

# ADDRESSING THE HIDDEN EMISSIONS IN BUILDINGS

STATUS QUO, GAPS, AND RECOMMENDATIONS FOR ENVIRONMENTAL PRODUCT DECLARATIONS AND WHOLE-LIFE CARBON



FACT SHEET

DECEMBER 2021

## INTRODUCTION

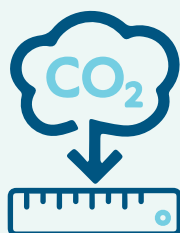
### IMPROVING THE AVAILABILITY AND QUALITY OF DATA SOURCES FOR WHOLE-LIFE CARBON MEASUREMENT

Buildings are not only responsible for emissions during their use phase, but also for emissions arising from manufacturing and processing of building materials. Achieving climate-neutrality goals requires urgent emissions reductions across the entire building lifecycle. While prioritising energy efficiency – and thereby in-use carbon emissions reductions – is well understood and embedded in EU building policies,<sup>1</sup> it is time to begin measuring the carbon footprint of materials and products used to create buildings. Without accounting for embodied emissions, there is a risk that individual construction and renovation decisions, as well as wider policy decisions, ignore these hidden emissions. Assessing the whole-life carbon (WLC) footprint will help better understand the full impact of new constructions and renovations and how this can be reduced. It will also enable the design of policies that align the operational and embodied carbon trajectories.



**Embodied carbon is more difficult to measure and track than operational carbon, which is also the reason why it is more difficult to effectively regulate.**

**A first step to regulate carbon emissions across the entire lifecycle of buildings is to measure it. This requires rapid improvement in the process of creating and sharing consistent WLC data.**



A key aspect to the generation of reliable WLC measurement is to use standardised approaches. Such methodologies are already available and in use by the industry, in the form of the suite of standards created by CEN/TC 350, i.e. EN 15804 and EN 15978. EN 15804 underpins the production of Environmental Product Declarations (EPDs) for construction products, which include data on embodied carbon. Data from EPDs are meant to be brought together to make building-level assessments. However, to produce reliable and comparable WLC assessments, first the consistency of EPDs needs to be resolved.

This factsheet provides a snapshot of the current state of EPDs. It identifies gaps in adoption and useability of EPDs, as well as in the quality and reliability of data used to create these reports. The document also puts forward a set of high-level recommendations to improve the status quo and to prepare the market for introducing WLC requirements in buildings.

<sup>1</sup> The Energy Efficiency First (EE1st) principle is a guiding principle for energy-related decisions in the European Union and it is enshrined in the Governance Regulation (2018/1999).

# WHAT IS AN EPD?

Most environmental data used in the construction sector comes from Environmental Product Declarations (EPDs). EPDs are descriptive summaries which product manufacturers publish to provide an overview of the environmental impacts of their products. EPDs usually cover the complete lifecycle of a product, from material extraction to final disposal. The purpose of an EPD is to encourage the use of materials and products that lead to buildings designed with the lightest environmental load.

## HOW ARE ENVIRONMENTAL PRODUCT DECLARATIONS PRODUCED?

The European construction sector follows the EN 15804+A2 standard which describes the general Product Category Rules (see below and Figure 1) for performing a life-cycle assessment (LCA) and producing the EPD for construction products. There are several EPD Programme Operators across Europe that will develop EPDs based on EN 15804+A2, though sometimes there may be additional country specific rules and requirements. It is up to the manufacturer to select a Programme Operator that will best serve its market.

### Product Category Rules (PCR)



While EN 15804+A2 provides the general PCR for construction products, specific PCR rules (cPCR) per product family, for example, 'bricks', 'concrete blocks' or 'insulation' are also needed. PCR define product specific rules to perform EPD calculation including data collection. They are required to keep consistency of EPD data when used for the building assessment, e.g. comparing the building performance using two different insulation systems. PCR are developed and administered by Programme Operators or by the CEN/CENELEC Product Technical committees. Many PCR already exist, however not for all construction products.

Once a relevant PCR has been identified or created, the manufacturer, or an appointed LCA specialist, completes a life-cycle assessment in line with the PCR, as well as with any specific rules required by the Programme Operators. Once the LCA is completed, the final EPD may then be created by the manufacturer or an external LCA specialist using an LCA software.

### Programme Operators and verification



The appointed Programme Operator confirms that the EPD respects the applicable standards and PCR. Verification can be done either by an internal reviewer or by a third-party verifier which will be appointed by the Programme Operator. Sometimes the same verifier is approved by several Programme Operators. Different Programme Operators have slightly different rules, LCA scenarios and assumptions.

### EPD data and WLC measurement



For WLC assessments, third-party verified EPDs (Type III) and datasets in accordance with EN 15804 are the preferred sources of data.<sup>2</sup> Where there are no specific carbon data available, equivalent or closely similar products can be used as proxies, including industry wide EPDs (i.e. generic declarations that cover the average product across many manufacturers). Data should be selected according to geographical relevance and anticipated supply chains. The EN 15804+A2 standard requires that specific product data should not be older than five years and generic data no older than 10 years.<sup>3</sup>

### EPD databases

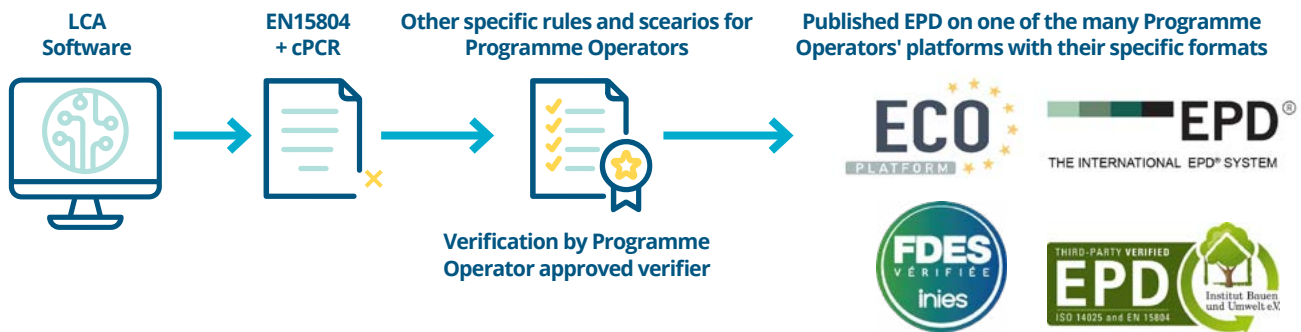


Manufacturers publish EPDs on many platforms, each having a specific format for presenting the data. Although many Programme Operators mutually recognise each other, market dynamics mean that in Member States one will be more dominant than others.

<sup>2</sup> RICS (2017) *Whole life carbon assessment for the built environment*, Professional Statement 1st ed.

<sup>3</sup> EN 15804 – section 6.3.7.

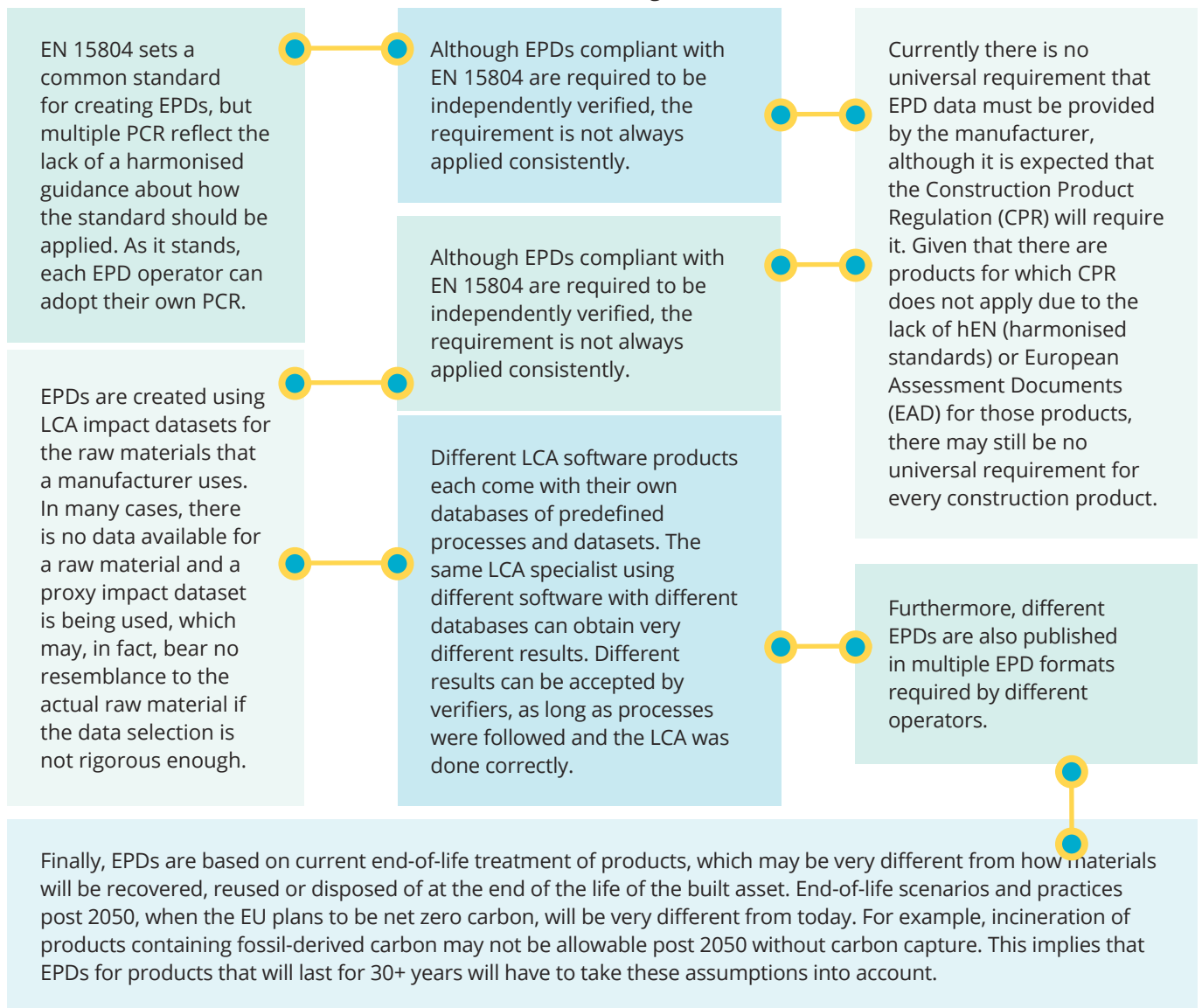
Figure 1: The process of creating EPDs.<sup>4</sup>



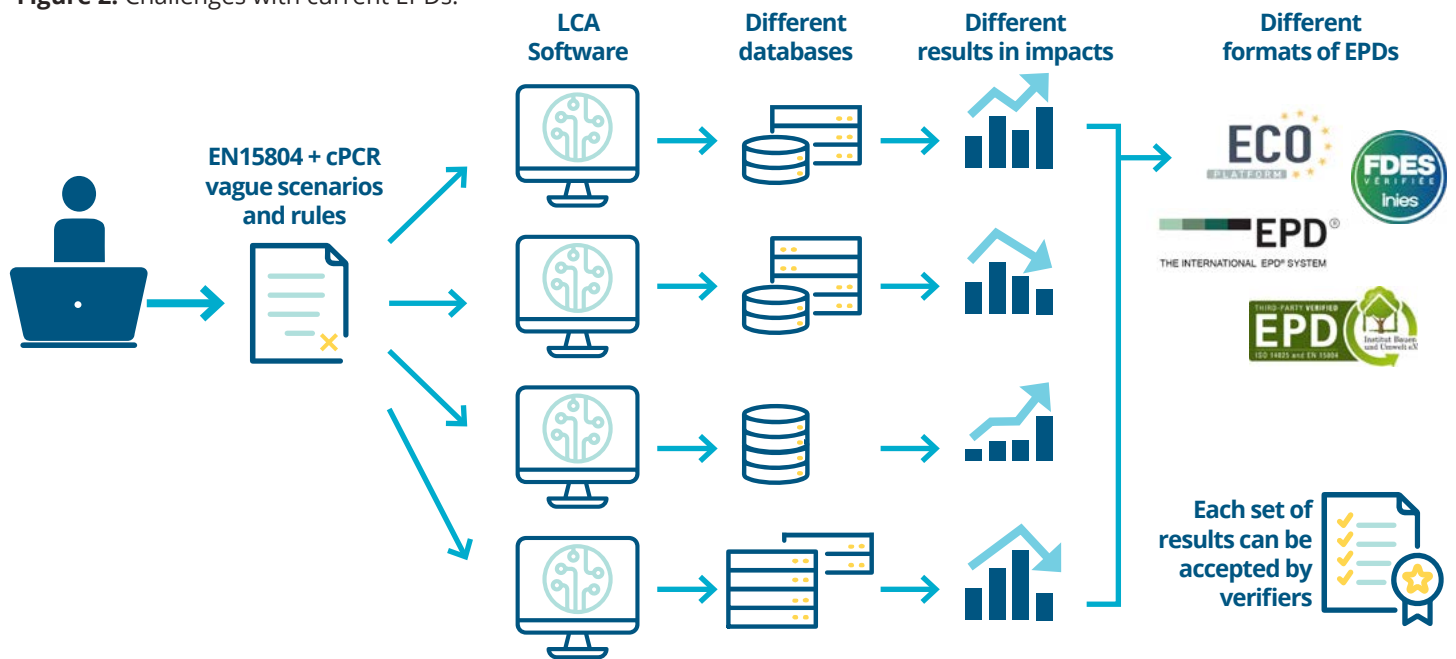
## CHALLENGES WITH CURRENT ENVIRONMENTAL PRODUCT DECLARATIONS

In practice, aspects of the EN 15804 and PCR have been subject to varying interpretations by professionals and the value chain: varying assumptions have been made due to vague rules and scenarios (e.g. declared units and end of life scenarios) and poor quality data selectively and/or inappropriately used. A harmonised approach to the practical application of the standard is still lacking.

Concerns with current EPDs are summarised below and in Figure 2:



<sup>4</sup> Source: Interview with Baijia Huang, ROCKWOOL International, 2021.

Figure 2: Challenges with current EPDs.<sup>5</sup>

EPDs created in different ways can lead to significant discrepancies in the results of a whole building assessment and can make comparison of similar projects misleading. EPDs are typically created using many assumptions and proxies, all of which introduce uncertainties that will need to be reduced to improve reliability of carbon measurement and gain the confidence of the built environment stakeholders to adopt WLC thinking.



## RECOMMENDATIONS

### USING ENVIRONMENTAL PRODUCT DECLARATIONS AS A RELIABLE DATA SOURCE FOR WHOLE-LIFE CARBON MEASUREMENT AND REGULATION WOULD REQUIRE:

Making EPDs mandatory under Construction Product Regulations and extending Construction Product Regulations to apply to all products placed on the market either via the hEN (harmonised standards) or European Assessment Documents system.

The existence of a single common PCR per product category across Member States and Programme Operators for all products, agreed and mandated at EU level.

Establishing a single EU LCA impact database for raw materials, energy and transport.

Incentivising the use of supplier specific LCA impact data/EPDs.

The use of generic 'industry average' LCA impact data/EPDs should be allowed only if data from the specific supplier is included in the generic LCA impact data/EPDs.

Reflecting realistic end-of-life scenarios at likely end-of-life dates, which may vary from current practices and may be different depending on the type of material.

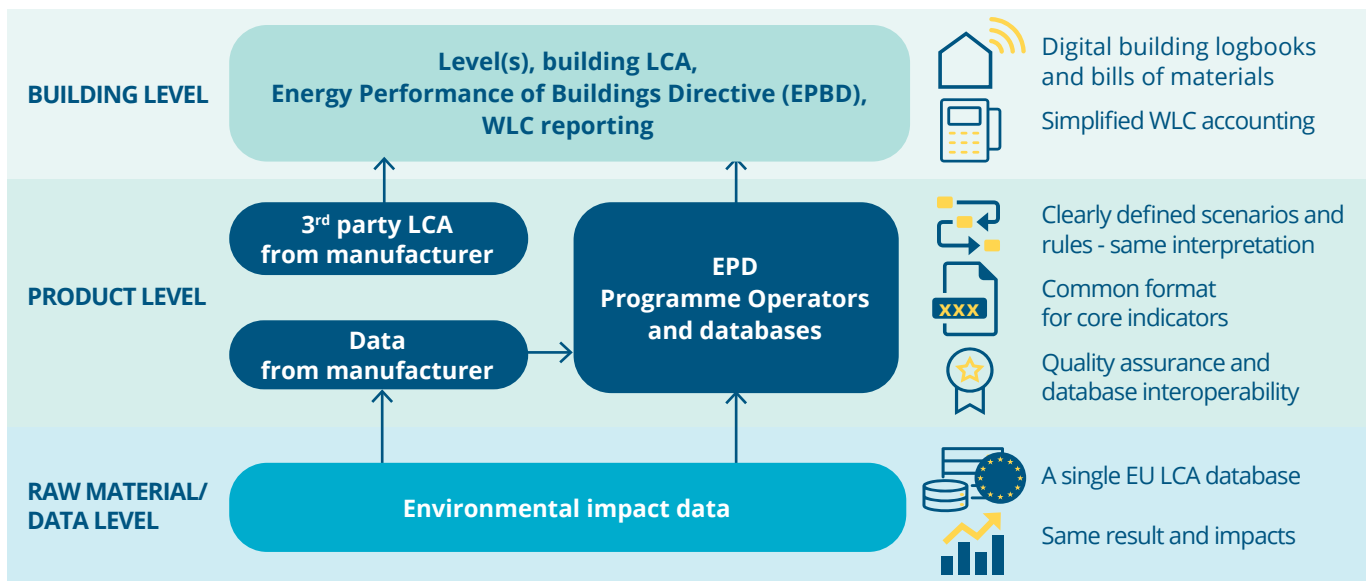
Understanding of the opportunities for improvements based on the European Commission's Product Environmental Footprint (PEF) methodology.

Digitalisation of information according to a harmonised format to facilitate interoperability with building assessment tools.

<sup>5</sup> Source: Interview with Baijia Huang, ROCKWOOL International, 2021.

Based on the recommendations above, going forward it will be important to ensure that all the carbon data sources on the different levels (building, product and data/raw material) are linked to each other to deliver consistent results.

**Figure 3:** Linking carbon data sources, EPD data and building level assessments.



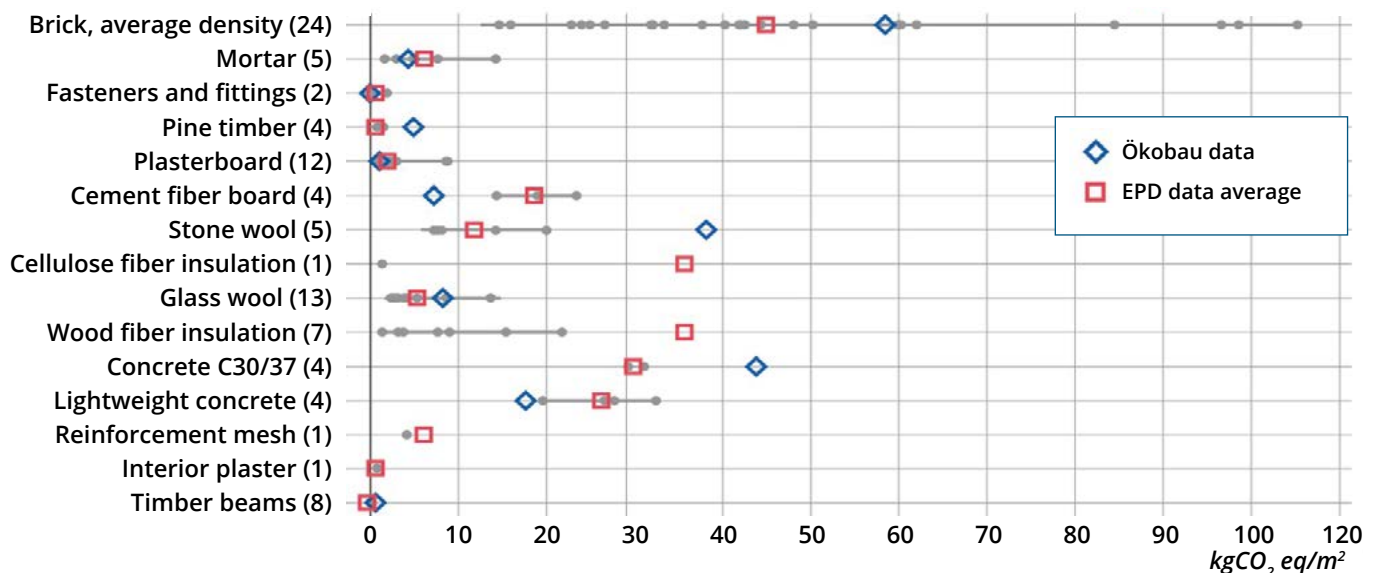
# OUTLOOK

## ENVIRONMENTAL PRODUCT DECLARATION AND BUILDING LEVEL WHOLE-LIFE CARBON MEASUREMENT

EPDs are increasingly available to the construction sector as a recognised resource for calculating and documenting the embodied carbon of products, although they are not yet mandatory. There are further limitations on the use of EPDs for comparison and there is a need to harmonise EPDs and PCR.

Figure 4 below shows the LCA results from a Danish study and Global Warming Potential of materials making up exterior walls. The study compared EPD data with generic EPD data from Ökobau (an environmental database managed by the German Federal Ministry of the Interior). The grey dots represent different EPD data points, while the red squares indicate the EPD average for specific materials. The blue squares represent the Ökobau data. The quality of LCA largely depends on the EPDs used. The report concludes “that there is a large spread in emissions for different material groups, and that the use of accurate data for materials will give us a more accurate result when we calculate the climate impact of buildings”.

**Figure 4:** Spread of GWP of different material groups according to different data sources.<sup>6</sup>



<sup>6</sup> Source: Birgisdóttir et al (2021).



EPDs cannot be used to compare the environmental performance of two different materials... and, very often, not even two similar products.<sup>7</sup>

Policies aiming to compare products across categories should consider a building-level approach and use whole building life cycle assessment (LCA).<sup>8</sup>



#### PRODUCT-LEVEL AND BUILDING-LEVEL APPROACHES

##### PRODUCT-LEVEL APPROACH

Focuses on the embodied carbon impact of individual construction materials and incentivises transparency and market demand for products made with lower environmental impact.

##### BUILDING-LEVEL APPROACH

Focuses on the embodied carbon impact of a building as a whole. It considers not only the choice of materials according to their carbon impact, but also material efficiency, re-use, fitness for purpose, lifespan and circularity.



## STEPS TO DEVELOP WHOLE-LIFE CARBON LIMITS IN BUILDINGS

- 1.** The first step in developing WLC limits in buildings is to improve the consistency of EPDs and approaches for calculating embodied carbon at the product and building levels.
- 2.** The next step is to set voluntary requirements based on common standards and agreed methodologies. New construction and public buildings should be required to assess and disclose information on embodied carbon emissions. Making WLC reporting mandatory will facilitate data collection and benchmarking, as well as allow the construction sector to become familiar with WLC accounting and the sourcing and supplying of EPDs, without placing an undue burden on the industry.
- 3.** Ultimately, mandatory minimum WLC standards that will be strengthened over time will have to be introduced.

## KEY TAKEAWAY

Regulating the WLC footprint of buildings will require measures targeting both products and buildings. Introducing WLC considerations in the EPBD and building regulations should start with reporting requirements and improving carbon data consistency. Once comparable data and reliable measurement are available, minimum thresholds and target values could be introduced.

<sup>7</sup> Meaningful comparisons between products would ideally take place by functional units and would require thorough LCA literacy from design teams.

<sup>8</sup> Lewis, M., Huang, M., Waldman, B., Carlisle, S., and Simonen, K. (2021) Environmental Product Declaration Requirements in Procurement Policies. Carbon Leadership Forum, University of Washington. Seattle, WA.



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