The role of commercial real estate in shaping our carbon future

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Abstract

The urgency of the ongoing climate crisis requires swift action from all industries. This includes commercial real estate as the building industry is responsible for nearly 39 per cent of annual global energy-related carbon emissions. It is critical that the real estate sector focuses on reducing both operational and embodied carbon emissions to effectively decarbonise our built spaces. This paper discusses the role that the commercial real estate sector plays in reversing global warming and the

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resources, tools and organisations already available for companies and individuals looking to begin to reduce their carbon footprint. It also details the two types of carbon emitted by our buildings and the importance of focusing on embodied carbon for substantial change. Readers will walk away with actionable steps they can take to lower the carbon footprint of commercial real estate.

Keywords: climate change, carbon emissions, building life cycle, net zero, embodied carbon, carbon reduction, wellness

INTRODUCTION

The Intergovernmental Panel on Climate Change (IPCC), the United Nations body for assessing the science related to climate change, regularly reports on the likelihood that our planet will cross the global warming level threshold of 1.5°C in the coming decades. A recent report by the IPCC found that unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to 1.5°C or even 2°C will be beyond reach.[1]

We can no longer deny that we are in the midst of a climate crisis and must admit the impact of human activity on the environment is real and severe. The decisions made by business leaders in the next ten years are not just shaping future generations and the future of our world — they are shaping our current reality. All of us, from industry to individual, must take responsibility. This includes corporate real estate (CRE).

Think of the sheer size of the built environment and the trillions of square feet it comprises. Buildings play a vital role in every aspect of modern life. They house families, businesses, goods and governments. Due to its enormous size, the building industry has a substantial impact on the environment, responsible for 39 per cent of annual global energy-related carbon emissions.[2]

Of that, 28 per cent come from operational carbon, which includes emissions produced by general building use like those from heating, ventilation and air conditioning (HVAC) systems and electrical systems. The remaining 11 per cent of emissions are from embodied carbon.[3] Embodied carbon measures the total emissions produced during the full life cycle of a building's construction materials.

The key difference between operational carbon and embodied carbon is that operational carbon can be reduced over time by implementing energy-efficient practices, technology upgrades and a cleaner energy grid; in contrast, embodied carbon remains at a set level throughout a building's life cycle. While operational carbon can adjust with the discovery and implementation of new improvements, accounting for embodied carbon emissions requires planning and forethought well before a project even breaks ground. The aspects of embodied carbon that most urgently need to be addressed are the upfront life cycle stages. These stages include resource extraction through product creation and are also known as the cradle-to-gate phase of a product's life cycle.

As sustainability efforts progressed, the real estate sector prioritised reducing operational carbon emissions by focusing on improving energy efficiency. However, with the predicted growth in construction set to double by 2060, embodied carbon will soon outpace operational carbon as the main emissions vector, achieving 57 per cent of building sector emissions by 2040.[4] It is the responsibility of the building industry to begin addressing embodied carbon issues now and to make net zero commitments that go beyond operations and into the value chain of organisations.

As primary decision makers in the building industry, CRE professionals are well positioned to become champions of environmental progress by leveraging purchasing power and influence over the entire

construction supply chain. As key leaders, they are responsible for aligning all other players (architects, contractors, engineers, etc.) with embodied carbon reduction targets.

The decision to pursue embodied carbon reduction targets will have a ripple effect. Not only does it signal market demand for cleaner practices and more sustainable products, but it also urges others in the industry to consider their environmental impacts and start their own journeys toward embodied carbon reduction.

MEASURING THE IMPACT OF CARBON

To better understand the extent of carbon emissions and make it easier to account for what emissions come from where, the total carbon impact of an organisation is broken down into three groups called Scopes 1, 2 and 3. This structure helps companies determine which types of emissions are more directly under their control and which ones are not.

- *Scope 1 – direct emissions*: These are energy and process-related emissions directly in a company's control, including manufacturing products, the creation of waste, fuelling company vehicles and equipment;
- *Scope 2 – indirect emissions from purchased energy*: These emissions are generated from electricity, natural gas, HVAC, refrigeration and other energy consumption needs;
- *Scope 3 – indirect emissions from product life cycle*: As defined by the Greenhouse Gas Protocol,[5] these emissions are 'all indirect emissions (not included in Scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions'. This covers everything from the emissions produced for purchased parts and materials (eg microchips to build smartphones) to the end user's use of a product or service (eg the energy used to power a smartphone).

Currently, most company sustainability initiatives address Scopes 1 and 2, which are emissions directly within a company's control. However, Scope 3 emissions, which are associated more with an organisation's supply chain and indirect activities, include the bulk of embodied carbon. In fact, the average company's Scope 3 emissions are 11.4 times bigger than its Scope 1 and 2 emissions combined, so organisations must reduce their Scope 3 emissions to meaningfully reduce their total carbon impact.[6] To accomplish this, businesses must partner with their suppliers and manufacturers to examine their environmental impact and pursue more sustainable solutions, including products and materials purchased for building projects.

ENVIRONMENTAL PRODUCT DECLARATIONS (EPD)

Finding the hard facts within corporate sustainability stories can be challenging, which is why an EPD is an important tool when assessing products. An EPD is like a nutrition label that details a product's environmental impact based on the raw materials and manufacturing process used to create the product.

Widespread adoption of EPDs in the US Green Building Council's LEED® (Leadership in Energy and Environmental Design) green building programme and other green building standards make it possible to use EPD data to design buildings and interiors with lower environmental impacts.

On their own, EPDs from only one company are not very powerful. Their strength is they have a common format that, when used by multiple suppliers, allows customers to compare products like-for-like, enabling specifiers to make better informed decisions about products. In an

era when every company says they are green, EPDs show whether company activities or certifications are reducing a product's environmental impact. Furthermore, EPDs allow manufacturers to make choices about product ingredients and understand the impacts of those choices.

EPDs convey whether recycled content really decreases life cycle environmental impact or just seems green. The documents can be long and technical, so employing tools that simplify the information to make it more usable and comparable is important for scalability across projects.

ADDRESSING THE STEPS TO REDUCE EMBODIED CARBON

It is easy to get overwhelmed when starting to account for embodied carbon. Fortunately, there are numerous, often free, resources available to help guide companies through the process.

Embodied carbon toolbox

There are multiple carbon assessment tools available to help businesses measure the impact of their buildings. These tools use average industry data and EPD databases to help building professionals make educated carbon decisions about their projects.

The realm of embodied carbon measurement is still in its infancy but growing fast. Currently, there are no standardised methods for measuring embodied carbon, so it is important that the same tool is used for all embodied carbon measurements in a project to ensure accuracy and consistency. Many options are available, these are some of the most well-known tools.

Athena[7] is free software that allows users to compare design scenarios and incorporate environmental considerations at the beginning of a project.

OneClick[8] is an automated life cycle assessment software that helps users calculate and reduce the environmental impacts of their buildings, infrastructure projects, products and portfolio.

Embodied Carbon in Construction Calculator[9] (EC3) is the cornerstone tool of non-profit Building Transparency and fosters a better building future by addressing embodied carbon's role in climate change. This free, open-access tool helps companies set and achieve major carbon reduction targets for their buildings by enabling low-carbon procurement in a way that is more efficient and easily accessible than ever before. It is the first tool that allows for supply chain-specific analysis of embodied carbon data, which helps the industry directly measure, compare and reduce the embodied carbon of the products it purchases, specifies, procures and manufactures. It includes the first searchable, sortable, fully digital and standardised database of global EPDs. EC3 can be implemented in both the design and procurement phases of a construction project to look at overall embodied carbon emissions. It even has built-in baselines a company can use before it develops its own.

Tally,[10] also managed by Building Transparency, is a life cycle assessment (LCA) app that calculates the environmental impacts of building design decisions directly in Autodesk® Revit®.

Establishing an embodied carbon baseline and projecting targets

Before creating an embodied carbon reduction target, companies must identify their starting place. Establishing an embodied carbon baseline is a critical step that will inform the entire reduction process.

Inputting materials and quantities data from several recent projects into selected carbon accounting tools will provide enough data to develop an average embodied carbon footprint for a portfolio. It is okay if past project data is incomplete or if the data is not completely accurate. The primary goal is to create a starting point.

Using the outputs of carbon measurement tools, a representative project can help a company forecast possible carbon outcomes to assist in developing embodied carbon reduction targets.

After accomplishing these goals, be sure to celebrate the work product. An established baseline and embodied carbon targets also support the setting of major benchmarks for all future projects. These materials will be the basis on which all projects are measured moving forward.

Declaring carbon intentions

A key component of a successful carbon reduction journey is alignment with vendors that share similar goals. For full clarity on its embodied carbon, a company needs specific data about its materials from suppliers. This is where EPDs come into the mix.

To start, a company should state its intentions to prioritise the reduction of embodied carbon and send a letter notifying suppliers that they must provide product EPDs when submitting to any future projects. When it comes to goal setting, always prioritise reaching net zero or beyond. Consider how low in embodied carbon a project can be and still meet other criteria.

With the growing demand for sustainability, low-carbon options are increasingly common, and, in many cases, they cost the same as 'regular' competitors or products with a larger environmental impact. Certain material categories have a higher likelihood of providing formalised EPDs, low-carbon alternatives and knowledge about the process.

To get a good idea of suppliers that already have EPDs, companies can search for them in the EC3 tool.

VETTING VERDANT VENDORS

It is important to apply a critical eye to supplier sustainability claims instead of taking them at face value. Many manufacturers state they are sustainable when they may be greenwashing, which means they cannot back up their environmental claims, or their claims only apply to a subset of products. When looking for vendors, be sure to inquire about their sustainability efforts. Ask them to answer questions such as:

(1) What is your company's purpose, mission and plan?;
(2) Has your company set a science-based target?;
(3) Where does your company report its sustainability progress?;
(4) Do you have EPDs for your products?;
(5) What is a recent sustainability innovation? A future one?;
(6) Do you have a take-back programme? What happens to returned materials? Is there third-party certification?

The answers to these questions will help identify the vendors who can meet or exceed sustainability expectations. It does not cost anything to ask for information.

INDUSTRY GROUPS

The first thing to do when starting on an embodied carbon journey is to connect with other building industry professionals who are already involved in the total decarbonisation process.

ownersCAN[11] is comprised of owners, developers, users and managers of buildings who are dedicated to measuring and reducing the embodied carbon of their projects. It currently includes a group of 25 owners, such as Salesforce, Microsoft, GSA, LinkedIn and Shopify, who are driving embodied carbon awareness and providing tools and case studies to reduce emissions. They even created an Embodied Carbon Action Plan (ECAP)[12] (see Figure 1)which outlines the key steps and actions necessary to reduce embodied carbon in the built environment.

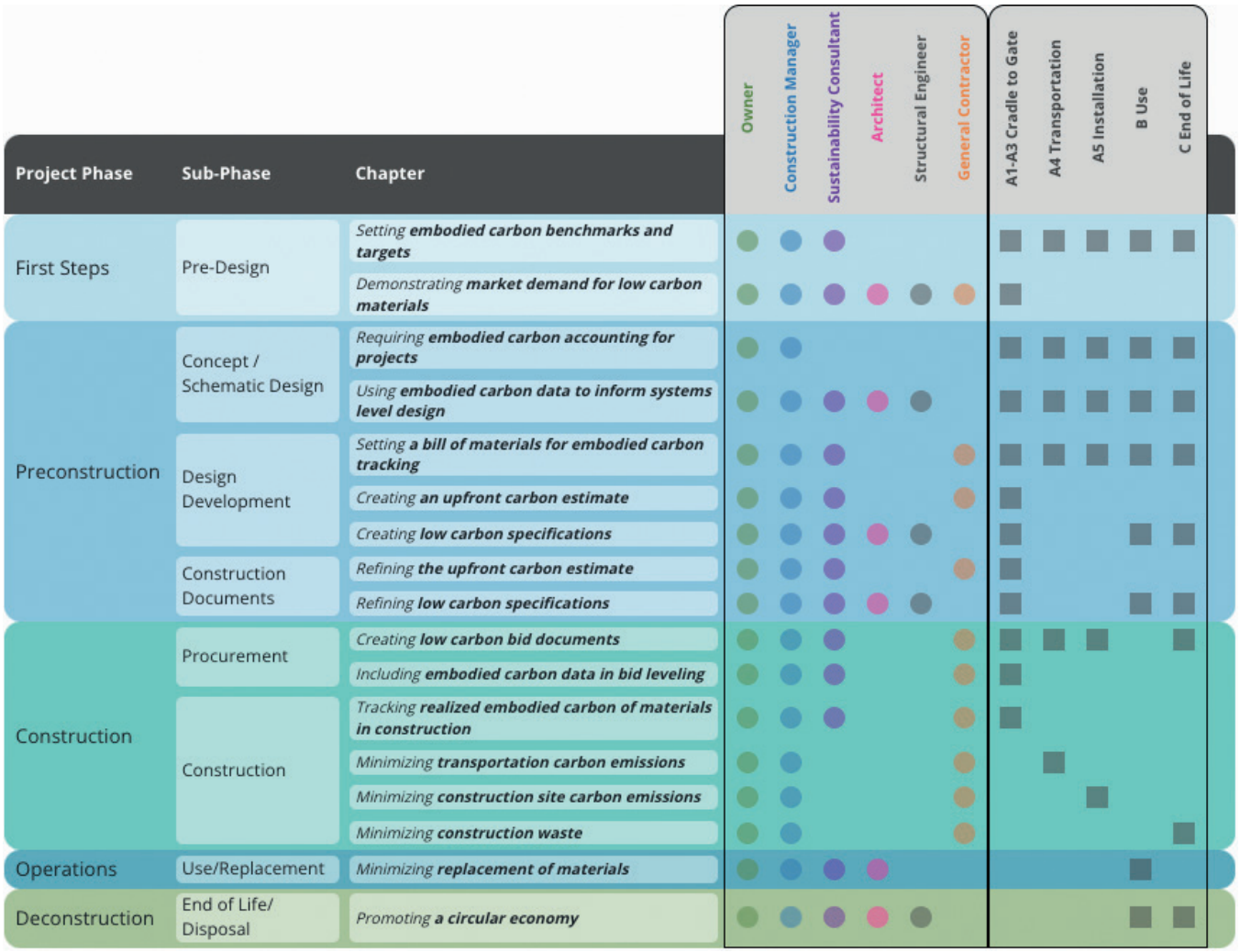

Figure 1 ownersCAN ECAP

The Carbon Leadership Forum[13] (CLF) is a non-profit organisation at the University of Washington dedicated to accelerating the transformation of the building sector to radically reduce the embodied carbon in building materials and construction through collective action. The organisation is made up of architects, engineers, contractors, material suppliers, building owners and policymakers who care about the future and are taking bold steps to decarbonise the built environment, with a keen focus on eliminating embodied carbon from buildings and infrastructure.

The Urban Land Institute[14] (ULI) is a global non-profit research and education organisation comprised of professionals representing many land use and real estate disciplines.

Sustainability is critical in its mission to 'shape the future of the built environment for transformative impact in communities worldwide.' They have multiple sustainability initiatives and programmes to help educate, advocate and push for greener practices across various industries.

In addition, green building councils and other practitioner-led movements,

like Architects Declare[15] and the Architects Climate Action Network,[16] are investing in and popularising efforts to tackle embodied carbon alongside operational carbon emissions.

EXECUTING EMBODIED CARBON STRATEGY THROUGH THE BUILD PROCESS

Throughout the design, procurement and construction phases, companies must rely on other players to report carbon findings to help inform decisions. It is important that all involved, from structural engineers to general contractors, understand the scope of what is being asked of them.

Having internal processes for recording and reporting carbon is also critical for capturing accurate data. A free tool such as EC3 can house actual data for the highest impact material, instead of modelled. This allows project teams to record embodied carbon data and give the owner access to this reporting.

CONCEPT AND DESIGN

When it is time to select an ACE team, a company should state its embodied carbon intentions, just like it did with suppliers. This can be done in a formalised letter that lets bidders know they must account for embodied carbon throughout the conception and design phases.

Once there is a schematic design in place, a whole building life cycle assessment (WBLCA) should be performed to enable comparison and assessment of building systems and scales and to inform decisions around building size, scale, structural and envelope system. These results should be presented alongside cost information to determine the best selection for the project from both a carbon and budget standpoint.

Following material type decisions from the WBLCA, the EC3 tool can be used to create a product stage emissions carbon estimate. Using the submitted EPDs from suppliers, products can be compared to make the best-informed decisions for the project. At this stage, project teams should recognise that they will be working with averages for varying material categories, and they may know that they have opportunities to reduce emissions further by using innovative materials on the lower end of the categories. This estimate will need to be revisited and refined as cost estimates come in from both the design and construction teams.

PROCUREMENT AND CONSTRUCTION

The construction phase (A4–A5 of WBLCA in Figure 2) is one of the hardest steps to track for embodied carbon, in part due to a lack of standardised methodologies but also due to a deficit in carbon accounting knowledge and experience within the construction industry.

When moving a project to bidding, a company should state clear expectations for contractors, noting the intent to account for embodied carbon emissions throughout the construction process. While there are contractors and construction groups that ensure carbon accounting, the area is still new to the industry, and it is likely that the winning bid will need help navigating the process and prompting to explore innovative practices.

When including construction, a company should have multiple processes in place to ensure smooth accounting across the many moving pieces of a job site. It is essential to have sourcing and fuel plans for all major suppliers, an emission reduction plan for the job site and a landfill diversion plan for waste. While this is a smaller part of the life cycle carbon impact, sending the right signals is low- to no-cost and can drive reduction.

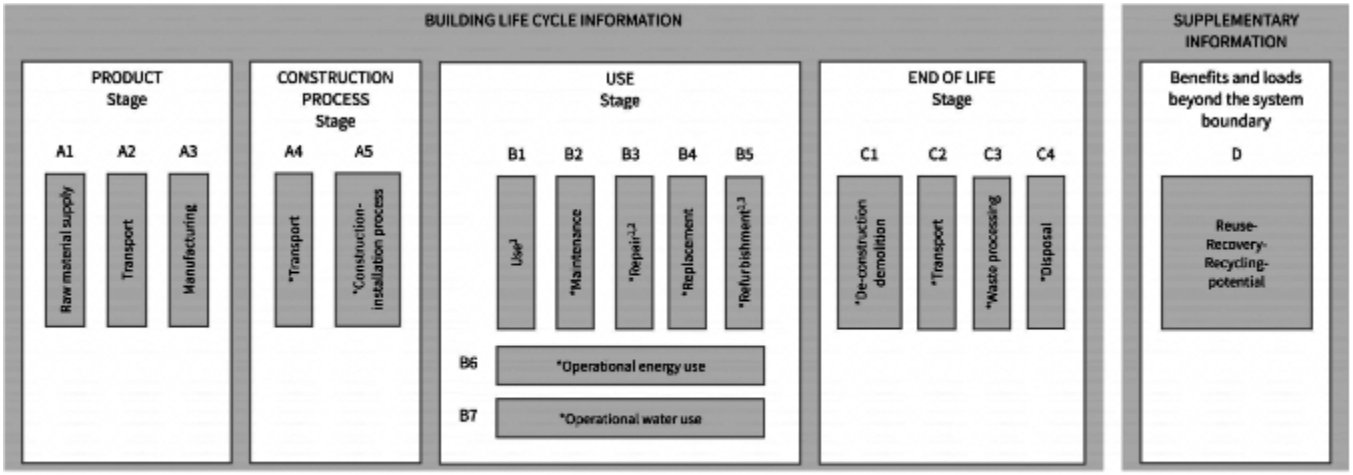

Figure 1: The EC3 Tool Focus

Whole Building Life Cycle Analysis stages per EN 15978, from LCA of Buildings: A Practice Guide[1]

Figure 2 The EC3 tool focus

Microsoft conducted a pilot programme to measure construction site carbon when modernising its Puget Sound campus. It released a comprehensive white paper about the project,[17] detailing the insights garnered at each stage of the carbon measuring process.

Use and demolition

To properly account for embodied carbon, all cycles of a building's life must be considered before breaking ground or starting demolition, including the use and decommissioning of a building. While most embodied carbon occurs upfront, building upgrades, maintenance, replacement and eventual destruction also add to a building's total impact as the waste generated from these activities and the procurement of new materials adds to carbon emissions. Over time, even low-carbon products can result in higher emissions than other options if the low-carbon products require frequent replacement.

A building's end of life should include as much material reuse as possible. Manufacturers of some items, such as carpet, often have material take-back programmes. Companies should inquire about these types of programmes when selecting vendors and investigate what happens to those materials once reclaimed. Third-party certification of these claims is ideal.

Weighing carbon versus cost

A long-standing complaint about green materials is they add too much cost to a project. There was a point in time where that may have been true, but technological advances have pushed the industry to the point where choosing sustainable materials now adds little-to-no additional cost to end users.[18] The green building materials market itself is experiencing exponential growth and is predicted to have a worth of US$383.85bn by 2025.[19]

However, carbon is only one factor to consider. There may be instances where durability, quantity or cost outweigh the benefits of the lowest carbon option, and a different material is selected for a project. Although embodied carbon will never be the only decision-making criteria, awareness of the ability to measure and reduce embodied

carbon in building projects is growing, and the need for traction and scale is urgent.

Salesforce is an example of one global CRM leader that reduced the carbon footprint of its entire real estate portfolio by considering embodied carbon.[20]

ADDITIONAL BENEFITS OF GOING GREEN

Investing in more sustainable building practices also has benefits that extend beyond environmental stewardship.

Attracting talent

Up and coming employees expect more from employers beyond a simple paycheque. The next generation of top talent wants to work for a company that reflects their interests and concerns — and sustainability is one of them.

Research shows that an increasing number of workers, especially those in the Millennial and Gen Z generations, rate environmental responsibility as an important factor in choosing employment. Sixty-eight per cent of workers from 25–44 years of age said they would be more likely to work for a company that has a strong environmental policy.[21]

Lower operational costs

Inefficient operating costs can significantly affect a building's bottom line. While installing more efficient systems in buildings might seem costly upfront, they can save money in the long run.

New buildings and retrofits that feature sustainable elements are built to be more efficient than traditional construction and, as a result, have reduced operational costs. The average reduction is 10 per cent in the first 12 months and 16.9 per cent over the next five years.[22]

Buildings and employee wellness

A healthy and well-balanced workforce is the key to optimal productivity, and nothing has helped usher in the age of workplace well-being more than COVID-19. Now more than ever, workers and employers alike are paying attention to the impact a built environment has on its inhabitants.

Studies show that healthier buildings can increase employee productivity[23] and reduce sick time.[24] The demand for buildings optimised for health and well-being has also experienced a sharp rise with the onset of COVID-19.[25]

Climate change is the greatest threat to human health of the 21st century. The carbon impact of making, transporting, installing and using building materials has a direct effect on climate change. Reducing the embodied carbon of building projects, when scaled, can positively affect public health and how people use built spaces.

Increased asset value

Buildings constructed with sustainability in mind increase in value over time. This is due to the lower operational costs associated with more efficient systems and the rising cultural value placed on structures with sustainable features.

According to owners and investors, the expected increase in asset value for new green buildings continues to rise or sustain its growth. In 2012, 16 per cent of owners and investors expected more than a 10 per cent increase in value; as of 2021, that number has grown from 16 per cent to 29 per cent. Engineers and architects also expect a relatively similar value increase amount.[26]

CONCLUSION

While climate predictions may be dour, there is a growing interest across the globe to step up and take action to create a climate fit for life that inspires hope. Efforts are now being made at the industry level to take responsibility and make the necessary investments to improve practices — especially as more companies include net zero building

goals in overarching sustainability commitments. At the same time, policymakers at various levels — from local to state to federal to global — are considering and creating low carbon procurement and building policies that will impact the commercial real estate sector. The more industries, companies and professionals prioritise and require finding more sustainable ways to live, build and act, the easier it will be to find a way forward.

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