



The use and limitations of

# Embodied Carbon Data

## Embodied carbon: A growing environmental requirement

The requirement to address the environmental impact of the built environment is growing and requests for **embodied carbon** data for **mechanical, electrical and plumbing (MEP)** products is increasing as a response.

There is no doubt that to achieve truly **Net Zero buildings** and **infrastructure** we must shift our focus to include more than operational carbon alone. But what is the **value of using product embodied carbon data** as a metric within your project or programme?



## What do we mean by product embodied carbon?

When considering embodied carbon, we face a significant challenge as there does not appear to be a **single accepted definition of embodied carbon for products** which industry can adhere to.

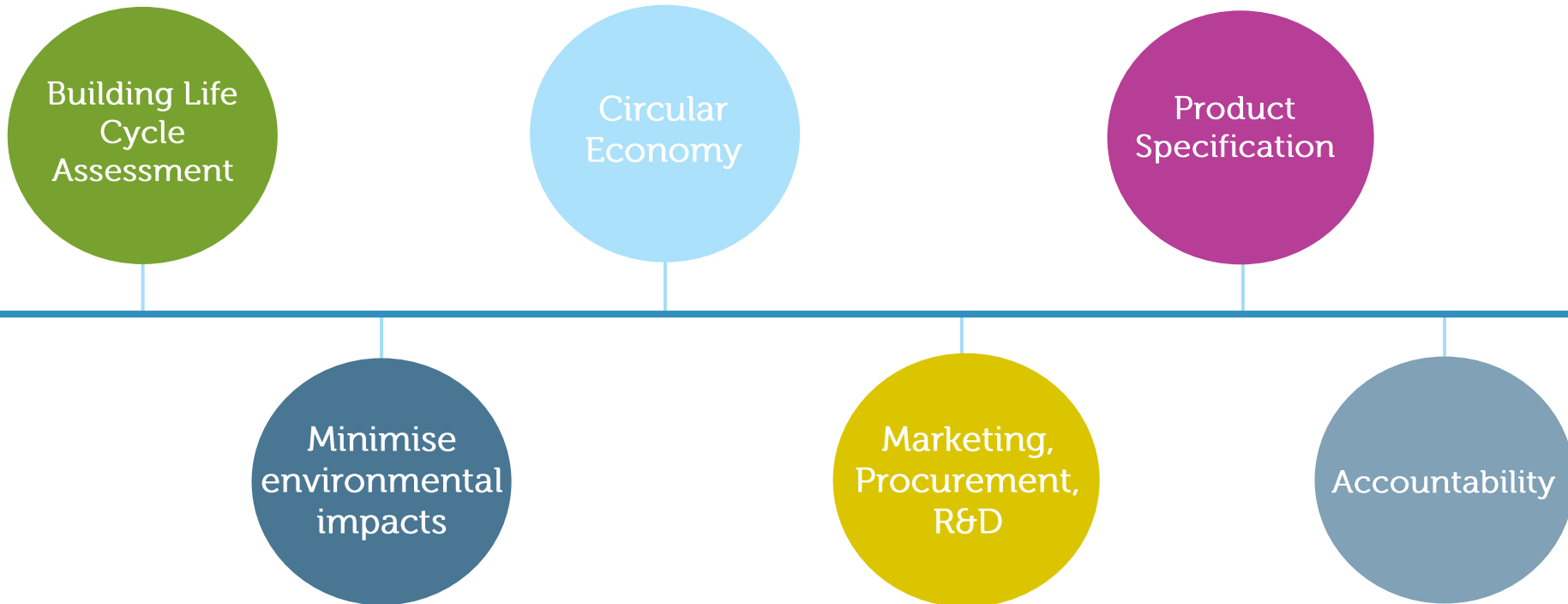
BEAMA is a trade association representing a **cross section of manufacturers of energy-related products and services** for the **built environment**, covering buildings and infrastructure. Following a **comprehensive review** of existing standards and policies, our members have collectively agreed to **adopt a common definition** for the embodied carbon of products.

You can read this definition [here](#)



What is driving industry  
interest in embodied carbon?

## What are the core reasons for developing embodied carbon information?



## Why are stakeholders requesting embodied carbon information?

The requirements to provide embodied carbon information for products to be **eligible** for selection by various **tenders and programmes** is increasing. There is **no current legislative requirement** to measure embodied carbon – all action is voluntary.

Seen as a  
requirement for  
tender participation

To meet Ofgem  
(RIIO-2)  
requirements

Green Building  
Programs:  
LEED, BREEAM

A method of  
reporting Scope 3  
emissions

Regional Regulatory  
Requirements  
(eg GLA's London  
Plan)

PAS 2050 / PAS 2080  
compliance

## Who is asking for embodied carbon information?

Embodied carbon information can be used in many ways, from **supplier qualification** to **building LCA** requirements. This means a variety of job roles could request this data – although it may not be clear who within a company these requests need to be sent to.

EC database  
developers

Tier 1 clients

Specifiers and  
Building Services  
Consultants

Housing Developers

Finished product  
manufacturers

DNOs / IDNOs and  
their distributors

## A Main Driver: Measurement

INTERNAL	EXTERNAL
<ul style="list-style-type: none"><li>• Can benefit/drive product innovation</li><li>• Can be used to drive internal carbon reduction initiatives</li><li>• Can be used within wider Scope 3 emissions reporting</li><li>• Can be used as for sales/marketing leverage - 'we've done this work and have this information available'</li><li>• Product certification (e.g. Living Product Labels)</li></ul>	<ul style="list-style-type: none"><li>• Makes manufacturer information specific (i.e. at product level), and can be related directly to project requirements</li><li>• Enhances transparency and accountability at product level</li><li>• Can be directly dropped into green building schemes (LEED, BREEAM) and project LCAs</li></ul>



What can embodied carbon  
data be used for?

## Embodied carbon data to facilitate green certification for projects and products.

The following section will illustrate how embodied carbon data can support certification of green building projects as well as products\*. **LEED**, **BREEAM**, and **Living Product Challenge** are chosen due to their widespread recognition and adoption across Europe and globally.

\*The information presented is current as of the time of publication. For the most accurate and up-to-date information, it is always recommended to refer to official sources.



## LEED

LEED (**Leadership in Energy and Environmental Design**), is the world's most widely used **green building rating system**. It provides a framework for healthy, highly efficient, and cost-saving green buildings, which offer environmental, social, and governance benefits.

LEED has included **credits for Environmental Product Declarations (EPDs)** since the introduction of LEED v4. The EPD credit encourages the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. LEED v4.1 has continued to offer EPD credits, with some adjustments to the thresholds and requirements for credit achievement.



- **Current Version:** LEED v4.1
- **Rating Systems:** Building Design + Construction (BD+C), Interior Design + Construction (ID+C)
- **Category:** Materials and Resources (MR)

Credit Name	Requirement to be supported with EC Data <sup>1</sup>	Max. Applicable Points
Building Product Disclosure and Optimization – Environmental Product Declarations	<p><u>Option 1. Environmental Product Declaration (EPD)</u>            Use at least 20 different permanently installed products sourced from at least five different manufacturers that provides cradle-to-gate LCA/EPD based upon ISO 14044 and EN15804/ISO 21930, and has internal critical review (1 product count) or externally certified and critical reviewed (1.5 product count).            Note: 10 different permanently installed products from three different manufacturers for CS and Warehouses &amp; Distribution Centres.</p> <p><u>Option 2. Multi-Attribute Optimization</u>            Use products that have a compliant embodied carbon optimization report or action plan separate from the LCA or EPD for 10%, by cost, of the total value of permanently installed products in the project, or use at least 10 permanently installed products sourced from at least three different manufacturers.</p>	1

<sup>1</sup> LEED BD+C: New Construction v4.1 (USGBC, 2019)

## BREEAM

BREEAM (**B**uilding **R**esearch **E**stablishment **E**nvironmental **A**ssessment **M**ethod) is originated and widely used in the UK, but also a leading global sustainability assessment method for master planning projects, infrastructure, and buildings.

BREEAM has introduced **credits for EPDs** to encourage the use of products with a quantified environmental impact, thus promoting transparency and informed decision-making in the construction industry. There are different schemes under the BREEAM family to cater to different geographical regions, namely BREEAM UK for projects in the UK, BREEAM International for projects outside the UK, BREEAM España for the Spanish market and BREEAM NOR for the Norwegian market.



- **Current Version:** BREEAM UK Version 6.1
- **Rating Systems:** New construction
- **Category:** Materials

Credit Name	Requirement to be supported with EC Data <sup>2</sup>	Max. Applicable Points
Mat 01 Environmental impacts from construction products - Building life cycle assessment (LCA)	Selecting products with EPD that show lower environmental impact helps reduce the overall building impact.	7
Mat 02 Environmental impacts from construction products – Environmental Product Declarations (EPD)	Each 3 <sup>rd</sup> party verified, single product EPD contribute 1.5 EPD points towards the min. requirement of 20 points, while each generic/industry-wide EPD contribute 0.5 EPD point, and each manufacturer-specific EPD contribute 1 EPD point.	1

<sup>2</sup> BREEAM UK New construction V6.1 (BRE, 2023)

## Living Product Challenge (LPC)

The **Living Product Challenge (LPC)** - developed by International Living Future Institute (ILFI) under the larger Living Future Challenge framework - is a comprehensive tool for manufacturers to create products that are **healthy, inspirational, and environmentally beneficial**. It's the most advanced product sustainability standard, encouraging the creation of products that give more than they take across their life cycles.


The LPC is organised into **seven performance areas** called "Petals," which include Place, Materials, Water, Equity, Energy, Beauty, and Health + Happiness. The program asks manufacturers to engage with every aspect of the product and its manufacturing process. Full LPC Certification requires the achievement of all twenty imperatives, indicating that the product has become truly regenerative across all impact areas.



- **Current Version:** Living Product Challenge v2.0
- **Rating Systems:** New construction
- **Category:** Energy Petal

Imperative Name	Requirement to be supported with EC Data <sup>3</sup>
Core Imperative 06 Energy Footprint	<p>Manufacturers must conduct a Life Cycle Assessment to assess and document the fossil-based energy footprint and identify the five processes that make the largest contributions to the product's cradle-to-gate fossil energy footprint.</p> <p>The fossil energy footprint reflects the use of fossil fuel energy across the supply chain. The manufacturer can use LCA or EPD. The manufacturer must also demonstrate that the fossil energy footprint of the product is lower than the industry average for the product type.</p>

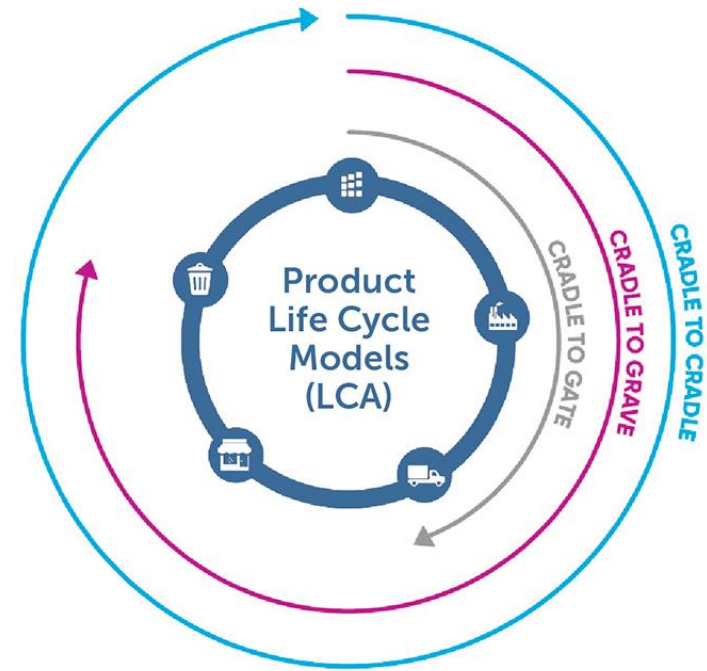
<sup>3</sup> Living Product Challenge 2.0 (ILFI, 2019)



What are the limitations of  
embodied carbon?

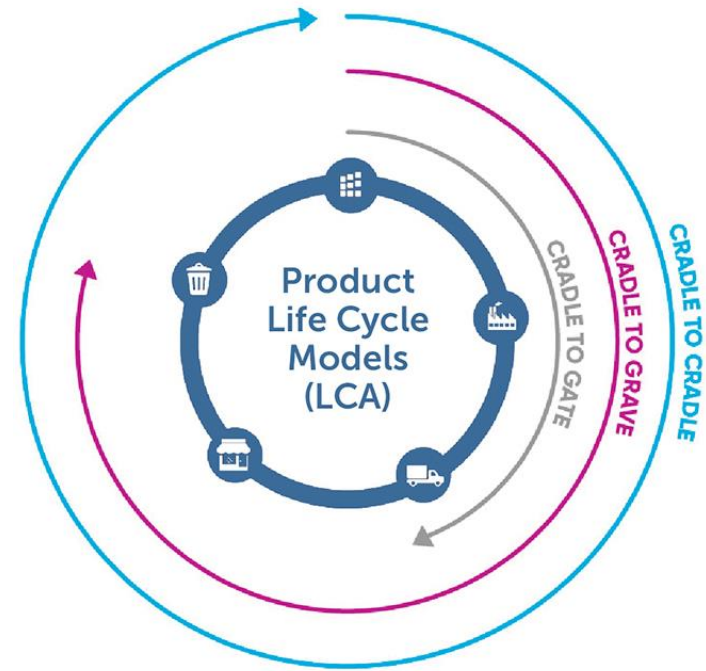
## Definitions for LCA models

**Cradle-to-Gate:** This approach evaluates a product's environmental impact from its inception to the moment it departs the factory. It encompasses the initial two stages of the product's life cycle, focusing on production till the gate of the manufacturing site.



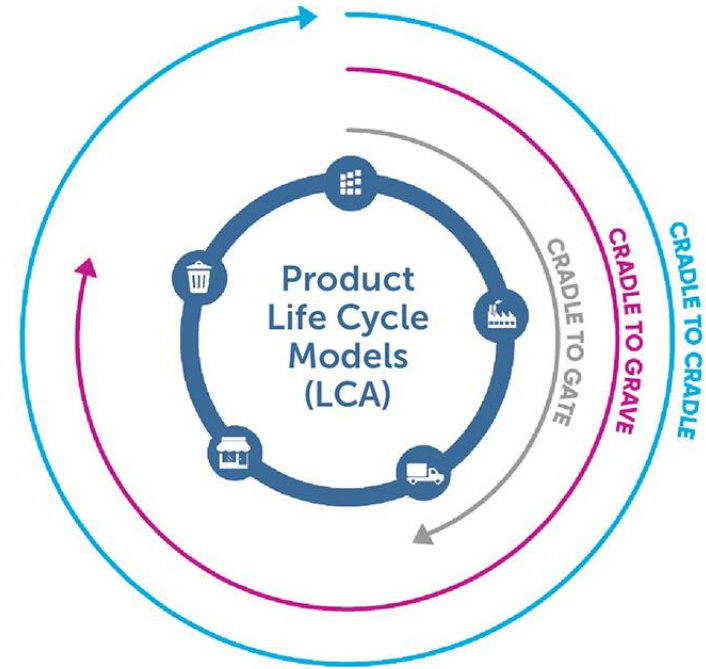
## Definitions for LCA models

**Cradle-to-Grave:** This comprehensive assessment includes all stages of a product's life cycle, offering a full picture of its environmental footprint. It spans from the product's creation to its ultimate disposal, ensuring that every phase of its existence is accounted for.



## Definitions for LCA models

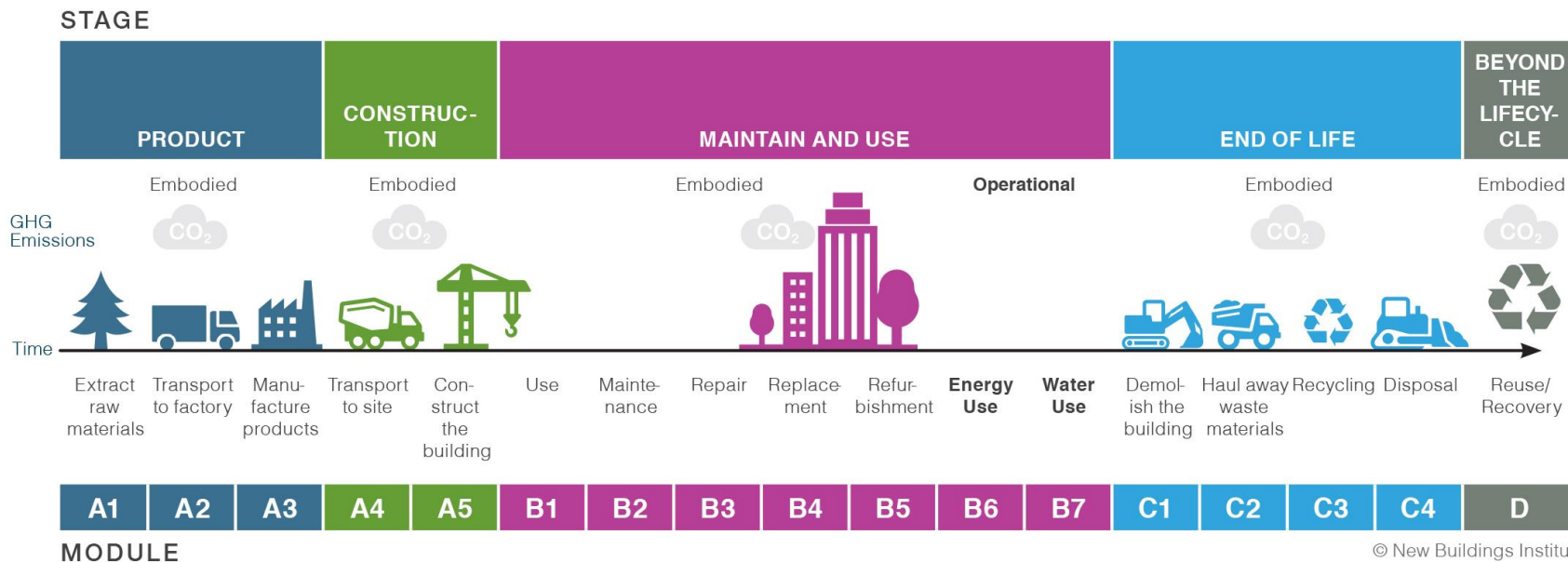
**Cradle-to-Cradle:** This kind of approach to product development which redefines the end-of-life concept by replacing the waste stage with a recycling or upcycling process. It ensures that materials or components are repurposed for new products, thus “closing the loop.” This circular approach is crucial as it promotes sustainability and reduces waste, underlining the importance of creating products that contribute positively to the environment throughout their entire life cycle.



## Encouraging a holistic view

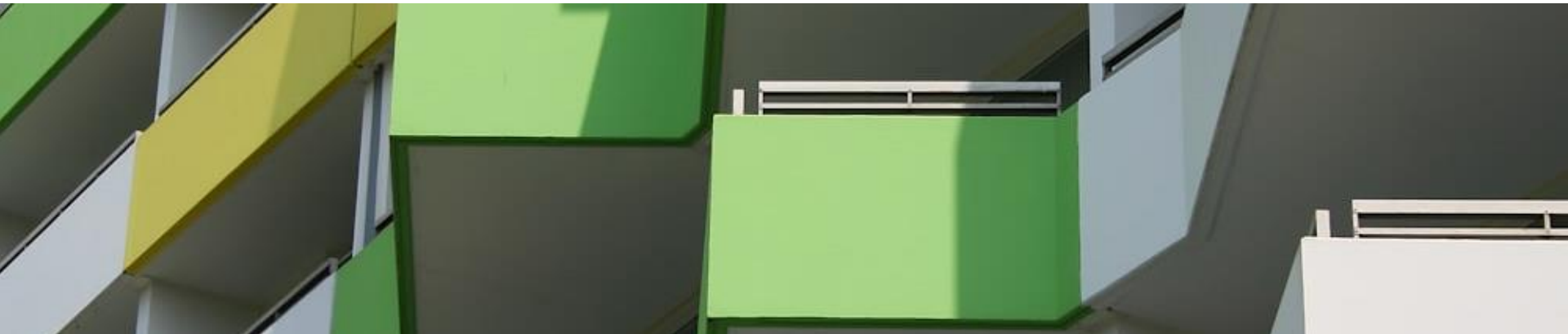
When looking at product embodied carbon, manufacturers are focussed on **A1-A3 life cycle stages**. However, embodied carbon, especially when looking at embodied carbon for a project, can cover more stages within the life cycle assessment.

FIGURE 1: LIFECYCLE STAGES



## Bring aware of limitations and gaps

- The approach does not account for **other environmental impacts** such as water usage, resource depletion, or pollution from material extraction and manufacturing.
- Embodied carbon frequently has set **scope boundaries that may differ** from project to project. This can result in inconsistencies and make it difficult to compare the embodied carbon of various buildings or materials.
- The **time scale for assessing environmental impacts** should ideally extend over the lifecycle of the building, including demolition and disposal at the end of its useful life.



- **Obtaining information can be difficult**, especially for complex supply chains and subcontractors.
- The emphasis on reducing embodied carbon may lead to the adoption of alternative materials or construction methods that have lower carbon emissions. However, these substitutions may have **unintended consequences** such as increased **energy usage**, **resource consumption** or **operational carbon**.
- **Education and awareness** are usually the biggest barriers to achieving positive change through data collection.





## Find out more

BEAMA and our members have joined forces to increase awareness of the complexities of embodied carbon data for MEP (mechanical, electrical, and plumbing) products.

For more information about our [Product Carbon Initiative](#).

