STRENGTHENING ENVIRONMENTAL PRODUCT DECLARATIONS

COMMUNICATING THE ENVIRONMENTAL IMPACTS OF CONSTRUCTION PRODUCTS ACCURATELY AND TRANSPARENTLY

OCTOBER 2024

ecos

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For the EU to achieve the 55% greenhouse gas reduction target by 2030 and net zero by 2050[1], embodied impacts of construction products must be addressed as a priority. Construction products are among the most polluting and carbon-intensive products on the EU market, representing a carbon footprint of 250 million tonnes of CO_2eq per year[2]. Up to one-fifth[3] of these impacts are embodied, meaning they occur throughout a product's lifecycle. In addition to CO_2 emissions, construction is the industrial sector most dependent on raw materials[4], extracting 1.6 billion tonnes per year. With selective deconstruction – demolishing only what cannot be reused, depolluted, or renovated – still not being the norm, buildings, by weight, generate over a third of the EU's waste annually[5].

With approximately 97% of the EU building stock to be upgraded[6], sufficiency and proactive material selection can significantly reduce extraction and embodied carbon in the construction sector[7]. **But a more sustainable material selection can only happen if the information on the environmental performance of products is reliable, comparable, and robust.**

Together with legislative incentives to decarbonise products, such as requirements on embodied carbon, or Green Public Procurement (GPP) criteria, disclosure of environmental information remains a key pillar to assessing, monitoring, and comparing a product's environmental performance. **To disclose environmental information, Environmental Products Declarations (EPDs) are the most used tool in the construction sector**, with over 10,000 EPDs registered in 2021 in the EU[8]. The disclosure of environmental impacts, previously voluntary, in an important step forward, will become mandatory under the new Construction Products Regulation (CPR), providing an opportunity to address critical gaps in EPDs.

This paper addresses one gap in particular: transparency. The transparency of databases providing data for EPDs is often overlooked but significantly impacts their reliability. To drive the decarbonisation of construction products across the EU, **the foundation of how environmental information is calculated and disclosed must be improved to cover full environmental impacts.**

What are Environmental Product Declarations?

EPDs are provided by manufacturers to disclose environmental information across the construction value chain: to builders, architects, contractors, customers, and, most importantly, public authorities. An EPD is a document that presents a construction product's function, and the environmental impacts related to that function. These environmental impacts are calculated using a Life Cycle Assessment (LCA) methodology, assessing a product from extraction to end-of-life. In total, there are 19 environmental impact categories for construction products (Table 1).

Table 1. Core and additional environmental indicators in EN 15804+A2 and in Annex I.2 of the Construction Products Regulation (Source: ECOS)

		Indicators
Entry into force with the CPR	**Entry into force four years later**	**Entry into force 6 years later**
(a) climate change effects – total; (aa) climate change effects – fossil fuels; (ab) climate change effects – biogenic; (ac) climate change effects – land use and land use change.	(b) ozone depletion; (c) acidification potential; (d) eutrophication aquatic freshwater; (e) eutrophication aquatic marine; (f) eutrophication terrestrial; (g) photochemical ozone; (h) abiotic depletion – minerals, metals; (i) abiotic depletion – fossil fuels; (j) water use.	(k) particulate matter; (l) ionizing radiation, human health; (m) eco-toxicity, freshwater; (n) human toxicity, cancer; (o) human toxicity, non-cancer; (p) land use related impacts.

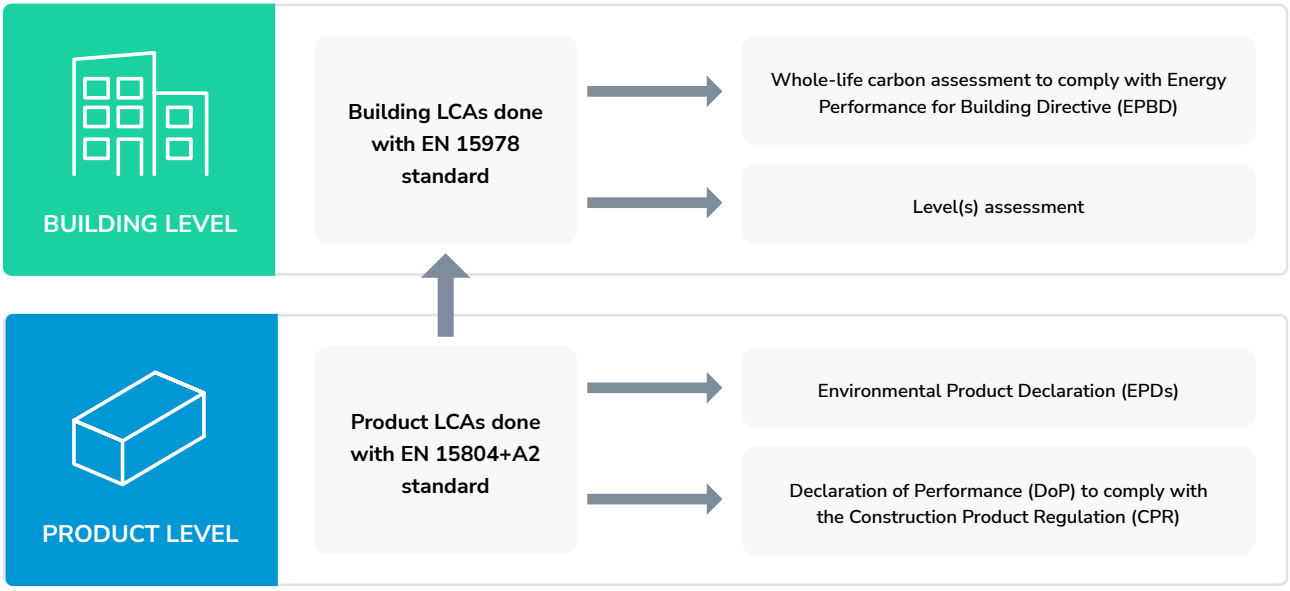
EPDs are not only used for environmental disclosures of construction products. They also play a role in monitoring, assessing, and reducing environmental impacts of buildings (Figure 2).

Figure 1. The link between LCAs and EPDs (Source: adapted from Ecochain)

The recently revised EU Energy Performance of Buildings Directive (EPBD) requires every Member State to assess, monitor, and report lifecycle Global Warming Potential (GWP) – often referred to as Whole Life Carbon (WLC) – emissions for new constructions[9]. By 2030, based on guidance from the EU, countries will have to develop national roadmaps with targets on how to reduce WLC emissions[10]. Additionally, renovation rates must be doubled by 2030[11] to reduce energy use and greenhouse gas emissions, as well as counter inevitable material use and waste generation of new constructions. **Robust and transparent information from EPDs is an essential aspect of calculating emissions from buildings, that must reach designers, architects, contractors, owners, tenants, and ultimately policymakers.**

These assessments will be based on the European standard EN 15978:2011. The standard has already been the basis of voluntary assessments using Level(s)[12], a methodological toolkit for assessing and reporting on the sustainability of buildings. This voluntary framework is based on six macro-objectives. Whole Life Carbon, material efficiency, water use, health and comfort, climate change adaptation, long-term costs, and value. These address key sustainability aspects throughout a building's life cycle. EPDs provide data on construction products regarding different macro-objectives of Level(s). However, its application has been limited to a relatively low number of pilot buildings in the EU, while the EPBD will require the assessment of a larger share of buildings.

Figure 2. EPDs at product and building level (Source: ECOS)



From voluntary to mandatory

Addressing the non-harmonised European regulatory patchwork, **the newly revised CPR now requires disclosure of environmental information before placing products on the European market**[13]. The assessment[14] will have to be conducted following the same standard as EPDs: EN 15804+A2. Environmental impact assessment results will be delivered in the Declarations of Performance (DoPs). DoPs and EPDs are expected to coexist in the near future.

A full EPD is a widely used practice in many Member States and focuses on disclosing all relevant environmental impacts. However, **the new CPR requires disclosure of environmental impacts in a stepwise approach**[15], **adding unnecessary complexity.**

What are Declarations of Performance?

Under the revised CPR, manufacturers are legally required to provide a Declaration of Performance (DoP) to receive the CE marking for their products, gaining access to the EU market. Through this document, manufacturers declare the intended use of products and their performance against the so-called essential characteristics, laid out in standards. These include parameters such as mechanical performance or fire resistance. With the new CPR, environmental information will also have to be included in the DoP.

Life Cycle Assessment of construction products

LCA is an established methodology[16] assessing the whole life cycle of a product[17]. A specific European standard for LCA of construction products was developed by the European Committee for Standardisation (CEN): EN 15804[18]. This standard has been improved since its original publication in 2008 with its last iteration being EN 15804+A2 in 2019. It contains core rules on how to conduct LCAs and how to present the required information in EPDs, providing results corresponding to environmental indicators (Table 1 **above**).

The LCA calculates the environmental impact of the product's life cycle – production, transport, installation, repair, maintenance, and end of life. The life cycle stages are identified with codes. For example, stage A1 encompasses all consumption and emissions linked to extraction (Table 2).

Table 2. Stages of an LCA defined in EN 15804+A2 (Source: ECOS)

Product lifecycle															Supplementary information
Product			Construction		Use stage							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw materials supply	Transport	Manufacturing	Transport	Construction	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction Demolition	Transport	Waste processing	Disposal	Re-use Recovery Recycling potential

EN 15804+A2 lists a broad range of 19 environmental impacts[19], such as impacts on climate change or water use (Table 2). For a complete LCA, according to EN 15804+A2, all the stages (A1-D) need to be assessed. In EPDs, all the data results per life stage and environmental indicator must be presented.

Part of the data used for LCAs is **specific (or primary) data** directly accessible from the supply chain and production process. **Generic (or secondary) data** is derived from databases representing industry averages, which cannot account for variations in actual practice. For example, there will be a figure for the average fossil CO_2 emissions of a 16-tonne lorry transporting a tonne of goods over one kilometre. In practice, there will be different types of lorries, fully or half-loaded with different drivers on different roads, at different inclines. The databases also contain averages representing material and energy consumption as well as emissions corresponding to this transportation process. **The standard EN 15804+A2 states[20] that primary data must be used whenever possible – and secondary data may only be used to fill data gaps with conservative assumptions following a plausibility check.**

LCAs are complicated assessments requiring rigorous data quality. Without it, calculations found in EPDs may be skewed. Independent and external verification is required to assess the data quality and its alignment with EN 15804+A2.

Data must reflect the real environmental impacts of construction products – ECOS recommendations

Improving environmental information on construction products is crucial for advancing sustainable building practices and reducing the ecological footprint of this highly polluting industry. This can only happen with high-quality information that is also effectively communicated. Instead, **varying levels of data quality and a lack of transparency prevail in today's market.**

Four main priorities need tackling to improve the transparency and accuracy of EPDs:

Require immediate full disclosure of environmental impacts. This will enable end users to effectively compare the sustainability of construction products.

Promote the use of primary data by disclosing the ratio of such primary data used for each environmental indicator. This new metric is crucial as it will allow end users to gauge data quality in an EPD.

Create an EU background database, which will provide increased quality and transparency of generic data.

Disclose extracted raw materials. By requiring disclosure of the overall quantity of extracted materials in EPDs, comparison across sectors will be possible.

EPDs can only work with full disclosure of environmental impacts

Until now, differing requirements across EU Member States on what environmental impacts to disclose have prevented proper comparison and monitoring of EPDs. The new CPR's stepwise approach - focusing on gradually requiring disclosure of environmental impacts - misses the opportunity to immediately harmonise EPDs. This is because certain environmental indicators are being prioritised over others.

For example, in France and Belgium, national regulations require[21] disclosure of core and *additional indicators* (Table 1). In contrast, other Member States, such as Germany in the IBU database[22], still allow for EPDs to focus on core indicators only, making a holistic approach to building-level calculations impossible[23].

With the new CPR, **full mandatory disclosure of environmental information – from climate change impacts to human toxicity – will only happen six years after the CPR enters into force.** Between then and the date of entry into force (most likely end-2025), manufacturers will only be required to disclose information concerning their climate change effects[24].

> **"The construction industry is among those most dependent on natural resources.**

Four main reasons support an immediate disclosure of all environmental impacts:

- The standard EN 15804+A2 requires full disclosure of core environmental impacts, leaving disclosure of additional indicators optional. However, even in Member States where it is not mandatory, manufacturers still often disclose the full impacts of their products in EPDs.

- LCA calculations according to EN 15804+A2 do not require additional data inputs for additional indicators, as they are all calculated simultaneously.
- Decision-makers – whether regulators, architects, or customers – need all available information to make informed decisions based on the product's intended use. Delaying full disclosure of information (such as particulate matter or eco-toxicity impacts) by 6 years undermines the purpose of LCAs.
- The construction industry is among those most dependent on natural resources[25]. Ignoring certain environmental indicators makes the accurate representation of a product's impact impossible. For example, a manufacturer who is considering switching to a lower-carbon energy source to reduce greenhouse gas emissions should be aware if this decision would result in an increase of land use[26]. However, under the new CPR, this piece of information would not be mandatory until 2031 at the earliest.

Respecting the hierarchy of data by including an indicator on specific data

According to the reference European standards for EPDs (EN 15804+A2), specific data (reflecting local conditions and technologies) must be preferred to generic data. Table 3 taken from EN 15804+A2 indicates where specific data should be used.

Despite the clear indication in the standard, the majority of EPDs remain based on a mix of specific and generic data, often lacking implementation of the clear rules posed by the standard.

Going forward, primary data should be prioritised. Only when indirectly accessible data is not available should generic data be used. This should be limited to downstream processes, such as recycling, and only in very specific cases, to upstream operations, such as raw materials extraction. In fact, specific data on raw material extraction is directly accessible when extraction occurs in the perimeter of a manufacturer's activities. When this is not the case, data from suppliers can be indirectly accessible upon request (Table 3).

Life Cycle Inventories (LCI) datasets and databases

LCI databases are central to current LCA-making as they are the source of generic (or secondary) data. Generic data are average data on the environmental footprint of specific processes or materials[27]. This information is regrouped into datasets, providing an estimation of material and energy consumption, emissions, and waste generated by a specific process. These datasets are regrouped in databases, containing thousands of LCI datasets. Some of the most used in Europe are the European Commission's Product Environmental Footprint database and Ecoinvent.

> **"Going forward, primary data should be prioritised.**

Table 3. Application of generic and specific data (Source: EN 15804+A2)

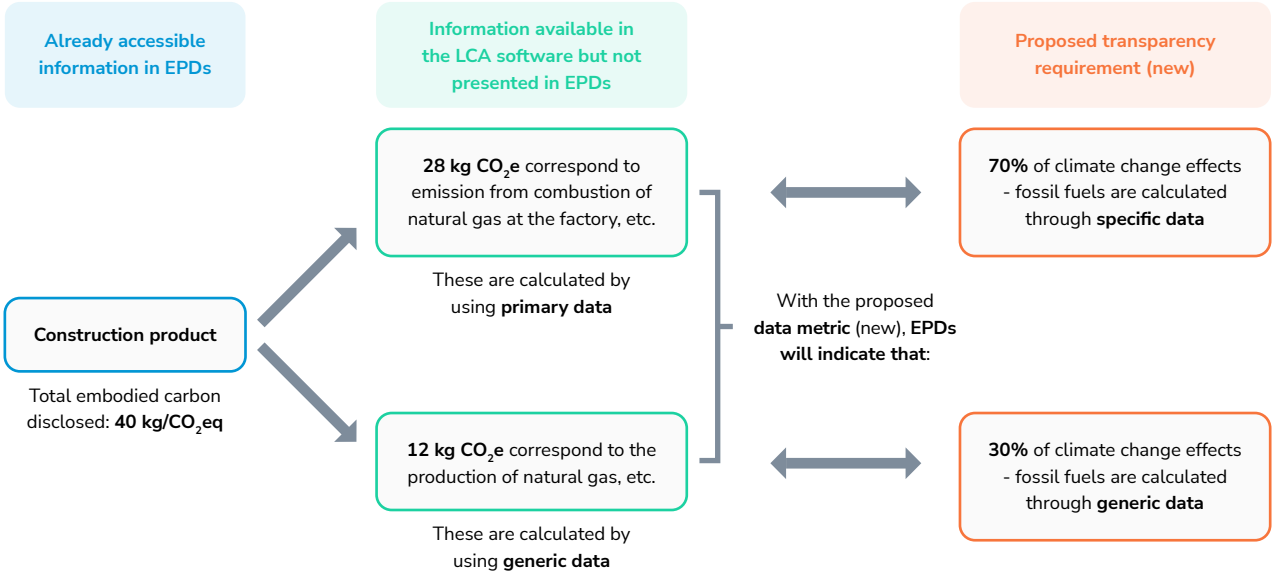
Modules	Module A1-A3		A4 and A5	B1-B7	C1-C4
	Production of commodities, raw materials	Product manufacture	Installation processes	Use processes	End-of-life processes
Process type	Upstream processes	Processes the manufacturer has influence over	Downstream processes		
Data type	Generic data	Manufacturer's average or specific data	Generic data		

This issue on data is not unique to the European EPD system. In April 2024, the United Nations Industrial Development Organization (UNIDO) recommended introducing a new metric representing the proportion of primary data to total data used[28]:

> **By 2026 (to) develop or endorse a mechanism to account for and disclose the proportion of emissions represented by primary data in an EPD. This should include data for direct and indirect emissions from energy sources and material inputs.**

Such a metric should be developed for the European EPD system, to ensure a wider prioritisation of primary data. **It should represent the percentage of the total impact (Modules A+B+C) calculated using specific data.** This needs to be done for each environmental indicator. **With a simple disclosure, this has the potential** to enhance transparency in reporting, by having manufacturers disclose the share of primary and secondary data for each impact.

Figure 3. Example presenting how to implement specific and generic data metrics in practice (Source: ECOS)



The urgent need to converge to an EU background database

Different databases exist, yielding different results on the environmental performance of construction materials. The European Commission must lead the way with an EU-wide database for environmental lifecycle information to ensure high data quality, accessibility, and transparency.

In the EU, there are two main background LCI (Life Cycle Inventory) databases providing generic data for LCA: Managed LCA Content (MLC) - formerly GaBi, and ecoinvent. The former is developed by Sphera, a US-based company[29], while the latter is an independent association set up by Swiss academic research institutes[30].

The two databases differ greatly in the granularity of information they provide. For example, for cardboard packaging of a construction product, ecoinvent provides information on the different steps in manufacturing the cardboard, such as bleaching, pulp production, and transport. This information is communicated from the upstream user (cardboard manufacturer) to the downstream user (manufacturer of the construction product), using ecoinvent's database. MLC, in contrast, only provides aggregated datasets, without giving access to the underlying data.

Underlying data is important as both LCA practitioners and verifiers must confirm the plausibility of calculations following EPDs rules (EN 15804+A2)[31]. Enforcing granularity will finally allow for a more reliable system of checks and corrections. At present, data that is too highly aggregated forces practitioners and verifiers to assess it without appropriate access.

Despite its drawbacks, the new CPR does take a step in the right direction: the European Commission will have to provide a free-of-charge database for EPDs in the EU[32].

While this software tool does not yet exist, it will be legally needed as soon as reporting on climate change impacts becomes mandatory in 2025[33]. A centralised database **will ensure the same level of data quality and transparency for generic data covering construction products across the EU**. This will help prevent generic information on similar products yielding different results in different countries.

To be effective, a common EU database must be built on robust quality and transparency requirements. While traces of these requirements already exist (notably in standard EN 15941[34]), they are largely insufficient, as they focus exclusively on delivering information to verifiers, confidentially. Even then, most of the existing requirements remain simple recommendations. To ensure transparency and quality are mainstreamed in environmental lifecycle data for construction materials, extensive criteria should be made mandatory[35].

> **A common EU database must be built on robust quality and transparency requirements.**

Integrating circularity through the disclosure of information on raw material use

Raw material quantities in final products do not reflect **the actual quantities extracted. This represents a missed opportunity for EPDs, which only report on final product quantities.** For example, producing 1 kilogram of aluminium from virgin materials requires the extraction of at least 4.5 kilograms of bauxite ore[36].

Fortunately, LCIs do include the quantities of raw materials extracted. With the building sector responsible for half of the EU's material extraction[37], **EPDs should be reformed to transparently report on raw materials necessary to manufacture a product.**

While the EU acknowledges the importance of moving towards a circular economy[38], the construction industry remains mostly linear. Natural resources are extracted at an alarming rate with the intention to be used once – with the majority ending up being downcycled[39].

> **Natural resources are extracted at an alarming rate with the intention to be used once.**

Despite the importance of a transition towards a circular economy, EPDs currently provide little to no information on raw materials used. To give an example, for concrete bricks, an EPD normally reports information on recycled materials (secondary materials), which, in this case, consist of quarry dust material[40]. Yet, that's far from enough: **no information on primary materials used or total amount of raw materials used overall is currently reported by an EPD**. This fails to provide a comprehensive picture of what percentage of materials is effectively recycled compared to what was extracted specifically for this product.

To make decisions based on the effective impacts in the extraction phase, EPDs must provide better information on circularity, to better assess and ultimately compare products.

To do so, **two additional sets of information** (in the form of LCI output flows) **must be introduced** to complement the currently reported information on secondary raw materials:

- **Primary raw material** (expressed in kg): this set of information will inform on volumes of virgin materials effectively extracted from the environment.
- **Total raw material** (expressed in kg): this will provide overarching information on the sum of primary and secondary materials used to manufacture a product.

To make the construction sector truly circular, information on extracted and secondary materials must be better integrated into the EPD system. This will support improvements in the manufacturing process, thus reducing overall extraction.

While these might seem like a new information requirement, no additional input work will be required from manufacturers or LCA practitioners. In fact, these sets of information are already needed for regular EPD calculations. From a practical standpoint, this will only entail updates to the output template used in the LCA software, as the calculations on these flows are already performed nowadays but the results are not displayed in EPDs.

Moreover, the addition of new flows is nothing new to the EPD system. The most recent review (2019) saw the inclusion of new flows related to energy.

About ECOS

ECOS - Environmental Coalition on Standards is an international NGO with a network of members and experts advocating for environmentally friendly technical standards, policies, and laws. We ensure the environmental voice is heard when they are developed and drive change by providing expertise to policymakers and industry players, leading to the implementation of strong environmental principles.

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