion. More than half of which, $2.3 trillion, is invested through non-listed real estate funds with the remainder in listed and other products such as derivatives.[4]

The Net Zero Investment Framework[5] (NZIF) provides guidance as to how investors can assess and align their real estate assets to the Paris Agreement and how to develop net zero objectives, strategies and targets.[6] When published In March 2021, the focus of the real estate asset class guidance was on operational emissions, with a caveat stating "embodied carbon is not included at this time, but should be considered in strategies and accounted for as methodologies become available".[7] Technical guidance, methodologies and pathways addressing embodied carbon are now increasingly becoming available to investors.[8]

Throughout 2022 IIGCC undertook a series of roundtables on embodied carbon and addressing whole life carbon in real estate portfolios. The outcomes of these roundtables were published in January 2023 – Measuring and Managing Whole Life Cycle Carbon in Real Estate Portfolios: Reflections and recommendations from IIGCC Roundtables with Investors – and included a recommendation to develop a step-by-step guide to addressing whole life cycle emissions.

The aim of this guidance is to provide investors with the practical steps to address whole life carbon (WLC) within their direct real estate portfolios and interactions with key stakeholders across the life cycle of a building. The guidance will support investors in beginning to incorporate WLC into their net zero targets and strategies, signposting investors to best practice and available methodologies to assess WLC and reduce their real estate emissions. The principles outlined in this guidance can support investors with their indirect real estate portfolios. Further guidance will be developed by IIGCC on stewardship and engagement, including for indirect real estate and real estate debt and embodied carbon.

As this guidance sets out, investors can play a significant role in addressing emissions across the investment and property life cycle.

Background

What is Whole Life Carbon

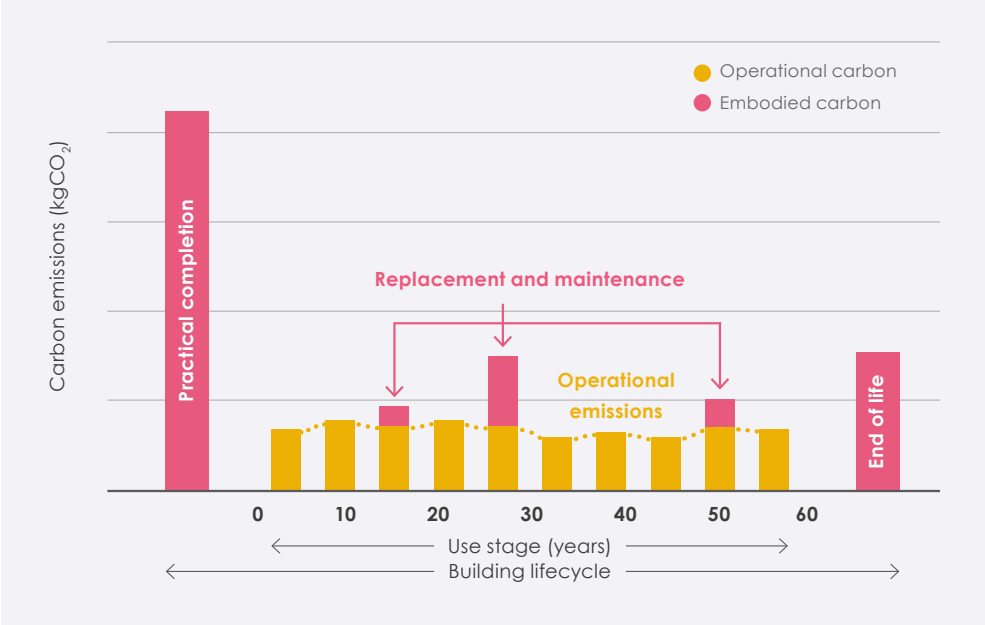
Whole life carbon emissions refers to the carbon dioxide (CO_2) and other greenhouse gases (GHG) emissions emitted over the entire life cycle of a building or infrastructure asset. Be it a house, office block or airport; from construction, to operation and maintenance, to the disposal or end of life of the building. Whole life carbon takes into account both operational emissions and embodied emissions. In reference to a building WLC covers scope 1, 2 and 3 emissions – with operational emissions being scope 1 and 2, and embodied emissions being scope 3.

The British Standard Institute's (BSI) British Standard (BS) EN 14978 defines operational emissions as the emissions associated with the ongoing use of a building, this includes energy consumption for heating, cooling, lighting and appliances, as well as water consumption and waste generation.[9] BSI PAS 2080 further breaks down these emissions into 'operational' and 'use' – operational being emissions cost of maintenance and 'use' phase emissions resulting from actions of third parties such as tenants.[10]

BS EN 15978 defines embodied emissions as the emissions associated with the production, transport and installation of building materials and components, as well as the construction or renovation process itself.[11]

In order to address whole life emissions, operational and embodied emissions need to be considered together but also very differently. As highlighted in Diagram 1, emissions take place across the life cycle, and while a significant proportion of embodied emissions are involved in the upfront construction phase – about 60 per cent of the total embodied emissions and 30 per cent of all emissions across the life cycle of the building[12] – embodied emissions will take place throughout the lifecycle.

Figure 2: Interaction between operational and embodied emissions in a building across the building lifecycle[13]



Why is WLC important for investors to address in their portfolios?

Investors in the built environment have historically focused on reducing the operational emissions of buildings, which typically account for 70% of emissions. However, as these emissions reduce, embodied emissions make up a greater share of emissions over the building's life cycle. This creates a growing focus on embodied emissions and a need to account for whole life carbon.

There are several drivers leading to this increased interest in WLC. For operational emissions, this is largely due to increased reporting requirements and increased operational costs within portfolios. Interest in embodied carbon has risen due to increased awareness in the industry, increased guidance in the space and the introduction of mandatory reporting in some jurisdictions. This comes alongside acknowledgement that in the future reporting may become mandatory, for example through the recast of the EU Energy Performance of Buildings Directive.[14]

In some jurisdictions, mandatory embodied carbon emissions reporting is already happening. In France, the RE2020 which entered into force in January 2022 introduced new requirements aimed at reducing emissions from building materials over the life of the building.[15] While in Sweden, since 2022 developers must calculate the embodied emissions of new buildings before submitting them to the government in order to receive the final building permit.[16]

Investors should beware that an exclusive focus on either operational or embodied carbon can lead to entirely different solutions. Buildings are temporal, meaning that the extent and manner in which emissions are released depends on the stages of the building life cycle. Materials can have different emissions profiles under a whole life carbon approach and through considering the full lifecycle impact of a building, investors make more informed decisions about the materials and systems used in construction, as well as the energy efficiency and maintenance of the building over its life. Such an approach prevents carbon emissions and their accountability from being shifted from one lifecycle stage to another.

Investors can play an important role in accelerating reductions in carbon emissions in real estate. They mobilise significant capital and influence the design, construction, management and operation of buildings, as well as how they are disposed of. This can provide a powerful incentive to shape the activities in the built environment and the behaviour of market participants to better consider decarbonisation.

Net Zero Investment Framework and whole life carbon

NZIF recommends that to assess current and forward-looking alignment of assets' operational emissions to net zero, investors should use the Carbon Risk Real Estate Monitor (CRREM) methodology or an equivalent standard when available.[17] In addition to the existing recommendations for the alignment of real estate assets, NZIF also sets out guidance on portfolio construction, stewardship and engagement and selective divestment (see Table 1).

Table 1: NZIF – real estate asset class guidance[18]

Assessment of assets	Implementation
• Set scope for assessment and alignment with net zero goals • Assess assets using CRREM tool to determine alignment with 1.5°C pathway • Prioritisation for engagement based on level of stranding risk and exposure • For direct investments assess options for investment / management to achieve alignment with 1.5 or net zero goals	1. **Portfolio construction:** - Screening and setting criteria for potential investments using CRREM tool 2. **B. Investment/management:** - For direct investments (and own buildings) agree investment / management plans to align assets with net zero goals through retrofits to reduce energy use, increase renewable energy use 3. **Engagement:** - Tenant engagement to improve data collection and facilitate investment/ management for alignment of assets; - Alignment based escalation strategy and voting (for listed assets); - Encourage corporate tenants to adopt targets and align including occupied buildings
Alignment Metrics (M) and Targets (T)	
M. Current and forward-looking alignment based on carbon emissions and energy use in line with net zero pathways (CRREM tool) **T.** Increase % AUM in net zero or aligned assets – 5-year goal **T.** Total coverage of assets aligned or under active management or engagement 70% of financed emissions from material sectors (combined with equities and corporate fixed income)	

CRREM provides pathways for operational emissions and does not consider embodied carbon. NZIF guidance states that embodied carbon is not currently included in the guidance, but should be considered in strategies and accounted for as methodologies become available.

The Science Based Targets Initiative (SBTi) have recently developed the first 1.5°C aligned global embodied carbon pathway, which is currently open for consultation from wider industry.[19] The new embodied pathway only covers new construction at this time, which represents 60 per cent of embodied emissions. This is due to a lack of consistent and available data, and a global renovation pathway has not yet been developed on renovation activities. Nonetheless, this will allow investors to align embodied emissions from new construction to a 1.5°C degree pathway for the first time. Guidelines are included for investors to be able to set targets, on an asset or wider portfolio basis.

Section 1 – Assessing WLC in the property life cycle

Investors have the unique opportunity, by having an overview across all lifecycle stages, to make a significant contribution to improving the ability of the industry to address its carbon and resource footprint.

They can do this by setting minimum requirements for reporting across all the lifecycle stages, to introduce a 'golden thread' from information to accountability, and by ensuring the whole life cycle assessments (WLCA)[20, 21] are undertaken at key points across the property life cycle. This will not only help set consistency in terminology and processes across the various stakeholders, but also signal leadership and preparedness to meet upcoming changes in reporting requirements and frameworks.

Taking a holistic approach across lifecycle stages will also encourage an understanding of how the flow of information and requirements impacts activities upstream and downstream of any lifecycle stage. The creation of a digital twin – including a building passport listing all materials used in its construction during the lifecycle – of an asset in both its intended (in product and construction phases) and real world performance (for in-use phases), can assist investors obtaining and maintaining data on a buildings performance across the life cycle stages.

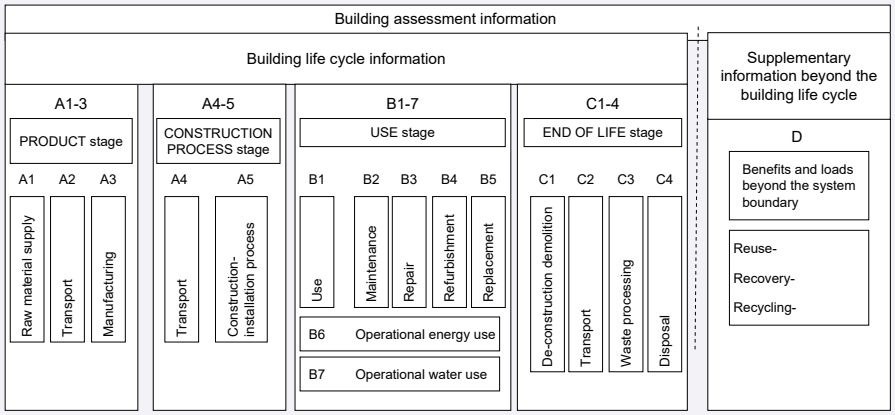
Several stakeholders are involved in the different lifecycle stages and can take accountability for activities within their control. Setting consistent metrics and output standards, embedded in first principles and mindful of regional practices, will help the data fit in with the wider reporting framework.

The real estate industry can be highly regulated, stipulating and outlining processes for individual stakeholders within the value chain to ensure compliance with relevant regulation and guidelines. Increasing awareness, accountability and consistency in the requirements, aligned with existing processes where possible, will help mobilise action effectively.

1. Project lifecycle stages

The project lifecycle stages are set out in *BS EN 15978:2011 Sustainability of Construction Works — Assessment of Environmental Performance of Buildings,* produced by the BSI, and covers the sustainability of construction works, assessment of environmental performance of buildings and the calculation methodology. It provides a breakdown of the building life cycle and sets out a methodology for calculating whole life carbon across different lifecycle stages.

Figure 3: Modular information for the different stages of the building assessment (BS EN 15978:2011)



While there may be other frameworks structuring the life cycle of a building, the modular approach outlined in BS EN 15978, is most frequently referred to. There is broad consistency in the life cycle stages of buildings and the measures that can be embedded in these, which support assessment and management of whole life carbon emissions.

Such an approach is geographically agnostic, and the methodology and principles can be used by investors regardless of the location or industry of their investments.

The following sections will set out how investors can address WLC emissions in the building life cycle and signpost to technical guidance and best practice.

1.1 Production (including acquisitions)

This phase involves defining the 'product' or project, and determining the components and materials which will be used and their environmental impact including GHGs.

While the actual emissions generated by this phase may be small, it is nonetheless a key phase for addressing WLC emissions. Investors can embed principles and targets that will underpin the performance of the building, at completion/handover, through its operational life and its impact at the end of life/use.

For investors this phase could occur in two instances; new developments and acquisitions.

1.1.1 New development

Investors looking to incorporate WLC within new developments should consider:

- Implementing a fabric-first approach to maximise the performance of components and materials of the building, including designing for maximum material efficiency (taking into account minimal fit-out in speculative spaces and material use intensity metrics[22]).
- Incorporating circularity in material and product selection, high recycled content and materials and components designed for dismantlability/disassembly.
- Reuse of existing infrastructure – structural systems can comprise up to 80 per cent of a buildings embodied carbon, reusing existing structures and materials can significantly reduce embodied emissions of a new development.
- Undertaking a WLCA to understand the impact of extraction, transportation and manufacturing processes necessary to produce any construction products, including components required to construct the asset.
- Use WLCA and request any additional embodied carbon calculations from early project stages to benchmark and track changes/ improvements.
- Undertake climate scenario analysis to understand building performance under different climate trajectories.
- For suppliers, investors may consider:
  - Requesting environmental product declarations (EPDs)[23] including embodied carbon intensity performance of primary materials that will be purchased in requests for proposals (RFP).
  - Asking suppliers whether they have made forward-looking commitments that are recognised by either Transition Pathway Initiative (TPI) or SBTi to reduce emissions intensity of products. This will send strong signals to contractors at the outset and ensure accountability
- Investors should consider setting targets for emissions from steel and concrete used in the development phase that are aligned with the TPI pathways.[24] Materials purchased in these sectors can be benchmarked against 1.5°C degree climate scenarios. Investors looking to align their embodied emissions with net zero may want to align with these benchmarks. Suggested targets for investors include:
  - Average emissions intensity of steel/concrete of steel procured
  - Proportion of suppliers/materials (by value or volume) that have come from suppliers with externally verified net zero commitments (steel companies with SBTi)

Investors may also want to consider IIGCC's Steel Purchaser Framework[25], alongside other industry led schemes like First Movers Coalition[26] (which includes the cement/concrete and steel sectors) and Steel Zero.[27]

- Further targets for investors to consider, include:
  - Minimum reuse and diversion from landfill rates for demolition waste
  - Embodied carbon targets based on best practice approaches, for example in the UK using the limits provided for in the UK Net Zero Building Standards once finalised.[28]

Product stage key resources:

- Climate Action Tracker
- EU – Level(s) common framework
- ULI – Embodied Carbon in Building Materials in Real Estate
- WBCSD – WLC emissions assessment guide
- LETI – Embodied Carbon Primer
- RICS – Whole Life Carbon Assessment (WLCA) Standard – 2nd Edition
- ISO 14044:2006 Environment management – Life cycle assessment – requirements and guidelines
- WBCSD and Arup – Net zero buildings: Halving construction emissions today
- UK Net Zero Carbon Buildings Standard – under development
- BRREAM – Communities Standard
- British Council for Offices, Guide to Specification Key Criteria Update – February 2023

Embodied Carbon Databases

- PCAF – European building emissions factor database
- Inventory of Carbon and Energy (ICE) Database

Sector Pathways

- TPI Carbon performance assessment of steelmakers: note on methodology
  - TPI Carbon performance assessment of steelmakers: Discussion paper (split pathways)
- TPI Carbon performance assessment of cement producers: note on methodology

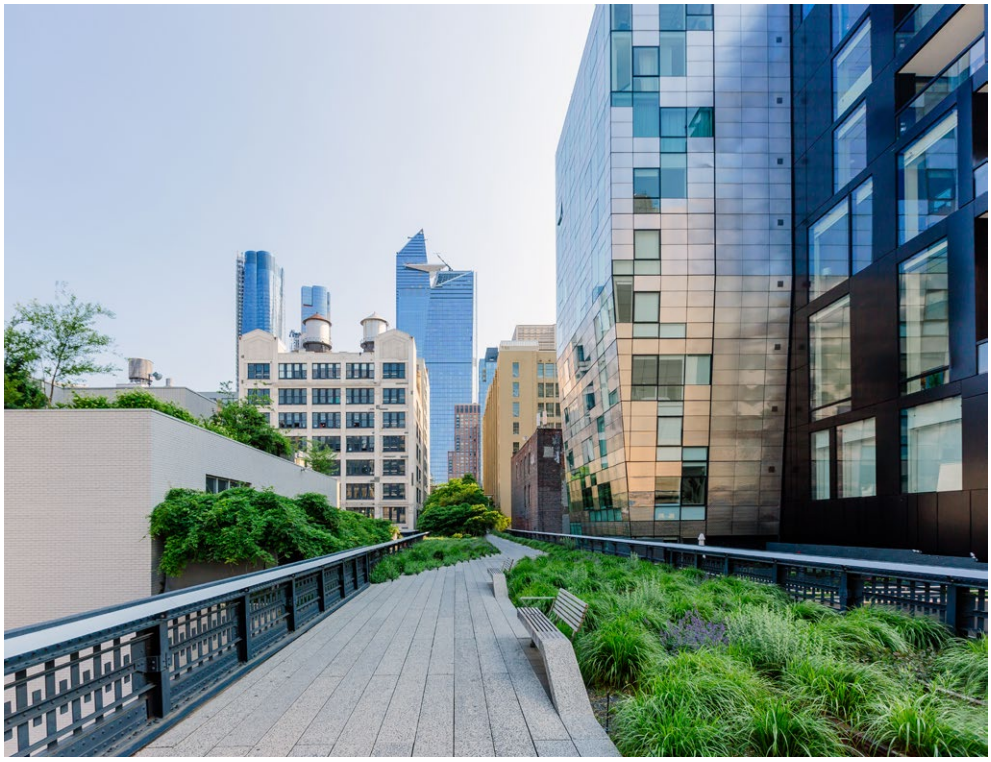
1.1.2 Acquisition

For new acquisitions, where investors are not involved in decisions on building design and materials, while not responsible for historic embodied emissions, investors should adopt thorough due-diligence processes to evaluate an asset's environmental risks and opportunities against industry and best practice sustainability targets. This includes ensuring that the embodied carbon of an acquired project is captured in the emissions disclosure. This is also an opportunity for investors to align commercial decisions with their organisational ESG targets and strategies.

EU Level(s)

The European Commission's Level(s) provides an adaptable framework to improve the sustainability of buildings. Taking a whole life carbon approach, the framework provides a clear set of priorities for a buildings performance and a standardised basis for setting requirements for new and renovated buildings.

Level(s) is aimed at actors involved in the different stages of a building's life cycle – including those involved in planning, design, financing and execution. Investors can use Level(s) indicators to track environmental and financial impact of building projects. The framework has 6 major objectives and 16 indicators.



Macro Objectives		Indicators
1. Greenhouse gas emissions along a building life cycle	Minimise the whole life carbon output, consider both energy consumption during the use phase of the building and embodied energy	1.1 Use stage energy performance (kWh/m2/yr) 1.2 Life cycle Global Warming Potential (CO_2 eq./m2/yr
2. Resource efficient material life cycles	Optimise the building design to support lean and circular flows, including: • Building materials use and quantities • Minimise construction and demolition waste generated to optimise material use • Replacement cycles and flexibility to adapt to change • Potential for deconstruction as opposed to demolition	2.1 Bill of quantities, materials and lifespans 2.2 Construction and demolition waste and materials 2.3 Design for adaptability and renovation 2.4 Design for deconstruction, reuse and recycling
3. Efficient use of water resources	Use water efficiently, particularly in areas of identified long-term or projected water stress.	3.1 Use stage water consumption (m3/occupant/yr)
4. Healthy and comfortable spaces	Create buildings that are comfortable, attractive and productive. This includes four aspects of the quality of the indoor environmental quality: • The indoor air for specific parameters and pollutants • The degree of thermal comfort • The quality of artificial and natural light and associated visual comfort • The capacity of the building fabric to insulate occupiers from internal and external sources of noise	4.1 Indoor air quality 4.2 Time outside of thermal comfort range 4.3 Lighting and visual comfort 4.4 Acoustics and protection against noise
5. Adaptation and resilience to climate change	Futureproof building performance: • Adapt to changes of future climate impacting on thermal comfort • Make the building more resilient and resistant to extreme weather events (including flooding: fluvial, pluvial and coastal). • Improve the building design to reduce the chances of pluvial/fluvial flood events in the local area (i.e. increasing sustainable drainage).	5.1 Protection of occupier health and thermal comfort 5.2 Increased risk of extreme weather 5.3 Sustainable drainage
6. Optimised life cycle cost and value	Long term view of the whole life costs and market value of more sustainable buildings, including: • Life cycle costs (construction, operation, maintenance, refurbishment and disposal). • Encourage the integration of sustainability aspects into market value assessment and risk rating processes and ensure that this is done as informed and transparent as possible.	6.1 Life cycle costs (€/m²/yr) 6.2 Value creation and risk factors

1.2 Construction (including major refurbishments)

The construction phase of the property life cycle is an emissions-intensive phase, particularly for embodied carbon. To reduce emissions investors should set up requirements for reporting and accountability across all stakeholders, from delivery partners to investors and shareholders. Similar sets can be taken as outlined in Section 1.1.1.

Undertaking a WLCA should be considered for both construction and major refurbishments. Specific products are chosen and designs may be adjusted, which may impact on emissions and so interventions may be made to reduce emissions. Forecasts undertaken at the Product stage should be reviewed and updated to monitor construction variations.

Construction, as well as major refurbishment, is a resource intensive activity. Investors can embed the need for monitoring and reporting the impact of site activities to help minimise impact across a range of parameters, including resource consumption (fuel, water, materials, waste etc), impact on local air quality, health and safety measures and local biodiversity.

The World Business Council for Sustainable Development (WBCSD) has developed flexible guidance for investors and developers[29] which provides details of carbon reduction policies and best practices to adopt for projects and how to use them. These are grouped around five main principles:

1. Create a carbon policy that sets out consistent requirements for all projects to follow
2. Set targets and transparency requirements for projects to meet across all their phases
3. Prioritise circularity
4. Design optimisation to use less material and to choose materials with a low carbon footprint (where not already specified in the product phase – see Section 1.1.1)
5. Low-carbon procurement to ensure acquisition of materials with a low carbon footprint (where not already specified in the product phase – see Section 1.1.1).

The same principles may be applied for major refurbishments and renovations.

A recently produced report from CRREM on the embodied carbon of retrofits, focused on the trade-off between operational savings and embodied carbon of renovations, found that on average the carbon payback of renovations was a period of up to eight years. This highlights the favourable nature of refurbishments from an ecological perspective.[30] The report suggests some initial benchmarks for embodied carbon for both multi-family residential real estate (between 20-80 Kg CO_2e/m^2) and commercial real estate (up to 140 Kg CO_2e/m^2). Further limit values for embodied carbon are identified in the UK Net Zero Building Standard.

Construction phase (including major refurbishments) key resources:

- EU – Level(s) common framework
- BRREAM – New Construction Standard
- ULI – Embodied Carbon in Building Materials in Real Estate
- WBCSD – Decarbonizing construction: Guidance for investors and developers to reduce embodied carbon
- RICS – Whole Life Carbon Assessment (WLCA) Standard – 2nd Edition
- ISO 14044:2006 Environment management – Life cycle assessment – requirements and guidelines
- CRREM – Embodied Carbon of Retrofits: Ensuring the ecological payback of energetic retrofits
- WBCSD and Arup – Net zero buildings: Halving construction emissions today
- Circular Economy Statement Guidance | GLA (london.gov.uk)

EU Taxonomy

The EU taxonomy is the foundation of the EU Sustainable Finance framework, a classification system that defines criteria for economic activities that are aligned with a net zero trajectory by 2050 alongside broader environmental goals other than climate.

Construction and real estate are a key sector included in the taxonomy, and it covers the following activities:

- Acquisition and ownership of buildings
- Construction of new buildings
- Renovation of existing buildings

Under each activity, it provides further information around specific requirements for an activity to be aligned to the Taxonomy in the areas of Climate Mitigation and Climate Adaptation – please see Annex 1 for an overview of the substantial contribution criteria.

In June 2023 the Commission adopted a new EU Taxonomy delegated act under the sustainable finance package which introduces new non-climate environmental objectives, including the transition to a circular economy.

The substantial contribution criteria for transition to a circular economy covers both construction of, and renovation of existing buildings (see Annex 1 for text). This directly links substantial contribution in the transition to circularity and the EU Levels framework (see above).

The new EU Taxonomy elements will come into force from January 2024.

1.3 In-use

The operation of a building can be the most challenging to manage owing to interaction between various, and varying, stakeholders. The complex relationship between owners, management, tenants and users of buildings can make it difficult to track environmental and sustainability KPIs. Undertaking a WLC approach will ensure that all stakeholders are reporting consistent activity and emissions boundaries. While there is recognition of the need to upskill stakeholders to be able to deliver to KPIs, investors can help significantly by simplifying and setting consistent reporting requirements across assets and regions.

Traditionally, the main focus of assessing and managing the energy impact of buildings in-use has been for its operation (energy use for heating, cooling, ventilation, lighting and servicing). It is at the operation stage that investors can undertake high impact and low cost interventions that are less intrusive than major retrofits.

There is increasing awareness of the embodied carbon impact of maintenance, refurbishments and upgrades, typically measured as $kgCO_2e/m^2$. It is widely acknowledged that the embodied carbon impact of maintenance and minor upgrades is difficult to track, measure and report, due to a lack of data and reporting frameworks. However, investors and asset managers can set requirements for maintaining asset information during the life of a building, to help collect the data that would be used to set suitable standards to quantify the impact.

Setting up a common language, methodology and set of KPIs across all lifecycle stages will go a long way in maintaining continuity in recording and reporting the overall impact of operating a building. This will also help stakeholders ensure the right skills and knowledge are developed within their teams.

In-use phase key resources:

- EU – Level(s) common framework
- Carbon Risk Real Estate Monitor - Tool
- PCAF, CRREM & GRESB – Accounting and Reporting of GHG Emissions from Real Estate Operations
- BRREAM – In-use Standard
- BRREAM – Refurbishment and Fit Out Standard

Data sources:

- PCAF – European building emissions factor database

1.4 End of life

The end of life of a building for investors can take place in two ways:

- The demolition of an asset: Investors can make a considerable contribution to managing the environmental impact of a building during demolition by setting up processes to identify, understand and plan for the recovery and utilisation of materials and products from the building, either on site or at a suitable external facility. One of the main barriers to this currently is the lack of accurate information available for existing assets, further emphasising the need to maintain a consistency in recording and reporting approaches across lifecycle stages.
- The sale of an asset: Responsible investor practices can help improve the quality of information to support circularity and whole-life carbon tracking and reporting across the industry. Embedding and maintaining information on assets in a consistent and well-recognised format can be a very effective way to support the due-diligence process, the climate impact assessment of an asset by a new owner, as well as being important in the further onward sale of an asset.

1.5 Reporting and maintaining asset information

Guidance is available to help set up processes to structure, record, maintain and report asset information across lifecycle stages. In addition to adhering to wider global principles, there is an opportunity to align to regional priorities and regulations.

Reporting requirements can be set either at organisation level or across the industry, to track progress across portfolios and identify gaps in knowledge and skills where training is required.

Some key measures and documents that can be developed and embedded are listed below:

- Circular Economy statements, enabling stakeholders to record and report the environmental impact of materials and products within a building/asset across all lifecycle stages. Even while the industry develops standards and calculation methodologies to support WLC calculations, this data will be invaluable in preparing the industry to report against upcoming guidelines, as well as in supporting the wider supply chain in developing appropriate systems to manage asset components during and at the end of their useful life.
- Investors should take this opportunity to make reference to best practice endeavours like setting minimum EPDs (Environmental Performance Declarations) and material passport requirements across their portfolios.
- Due Diligence auditing and reporting requirements, to support sales and acquisitions of assets, incorporating environmental risk and opportunity disclosures that will impact the long-term valuation of assets against upcoming regulations and best practice standards.

- Operational Carbon reporting should be standardised across all built assets, which can be supported by setting sub-metering requirements at design and construction (building upgrade) stages. This will help asset operators to report energy use data in granularity that aligns with the different building use patterns, relevant to all stakeholders who can implement energy demand reduction measures effectively within areas of their control, realising benefits from the same.
- Green lease policies and templates, which can be aligned with the specific operating models of organisations, and also be used as a collaborative tool between landlords, tenants and investors to facilitate sustainable operational practices.

Reporting and maintaining asset information:

- EU – Level(s) common framework
- Better Buildings Partnership - Acquisitions Sustainability Checklist Excel.xlsx (live.com)
- Better Buildings Partnership - Green Lease Toolkit
- OneClick LCA – Environmental Product Declaration guidance
- Whole Life-Cycle Carbon Assessments guidance | London City Hall
- Materials Passports - BAMB (bamb2020.eu)

1.6 Stakeholders

The challenge of addressing WLC across the real estate sector is complex and involves a number of different stakeholders. Effective WLC management requires successful engagement with these different stakeholders, with investors uniquely positioned to influence them.

While it is inevitable that stakeholders are likely to engage within the boundaries of their scope of employment and influence, investors are well placed to develop recording and reporting mechanisms across the life of an asset, maintaining a continuous golden thread that is embedded within the roles of key stakeholders. Investors can maintain an overview across the lifecycle stages by setting clear guidelines and engaging with relevant stakeholders. The use of digital twins can assist in this, providing end-to-end visibility across the building life cycle and assist with identifying key stakeholders for engaging and influencing.

An overview of how the different stakeholders interact with the phases of the life cycle is outlined below.

Key stakeholders across the lifecycle

Product (including acquisitions)

- Development partners, who can set clear operational and embodied carbon targets for:
  - Design teams, including architects, engineers and key supply chain partners (for offsite systems, for instance)
  - Contractors
- Portfolio managers and acquisition teams

Construction (and major refurbishments)

- Contractors, responsible for engaging with the delivery supply chain for projects

In-use

- Facility managers, for data recording and reporting
- Occupants (including owners and tenants) through green leases setting operational efficiency standards for energy use and embodied carbon

End of life

- Portfolio managers and investment teams.

1.7 Data, reporting and disclosure

Data collection across the property lifecycle plays a pivotal role in allowing investors to quantify a property's whole life carbon emissions across its life cycle. Alongside this, accurate data collection can also improve decision-making processes to reduce emissions and assist in effective risk mitigation and value enhancement. It is recommended that investors obtain accurate data, but where it is not possible to collect the data, industry proxies should be used to estimate missing data.

A holistic approach is required, ensuring that data is transferred seamlessly across the various stages of a property's lifecycle, fostering a comprehensive understanding of its carbon footprint evolution. The handover of data from design and construction to operation and eventual end-of-life considerations, is paramount for investors to maintain accurate whole life carbon assessments and ensure effective mitigation strategies. This continuity not only empowers investors to identify potential inefficiencies and areas of improvement, but also supports the establishment of robust carbon management plans that can adapt to changing regulations and investor preferences.

It is important that the metrics being collected are consistent and can allow for integration into investors disclosure and reporting requirements.[31]

Creating a digital twin of assets, that is a digital model of an intended (in product and construction phases) and real world operational performance (for in-use phases), which includes a building material passport, can assist investors obtaining and maintain data on a buildings performance.

While investors are already collecting data on operational emissions, the collection of embodied carbon data is not widespread, and the mainstreaming of embodied carbon data collection early on is in its early stages. It is recommended that investors start collecting and disclosing embodied emissions in line with GRESB and other reporting regimes of which they are members, eg The European Association for Investors in Non-Listed Real Estate Vehicles (INREV). It is recommended that investors publicly disclose both their operational and embodied carbon.

Operational emissions

The Global Real Estate Sustainability Benchmark (GRESB) is the widely recognised standard for reporting the environmental performance of real estate assets. Providing a standards framework for investors to measure and compare the operational performance of their portfolios. It is recommended that investors should use the GRESB metrics[32], or other equivalent reporting standards, which align with CRREM, as a basis for collection of operational performance data.[33]

For operational emissions accounting and reporting, investors should follow the Partnership for Carbon Accounting Financials (PCAF) guidance in the 'Global GHG Accounting and Reporting Standard for the Financial Industry'[34] and the PCAF, CRREM and GRESB guidance 'Accounting and Reporting of GHG Emissions from Real Estate Operations'.[35]

Embodied carbon

Net Zero Investment Framework – target setting

For investors using the Net Zero Investment Framework, it is encouraged that they begin to set and disclose targets for their embodied emissions for new construction and retrofit activities, alongside operational emissions.

When setting a target for embodied carbon emissions the key metric investor should us is kg CO_2e/m^2.

GRESB

From 2023, GRESB Foundation has included embodied carbon in its Real Estate Standard, including reporting for both new construction and major renovation projects, deeming it to be a highly material issue that should be addressed.

Under the Standard, participants that report through GRESB are required to report on quantitative embodied carbon metrics relating to development projects completed within the reporting year, along with the scope of what is included in the measurement. When collecting this data, it is important that investors split out embodied carbon by material to ensure that it can be appropriately measured.

GRESB 2023 Real Estate Standard[26]

Does the entity measure the embodied carbon emissions of its development projects?

☐ **Yes**

Average embodied carbon intensity ($kgCO_2e/m^2$): _____

Total embodied carbon emissions ($kgCO_2e$): _____

Select the life cycle stages included in scope:

- A1-A3 (Cradle to gate)
- A1-A3, A4 (Cradle to site)
- A1-A3, A4, A5 (Cradle to practical completion)
- Other: _____

Select the building layers included in the scope:

- Substructure
- Superstructure
- Finishes
- Fixed FF&E
- Building services (MEP)
- Furniture and appliances
- Other: _____

Percentage of new construction projects included: _____

☐ **No**

Does the entity measure the embodied carbon of its major renovation projects?

☐ **Yes**

Average embodied carbon intensity ($kgCO_2e/m^2$): _____

Total embodied carbon emissions ($kgCO_2e$): _____

Select the life cycle stages included in scope:

A1-A3 (Cradle to gate)

- A1-A3, A4 (Cradle to site)
- A1-A3, A4, A5 (Cradle to practical completion)
- Other: _____

Select the building layers included in the scope:

- Substructure
- Superstructure
- Finishes
- Fixed FF&E
- Building services (MEP)
- Furniture and appliances
- Other: _____

Percentage of major renovation projects included: _____

☐ **No**

Has the entity disclosed the embodied carbon emissions of its development projects?

☐ **Yes**

The disclosure is

- Publicly available
- URL _____
- Indicate where in the evidence the relevant information can be found _____
- Not publicly available

☐ **No**

Explain the embodied carbon calculation method applied and the results of the assessment (maximum 250 words)

_____

☐ **No**

☐ **Not applicable**

INREV

Embodied carbon (tonne CO_2e/yr)	Number (without decimals, with separator)	Refers to emissions that arise from producing, procuring and installing the materials and components that make up a structure. It may also include the lifetime emissions from maintenance, repair, replacement and ultimately demolition and disposal (ref: GRESB). This can be categorized under the lifecycle stages A1-A3 product stage, A4-A5 Construction stage and C1-C4 end of life stage in the European standard EN 15978.

Key resources:

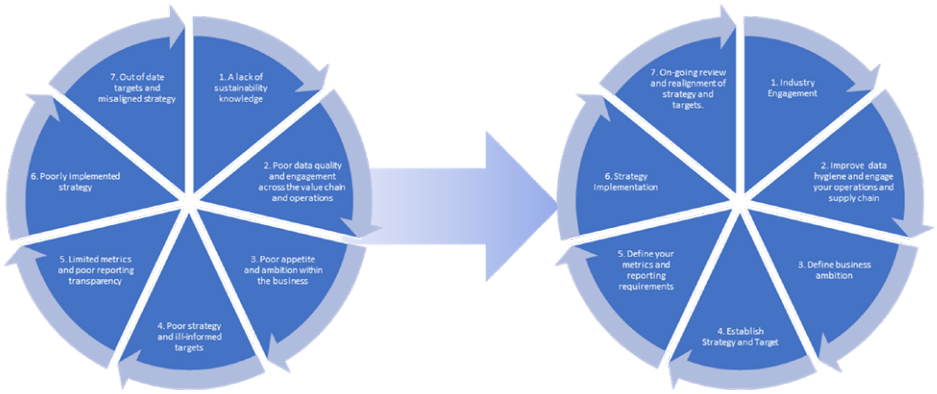
- **PCAF** The Global GHG Accounting and Reporting Standard for the Financial Industry
- **PCAF, CRREM & GRESB** Accounting and Reporting of GHG Emissions from Real Estate Operations
- **GRESB** 2023 Real Estate Standard and Reference Guide
- **INREV** ESG Standard Data Delivery Sheet 2023 (not yet published)

Section 2 – Developing a process to address whole life carbon emissions

WLC emissions take place at many different elements of the property lifecycle and it is important to ensure that internal processes are in place to address these emissions. The following section sets out some of the key challenges and recommendations, developed by IIGCC's Real Estate Working Group, that if followed can assist in developing a successful strategy to address emissions in real estate portfolios.

2.1 The seven challenges and rules

Figure 4: The seven challenges and rules



Challenge 1: Make sure you know what you're talking about

Investors setting portfolio level targets need to ensure that they fully understand what makes up a credible target and industry best practice on crucial issues. IIGCC's NZIF provides a framework for asset owners and asset managers to make commitments to achieving net zero emissions. This includes setting credible science-based targets, including for real estate assets, defining strategies, measuring alignment, and transition portfolios.

The importance of developing credible targets is highlighted by a recent Bisnow report[36] of a survey of real estate investors. It found that 9 out of 10 senior real estate leaders did not think that the industry would hit its 2050 targets. The report highlighted that a number of real estate investors had not set a credible scope 3 target or embodied emissions target, which can account for over 90 per cent of an investor's emissions.

It Is recommended that asset owners and asset managers establish an internal education strategy to address the knowledge issues within their organisations.

Rule one: Industry engagement

Ensuring that there is robust knowledge of decarbonising a building across its life cycle, including awareness of the complex range of stakeholders involved within asset managers and asset owners, is integral to integrating whole life carbon thinking into business operations. There is significant guidance and frameworks for investors to follow – See section 1.

Challenge 2: You can't improve what you don't measure

Real estate emissions data, and broader ESG data, is complex and comes from many proprietary systems and stakeholders. Ensuring high quality data is collected is crucial for investors to understand their portfolios, including any hotspots that may undermine their strategy or targets that have been set, alongside meeting their regulatory reporting requirements.

For real estate investors, WLC data may originate from tenants, suppliers, managing agents, facility managers, and many other stakeholders.

To collect this data and information, investors should understand the data that they need to collect and report on. Organisations will need to navigate the challenge of how they can build effective engagement with different stakeholders to access this data and ensure buy-in into the strategy.

Rule two: Improve data

Real estate investors should engage with their operations and supply chain to build a data footprint across material sustainability issues. Innovative technology is playing a growing role in helping to acquire building level data, which can be integrated into their strategy to highlight priority areas for engagement.

Where investors find that data is unavailable, it is important to understand who needs to be engaged and what process put in place in order to collect it. Where it is not possible to collect the data, industry proxies should be used to estimate missing data (see suggested methodologies and databases in Section 1). It is recommended that investors establish a timebound plan to obtain reliable accurate data to replace reliance on proxy data.

During the data collection process, risks are likely to be identified that should be fed into the long-term physical and transitional resilience plan

Challenge 3: it's a non-starter if you don't have buy-in

Ensuring organisational buy-in to address WLC emissions is essential to ensure the success of the strategy. There are many stakeholders who need to be involved to ensure success and failure to get widespread support, from CEO to facilities management, can hinder progress.

It will be important to ensure that the strategy to address WLC emissions fits within any portfolio-wide net zero target and strategy that an investor may have.

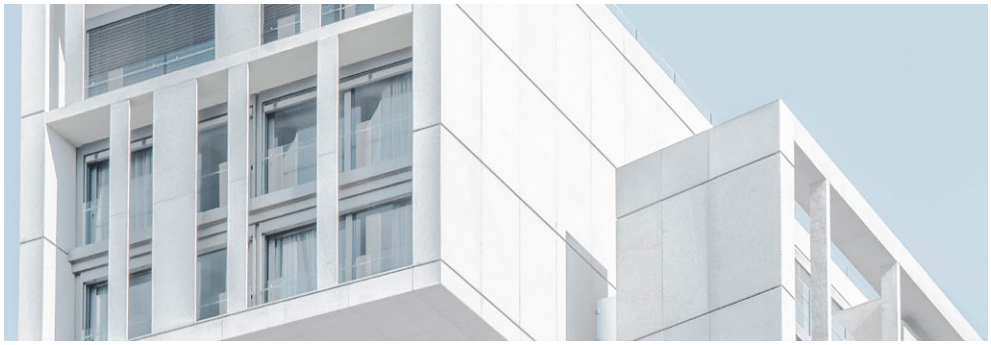
To succeed, the sustainability lead needs to consider how to build enthusiasm and ensure that sustainability is integrated into everyone's role.

Rule three: Governance

Decarbonisation objectives that address whole life carbon emissions should be integrated throughout the business and into job specifications, including incentive plans. The designated lead for sustainability should ensure that robust governance is in place, ensuring clear accountability at different levels of the organisation.

Governance is an integral element of NZIF and includes the following recommendations:

- Undertake risk assessment and management including scenario analysis, in line with the recommendations of the TCFD.
- The board or investment committee updates mandates and performance objectives for asset managers, portfolio managers and other relevant personnel as relevant to ensure assets are managed to reflect the net zero investment strategy, reviewing the implementation of these mandates and performance over time.
- The board or investment committee monitors and reports on the implementation of the net zero investment strategy and performance against objectives and targets set.



Challenge 4: A bad strategy just leads to inaction

If an investor is in a position where they have limited data, organisational buy-in, or understanding of what a credible strategy to reduce WLC emissions looks like, it is likely that any strategy set will provide limited benefits.

Such a false start can be damaging, and investors should be mindful of the laws and regulations around greenwashing in this regard.

It is important that investors address these challenges. At this stage, once these challenges have been overcome, investors can begin to robustly forecast how much investment is required to address WLC emissions in their portfolio.

Rule four: Establish a credible strategy and targets

Once a business has the required level of knowledge, collects the necessary data and through internal engagement has buy-in from key stakeholders into decarbonising their real estate portfolios, it should consider setting targets and agreeing on its strategy.

When developing this strategy, it is essential to ask questions of senior leadership, which will help determine support before setting targets, for example:

- How do real estate targets fit into any wider corporate level net zero targets?
- When are we expected to achieve our targets?
- How much are we willing to spend?

It is important to consider the investment approach in developing the strategy. For instance, a Real Estate Investment Trust or an asset owner who directly holds an asset may have a long-term horizon, meaning it can invest in larger CAPEX projects. On the other hand, a private equity asset manager may have a shorter term investment horizon and will be more inclined to invest in projects that can deliver quicker returns and maximise asset value.

A contentious area of developing a strategy is how to address those properties within a portfolio where the economic rationale for retrofit is not immediately clear, or when dealing with residual emissions.

Challenge 5: Don't report for the sake of reporting

Reporting can be extremely burdensome; in fact, it can take up all the sustainability resources of a business without providing any tangible benefits.

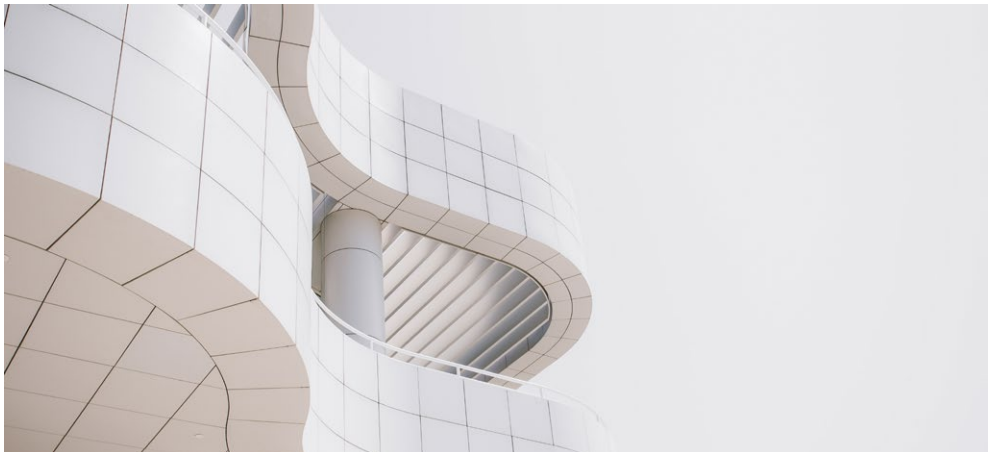
It is crucial that the reporting and metrics align with requirements that will move the dial and link with industry best practices. This is likely to become increasingly important over time as reporting on embodied carbon becomes more widespread. It may become mandatory in some jurisdictions.

Rule five: Define metrics and reporting requirements

There is growing consensus on the metrics and reporting required for critical topics like circularity, net zero, resilience, and social value such as this report produced by many of the key bodies. Investors are also increasingly looking at biodiversity and nature metrics as these begin to be integrated into regulations and sector guidance. Investors are increasingly required to report on the sustainability metrics of their real estate portfolio.

At an EU level, the Sustainable Finance Disclosure Regulation (SFDR) aims to direct capital towards more sustainable investment through increased transparency. Investor engagement should address ongoing policy-related barriers to aligning real estate assets and decarbonising the real estate sector.

Products with an objective to deliver measurable improvements in the sustainability profile of assets over time should also be considered. These products are invested in assets that, while not currently environmentally or socially sustainable, are selected for their potential to become more environmentally and/or socially sustainable over time, including in response to the stewardship influence of the firm.



Challenge 6: Setting the strategy is only the beginning, implementation is where the tough work begins

Once targets and strategies have been set, it is important not to lose momentum and investors should focus on the implementation of this strategy to meet their targets.

At implementation, investors need to develop a transition plan for their real estate portfolios, which should include commitment to sufficient investment and effort to ensure the strategy is successfully implemented. For instance, the cost of retrofitting an asset to achieve net zero goals may be between 5% to 30%; for some asset owners and asset managers, this means investing significant CAPEX. Therefore, it is easier to do this over an extended period: spreading out investment cost can minimise cash requirements and preserve ROI.

Rule six: Strategy implementation

While the overall cost of implementing a strategy to decarbonise a real estate portfolio may look significant, it is possible through focusing on short- to medium-term projects that are low cost and deliver a quick payback. These can make significant impact within a portfolio, alongside having a significant cumulative impact on reducing emissions.

Projects that may provide investors with a quick payback, include:

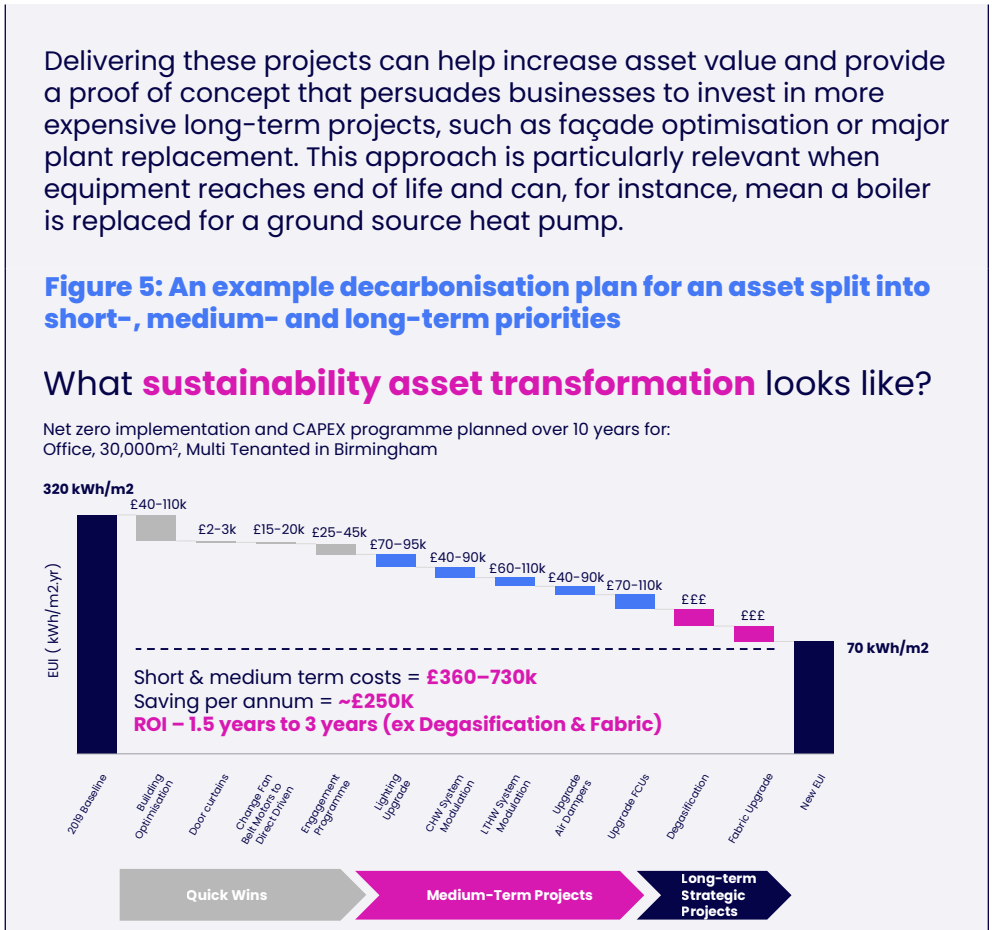
- Reducing energy demand through smart buildings
- Implementing energy savings measures, such as installing LED lighting, reviewing heating systems and renewable energy sources, such as rooftop solar
- Replacing cooling systems with environmentally friendly refrigerants to reduce leakage rates and emissions
- Undertaking WLCA on all new construction and major renovations to ensure opportunities to reduce embodied emissions are identified
- Tenant engagement to reduce operational emissions
- Demand side response

Rising energy costs have made the return on investments of such improvements more attractive.

For investors that are also landlords, several of these projects can be charged back to tenants as part of a service charge because the tenant is the main beneficiary of the energy savings – this means that it is not the investor who needs to pay.

Delivering these projects can help increase asset value and provide a proof of concept that persuades businesses to invest in more expensive long-term projects, such as façade optimisation or major plant replacement. This approach is particularly relevant when equipment reaches end of life and can, for instance, mean a boiler is replaced for a ground source heat pump.

Figure 5: An example decarbonisation plan for an asset split into short-, medium- and long-term priorities



*subject to further feasibility and the project roadmap selection.

Diagram courtesy of Accenture

Challenge 7: Sustainability goal posts won't stand still

As industry guidance evolves and changes over time, it is important that asset owners and asset managers remain up to speed on the latest industry guidance and iterate their strategy to collect new data streams and educate their stakeholders on evolving requirements.

It is recommended that investors look to engage with industry initiatives to remain up to date with latest developments.

Equally, as highlighted in NZIF, investors should strengthen policy engagement to improve the policy framework and regulatory environment and engage with policymakers and industry bodies on WLC. This will build on lessons learnt to progress industry guidance and address barriers.

Rule seven: Routinely review and realign your targets

To ensure the strategy remains relevant and focused, businesses should continuously review and challenge the relevance of its approach. This objective is achieved by staying engaged with any industry developments, best practice and regulatory and policy developments. This will involve revisiting and updating a strategy. Any changes to an investor's strategy should be fed back into the rules outlined above to ensure full adoption.

The Net Zero Investment Framework recommends increasing investment in climate solutions. Cyclical re-engagement with the industry helps to identify innovations in WLC that might enable the business to decarbonise and identify climate solutions. Technological evolution is expected to play a central role in sustainability and the achievement of net zero; analysis has identified examples, including smart buildings, heat pumps, and glazing optimisation, as technologies that could significantly reduce energy demand.

Industry engagement, also provides business with the opportunity to provide and share their insight with others, to challenge the status quo. It is through this industry engagement, sharing of best practice that the market can improve its approaches.

Annex 1: Extracts from EU Taxonomy

Activity: Acquisition and ownership of new buildings

Substantial contribution criteria to climate mitigation[37]

1. For buildings built before 31 December 2020, the building has at least an Energy Performance Certificate (EPC) class A. As an alternative, the building is within the top 15% of the national or regional building stock expressed as operational Primary Energy Demand (PED) and demonstrated by adequate evidence, which at least compares the performance of the relevant asset to the performance of the national or regional stock built before 31 December 2020 and at least distinguishes between residential and non-residential buildings.
2. For buildings built after 31 December 2020, the building meets the criteria specified in Section 7.1 of this Annex that are relevant at the time of the acquisition.
3. Where the building is a large non-residential building (with an effective rated output for heating systems, systems for combined space heating and ventilation, air-conditioning systems or systems for combined air-conditioning and ventilation of over 290 kW) it is efficiently operated through energy performance monitoring and assessment.

Substantial contribution to climate adaptation[38]

1. The economic activity has implemented physical and non-physical solutions ('adaptation solutions') that substantially reduce the most important physical climate risks that are material to that activity.
2. The physical climate risks that are material to the activity have been identified from those listed in Appendix A to this Annex by performing a robust climate risk and vulnerability assessment with the following steps:
   a) Screening of the activity to identify which physical climate risks from the list in Appendix A to this Annex may affect the performance of the economic activity during its expected lifetime;
   b) Where the activity is assessed to be at risk from one or more of the physical climate risks listed in Appendix A to this Annex, a climate risk and vulnerability assessment to assess the materiality of the physical climate risks on the economic activity;
   c) An assessment of adaptation solutions that can reduce the identified physical climate risk.

The climate risk and vulnerability assessment is proportionate to the scale of the activity and its expected lifespan, such that:

a) For activities with an expected lifespan of less than 10 years, the assessment is performed, at least by using climate projections at the smallest appropriate scale;

b) For all other activities, the assessment is performed using the highest available resolution, state-of-the-art climate projections across the existing range of future scenarios (642) consistent with the expected lifetime of the activity, including, at least, 10 to 30 year climate projections scenarios for major investments.

3. The climate projections and assessment of impacts are based on best practice and available guidance. These should take into account the state-of-the-art science for vulnerability and risk analysis and related methodologies in line with the most recent Intergovernmental Panel on Climate Change reports (643), scientific peer-reviewed publications and open source (644) or paying models.

4. The adaptation solutions implemented:

a) Do not adversely affect the adaptation efforts or the level of resilience to physical climate risks of other people, of nature, of cultural heritage, of assets and of other economic activities;

b) Favour nature-based solutions (645) or rely on blue or green infrastructure (646) to the extent possible;

c) Are consistent with local, sectoral, regional or national adaptation plans and strategies;

d) Are monitored and measured against pre-defined indicators and remedial action is considered where those indicators are not met;

a) Where the solution implemented is physical and consists of an activity for which technical screening criteria have been specified in this Annex, the solution complies with the do no significant harm technical screening criteria for that activity.

Activity: Construction of new buildings

Substantial contribution criteria to climate mitigation[39]

1. The Primary Energy Demand (PED), defining the energy performance of the building resulting from the construction, is at least 10% lower than the threshold set for the nearly zero-energy building (NZEB) requirements in national measures implementing Directive 2010/31/EU of the European Parliament and of the Council. The energy performance is certified using an as built Energy Performance Certificate (EPC).

2. For buildings larger than 5000 m2, upon completion, the building resulting from the construction undergoes testing for air-tightness and thermal integrity, and any deviation in the levels of performance set at the design stage or defects in the building envelope are disclosed to investors and clients. As an alternative, where robust and traceable quality control processes are in place during the construction process this is acceptable as an alternative to thermal integrity testing.

3. For buildings larger than 5000 m2, the life-cycle Global Warming Potential (GWP) of the building resulting from the construction has been calculated for each stage in the life cycle and is disclosed to investors and clients on demand.

Substantial contribution to the transition to a circular economy[40]

1. All generated construction and demolition waste is treated in accordance with Union waste legislation and with the full checklist of the EU Construction and Demolition Waste Management Protocol, in particular by setting sorting systems and pre-demolition audits. The preparing for re-use or recycling of the non-hazardous construction and demolition waste generated on the construction site is at least 90% (by mass in kilogrammes), excluding backfilling. This excludes naturally occurring material referred to in category 17 05 04 in the European List of Waste established by Decision 2000/532/EC. The operator of the activity demonstrates compliance with the 90% threshold by reporting on the Level(s) indicator 2.278 using the Level 2 reporting format for different waste streams.
2. The life-cycle Global Warming Potential (GWP) of the building resulting from the construction has been calculated for each stage in the life cycle and is disclosed to investors and clients on demand.
3. Construction designs and techniques support circularity via the incorporation of concepts for design for adaptability and deconstruction as outlined in Level(s) indicators 2.3 and 2.4 respectively. Compliance with this requirement is demonstrated by reporting on the Level(s) indicators 2.3 and 2.4 at Level 2.
4. The use of primary raw material in the construction of the building is minimised through the use of secondary raw materials. The operator of the activity ensures that the three heaviest material categories used to construct the building, measured by mass in kilogrammes, comply with the following maximum total amounts of primary raw material used:
   a) For the combined total of concrete, natural or agglomerated stone, a maximum of 70% of the material comes from primary raw material;
   b) For the combined total of brick, tile, ceramic, a maximum of 70% of the material comes from primary raw material;
   c) For bio-based materials, a maximum of 80% of the total material comes from primary raw material;
   d) For the combined total of glass, mineral insulation, a maximum of 70% of the total material comes from primary raw material;
   e) For non-biobased plastic, a maximum of 50% of the total material comes from primary raw material;
   f) For metals, a maximum of 30% of the total material comes from primary raw material;
   g) For gypsum, a maximum of 65% of the material comes from primary raw material.

The thresholds are calculated by subtracting the secondary raw material from the total amount of each material category used in the works measured by mass in kilogrammes. Where the information on the recycled content of a construction product is not available, it is to be counted as comprising 100% primary raw material. To respect the Waste Hierarchy and thereby favour re-use over recycling, re-used construction products, including those containing non-waste materials reprocessed on site, are to be counted as comprising zero primary raw material. Compliance with this criterion is demonstrated by reporting in accordance with the Level(s) indicator 2.1.

5. The operator of the activity uses electronic tools to describe the characteristics of the building as built, including the materials and components used, for the purpose of future maintenance, recovery, and reuse, for example using EN ISO 22057:2022 to provide Environmental Product Declarations. The information is stored in a digital format and is made available to investors and clients on demand. In addition, the operator ensures the long-term preservation of this information beyond the useful life of the building by using the information managing systems provided by national tools, such as cadastre or public register.

Activity: Renovation of existing Buildings

Substantial contribution criteria to climate mitigation[41]

The building renovation complies with the applicable requirements for major renovations [As set in the applicable national and regional building regulations for 'major renovation' implementing Directive 2010/31/EU].

Alternatively, it leads to a reduction of primary energy demand (PED) of at least 30%.

Substantial contribution to climate adaptation

1. The economic activity has implemented physical and non-physical solutions ('adaptation solutions') that substantially reduce the most important physical climate risks that are material to that activity.
2. The physical climate risks that are material to the activity have been identified from those listed in Appendix A to this Annex by performing a robust climate risk and vulnerability assessment with the following steps:
   a) Screening of the activity to identify which physical climate risks from the list in Appendix A to this Annex may affect the performance of the economic activity during its expected lifetime;
   b) Where the activity is assessed to be at risk from one or more of the physical climate risks listed in Appendix A to this Annex, a climate risk and vulnerability assessment to assess the materiality of the physical climate risks on the economic activity;
   c) An assessment of adaptation solutions that can reduce the identified physical climate risk.

The climate risk and vulnerability assessment is proportionate to the scale of the activity and its expected lifespan, such that:

a) For activities with an expected lifespan of less than 10 years, the assessment is performed, at least by using climate projections at the smallest appropriate scale;

b) For all other activities, the assessment is performed using the highest available resolution, state-of-the-art climate projections across the existing range of future scenarios (613) consistent with the expected lifetime of the activity, including, at least, 10 to 30-year climate projections scenarios for major investments.

3. The climate projections and assessment of impacts are based on best practice and available guidance and take into account the state-of-the-art science for vulnerability and risk analysis and related methodologies in line with the most recent Intergovernmental Panel on Climate Change reports(614), scientific peer-reviewed publications and open source(615) or paying models.

4. The adaptation solutions implemented:

a) Do not adversely affect the adaptation efforts or the level of resilience to physical climate risks of other people, of nature, of cultural heritage, of assets and of other economic activities;

b) Favour nature-based solutions (616) or rely on blue or green infrastructure (617) to the extent possible;

c) Are consistent with local, sectoral, regional or national adaptation plans and strategies;

d) Are monitored and measured against pre-defined indicators and remedial action is considered where those indicators are not met;

e) Where the solution implemented is physical and consists in an activity for which technical screening criteria have been specified in this Annex, the solution complies with the do no significant harm technical screening criteria for that activity.

Substantial contribution to the transition to a circular economy[42]

1. All generated construction and demolition waste is treated in accordance with Union waste legislation and the full checklist of the EU Construction and Demolition Waste Management Protocol, in particular by setting sorting systems and pre-demolition audits. The preparing for re-use or recycling of the non-hazardous construction and demolition waste generated on the construction site is at least 70% (by mass in kilogrammes), excluding backfilling. This excludes naturally occurring material referred to in category 17 05 04 in the European List of Waste established by Commission Decision 2000/532/EC. The operator of the activity demonstrates compliance with the 70% threshold by reporting on the Level(s) indicator 2.2 using the Level 2 reporting format for different waste streams.

2. The life cycle Global Warming Potential (GWP) of the building's renovation works has been calculated for each stage in the life cycle, from the point of renovation, and is disclosed to investors and clients on demand.

3. Construction designs and techniques support circularity via the incorporation of concepts for design for adaptability and deconstruction as outlined in Level(s) indicators 2.3 and 2.4 respectively. The operator of the activity demonstrates compliance with this requirement by reporting on the Level(s) indicators 2.3 and 2.4 at Level 2.
4. At least 50% of the original building is retained. This is to be calculated based on the gross external floor area retained from the original building using the applicable national or regional measurement methodology, alternatively using the definition of 'IPMS 1' contained in the International Property Measurement Standards.
5. The use of primary raw material in the renovation of the building is minimised through the use of secondary raw materials107. The operator of the activity ensures that the three heaviest material categories that have been newly added to the building in the renovation of the building, measured by mass in kilogrammes, comply with the following thresholds regarding the maximum amount of primary raw material used:
   a) For the combined total of concrete, natural or agglomerated stone, a maximum of 85% of the material come from primary raw material;
   b) For the combined total of brick, tile, ceramic, a maximum of 85% of the material come from primary raw material;
   c) For bio-based materials, a maximum of 90% of the material come from primary raw material;
   d) For the combined total of glass, mineral insulation, a maximum of 85% of the material come from primary raw material;
   e) For non-biobased plastic, a maximum of 75% of the material come from primary raw material;
   f) For metals, a maximum of 65% of the material come from primary raw material;
   g) For gypsum, a maximum of 83% of the material come from primary raw material.

   The thresholds are calculated by subtracting the secondary raw material from the total amount of each material category used in the works measured by mass in kilogrammes. Where the information on the recycled content of the construction product is not available, it is to be counted as comprising 100% primary raw material. In order to respect the Waste Hierarchy and thereby favour reuse over recycling, re-used construction products, including those containing non-waste materials reprocessed on site, are to be counted as comprising zero primary raw material. Compliance with this criterion is demonstrated by reporting in accordance with the Level(s) indicator 2.1.

6. The operator of the activity uses electronic tools to describe the characteristics of the building as built, including the materials and components used, for the purpose of future maintenance, recovery, and reuse, for example using EN ISO22057:2022 to provide Environmental Product Declarations 111. The information is stored in a digital format and is made available to investors and clients on demand. In addition, the operator of the activity ensures the long-term preservation of this information beyond the useful life of the building by using the information managing systems provided by national tools, such as cadastre or public register.

Endnotes

1 globalabc.org/sites/default/files/2022-11/FULL REPORT_2022 Buildings-GSR_0.pdf

2 By real estate, we refer to all types of real estate e.g. commercial, residential, industrial etc.

3 ANREV/INREV/NCREIF Fund Manager Survey 2023, Fund Manager Survey | ANREV

4 ANREV/INREV/NCREIF Fund Manager Survey 2023, Fund Manager Survey | ANREV

5 https://www.iigcc.org/resources/net-zero-investment-framework-implementation-guide

6 Please note that throughout this document align or alignment means alignment with an individual investors net zero goals.

7 https://www.iigcc.org/download/net-zero-investment-framework-implementation-guide/?wpdmdl=4425&refresh=64ad7fdaeea281689092058

8 Recent and upcoming guidance, methodologies and pathways for embodied emissions includes:
- SBTi Embodied Carbon Pathway (draft) https://sciencebasedtargets.org/resources/files/DRAFT_SBTi_Embodied-carbon-pathway-development-description.pdf
- UK Net Zero Building Standard (draft) https://www.nzcbuildings.co.uk/

9 In relation to EN 15978 this refers to module B6.

10 https://www.bsigroup.com/en-GB/standards/pas-2080/

11 In relation to EN 15978 this refers to modules A1-3, A4-5, B1-5 and C1-4

12 Arup & WBCSD https://www.arup.com/-/media/arup/files/publications/n/wbcsd-nzb-halving-construction-emissions-today.pdf

13 In France, Reglementation environmentale 2020 (RE 2020) and in the Netherlands, Building Decree 2021 (Bourbesluit 2012).

14 europarl.europa.eu/doceo/document/TA-9-2023-0068_EN.html

15 https://www.ecologie.gouv.fr/reglementation-environnementale-re2020

16 https://www.boverket.se/en/start/building-in-sweden/contractor/tendering-process/climate-declaration/

17 https://www.crrem.org/pathways/

18 Net Zero Investment Framework Implementation Guide (iigcc.org)

19 https://sciencebasedtargets.org/resources/files/DRAFT_SBTi_Embodied-carbon-pathway-development-description.pdf

20 RICS, Whole Life Carbon Assessment (WLCA) Standard – 2nd Edition, https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/construction-standards/whole-life-carbon-assessment

21 ISO 14044:2006 Environment management – Life cycle assessment – requirements and guidelines

22 British Council for Offices, Guide to Specification Key Criteria Update – February 2023

23 An EPD is defined in ISO 14025 as a declaration that quantifies the environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function.

24 TPI pathways:
- TPI Carbon performance assessment of steelmakers: note on methodology
- TPI Carbon performance assessment of steelmakers: Discussion paper (split pathways)
- TPI Carbon performance assessment of cement producers: note on methodology

25 https://www.iigcc.org/resources/iigcc-steel-purchaser-framework-2023

26 https://www.weforum.org/first-movers-coalition/sectors

27 https://www.responsiblesteel.org/about/steelzero/

28 UK Net Zero Carbon Buildings Standard (draft)

29 WBCSD, Decarbonizing construction: Guidance for investors and developers to reduce embodied carbon https://www.wbcsd.org/contentwbc/download/12455/185688/1

30 CRREM – Embodied Carbon of Retrofits: Ensuring the ecological payback of energetic retrofits

31 The Net Zero Investment Framework recommends disclosing in-line with the recommendations of the Task Force for Climate-related Financial Disclosures (TCFD). Further disclosures are also recommended in-line with TCFD reporting structure, for further information, see the Net Zero Investment Framework5 - Section 9. Recommended Disclosures.

32 https://documents.gresb.com/generated_files/real_estate/2023/real_estate/reference_guide/complete.html

33 Current interoperability between GRESB and other global reporting standards, such as International Financing Reporting Standards is strong, with analysis finding that 80 per cent of Sustainability Accounting Standards Boards's (SASB) real estate indicator objectives/scopes and underlying content are addressed by GRESB (with SSAB metrics being incorporated in IFRS' International Sustainability Standards Boards standards) https://www.gresb.com/nl-en/insights/new-ifrs-standards-represent-a-milestone-for-sustainability-disclosure/

34 https://carbonaccountingfinancials.com/standard

35 https://carbonaccountingfinancials.com/files/downloads/ghg_emissions_real_estate_guidance_1.0.pdf

36 https://www.bisnow.com/national/news/sustainability/investigation-real-estates-biggest-investors-dont-have-a-target-to-reduce-their-carbon-emissions-118318

37 https://ec.europa.eu/sustainable-finance-taxonomy/taxonomy-compass/the-compass

38 https://ec.europa.eu/sustainable-finance-taxonomy/taxonomy-compass/the-compass

39 https://ec.europa.eu/sustainable-finance-taxonomy/taxonomy-compass/the-compass

40 https://finance.ec.europa.eu/system/files/2023-06/taxonomy-regulation-delegated-act-2022-environmental-annex-2_en_0.pdf

41 https://ec.europa.eu/sustainable-finance-taxonomy/taxonomy-compass/the-compass

42 https://finance.ec.europa.eu/system/files/2023-06/taxonomy-regulation-delegated-act-2022-environmental-annex-2_en_0.pdf

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