



Global Cement and Concrete
Association

ENVIRONMENTAL PRODUCT DECLARATIONS

An introduction to EPDs and how the GCCA
software tool can help businesses

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Introduction



As we look to address the climate challenge with greater urgency, the demand for sustainable construction is increasing. The carbon footprint of building materials is driving procurement decisions, with governments and designers increasingly requiring Environmental Product Declarations (EPDs) to show their environmental impact.

The cement and concrete sector is playing a key part in sustainable construction, with a full roadmap to decarbonisation by 2050. But demonstrating this requires transparent, objective and accessible data on the environmental impact of our products.

EPDs allow producers to transparently and objectively show the environmental impact of their products across a number of key metrics, including global warming potential, which is commonly referred to as carbon footprint.

This document will show you how EPDs work, what they provide and how they can enable you to help build a more sustainable world of tomorrow.

Summary:

This document provides an overview on EPDs and the GCCA tool. EPDs are fundamental in Low Carbon Procurement and are increasingly requested by clients. The GCCA EPD tool is a cost effective and efficient means for companies to meet the growing demand for EPDs.



For more information, please visit
gccassociation.org/sustainability-innovation/environmental-product-declarations

What is an EPD?

EPDs provide objective, transparent and comparable information about a product and serve as an environmental label or declaration.

2050 mission

The cement and concrete sector is playing a key part in sustainable construction, with a detailed roadmap to decarbonisation by 2050



You can use an EPD to report your carbon footprint."

An Environmental Product Declaration (EPD) is an independently verified report on the environmental impact of a product throughout its life cycle. The impact of the product is calculated via a Lifecycle Assessment (LCA) which conforms to the requirements of the relevant Product Category Rules (PCR).

An official EPD typically consists of two documents: the public EPD document summarising the environmental impact of the product (LCA results) and the private background report. Using the private background report, the finished document is verified by an approved Program Operator and published on one of the publicly available online platforms.

EPDs provide objective, transparent and comparable information about a product and serve as an environmental label or declaration. An EPD will usually remain valid for five years – unless there are major changes to production practices, or environmental impacts of energy and input materials change.



Why are EPDs important?

The publishing of a third-party verified EPD by a manufacturer indicates a transparent, robust and credible step in the pursuit and achievement of real sustainability in practice.



EPDs are fundamental to low carbon procurement and are increasingly requested in public and private procurement."

- EPDs are fundamental to low carbon procurement and are increasingly requested in public and private procurement such as the UN sponsored Industrial Deep Decarbonisation Initiative (IDDI) low carbon procurement initiative
- EPDs support the embodied carbon challenge by making the environmental impact of products and materials more visible hence allowing steps to be taken to reduce the impact
- Increasingly clients want manufacturers to provide them with sustainable building products and are requesting EPDs
- EPDs help designers develop lower carbon solutions as they enable the embodied carbon calculation that, together with operational carbon calculations, support whole life whole project carbon analysis
- EPDs help manufacturers to measure and reduce their environmental impact and benchmark their performance
- EPDs are an open and objective way to demonstrate the manufacturer's commitment to environmental impact transparency



LCA and PCRs

A Life Cycle Assessment (LCA) measures the environmental impacts of each distinct part involved in creating and using products and services, such as energy used in production, fuel used in transport, and end-of-life ecological costs.

This helps comparison between products, materials, and methods used, providing useful information by which to make decisions that could help the environment.






The Product Category Rules (PCR) provide the instructions for how LCA should be conducted. It sets out what needs to be considered, including but not limited to:

- System boundaries, i.e., which processes and stages of the product's life cycle need to be considered
- Declared/functional unit: the amount, weight, performance and service life of the product being assessed

- How to define the use phase and end-of-life options
- What impact categories need to be assessed

The LCA data calculations and processes behind an EPD use Life Cycle Inventory analysis (LCI) according to the ISO 14040 standard which describes the principles and framework of conducting an LCA. ISO 14025: "Environmental labels and declarations – Type III environmental declarations", is a specific standard for developing the declarations and labels based on an LCA. The standards seek to ensure LCAs and EPDs are uniform so that EPDs can be used together to assess whole project whole life impacts, and to enable comparison of EPDS of functionally equivalent products.

Life Cycle Assessment Stages:

 Product Stage	 Construction	 Use Stage	 End of Life	 Benefits and Loads Beyond the System Boundaries
A1 Raw Material Supply A2 Transport A3 Manufacturing	A4 Transport A5 Construction Process	B1 Use B2 Maintenance B3 Repair B4 Refurbishment B5 Repacement B6 Operational energy use B7 Operational Water use	C1 Deconstruction C2 Transport C3 Waste Processing C4 Disposal	D Reuse, Recovery and/or Recycling

For Cement: The PCR limits the scope of LCA to A1 to A3 because cement is a constituent of concrete products

For Concrete:

- The European PCR which is used widely around the world, covers all life stages, apart from B6 and B7. For projects where concrete contributes to B6 through energy efficiency, design teams must account for this elsewhere in their calculations
- The current North American PCR is limited to A1 to A3

The GCCA tool enables users to analyse and report all stages apart from B6 and B7

Program Operators, EPD Systems & Databases

A program operator can be a company or a group of companies, industrial sector or trade association, public authorities or agencies, or an independent scientific body or other organisation.

Program Operators

Europe (larger operators):



North America:



The program operator is responsible for verifying the EPD and managing the platform on which it is published. A program operator could also be an EPD system program operator.

The EPD system program operator is an independent agency which conducts, administers and supervises the development of an EPD, develops PCRs and publishes General Program Instructions (GPI) describing the processes and procedures for developing an EPD. Usually, each country has its own program operator(s) and thus their own EPD system. You are not necessarily limited to work with the program operator from the country that you are manufacturing or selling your products.

The most important factor when choosing a program operator is making sure that the resulting EPD will comply with the right standards for you and your customers.

Eco Platform

The Eco Platform is an international non-profit association whose main goal is to act as an umbrella organisation for EPD Program Operators in Europe and harmonise European EPD Systems. An EPD published on Eco Platform's database (ECO Portal) allows for recognition across Europe and can be used in international markets as well. The digital format accepted on Eco Platform's database is ILCD+EPD.

EC3

The Embodied Carbon in Construction Calculator (EC3) is a free digital database of construction EPDs and matching building impact calculator for use in design and material procurement provided by Building Transparency. The digital format accepted on EC3 is OpenEPD.




The Global Cement and Concrete Association (GCCA) has developed an Industry EPD Tool designed to facilitate the cement and concrete sector's ongoing efforts to reduce its environmental impact and support global sustainability goals.


The GCCA EPD tool can provide a **"cradle-to-gate"** (A1-A3) environmental impact assessment for aggregates, clinker and cement, and a **"cradle-to-grave"** (A1-D) assessment for concrete and precast products.

- A **self-declaration (not a validated official EPD)**, containing the main general/background information and the environmental performance (LCA results) of the specific product for all indicators.
- A **background report** with the complete set of input data and results of the specific product required to produce an EPD and allow third-party verification.

Self Declaration output. The GCCA EPD tool reports more than 40 indicators. ▶



Industry EPD Tool for Cement and Concrete

 GCIA
International concrete

opened concrete MIX - 7344 (GB)

Materials

⚠ Error map

In order to improve the quality and representativeness of the EPD, it is strongly recommended to use **primary data** whenever possible. This will also facilitate the verification process and improve the chances of success when filing for a verified EPD. The criteria for the inclusion of inputs and outputs or other self-declared data are listed below (see the EPD and its associated document).

 The declared unit is: **1 m³ of ready-to-use concrete.**

	Mass balance: 7190 kg per declared unit
	Mass of biogenic carbon in the product: 0.0 kg per declared unit
	Mass of biogenic carbon in the packaging: 0.0 kg per declared unit

New materials

Specific cement

+ Add exchange Cement, user defined

Default cement

Cement default:

	Quantity	Transport mode	Distance
300	kg	Truck	100 km
		Rail	100 km

+ Add transport ...

+ Add exchange Cement default

Primary raw materials


aggregates, natural

	Quantity	Transport mode	Distance
1000	kg	Truck	50 km

+ Add exchange ...

Secondary materials, products

+ Add exchange ...

 Global Cement and Concrete Association	Environmental Data Sheet Self-declaration Self-declaration based on Envirodec - c-PCR-003 Concrete and concrete elements (EN 16757) C30/35 mix 1															
	Core environmental impact indicators															
		A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-tot	kg CO ₂ eq.	2.6962	1.0561	1.0561	0E0	-	-	-	-	-	-	8.9960	8.9960	0E0	1.3261	0E0
GWP-GHG	kg CO ₂ eq.	2.7362	1.0561	1.6661	0E0	-	-	-	-	-	-	9.9960	8.9960	0E0	1.3261	0E0
GWP-fos	kg CO ₂ eq.	2.7362	1.0561	1.6661	0E0	-	-	-	-	-	-	8.9960	8.9960	0E0	1.3261	0E0
GWP-bio	kg CO ₂ eq.	8.08E-2	4.26E-3	6.7E-3	0E0	-	-	-	-	-	-	1.6E-3	6.56E-3	0E0	8.71E-3	0E0
GWP-luc	kg CO ₂ eq.	4.06E-2	3.68E-3	4.65E-3	0E0	-	-	-	-	-	-	1.13E-3	5.34E-3	0E0	7.08E-3	0E0
ODP	kg CFC111 eq.	8.45E-6	2.08E-6	1.78E-6	0E0	-	-	-	-	-	-	3.44E-6	1.54E-6	0E0	4.3E-6	0E0
AP	mol H ₂ eq.	9.14E-1	3.47E-2	1.05E-1	0E0	-	-	-	-	-	-	9.42E-2	4.18E-2	0E0	1.26E-1	0E0
EP-fw	kg P eq.	2.91E-4	8.37E-4	2.08E-3	0E0	-	-	-	-	-	-	4.02E-4	1.23E-3	0E0	1.54E-3	0E0
EP-mar	kg N eq.	2.01E-3	7.06E-5	6.5E-5	0E0	-	-	-	-	-	-	3.7E-5	9.06E-5	0E0	1.46E-4	0E0
EP-ter	mol N eq.	2.24E0	7.7E-2	3.84E-1	0E0	-	-	-	-	-	-	1.33E-1	1.17E-1	0E0	4.52E-1	0E0
AC	kg NMOV eq.	5.6E-1	3.31E-2	1.05E-1	0E0	-	-	-	-	-	-	1.22E-1	3.85E-2	0E0	1.33E-1	0E0
ADP	kg Sb eq.	1.22E-4	2.03E-5	1.06E-5	0E0	-	-	-	-	-	-	2.66E-6	1.16E-6	0E0	1.44E-5	0E0
ADFP	mol nat. carbonic value	1.73E2	1.73E2	1.65E2	0E0	-	-	-	-	-	-	1.3E2	1.37E2	0E0	3.67E2	0E0
WDPE	m ³ world eq. depleted	1.53E2	2.27E0	1.01E0	0E0	-	-	-	-	-	-	7.67E-1	1.96E0	0E0	1.77E1	0E0

* The **Impact Value (green value)** indicates the CO₂ emissions from the Incineration of waste. The **net value (excluding the emissions from the Incineration of fossil waste)** is 2.43E2 kg CO₂-eq. It should be noted that this applies to **GWP indicators** only and is ignored for other indicators where gross is applied by default.

GCCA EPD tool features

* Recarbonation refers to the process where part of the CO₂ emitted during the cement production is re-absorbed by concrete in use through carbonation.

Version 4.0 (released May 2023) features:

- Create EPDs for aggregates, clinker, cement, concrete and precast elements
- Alignment with EPD International's GPI 4.0 and EN15804 + A2 v1.2 as well as North American PCRs (see Table 1)
- Detailed documentation covering LCA model and underlying data available
- Inventory data drawn from Ecoinvent (v3.5) database and industry
- Digital EPD export (ILCD+EPD format)
- Import and share EPDs within your organisation
- Provides a full "cradle-to-grave" (A1 to D) life cycle assessment for concrete and precast products including recarbonation*
- Independently verified, consolidated and user friendly; it does not require LCA expertise
- The Application Program Interface (API) can assist in automating the EPD production and publication process
- Gross/Net GWP reporting
- Biogenic CO₂ emissions reporting
- KPIs input for clinker

Table 1: PCRs and Standards

Version	EPD standard	PCRs	LCA standard	Independent verification standard
International	ISO 21930	<ul style="list-style-type: none">• Sustainability of Construction Works (EN 15804+A2 v1.2)• Cement and building lime (EN 16908)• Concrete and concrete elements (EN 16757)	ISO 14040 ISO 14044	ISO 14025
North American		<ul style="list-style-type: none">• PCR for Portland, Blended, Masonry, Mortar, and Plastic (Stucco) Cements (NSF International)• PCR for Concrete (NSF International)• PCR for Precast Concrete (NSF International)		

How to Create an EPD?

1

Step 1: Initial decisions

As a first step you need to define a strategy using the questions below, to ensure the resulting EPD is right for you and your customers.

Who will create the draft EPD?

You can either engage a consultant or produce a draft EPD in-house. Consultants can take care of all the steps involved in the EPD process, using the GCCA EPD tool if they wish on behalf of manufacturers. Alternatively, you can use the GCCA EPD tool to create draft EPDs at a much lower cost.

What type of EPD do you need?

Typically, an EPD covers one product manufactured by a specific company. Other types of EPDs include industry average EPDs and plant specific EPDs.

Which Program Operator and PCR?

Though selecting a program operator based in your country is not compulsory, many manufacturers choose to do so. Customers/buyers may require a specific program operator. All program operators under the Eco Platform umbrella mutually recognise each other's EPDs. The PCR selection depends on the product and whether a complementary PCR by the program operator is available.

2

Step 2: Data Collection

The data required in a life cycle assessment are described in the relevant PCR and fall into 3 main categories:

1. Manufacturing Data

Manufacturing data covering primary and secondary materials, energy consumption, process emissions, wastage and waste handling. Much of the data is already available in a process management system. Alternatively, average data, covering a recent 12-month period can be used. Since the data will be verified by an independent verifier you need to ensure that all values are representative, reliable and evidenced.

2. Transport Data

Transport data covers the transportation of materials to the manufacturing plant and the transportation of the final product to the client. Specialised databases, such as Ecoinvent, the one used in the GCCA EPD tool, already have much such data available.

3. End-of-life Data

End-of-life scenarios are described in the relevant PCRs and are based on common practises and available technology. The EPD should clearly mention any assumptions made.

3

Step 3: Life Cycle Assessment

Before commencing the assessment, you will need to define its scope.

A "cradle-to-gate" or product stage analysis covers modules A1-A3, i.e. before a product leaves the factory gate. A "cradle-to-grave" analysis covers the whole life cycle from module A1 to D.

EN 15804+A2 states that all construction products and materials shall declare modules A1-A3, modules C1-C4 and module D. Products which fulfil specific conditions (e.g. products physically integrated with other products during installation such as cement) could be exempt from this requirement. In North America, the PCRs for cement and concrete

are limited to cradle to gate, but the remaining modules can be declared as supplementary information.

With regards to the environmental impact indicators, the PCRs and EPD standards define which ones need to be reported. The GCCA EPD tool performs the LCA and reports all the required indicators with clear explanation. All the indicators are calculated according to the pre-verified LCA model. The LCA model is clearly explained in the accompanying documentation. A detailed user manual is also available. We suggest users read all documents prior to commencing an assessment.

4

Step 4: Draft EPD and Background Report

A draft EPD is prepared using the Program Operator's template, if one is available. The results of the LCA can be directly inserted in the draft EPD.

The background report (also known as LCA report) accompanies the EPD but it is not public. The background report lists the Life Cycle Inventory data and is provided to the third-party verifier. The GCCA EPD tool exports a background report in excel format, for each EPD that the user creates.

How to Create an EPD?

continued

5

Step 5: Verification

The background report and EPD document are sent to a third-party verifier once ready. Some Program Operators assign a specific verifier whilst others allow the EPD consultant/manufacture to choose the verifier, provided they fulfil certain criteria or are already recognised by them as an independent verifier.

The verifier reviews the documentation and provides feedback, suggestions for modifications, requires further information/clarification etc. Since the LCA model of the GCCA EPD tool is pre-verified, the third-party verifier does not need to spend time on verifying the calculations thus significantly reducing the time and cost of verification.

6

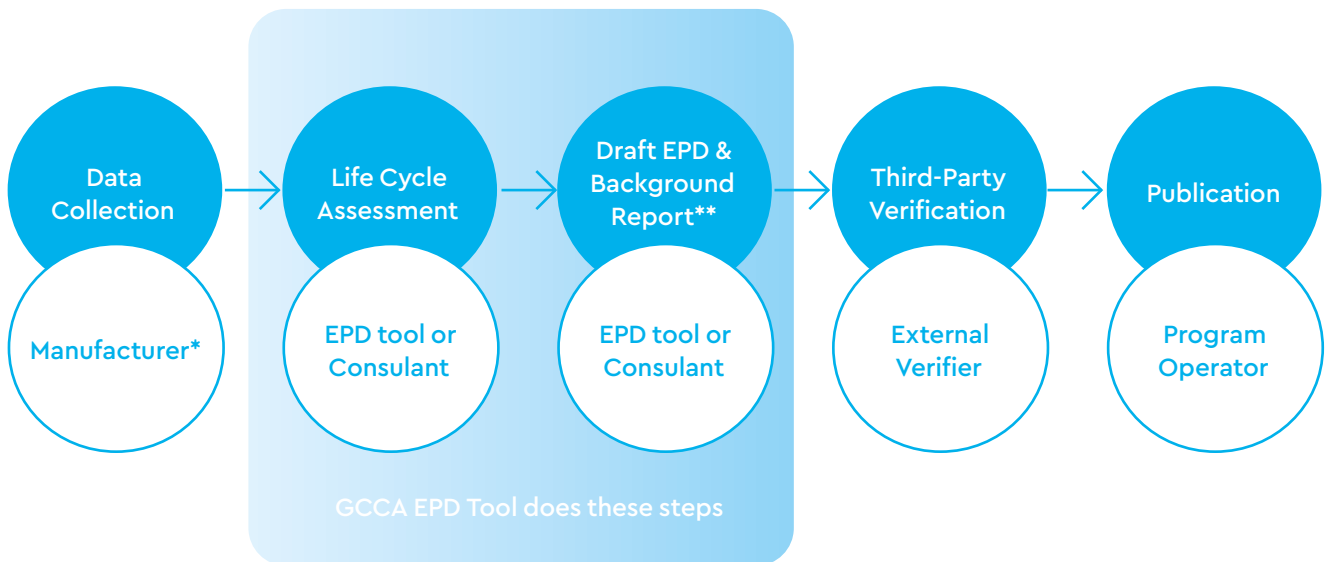
Step 6: Publication

The verifier provides a review statement for the EPD to get certified. The review statement is submitted along with the EPD documents to the Program Operator for certification and registration in the EPD database. A one-off fee usually applies for registering and publishing the EPD to the program operator and sometimes other fees apply, such as an annual subscription.

EPD developers and companies can utilise the GCCA EPD tool's API to automate the development process. For example, data can be automatically inputted into the tool from your company's management system and LCA results returned to a pre-made EPD template.

Traditional EPD Process

The traditional EPD process includes 5 stages with different responsibilities as illustrated below. The GCCA EPD tool and API enable automation of steps and interfaces.

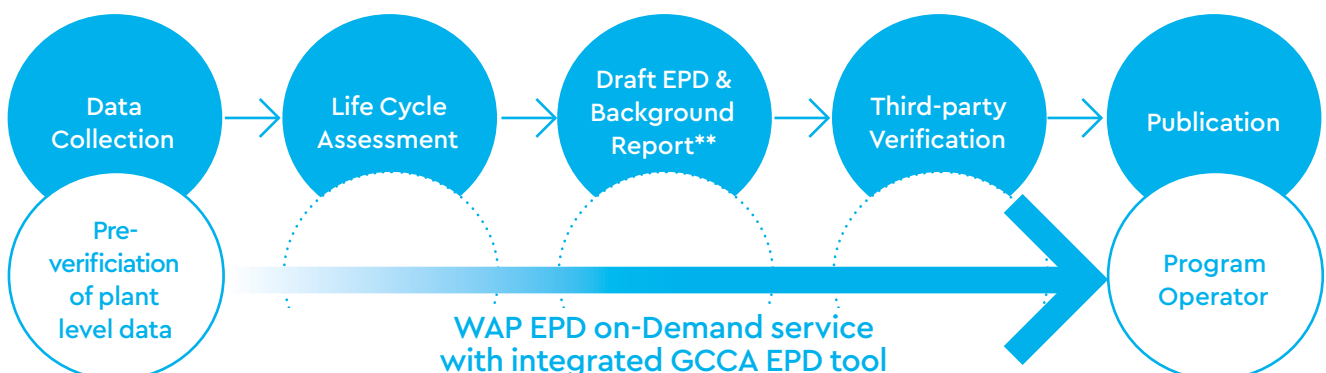


EPD on-Demand – GCCA/WAP Sustainability Partnership

An EPD on-Demand service, allows producers to instantly produce and publish a verified EPD. The pre-verification and locking of all plant level data allows the plant to develop verified EPDs for different mixes.

WAP Sustainability, a GCCA partner, provides an EPD on-Demand service which uses the GCCA's EPD calculation engine.

The service is available in N America and plans to develop availability elsewhere, in response to construction industry demands, are in place. For more information and updates click [here](#)



Why GCCA EPD tool?

50%

The pre-verified GCCA EPD tool reduces the verification cost of each EPD by as much as 50%.

Free

The GCCA tool is free for GCCA members

The GCCA EPD tool is a cost effective and efficient means for companies to meet the growing demand for EPDs. The benefits of the tool are:

- Created by the industry to serve and represent the best interests of producers and ensure consistency
- Includes the GCCA GNR database – key data collected according to the CO₂ and Energy Accounting and Reporting Standard for the Cement Industry
- The first one to consider whole life recarbonation to benefit the industry
- The pre-verification of the tool reduces the time and cost of verification of each EPD by as much as 50% and ensures that the generated EPDs are robust for product comparison and development
- Primary data collection/input is through a user-friendly cloud-based platform
- Exports digital EPDs



If you would like to find out more about the tool and get access to the demo or full version, please visit: gccassociation.org/sustainability-innovation/environmental-product-declarations

Who is the GCCA tool for?

The GCCA tool can be used by:

- Construction material producers
- Governments, contractors, and companies in low carbon procurement
- Universities and research organisations

The GCCA tool is free for GCCA members and affiliates. A company which is a member of a GCCA affiliate receives a 50% discount.

The GCCA's EPD tool will help towards its mission of ensuring that concrete is seen as the sustainable building material of choice for today and the future needs of the world.

About the GCCA

80%

GCCA members account for 80% of the global cement industry volume outside of China, and also includes several large Chinese manufacturers.

The GCCA is the trusted, authoritative platform and voice for the cement and concrete sector across the world. Our members are producers of Portland cement clinker and other natural cementitious clinkers used in the manufacture of cement around the globe. GCCA members account for 80% of the global cement industry volume outside of China, and also includes several large Chinese manufacturers.

Our vision sees a world where concrete supports global sustainable economic, social, and environmental development priorities; and where it is valued as an essential material to deliver a sustainable future for the built environment.



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