SYSTEMIQ

Seeing is Believing: Unlocking the Low-Carbon Real Estate Market

Leaders of the Urban Future (LOTUF) in partnership with Systemiq

JUNE 2024

atp
BlackRock
HOOPP Healthcare of Ontario Pension Plan
Ivanhoé Cambridge
Norges Bank Investment Management
PICTET 1805
Urban Partners
Victory

About LOTUF and this paper

This paper was commissioned by the Leaders of the Urban Future (LOTUF) project that aims to accelerate the decarbonisation of unlisted, institutionally-owned real estate by working with and building on existing sector efforts. Current LOTUF project funders include **ATP, BlackRock, HOOPP, Ivanhoé Cambridge, Norges (NBIM), Pictet, Urban Partners, and Victory Group.**

This document sets out what we believe is needed to support a low-carbon real estate market, i.e. one aligned with a 1.5°C future. We examine the gaps between this goal and how the market currently operates, and conclude that a lack of transparency on carbon and energy performance and a disconnect between emerging 1.5°C pathways and green certifications and ratings is muddying demand signals. This is making it near-impossible to establish a clear link between carbon and value.

We propose actions for real estate owners and others across the system to bridge these gaps and kick-start the low-carbon real estate market. We recognise the importance of regulation, but our focus is on establishing the infrastructure of standards, pathways, certifications, and data that underpin a well-functioning voluntary market that can in turn influence policy. Though out of scope for our collective action project, we also recognise the importance of resilience and adaption for the sector (i.e. tackling physical climate risk).

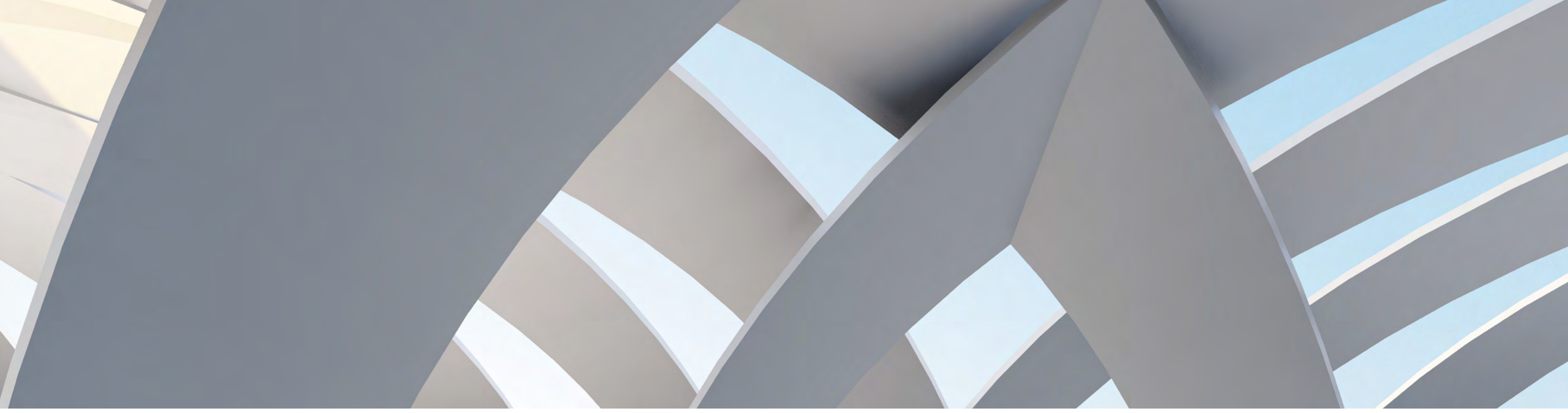
About Systemiq

Systemiq, the system-change company, was founded in 2016 to drive the achievement of the Sustainable Development Goals and the Paris Agreement, by transforming markets and business models in five key systems: nature and food, materials and circularity, energy, urban areas, and sustainable finance. A certified B Corp, Systemiq combines strategic advisory with high-impact, on-the-ground work, and partners with business, finance, policy-makers and civil society to deliver system change. Systemiq has offices in Brazil, France, Germany, Indonesia, the Netherlands and the UK.

Find out more at **www.systemiq.earth**

Authors and Acknowledgements

This paper was jointly authored by Systemiq and the LOTUF investors. The Systemiq authors are Amy Paterson, Mike Batley, Isha Patel and Pippi Durie, with support from Julie Hirigoyen and Jeremy Oppenheim. During the development process a wide range of sector stakeholders and experts were engaged and consulted, including numerous Green Buildings Councils, certification and ratings providers, standards and pathway developers, and other investor organisations and networks. We gratefully acknowledge the valuable contributions from each of these individuals and organisations.



As a long-term and diversified investor, our return depends on sustainable development in economic, environmental and social terms. We are therefore committed to expertly managing the climate risks and opportunities across our entire portfolio, including real estate. The principles set out in this report are closely incorporated into our real estate decarbonisation strategy: our 2050 net zero target covers operational and embodied carbon emissions, our 2030 operational targets cover tenant and owner spaces, and we see carbon and energy data transparency, including benchmarking against 1.5°C pathways such as CRREM, as crucial to understand asset performance and inform investment decisions.

Mie Caroline Holstad, Chief Investment Officer Real Assets, Norges Bank Investment Management

GREEN believes it is vital for the real estate sector to manage the climate risks it faces. Transparency regarding carbon and energy performance and managing progress against science-based pathways are crucial for achieving this. We therefore welcome and support the findings of this report – which align closely with our own investor statement – and urge real estate asset owners and managers to measure and disclose the performance of their buildings and incorporate this information into their financial decision-making. We also advocate for the standardisation of third-party green certifications to help improve transparency and comparability across buildings and portfolios.

Maaike Hof, Executive Board Member of GREEN

At IIGCC, through the Net Zero Investment Framework, we propose real estate investors set targets for operational and embodied carbon emissions, and to disclose performance against both. The report by LOTUF and the 'North Star' aligns with our guidance and sets clear actions for investors in their role on improving carbon performance transparency. By improving the tools available to measure and certify performance, the guidance should enable investors to build better transition plans and support decision-making based on reducing emissions for new developments and major retrofits.

Hugh Garnett, Investor Practices Senior Programme Manager, Real Assets at IIGCC

Decarbonising the built environment is not just fundamental to protecting long-term asset values but represents an enormous business opportunity, for those willing to seize it. This action paper – through the North Star – clearly sets out how to activate the low-carbon real estate market. Doing so will require a collective voice and, crucially, collective action. Investors and other industry players need to now come together to put this work into practice, accelerate the sector's decarbonisation, and benefit from the results.

Mikkel Bülow-Lehnsby, Executive Chairperson and Co-founder of Urban Partners

The role of investors is fundamental if we are to succeed in reducing carbon emissions from real estate in line with the Paris Agreement goals. We very much welcome this report as it outlines the critical need for investors to have relevant and standardized information that they can rely on to understand if they are on track to decarbonize their portfolios. This is a very important intervention as outlined in the recently launched global Market Transformation Action Agenda for the Built Environment. Only if we measure and track the total carbon emissions of the real estate sector consistently, and if we agree on performance targets in line with a 1.5°C pathway and act on them, will we be able to transform the built environment at scale.

Roland Hunziker, Director Built Environment, WBCSD

Ivanhoé Cambridge joined the LOTUF project to help address some of the key challenges real estate investors face in redeploying capital to support the decarbonisation of the built environment. Over the last 18 months we have worked closely with Systemiq and the other LOTUF investors to better understand what needs to happen to unlock the low-carbon real estate market and further integrate carbon into investment decision-making. We hope this paper helps rally investors behind the call for greater carbon transparency and clear targets as a basis for activating the low-carbon real estate market.

Michèle Hubert, Vice-president, Real Estate Strategy and Portfolio Construction, Ivanhoé Cambridge | CDPQ

Contents

The LOTUF project investors have worked with Systemiq and industry-wide stakeholders to put forward: **(1)** a set of best practice principles and levers underpinning real estate decarbonisation, **(2)** a "North Star" for unlocking the low-carbon real estate market, and **(3)** key actions for each stakeholder group to help us get there.

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1 How to decarbonise real estate: key principles and levers

Cover all building emissions (scope 1-3)	Cover **whole life emissions** (operational and embodied carbon)
	Cover **whole building emissions** (owner and tenant spaces)
Set ambitious goals	Set targets informed by industry-backed **1.5°C pathways**
Mitigate effectively	Use **energy efficiency** as a key mitigation lever for operational carbon *alongside* **electrification and renewable supply**
	Prioritise abatement over offsets to hit targets; offsets can help *go beyond*

Three key decarbonisation levers for investors

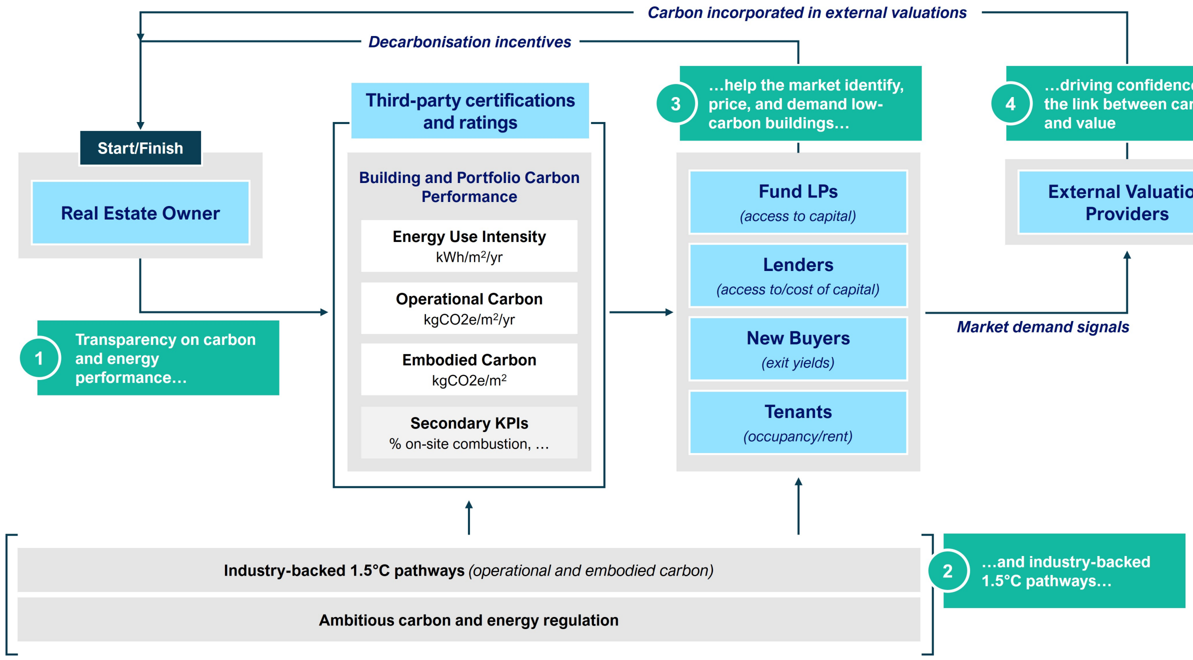
Reduce energy demand	Decarbonise energy supply	Build and renovate smarter
KPI: energy use intensity **kWh/m²/yr**	KPIs: (1) operational **kgCO2e/m²/yr**; (2) % on-site combustion	KPI: upfront and in-use embodied **kgCO2e/m²**
Maximise energy efficiency of new and standing buildings	Electrify building heating and cooling	Improve efficiency and circularity of materials through e.g. better design
Change consumption patterns in owner-operated spaces	Use buildings for energy generation and storage	Use lower carbon or alternative materials, and reduce waste
Influence tenant consumption patterns		

Beyond value chain mitigation	Carbon offsets (purchased in the form of credits)
	Buildings as a system enabler (e.g. energy load optimising capacity)

2 The North Star: transparency is key to unlocking the low-carbon real estate market

We need a real estate market where carbon and energy data are shared and used like financial data to inform decision-making

Carbon and energy performance transparency – underpinned by consistent metrics, industry-backed pathways, and certifications/ratings – **enables the market to identify, price, and demand low-carbon buildings and portfolios.**



3 How to get there: drive data sharing and align targets

The market is not demanding and supplying consistent carbon/energy data. Major certification and ratings do not *yet* provide performance transparency nor have clear targets informed by 1.5°C pathways. These pathways also need further refinement.

Progress requires action from all sides…

Lenders, tenants, investors, and fund managers	Certifications and ratings	Standard-setters and pathway developers	External valuation providers	Policymakers
Demand – and incorporate – carbon and energy performance data	Greater transparency on targets and actual performance; targets informed by (or better than) 1.5°C pathways	Multi-stakeholder effort to align around and improve sector 1.5°C pathways	Incorporate carbon and energy performance data into assessments	Introduce ambitious, performance-based regulation and help drive data sharing

…and real estate owners can play a crucial role

1 Stimulate demand	2 Drive better ratings tools	3 Facilitate data sharing	4 Advocate for policy
Demonstrate to lenders, tenants, and other investors they should be demanding low-carbon buildings and performance data	Use certifications and ratings that offer transparency and reflect 1.5°C (or better) ambition	Facilitate transparency by sharing and demanding performance data	Make the case to policymakers for more ambitious regulation (performance-based, help drive data sharing)

Executive Summary

Decarbonising our global economy means decarbonising real estate. Beyond this imperative, decarbonised buildings are also better buildings: they are more energy and cost efficient, more attractive to tenants with climate commitments, and de-risked against future climate regulation. However, despite the evidence of a growing market for holistically "green" certified buildings, there is not yet a meaningful market for low-carbon (i.e. 1.5°C-aligned) real estate.

Deep decarbonisation of buildings requires significant investment: $600bn annually from now to 2050.[1] Regulation is ultimately needed to unlock this but has so far been slow to ramp up.[2] In the near-term, therefore, decarbonisation must be driven by a clear demand signal for low-carbon buildings from lenders, tenants, investors (LPs) and fund managers (GPs), that is reflected in third-party valuations. These players need the right infrastructure of voluntary standards, pathways, certifications, and data to enable them to identify, price and demand low-carbon buildings.

A well-functioning market for low-carbon real estate needs:

- **Carbon and energy performance transparency:** Lenders, tenants, investors and fund managers, and the external valuers that support them, assessing buildings and portfolios using real data, and consistent carbon and energy metrics (energy use intensity, operational carbon, embodied carbon[3]).
- **Clear targets:** Underpinning these metrics, industry accepted targets indicating how buildings and portfolios should broadly be performing at any given date. This means comparing performance against a commonly agreed set of 1.5°C pathways[4], using common decarbonisation principles such as those set out at the front of this paper.

Third-party certifications and ratings – which the market uses to assess the carbon performance of buildings today – can play a key role in enabling carbon and energy performance transparency, and highlighting which buildings and portfolios are 1.5°C-aligned.

With the above elements in place lenders, tenants, investors, and fund managers that care about carbon will be able to better identify and price low-carbon buildings. This will give valuers evidence to reflect carbon in their models, boosting real estate owner confidence to transition their building stock. This should lead to performance-based regulation consistent with these voluntary standards, metrics, and 1.5°C pathways. This dynamic – our North Star – is shown in **Exhibit ES1.**

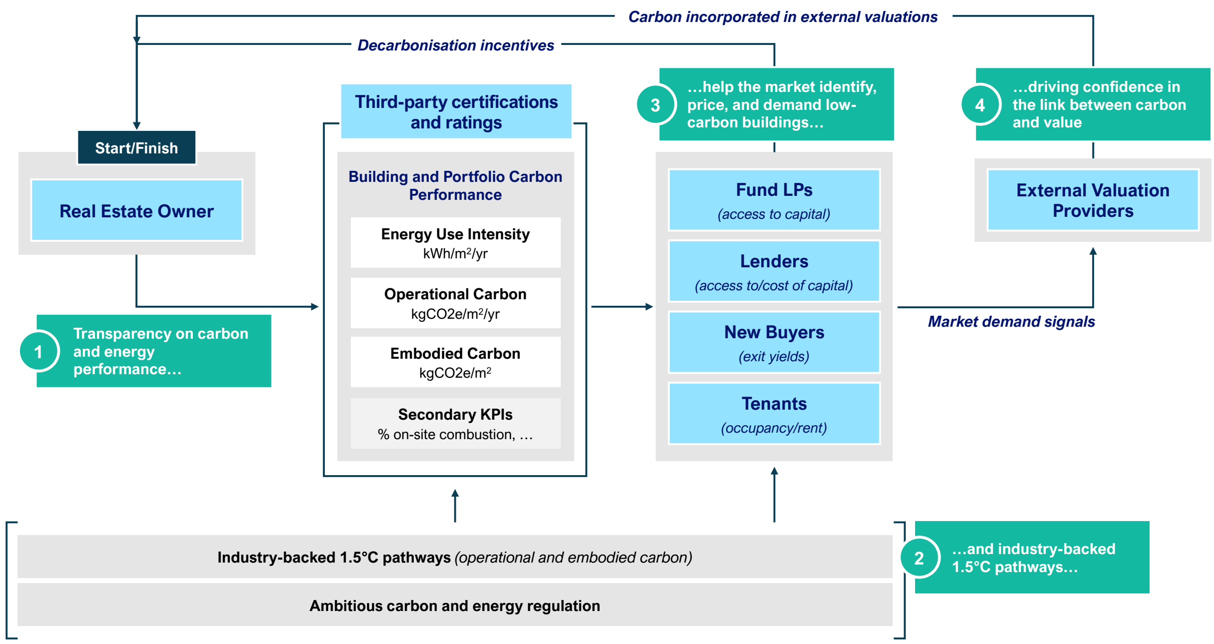
This is not happening today, for two key reasons:

- **Current tools do not provide clarity on the carbon and energy performance of buildings and portfolios.** Exceptions exist, but many major certifications and ratings offer limited or patchy insight into how buildings actually perform against energy use intensity, operational carbon, and embodied carbon KPIs.

1 IIGCC, Climate Investment Roadmap, 2022 - Figure 22: Retrofits and heat pumps drive investments needs in buildings in IEA NZE 2050 scenario.
2 Different regulatory markets are moving at different paces, with Europe taking the lead, for example with the recent passing of the EPBD.
3 Specifically upfront embodied carbon for new developments, and in-use embodied carbon for major renovations/retrofits.
4 Performance may also be compared against current and future climate regulation and local benchmarks, where relevant.

- **Many of these tools do not have targets consistent with 1.5°C pathways.** The result is that many certified assets are not aligned with these pathways. For example, in an analysis across LOTUF investor portfolios, only 37% of certified assets were aligned to their respective CRREM 1.5°C energy intensity pathways by 2025. Our analysis also shows no clear correlation between certified assets and better energy performance.[5] Existing 1.5°C pathways need refining[6] and, given the complexities and variations that exist at a building level, should not necessarily *dictate* all certification targets.[7] However, they are a valuable guide for market decision-making and so should at least *inform* target-setting.

Exhibit ES1: Transparency on carbon and energy performance of buildings, and commonly agreed 1.5°C pathways are key to unlocking the low-carbon real estate market



Based on our analysis the major certifications, which cover ~80% (~9bn m²) of globally certified floorspace, do not today provide transparency on carbon and energy performance. Nor do they have clear targets aligned with 1.5°C pathways.[8]

The result is that lenders, tenants, investors, and fund managers who are looking for low-carbon buildings (either to de-risk their business or as a value proposition) are **struggling to properly identify, price and provide incentives for them, muting any demand signal.**

5 This analysis, see Exhibits 5 and 6, is based on an assessment of 203 LOTUF assets. There are several important caveats covered in more detail in the paper, including that the EUI data used is not normalised for occupancy or weather. It is therefore illustrative only. Nonetheless, we see no compelling evidence that certified assets are consistently better energy performers than non-certified assets. This may be the case for several reasons. For example, historical versions of the major certifications may have been design, not performance based, and therefore the buildings are efficient in principle but not being operated as such. Many schemes are also holistic in nature (i.e. covering other important areas of sustainability such as water and waste) and may not have had clear minimum carbon and energy thresholds to be certified.

6 CRREM 1.5°C pathways are perhaps the most established for EUI and operational carbon, but these are mostly adopted in Europe and need further development in other regions to encourage uptake (though work is ongoing). SBTi has released global pathways for upfront embodied carbon, but these are generally seen as a starting point. In parallel, local/regional pathways continue to be developed, such as for the UK NZCBS. These are likely to have more local support, but it remains to be seen how they fit into and work with the broader industry/pathway architecture. There is alignment between pathways and new carbon/net zero-focused certifications, such as LCBI, but these have yet to scale meaningfully.

7 Note that whilst commonly agreed 1.5°C pathways are highly valuable reference points, they represent average building trajectories and not performance limits. At an asset-level, therefore, they should inform target-setting (to ensure consistency) but not necessarily always dictate target-setting, which may also include a consideration of decarbonisation levers (e.g. remove on-site combustion) and maximum technical feasibility.

8 This is primarily driven by existing versions of the major certification schemes from BREEAM and LEED. There are several smaller certifications and energy ratings that do provide transparency on carbon and energy performance and have clear 1.5°C-aligned targets such as NABERS, ILFI, LCBI, and the UK NZCBS (though this is a standard and not a certification). However, these schemes cover fewer assets than BREEAM and LEED, globally.

External valuation providers in turn lack the confidence to price carbon into their assessments. This means it is near impossible to derive a clear correlation between carbon and value today, limiting market confidence to invest in deep decarbonisation.

To be clear, certifications and ratings are not the root cause of this disconnect.[9] They respond to market demand. Changing market demand means end-users that care about carbon actively demanding transparency on carbon performance and 1.5°C alignment.

Progress requires action from all sides. To kick-start the low-carbon real estate market we need:

- **Lenders, tenants, investors, and fund managers** to demand carbon and energy performance transparency – from other market participants and from the certifications and ratings they use – to better inform buildings and portfolio assessment. These assessments should be underpinned by common metrics, decarbonisation principles, and 1.5°C pathways.

- **Certifications and ratings** to enable better assessments by providing transparency on their targets, ensuring targets are informed by 1.5°C pathways, and publicly reporting on the carbon and energy performance for rated buildings and portfolios.

- **Standard setters and pathway developers** to align around a commonly agreed set of 1.5°C pathways to inform target setting, building on and improving pathways that already exist. This is likely to be a multi-stakeholder effort amongst standards, pathway developers, certifications and ratings, and other key industry bodies (such as Green Building Councils).

- **Third party valuers** to incorporate carbon into their assessments, working closely with building owners and lenders to understand assumptions on carbon and value, alongside supporting evidence, and help facilitate an emerging demand signal.

- **Policymakers** to amplify market signals by introducing ambitious performance-based regulation that drives transparency/data-sharing and has simple, clear targets for energy use intensity, operational carbon, and embodied carbon. This should be aligned with the standards and pathways underpinning the voluntary market.[10]

Real estate owners can play a key role in accelerating change. In the short-term they can:

1. Demonstrate to lenders, tenants, and other investors that they should be demanding low-carbon buildings, or at the very least, a clear picture of carbon and energy performance.

2. Use certifications and ratings that offer transparency and reflect 1.5°C ambition.

3. Facilitate transparency by gathering and sharing carbon and energy performance data, and demanding this data in turn during transactions.

4. Make the case to policymakers for simple, ambitious, performance-based regulation with clear carbon and energy targets.

This call for greater carbon and energy transparency is echoed by other investor initiatives such as GREEN and the Better Buildings Partnership (BBP).[11]

9 We also recognise these schemes have had a significant positive impact on the market historically by helping push carbon and other sustainability factors up the real estate agenda. To stay relevant, however, they need to meet rapidly evolving market needs on climate.

10 Recognising that the voluntary market where green certifications are used is the more ambitious end of the market and, today, represents a relatively small part of overall commercial real estate floorspace.

11 For example, see the GREEN Investor Statement and the BBP Climate Commitment.

To support these actors to assess carbon/energy performance consistently, this paper provides a simple due diligence framework designed to work with tools available today (see **Appendix**). We also provide a detailed mapping of certifications and ratings in **Exhibit 3** to help owners identify which schemes provide transparency and have targets broadly consistent with 1.5°C pathways (or are working to this end).

In recent months LOTUF has been working on these fronts, including with major certifications and ratings on increasing the transparency and ambition of their targets. **These conversations and broader announcements have revealed positive signs that the market is moving.** Major certifications such as LEED and BREEAM are updating their schemes to be more transparent and ambitious, and new carbon-focused schemes are entering the market. There are ongoing efforts to improve CRREM 1.5°C pathways and drive uptake through greater industry participation in governance and technical work. And finally, RICS recently published thoughts on how external valuers can begin to incorporate carbon and energy into their assessments.[12] This progress is encouraging, but there is still much to do to get the sector on track for 1.5°C.

Greater transparency on carbon and energy performance and commonly agreed 1.5°C pathways are no silver bullet, but they are crucial to driving a clearer link between carbon and value and unlocking the low-carbon real estate market.[13] The risks and opportunities for real estate are no secret – almost 1/5th of current real estate value is at risk from the transition if no action is taken.[14] Meanwhile, there are increasing cases – including amongst the LOTUF group – showing that decarbonisation does create (and preserve) value. The way to prove this at scale and kick-start the low-carbon real estate market is clear: real estate owners, and other market participants, need to shift from a reliance on opaque tools towards real carbon performance transparency and 1.5°C targets. There is an emerging toolkit of data and pathways to help them do this. These data and pathways need continued improvement, but they are a good enough starting point to accelerate change today.

12 RICS. 2024. The future of real estate valuations: The impact of ESG.

13 Truly scaling this market will also require solutions to several other key challenges. For example, adopting a common approach to assessing transition risk, tackling split-incentives between tenants and landlords, and de-risking new climate solutions for the Built Environment. For a broader list of system-wide issues see the ULI C-Change agenda.

14 MSCI. 2022. Transition Risks Vary by Scenario. Estimate represents MSCI's 2°C REMIND Disorderly scenario which assumes global annual emissions do not decrease until 2030, with strong policies then needed to limit warming to below 2°C.

Section I: The case for a low-carbon real estate market

Decarbonising real estate is crucial for achieving global net zero goals. Real estate has one of the highest carbon footprints of any sector, producing almost 40% of the world's energy-related emissions.[15] These have risen by an average of 1% per year since 2015, while global annual retrofit rates have remained well below the 2.5% needed to be on track for 1.5°C.[16,17]

Deep decarbonisation of buildings will require significant investment: $600bn p.a. globally from now to 2050 just to retrofit our existing stock.[18] Institutionally owned real estate ($12tn in value globally) is just one segment of this, but a critical segment that should be leading the way on decarbonisation given owner sophistication, scale advantages, and ability to directly manage and improve individual assets.[19]

Low-carbon (i.e. 1.5°C-aligned or better) buildings are fundamentally better buildings and should have benefits for lenders, tenants, investors (LPs), and fund managers (GPs). These include (1) cost savings and revenue streams associated with more efficient, flexible, grid-integrated buildings,[20] (2) asset de-risking against future carbon and energy regulation,[21] and (3) achievement of in-house climate commitments and financed emissions targets.

In recent years there has been an emerging demand signal for "greener" buildings and portfolios from a number of lenders, tenants, investors, and fund managers. This has manifested in the growth of green certifications, ratings, and green real estate finance.[22] We are now seeing a growing market for these green certified buildings, with asset value premiums ranging from 10-25%.[23]

However, there is not yet a clear market for low-carbon real estate. This is in part because regulation has been slow to ramp up,[24] but also because we are not seeing a strong enough demand signal for low-carbon buildings from lenders, tenants, investors, and fund managers, that is in turn reflected in third-party valuations. These two shifts would drive monumental change, but both rely on there being transparency in the market on the current and required carbon performance of our building stock.

15 UNEP. 2022. Global Status Report For Buildings and Construction

16 IEA. 2023. Breakthrough Agenda Report 2023 Buildings

17 IEA. 2023. Net Zero Roadmap a Global Pathway to Keep the 1.5 °C Goal in Reach

18 IIGCC, Climate Investment Roadmap, 2022 - Figure 22: Retrofits and heat pumps drive investments needs in buildings in IEA NZE 2050 scenario.

19 LaSalle. 2023. Global Real Estate Universe

20 A recent study found that deep retrofit of assets, including the deployment of efficiency, on-site solar, storage and grid-flexibility solutions, lowered the energy costs across a range of building archetypes by 50-60%. Schneider Electric. 2022. Towards Net-Zero Buildings, A quantitative study

21 In its latest sector transition risk analysis, MSCI estimates transition value at risk could be up to 19% of asset value (this figure excludes physical climate risks). MSCI. 2022. Transition Risks Vary by Scenario

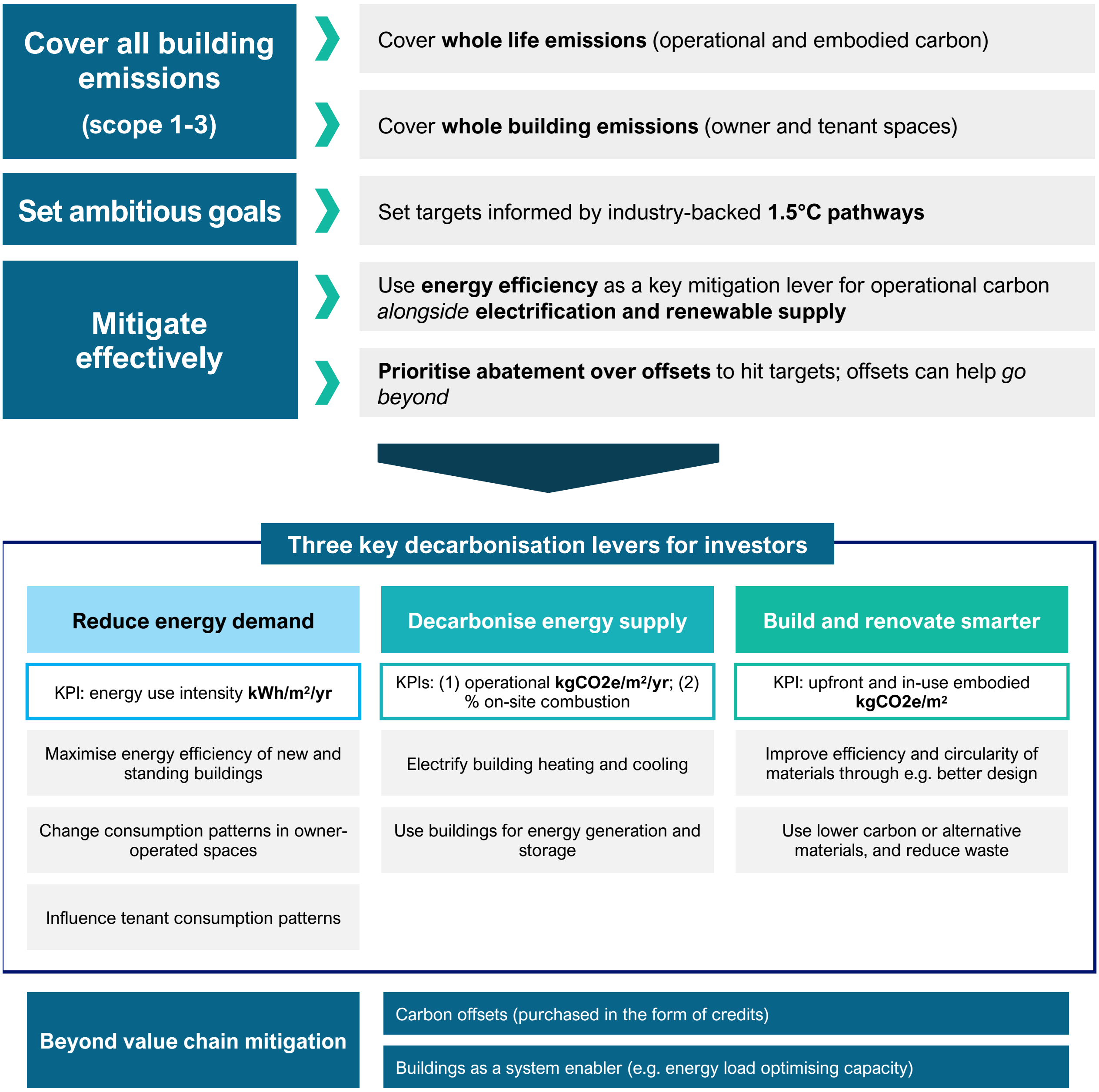
22 As of 2023, more than 170,000 assets were submitted to GRESB, a key real estate rating tool LPs use to identify fund-level sustainability performance, accounting for $7.2tn in asset value. At an asset level, green certified properties rose by 500% between 2013 and 2021 in the European Union alone (Bisnow. 2024. The Green Building Certification System Is Worth Billions — But It Isn't Helping To Cut Carbon). There have also been increasing volumes of sustainable loans/bonds issued to finance real estate. For example, 27% of global green bond proceeds between 2014 and 2022 have been invested in buildings (Statista. 2023. Distribution of use of proceeds from green bonds worldwide between 2014 and 2022, by sector).

23 Systemiq analysis, based on LaSalle's What is the value of green? (2023)

24 Minimum energy performance standards are emerging, for example at a bloc and/or national level via the recently approved European Energy Performance of Buildings Directive and the Japanese Zero Energy building policy, or at a local level via New York Local Law 97 (WBCSD. 2023. Net-Zero Operational Carbon Buildings: State of the Art). However, these regulations are not yet widespread, i.e. covering all building types, legislated and robust, i.e. clearly 1.5°C aligned. In Europe, operational energy targets are often pinned to EPCs (European Union. 2023. Amendments to Energy Performance of Buildings Directive), which are variable in methodology across countries and do not clearly link to emissions reductions. Regulation on embodied carbon is even further behind. Some LCA requirements on new developments are being introduced in European countries, such as Germany and the UK, but tend to have limited scopes, e.g. only covering publicly owned buildings. Only Denmark has developed whole lifecycle carbon regulation for new builds aligned to 1.5°C (The Institute of Structural Engineers. 2023. International drivers of low carbon structural design).

There are many initiatives ongoing to identify the correlation between (de)carbon(isation) and value, a key priority for forward-thinking investors and fund managers. However, we believe that to derive this correlation, and meaningfully accelerate the development of a low-carbon real estate market, the right infrastructure of voluntary standards, pathways, certifications, and data is fundamental. This paper unpicks why the current landscape is not necessarily working as it should and sets out what is needed to get this market moving faster. It pushes for specific, actionable solutions that in combination could amount to a real breakthrough in the space. In order to consistently describe where we need to get to and assess the existing state of play, the LOTUF group derived a set of key principles and levers for real estate decarbonisation (See **Exhibit 1**).

Exhibit 1: Key principles and levers for decarbonising real estate



These do not represent a new definition of "net-zero" real estate (for which there are many e.g. zero energy, net zero carbon, zero carbon ready) – nor are they a new scheme or standard, but instead a series of best practice principles (developed by independent parties) that should underpin any definition or scheme, and that we believe the industry must coalesce around. These principles have already gained traction amongst certain regulators, voluntary standards-setters, and certifications, and they underpin the analysis in this paper.[25]

25 For example, standards like SBTi and PCAF are aligning to these principles. They cover whole life/whole building carbon, as well as 1.5°C target setting (PCAF. 2023. Accounting and Reporting of GHG operations from Real Estate Operations; SBTi. 2023. Buildings Science-Based Target Setting Guidance: Version 0.2.1). Major regulators, through the EU/US Zero Emissions Building (ZEB) definitions, are also aligning. Both take a whole building approach and set ambitious efficiency targets before allowing renewable energy procurement. The next version of the US ZEB definition will include low embodied carbon materials and the EU ZEB has a whole-life carbon measurement requirement. (US Government. 2023. National Definition of a Zero Emissions Building: Part 1 Operating Emissions: Version 1.00, Draft Criteria; European Parliament. 2023. Energy Performance of Buildings Recast).

Section II: A low-carbon real estate market needs performance transparency and clear targets informed by 1.5°C pathways

A well-functioning low-carbon real estate market requires lenders, tenants, investors (LPs), and fund managers (GPs) to be able to identify, price and provide incentives for better buildings.

At its core, this means we need:

- **Performance transparency:** Lenders, tenants, investors, and fund managers, and the external valuers that support them, evaluating buildings and portfolios using real data and consistent carbon and energy metrics (energy use intensity, operational carbon, embodied carbon).
- **Clear targets:** Industry accepted 1.5°C pathways and decarbonisation principles (see **Exhibit 1**) indicating how buildings and portfolios should broadly perform at any given date.

Using this information as a foundation – and overlaying it with an asset's performance against existing/future regulations and a costed decarbonisation plan – should enable market players to develop a sophisticated view of the transition risks, opportunities, and cost to de-risk for a building or portfolio, which can then be incorporated into pricing.[26]

Third-party certifications and ratings – which are currently used by the majority of the market – can play a key supporting role by delivering carbon and energy performance transparency and highlighting which buildings and portfolios are broadly 1.5°C-aligned or better.

Real estate owners should seek out certifications and ratings which:

1. **Are aligned to the decarbonisation principles in Exhibit 1.** This means they:
   - **(a) Cover all building emissions:** Incorporate whole-life (e.g. operational carbon and, for new developments, upfront embodied carbon) and whole building carbon.
   - **(b) Have clear and ambitious carbon/energy targets:** covering energy use intensity, operational carbon and embodied carbon.[27] These targets should be informed by and therefore broadly consistent with (or better than) 1.5°C pathways for the top performance brackets (e.g. "5-star" or "platinum").
   - **(c) Drive real economy emissions reductions:** e.g. through minimum thresholds for energy efficiency, operational carbon and embodied carbon, where relevant; and prioritising carbon abatement measures over offsets.
2. **Are performance-based:** using actual energy and carbon performance information, not design characteristics, as much as possible to ensure greater accuracy.[28]

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26 This analysis could, for example, utilise the sector transition risk assessment guidelines developed by the ULI C-Change initiative.

27 Secondary KPIs and targets may also include levels of on-site combustion and on-site renewable energy generation, amongst others. We recognise other areas of sustainability such as waste, water, and air quality are as important as carbon, but our focus is on driving greater carbon performance transparency now to unlock the low-carbon real estate market.

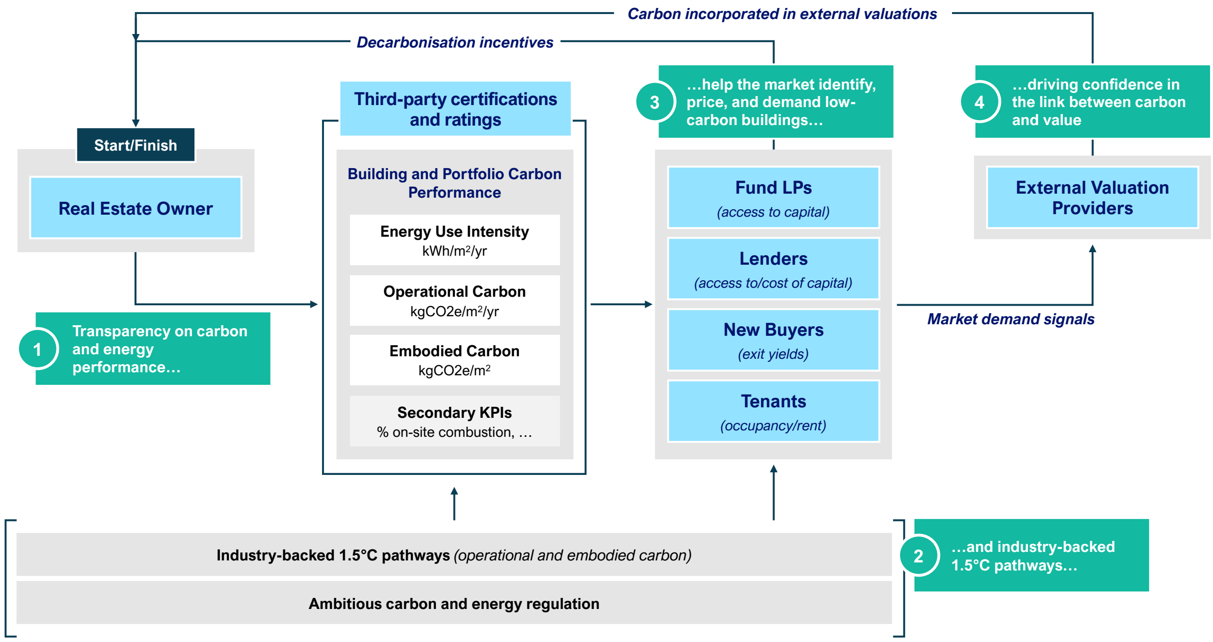
28 A key part of being performance-based means also having time-limited periods of validity. For example, a certification or rating expiring and requiring renewal every 12 months or 2-3 years.

3. **Publicly disclose actual performance:** covering key energy use intensity, operational carbon and embodied carbon metrics for certified/rated buildings and portfolios, and how this compares with certification targets and/or relevant 1.5°C pathways.

Further illustration of key data points that should inform lender, tenant, and investor carbon due diligence and therefore warrant greater disclosure can be found in **Appendix A2**.

Transparency on carbon and energy performance, clear 1.5°C pathways, and a supporting network of certifications and ratings that meet the above criteria enables market participants to identify and accurately underwrite low-carbon buildings and portfolios. This then gives valuation providers evidence to reflect carbon performance in their models, further boosting real estate owners' confidence to transition their buildings. This setup – a market where carbon and energy data are shared and used like financial data to inform decision-making – is our North Star for real estate (see **Exhibit 2**).

Exhibit 2: The "North Star": A well-functioning low-carbon real estate market



This momentum, and the voluntary standards, pathways, certifications, and data supporting it, can then be used to inform the development of more ambitious performance-based regulation to amplify demand and accelerate sector decarbonisation.

Section III: Why the market is not working today

Major certifications and ratings tools do not provide transparency on carbon and energy performance and do not have clear targets that are broadly 1.5°C-aligned or better

Today, lenders, tenants, investors, and fund managers that care about climate transition risk largely rely on green certifications and ratings to proxy a building or portfolio's carbon and energy performance. These include holistic building certifications like LEED and BREEAM, portfolio ratings like GRESB, and building energy ratings like NABERS, EnergyStar, and EPCs.

Third-party certifications and ratings can therefore play a key role in providing transparency and assurance on carbon and energy performance and highlighting what is broadly 1.5°C-aligned or better.

However, many major schemes do not clearly do this today. In **Exhibit 3** we show a mapping of the major certifications and ratings against whether they **(1)** incorporate the decarbonisation principles from **Exhibit 1** – i.e. target all building emissions, have clear 1.5°C-aligned targets,[29] and drive real emissions reductions by prioritising abatement; **(2)** are performance-based; and **(3)** publicly disclose the performance of certified buildings or portfolios against key metrics.[30] Further detail on this mapping can be found in **Appendix A3**.

Like-for-like comparison across certifications and ratings is challenging given their different use-cases, the complexity of their assessments, and the varying approaches they can take. Nonetheless, several themes emerge:

- Most schemes recognise the need to target all building emissions, either partially or fully incorporating approaches to whole life and whole building carbon, where relevant.
- Most schemes also agree on the need to incorporate energy efficiency improvements into assessments alongside renewable electrification, as well as on the need to ensure core targets are hit before offsets may be used to "go beyond".
- Most in-use schemes are performance-based, requiring actual energy use data. EPCs are a notable exception.[31] New development schemes increasingly require lifecycle assessments (LCAs).
- However, the most widely used certifications and ratings do not yet:
    - Have clear, publicly available targets for energy use, operational carbon, and embodied carbon that are broadly 1.5°C-aligned or better.
    - Disclose the actual performance of certified assets against the above metrics.

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29 Targets were determined to be broadly 1.5°C-aligned or better if they were explicitly stated to be such (i.e. derived based on IPCC criteria), if they broadly aligned with existing sector pathways from CRREM and SBTi, or if they would clearly result in a "net zero" building, i.e. highly energy efficient, no on-site combustion, 100% procured renewable energy for the whole building and residual emissions (e.g. fugitives) offset.

30 This analysis is based on publicly available documentation and has been discussed with multiple schemes in advance of publication.

31 EPCs are being improved through the EPBD finalised in March 2024, see Article 19/Annex V of EPBD. In 24 months all EPCs will need to at least include the calculated primary and final energy use in $kWh/m^2/y$, % of renewable energy produced onsite and include life cycle GWP if available. Category A of all EPC rating systems by country must correspond to performance of a zero-emissions building and G to worst performing buildings.

Exhibit 3: View of major certifications/ratings vs. decarbonisation and transparency principles

Methodology for comparison of certifications and ratings vs. decarbonisation and transparency principles

1 Cover all emissions
- Are **operational and upfront embodied** emissions included?
- Are **whole building** emissions included?

2 Set ambitious goals
- Are there **broadly 1.5°C-aligned or better targets** for the top performance bracket? (across operational and embodied carbon)

3 Mitigate effectively
- Are there **minimum requirements for energy efficiency, operational and embodied** carbon?
- Is **abatement prioritised over offsets**?

4 Measure performance
- Is the certification or rating performance-based? i.e. does it **require actual carbon and energy data?**

5 Provide transparency
- Does the rating have **clear, publicly available targets** for EUI, embodied, operational carbon?
- Is performance of certified assets **publicly available?**

Portfolio ratings / New development certifications

Certification/Rating	GRESB	BREEAM	BREEAM (NEW)	LEED	LEED (NEW)	DGNB	DGNB (NEW)	Green Star	ILFI	LCBI	UK NZCBS
	Portfolio ratings	New development certifications	Under consultation		Under consultation		Under consultation				Under development
Primary geography	Global	Global	Global	Global	Global	Germany	Global	Australia	US	Europe	UK
Assessment level	Portfolio	Asset	Asset	Asset	Asset	Asset	Asset	Asset	Asset	Asset	Asset
Scheme penetration[1]	**Large**	**Large**	**N/A**	**Large**	**N/A**	**Mid**	**Mid**	**Mid**	**Small**	**N/A**	**N/A**
Building lifecycle stage	All	New	New	New	New	New	New	New	New	New	New
Certification/rating type	**Holistic**	**Holistic**	**Holistic**	**Holistic**	**Holistic**	**Holistic**	**Holistic**	**Holistic**	**Carbon**	**Carbon**	**Carbon**
Scheme version	v.2024	v6.1	v7	v4.1	v5	v2023	v2030	v1	ZC v1.1	v1.0	TBC
Approx. % points for energy/carbon	21%	16%	TBC	38%	51%	16%	N/A	24%	N/A	100%	100%
Targets operational and upfront embodied carbon	Partially meets	Partially meets	Partially meets	Partially meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets
Targets whole building emissions	Fully meets	Partially meets	Partially meets	Partially meets	Partially meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets
Top performance consistent with or better than 1.5°C pathways (Operational)	Does not meet	Does not meet	Partially meets	Does not meet	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets
Top performance consistent with or better than 1.5°C pathways (Upfront Embodied)	Does not meet	Does not meet	Partially meets	Does not meet	Partially meets	Partially meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets
Minimum EUI performance to be certified	N/A	Partially meets	Fully meets	Partially meets	Partially meets	Partially meets	Partially meets	Fully meets	Fully meets	Fully meets	Fully meets
Minimum operational carbon performance to be certified	N/A	Does not meet	Partially meets	Partially meets	Partially meets	Partially meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets
Minimum upfront embodied carbon performance to be certified	N/A	Does not meet	Partially meets	Does not meet	Partially meets	Partially meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets
Prioritise abatement over offsets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets
Actual data required (energy/operational)	Fully meets	Partially meets	Partially meets	Partially meets	Partially meets	Partially meets	Fully meets	Partially meets	Fully meets	Partially meets	Fully meets
Actual data required (embodied)	Does not meet	Does not meet	Partially meets	Does not meet	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets
Carbon performance targets are public, clear and reference to 1.5°C pathways	Partially meets	Does not meet	Partially meets	Does not meet	Partially meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets
Performance of certified assets is shared and transparent	Partially meets	Does not meet	Does not meet	Does not meet	Partially meets	Partially meets	Fully meets	Partially meets	Partially meets	Partially meets	Fully meets

In-use certifications and energy ratings

Certification/Rating	BREEAM	BREEAM (NEW)	LEED	LEED (NEW)	LEED ZERO (NEW)	DGNB	Green Star	ILFI	UK NZCBS	NABERS	Energy Star	EPC
	Under consultation		Under consultation						Under development			
Primary geography	Global	Global	Global	Global	Global	Germany	Australia	US	UK	Australia	N. Am	Europe
Assessment level	Asset	Asset	Asset	Asset	Asset	Asset	Asset	Asset	Asset	Asset	Asset	Asset
Scheme penetration[1]	**Large**	**N/A**	**Large**	**N/A**	**N/A**	**Mid**	**Mid**	**Small**	**N/A**	**Mid**	**Large**	**Large**
Building lifecycle stage	In-use	In-use	In-use	In-use	In-use	In-use	In-use	In-use	In-use	In-use	In-use	In-use
Certification/rating type	**Holistic**	**Holistic**	**Holistic**	**Holistic**	**Holistic**	**Holistic**	**Holistic**	**Carbon**	**Carbon**	**Energy**	**Energy**	**Energy**
Scheme version	v6.0	v7	v4.1	v5	v5	v2020	Perf. v2	ZC v1.1	TBC	[…]	[…]	[…]
Approx. % points for energy/carbon	27%	TBC	35%	44%	100%	30%	24%	N/A	100%	100%	100%	100%
Targets whole building emissions	Partially meets	Partially meets	Partially meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Partially meets	Fully meets	Partially meets
Top performance consistent with or better than 1.5°C pathways (Operational)	Does not meet	Partially meets	Does not meet	Partially meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Partially meets	Does not meet
Minimum EUI performance to be certified	Partially meets	Fully meets	Partially meets	Fully meets	Fully meets	Partially meets	Partially meets	Fully meets	Fully meets	N/A	N/A	N/A
Minimum operational carbon performance to be certified	Does not meet	Partially meets	Partially meets	Fully meets	Fully meets	Partially meets	Partially meets	Fully meets	Fully meets	N/A	N/A	N/A
Prioritise abatement over offsets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	N/A	N/A	N/A
Actual data required (energy/operational)	Partially meets	Partially meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Does not meet
Carbon performance targets are public, clear and reference to 1.5°C pathways	Does not meet	Partially meets	Does not meet	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Fully meets	Partially meets	Does not meet
Performance of certified assets is shared and transparent	Does not meet	Does not meet	Partially meets	Partially meets	Partially meets	Partially meets	Partially meets	Partially meets	Fully meets	Fully meets	Partially meets	Does not meet

Fully meets criteria | Partially meets criteria | Does not meet criteria | Key gaps vs. decarbonisation and transparency principles

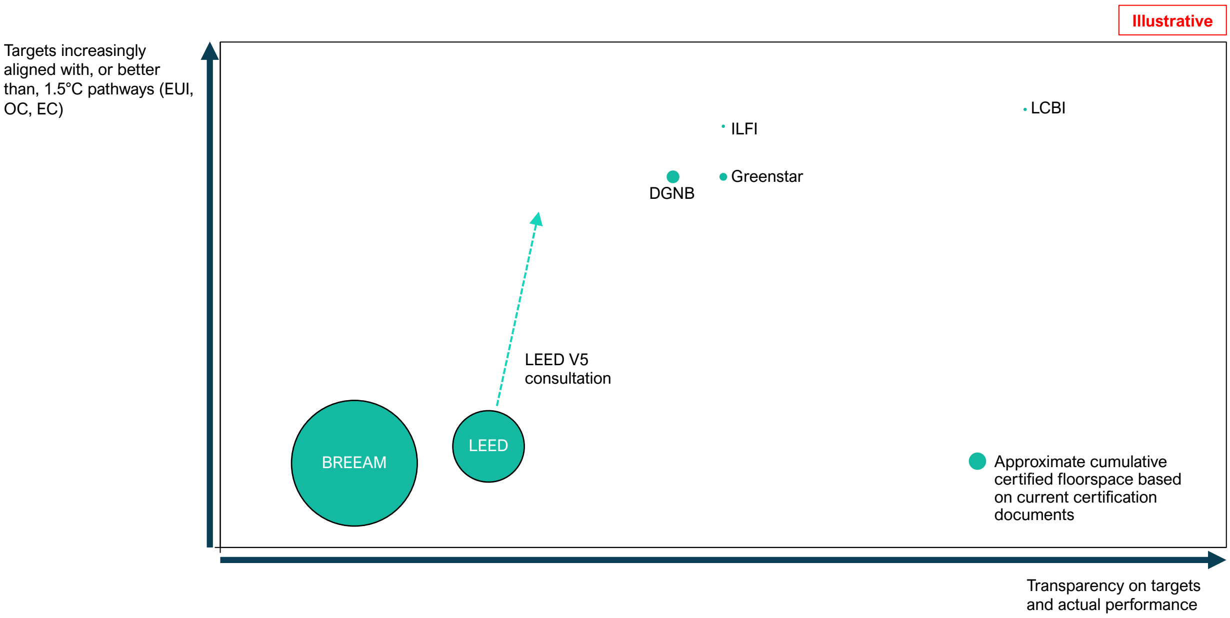
[1]Based on cumulative globally certified floorspace

Note: Systemiq analysis supported by Arup. This was conducted based on available certification documents, external input, and stakeholder discussions. The complexity and variability of approaches across different schemes makes it challenging to assess all of them in a consistent like-for-like manner. There is therefore some degree of subjectivity in these assessments

There are exceptions. For example, NABERS – an energy rating scheme in Australia and the UK – has both clear, performance-based targets and publicly discloses energy and carbon data for all rated assets. Additional high-ambition schemes include ILFI in the US, LCBI in Europe and the upcoming UK NZCBS.[32] But these do not represent the majority of certified buildings.

In fact, based on our analysis, the major certifications, covering an estimated ~80% (~9bn m²) of globally certified floorspace, do not – today – provide transparency on carbon and energy performance nor have clear targets that are broadly 1.5°C-aligned or better (see Exhibit 4).

Exhibit 4: Major certifications LEED and BREEAM – covering an estimated 80% of certified floorspace – today provide limited transparency on carbon and energy performance and do not have clear targets that are broadly 1.5°C-aligned or better[33]



Note: Only includes active certifications. Excludes portfolio ratings (GRESB) and energy ratings such as NABERS, EnergyStar, and EPCs. Illustrative assessment across new development/in-use schemes. See Exhibit 3 for further detail. Floorspace estimates based on publicly available data on cumulative certified floorspace (e.g. from certifier project directories).[34]

32 Although it is important to note that the UK NZCBS will be a standard and not a certification or rating scheme.

33 ~80% is an approximate calculation of the floorspace certified by the major certifications LEED and BREEAM, divided by the total global certified floorspace. Total global certified floorspace is 4.3bn m² for Green Building Councils (GBCs), according to the World Green Building Council, and at least~6.9bn m² for non-GBCs based on estimates. For major certifications, LEED have certified approximately ~2.2bn m² (~24bn sqft) cumulatively based on the LEED project directory data and BREEAM have certified approximately ~6bn m² based on estimates (see below).

34 BREEAM certified floorspace estimate based on an average asset size of ~11,000 m² applied to ~610k assets listed on the BREEAM project directory.

GRESB, the dominant "green" portfolio rating in the market (covering $7.2tn in assets), is performance-based and provides transparency on underlying carbon and energy metrics to subscribed LPs. However, only 4% of its score goes towards carbon and energy performance targets and these are not yet informed by 1.5°C pathways (instead being based on whether or not there has been a year-on-year improvement for EUI and operational carbon; upfront embodied carbon is not yet factored into scoring).[35]

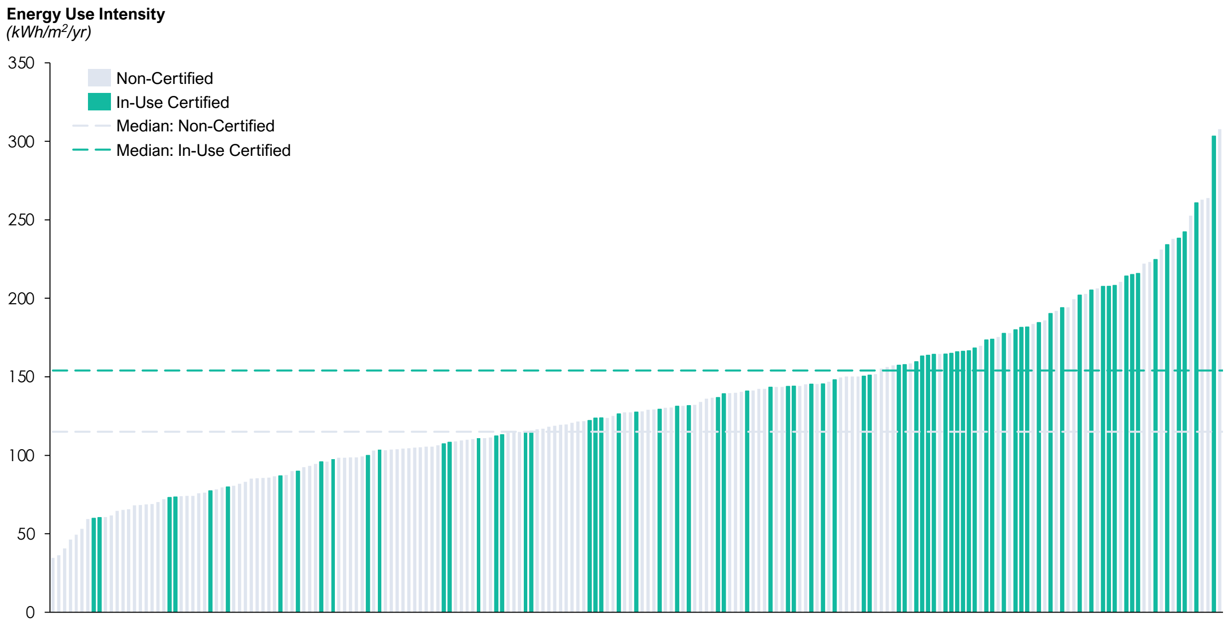
Without clear, broadly 1.5°C-aligned targets and transparency on performance, schemes are unclear indicators for end-users making decisions on climate transition risk and opportunity.

To further evidence this, we analysed the energy use intensity (EUI) of several hundred office buildings across LOTUF portfolios. We found:

- **No correlation between certifications and energy performance[36]** (and by association carbon performance). See **Exhibit 5.**
- **No correlation between certifications and 1.5°C pathway alignment[37]** (using CRREM pathways, which are increasingly emerging as a key target setting and benchmarking tool for real estate investors).[38] See **Exhibit 6**.

Of course, there are important caveats to this analysis, including a limited overall sample size. **Nonetheless, if certifications and ratings were clear, robust indicators of carbon performance today then even a small correlation should emerge.**

Exhibit 5: No correlation between certifications and energy performance



Note: Contains whole building EUI data on 203 LOTUF office buildings across Europe and the US. Includes a mixture of data from 2021-2023, only normalised for floor area and asset type. In-use certifications include LEED, BREEAM, DGNB, BOMA/ BEST and others.

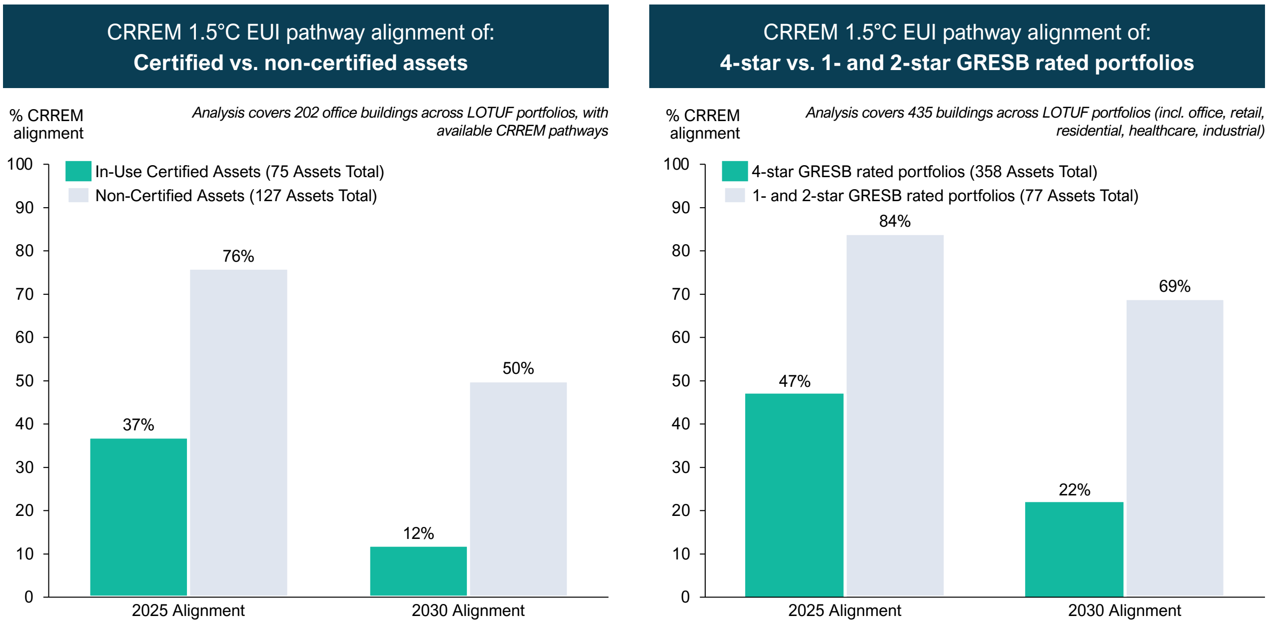
35 Points are also awarded for green certifications and carbon/energy data coverage. In total, ~21% of GRESB scores are carbon/energy related.

36 Our analysis returned a correlation coefficient of 0.01 between assets with an in-use certification and better energy use intensity.

37 Our analysis returned a correlation coefficient of -0.08 between assets with a certification and those that are aligned to CRREM's 2025 1.5°C EUI target, and -0.12 for those that are aligned to the CRREM 2030 EUI target.

38 CRREM provides top-down asset-level 1.5°C operational carbon and EUI pathways across Europe, North America and parts of APAC. See here for more information: https://www.crrem.eu

Exhibit 6: No correlation between certifications/portfolio ratings and 1.5°C pathway alignment



Note: To calculate CRREM alignment across datasets, each asset was compared to its relevant country and asset-specific CRREM EUI intensity pathway. Certifications in the office dataset include LEED, BREEAM, DGNB, BOMA/BEST and others. GRESB scores in the GRESB analysis only include 1-star, 2-star and 4-star.

These conclusions are further supported by analysis from BBP[39] on EPC ratings, as well as JLL[40] and the Climate Bonds Initiative[41] on major green certifications.

We recognise, of course, that many green certifications were not originally designed to assess climate performance exclusively, instead covering a range of (important) sustainability indicators, such as waste, water, and air quality.[42] And they have had a significant positive impact historically in raising carbon and other sustainability issues up the agenda for real estate. However, the market has since moved on, and the need for transparency on carbon and energy performance is now crucial.

We also recognise that certifications and ratings are not the root cause of this disconnect; they respond to market demand. To drive change, end-users that care about carbon should demand greater transparency on carbon performance and 1.5°C-alignment. Such demand signals are beginning to emerge, for instance through groups like LOTUF.

We are also beginning to see efforts across major certifications and ratings to improve transparency on targets and ambition around decarbonisation, including consideration of 1.5°C pathways. BREEAM v7 and LEED v5 – which are under consultation/development and due to be launched in 2024 and 2025 respectively – will include more robust data requirements and more ambitious performance targets. For example, LEED v5 strengthens minimum requirements for the top "platinum" performance level as well as the in-use "zero carbon" label. This new "zero carbon" label sets targets for buildings to achieve a minimum "gold" certification, be highly

39 BBP Real Estate Environmental Benchmark (REEB), 2022 Insights Report. Sample contains energy use intensity data from 1,275 UK commercial properties, with 63% of these being offices and most of the rest being retail/shopping centres.

40 JLL, "Return on Sustainability", 2022. Data shows a sample of LEED properties in Boston (US).

41 Climate Bonds Initiative (CBI),"Buildings Criteria: The Buildings Eligibility Criteria of the Climate Bonds Standard & Certification Scheme", 2023.

42 Furthermore, they were developed with building codes in mind such as ASHRAE in the US and Part L in the UK, which do not lend themselves easily to clear carbon and energy targets.

energy efficient, have no on-site combustion and have 100% generated/procured renewable energy for the whole building, making it 1.5°C-aligned.[43] However, both schemes have cited challenges on publicly disclosing actual performance of certified assets (energy use intensity, operational carbon, and embodied carbon) including permission requirements from real estate owners. See further information in **Exhibit 3**. In its 2024 roadmap, GRESB also recognises the need to better reward actual energy and operational carbon performance in its next iteration and is exploring how to better incorporate embodied carbon for new developments.[44]

Existing 1.5°C pathways are not being incorporated into certifications and ratings, in large part due to the need for refinement

To help certifications and ratings get this effort right and set clear, ambitious targets, there needs to be a foundation of commonly agreed 1.5°C operational and embodied carbon pathways for them to assess performance against.

The most established top-down pathways today are CRREM (for energy use intensity and operational carbon) and SBTi (for upfront embodied carbon). These pathways form a good starting point for real estate owners and other market participants to set targets and benchmark assets and portfolios. However, there is a recognition that they need continued development. This includes, for example, expansion to new geographies and refinement of existing pathways through greater bottom-up analysis (using local asset performance and technical feasibility limits).

The perceived need for improvement has slowed adoption of these pathways by major certifications and ratings. However such adoption is key to unlocking the low-carbon real estate market, given the considerable reliance upon these ratings tools. It is therefore crucial that there is a multi-stakeholder effort to refine existing 1.5°C pathways and make them "good enough" for use by both industry and certifications and ratings.

Fortunately, such efforts are accelerating. For example, an industry-led project to improve North American CRREM pathways is expected to release final results in July this year. In Europe – where CRREM pathways are more established – some certifications are starting to include these pathways in their target setting e.g. the newly released LCBI. In the UK, the NZCBS has been a multi-stakeholder effort to develop industry-backed 1.5°C operational and embodied carbon pathways for fourteen different asset types. While such developments are encouraging, we must ultimately see the most-used schemes – BREEAM, LEED and GRESB – also ensure their targets are clearly informed by 1.5°C pathways.

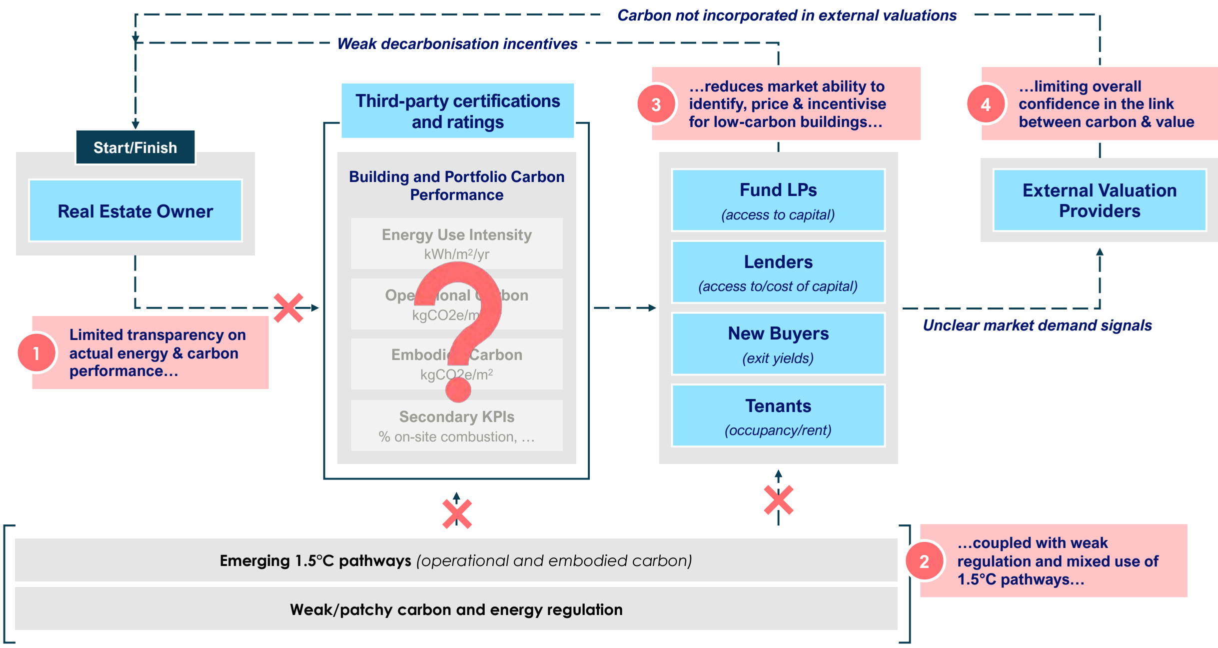
43 LEED. 2024. V5 Operations and Maintenance
44 GRESB. 2023. Foundation 2024 Roadmap

The lack of transparency and clear targets informed by 1.5°C pathways is muting demand signals for low-carbon buildings, limiting owner confidence to invest in decarbonisation

As a result of the above, lenders, tenants, investors, and fund managers who are looking for low-carbon buildings (either to de-risk their business or as a value proposition) are struggling to properly identify, price and provide incentives for them, muting demand signals. External valuation providers, in turn, lack the confidence to price carbon into their assessments. This means it is near impossible to derive a clear correlation between carbon and value.

The ultimate outcome is limited confidence for real estate owners – whose mandates are to create and preserve value – to invest in deep decarbonisation across their assets and portfolios. This system also limits accountability for slow movers who can take advantage of the lack of transparency to delay action. This existing setup is shown in **Exhibit 7**.

Exhibit 7: The market is not yet providing the transparency on building and portfolio carbon performance vs. 1.5°C needed to unlock low-carbon real estate



Section IV: How to kick-start the low-carbon real estate market

To kick-start the low-carbon real estate market we need:

- **Lenders, tenants, investors, and fund managers** to demand carbon and energy performance transparency – from other market participants and from the certifications and ratings they use – to better inform their assessments of buildings and portfolios. These assessments should be underpinned by common metrics, decarbonisation principles, and 1.5°C pathways.

- **Certifications and ratings** to enable better assessments by providing transparency on their targets, ensuring targets are informed by 1.5°C pathways, and publicly reporting on the carbon and energy performance for rated buildings and portfolios.

- **Standards-setters and pathway developers** to align around a commonly agreed set of 1.5°C pathways to inform target setting, building on and improving pathways that already exist. This is likely to be a multi-stakeholder effort amongst standards, pathway developers, certifications and ratings, and other key industry bodies that operate at a national level such as Green Building Councils. Improving operational pathways to drive industry uptake and enable them to be better incorporated into certifications and ratings is a priority. Developing fit-for-purpose embodied carbon pathways is likely to be a larger and longer effort, given current limitations on data, but should be pursued in parallel.

- **External valuation providers** to incorporate carbon into their assessments – working closely with building owners and lenders to collect evidence on and better understand the relationship between carbon and value – and help facilitate an emerging demand signal.

- **Policymakers** to amplify market signals by introducing ambitious performance-based regulation that drives transparency/data-sharing and has simple, clear targets for energy use intensity, operational carbon, and embodied carbon. This should be aligned with the standards and pathways supporting the voluntary market and is crucial for helping drive broad, sector-wide progress, recognising that the market for green certifications and ratings only covers a small proportion of total commercial real estate today.

Real estate owners can play a key role in accelerating change. In the short-term they can:

1. Demonstrate to lenders, tenants, and other investors that they should be demanding low-carbon buildings, or at the very least, a clear picture of carbon and energy performance.

2. Use certifications and ratings that offer transparency and reflect 1.5°C ambition.

3. Facilitate transparency by gathering and sharing carbon and energy performance data, and demanding this data in turn during transactions.

4. Make the case to policymakers for simple, ambitious, performance-based regulation with clear carbon and energy targets.

This call for greater transparency is echoed by other investor initiatives such as GREEN and the Better Buildings Partnership (BBP).[45]

To support lenders, tenants, and other investors/managers in assessing carbon performance consistently, we have provided a simple due diligence framework designed to work with tools available today (see **Appendix**).

In recent months LOTUF has been tackling point 2 above: working with major certifications and ratings on increasing the transparency and ambition of their targets.

These conversations, and broader announcements, have revealed positive signs that the market is moving. Major certifications such as LEED and BREEAM are updating their schemes to be more transparent and ambitious, and new carbon-focused schemes are entering the market, such as LCBI. There are ongoing efforts to improve CRREM 1.5°C pathways and drive uptake through greater industry participation in governance and technical work. And finally, RICS recently published thoughts on how external valuers might begin to incorporate carbon and energy into their assessments.[46] This progress is encouraging, but there is still much to do to get the sector on track for 1.5°C.

Greater transparency on carbon and energy performance and commonly agreed 1.5°C pathways are no silver bullet, but they are crucial to driving a clearer link between carbon and value and unlocking the low-carbon real estate market.[47] The risks and opportunities for real estate are no secret – almost 1/5th of current real estate value is at risk from the transition if no action is taken.[48] Meanwhile, there are increasing cases – including amongst the LOTUF group – showing that decarbonisation does create value. The way to prove this at scale and kick-start the low-carbon real estate market is clear: real estate owners, and other market participants, need to shift from a reliance on opaque tools towards real carbon performance transparency and 1.5°C targets. There is an emerging toolkit of data and pathways to help them do this. These data and pathways need continued improvement, but they are a good enough starting point to accelerate change today.

45 For example, see the GREEN Investor Statement and the BBP Climate Commitment.

46 RICS. 2024. The future of real estate valuations: The impact of ESG.

47 Truly scaling this market will also require solutions to several other key challenges. For example, adopting a common approach to assessing transition risk, tackling split-incentives between tenants and landlords, and de-risking new climate solutions for the Built Environment. For a broader list of system-wide issues see the ULI C-Change agenda.

48 MSCI. 2022. Transition Risks Vary by Scenario Estimate represents MSCI's 2°C REMIND Disorderly scenario which assumes global annual emissions do not decrease until 2030, with strong policies then needed to limit warming to below 2°C.

Appendix

A1. Glossary of Key Terms

Term	Definition
Low-carbon real estate	1.5°C-aligned or better real estate, underpinned by the decarbonisation principles set out in Exhibit 1.
Low-carbon real estate market	At scale demand and supply of low-carbon real estate.
Energy/carbon target	The required energy/carbon performance for a given asset or portfolio at a given point in time. Others may refer to this as the “limit” or “minimum threshold”.
Energy/carbon 1.5°C-aligned pathway	A trajectory of 1.5°C-aligned energy/carbon targets over a specified period of time.
Institutionally owned real estate	Real estate owned by large entities such as asset managers, real estate companies, pension funds and insurance companies, etc.
Operational carbon	The GHG (greenhouse gas) emissions associated with the use stage of a building’s lifecycle, including direct emissions (fossil fuels burned on-site and fugitive emissions) and indirect emissions (electricity and heat procured off-site).
Embodied carbon	The GHG emissions associated with the manufacturing, transportation, installation, maintenance and disposal of building materials. Embodied carbon can be split into upfront, in-use and end-of-life. For the purposes of this paper, we focus primarily on upfront embodied carbon for new developments and in-use embodied carbon for major renovations/retrofits.
Holistic “green” certification/ rating	An assessment of an asset or portfolio’s sustainability performance, often covering a range of factors including energy, carbon, waste, water and air quality, provided by an organisation that has developed a proprietary assessment methodology or standard.
Energy rating	An assessment of an asset’s energy efficiency, provided by an organisation that has developed a proprietary assessment methodology or standard.
Performance-based	An assessment of an asset using actual energy and carbon performance information, not design characteristics.

A2. Decarbonisation Due Diligence Framework

To support lenders, tenants, and other investors/managers in assessing building performance consistently, we have provided a simple due diligence framework designed to work with tools available today.

The framework requires actual carbon and energy data as a foundation, and overlays it with an asset's performance against 1.5°C pathways, existing/future regulations, and a costed decarbonisation plan. Together, this information should enable market players to develop a sophisticated view of the transition risks, opportunities, and cost to de-risk for a building or portfolio, which can then be incorporated into pricing.

In more detail, the due diligence framework includes:

1. **Actual carbon and energy data:** At a minimum market players will need information on three key metrics for a building or portfolio: the energy use intensity (EUI) in $kWh/m^2/yr$, the operational carbon in $kgCO_2e/m^2/yr$ and, for new developments, the upfront embodied carbon in $kgCO_2e/m^2$. This may also be supported with secondary KPIs such as a whole-life LCA (for new developments) and the level of on-site combustion and on-site renewables. Inevitably there is a degree of modelling to fill gaps in actual performance data, therefore "data coverage" metrics can provide insight into the level of estimation and the reliability of data.[49]

2. **Comparison versus 1.5°C pathways:** Comparison against industry-backed pathways provides a helpful, albeit imperfect view of how "1.5°C-aligned" or "good" a building or portfolio is. Current and emerging pathways include CRREM for energy use intensity and operational carbon (primarily used in Europe but also available in North America and parts of APAC), SBTi's upfront embodied carbon pathways, and other local pathways and targets such as those being developed by the UK NZCBS.

3. **Alignment to regulation:** Information required will vary by jurisdiction but will include comparison versus current and anticipated minimum energy and carbon performance standards. Examples include EPC ratings in the UK/Europe and Local Law 97 in New York City.

4. **Verification:** Third-party verification, through e.g. certifications and ratings, can provide additional assurance on the quality/completeness of carbon and energy data and comparison versus sector targets.[50] Holistic ratings can also provide insight into how buildings or portfolios perform against a broader suite of sustainability metrics such as waste, water, air quality and social factors, which will no doubt become increasingly important to stakeholders in coming years where they are not already.

5. **Costed transition and capex plan:** As well as understanding how a building is performing today it is important to understand what decarbonisation plans, if any, the building owner has, how these will de-risk and improve the building, and how much capital expenditure it will require. This is primarily important for standing assets undergoing brown-to-green transitions.

49 We recognise there is some debate over the universal applicability of per m^2 intensity metrics across all real estate asset types and that other output denominators may provide a better indication of actual efficiency (for example data centres often consider Power Usage Effectiveness). We acknowledge that this may be the case for certain asset types, though we hold to the core principle of this due diligence framework: that performance be assessed against clear output metrics for energy use, operational carbon and embodied carbon. We also recognise that for energy use it may be valuable to split this metric into regulated (e.g. whole building heating and cooling) and unregulated (e.g. tenant plug-loads/computers) use to better understand energy and emissions more directly within control of the building owner.

50 Including, for example, ensuring energy and carbon data is normalised for occupancy, climatic conditions, and other factors. Normalisation for occupancy is important to ensure that high-efficiency buildings and low occupancy buildings are not rated the same given they will both have low overall energy uses. Approaches will vary between different certifications and ratings.

This due diligence framework is set out in **Exhibit A1**. It is generic and simplified, covering datapoints relevant to all market players which may be adjusted according to individual needs (e.g. tenants are likely to take a lighter-touch approach than lenders or fund managers). Examples of how this framework might be applied today using available tools for lenders (asset-level loans) and LPs (portfolio assessments) is shown in **Exhibits A2 and A3**.

Exhibit A1: Real estate decarbonisation due diligence framework

Key principles underpinning carbon due diligence framework

- Target **whole life emissions**
- Target **whole building emissions**
- Set targets using industry-backed **1.5°C pathways**
- **Energy efficiency** is key *alongside* renewable electrification
- **Prioritise abatement over offsets**

New Developments

Standing Assets

Datapoint	Unit	Description & Rationale
LCA *(Lifecycle Emissions)*	kgCO2e/m²/yr	Provides complete whole-life carbon view
% Actual data coverage *(Embodied Carbon)*	%	Helps determine reliability of embodied carbon data (i.e. actual vs. modelled/estimated)
Upfront Embodied Carbon intensity *(and comparison vs. 1.5°C pathway)*	kgCO2e/m² *(and pathway compliance yr)*	Compare upfront embodied carbon for new builds vs. 1.5°C pathway (e.g. SBTi). Compliance year is year emissions intensity goes above pathway
% Actual data coverage *(Energy/Operational Carbon)*	%	Helps understand coverage and reliability of building energy use data (actual vs. modelled)
% Energy from on-site combustion	%	Helps understand level of building electrification vs. on-site combustion (e.g. gas boilers)
Energy use intensity (EUI) *(and comparison vs. 1.5°C pathway)*	kWh/m²/yr *(and pathway compliance yr)*	Compare EUI vs. 1.5°C pathway to understand need for efficiency improvements vs. electrification / renewable energy in decarbonisation plan
Operational Carbon intensity *(and comparison vs. 1.5°C pathway)*	kgCO2e/m²/yr *(and pathway compliance yr)*	Compare operational carbon vs. 1.5°C pathway to help understand transition risk. Compliance year is year emissions intensity goes above pathway
Regulatory datapoint (e.g. EPC)	e.g. EPC A	Additional datapoints alongside 1.5°C pathways to compare building to regulation (e.g. EPC in EU)
Third-party verification / holistic certification or rating	e.g. LEED Gold	Additional holistic sustainability performance validation through certification or rating.
1.5°C-aligned transition and capex plan	Yes/No or % coverage	Standing asset focused – is there a transition and capex plan for an asset or % of portfolio?

Exhibit A2: Illustrative application of decarbonisation due diligence framework to green loans

1 New Low-Carbon Development Loan

Datapoint	Target
LCA *(Lifecycle Emissions)*	15 kgCO2e/m²/yr
Upfront Embodied Carbon intensity	400 kgCO2e/m²
SBTi EC 1.5°C Path. Compliance Year	2030
% Energy from on-site combustion	0 %
Energy use intensity (EUI)	40 kWh/m²/yr
CRREM EUI 1.5°C Path. Compliance Year	2050
Operational Carbon intensity *(location-based)*	5 kgCO2e/m²/yr
CRREM GHG 1.5°C Path. Compliance Year	2050
EPC Rating	A
Asset Certification	BREEAM Outstanding

Targeted KPIs – to be confirmed based on actual performance data post construction

2 Standing Asset Brown-to-Green Transition Loan

Datapoint	Current	Target
% Actual data coverage *(Energy/OC)*	50 %	100 %
% Energy from on-site combustion	50 %	0 %
Energy use intensity (EUI)	200 kWh/m²/yr	80 kWh/m²/yr
CRREM EUI 1.5°C Path. Compliance Year	2020	2038
Operational Carbon intensity *(location-based)*	100 kgCO2e/m²/yr	20 kgCO2e/m²/yr
CRREM GHG 1.5°C Path. Compliance Year	2020	2040
EPC Rating	D	A
Asset Certification	N/A	DGNB Gold
Cost to Transition Asset		$50m

Exhibit A3: Illustrative application of decarbonisation due diligence framework to LP reporting

Fund		Standing Assets											New Developments						
KPIs	Overall GRESB Score	No. Assets / Floorspace	Actual Energy Use Data Coverage	Avg. Energy Use Intensity (EUI)	CRREM Pathway EUI Compliance (2023)	Avg. Op. Carbon Intensity	CRREM Pathway GHG Compliance		Asset-level Transition Plan Coverage	CRREM GHG Pathway Compliance (post Transition Plan, 2030)	EPC Rating (% EPC B or above)	% Assets Green Certified	No. Assets / Floorspace (2023)	Avg. Upfront Emb. Carbon Intensity (2023)	SBTi Pathway EC Compliance (2023)	Avg. Op. Carbon Intensity (2023)	CRREM Pathway GHG Compliance (2030)	EPC Rating (% EPC B or above)	% Assets Green Certified
							2023	2030											
Units	Stars	$\#/m^2$	%	$kWh/m^2/yr$	% Assets	$kgCO_2e/m^2/yr$	% Assets						$\#/m^2$	$kgCO_2e/m^2$	% Assets	$kgCO_2e/m^2/yr$	% Assets		
Fund A	4.5	20 / 20k	80%	50	70%	10	90%	40%	95%	95%	100%	70%	10 / 10k	400	80%	10	95%	100%	90%
Fund B	3.5	500 / 100k	60%	100	40%	80	50%	10%	30%	30%	45%	40%	40 / 100k	1,000	20%	20	70%	80%	70%
Fund C	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]
Fund D	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]
Fund […]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]	[…]

A3. Detailed View of Certifications/Ratings vs. Decarbonisation and Transparency Principles

Methodology for comparison of certifications and ratings vs. decarbonisation and transparency principles

Category	Principle	Rating system
Cover all emissions	**Targets operational and at least upfront embodied carbon**	New development focused: **Red:** Doesn't cover both operational and upfront embodied carbon **Amber:** Covers operational and upfront embodied carbon, not mandatory **Green:** Covers both operational and upfront embodied carbon as mandatory (may also include in-use embodied carbon)
	Targets whole building	**Red**: Only covers part of the building **Amber**: You can do either part or whole building **Green:** Only covers whole building
Set ambitious goals	**Top performance broadly consistent with, or better than 1.5C pathways (Operational)**	**Red:** No mandatory operational carbon targets/limits **OR** no mandatory performance-based actions to get to a zero emissions building **Amber**: Some mandatory operational carbon targets/limits, not necessarily 1.5C aligned for top performance **OR** some mandatory performance-based actions for reducing operational carbon, but not clearly to zero (some mix of energy efficiency/100% renewables/no onsite combustion) **Green**: Mandatory operational targets/limits that are 1.5C aligned for top performance **OR** based on reducing operational carbon to zero (max energy efficiency/100% renewables/no onsite combustion)
	Top performance broadly consistent with, or better than 1.5C pathways (Upfront Embodied)	**Red**: No mandatory upfront embodied carbon reductions **Amber**: Some mandatory upfront embodied carbon reductions for top performance, not referenced against a 1.5°C pathway or benchmark **Green:** Clear upfront embodied carbon targets for top performance that have been checked against 1.5°C benchmarks and broadly align/exceed
Mitigate effectively	**Minimum energy efficiency/EUI performance requirements to be certified**	**Red:** No minimum performance level **Amber:** Some implicit or unclear minimum performance level, for example a self-defined level/requirement for a transition plan, or one that is nested within a broader calculation framework **Green:** Clear minimum performance level to be certified. This may, for example, be referenced to an industry-backed benchmark.
	Minimum operational carbon performance requirements to be certified	**Red:** No minimum performance level **Amber:** Some implicit or unclear minimum performance level, for example a self-defined level/requirement for a transition plan, or one that is nested within a broader calculation framework **Green:** Clear minimum performance level to be certified. This may, for example, be referenced to an industry-backed benchmark.
	Minimum upfront embodied carbon performance requirements to be certified	**Red:** No measurement requirement or minimum performance level **Amber:** Some improvement to performance expected based on a measurement requirement/LCA **Green:** Clear minimum performance level to be certified. This may, for example, be referenced to an industry-backed benchmark.
	Prioritise abatement over offsets to hit targets; offsets can help go beyond	**Red:** Offsets possible, no minimum emissions reductions **Amber**: Offsets possible with some minimum reduction level **Green**: Maximum emissions reductions (broadly consistent with or better than 1.5°C pathways) before offsetting **OR** offsets not allowed
Measure performance	**Actual data required (energy/operational)**	**Red:** No actual performance data or design-based only **Amber (In-use):** Modelled data based on partial coverage or optional **Amber (New):** Requirement to meter energy and report on data, but actual data not required at the point of certification/rating **Green:** Actual performance data, i.e. 12 months of energy use data, is a requirement to be certified/rated
	Actual data required (upfront embodied)	**Red**: No mandatory LCA **Amber:** Pre-construction/design stage LCA **Green:** Post-construction/as-built LCA Note that different LCA approaches are taken. There is a need to harmonise across systems to make these comparable and to ensure data robustness.
Provide transparency	**Carbon performance targets/thresholds are publicly available and clear, with reference to how they have been informed by 1.5°C pathways**	**Red:** No clear carbon performance thresholds or unclear methodology. No reference to how targets have been informed by or are broadly consistent with 1.5°C pathways **Amber:** Clear methodology and scoring based around carbon reduction levers (efficiency, no on-site combustion, renewable energy procurement) but no absolute performance targets/limits, in e.g. kWh/m^2/yr, and no reference to how these have been informed by or are broadly consistent with 1.5°C pathways **Green:** Publicly available and clear carbon and energy performance targets/limits, in e.g. kWh/m^2/yr, **OR** clear methodology and scoring based around carbon reduction levers (efficiency, no on-site combustion, renewable energy procurement) with clear reference to how targets/limits have been informed by or are broadly consistent with 1.5°C pathways
	EUI, Operational Carbon and Upfront Embodied Carbon performance of certified assets is shared and transparent	**Red:** No publicly available information on certified assets, or no reporting of core KPIs (EUI, operational carbon, embodied carbon, where relevant) privately to asset owner via the assessment **Amber:** Reports carbon performance information - including core KPIs such as EUI, operational carbon, and embodied carbon, where relevant - privately to asset owner via the assessment, which may then be shared as needed. This may include reference to 1.5°C pathways. There may also be some high-level public reporting for certified assets, for example overall asset score. **Green:** Reports asset level performance data for certified assets publicly for across core KPIs (EUI, operational carbon, embodied carbon, where relevant)

Portfolio and new development certifications (part 1)

New Development: 1	Portfolio		Consultation		Consultation		Consultation				Development
Certification/Rating	**GRESB**	**BREEAM**	**BREEAM**	**LEED**	**LEED**	**DGNB**	**DGNB**	**Green Star**	**ILFI**	**LCBI**	**UKNZCBS**
Certification Document	2024 Standard	V6.1 UK New Construction	V7 Consultation	v4.1 BD+C Guide	v5 BD+C Consultation	v2023 New Construction Buildings Set Criteria	v2030 New Construction	v1 Submission Guidelines	Zero Carbon 1.1	v1.0 New Construction Scheme	Development stage
Targets operational and at least upfront embodied carbon	Focus on operational carbon, no points for LCA (Development: Materials)	Optional coverage (Credit Mat01)	Covers both based on standards mentioned, unclear if mandatory	Optional coverage (MR Credit: Building Lifecycle)	Mandatory coverage (Embodied Carbon Prerequisite)	Mandatory coverage (ENV1.1 Climate action and energy)	Mandatory coverage	Mandatory coverage (Credit 21 Upfront Carbon Emissions)	Mandatory coverage (Intent and requirements)	Mandatory coverage (Methodology)	Mandatory coverage
Targets whole building	Prioritises a whole building approach (Reporting and Scope Boundaries)	Fully Fitted, Shell & Core or Shell Only	Likely whole building but not confirmed	See rating systems on USGBC website	See rating systems on USGBC website	Whole building only	Whole building only	Whole building only	Whole building only (Project Boundary and Floor Area)	Whole building only (Performance evaluation)	Whole building only, future versions to split between tenant and owner
Top performance broadly consistent with, or better than 1.5C pathways (Operational)	Absolute EUI/OC for given ratings levels are not specified in GRESB (Development: Energy)	Requirement for a higher score to achieve Excellent and Outstanding, but not seen as a reliable indicator of performance (Credit Ene01)	Reference to external limits and benchmarks. e.g. CRREM, unclear if these would be a requirement (BREEAM approach to operational carbon)	Energy efficiency measures; no required improvement for the top certificate level (EA Credit: Optimise Energy Performance)	Requirement for platinum level to maximise energy efficiency, minimise combustion and use 100% renewables (Appendix 1)	Requirement for platinum level to reduce emissions to 0 by 2030 (ENV1.1 Climate Action and Energy)	Requirement to reduce emissions to 0 emissions by 2030	Requirement for 6 star rating to get to 0 operational emissions; requirements rachet up through time for all rating levels (Climate Positive Minimum Expectation)	Requirement to maximise energy efficiency, minimise combustion and use 100% renewables (Energy Baseline Clarifications)	Requirement to follow CRREM operational carbon targets (Carbon performance)	Requirement to follow 1.5-degree pathways
Top performance broadly consistent with, or better than 1.5C pathways (Upfront Embodied)	No requirement for upfront embodied carbon reduction, or clear thresholds (Development: Materials)	No requirement for upfront embodied carbon reductions for any certification level, or clear thresholds (Credit Mat01)	Reference to the introduction of limits based on LCA (BREEAM approach to embodied carbon)	No requirement for upfront embodied carbon reductions for any certification level, or clear thresholds (MR Credit: Building Lifecycle)	Requirement for Platinum level to reduce upfront embodied emissions by 10% (Appendix 1)	Optional thresholds aligned with 1.5-degree pathways for max points (ENV1.1 Climate Action and Energy)	Requirement to reduce upfront embodied emissions by 50%	Requirement for 6 star rating to reduce upfront embodied emissions by 20%, approximately aligned to SBTi (Climate Positive Minimum Expectation)	Requirement to meet a 350 $kgCO_2e/m^2$ threshold, referenced against SBTi and LETI (Embodied Carbon Threshold Clarifications)	Requirement for top performance to reduce LCA by 30%, approximately aligned to SBTi (Performance evaluation: Embodied carbon)	Requirement to meet performance threshold set by UKNZCBS
Minimum energy efficiency/EUI performance requirements to be certified	N/A to portfolio rating	Relative improvement versus Building Regulation Part L, no EUI performance requirement (Credit Ene01)	Proposal for EUI performance requirement to be added (BREEAM approach to operational carbon)	Requirement for energy efficiency measures, no explicit EUI performance requirements (EA Credit: Optimise Energy Performance)	Decarbonisation planning required, no explicit EUI performance levels (EA Prerequisite: Minimum Energy Efficiency)	Aligns to regulatory energy efficiency requirements (German regulation seen as challenging without additional requirements)	Aligns to regulatory energy efficiency requirements (German regulation seen as challenging without additional requirements)	Requirement to improve EUI by 10% (Climate Positive Minimum Expectation)	Requirement to follow EUI baseline figures from ASHRAE guidance, with % improvement outlined (Energy Baseline Clarifications)	A comparison to CRREM EUI pathways is included (Target Setting Methodology for Operational Carbon)	Requirement to follow EUI performance levels
Minimum operational carbon performance requirements to be certified	N/A to portfolio rating	No minimum performance requirement found (Credit Ene01)	Expected, but not confirmed (BREEAM approach to operational carbon)	Requirement to meet energy efficiency standards, no explicit EUI performance levels (Prerequisite: Minimum Energy Performance)	Requirement to meet energy efficiency standards, no explicit EUI performance levels (EA Prerequisite: Minimum Energy Efficiency)	Requirement for a transition plan at all certification levels (ENV1.1 Climate Action and Energy)	Requirement to reduce emissions to 0 emissions by 2030	Requirement to improve EUI by 10% (Climate Positive Minimum Expectation)	Requirement to improve EUI versus ASHRAE, or other benchmark by 20% (Energy Baseline Clarifications)	Requirement to meet minimum performance level to be certified (Performance Evaluation: Operational Carbon)	Requirement to follow EUI performance levels

Portfolio and new development certifications (part 2)

New Development: 2	Portfolio		Consultation		Consultation		Consultation				Development
Certification/Rating	**GRESB**	**BREEAM**	**BREEAM**	**LEED**	**LEED**	**DGNB**	**DGNB**	**Green Star**	**ILFI**	**LCBI**	**UKNZCBS**
Certification Document	2024 Standard	V6.1 UK New Construction	V7 Consultation	v4.1 BD+C Guide	v5 BD+C Consultation	v2023 New Construction Buildings Set Criteria	v2030 New Construction	v1 Submission Guidelines	Zero Carbon 1.1	v1.0 New Construction Scheme	Development stage
Minimum upfront embodied carbon performance requirements to be certified	N/A to portfolio rating	No minimum requirement (Credit Mat01)	Limits to be introduced based on LCA, unclear if mandatory across all certifications (BREEAM approach to embodied carbon)	No minimum requirement (MR Credit: Building Life-Cycle Impact Reduction)	Minimum requirement to conduct LCA, minimum performance for platinum level (MR Prerequisite: Assess Embodied Carbon)	Minimum requirement to conduct LCA, with points rewarded vs reference level; Minimum requirements on circularity (ENV 1.1, TEC 1.6)	Minimum requirement for 25% reduction (Minimum requirements)	Minimum requirement for 10% reduction (Climate Positive Minimum Expectation)	Threshold set to 350 kgCO_2e/m² for A1-A5 stages, referenced to SBTi and LETI (Embodied Carbon Threshold Clarifications)	Thresholds set to 1000 kgCO2e/m² for a full-scope LCA (Performance Evaluation: Operational Carbon)	Minimum requirement to meet upfront embodied carbon limits
Prioritise abatement over offsets to hit targets; offsets can help go beyond	No offsets	No offsets	Based on current methodologies, likely green	No offsets	No offsets	No offsets (DGNB Carbon Framework)	No offsets	Points awarded for offsets once minimum performance levels are met	Clear criteria on procuring offsets (Embodied Carbon Offset Clarifications)	No offsets	Optional offsetting only when performance levels are met
Actual data required (energy/operational)	Data collected and reported per asset, points rewarded for higher coverage (Performance: Energy)	Requirement for metering, data calculations modelled only (Ene 02 Energy monitoring)	Expected to have actual data requirements, but unclear based on document	Requirement for metering and yearly data collection after certifying (EA Prerequisite: Building-Level Energy Metering)	Requirement for metering and yearly data collection after certifying (EA Prerequisite: Energy Metering and Reporting)	No requirement for metered energy data at certification	Requirement for metered energy data at certification	Requirement for metering energy use (Verification and Handover)	Requirement for 12 months metered data once fully operational to certify (Documentation Requirements)	Monitored energy consumption is given the highest rating, but not required	Requirement for 12 months of metered energy data
Actual data required (upfront embodied)	Recognition for LCA but no data collected (Development: Materials)	No mandatory LCA (Credit Mat02)	Reference to harmonizing with other standards on measuring embodied carbon (BREEAM approach to embodied carbon)	No mandatory LCA (MR Credit: Building Life-Cycle Impact Reduction)	Requirement for as-built LCA (MR Prerequisite: Assess Embodied Carbon)	Requirement for as-built LCA (Sustainability reporting)	Requirement for as-built LCA (Minimum requirements)	Requirement for as-built LCA (Credit 21: Upfront Carbon)	Requirement for LCA reflects built condition of project (Documentation Requirements)	Requirement for a second stage of LCA after construction	Requirement for as-built LCA and additional requirements to ensure data robustness
					All the requirements above reference as-built or require an LCA beyond the design phase. Unclear which system meets the highest level of data robustness and accuracy, so they have all been rated green.						
Carbon performance targets/thresholds are publicly available and clear, with reference to how they have been informed by 1.5C pathways	Assessment methodology publicly available, targets are relative only (Performance: GHG)	Internal scoring methodology only, not performance-based (Credit Ene01)	Unclear based on consultation document	No targets, thresholds or clear mandatory set of levers for top performance	Clear methodology, no explicit targets that could be referenced to a pathway (EA Prerequisite: Minimum Energy Efficiency; MR Credit: Reduce Embodied Carbon)	Clear targets based on reaching 0 operational emissions on a chosen year before 2045 (ENV1.1 Climate Action and Energy)	Clear targets based on reaching 0 operational emissions	Clear methodology; EUI referenced to NABERs or AUS government figures	Clear methodology with guidance on where to reference EUI figures (Energy Baseline Clarifications)	Targets provided in technical manual Embodied (p21), Operational (p23) and Biogenic carbon (p25)	Targets and limits to be published
EUI, Operational Carbon and Upfront Embodied Carbon performance of certified assets is shared and transparent	Report shared privately gives performance data and comparison to CRREM pathways	Project directory provides scoring only (See project directory on BREEAM website)	Current project directory provides scoring only (See project directory on BREEAM website)	Scoring only (See project directory on USGBC website)	New impact report to provide performance data privately	Performance data available privately (DGNB project directory)	Performance data to be made available publicly	Performance data to be shared privately (See project directory on GBCA website)	Performance data available privately (See project directory on ILFI website)	May not be available publicly, no projects certified yet	Requirement to publish EUI and embodied carbon performance

In-use certifications and energy ratings (part 1)

In-use: 1		Consultation		Consultation	Consultation				Development			
Certification/Rating	**BREEAM**	**BREEAM**	**LEED**	**LEED**	**LEED ZERO**	**DGNB**	**Green Star**	**ILFI**	**UKNZCBS**	**NABERS**	**Energy Star**	**EPC**
Certification document	v6.0 International In-Use	V7 Consultation	v4.1 Buildings Operations and Maintenance	v5 Buildings Operations and Maintenance	v5 LEED ZERO	v2020 Buildings In use Criteria Set	v2 Performance Submission Guidelines	Zero Carbon 1.1	Development stage	Fact Sheet Office Buildings	N/A	N/A
Targets operational and at least upfront embodied carbon	Embodied carbon excluded from in-use for simplicity. Note that embodied emissions from retrofit and refurbs can be significant and should be assessed for decision making.											
Targets whole building	Split by owner type (Scope section, Assessing tenanted assets)	Likely whole building but not confirmed	See rating systems on USGBC website	Whole building only	Whole building only	Whole building only	Targets can be base building or whole building, with other requirements targeting tenant emissions	Whole building only (Project Boundary and Floor Area)	Whole building only, future versions to split between tenant and owner	Base building, tenant certification and whole building available (Fact Sheet office buildings)	Whole building only	Can do either
Top performance broadly consistent with, or better than 1.5C pathways (Operational)	Credits for minimising energy use and other energy efficiency measures with no clear targets/outcomes (Credit Ene01)	Reference to comparison with external limits and benchmarks, e.g. CRREM (BREEAM approach to operational carbon)	Points based system, with a minimum score, top certification expected to have good GHG performance, but not necessarily EA Prerequisite: Energy Performance	Additional requirements for top performance level, unclear if reduces operational emissions to 0 (Appendix III: Platinum Requirements)	Requirements to reduce operational carbon to 0 (Appendix II: Leed Zero Requirements)	Requirement for platinum level to reduce operational carbon to 0 by 2030 (Framework for Carbon Neutral Buildings and Sites)	Requirements for 6 star rating to reduce operational emissions to 0; requirements rachet up through time for all rating levels (Climate Positive Rating Expectation)	Requirements to maximise energy efficiency, minimise combustion and use 100% renewables (Energy Baseline Clarifications)	Requirement to align to 1.5-degree pathways based on UK emissions budget and bottom-up UK building performance data	Clear performance levels per rating and rating of 4.5 stars or more expected to be 1.5 degree aligned	Unclear if top energy star performance levels are 1.5 aligned as top scores are based on relative performance to peers	Does not incorporate EUI
Top performance broadly consistent with 1.5C pathways (Upfront Embodied)	Excluded for simplicity											
Minimum energy efficiency/EUI performance requirements to be certified	Internal scoring system based on ratios, no clear EUI (Operational Energy Calculator Guidance)	Proposal for EUI performance requirement to be added (BREEAM approach to operational carbon)	No requirement with explicit EUI performance levels EA Prerequisite: Energy Performance	Requirement for EUI performance through Energy Star or similar (Prerequisite: Energy, Carbon and Operations Foundations)	Requirement for EUI performance meeting Energy Star Score of 85 or similar (Appendix II: Leed Zero Requirements)	No requirement with explicit EUI performance levels (Appendix A)	No requirement on performance, baseline EUI set through NABERs or alternative pathway to get rating above 2 stars (Climate Positive Rating Expectation)	Requirement to reference EUI baseline figures from ASHRAE guidance, with % improvement outlined (Energy Baseline Clarifications)	Requirement to meet EUI performance levels	N/A to energy rating		
Minimum operational carbon performance requirements to be certified	No required minimum performance level (Credit Ene01/Ene19)	Expected, but not confirmed (BREEAM approach to operational carbon)	No requirement with an explicit minimum performance level, it is hidden within a scoring system EA Prerequisite: Energy Performance	Requirement for EUI performance through Energy Star or similar (Prerequisite: Energy, Carbon and Operations Foundations)	Requirement for EUI performance meeting Energy Star Score of 85 or similar (Appendix II: Leed Zero Requirements)	Requirement for decarbonisation planning at all levels	Requirements are measurement only initially for some levels, these rachet up to cover all certifications by ~2032 (Climate Positive Rating Expectation)	Requirement to improve EUI versus ASHRAE, or other benchmark by 50% (Energy Baseline Clarifications)	Requirement to meet EUI performance levels	N/A to energy rating		

In-use certifications and energy ratings (part 2)

In-use-2		Consultation		Consultation	Consultation				Development			
Certification/Rating	**BREEAM**	**BREEAM**	**LEED**	**LEED**	**LEED ZERO**	**DGNB**	**Green Star**	**ILFI**	**UKNZCBS**	**NABERS**	**Energy Star**	**EPC**
Certification document	v6.0 International In-Use	V7 Consultation	v4.1 Buildings Operations and Maintenance	v5 Buildings Operations and Maintenance	v5 LEED ZERO	v2020 Buildings In use Criteria Set	v2 Performance Submission Guidelines	Zero Carbon 1.1	Development stage	Fact Sheet Office Buildings	N/A	N/A
Minimum upfront embodied carbon performance requirements to be certified	Excluded for simplicity.											
Prioritise abatement over offsets to hit targets; offsets can help go beyond	No offsets	Based on current methodologies likely green	No offsets	No offsets	No offsets	No offsets (DGNB Carbon Framework)	Points awarded for offsets with minimum performance levels met	Clear criteria on procuring offsets (Embodied Carbon Offset Clarifications)	Optional offsetting only when performance levels are met	N/A to energy rating		
Actual data required (energy/operational)	No clear requirement, points rewarded for higher coverage of metered energy (Ene15 Monitoring energy and Uses)	Expected to have actual data requirements, but unclear based on document	Requirement for 12 months of data (EA Prerequisite: Energy Performance)	Requirement for 12 months of data (Prerequisite: Energy, Carbon and Operations Foundations)	Requirement through v5 O&M	Requirement for energy data forms part of CO2 emissions calculation (Appendix A)	Requirement for 12 months metered data (Energy Use)	Requirement for 12 months metered data once fully operational to certify (Documentation Requirements)	Requirement for 12 months of metered energy data to be verified	Requirement for 12 months of operational energy data (Fact sheet, office buildings)	Requirement for metered energy data as an input to calculation	Design-based assessment, no actual data
Actual data required (upfront embodied)	Excluded for simplicity.											
Carbon performance targets/thresholds are publicly available and clear, with reference to how they have been informed by 1.5C pathways	Internal benchmarks for awarding credits only	Unclear based on consultation document	No targets, thresholds or clear mandatory set of levers for top performance	Clear instruction on benchmarks to follow for EUI and operational emissions (Appendix 1: Site EUI Targets)	Clear instruction on benchmarks to follow for EUI and operational emissions (Appendix II: Leed Zero Requirements; Appendix I: Site EUI Targets)	Clear targets based on reaching 0 operational emissions on a chosen year before 2045	Clear methodology; EUI referenced to NABERs or AUS government figures	Clear methodology with guidance on where to reference EUI figures (Energy Baseline Clarifications)	Targets and limits to be published	Clear EUI targets per star rating, with conversions to GHG emissions provided (DfP Base Building Rating Report)	Performance thresholds per rating not found publicly	No targets
EUI, Operational Carbon and Upfront Embodied Carbon performance of certified assets is shared and transparent	Project directory provides scoring only (See project directory on BREEAM website)	Current project directory provides scoring only (See project directory on BREEAM website)	Performance data available privately through Arc platform	New impact report to provide performance data privately	New impact report to provide performance data privately	Performance data available privately (DGNB project directory)	Performance data shared privately (See project directory on GBCA website)	Performance data available privately (See project directory on ILFI website)	Requirement to publish EUI (and embodied carbon) performance	Performance data by asset can be downloaded (NABERS website)	Performance data available privately, directory includes scores (See Energy Star project directory)	Currently no performance metrics

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