Global Cement and Concrete Association

THE INTERNATIONAL EPD® SYSTEM

CONCRETE FUTURE

Environmental Product Declarations

An overview of EPDs, the GCCA tool and the publication process

Webinar
18th April 2023

Speakers

Dr Andrew Minson, Concrete and Sustainable Construction Director, GCCA

Nicolas Antoniou, Sustainable Design and Construction Manager, GCCA

Sebastiaan F. Stiller, CEO, EPD International AB

Agenda

- Introduction to EPDs
- GCCA EPD tool and demonstration
- How to publish an EPD on EPD International
- The main drivers for product specific EPDs
- Q & A

Introduction to EPDs

Environmental Product Declaration (EPD)

An EPD is an independently verified report on the environmental impact of a product throughout its life cycle.

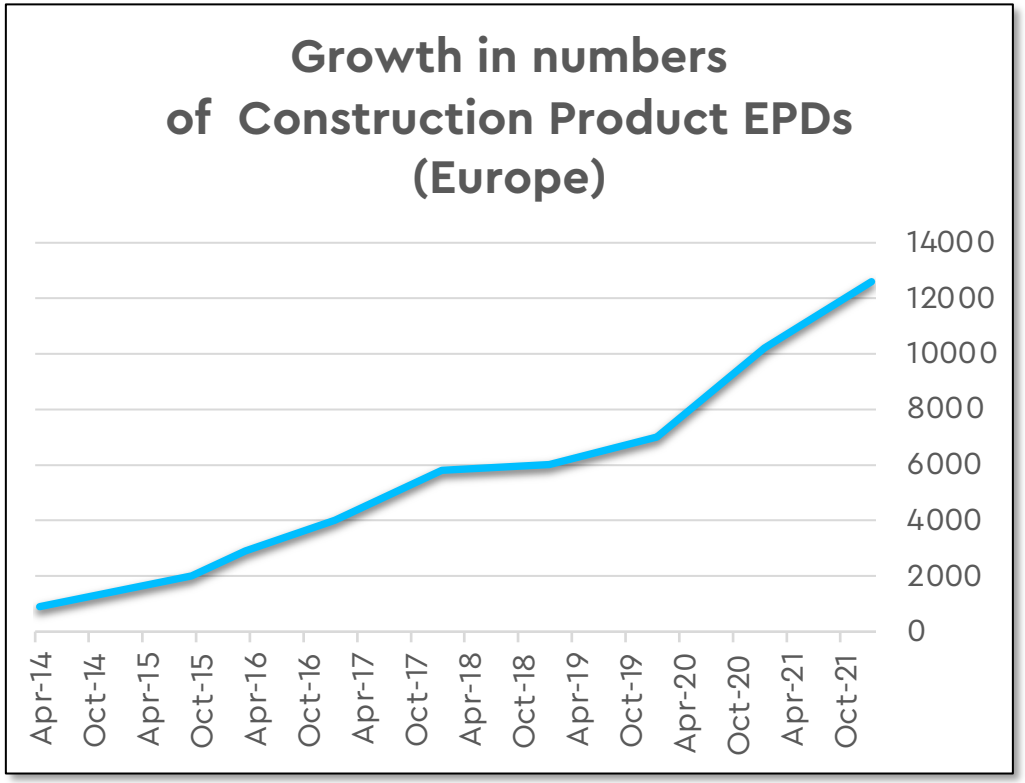
The impact of the product is calculated via a Lifecycle Assessment (LCA), which conforms to the requirements of the relevant Product Category Rules (PCR).

An official EPD typically consists of:

- The public EPD document summarising the environmental impact of the product
- The private Background Report used by verifiers and program operators to verify the results

Why are EPDs important?

- Fundamental to low carbon procurement and increasingly requested in public and private procurement (e.g. IDDI)
- Support the embodied carbon challenge by making the environmental impact of products visible
- Increasingly requested by clients who want manufacturers to provide them with sustainable products
- Used by designers to develop lower carbon solutions
- Used in whole-life whole-project carbon analysis
- Help manufacturers:
    - Measure and reduce their environmental impact and benchmark their performance
    - Demonstrate openly and objectively their commitment to environmental impact transparency



GCCA EPD tool

GCCA EPD tool

- Web-based calculation tool for EPDs of **clinker, cement, concrete, and precast elements**
- Available in two versions: International and North American

Objectives

- Facilitate the cement and concrete sector's ongoing efforts to reduce its environmental impact
- Ensure consistency and comparability within the sector, thereby reinforcing reliability and credibility
- Allow GCCA members and non-members to easily produce EPDs
- Minimise the time, effort and cost required to prepare EPDs
- Solution recognised by EPD programme operators

GCCA EPD tool: Outputs

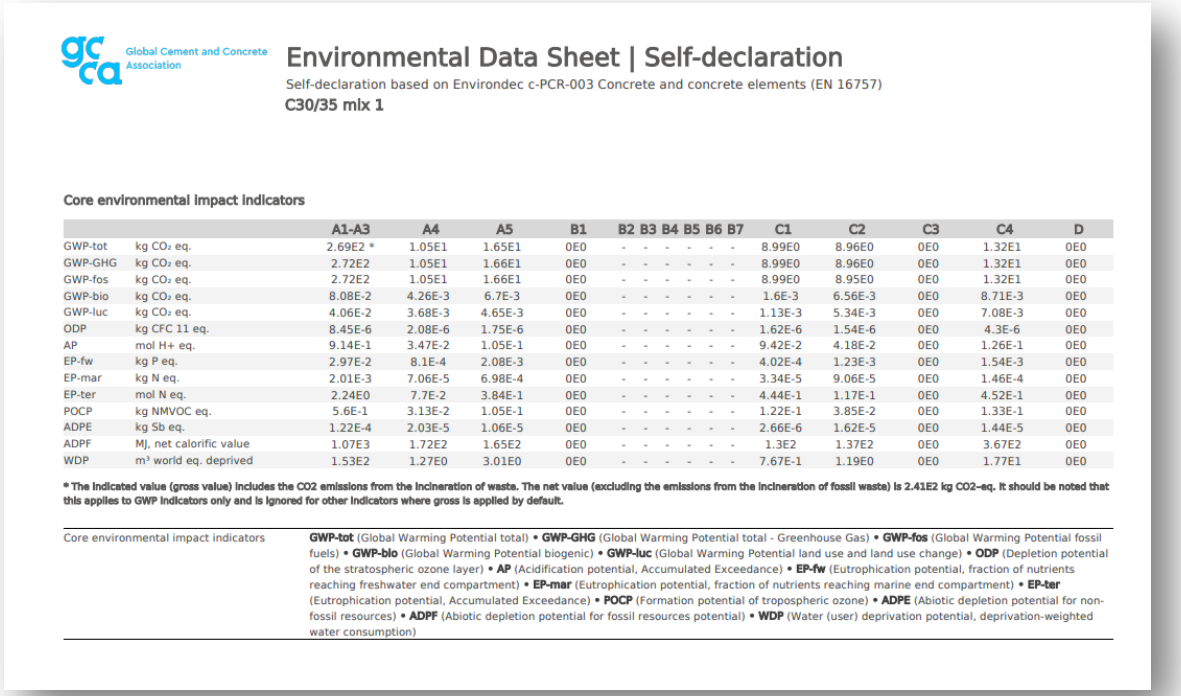
The two major outputs of the GCCA EPD tool are:

1. Self-declaration (not a validated official EPD)

Contains the main general/background information and the environmental performance (LCA results) of the specific product for all indicators.

2. Background report

Excel file with the complete set of input data and results of the specific product required to produce an EPD and allow a third-party verification.



Global Cement and Concrete Association

Environmental Data Sheet | Self-declaration

Self-declaration based on Environdec c-PCR-003 Concrete and concrete elements (EN 16757)

C30/35 mix 1

Core environmental impact indicators

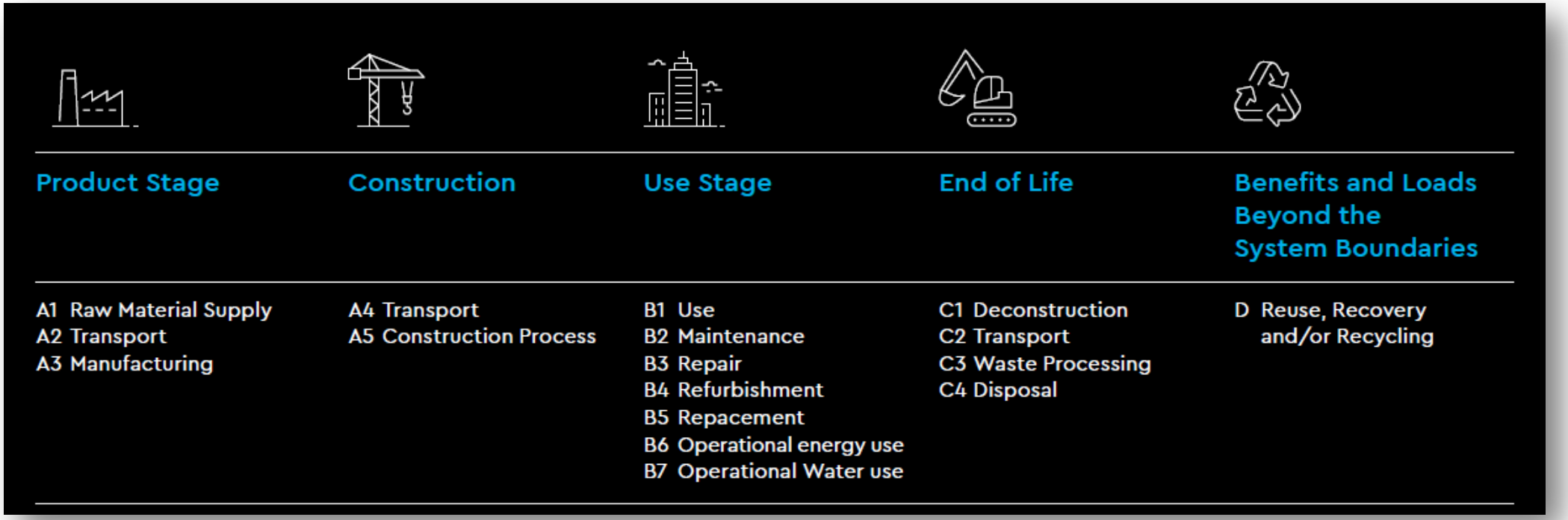
		A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-tot	kg CO_2 eq.	2.69E2 *	1.05E1	1.65E1	0E0	-	-	-	-	-	-	8.99E0	8.96E0	0E0	1.32E1	0E0
GWP-GHG	kg CO_2 eq.	2.72E2	1.05E1	1.66E1	0E0	-	-	-	-	-	-	8.99E0	8.96E0	0E0	1.32E1	0E0
GWP-fos	kg CO_2 eq.	2.72E2	1.05E1	1.66E1	0E0	-	-	-	-	-	-	8.99E0	8.95E0	0E0	1.32E1	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 CFC 11 eq.	8.45E-6	2.08E-6	1.75E-6	0E0	-	-	-	-	-	-	1.62E-6	1.54E-6	0E0	4.3E-6	0E0
AP	mol H+ 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.	2.97E-2	8.1E-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	6.98E-4	0E0	-	-	-	-	-	-	3.34E-5	9.06E-5	0E0	1.46E-4	0E0
EP-ter	mol N eq.	2.24E0	7.7E-2	3.84E-1	0E0	-	-	-	-	-	-	4.44E-1	1.17E-1	0E0	4.52E-1	0E0
POCP	kg NMVOC eq.	5.6E-1	3.13E-2	1.05E-1	0E0	-	-	-	-	-	-	1.22E-1	3.85E-2	0E0	1.33E-1	0E0
ADPE	kg Sb eq.	1.22E-4	2.03E-5	1.06E-5	0E0	-	-	-	-	-	-	2.66E-6	1.62E-5	0E0	1.44E-5	0E0
ADPF	MJ, net calorific value	1.07E3	1.72E2	1.65E2	0E0	-	-	-	-	-	-	1.3E2	1.37E2	0E0	3.67E2	0E0
WDP	m^3 world eq. deprived	1.53E2	1.27E0	3.01E0	0E0	-	-	-	-	-	-	7.67E-1	1.19E0	0E0	1.77E1	0E0

*** The indicated value (gross value) includes the CO2 emissions from the incineration of waste. The net value (excluding the emissions from the incineration of fossil waste) is 2.41E2 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.**

Core environmental impact indicators	**GWP-tot** (Global Warming Potential total) • **GWP-GHG** (Global Warming Potential total - Greenhouse Gas) • **GWP-fos** (Global Warming Potential fossil fuels) • **GWP-bio** (Global Warming Potential biogenic) • **GWP-luc** (Global Warming Potential land use and land use change) • **ODP** (Depletion potential of the stratospheric ozone layer) • **AP** (Acidification potential, Accumulated Exceedance) • **EP-fw** (Eutrophication potential, fraction of nutrients reaching freshwater end compartment) • **EP-mar** (Eutrophication potential, fraction of nutrients reaching marine end compartment) • **EP-ter** (Eutrophication potential, Accumulated Exceedance) • **POCP** (Formation potential of tropospheric ozone) • **ADPE** (Abiotic depletion potential for non-fossil resources) • **ADPF** (Abiotic depletion potential for fossil resources potential) • **WDP** (Water (user) deprivation potential, deprivation-weighted water consumption)

GCCA EPD tool: LCA modules covered

- Clinker and cement: "**cradle-to-gate**" (A1-A3)
- Concrete and precast products: "**cradle-to-grave**" (A1-D)



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

Notes:

- Because cement is a constituent of concrete products, the PCR limits the scope of LCA to A1 to A3
- The current North American PCR is limited to A1 to A3 for both cement and concrete

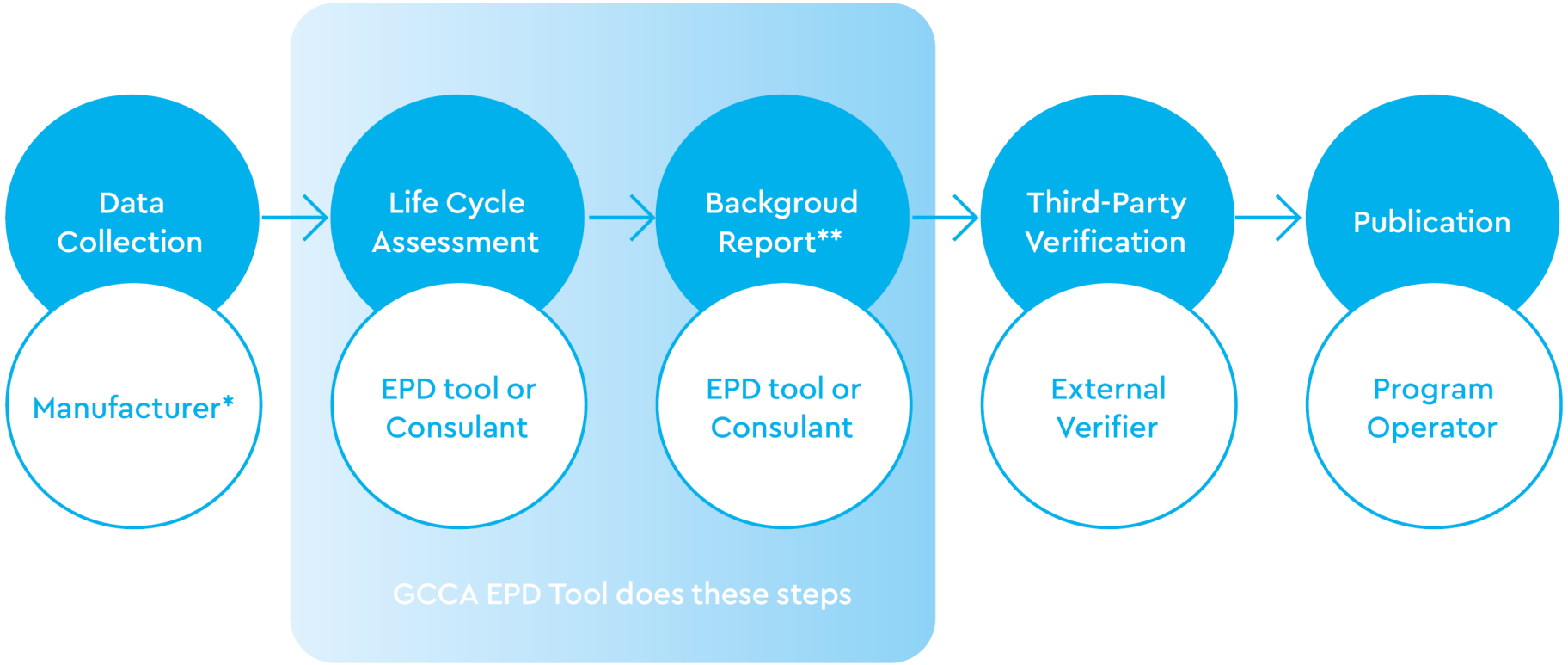
GCCA EPD tool: Features

- Generation of EPDs of clinker, cement, concrete and precast elements
- Detailed documentation covering LCA model and underlying data
- Inventory data drawn from EcoInvent (v3.5) database and industry
- User friendly
- Digital EPD export (ILCD+EPD format)
- Considers recarbonation for concrete and precast products
- Independently verified
- Alignment with EPD International's GPI 4.0

GCCA EPD tool: Standards

Version	EPD standard	PCRs	LCA standard	Independent verification standard	Independent Verifier
International	ISO 21930	• PCR 2019:14 - Construction Products (EN 15804+A2 v1.2) • PCR-001 - Cement and building lime(EN 16908) • PCR-003 - Concrete and concrete elements (EN 16757)	ISO 14040 ISO 14044	ISO 14025	STUDIO FIESCHI & SOCI sostenibilità su misura
North American		• PCR for Portland, Blended, Masonry, Mortar, and Plastic (Stucco) Cements (NSF International) • PCR for Concrete (NSF International) • PCR for Precast Concrete (NSF International)			Athena Sustainable Materials Institute

Traditional EPD process



* The manufacturer manages all stages and liaises with many points of contacts
** The background report contains confidential information and is only used by the external verifier

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:

- Includes the GCCA GNR database - key data collected according to the CO_2 and Energy Accounting and Reporting Standard for the Cement 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 web-based platform
- Does not require LCA expertise
- Can be used in material research and benchmarking

Version 4.0 – May 2023

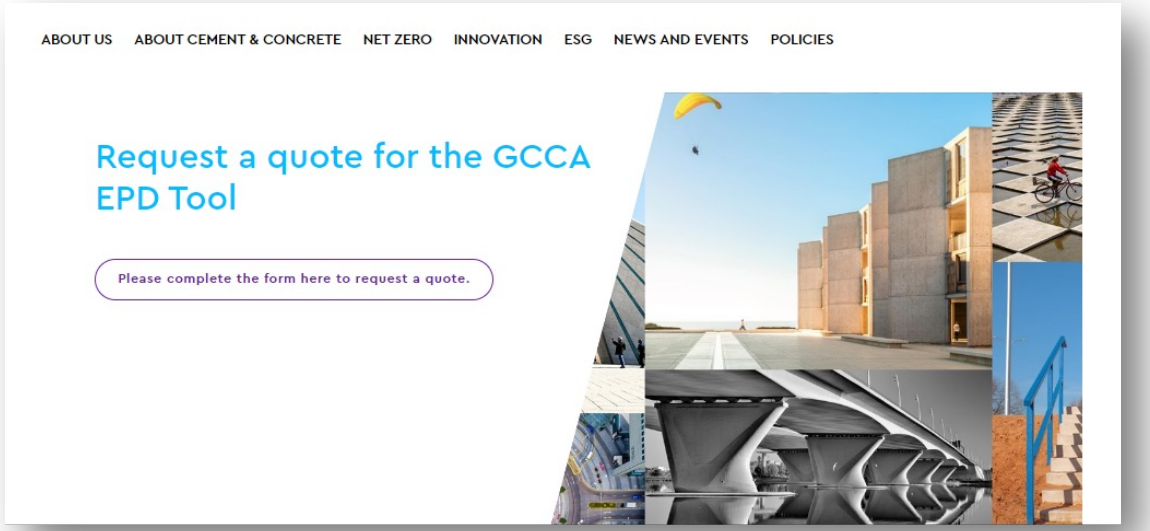
Additional Features

- Application Program Interface (API)
- EPDs for aggregates
- Import third party EPDs and associate them to a specific category
- Share EPDs within your organisation
- Project control and management by company administrator
- Project share among company users
- Update of North-American version to better integrate Canada

How to get a Licence

- The EPD tool is available to GCCA-members for free
- Non-GCCA members can purchase an annual license
- To find out more or get access to the tool visit our website:

https://gccassociation.org/sustainability-innovation/environmental-product-declarations/



Introduction on how to use the GCCA EPD tool

Main drivers for product specific EPDs

GCCA Environmental Product Declarations Online Webinar

April 18, 2023
12:30 hrs London/ 13:30 hrs CEST

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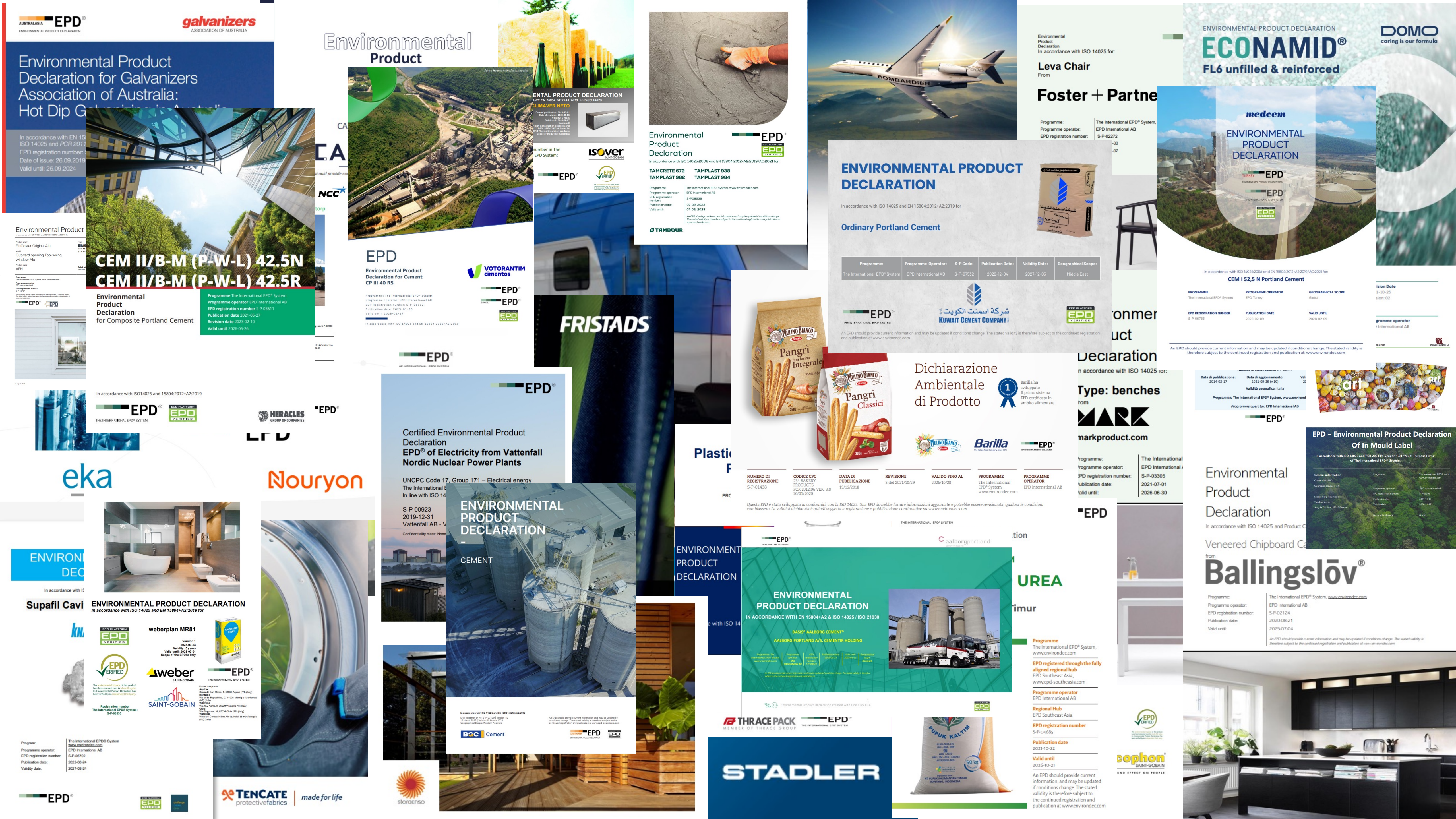
EPD International AB
www.environdec.com

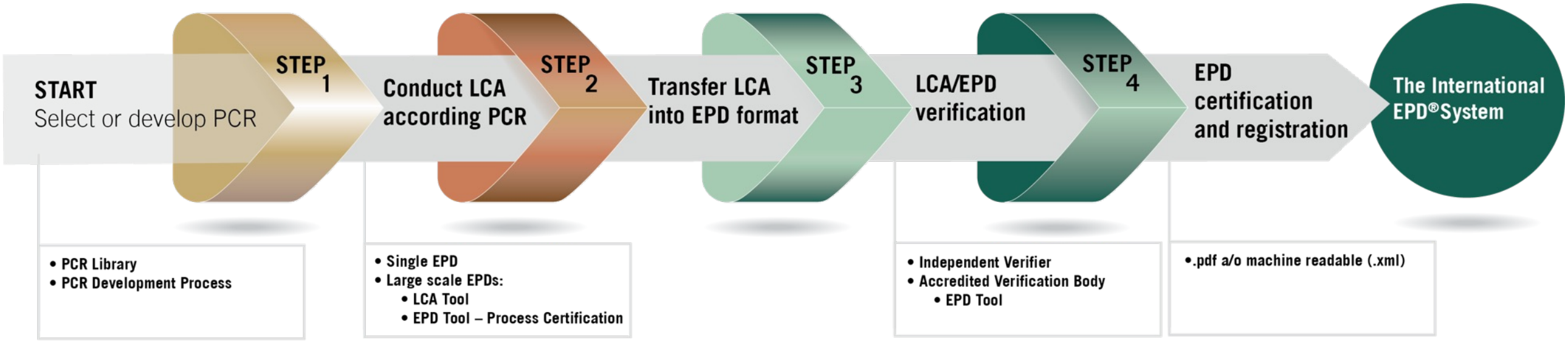
The International EPD System

- Worldwide first EPD programme founded Sweden in 1997; jointly owned by Swedish Environmental Protection Agency & Industry
- In 2014, EPD programme ownership transferred to EPD International AB, a fully-owned subsidiary to the NPO IVL Swedish Environmental Research Institute (IVL)
  - *We want to make quality EPD services as credible, accessible and affordable as possible.*
  - *Any organization, no matter its size, location and industry has the right to publish EPDs in an as sensible, simple and affordable way*
- EPD Intl. offers registration and publication services for Environmental Product Declarations (EPD) acc. ISO 14025 & EN 15804/ ISO 21930 for construction products



EPD AUSTRALASIA
galvanizers ASSOCIATION OF AUSTRALIA
Environmental Product Declaration for Galvanizers Association of Australia: Hot Dip G
CEM II/B-M (P-W-L) 42.5N
CEM II/B-M (P-W-L) 42.5R
Environmental Product Declaration for Composite Portland Cement
Environmental Product
EPD
Environmental Product Declaration for Cement CP III 40 RS
VOTORANTIM cimentos
ENTAL PRODUCT DECLARATION
CLIMAVER NETO
ISOVER SAINT-GOBAIN
Environmental Product Declaration
TAMCRETE 672 TAMPLAST 938
TAMPLAST 982 TAMPLAST 984
TAMBOUR
BOMBARDIER
ENVIRONMENTAL PRODUCT DECLARATION
Ordinary Portland Cement
KUWAIT CEMENT COMPANY
Leva Chair
Foster + Partne
ECONAMID®
FL6 unfilled & reinforced
DOMO caring is our formula
medcem
ENVIRONMENTAL PRODUCT DECLARATION
CEM I 52,5 N Portland Cement
NCC
FRISTADS
HERACLES GROUP OF COMPANIES
Certified Environmental Product Declaration
EPD® of Electricity from Vattenfall Nordic Nuclear Power Plants
eka
Nouryon
ENVIRONMENTAL PRODUCT DECLARATION
CEMENT
ENVIRONMENTAL PRODUCT DECLARATION
weberplan MR81
weber SAINT-GOBAIN
Supafil Cavi
Dichiarazione Ambientale di Prodotto
MULINO BIANCO
Pangrì Integrale
Pangrì Classici
Barilla
Type: benches
markproduct.com
Plasti
ENVIRONMENTAL PRODUCT DECLARATION
IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930
BASIS® AALBORG CEMENT®
AALBORG PORTLAND A/S, CEMENTIR HOLDING
aalborgportland
UREA
EPD – Environmental Product Declaration Of In Mould Label
Environmental Product Declaration
Veneered Chipboard
Ballingslöv
PUPUK KALTIM
THRACE PACK
STADLER
TENCATE protectivefabrics
made for life
storaenso
ophon SAINT-GOBAIN

EPD development process

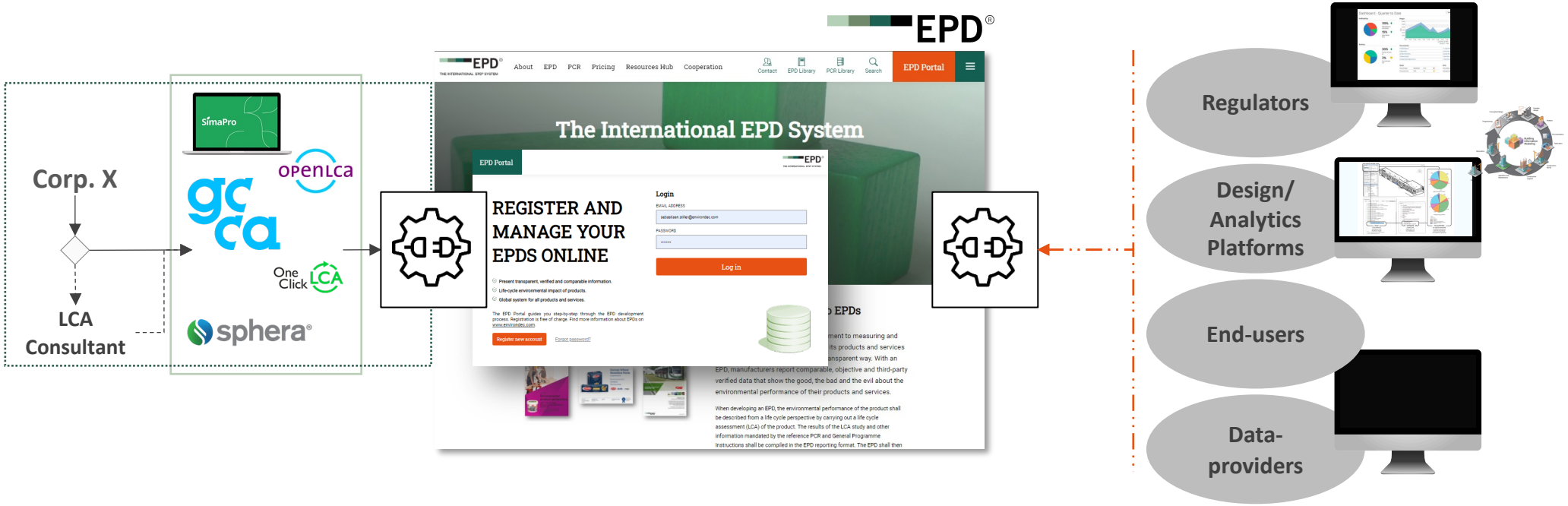


Automation, Digitisation and Digitalisation

Hyper transparency in over-drive for handling of large amounts of data, eventually for benchmarking purposes!

- Single LCA
- Pre-verified EPD Tools
- Fully automated EPD Tools

- ILCD + EPD (EUROPE)
- OPEN EPD FORMAT (USA)
- PDT – EPD IN BIM (ISO 22057)



For support, please contact:
support@environdec.com

Pricing Plan 2021/23 (valid as per 01/01/2021)

EPD International AB

Pricing plan consists of two fees.

ONE-OFF EPD Registration Fee

- **Registration Fees for EPDs (2021/2)**
  1. Registration fees per EPD according the accumulated number of EPDs per account per annum.
  2. No additional fee will be charged for ECO EPDs (construction products) and listing at ECO Platform.

RECURRING Annual Fee

- **Annual Fee charged for the organisation (not on EPD level)**
  - Micro 500 Euros
  - SME 1000 Euros
  - MNE 2500 Euros
  - Industry ass. 1000 Euros

- EPDs have a validity of 5 years; during this validity period we charge an annual fee from the organisation that owns the EPDs
- EPD updates (incl. editorial changes and major revisions) are included
- Annual fees can be cancelled anytime with right for refund

See: https://www.environdec.com/pricing/pricing2022 for latest pricing and plans

Registration fee

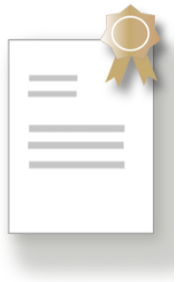
For the registration fee, we **accumulate the number of EPDs per customer account during one calendar year**. So that you can benefit from attractive reductions when registering and publishing your EPDs via our EPD programme during one calendar year (January-December).

The following registration fees are valid per EPD.

Registration Fees (per registered EPD)

EPD no. 1:	1000 EUR
EPD no. 2, 3, 4:	500 EUR
EPD no. 5 - 99:	100 EUR
EPD no. 100 and more:	50 EUR

With the first EPD registration of an organisation, the registration fee will be invoiced together with the annual fee. If an organisation seek to publish 5 EPDs, the registration cost for the EPDs would be as follows: 1000 EUR (1st EPD) + 500 EUR (2nd EPD) + 500 EUR (3rd EPD) + 500 EUR (4th EPD) + 100 EUR (5th EPD) = 2600 EUR.



Annual fee

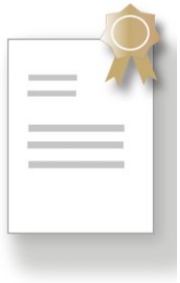
The annual fee is a recurring fee to be paid *per organisation, i.e. customer account*, while its EPDs remains published and registered. As that, the annual fee is independent of the number of EPDs registered by the organisation.

Updates of registered EPDs during their validity (e.g. editorial updates) or after they have expired are included in the annual fee.

Annual Fees (by org. size)

Micro (1-10 employees):	500 EUR
SME (11-250 empl.):	1000 EUR
MNE (>250 empl.):	2500 EUR
Industry associations:	1000 EUR

With the first EPD registration of an organisation, a share of the annual fee of the present calendar year will be invoiced together with the registration fee: registration in Q1: 100%, Q2: 75%, Q3: 50%, Q4: 25%.
Annual fees after the first, partial calendar year are then normally invoiced at the beginning of the year.



REASONS FOR AN EPD

External drivers

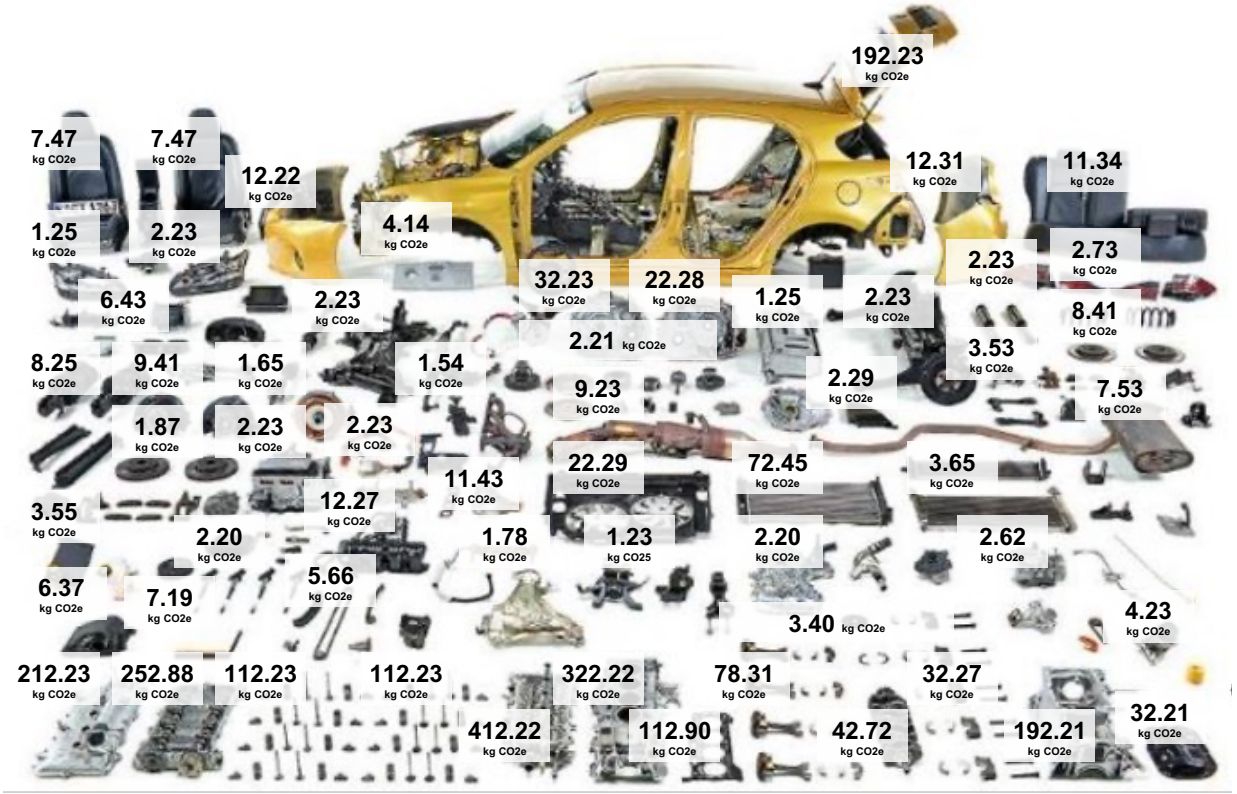
- **Benchmarking**
- **(Future) Legal Compliance**
- **Compliance with BREEAM and LEED certification schemes**
- Competitive Edge in Green (Public) Procurement Tenders
- Use of Building Information Management (BIM) technology

Internal drivers

- Corporate Sustainability Goals
- Marketing
- Green Product and Process Innovation (LCA, eco-design)
- Environmental Management Systems (EMS)
- Sustainable Supply Chain Management (SSCM)
- Value chain collaboration for process improvement

Because you want it!

For comparison and decision making when e.g., buying your next car (spare parts)



Option 1 …
Option 2 …..
Option 3 …….

_____

XXXXX, xx EUR
XXXXX, xx kg/CO2 eqv.

Values for representation only!
Source: WAP Sustainability

Market Regulation & Legal Compliance

- **SOCIETY** is acting on climate change and the topic is likely to gain relevance!
- Global environmental/sustainability problems can never be solved without an **active business sector**

- **BUSINESS** increasingly commits to various sustainability objectives and frameworks:

Embodied Carbon Demand Drivers

VALUE REPORTING FOUNDATION SASB STANDARDS	WORLD RESOURCES INSTITUTE	SCIENCE BASED TARGETS
Including GHG/ EC in the Infrastructure -- Real Estate Standard	Embodied Emissions Methodology to be published shortly.	Sector Decarbonization approach for Real Estate Portfolios

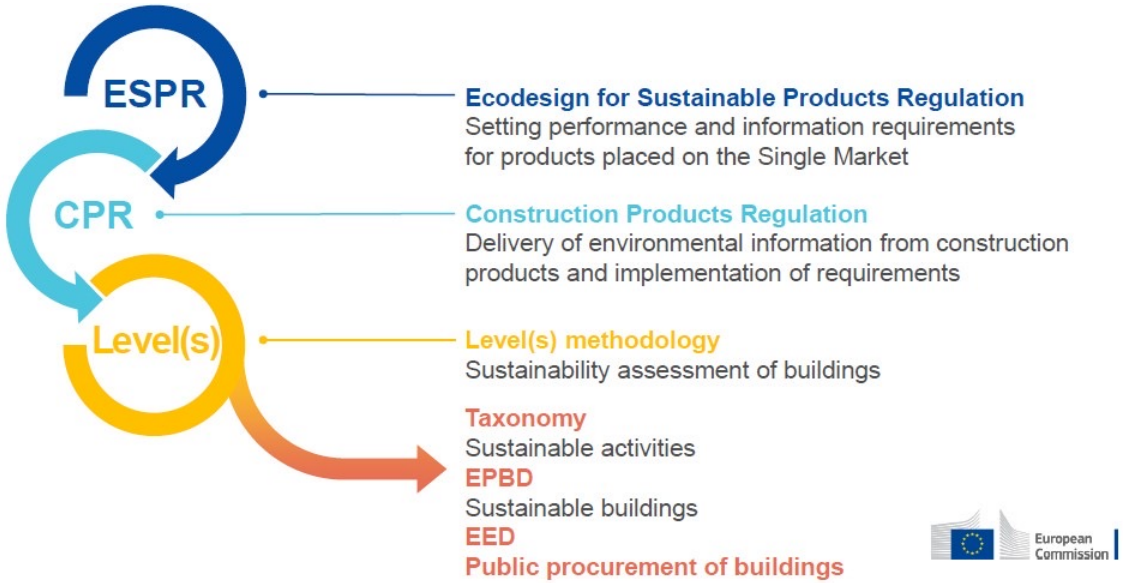
- **BUSINESS** needs to know … to transparently communicate the impact of their products (with comparable, objective and third-party verified data)

- The **PRIVATE** sector is defining the level playing field by developing standards in the field of **environmental management, conformity assessment** and **climate mitigation**

- The **PUBLIC** sector is defining the level playing field for a **green economy** to ascertain **fair market competition** and **avoid green washing**

EC Regulatory Framework

- **EU Regulation**
- **Integration of sustainability in many different regulations**
- **CPR to provide necessary data from construction products**
- **for national regulation and for different regulations on other le**

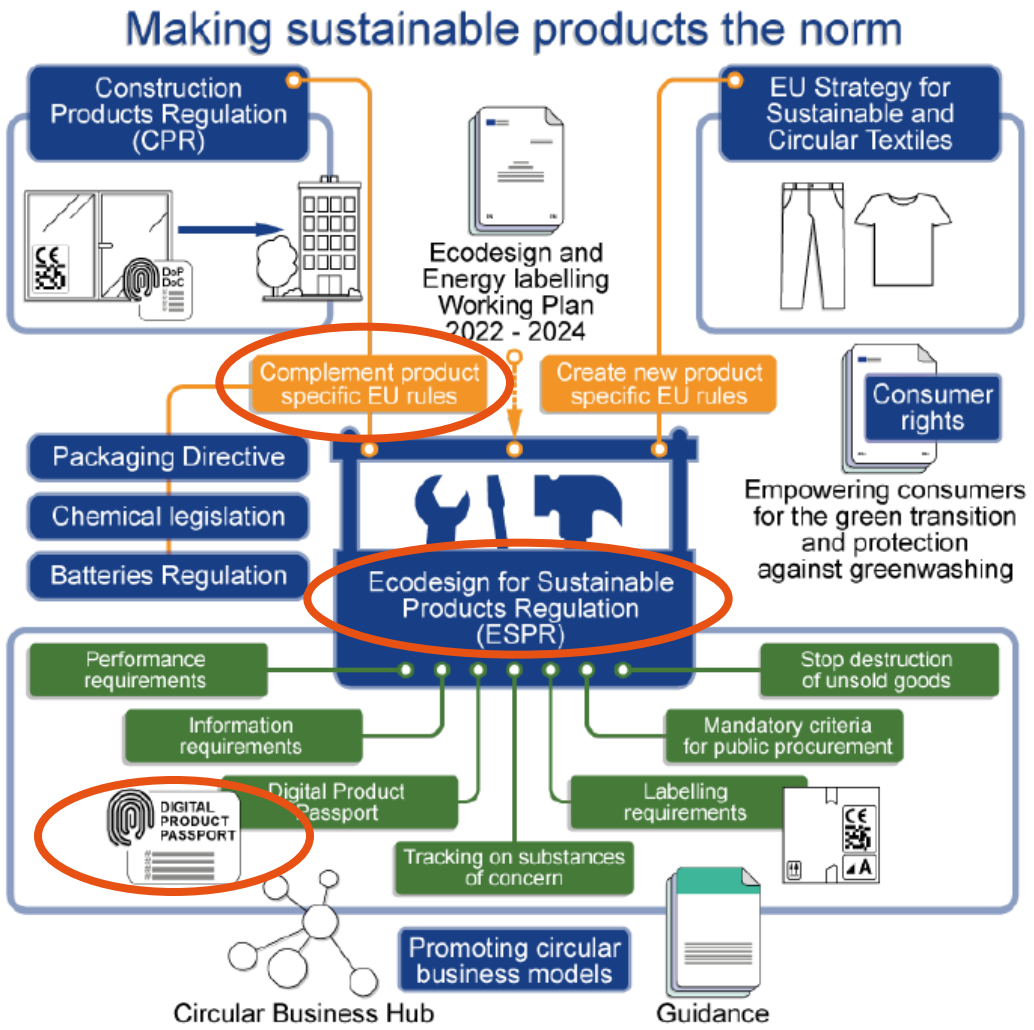


EXAMPLE: EU ESPR & CPR

!!! PROPOSAL !!!!

- March 2022, EU's Spring Package was presented as part of the **EU Green Deal** to provide the necessary rules and tools to address environmental challenges
- **ECO DESIGN for SUSTAINABLE PRODUCTS REGULATION (ESPR)** is REGULATORY umbrella framework in case no specific legislation exists to address environmental sustainability
- **CONSTRUCTION PRODUCT REGULATION (CPR)** is EU complementary regulation to implement ESPR in construction products
  - Provides a list of rules and requirements that shall be met in order to sell products in the EU market
  - The product is assessed/verified against its conformity with the rules in order to obtain a CE marking
- The **DIGITAL Product Passport** is a tool containing the DoP, DoC and instructions for use, and e.g. links Digital Building Logbooks

ESPR is proposed umbrella, but other product legislation can regulate sustainability of products instead (like CPR)



European Commission

Source: DG GROW

Construction Product Regulation (CPR) revision as part of ESPR

!!! PROPOSAL !!!!

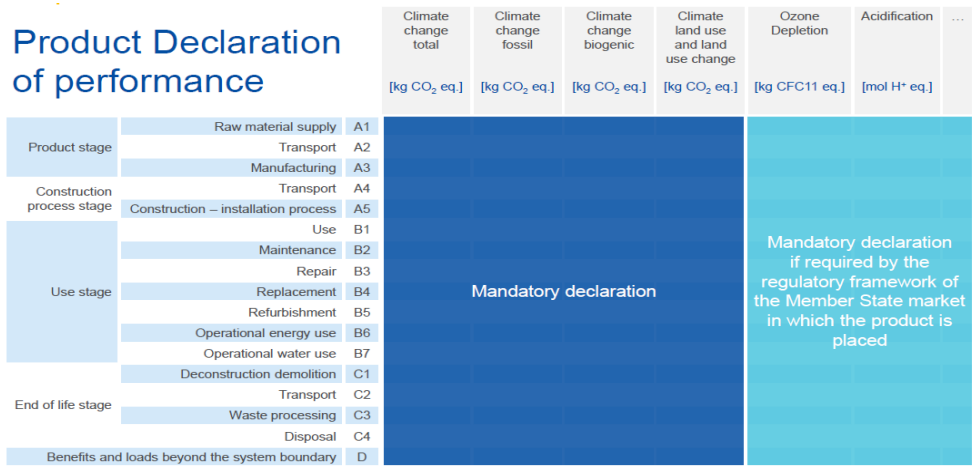
- CPR contains rules on sustainability indicators
  - *Core* and *Additional* indicators

Core indicators

- **Climate change – total / fossil /biogenic / land use and land use change**
- Ozone Depletion
- Acidification
- Eutrophication aquatic freshwater
- Eutrophication aquatic marine
- Eutrophication terrestrial
- Photochemical ozone creation
- Depletion of abiotic resources – mineral and metals
- Depletion of abiotic resources – fossi fuel
- Water use

- Reporting of core Indicator **“Climate Change Effects”** proposed to be obligatory in DoP (Declaration of Performance)
- Reporting obligation of other core and additional indicators depends on decision of the EU Members States

- **EPDs report these core indicator already today!**
- **I.e. you are compliant with CPR when publish(ing) EPDs for construction products**



Source: DG GROW

National compliance example - EU Levels(s) -

Decarbonising the construction sector in the Nordics

Sweden

Mandatory:
2022
CFP limits:
2027
Method:
Boverket

Denmark

Mandatory:
2023
CFP limits:
2023
Method:
Baeredygtighedsklassen

Finland

Mandatory:
2025
CFP limits:
2025
Method:
YM – Ministry of Env.

Norway

Mandatory:
2018 for public constr.
CFP limits:
2018
Method:
NS 3720

Iceland

Mandatory:
-
CFP limits:
-
Method:
-

Boverket

From 2022, all new buildings require a LCA on building level **«KLIMATDEKLARATION».**
Boverket's database contains CO_2-values for 171 generic construction materials and resources:

- Generic datasets are conservative values and have a 25% higher than typical value
- EPDs are specific data that are frequently lower that the generic datasets
  - bonus malus system
- For CPs used with specific data, you **must** report the EPD that was used

Sources:
Boverket 2021,
OneClick LCA 2021

USA - Buy Clean California Act -

The **Buy Clean California Act (BCCA)** (Public Contract Code Sections 3500-3505), states the Department of General Services (DGS), in consultation with the California Air Resources Board (CARB), is required to establish and publish the maximum acceptable Global Warming Potential (GWP) limit for four eligible materials. The BCCA targets carbon emissions associated with the production of **structural steel** (hot-rolled sections, hollow structural sections, and plate), **concrete reinforcing steel**, **flat glass**, and **mineral wool board insulation**.

When used in public works projects, these eligible materials must have a GWP that does not exceed the limit set by DGS.

NEWS

- Maximum acceptable GWP limits were established on January 1, 2022 and can be found in the GWP Limits (table below).
- Beginning July 1, 2022, the awarding authorities will determine GWP limit compliance of eligible materials using Environmental Products Declarations (EPDs).
- **BCA is rolled out on Federal and National levels and to include more materials/products**

250 Mio US Dollars to establish EPD in US market

Table 1: GWP limits for eligible materials

Eligible material	Maximum acceptable GWP limit (unfabricated)*
Hot-rolled structural steel sections	1.01 MT CO_2 eq./MT
Hollow structural sections	1.71 MT CO_2 eq./MT
Steel plate	1.49 MT CO_2 eq./MT
Concrete reinforcing steel	0.89 MT CO_2 eq./MT
Flat glass	1.43 MT CO_2 eq./MT
Light-density mineral wool board insulation	3.33 kg CO_2 eq./1 m^2
Heavy-density mineral wool board insulation	8.16 kg CO_2 eq./1 m^2

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Thank you for joining us!