Embodied Carbon Summit 2025

Report and evidence

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The Institution of Structural Engineers
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We are the Royal Institution of Chartered Surveyors (RICS), a leading professional body working in the public interest to advance knowledge, uphold standards, and inspire current and future professionals. Our members help to create and protect built and natural environments that are sustainable, resilient and inclusive for all.

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The Trust brings together award-winning expertise across strategy, engineering, architecture, and design, operating as a B Corp, Social Enterprise, and Employee Benefit Trust. Our purpose is to blaze a trail in the integrated, intelligent, and ethical provision of the human environment, demonstrating a new model of consultancy where strategic insight, design innovation, and technical excellence operate as one force for regenerative change.

The Embodied Carbon Summit

5 November 2025

Embodied carbon represents one of the most significant sources of emissions from the UK built environment. It encompasses the emissions associated with materials and construction processes, including manufacturing, transportation, maintenance, and demolition. While emissions from energy use in buildings are falling, embodied carbon has stayed at a similar level for decades. At the same time, government ambitions to accelerate housebuilding and infrastructure delivery mean embodied carbon is set to account for an increasing share of built environment emissions.

Against this backdrop, the Embodied Carbon Summit was convened to bring together built environment leaders, policymakers, civil servants, academics and other supporting organisations (a full list of participants is provided at the end of this report). The summit was designed as a collaborative response to the government-commissioned AECOM report, *The practical, technical and economic impacts of measuring and reducing embodied carbon in new buildings,* with the authors participating in the summit to enable direct engagement with the findings.

The purpose of the summit was to discuss the challenges raised in the AECOM report, as well as the solutions already being developed by industry. Participants examined how existing barriers could be addressed through coordinated action, improved data and tools, skills development, and government policy intervention. The summit facilitated a constructive dialogue on how embodied carbon can move from being addressed primarily by the most pioneering of organisations, to one that is tackled consistently across the sector through regulation and widespread action.

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Executive Summary

This report summarises the outcomes of the Embodied Carbon Summit on 5th November 2025. This report builds on the findings outlined in AECOM's report, The practical, technical and economic impacts of measuring and reducing embodied carbon in new buildings, and presents the latest evidence. Summit participants explored challenges and solutions across the three core AECOM themes (practical, technical and economic) and provided up to date evidence to support these discussions. This report brings together this information, presents the views of the community, and acts as a reference resource for industry, government, academia and other supporting organisations. It does not present recommendations.

Summit participants agreed that measurement and reporting of embodied carbon of the built environment, and its subsequent reduction, is technically achievable but requires systemic change across policy, legislation, practice, and culture. Participants agreed that one of the strongest catalysts for change is government leadership, through e.g. a long-term government-supported database. Collaboration between government and built environment industry, combined with harmonised standards and targeted financial support, were highlighted as being critical to delivering a low-carbon built environment at scale.

Practical Considerations

Industry is already responding to skills, capability, and engagement barriers associated with embedding whole-life carbon literacy across the built environment. Summit participants shared numerous examples of solutions, including targeted training and upskilling initiatives designed to reflect differing organisational capacities, such as the Climate Framework; updated accreditation requirements, e.g. for the Char-

tered Institute of Building (CIOB); and a comprehensive list of training programmes, e.g. from the Royal Institution of Chartered Surveyors (RICS), the Chartered Institution of Building Services Engineers (CIBSE) and Institution of Structural Engineers (IStructE). These initiatives are helping to make whole-life carbon assessment more accessible, practical, and relevant, particularly for smaller organisations.

Participants also identified the value of combining industry-wide requirements with supplier engagement incentives to drive more consistent uptake of embodied carbon measurement and reporting across project teams and supply chains. Upskilling mid-career professionals and improving public understanding of embodied carbon were further highlighted as essential steps for scaling adoption effectively across the sector.

Within the insurance and risk landscape, it was noted that insurance and insurers are not in any way blockers to measuring and reducing embodied carbon. In fact, it was recognised that reducing emissions and increasing climate resilience are aligned with the interests of insurers. Summit participants identified growing momentum behind collaborative approaches to address insurer confidence, professional liability concerns, and the high costs associated with certification. Initiatives such as the Mass Timber Insurance Playbook and the Commercial Timber Guidebook were cited as examples of how shared evidence, collective learning, and clearer guidance can build trust between insurers, designers, and contractors. Participants also identified a continuing and important role for government leadership, including the creation of government-funded material testing, certification and safety databases, support for new types of contracts and models such as integrated project insurance to enable risk-sharing, and the provision of subsidies for bio-based material certification. Expanding government funding programmes of the above was consistently highlighted as critical to reducing financial barriers and accelerating wider market adoption.

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Technical Considerations

Industry is actively developing solutions to address inconsistent methodologies, fragmented data, and unrealistic expectations around fixed figures in whole-life carbon assessment. Participants highlighted solutions that focus on improving methodological alignment, increasing transparency, and acknowledging uncertainty – particularly at early design stages where precision is limited but decisions have significant long-term impact.

The importance of sector- and typology-specific tools were also emphasised, including housing-focused approaches such as those being developed by the Future Homes Hub, alongside alignment with the RICS Professional Standard on Whole Life Carbon Assessment for the Built Environment, 2nd edition. A phased regulatory approach, supported by clear guidance and timelines, was identified as a critical enabler for industry capability-building. International examples, including Sweden's regulatory framework, were cited as demonstrating the benefits of government-led baselines and staged implementation in improving consistency, confidence, and comparability across the sector.

Summit participants stressed the need for strong government leadership alongside industry innovation to address ongoing challenges related to data quality, fragmented tools, and limited infrastructure. This includes mandating whole-life carbon assessment for public-sector projects, supporting the development of a national carbon database, and enabling interoperability standards to improve accessibility and comparability. Participants also identified the growing potential of digital innovation, particularly affordable, user-friendly tools that integrate carbon and cost data, streamline Environmental Product Declaration (EPD) processes, and automate data collection, to reduce the time, cost, and uncertainty associated with assessments.

Economic Considerations

Industry has already developed a range of financial and policy-aligned solutions capable of addressing the economic barriers that currently discourage investment in low-carbon construction. Participants shared evidence of initiatives that focus on reducing perceived risk, aligning incentives, and better recognising the long-term value of embodied carbon reduction, while acknowledging that government intervention remains essential to unlock investment at scale.

Participants highlighted mechanisms including tiered approaches to carbon assessment, funded Life Cycle Assessment (LCA) support for Small and Medium-sized Enterprises (SMEs), and earlier engagement of the supply chain within the design process to identify cost-effective opportunities. The importance of government-designed financial structures and policy mechanisms was repeatedly emphasised as a means of shifting industry away from short-term cost optimisation. Reinforcing the co-benefits of embodied carbon reduction, such as cost savings, improved health outcomes, resilience, and regional economic gains, was also identified as an effective way to strengthen the business case for sustainable construction and support wider market transformation.

The Phoenix, Lewes | ©Ash Sakula

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Practical Considerations

Training and Upskilling

Participants agreed that training and upskilling are essential to mainstream whole-life carbon (WLC) literacy across the built environment sector. While technical expertise among specialists has advanced significantly, widespread knowledge gaps, resource constraints, and inconsistent engagement were highlighted as hindering progress. Reported challenges range from accessibility and cost barriers to the complexity of methodologies and the need for cultural change across the industry. These obstacles are described below and the practical solutions, including current initiatives, collaborative approaches, and strategies to embed WLC literacy proposed by participants are summarised. By addressing these issues, it was acknowledged that the built environment sector, with sufficient government support, can build the capacity required to deliver low-carbon outcomes at scale and pace.

Understanding, Accessibility and Cost

Despite significant progress among specialists, summit participants noted the substantial remaining lack of understanding of WLC across the wider industry. Smaller firms often face resource constraints, limiting their ability to invest in training compared to larger organisations. Training programs and WLC assessments were reported as prohibitively expensive for SME representatives at the summit, creating a significant barrier to participation and engagement. Summit participants would welcome training programs designed to accommodate the breadth of ages across the workforce and support mid-career professionals returning after career breaks.

Regional disparities were also reported to exist, with London demonstrating higher uptake of WLC assessments compared to other parts of the UK. This is because the Greater London Authority, through the London Plan (Sustainable Infrastructure Policy 2), mandates WLC assessments for major developments.

Current training initiatives

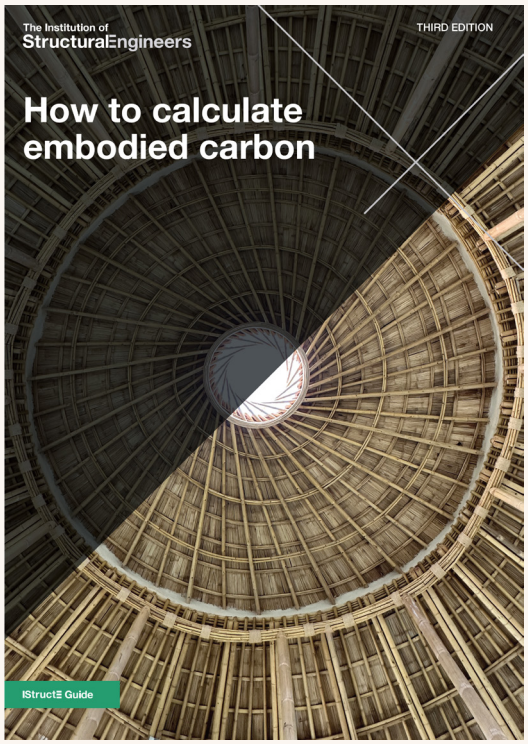
Several initiatives are already underway to improve training and upskilling across the built 136 environment sector. The training or accreditation schemes that cover embodied carbon, 137 EPDs and WLCAs are listed below. In addition, training providers have published online 138 learning resources, often free of charge.

Provider	Training Scheme	Duration	Format	Cost	Audience
Architects Climate Action Network	Various	Self-paced	Online	Free	Architects and built environment professionals
CIBSE	WLC Assessment Practitioner Training	~30 CPD hours	Online	£1,800 + VAT	Developers, contractors, sustainability professionals
CIBSE	WLC Assessment Foundation Training	~6 CPD hours	Online	Free	Students, entry-level professionals
CIOB Academy	Embodied Carbon in the Built Environment	Self-paced guide	Online (digital publication)	£53 (members discount available)	Built environment professionals, project managers, sustainability specialists
Construction Industry Council	Climate Framework	Self-paced guide	Online	Free	Built environment professionals and tutors who are teaching the next generation professionals

Provider	Training Scheme	Duration	Format	Cost	Audience
Constructivist	Custom WLC Assessment and Embodied Carbon Training	Tailored (on request)	Online / In-person	Free-£5,500	Built environment professionals in engineering, design, creativity and climate action, with a focus around regenerative design
Feilden Clegg Bradley Studios	FCBS CARBON training	On-demand	Online / In-person	By arrangement	Architects and built environment professionals
IStructE	Embodied Carbon Basics for Structural Engineers	On-demand	Online	Free for members / £215 + VAT standard	Structural engineers, architects, civil engineers
IStructE	Structural Carbon Tool Training	Self-paced	Online	Free	Structural engineers, design teams
IStructE	Net Zero Structural Design course	10 CPD hours	Online	£765 + VAT (member dicounts)	Mid-career engineer, senior engineers/Team leader/Manager
IStructE	Sustainability Resource Map	Self-paced	Online	Free	Structural engineers and wider built environment professionals
Morgan Sindall Construc-tion and Nottingham Trent University	CarboniCa Tool Training	Project-based	Online / In-person	By arrangement	Contractors, designers, clients seeking WLC assessment integration
One Click LCA Academy	WLC Assessment for RICS v2	5–7 lessons	Online, on-demand	Free	LCA assessors, sustainability consultants, architects
One Click LCA Academy	LCA and EPD Bootcamps	1 week (live)	Online	Free	Construction professionals, product manufacturers
RIBA	RIBA Net Zero Carbon Course	4 modules	Online	£60-225 + VAT	Architects and built environment professionals
RIBA	Designing for a Climate Emergency	4 modules	Online	£15-98 + VAT	Architects and built environment professionals
RIBA	Materials and calculating carbon	1 module	Online	£15-95 + VAT	Architects and built environment professionals
RICS	Certificate in WLC Assessment	~140 CPD hours	Online	From £1,915 + VAT	Quantity surveyors, cost consultants, designers
RICS	Global Whole Life Carbon	1 CPD hour	Online	From £26 + VAT	Quantity surveyors, cost consult-ants, building surveyors, designers, engineers and environmental, social and governance consultants
RICS	Global Introduction to Whole Life Carbon Assessment	4.5 CPD hours	Online	From £188 + VAT	Quantity surveyors, cost consult-ants, building surveyors, designers, engineers and environmental, social and governance consultants
RICS	Sustainability Advisory (MRICS) pilot pathway	n/a	Membership route	n/a	new membership route for professionals offering strategic sustainability advice in the built and natural environment.
Supply Chain Sustainability School	Embodied Carbon Learning Pathway	Modular (multiple short courses)	Online (interactive e-learning)	Free	Contractors, suppliers, designers, sustainability professionals
UKGBC	Embodied Carbon and WLC Assessment Masterclass	1 day	Online / In-person	£450–£550 (member discounts)	Sustainability professionals, architects, engineers, developers
UKGBC	Carbon Reduction Essentials in the Built Environment	16 CPD hours	Online	Free for members, or £300	Professionals in built environment and construction sectors

Technological Complexity, Granularity and Uncertainty

Current training resources are reportedly perceived by the community as overly technical and time-consuming, resulting in high dropout rates. An overemphasis on perfect methodologies risks alienating practitioners, whereas providing a broader understanding of key principles - such as “build nothing, build less, build clever, build efficiently” – was agreed as being more effective.



IStructE

It was suggested that excessive focus on micro-level analysis offers minimal return, making it more practical to prioritise high-impact elements. Guidance such as CIBSE TM65 and IStructE’s How to calculate embodied carbon were cited as examples of where guidance has balanced the need for accurate embodied carbon calculations with practical constraints of data availability to manage issues of uncertainty.

According to some summit participants, engagement with WLC training remains inconsistent across the built environment sector, underscoring the need for cultural change and the introduction of incentives to encourage participation. Summit participants would like to see all professionals speaking a common language on WLC rather than creating an increased number of specialists.

Learning from Other Industry Practices

Participants highlighted the need to introduce WLC literacy requirements similar to those mandated under the Construction (Design and Management) Regulations 2015, ensuring that all project participants have a baseline understanding of carbon principles. Responsibility for carbon considerations would then shift from specialists alone to a collaborative approach. Supplier engagement was also identified as a critical factor, with initiatives such as Wates’ preferential access for subcontractors who demonstrate progress in upskilling serving as effective incentive models.

Additional Training and Upskilling Initiatives

It was widely agreed that training grants for SMEs would help overcome resource constraints; and embedding whole-life carbon training into existing chartership and membership programs could reduce duplication and improve efficiency. Summit participants proposed that efforts should also focus on upskilling the public to influence residential market decisions. Training strategies that address mid-career upskilling needs alongside entry-level education were also considered important, to ensure that professionals remain current with evolving standards and practices.

Insurance and Fire

The role of insurance and risk management in influencing the adoption of low-carbon solutions was explored by participants. It was noted that reporting embodied carbon is not directly hindered by insurance requirements. Separately, however, insurance was noted as one of the myriad challenges facing the implementation of innovative materials and circular practices. Concerns around insurer confidence, professional liability, and the scalability of new products were highlighted as the key barriers that slow progress. These issues highlight the impact of stranded asset risks, warranty limitations, and certification costs, but there exist practical solutions to build trust, reduce risk, and enable market transformation. By fostering collaboration between insurers, professionals, and policymakers, and by introducing targeted financial and regulatory measures, participants believed the industry can overcome the insurance-related barriers to material reuse and the use of new materials, technologies and techniques.

Challenges with product warranty, construction, buildings, professional indemnity and latent defects insurance are not an obstacle to reporting embodied carbon but are associated with the implementation of lower embodied carbon solutions.

Insurer Confidence and Stranded Assets

Insurance companies writing long-term life and pensions business have significant asset portfolios that are increasingly threatened by climate risks. Concerns around stranded assets were reported to be driving interest in real estate assets that are more readily demountable (a key circular economy design principle) and retrofitted to build in greater climate resilience (e.g. through upgraded envelopes and building systems) and avoid obsolescence. Whole Life Cost and Carbon Analyses can reveal design features offering such resilience to obsolescence risks and are likely to be increasingly called for by real estate investors such as these insurance companies. Furthermore, real estate investors are beginning to recognise the role of material passports in enhancing residual value, and valuations more generally. Material passports increase the likelihood of onward reuse of materials and components (another key circular economy principle) and can help provide greater assurance as to provenance under warranties to be provided for such reuse, a concept explored by the Ellen MacArthur Foundation. Such demonstration of provenance could improve the terms of any insurance sought to back such warranties.

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Initiatives that gather solutions-based evidence on the insurance sectors' perceived challenges of sustainable construction practises are one way to improve insurer confidence. The Mass Timber Insurance Playbook addresses insurer concerns by convening fire experts to agree on 10 conservative principles. This consensus has reassured insurers and improved risk pricing. The Commercial Timber Guidebook aims to promote the use of structural timber in office construction and offers detailed technical information to these mitigate risks; it is a 'technical companion' to the Mass Timber Insurance Playbook. It addresses common concerns that face timber construction, including durability, moisture, fire safety, and as a result, the challenge of obtaining sustainable property insurance. The Guidebook details a UK fire engineers' consensus around ten principles of fire engineering for commercial mass timber buildings. It is anticipated this further improves industry

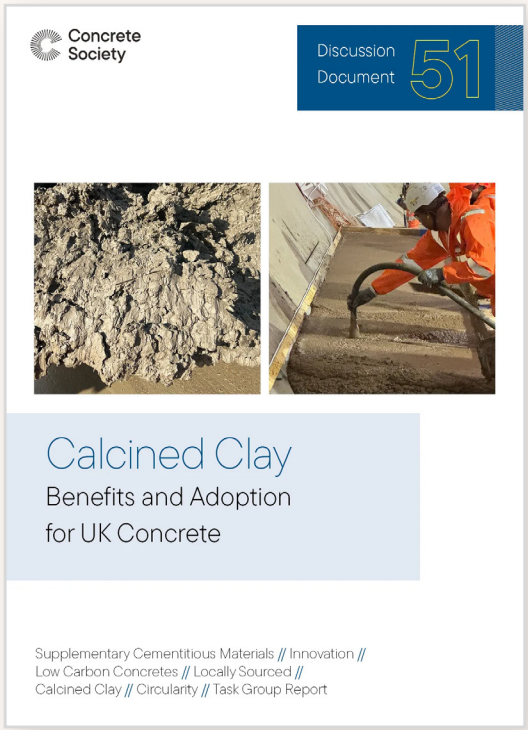
confidence in insuring mass timber structures and demonstrates that the construction industry is converging around such good-practice principles, thus reducing the risk of fire (and moisture) in completed mass timber buildings. The initiative includes input from specialist insurance consultants Lignum Risk Partners to engage the wider insurance sector.

With regards to addressing insurance challenges associated with moisture; The practical guide to moisture for timber construction, developed by the Danish Technological Institute and funded by Built by Nature, offers a "comprehensive, experience-based framework for managing moisture in timber buildings across all phases of construction and occupancy". A similar, UK-specific, moisture repair guide is also being prepared.

Professional Confidence

The findings of the Grenfell Tower inquiry (and subsequent commentary, e.g. The Conversation) criticised industry testing and certification bodies which had held trusted positions within the construction industry with regards to fire safety. Now specifiers and engineers have to bear greater responsibility for material safety and architects can face increased liability. Summit attendees found lower-tier clients to increasingly target design teams in disputes, reducing willingness to adopt innovative, and therefore riskier, materials and products. In Germany, a government-funded database of fire certifications for all construction products, enables impartial comparisons.

To strengthen professional confidence and reduce risk, participants proposed organisations should promote knowledge sharing, including lessons learned from both successes and failures. It was believed that government-funded databases for material safety, similar to Germany's database of fire certifications, should provide impartial and accessible information. Summit participants also suggested insurer-funded initiatives could further mitigate climate-related losses. Contractual measures such as Net Contribution Clauses can help lower Professional Indemnity insurance costs, and scaling Integrated Project Insurance – a collaborative, "no-blame" approach where all parties share risks under one policy – offers one form of solution, as demonstrated by the Dudley Advance II building.



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Scaling Up New Solutions

The UK market favours large manufacturers and established products due to warranty and certification challenges. For example, non-petrochemical insulants (mineral wool, wood fibre, cellulose) hold significantly less market share in the UK when compared to overseas. The cost of essential insurance certification (offering quality assurance, performance verification, and compliance with standards like UK Building Regulations) for new products can be unaffordable for SMEs and need updating regularly.

To accelerate the adoption of low-carbon solutions, summit participants expressed the need to subsidise certification for new materials such as bio-based products and involve universities in testing to reduce costs and improve credibility. It was suggested that government funding programs, such as the £1 billion Net Zero Innovation Portfolio, could be expanded and better publicised to ensure wider participation. On the demand side, measures like mandatory lifecycle analysis, compensation schemes such as the Netherlands' "White Spots" program, and Advanced Market Commitments (AMCs) for low-carbon products were highlighted

as good opportunities to provide strong market signals. Examples include initiatives for low-carbon concrete led by Carbon Limiting Technologies and Expedition Engineering, as well as commitments from local authorities to guarantee a minimum throughput of low-carbon concrete (e.g. Construction Leadership Council's Five Client Carbon Commitments), giving manufacturers the confidence to scale production.

Further Evidence Supporting Practical Considerations

Evidence of contractual or procurement models that reward low-carbon supply chains

The UK Green Building Council (UKGBC) Decarbonising the Supply Chain Task Group of industry experts works to mobilise cross-sector collaboration and overcome barriers to decarbonising supply chains (convened November 2024). They are currently reviewing procurement strategies for low-carbon sourcing and engaging with suppliers and SMEs to drive collaboration and innovation. They will create practical guidance, tools, and collaborative forums to accelerate decarbonisation across the built environment value chain.

Some specific examples of contractual or procurement models that aim to reward low-carbon supply chains are:

- Landsec's Sustainable Development Toolkit (2022) defines embodied carbon targets for every development, which are included in the design team scope of services. Their Sustainability Preliminaries for Contractors includes requirements to meet the carbon intensity threshold for concrete and steel. A financial mechanism included in contracts also incentivises achievements of the overall upfront embodied carbon target for the development. The Landsec Materials Brief (2024) provides guidance for material selection and procurement across projects, embedding circular economy principles and sustainability goals.

- A Hawkins\Brown project (for the Haringey Council Civic Centre) involved a pre-commencement planning condition (in addition to the London Plan requirements) related to WLC assessment, evidence and emissions reduction to ensure WLC assessment is embedded at delivery stage as materials are procured.

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- Increasingly, organisations are requesting that materials are procured from an organisation signed up to a responsible material initiative (e.g. the SteelZero Initiative or the Concrete Initiative) or with a Science Based Targets initiative commitment.

- Morgan Sindall's Circular Twin and Regenerative Twin projects researched challenging procurement models and behaviours to achieve better outcomes. They identified recommendations around how to design procurement strategies around embodied carbon targets without significantly increasing capital expenditure. The Regenerative Twin particularly points to economic opportunities, for example putting more value into Welsh forests and supply chains.

Evidence demonstrating whether European regulation is accelerating market change and providing certainty on the continent

Some leading European countries are already regulating embodied carbon emissions of the built environment. In these markets, they first established a measurement methodology to establish baselines for building design. Recent and upcoming EU regulations, as discussed in this section, are expected to increase the adoption of whole life carbon assessment across the sector. A 2024 Buildings Performance Institute Europe report summarised the experiences of Czechia, Ireland and Spain in taking initial steps towards regulation in this area.

The EU Energy Performance of Buildings Directive (EPBD) adopted in April 2024 and in force since May 2024, aims to accelerate the decarbonisation of the EU building stock and achieve zero-emission buildings by 2050, supporting the European Green Deal and the "Fit for 55" climate targets. The provision of Energy Performance Certificates and Renovation Passports is expected to improve planning, ensure consistency with related initiatives and minimise potential fragmentation of the market. A 'national building renovation plan' from each Member State will include an overview of market barriers and failures and review the capacities in the construction, energy efficiency and renewable energy sectors. To align with this, six European associations representing the concrete industry and its value chain united under a single umbrella organisation in 2023: Concrete Europe. Concrete Europe supports EU decarbonisation goals and sees EPBD as a key contributor.

The EU Emissions Trading System (EU ETS) - Europe's flagship carbon pricing mechanism - has driven 14-16% reductions in CO_2 emissions among regulated manufacturing firms without harming economic activity (Colmer et al. 2024). It covers energy-intensive industries, including cement, steel, and glass. Firms responded by making targeted investments in energy-saving technologies, suggesting that clear price signals create certainty for long-term planning. The EU ETS is pushing the construction sector toward low-carbon materials and processes, while the second version (from 2027) will drive energy-efficient building design and renovation. Together, they provide long-term regulatory certainty, but firms must adapt to higher carbon costs and market volatility.

The Carbon Border Adjustment Mechanism (CBAM), set to apply from 2026 (EU) and 2027 (UK), imposes a carbon tariff on imported goods from countries with less stringent climate policies. It is already influencing global supply chains and includes carbon-intensive materials that are essential for building projects, such as cement, steel, and aluminium. Some participants warned of the need to ensure that such mechanisms guard against the hoarding of highly-constrained fully-utilised materials such as ferrous scrap for steel-making and ground granulated blast furnace slag (GGBS) in cement-making. Early evidence shows that CBAM is encouraging third countries to adopt domestic carbon pricing to maintain competitiveness, reinforcing the UK's and

EU's role in shaping international market behaviour. It is also anticipated developers and contractors will need to adjust procurement strategies, potentially shifting toward local suppliers or low-carbon alternatives to avoid CBAM-related costs. This has set a new benchmark for shaping policies in the construction sector; the European Commission is now considering how to regulate GHG emissions related to the entire life cycle of materials used in the construction sector.

Evidence of the risks and costs if the UK falls behind European regulation

EU Sustainable Finance Taxonomy (2020) is a classification system that defines which economic activities can be considered environmentally sustainable within the EU. It is the methodology behind multiple sustainable finance regulations such as the Sustainable Finance Disclosure Regulation (2021) and the European Green Bond Standard (2021). The EU Taxonomy market transparency tool provides a summary of uptake in various markets.

The Buildings Performance Institute Europe (BPIE) have looked at the implications of the EPBD on Europe. This remains the most important legislative driver for change in the buildings sector. The latest EPBD offers recommendations for closing the building decarbonisation gap and realign the EU with its 2030 and 2050 targets.

If the UK is not engaged in low-carbon construction and therefore not delivering low-carbon buildings at the same rate as Europe (and using a definition that global investors are familiar with), summit participants believe it is likely that UK real estate will be less able to attract long-term investment. Participants expect this would reduce the amount and variety of investment available to the real estate sector in the UK. A similar effect is anticipated in the letting market; global organisations that have net zero commitments and are seeking a presence in Europe are expected to prioritise the selection of low-carbon buildings more readily available and more well-recognised in Europe.

Technical Considerations

Consistency and Standardisation in Data and Tools

In the absence of definition from government, numerous credible industry benchmarks, methods and standards have been developed, with methodologies and data evolving and expanding every year. As these are often based on different scopes, methodologies and vary by sector there is inconsistency, resulting in misrepresentation. Data availability, quality, and consistency remain obstacles, compounded by fragmented tools, unclear standards, and limited infrastructure. These issues create barriers for practitioners and hinder progress toward embodied carbon reduction.

Consistency in LCA calculations depends largely on the use of standardised embodied carbon factors. Studies highlight that variations in databases lead to significant differences in reported carbon values, stressing the need for reliable sources for consistent carbon data. Variations in tools/models also lead to inconsistencies; significant differences of almost 15% in embodied impacts between simplified models and structured models have been reported. Differences were mainly driven by exclusion of elements felt to be non-key to the assessment at early design. Different tools/model interpretations and boundaries can also create significant inconsistencies in reported carbon values, making it difficult to track progress, compare building performances, or share best building design practice across different jurisdictions (Ramboll 2023). The World Business Council for Sustainable Development (WBCSD)/Autodesk projects are working to improve consistency in the BIM to LCA process through three phases (Phase 1, Phase 2, Phase 3 in 2026)

Industry initiatives for consistency in methodology

RICS PS 2023 2nd Edition, is the leading whole-life carbon assessment methodology for the built environment. This provides a common set of rules for carrying out the WLC assessment to ensure confidence in, and comparability between, assessments, reducing the degree of subjectivity. While participants agree that minor aspects need to be better defined, they are relatively insignificant in terms of their impact on the WLC assessment results. However, many assessments are not done through direct use of the RICS methodology, and should therefore be assessed by appropriately qualified experts for full alignment.

The RICS Software Validation Programme verifies WLC assessment tools perform calculations and report results in compliance with RICS PS 2023 2nd Edition. Validated software receives a badge and a detailed list of how RICS PS 2023 2nd Edition is implemented and any exclusions. Validation should be made plain to the purchaser or user. This is something that participants report have been requested by WLC assessors and the wider industry; positive feedback on this programme has been received.

RICS advise that RICS PS 2023 2nd Edition should not be used in conjunction with the 1st Edition (2017). Using both editions in conjunction can distort the process. For example, the AECOM WLC Assessment for Liverpool Street Station development makes selective use of both the 1st and 2nd Editions which provides results that are inconsistent with WLC assessment done using only the 2nd Edition and are therefore not comparable. Such a method can give overly optimistic assessment outcomes leading to industry confusion.

Consistency, Scope and Standardisation

Consistency in scope is considered vital by participants; and whole-life carbon, including operational emissions, should be included in assessments. Participants felt there is a need for base-level consistency while supporting those who want to go further, (such as those in the industry already conducting carbon calculations). RICS PS 2023 2nd Edition requirements help improve consistency and various databases support this by providing a generic product dataset (more info below). Inconsistencies also exist at local authority level in assessing WLC assessment submissions and benchmarking. The different scopes for an upfront carbon assessment [A1-A5] covered by the various targets/limits/benchmarks are shown below.

- Difficulty in **comparing** past data and projects **to new limits...**
- **UK NZCBS** requires full reporting **in line with RICS v2**
- **LETI** targets and **GLA** process are currently to **RICS v1**
- Limits **exclude PV, external works and loose FFE**
  - ***Except offices which must include all FFE***

Building Element	RICS NRM	UK NZCBS	LETI/RIBA	GLA
Demolition	0	✓ (recorded)	✗	✓ (recorded)
Facilitating Works	0	✓	✓	✓
Substructure	1	✓	✓	✓
Superstructure	2.1 – 2.4	✓	✓	✓
Façade	2.5 – 2.6	✓	✓	✓
Fit out 2.7 – Int. Walls & Partitions 3 – Internal Finishes 4 – FF&E	2.7 – 4	✓ (Full fit-out includes FFE for offices)	✓ (Cat A & fixed FFE only)	✓ (Cat A)
Building Services/ MEP	5	✓ PV excluded. Full fit-out	✓ PV excluded. Cat A	✓ (Cat A)
Prefabricated Buildings	6	✓	✓	✓
Works to Existing Building	7	✓	✓	✓
External Works	8	✓ (recorded)	✓ (recorded)	✓

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Comparison table to demonstrate the different scopes for an upfront carbon assessment [A1-A5] covered by the various targets/limits/benchmarks (provided by Buro Happold).

Despite the availability of British standards relating to embodied carbon (e.g. BS 15978, BS 15804), there are inconsistencies when considering typical industry ratings and embodied carbon guidance (voluntary) initiatives such as: BREEAM Mat01; SBTI Buildings Criteria; UKGBC NZC Framework Definition; PAS2080; IStructE, CWCT, UKGBC and CIBSE TM65 and emerging local planning policies. A recent study by the University of Sheffield reviewed over 4,000 planning documents and found inconsistent approaches to embodied carbon.

Examples of collaboration for consistency:

- The UK Net Zero Carbon Buildings Standard has been collectively developed by the industry and provides a common understanding of WLC assessment methodology and scope for embodied carbon and is based on RICS PS 2023 2nd Edition. It offers a structured approach to meet science based embodied carbon limits, alongside other key indicators to achieve Net Zero-aligned assets. The NZCBS 2022 call for evidence saw over 800+ embodied carbon assessments being shared, with data submitted via the Built Environment Carbon Database (BECD)

- The Embodied Carbon Target Alignment (between LETI, RIBA, IStructE and the Whole Life Carbon Network), provides an example of collaborative work towards consistency in methodology, approach and alignment of respective targets. It proposes a letter rating system (akin to display energy certificate) for comparison of embodied carbon ambition across different buildings.

- Carbon Border Adjustment Mechanism (CBAM) creates a strong incentive for collaboration with upstream suppliers to cut emissions and maintain cost competitiveness. For example Wates Group are resetting relationships with suppliers from transactional to partnership-based models, with two key supplier requirements: setting science-based targets (SBTs) for decarbonisation; providing EPDs for transparency on product emissions.

- Part Z is a collaborative industry campaign for embodied carbon reporting and regulation that proposes an amendment to the UK Building Regulations that would mandate WLC assessments and eventually set limits on embodied carbon for major construction projects.

Data Availability, Standardisation, Quality and Accessibility

Participants feel there is a need to move away from an overemphasis on achieving a single precise value early in the process to make assessments more accessible and encourage broader adoption. Identifying the right stage in the process to introduce mandatory requirements is believed key. Limiting assessments to only superstructure, substructure, and façade elements may overlook other components with significant carbon impacts, suggesting the need for further research to justify standardisation and simplicity.

Participants suggested improvements to the quality of data should be approached pragmatically and incrementally. Early investment in infrastructure and clear processes are expected to yield efficient initial gains, even if initial datasets are imperfect.

Participants agreed that accessing reliable data remains a major challenge. Existing datasets are often incomplete, inconsistent, or difficult to verify. A lack of standardisation in assumptions and factors leads to wide variation in results, while product-level and building-level datasets operate at different granularities, making comparisons difficult. Gathering detailed project-level data is resource-intensive and can be considered unnecessary due to the absence of benchmarks and comparability. Participants believed that clearer purpose, consistent expectations, and stronger feedback loops are needed to justify the work required.

Existing free tools and databases need frequent updates and sustained funding, something that participants noted has been difficult to obtain to date. Concerns were therefore raised that free tools and databases may not reflect the latest industry knowledge. Paid models however, like OneClick LCA dominate the market and can raise cost concerns for smaller firms. A central, funded, and universally trusted database is believed to be critical to improving data confidence and consistency across the sector.

To scale embodied carbon assessment, tools and guidance must be intuitive and suitable for non-specialists. Participants believed data must be easy to share and transfer between systems. National data-sharing standards and APIs linking carbon and cost reporting were proposed by participants, to mirror established cost management practices and improve efficiency. It was also highlighted that organisations often lack clarity on what project data can legally be shared. Standardised permission processes,

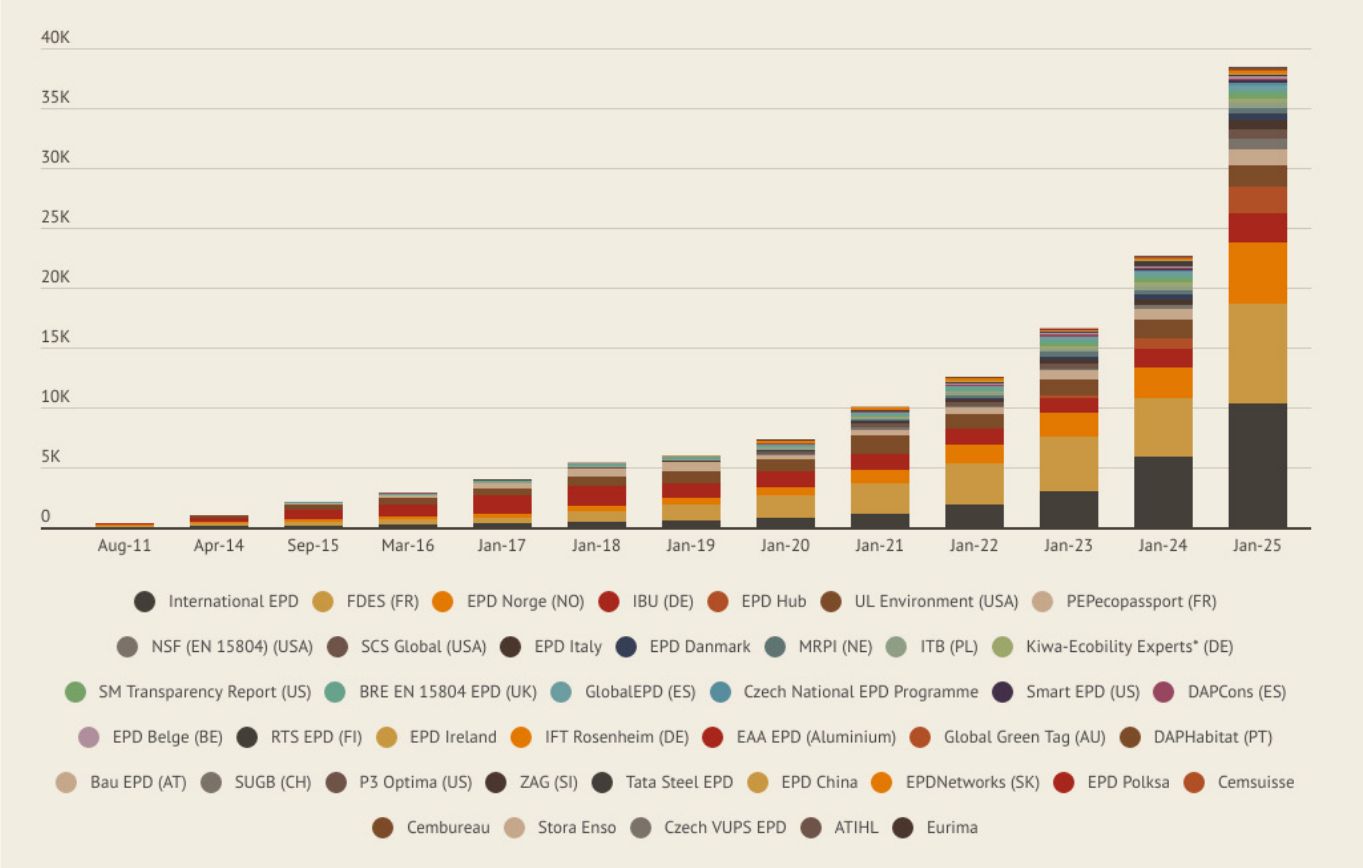
including anonymised datasets, could unlock wider sharing without compromising commercial sensitivity. Legal uncertainty around sharing project-level data further hinders the development of shared industry datasets.

Summit participants shared experiences of a prevailing sector-wide expectation for a single fixed figure in whole-life carbon assessments, rather than a range. While they agree simplicity indeed makes results more accessible, many believe it can compromise accuracy. Improving processes is considered essential, but even when using the same standard, different assessors can produce varying results. Inconsistencies arises because carbon calculations now include more elements, and allowances must be made for uncertainties.

Participants suggest early-stage assessments should remain simple and geared toward decision-making, while detailed construction-stage assessments should focus on benchmarking and data collection.

Examples of data and databases:

The numbers of registered EPDs to EN 15804 (the European standard for EPDs in the construction sector) are growing exponentially, with EN 15804 based programmes now operating across the globe, including the Middle East, China, Southeast Asia, and South America. The figure below shows shows the rapid growth of EPDs registered to EN 15804, with nearly 40,000 verified EPDs registered with EPD Programmes globally in January 2025. (ConstructionLCA 2025).



Number of registered construction product EPDs to EN 15804 (ConstructionLCA 2025)

- EPDs being certified to relevant ISO standards with 3rd party verification is believed to be critical to be able to compare the embodied carbon intensity of different products. Participants also believed EPDs need to become cheaper and faster to produce.

- Inventory of Carbon and Energy (ICE) and other databases (e.g., Baubook (Austria), ÖKOBAUDAT (Germany), Ecoinvent (Switzerland), CO2mpare (by Ramboll)) are recognised for providing harmonised datasets for construction materials, supporting accurate and comparable LCA results. Sweden (Boverket database) and Finland (Emissions database for building construction) have developed their own generic material database where EPDs are not available. These databases aim to align with ISO 14040/14044 standards, ensuring methodological consistency.

- The Built Environment Carbon Database (BECD) is a free repository for project- and product-level data; the reporting format is based on EN 15978, RICS PS 2017 1st Edition and RICS PS 2023 2nd Edition. The user can choose between the three RICS different formats, which allows the BECD to receive new assessments, likely done to RICS 2023; old assessments, likely done to RICS 2017; and assessments done to any other methodology, provided it is aligned with the general framework set out by EN 15978. RICS have included detailed building descriptors (type, height) to support analysis and drive consistency on the non-carbon information that accompany WLC assessment results.

- The IStructE How to Calculate Embodied Carbon guide provides default carbon factors that can be used across the industry at early design stages, bringing consistency.

- The Global Building Database Initiative aims to accelerate global decarbonisation of buildings by providing open, high-quality shared digital format WLC data and tools for industry leaders, policymakers, and designers, and help consistency in reporting.

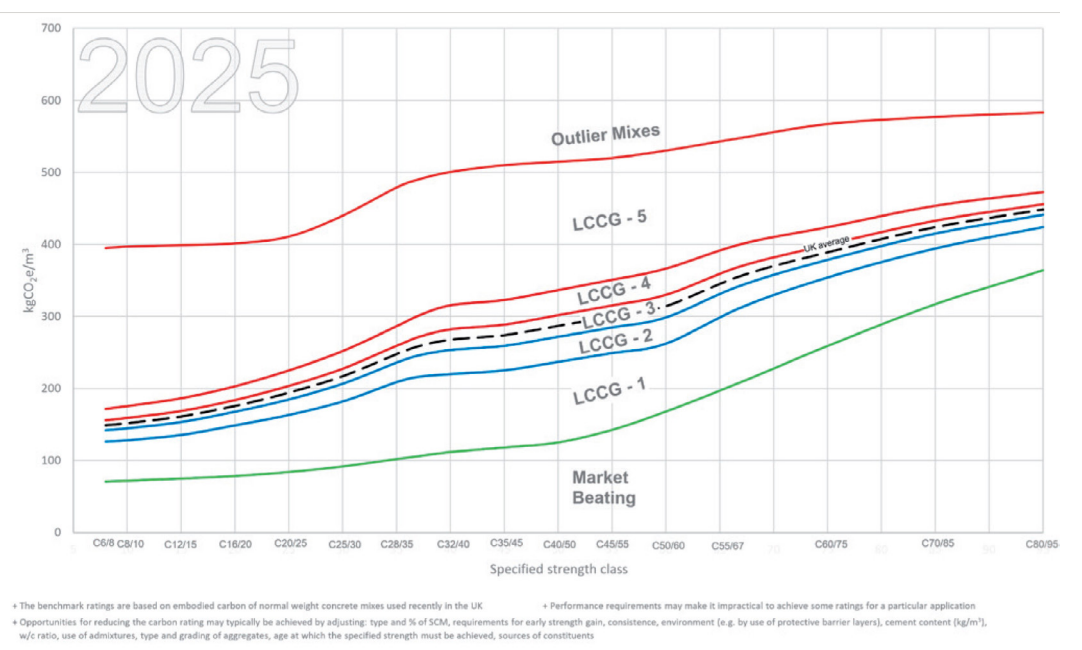
- The government's own publications for carbon factors provide a critical common reference for carbon intensity of actions and products; the industry uses both the GHG Protocol and the Green Book supplementary Data Tables 1-19.

- A Defra/DESNZ commissioned Arup report (2024) provides recommendations on how to improve WLC assessment data and methodologies for assessing buildings specifically built with timber. It calls for improved guidance on the use of dynamic LCA methods in the UK, and better data and methodological guidance for LCA 'module D' calculations to better represent the benefits of reuse and recycling.

- For concrete compliance, the FprEN 206-1 details material performance, requirements, factory production control and assessment criteria for individual values with a standardised CO2 classification which will be introduced into next revision of BS 8500 to drive consistency.

Examples of consistency in units and benchmarking:

- The Low Carbon Concrete Group LCCG market benchmark can be used to specify concrete carbon intensity (rather than kgCO2/m3 or "% cement replacement"). The LCCG grades provide a common reference point for concrete carbon intensity without requiring a specific product or technology. This provides contractors and suppliers flexibility to achieve the target performance with their preferred method or product, for example Landsec now require all structural engineers to use this.



©Low Carbon Concrete Group

- The Global Cement and Concrete Association also provide a common Global Ratings for Concrete for reporting the global warming potential of concrete products. Participants highlighted the LCCG market benchmark is preferable for use in the UK as it is a measure of the concrete technology available in the UK-specific market and is updated yearly.

- Participants suggested the adoption of benchmarking and normalisation practices, such as reporting carbon per square meter or per pound spent. Developing robust industry benchmarks are expected to help improve comparability and decision-making.

Understanding and Navigating Data, Tools and EPDs

The rapid growth of embodied carbon tools has created a fragmented landscape. Roles of tools, standards, and databases are often conflated, adding to the complexity. There is also a lack of tools specifically designed for building services and certain building types, and a need for solutions that integrate carbon and cost data while visually communicating design impacts.

Some participants argued that while RICS PS 2023 2nd Edition is accurate, it can be overly complex making them less accessible to some practitioners.

Inconsistencies related to the production of EPDs are separate from issues associated with building-level assessment methods. Clearly stating the assessment scope (of building elements and lifecycle modules) alongside the results is believed essential to make comparisons. Summit participants cited practitioners that often struggle to interpret EPDs and select appropriate datasets. EPDs vary in scope, representativeness,

and transparency, and without adequate training, users risk choosing data that does not accurately reflect the product being modelled.

Participants believed low-cost, user-friendly tools that support WLC assessment and are suitable for both large organisations and SMEs should offer different levels of detail, particularly for early design stages, and be simple enough for non-specialists without compromising accuracy.

Examples of tools, guidance and frameworks:

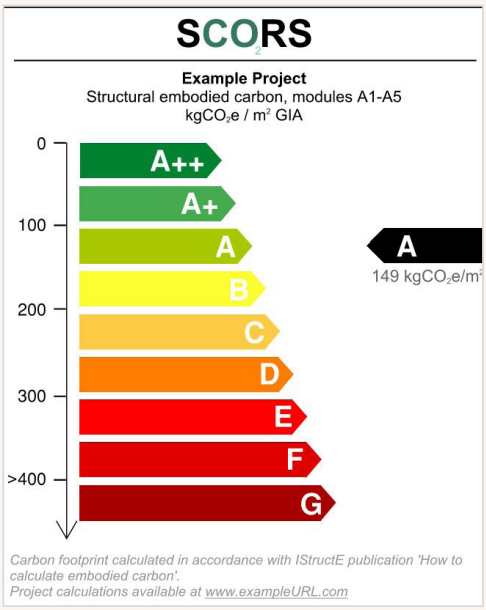
- One Click LCA is the leading software tool for LCA and EPD, with thousands of active licenses.

- Other openly available tools are available (e.g. FCBS Carbon, the IStructE's Structural Carbon Tool and H\B:ERT) as well as in-house assessments.

- CarboniCa is a WLC assessment tool built on RICS PS 2023 2nd Edition, which democratises decarbonisation and WLC assessment and reduction, using a by-industry, for-industry approach. CarboniCa is a joint venture between Morgan Sindall Group and Once For All, and soon to include other European tier 1 contractors. The joint venture is backed by significant investment and accompanied by the acquisition of 2050 Materials data platform, which will make it an industry owned tool – by multiple tier 1 contractors – and at a very low or zero price point. The tool will connect WLC assessment and the supply chain together and move the responsibility for ensuring correct data entry partly to the tool itself, rather than relying entirely on the assessor.

- The UK Future Homes Hub conventions and tool for early-stage assessment (based on RICS PS 2023 2nd Edition) are designed to improve reporting consistency for new housing developments.

- CIBSE TM65 is a technical guidance to calculate the embodied carbon of building services equipment. It addresses the lack of EPDs for many building services products by providing a consistent, simplified calculation approach although without 3rd party verification, the quality of these can be quite variable. The CIBSE DT65 Embodied Carbon Calculator is intended to assess the embodied carbon of building services equipment where no EPD is available.



- NACF Embodied Carbon Benchmarking tool supports sharing of best practice and learning on embodied carbon emissions on public sector building projects. It shows how the industry and particularly contractors are willing to collaborate and share data. Participants believed AI offers significant potential for automating data collection, detecting anomalies, and streamlining routine assessment tasks, making carbon analysis faster and more accurate.

- The IStructE SCORS rating scheme provides a framework to assess, compare, and benchmark structural designs.

- The Climate Group's Steel Zero and Concrete Zero initiatives provide a common framework for comparison and reporting of steel and concrete carbon intensity.

- Research by Arup proposes a methodology for incorporating the impact of resource constraints when assessing the embodied carbon of construction products.

- The International Federation of Consulting Engineers global Carbon Management Framework is a practical guide that helps project teams manage whole life carbon emissions in infrastructure projects. It provides, step-by-step actions that work for projects of any size, in any country, and at any stage of development.

Auditing and Compliance

Assessment tools are not always audited by RICS to ensure alignment with RICS PS 2023 2nd Edition. RICS has piloted compliance checks with OneClick LCA, and are now working with a further 3 software providers, focusing on process verification rather than holistic review. For consistency, it is important that carbon assessments are 'whole life' in accordance with RICS PS 2023 2nd Edition because partial assessments can distort the design process, producing different solutions to those that also consider whole life cycle and energy use. Prioritising upfront emissions in isolation can lead to shorter life outcomes and more frequent and onerous maintenance, repair and replacement cycles thus increasing emissions over the life cycle. To ensure the lowest embodied carbon outcome, participants say both the upfront and life cycle embodied emissions must be considered so that carbon emissions and resource efficiency are optimised.

Policy Alignment, Regulation and Awareness

EU policy mandates Digital Product Passports (or material passports) by 2030, which includes UK compliance for businesses wishing to sell into the EU market. Collaboration with the EU is believed to be essential to avoid reinventing frameworks inconsistently. Participants reported there is no significant downward trend in emissions, highlighting the need for stronger policy measures if net zero targets are to be met. The GLA Sustainable Infrastructure Policy 2 emphasises requesting benchmarks and data rather than imposing strict targets, to gather information to enable better decision-making.

Participants reported a disconnect between frontline practitioners and policymakers, where the latter often interact more with large developers, thus skewing policymakers' views of industry progress on this topic. Awareness of embodied carbon remains low among many stakeholders, underscoring the need for capacity-building and clearer communication from government about tools, expectations, and readiness. The PACER project, with Preoptima on behalf of Westminster City Council, is the first digital platform designed to help planning authorities enforce carbon reduction policies, bridge the green skills gap, ensure data is stored consistently, and keep pace with evolving building regulations. The platform is aligned to RICS PS 2023 2nd Edition.

As there are no clear governmental definitions on this, the industry has developed a range of credible benchmarks, methodologies, and standards, with data and approaches evolving annually (as described in earlier text). However, these frameworks often differ in scope, methodology, and sector-specific application, creating inconsistencies that can lead to inaccurate or misleading representations. Participants are calling for government to clearly communicate the expectation to use RICS PS 2023 2nd Edition, setting a timeline to give industry a clear target for compliance. Regulation can drive design changes that reduce construction costs and create economic benefits through consistency, a level playing field, and reduced variability.

Participants recognised that smaller firms may need targeted support to engage with embodied carbon tools and data. Dedicated systems and training are expected to increase participation, improve dataset diversity, and drive innovation across the sector.

Participants agreed that one of the strongest catalysts for change is government leadership, through e.g. a long-term government-supported database to include UK-average material data, cover major material types, span all RIBA stages, and align with international policies such as the EU CBAM. Mandating WLC assessments for all public-sector projects is expected to drive demand, normalise reporting practices, and set a clear precedent for the industry. Additionally, endorsing national initiatives such as the Built Environment Carbon Database (BECD) would boost credibility and encourage wider participation.

Development of Housing-Specific Tools

The UK Future Homes Hub conventions and tool for early-stage assessment are designed to improve reporting consistency for new housing developments - their first benchmark report will soon be published, containing insights from the first batch of assessments they have received. Their assessments are based on RICS PS 2023 2nd Edition. The Future Homes Hub are working towards an official set of generic factors for construction products for use during early design, and when specific factors are missing. However, adoption is entirely voluntary; UK Government approved values for all building sectors at UK level are needed for wider uptake and truer consistencies. Participants felt that conventions for different building types would help focus early-stage assessments on the most influential components for each building type. For example, the major contributors to carbon in a data center differ significantly from those in residential homes.

Economic Considerations

There are two ways that low embodied carbon design and construction aligns with low capital cost: circularity (reusing existing products and materials) and efficiency (using less material). It is generally recognised that higher initial fee rates are required for consultants and contractors to design and procure low-carbon buildings, to cover additional actions such as providing strategic advice and design optioneering. However, reducing embodied carbon in construction can cut both costs and emissions in the longer-term.

A 2023 report by Shifting Paradigms (for the European Climate Foundation, Embodied carbon regulation in the European construction sector) reviewed 72 European case studies where reducing embodied carbon often lowered costs. The design stage was the most effective point for intervention: where an average 41% reduction in embodied carbon cut costs by 9% (compared to business-as-usual).

The economic impacts presented here are split into those that affect businesses, and those that affect the wider sector.

Economic Impact to Business

The drive to reduce embodied carbon in construction is reshaping business practices but comes with economic implications. While sustainability goals are increasingly prioritised, the financial realities of compliance, assessment, and material selection present challenges for organisations. Costs extending beyond direct expenses include time, delays, and risk; factors that can disproportionately impact SMEs. Participants also considered supply chain limitations, data gaps, and insurance barriers to further complicate efforts to adopt low-carbon solutions. At the same time, misconceptions about overstating cost implications, or understating added value, coupled with misaligned incentives, were believed to hinder widespread adoption. Several participants were also concerned that the consequences from a lack of regulation providing a consistency of approach are rarely discussed and researched - such as the observed impact of different local authorities introducing different requirements on embodied carbon. The economic challenges businesses face in transitioning to low-carbon practices are summarised below, and practical solutions to unlock investment, scale adoption, and shift industry mindsets towards recognising the long-term benefits of sustainable construction are identified.

Cost, Delays, and Risk

Participants emphasised that undertaking LCAs and calculating embodied carbon at different project stages involves direct costs, but they stressed that the true cost of compliance extends beyond these. It was highlighted that this, however, also presents an opportunity for growth of green domestic jobs in carbon assessment. Time costs, often overlooked, can significantly impact project budgets, particularly for SMEs with limited capacity, although some participants noted that larger projects are less affected. They also highlighted that selecting lower-carbon materials, such as concrete alternatives or innovative products, can lead to extended procurement and construction timelines; delays that are frequently underestimated when evaluating overall project costs. However, it was believed that these costs can be avoided when embodied carbon reductions are achieved through material efficiency and reuse.

Meeting embodied carbon targets can be challenging when construction projects evolve, meaning design-stage assessments rarely reflect the final build. This lack of clarity makes it difficult to understand how changes affect embodied carbon outcomes, and businesses perceive this uncertainty as a risk, especially if they repeatedly fail to meet targets, discouraging investment. Participants highlighted initiatives such as the UK Net Zero Carbon Buildings Standard (which encourages early-stage embodied carbon assessment and continuous updates throughout the project), that mirror the process used for tracking financial costs.

©Net Zero Carbon Buildings Standard Ltd

Insurance and lending constraints were also identified as significant obstacles for non-traditional, low-carbon materials like timber. While Scotland demonstrates confidence in timber construction, participants noted that scaling this approach in England remains debated. These concerns are often cited as reasons for avoiding circularity or low-carbon materials; however, participants pointed to solution-oriented guidance, such as the Mass Timber Insurance Playbook, as a way forward.

When working with circular economy principles, transport and storage costs for reusable materials can distract from carbon benefits. Participants reported that many businesses lack storage facilities or cannot align project timelines, making material reuse impractical without enabling specific materials reuse suppliers

Gaps in Data and Supply Chain

Obtaining a comprehensive set of EPDs was highlighted as a significant challenge, as the absence of complete and reliable data makes informed decision-making difficult and creates inefficiencies in the assessment process. While the number of registered EPDs is increasing (see figure 1), participants noted that many innovative product manufacturers, particularly SMEs, face barriers to market entry because they cannot afford the cost of producing EPDs, which restricts the availability of new sustainable products and slows industry progress.

Verified EPDs not only demonstrate environmental performance but also enhance credibility with stakeholders and open doors to new projects and clients in a market increasingly focused on sustainability. For example, architecture firm, Amron, generated EPDs (from One Click LCA) to independently document and communicate its environmental impacts and to meet the growing demand for green construction credentials. Construction product manufacturer, Dextra Group, generated EPDs (from One Click LCA) to inform and implement a structured approach to arriving at verified and accurate carbon emissions data. The development of internal EPD capabilities can further reduce costs, streamline LCA processes, demonstrate market leadership and increase market competitiveness. Trade Associations can provide sector EPDs for their members, e.g. the Mineral Products Association has a series of five sector EPDs for ready-mixed concretes.

Participants also pointed to supply chain limitations, explaining that many suppliers are still at an early stage of their decarbonisation journey, often focusing on individual factories rather than their entire network, resulting in carbon calculations that do not accurately reflect overall operations. Furthermore, numerous innovative products are not yet commercially viable or scalable to meet developer demand, creating additional obstacles to widespread adoption.

Structures for Finance and Policy

Participants emphasised the need to work more closely with lending and insurance markets to unlock investment in low-carbon solutions, calling for greater transparency and wider participation beyond the current discussions that often occur out of public view. They suggested that regional planning guidance, such as that provided by the Greater London Authority, could serve as an effective starting point by requiring businesses to learn how to calculate carbon without immediately setting targets, helping to build skills and capacity where awareness and expertise are currently low. Additionally, participants recommended positioning carbon assessments at the earliest stages of a project and framing them as financial tools to reduce costs and improve viability, enabling businesses to view these assessments as opportunities to minimise material use and optimise resources.

Scalability

Participants recommended introducing a tiered approach to carbon assessment for different businesses or building types to help scale adoption, while also identifying opportunities to standardise processes for volume house builders as an 'easy win' for widespread implementation. They suggested that planning authorities should prioritise mass house builders to drive change and innovation, as their scale makes them more likely to adopt new practices quickly and efficiently. The Future Homes Hub conventions and tools for early-stage assessment are designed to improve reporting consistency for new housing developments and support the sector.

Participants also called for a funded mechanism enabling LCA experts to conduct assessments on behalf of innovative SMEs, helping them obtain EPDs and overcome barriers to market entry. The importance of engaging suppliers early in the design stage was highlighted to ensure they can prepare to meet low-carbon targets, reducing the risk of rollbacks after design due to material procurement challenges.

Mindset and Value

Participants highlighted the need to address the prevailing perception that low-carbon buildings require inferior materials and result in higher upfront costs. It was noted that this misconception can create a major barrier to adopting sustainable practices as stakeholders often prioritise short-term financial considerations over long-term benefits. Participants also emphasised that low embodied carbon is not widely recognised as adding market value, and users are generally unwilling to pay a premium for buildings with reduced embodied carbon, leaving developers to absorb additional costs and discouraging broader adoption. It was also highlighted that misaligned incentives, where those bearing the upfront costs of low-carbon measures are not the ones who benefit from long-term savings, create resistance to investment and slow progress toward sustainable solutions.

55 Baker Street, ©Useful Simple Trust

Participants believed that embracing WLC rather than focusing solely on embodied carbon would align with client expectations and strengthen market positioning. They also emphasised the importance of reframing discussions to highlight the co-benefits of low-carbon solutions, such as improved wellbeing from materials like timber, to demonstrate that these approaches deliver higher-quality assets. Additionally, participants viewed carbon assessments as an opportunity to upskill the workforce, creating a knowledge base that enhances competitiveness and supports business growth. They also stressed the need to promote bio-based materials, which are often understood to provide value beyond carbon reduction compared with alternatives which merely replicate appearance.

Increasingly, developments are completing a cost and carbon optioneering and evaluation process as part of the design and procurement process (e.g. Landsec are using this approach). In such cases, the embodied carbon and upfront cost impact of each measure are reported simultaneously to support cost-benefit decision making.

Economic Impact to Sector

The transition to low-carbon construction presents both opportunities and challenges for the UK built environment sector. While reducing embodied carbon is technically feasible, the economic, regulatory, and supply chain complexities make implementation far from straightforward. The key barriers are explored, ranging from policy conflicts and material availability to regional disparities and regulatory limitations, and practical solutions to overcome them are examined. The importance of harmonisation, phased regulation, and industry collaboration, are highlighted alongside the role of digital tools and supply chain integration in driving change. By adopting a balanced approach that considers economic realities, social impacts, and technological advancements, participants believed the sector can move toward a just transition that supports innovation without leaving industries or communities behind. Participants also agreed on the need to distinguish between sector-wide and direct economic benefits, emphasising untapped economic potential and socio-economic opportunities rather than focusing solely on barriers.

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Policy, Regulation and Market Response

It was acknowledged that embodied carbon is difficult to regulate compared to operational carbon, requiring a nuanced approach. Participants felt that assessing embodied carbon without immediately imposing strict limits is a practical first step. This approach allows industry to build capacity, gather data, and avoid unintended consequences while preparing for future regulations.

However, some participants felt that setting initial limits could be an effective starting point, with France cited as an example where regulation drove market change. Since 2020, France's RE2020 regulation has set a benchmark for sustainable construction policies worldwide, imposing strict life-cycle carbon caps (e.g., 530 kg CO_2e/m^2 for single-family homes). The prevalence of French EPDs demonstrates the impact of structured reporting frameworks.

Participants discussed how setting targets without mitigation risks harming vulnerable industries. The need for sector-by-sector and material-by-material approach was agreed upon to account for diverse challenges. The targets within the UK Net Zero Carbon Buildings Standard are expected to evolve over time, enabling a phased approach where initial measurement leads to gradual introduction of hard limits.

Industry Concerns and Solutions

The steel sector raised concerns about isolated building-level targets, which could incentivise imports and harm UK steel production. Participants felt a holistic, cross government departmental approach is needed to align net-zero ambitions with industrial strategy. While they acknowledged challenges exist, participants suggested embodied carbon policy could incentivise innovation and attract government investment. Morgan Sindall's in-house tool, CarboniCa, was highlighted as an example of bridging the gap between supply chain engagement and assessment. The tool aims to align cost and carbon, offering free access to contractors, consultants, and universities, funded by a global network of stakeholders. Such platforms could act as catalysts for industry harmonisation, creating shared material repositories and improving transparency.

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Supply Chain Integration and Material Availability

Participants highlighted that guidance on materials such as ground granulated blast furnace slag (GGBS) should account for the finite nature of resources and clearly communicate associated limitations. They stressed that policy frameworks must encompass the entire supply chain to ensure equitable conditions. Emerging markets for alternative low-carbon materials were cited as evidence of the critical role regulation plays in fostering innovation.

Concerns were raised regarding regional disparities in material availability. For example, Wales' timber industry was noted as lacking sufficient grading infrastructure and supply chain support for cross-laminated timber (CLT) production. Participants indicated that targeted government investment is necessary to strengthen domestic supply chains.

There was broad consensus on the need for greater harmonisation through common benchmarks and reporting tools, which would help reduce duplication and associated costs across the supply chain. Furthermore, participants suggested that closer integration of supply chain actors within assessment processes could enhance data quality and consistency, mitigating fragmented approaches that currently impede progress.

Methods for Cost Reduction

UK evidence shows that material reuse and building retrofit can reduce costs while delivering environmental benefits. The Material Reuse Group reports that reclaiming materials such as timber and brick can save 30–50% on raw material costs and cut carbon footprints by up to 60%, while also reducing landfill disposal expenses. Zero Waste Scotland highlights that construction waste costs can exceed £600 per tonne, meaning on-site material reuse not only lowers raw material and disposal costs but also improves profit margins. While participants reported that steel reuse has limitations, they suggested minimum thresholds should still be established. Similarly, they recommended retrofit must remain central to policy discussions, despite its complexities, given its role

in supporting a just transition as highlighted in the London Assembly Retrofit vs Rebuild report (2024).

Where reuse is not feasible, careful specification of materials (high recycled content, locally sourced, and using pre-cast concrete or cement replacement) can also reduce cost and carbon. Standardising design approaches through the adoption of Modern Methods of Construction (MMC) and digital twinning was also highlighted as an opportunity for enhanced assessment and project cost reduction.

The Platform Design for Manufacture and Assembly (P-DfMA) approach at Landsec's The Forge development has reduced embodied carbon emissions by 25% compared to a regular build. As a pioneering trial project the initial costs were higher than for typical construction but are expected to fall when delivered at scale.

The Irish Government's 2025 MMC report included embodied carbon calculations in the analysis of MMC methods to demonstrate small uplifts/decreases in embodied carbon can lead to often substantial and significant outcomes. Although reduction of waste on site is an advantage of MMC, evidence that MMC itself reduces embodied carbon is sporadic; generally, reductions are seen when moving to timber based MMC (Morton 2024, Teng 2018).

For projects working with concrete, The Decarbonising Precast Concrete project indicates use of precast concrete could achieve up to 40% reduction in embodied carbon, against the ICE embodied carbon database for building materials. For example; the UK's first fully electric prison, HMP Millsike (1500 inmates), used over 16,500 precast concrete components to achieve 24% embodied carbon savings. This enabled efficient, low-waste construction and ensured a RIDDOR-free site.

Current Tools, Reliability and Associated Costs

Costs associated with completing LCA assessments are associated with the time spent on carrying out the assessment, and the cost of accessing an assessment tool. Several participants, from SMEs to large firms, provided fee estimates for various LCA assessments: one-off design stage assessments, based on a clear bill of quantities and design specification are least expensive (£4-10k); tracking embodied carbon throughout the process of design and construction is more involved requiring multiple assessments at major milestones (£8-£20k per RIBA stage); as-built assessments require manual handling of information from multiple sources, regular reporting and tracking of carbon by sub-contractor work packages (upwards of £15k). Some high-level LCA assessment tools were also highlighted that are free and quick to use. For example, FCBS CARBON, is free and intended for RIBA stages 0-2. It takes about one hour to "learn" the software, and one hour to carry out the high-level calculations for a project, costing a architecture practice ca. £200 in employee time. Over 9,000 unique users have downloaded the software, and it is RIBA recommended for award submissions.

Participants noted that existing tools can produce inconsistent results due to variations in methodology and user input, highlighting the needs for greater training, transparency and standardisation.

The Carbon Experts Outlook 2024 report from One Click LCA analysed the results of a global survey of 129 professionals (49 in UK) in the construction sector and related industries. Part of the survey included a cost-associated "effort-estimate" for LCA or embodied carbon assessment. Most respondents evaluated the time spent on carbon assessment to be less than 40 hours, which was expected to decrease by 15% – 30%

over the next three years. To reduce costs and time spent on LCAs and embodied carbon assessments, 41% of all respondents had already increased or were planning to increase in-house training. Evidence from Ibstock (2024) shows that shortly after gaining in-house LCA skills, organisations can carry out quick early-stage carbon assessments and detailed tracking of improvements during product development, thereby reducing LCA costs.

While software can measure and inform, it is only part of the solution; procurement practices and economic incentives must also evolve to drive meaningful change.

Further Evidence Supporting Economic Considerations

Evidence that low-carbon design and construction can reduce costs

- Landsec use circularity for saving cost and carbon including. E.g., re-using Raised Access Flooring from the strip-out of buildings in the fit-out of others within the portfolio, re-manufacturing of existing light fittings to be re-installed in the same building as part of a refurbishment and extensive structural retention, refurbishment and vertical extension of existing buildings.

- Landsec (in collaboration with consultants) have co-developed structural design efficiency guidance for new build, high-rise residential buildings; minimising concrete quantities through efficient design of the structural frame helps to save on build costs and reduces the embodied carbon.

- Hawkins\Brown research into lean design looks to improve the financial viability of projects; there are strong correlations with material efficiency and low embodied carbon which we are drawing into the study.

- Waugh Thistleton Architects demonstrated a reduction in embodied carbon led to both cost and space savings in their Black and White building.

- Ramboll LCA White Paper (2024, Denmark) investigated the impact of the new Danish carbon limits on building practices. It presents the cost implications of meeting the limits but does not include the costs of assessments).

- Morgan Sindall's 10 Tonne Carbon Challenge produced several hundred case studies, many of which were cost-led (i.e. they saved cost and carbon (35%)) and the remainder of which were cost-neutral (65%). They were enabled by adoption of CarboniCa, a WLC assessment tool built on RICS PS 2023 2nd Edition. Running all case studies through an AI model estimated £1.42m cost savings across the cost-led initiatives, which together saved 10,800 tCO2e. The cost savings-led initiatives were in two categories: design efficiency (20% of case studies) and material reuse / circular economy (15% of case studies).

- Anglian Water reduced 2020 capital carbon by 61% in their capital programmes from the 2010 baseline and reduced operational emissions by 34% from the 2014/2015 baseline. These whole life carbon reductions financially benefited customers through driving additional capital expenditure and operational efficiencies.

- Cost and Carbon: Concept V5 Concept is a free conceptual design tool which enables designers to quickly compare embodied carbon, cost and construction time for a wide range of concrete frame options.

- Since 2020, France's RE2020 regulation has set a benchmark for sustainable construction policies worldwide. The impact of RE2020, lessons learned, and how its influence extends beyond France has been reviewed to guide international sustainability policies. This includes commentary and survey responses to both the impact on the industry and the cost of assessments.

Evidence of co-benefits linked to embodied carbon reduction

Evidence shows that reducing embodied carbon in construction delivers multiple economic, regulatory, social, and environmental co-benefits beyond emissions reduction.

- Cost Savings: Studies and case analyses indicate that early design interventions (e.g., optimising material use, modular construction) can cut embodied carbon by up to 40% while reducing costs by 9% compared to conventional approaches. Using efficient material sourcing and digital tools for LCA has been reported to lower waste and logistics costs, improving overall project economics.

- Circular Economy and Resource Efficiency: Strategies like reuse, recycling, and modular design has been shown to reduce demand for virgin materials, supporting a circular economy and minimising landfill waste. These approaches improve resilience against raw material price volatility and supply chain disruptions. Circularity can also support local communities and charities, e.g. through the Romulus initiative, a Landsec project has reused glazed partitions, kitchenettes and urinals from a strip-out and donated them to local schools and charities.

- Market Competitiveness and Investor Confidence: Companies that adopt embodied carbon reduction practices gain competitive advantage in winning green-certified projects and meeting EU Taxonomy criteria, unlocking access to sustainable finance. (Institute of Sustainability Studies 2025). Demonstrating low-carbon performance strengthens ESG credentials, attracting investors and clients focused on climate-aligned portfolios.

- Regulatory Compliance and Risk Mitigation: Anticipating embodied carbon limits under EPBD recast and CBAM reduces future compliance risks and potential penalties. Scrutiny also drives responsible sourcing through the supply chain, increasing the need for greater clarity of information and visibility of practices. This supports a reduction of modern slavery practices and poor environmental management for material extraction, processing and manufacturing.

- Health and Social Benefits: Many low-carbon materials (e.g., timber, hempcrete) improve indoor air quality, thermal comfort and user experience. The "Measuring Mass Timber" report (2025) showed case study buildings were found to be healthy, comfortable spaces. The Alliance for Sustainable Building Materials also evidence multiple examples of construction materials' impact on air quality, health and wellbeing.

- Regional economy and just transitions: Renovation and reuse strategies create local jobs and support regional economies. Minimising transport distances to reduce embodied carbon drives local sourcing which supports local, UK-based economies. Industry have mechanisms in place to support the transition of industries such as steel (e.g. Morgan Sindall's Just Transition approach and summary of progress on six place-based investments, and their employment of displaced Port Talbot steelworkers on their projects in the area). A well-managed transition should positively affect the sector's economic contribution and the workers' experiences.

Table of acronyms

Acronym	Full Form
BECD	Built Environment Carbon Database
CBAM	Carbon Border Adjustment Mechanism
CIBSE	Chartered Institution of Building Services Engineers
CIOB	Chartered Institute of Building
EPBD	Energy Performance of Buildings Directive
EPD	Environmental Product Declaration
ETS / EU ETS	Emissions Trading System (European Union)
ICE	Inventory of Carbon and Energy
IStructE	Institution of Structural Engineers
LCA	Life Cycle Assessment
LCCG	Low Carbon Concrete Group
MMC	Modern Methods of Construction
P-DfMA	Platform Design for Manufacture and Assembly
RIBA	Royal Institute of British Architects
RICS	Royal Institution of Chartered Surveyors
SME	Small and Medium-sized Enterprise
UKGBC	UK Green Building Council
WLC	Whole Life Carbon

Credits

Author

This report was written by Dr. Helen Freeman, Priestley Centre for Climate Futures. The Priestley Centre for Climate Futures is a leading climate change centre based at the University of Leeds. The Priestley Centre's Climate Evidence Unit provides independent insight to inform the delivery of a climate resilient, decarbonised future. For more information visit www.climate.leeds.ac.uk

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Disclaimer

The transition to a low-carbon built environment requires overcoming significant practical, technical, and economic challenges. Summit participants have identified key strategies to embed whole-life carbon literacy, improve methodological consistency, and align financial incentives with sustainability goals. This report explores the collaborative efforts underway – spanning training initiatives, regulatory frameworks, digital innovation, and government support – that aim to make whole-life carbon assessment more accessible, reliable, and economically viable across the construction sector. It presents the views of the community, seeks to reflect current (2025) industry practice, and acts as a reference resource for industry, government, academia and other supporting organisations. The mention (or omission) of any specific tool or guidance does not suggest endorsement or recommendation.

The information presented in this work are based on the current evidence on the date of publication. Any substantial progression in the underpinning evidence could therefore lead to the findings of this work being outdated or irrelevant. The findings do not indicate a view or position taken by the author's affiliation or the associated organisations.

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