Slattery Embodied Carbon

What's happening globally and why must Australia get ready?

June 2022

Embodied carbon: What's happening globally and why must Australia get ready?

As global regulation shifts gears and more countries begin to measure and manage construction's embodied carbon emissions, the signposts show Australia what's ahead on the road to net zero.

Background

According to the World Green Building Council, buildings are responsible for 39% of global carbon emissions: 28% generated during the operational phase to heat, cool and power them, and the remaining 11% from materials and construction [1].

The property and construction industry has focused on that 28% by reducing operational carbon emissions through more energy efficient design, smart building technology and behavioural change campaigns.

As operational energy consumption decreases, the remaining 11% – known as embodied carbon – is expected to become the dominant source of greenhouse gas emissions.

The Green Building Council Australia (GBCA) estimates embodied carbon emissions could be responsible for 85% of the built environment's carbon emissions by 2050 [2].

Targeted action to reduce embodied carbon emissions is therefore crucial for Australia to meet its net zero emissions target by 2050 [3].

This paper summarises some of the global trends, regulatory policies and strategies imposed on the construction industry worldwide to combat embodied carbon emissions.

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Key takeaways:

- Regulation of embodied carbon is gaining momentum around the world.
- Embodied carbon assessments and reduction mandates have been incorporated into planning, building and procurement requirements around Europe, in the United States and New Zealand.
- Embodied carbon emissions are forecast to become the dominant source of greenhouse gas emissions in the Australian construction industry – rising to an estimated 85% of the sector's emissions footprint by 2050.
- Targeted action to reduce embodied carbon emissions is crucial for Australia to meet its obligations under the legally binding international climate change treaty, the Paris Agreement.
- While there are currently no mandatory embodied carbon regulations in Australia, we expect this to change as a new federal government with elevated environmental priorities looks to address the embodied carbon challenge.
- Companies that begin to measure the embodied carbon in their projects now will upskill their workforce, drive a shift in culture and get ahead of inevitable regulation.

Around the world

Regulation of embodied carbon in the built environment is gaining momentum. Embodied carbon assessments are being incorporated into planning, building and procurement requirements in a growing number of countries around the world [4].

New Zealand

The New Zealand Government recently released its Emissions Reduction Plan. This year, the government are expected to introduce reporting requirements and caps for embodied carbon and operational emissions in new buildings through the building consent system and Building Code. These caps will be tightened periodically to deliver the increasing reductions in emissions required by the Emissions Reduction Plan [5].

A series of documents to support wholeof-life embodied carbon emissions measurement and reporting have been published to ensure consistency of assessments and to provide guidance to industry stakeholders [6] [7].

United Kingdom

The Carbon Emissions (Buildings) Bill was proposed to the UK Parliament in February 2022. The bill called for wholeof-life carbon emissions of buildings to be reported on all major building projects and for upfront embodied carbon limits to be set. The bill was withdrawn, after the member of parliament who proposed it was appointed to a new government role. However, the proposal did generate debate, enhance the awareness of embodied carbon emissions in construction and may be picked up by another MP in the next parliamentary session [8]. LETI, the London Energy Transformation Initiative, has published total embodied carbon targets and a voluntary rating system across various building portfolios [9].

The Greater London Authority's London Plan is the statutory spatial development strategy for the Greater London area. It requires development proposals to include whole lifecycle emissions calculations and to list actions that will be taken to reduce lifecycle carbon emissions [10].

Belgium

Belgium has a national Environmental Product Declaration database (B-EPD). Manufacturers who wish to include an environmental message on their product must first carry out a lifecycle assessment (LCA) [11].

France

The Réglementation environnementale RE2020 mandates analysis and reduction of embodied carbon emissions over the lifecycle for all new buildings. The policy, which came into force on 1 January 2022, dictates embodied carbon threshold values (caps) for different building typologies (measured in GWP/m2) that will become more stringent over the next nine years. By 2031, all new buildings will have an embodied carbon footprint 52% smaller than in 2022 [12].

Germany

Whole-building LCA is required for new federal building projects as part of a green building rating program specific to government projects, with points awarded as a function of performance against a benchmark. A private sector voluntary green building program has a similar LCA benchmark approach [13].

The Netherlands

The Netherlands was the first country to impose mandatory assessments of embodied carbon emissions for non-governmental buildings. Since 2018, new residential and office buildings over 100 sqm have been required to submit embodied carbon reporting as part of the building permit application. The Netherlands also has a national environmental product declaration database, a standardised method for whole-building LCA, and several software tools that follow the standardised method [13].

Sweden

Sweden has introduced new regulations that mandate consideration of embodied carbon from January 2022 (Klimatdeklaration). To obtain the final building permit approval, developers must calculate the embodied carbon emissions for new buildings. In the future, maximum threshold values on embodied carbon emissions are likely to be implemented. Sweden also has a national LCA-based tool to aid in the implementation of its program [14].

Norway

The Norwegian Government has enacted changes in its Technical Building Regulations, or TEK. The regulation requires that apartment and commercial buildings undertake embodied carbon assessments. The regulation does not set embodied carbon limit values. These new regulations come into effect on 1 July 2022 [15].



Denmark

Denmark is introducing mandatory embodied carbon targets into the country's building regulations in 2023 (Baeredygtighedsklassen). The policy sets out a staged phasing in and tightening of targets combining embodied carbon emissions and operational carbon emissions for buildings [16].

Finland

Finland is expected to introduce mandatory embodied carbon targets into the country's building regulations by 2025 [17].

United States

US federal and numerous state government administrations have implemented low embodied carbon procurement policies. These initiatives aim to drive change within the supply chain and accelerate the development and availability of lower carbon materials to the wider market.

In 2021, the Green Building Advisory Committee, an advisory body to the U.S. General Services Administration (GSA), approved a series of procurement principles to enable a shift to low embodied carbon building materials and approaches. The GSA's vast procurement power gives it a unique ability to influence markets. By shifting its procurement, GSA will accelerate the development of a market for low embodied carbon building materials in the US.

The two main pathways are:

- 1. **Material approach:** All projects require EPDs for 75% of materials used, and must demonstrate that their emissions fall in the best performing 80% of global warming potential among functionally equivalent products.
- 2. Whole building life cycle assessment approach: The design of larger buildings must demonstrate, through lifecycle carbon assessment, a 20% carbon reduction [14] [18].

Procurement policies related to embodied carbon of materials were introduced in eight states in 2021, including Washington, Oregon, California, Colorado, Minnesota, Connecticut, New York and New Jersey [19].

The Buy Clean California Act sets an upper limit on the embodied carbon intensity for certain construction materials purchased by the state. It ensures that only 'low carbon' suppliers and supply chains are used by California state purchases [20] [21].

New York City is currently targeting 40% less embodied carbon by 2030 and net zero embodied carbon by 2050 for new buildings, infrastructure and renovations projects. This approach has been endorsed by the NYC Mayor's Office of Sustainability and Building Congress members [22].

Canada

The National Research Council Canada recently published 'National guidelines for whole-building life cycle assessment'. This guideline interprets the relevant standards, provides detailed instruction for the practice of LCA, and addresses comparability and benchmarking. One of the aims of this document is to improve the quality and consistency of life cycle assessment results, and support LCAbased compliance schemes in green building programs and policy [23].

Public Services and Procurement Canada requires whole-building LCA for new building projects [13].

The City of Vancouver's green building policy for rezoning, introduced in May 2017, requires projects to conduct a whole building lifecycle assessment and to disclose the LCA results as part of rezoning submissions [23]. In May 2022, Vancouver City Council set limits on embodied carbon in new buildings. The council plans to introduce the first whole-building embodied carbon building by-law in North America [24]. By 2030, Vancouver aims to cut embodied carbon emissions in new buildings by 40% below 2018 levels [25]. In Quebec, a comparative greenhouse gas emissions analysis for structural materials in provincially funded new building projects is mandated under Quebec's Wood Charter [13].

Australia

With no mandatory regulations for embodied carbon measurement, reporting or reduction, Australia is currently lagging many international peers. The recent change in federal government has elevated environmental priorities, and we expect to see regulation on embodied carbon emissions introduced within the next few years.

With funding from the NSW Government, the National Australian Built Environment Rating System (NABERS) is currently researching and developing a new framework to measure, benchmark and certify embodied carbon from building materials and construction. This framework is due to be finalised in the next 12 to 18 months. The framework is intended to roll out nationally as a voluntary rating for commercial buildings, with the potential to enable mandatory planning policy in the future [26].

The Green Star Buildings 2020 rating system, developed by the GBCA, includes upfront embodied carbon reduction criteria for the first time. These criteria will become more stringent over time, and by 2030 all Green Star certified buildings will need to demonstrate at least 40% less upfront embodied carbon emissions when compared to a reference building.

What should Australia's construction industry do now?

Australia, as a signatory to the Paris Agreement, has committed to net zero carbon emissions by 2050. The construction industry currently accounts for approximately 25% of all greenhouse gas emissions in Australia – which puts it on the front line of action [27]. A net zero carbon future is only possible if we tackle embodied carbon.

The World Economic Forum's 2022 Global Risks Report finds "climate action failure" is now the biggest global threat and that a disorderly transition to net zero looms. Australia's property and construction industry, backed by government, can take strategic steps now to support an orderly transition to net zero.

The first strategic step to tackle embodied carbon is to establish a national industryagreed methodology and framework for measuring and reporting embodied carbon. This would ensure that meaningful comparisons can be made between projects. NABERS is developing this framework in collaboration with industry stakeholders including Slattery.

Image Credit: Queen & Collins, GPT Melbourne, VIC Jack Lovel Secondly, embodied carbon targets, thresholds or caps are likely to be set based on industry benchmarking data. Over time, these targets will be tightened to deliver increasing emissions reductions while driving design efficiencies and material innovations. Embodied carbon emissions targets will likely then be mandated or incentivised by government. Companies that begin to measure the embodied carbon in their projects now will upskill their workforce, drive a shift in culture and get ahead of inevitable regulation.

Finally, the new Albanese Government can look at applied policies abroad to guide Australia's embodied emissions policies and to guide an orderly transition toward a decarbonised construction industry.

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Australia's property and construction industry, backed by government, can take strategic steps now to support an orderly transition to net zero.



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About Slattery and Kaizen

Slattery is a property and construction advisory firm specialising in quantity surveying, cost management and early phase project advisory, with an outstanding history spanning more than 40 years.

We work hand-in-hand with governments, institutions and organisations as well as planners, developers, architects and design teams on a broad range of property and construction projects.

A commitment to excellence and innovation, and an ability to become an integral part of the project team has earned Slattery the trust and respect of clients and project teams alike. Slattery adds value by taking control and ownership of the cost management process from the outset. We understand the importance to drive innovation and productivity.

Slattery's Kaizen Papers focus on sharing knowledge, ideas and pertinent cost information related to our industry. Kaizen is the Japanese word for improvement, and a business philosophy that strives for continuous improvement in process. We produce papers across the sectors we work with, which are shared with our clients and made available on our website for all to view.

We invite you to explore our knowledge sharing further at www.slattery.com.au/thought-leadership

Slattery Carbon Planning

Slattery is proud to be the first Quantity Surveying firm in Australia to launch a Carbon Planning service.

Our service is available in conjunction with Cost Planning to assist our clients in achieving their Net Zero and sustainability targets. The focus of the carbon plan will address and educate clients on the embodied carbon of their current and future developments.

Read more about Slattery's Carbon Planning offering at www.slattery.com.au/carbonplanning

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