Global Cement and Concrete Association

CONCRETE FUTURE

# Environmental Product Declarations

## Latest on EPDs and the GCCA EPD Tool

10th December 2024

# Speakers

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GCCA

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# Our Members

Our members operate in almost every country of the world.

## Our Members

Asia Cement Corporation
Breedon Group
BUA Cement
Buzzi
Cementir Holding
Cementos Argos
Cementos Moctezuma
Cementos Pacasmayo
Cementos Progreso
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Cimenterie Nationale
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CRH
Dalmia Cement
Dangote
Emirates Steel Arkan
Fletcher Building
GCC
Heidelberg Materials
Holcim
Hima Cement
Huaxin Cement
JK Cement
JSW Cement
Medcem
MISR Cement Group
Molins
Nesher Israel Cement Enterprises
Norm
Northern Region Cement Company
Orient Cement
PT Solusi Bangun Indonesia
Schwenk Zement
Secil
Siam Cement Group
Siam City Cement
Taiheiyo Cement
TCC Group Holdings
TITAN Cement Group
TPI Polene
UltraTech Cement
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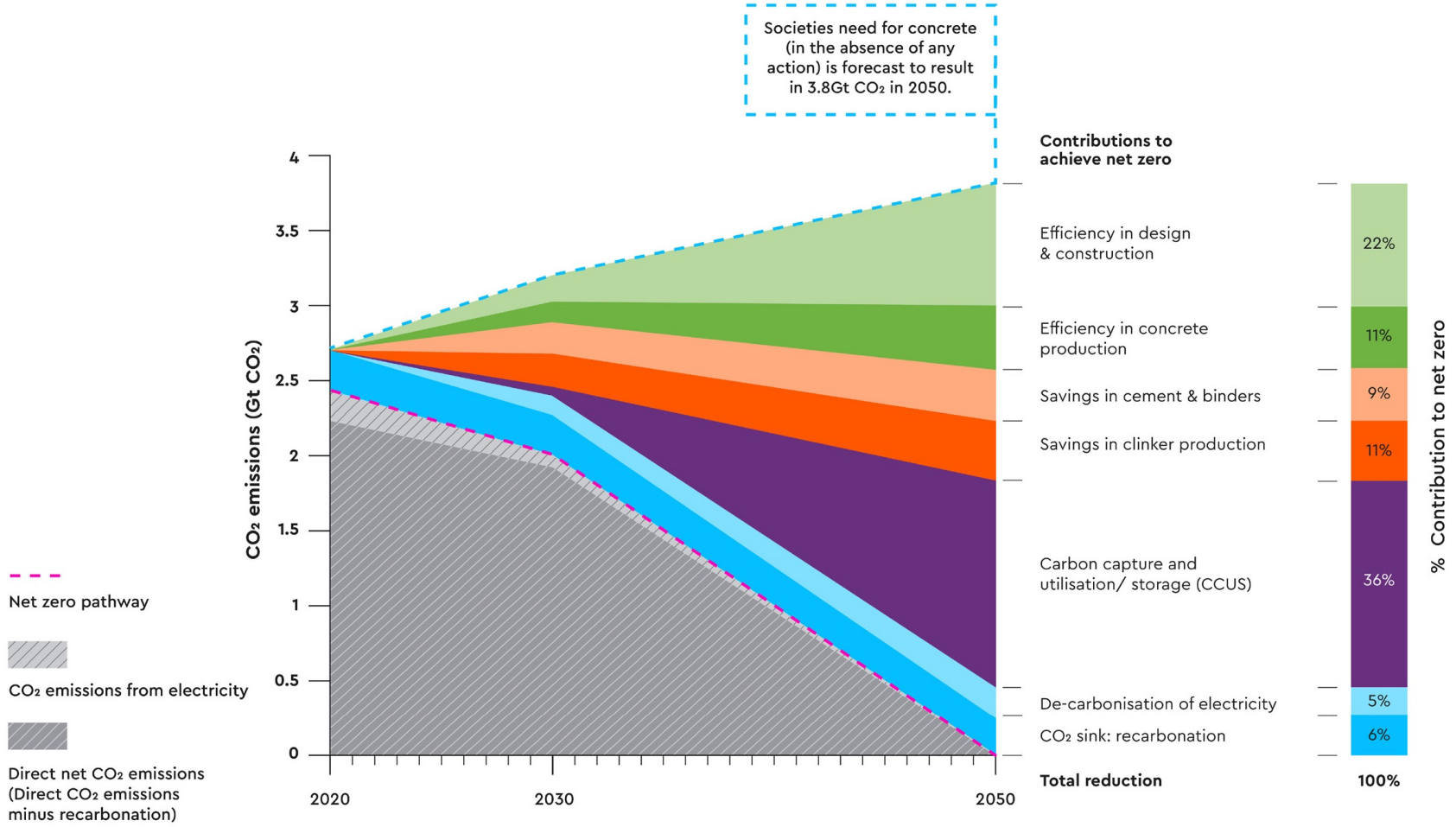
Votorantim Cimentos
YTL Cement
Yura Cement

## National & Regional Association Partners

Asociación de Productores de Cemento – Peru
Associação Brasileira de Cimento Portland – Brazil
Association of German Cement Manufacturers (VDZ) – Germany
Association Professionnelle des Cimentiers - Morocco
Betonhuis – Netherlands
BIBM – Europe
CANACEM – Mexico
Canadian Precast Prestressed Concrete Institute
Cement Association of Canada
Cement Concrete & Aggregates Australia
Cement Industry Federation – Australia
Cement Manufacturers Association – India
Cement Manufacturers Ireland
China Cement Association
Concrete NZ – New Zealand
European Cement Association (CEMBUREAU)
European Federation Concrete Admixtures
European Ready Mixed Concrete Organisation
Federación Iberoamericana del Hormigón Premezclado – LatAm
Federación Interamericana del Cemento (FICEM) – LatAm
Japan Cement Association
Korea Cement Association
Mineral Products Association - United Kingdom
National Ready Mixed Concrete Association – USA
Portland Cement Association – USA
South India Cement Manufacturers Association
Thai Cement Manufacturers Association
The Spanish Cement Association (Oficemen)
Turkish Cement Manufacturers Association (TürkÇimento)

# Global Roadmap to Zero

https://gccassociation.org/cement-industry-net-zero-progress/

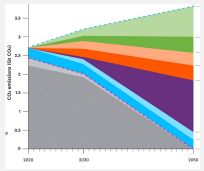


# Country Roadmaps

Country roadmaps – GCCA Net Zero Accelerator Initiative

A key step in regulatory transition and financing discussion

## KEY DELIVERABLES

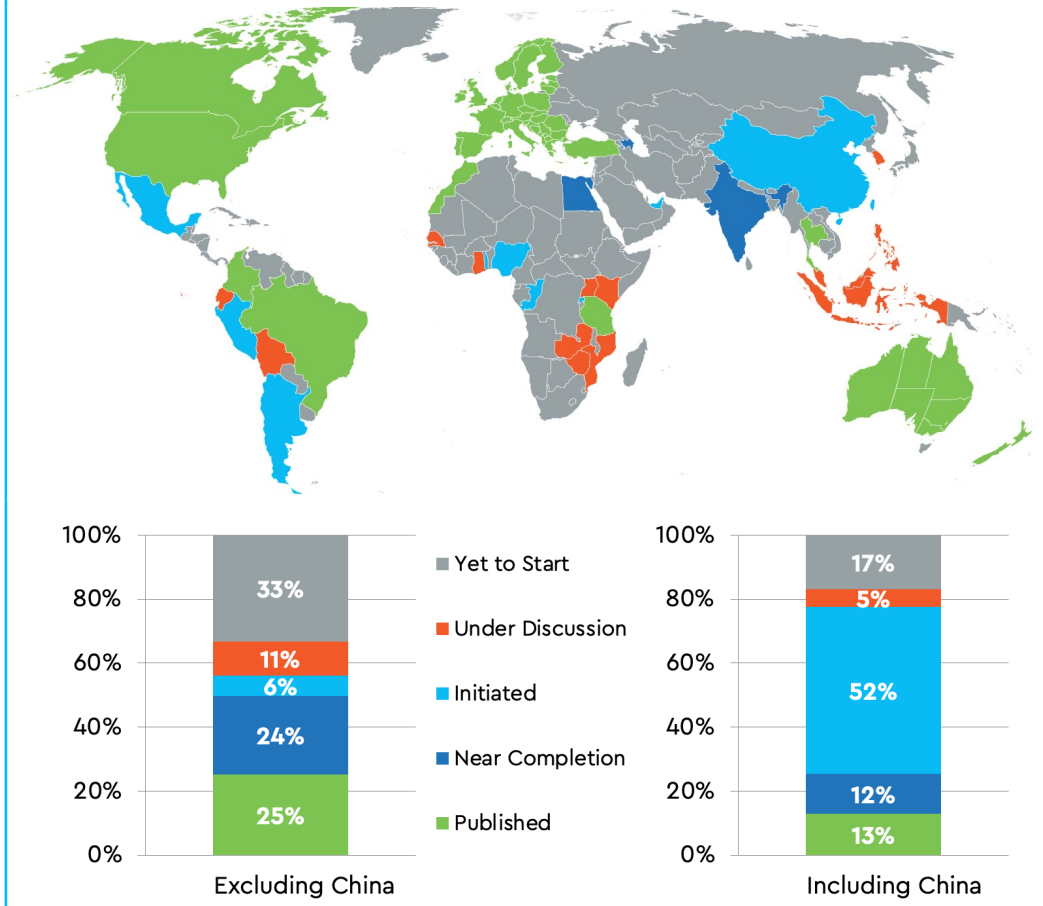


**Roadmap Levers and $CO_2$ impact**
Per lever, quantification of potential $CO_2$ reduction 2030 & 2050

**Policy**
Per lever, identification of enabling policies

**Lighthouse Projects**
Per lever, identification of lighthouse projects

**Progress of Roadmaps around the globe**



# Net Zero Progress Report

**Lever description and progress**

**Policy Enablers**

**Case Study Examples**

ACTION & PROGRESS

## Carbon Capture Utilisation and Storage (CCUS)

**36% contribution to Net Zero and 1,370Mt $CO_2$ emission savings in 2050**

Savings in CCUS:
- carbon capture at cement plants

**CCUS is a critical lever to decarbonise cement and concrete, because unlike other sectors switching to renewable energy is not sufficient to deliver decarbonisation. This is because the $CO_2$ emissions from the cement sector are not only due to energy use. Two thirds of the $CO_2$ emitted is from the calcination of limestone. Whilst there is work on alternatives to clinker (see Cement and Binders on p20), the scale of demand for buildings and infrastructure can only be met by Portland clinker cements.**

The contribution of carbon capture and utilisation/storage to decarbonisation is forecast to become significant beyond 2030 when commercial viability and necessary infrastructure have been established. Progress already this decade is surpassing forecasts.

The GCCA Concrete Future Roadmap set a milestone of 10 plants having applied carbon capture technology at an industrial scale by 2030. Publicly announced projects are collated and made available on the GCCA/LeadIT green cement technology tracker (see p28). In November 2024, of the 58 projects, 30 of them are industrial scale. In addition, in the pipeline and over and above publicly announced projects on the LeadIT tracker, there are already 42 projects of which 29 are industrial scale. Of the 100 projects, almost two thirds are industrial scale, and one third are expected to be completed in 2030 or before.

Also of note are the different technologies across a number of regions. Among the 42 projects (research and commercial) to be completed by end of 2030, 4 different specific carbon capture technologies are being applied. These are in Canada, China, Europe, India, North America, Rest of Asia and South America.

**Storage and Utilisation**
Once captured the $CO_2$ will be permanently stored primarily in geological storage or utilised. If utilised this may be within the cement and concrete industry or by other industries. Utilisation of captured $CO_2$ within the cement and concrete industry includes injection into wet concrete, curing of hardened concrete and in the manufacturing of aggregates from waste products. Further commercial development and expansion of these uses of captured $CO_2$ is under way. Fundamental research is also ongoing, including that by the Innovandi Global Cement and Concrete Research Network (GCCRN).

Relevant projects and references can be found in both the CCUS and Recarbonation/Recycling sections of the GCCRN online library. Innovandi GCCRN projects can be found at gccassociation.org/innovandi/gccrn/

**CCUS technology works and we are seeing an increasing number of pilots and industrial scale projects gather pace across the world in our sector.**

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**Cement Industry Net Zero Progress Report 2024/25**

**Policy enablers**
**Policy levers need to be extended across the world to to drive the number and scale of CCUS projects required for cement manufacturing to be on track to meet net zero by 2050.**

Policy support in Europe, USA and Canada has enabled the industry to be on track for its 2030 target of 10 plants at an Industrial scale. However, even here further policy development is required to enable a robust business case for the essential deployment from 2030. The policy landscape needs to be in place in the middle years of this decade to ensure the necessary ramp up in carbon capture from 2030, for the sector to stay on track.

Policies are required to support the development of CCUS technologies through financial, infrastructural, and regulatory measures. Policies must also foster innovation and demand for carbon-neutral solutions.

The key policy items are:

1. Use appropriate carbon pricing mechanisms to create a level playing field on carbon costs and avoid carbon leakage through adequate carbon pricing mechanisms.
2. Integrate CCUS in public financing mechanisms that covers in particular the initial investments and early operational abatement costs to allow for an investable business case.
3. Provide fair recognition of all carbon removal measures, both where the $CO_2$ is ultimately stored or used in products, either by acknowledging them as part of regional/national emissions trading systems or by developing tailored accounting rules. Include negative emissions savings through the use of CCUS combined with biomass fuels in the accounting rules.
4. Provide transport infrastructure and storage to move captured carbon to where it can be used or stored. In particular, speed up permitting processes to allow for the construction of carbon storage facilities. In addition, the infrastructure needs to be regulated in such a way that dispersed sites are not disadvantaged when it comes to access and costs.
5. Provide reliable access to sufficient and competitively priced decarbonised energy.
6. Establish public-private partnerships to speed-up CCUS developments, including shared investment in $CO_2$ transport and storage networks.
7. Support R&D including for new uses in other sectors of $CO_2$ captured by the cement and concrete industry.
8. Enable the integration of $CO_2$ performance in public procurement, building standards and construction codes alongside traditional criteria to create the demand for carbon-neutral products.



**CNBM's** CCUS project in **Qingzhou Zhonglian, China** commenced operation in January 2024 producing 200,000 t $CO_2$/annum, exceeding 99.9% purity and an energy consumption 40% lower than alternative methods. Read more on p50.



**Taiheiyo** is running carbon capture demonstration equipment installed in March 2024 in **Japan**. The compact facility replaces the conventional calciner. They are developing technology to convert recovered $CO_2$ into synthetic methane too. Read more on p71.



**Holcim** is advancing seven large-scale CCUS projects based on highly scalable, mature technologies and two of these, Carbon2Business and GO4ZERO broke ground in April and May 2024. Read more on p58.

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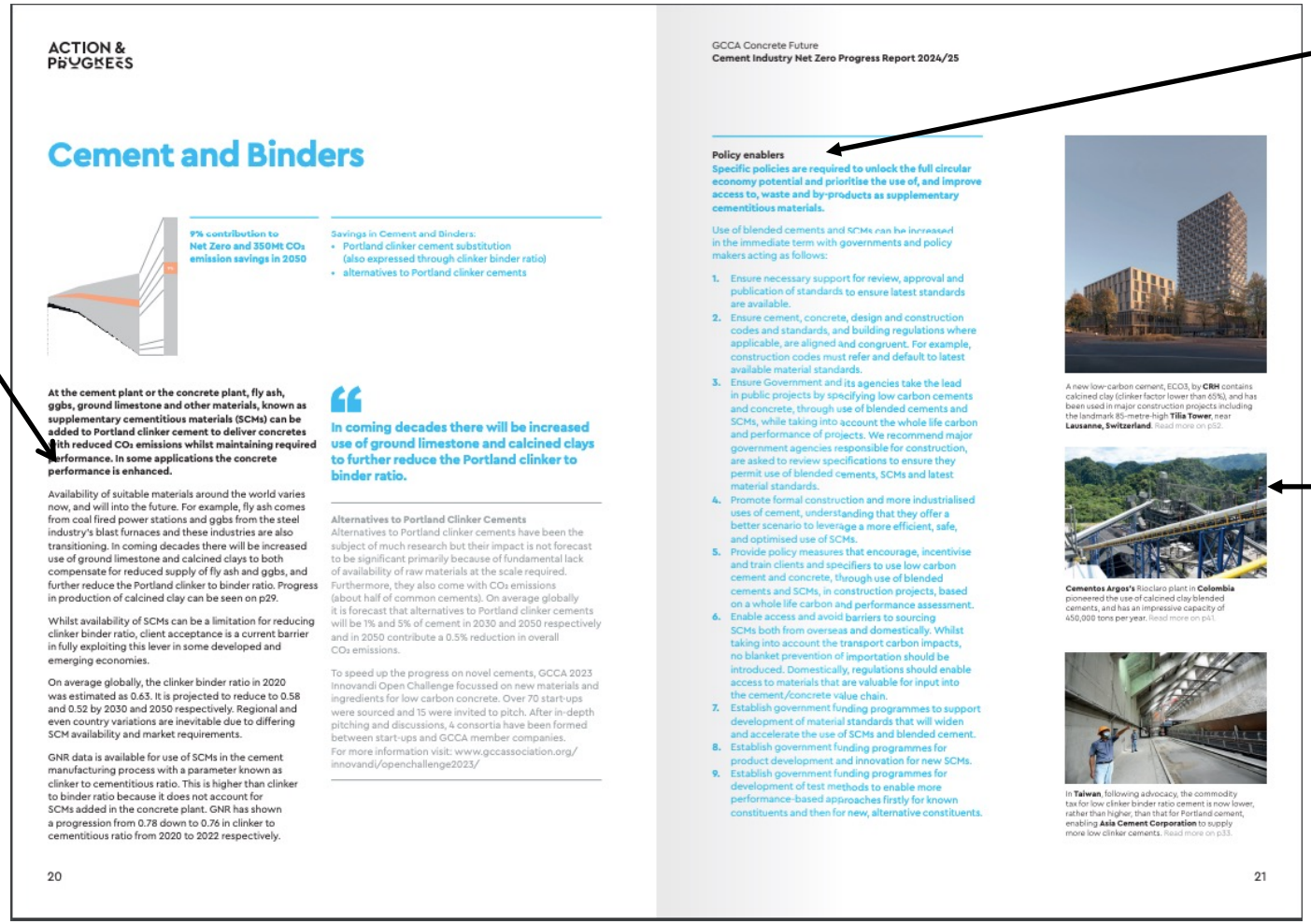
https://gccassociation.org/wp-content/uploads/2024/11/GCCA-Cement-Industry-Progress-Report-202425.pdf

# Net Zero Progress Report

**Lever description and progress**

**Policy Enablers**

**Case Study Examples**



ACTION & PROGRESS

## Cement and Binders



**9% contribution to Net Zero and 350Mt $CO_2$ emission savings in 2050**

Savings in Cement and Binders:
- Portland clinker cement substitution (also expressed through clinker binder ratio)
- alternatives to Portland clinker cements

**At the cement plant or the concrete plant, fly ash, ggbs, ground limestone and other materials, known as supplementary cementitious materials (SCMs) can be added to Portland clinker cement to deliver concretes with reduced $CO_2$ emissions whilst maintaining required performance. In some applications the concrete performance is enhanced.**

Availability of suitable materials around the world varies now, and will into the future. For example, fly ash comes from coal fired power stations and ggbs from the steel industry's blast furnaces and these industries are also transitioning. In coming decades there will be increased use of ground limestone and calcined clays to both compensate for reduced supply of fly ash and ggbs, and further reduce the Portland clinker to binder ratio. Progress in production of calcined clay can be seen on p29.

Whilst availability of SCMs can be a limitation for reducing clinker binder ratio, client acceptance is a current barrier in fully exploiting this lever in some developed and emerging economies.

On average globally, the clinker binder ratio in 2020 was estimated as 0.63. It is projected to reduce to 0.58 and 0.52 by 2030 and 2050 respectively. Regional and even country variations are inevitable due to differing SCM availability and market requirements.

GNR data is available for use of SCMs in the cement manufacturing process with a parameter known as clinker to cementitious ratio. This is higher than clinker to binder ratio because it does not account for SCMs added in the concrete plant. GNR has shown a progression from 0.78 down to 0.76 in clinker to cementitious ratio from 2020 to 2022 respectively.

**"In coming decades there will be increased use of ground limestone and calcined clays to further reduce the Portland clinker to binder ratio.**

**Alternatives to Portland Clinker Cements**

Alternatives to Portland clinker cements have been the subject of much research but their impact is not forecast to be significant primarily because of fundamental lack of availability of raw materials at the scale required. Furthermore, they also come with $CO_2$ emissions (about half of common cements). On average globally it is forecast that alternatives to Portland clinker cements will be 1% and 5% of cement in 2030 and 2050 respectively and in 2050 contribute a 0.5% reduction in overall $CO_2$ emissions.

To speed up the progress on novel cements, GCCA 2023 Innovandi Open Challenge focussed on new materials and ingredients for low carbon concrete. Over 70 start-ups were sourced and 15 were invited to pitch. After in-depth pitching and discussions, 4 consortia have been formed between start-ups and GCCA member companies. For more information visit: www.gccassociation.org/innovandi/openchallenge2023/





**Policy enablers**

**Specific policies are required to unlock the full circular economy potential and prioritise the use of, and improve access to, waste and by-products as supplementary cementitious materials.**

Use of blended cements and SCMs can be increased in the immediate term with governments and policy makers acting as follows:

1. Ensure necessary support for review, approval and publication of standards to ensure latest standards are available.
2. Ensure cement, concrete, design and construction codes and standards, and building regulations where applicable, are aligned and congruent. For example, construction codes must refer and default to latest available material standards.
3. Ensure Government and its agencies take the lead in public projects by specifying low carbon cements and concrete, through use of blended cements and SCMs, while taking into account the whole life carbon and performance of projects. We recommend major government agencies responsible for construction, are asked to review specifications to ensure they permit use of blended cements, SCMs and latest material standards.
4. Promote formal construction and more industrialised uses of cement, understanding that they offer a better scenario to leverage a more efficient, safe, and optimised use of SCMs.
5. Provide policy measures that encourage, incentivise and train clients and specifiers to use low carbon cement and concrete, through use of blended cements and SCMs, in construction projects, based on a whole life carbon and performance assessment.
6. Enable access and avoid barriers to sourcing SCMs both from overseas and domestically. Whilst taking into account the transport carbon impacts, no blanket prevention of importation should be introduced. Domestically, regulations should enable access to materials that are valuable for input into the cement/concrete value chain.
7. Establish government funding programmes to support development of material standards that will widen and accelerate the use of SCMs and blended cement.
8. Establish government funding programmes for product development and innovation for new SCMs.
9. Establish government funding programmes for development of test methods to enable more performance-based approaches firstly for known constituents and then for new, alternative constituents.



A new low-carbon cement, ECO3, by **CRH** contains calcined clay (clinker factor lower than 65%), and has been used in major construction projects including the landmark 85-metre-high **Tilia Tower**, near **Lausanne, Switzerland**. Read more on p52.



**Cementos Argos's** Rioclaro plant in **Colombia** pioneered the use of calcined clay blended cements, and has an impressive capacity of 450,000 tons per year. Read more on p41.



In **Taiwan**, following advocacy, the commodity tax for low clinker binder ratio cement is now lower, rather than higher, than that for Portland cement, enabling **Asia Cement Corporation** to supply more low clinker cements. Read more on p33.





https://gccassociation.org/wp-content/uploads/2024/11/GCCA-Cement-Industry-Progress-Report-202425.pdf

# Net Zero Progress Report

**Lever description and progress**

**Policy Enablers**

**Case Study Examples**

ACTION & PROGRESS

## Design and Construction



**22% contribution to Net Zero and 840Mt $CO_2$ emission savings in 2050**

Efficiency in Design and Construction:
- client brief to designers to enable optimisation
- design optimisation
- construction site efficiencies
- re-use and lifetime extension

**The project team of architect, engineer, contractor, project manager and quantity surveyor, together with the client (or their representative) have important roles to play to help decarbonise the whole life of cement and concrete.**

They are responsible for:
- Material specification: Specification with $CO_2$ as a criteria results in lower $CO_2$ solutions. Either lower carbon mixes with same performance requirements, or higher strength mixes with higher per unit volume carbon footprint outweighed by volume savings.
- Material procurement: Low carbon procurement is a key enabler for the industry to decarbonise production. (See Concrete on p22)
- Efficiency in design and construction of elements and whole projects: This can be achieved by applying many specific levers. These levers are able to be applied with current standards and regulations.

The primary means of unlocking design levers is ensuring that reduction of $CO_2$ emissions becomes a design parameter in addition to the current parameters of cost, time, quality and specific project client requirements.

Across all projects globally, the $CO_2$ emissions reductions achievable through design and construction levers is forecast as 7% and 22% in 2030 and 2050 respectively.

Project teams need to have $CO_2$ emission reduction at heart of design constraint triangle




Designers are familiar with working to constraints of cost, time and quality. Clients and funders must give designers the opportunity to design to an additional constraint of whole life carbon, whilst retaining requisite quality standards (which includes durability, safety and resilience).

Designers of buildings, with support of clients, can achieve $CO_2$ emission reductions through their choice of concrete floor slab geometry and system, choice of concrete column spacing and optimisation of concrete strength/element size/reinforcement percentage. This can be achieved whilst still obtaining all the performance benefits of concrete construction. Infrastructure projects offer similar opportunities.

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**"The primary means of unlocking design levers is ensuring that reduction of $CO_2$ emissions becomes a design parameter.**

**Policy enablers**
**The Clean Energy Ministerial Industrial Deep Decarbonisation Initiative calls on governments to commit to low carbon procurement of projects. Level two of their pledge includes: "Starting no later than 2030, conduct whole project life cycle assessments for all public construction projects, and, by 2050, achieve net-zero emissions in all public construction projects."**

Adoption of this pledge, implementation as soon as practical, and extension to privately funded construction will facilitate realisation of the potential design and construction decarbonisation savings.

Concrete design and construction can be optimised to reduce $CO_2$ impact, but there are often systemic barriers and practical constraints preventing this potential from being realised. For example:
- demands on speed of construction meaning low-carbon mixes are less economical
- fragmented value chains meaning the possibility and responsibility to reduce $CO_2$ is spread across different actors with diverging incentives
- the pace of change in revision of standards and building codes which (justifiably) prioritise avoiding risk

Policy enablers are required to tackle (non-regulatory) systemic barriers to enable the optimisation of concrete design and construction and prioritisation of $CO_2$ performance alongside other objectives at the procurement, design and construction stages.



**Votorantim Cimentos'** Spectra product has been used by the project team on a 36-storey project in **Brazil** to optimise total concrete and steel use and reduce water and carbon emissions. Read more on p80.



Only 14% of roads in **Peru** are paved, placing the country in the lowest quartile according to World Economic Forum. **Cementos Pacasmayo** promotes optimised slab concrete roads which deliver a 32% carbon reduction. Read more on p44.



**Ramboll**, the global engineering and architecture company, applied carbon optimisation to the standard flat slab and introduced column flares. This led to reduction in reinforcement, a thinner slab and embodied carbon reduction of approx 5%.

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https://gccassociation.org/wp-content/uploads/2024/11/GCCA-Cement-Industry-Progress-Report-202425.pdf

# What are Environmental Product Declarations (EPDs)?

EPDs are standardised documents that provide transparent, verified data about a product's environmental impact throughout its lifecycle.

**Key Features**:

- **Environmental Data**: Includes metrics like carbon footprint, energy use, and water consumption.
- **Standardised Format**: Follows ISO 21930, EN 15804 and Product Category Rules (PCR) for consistency.
- **Life Cycle Phases**: Covers production, transportation, usage, and end-of-life.
- **Third-Party Verification**: Ensures credibility and accuracy of information.

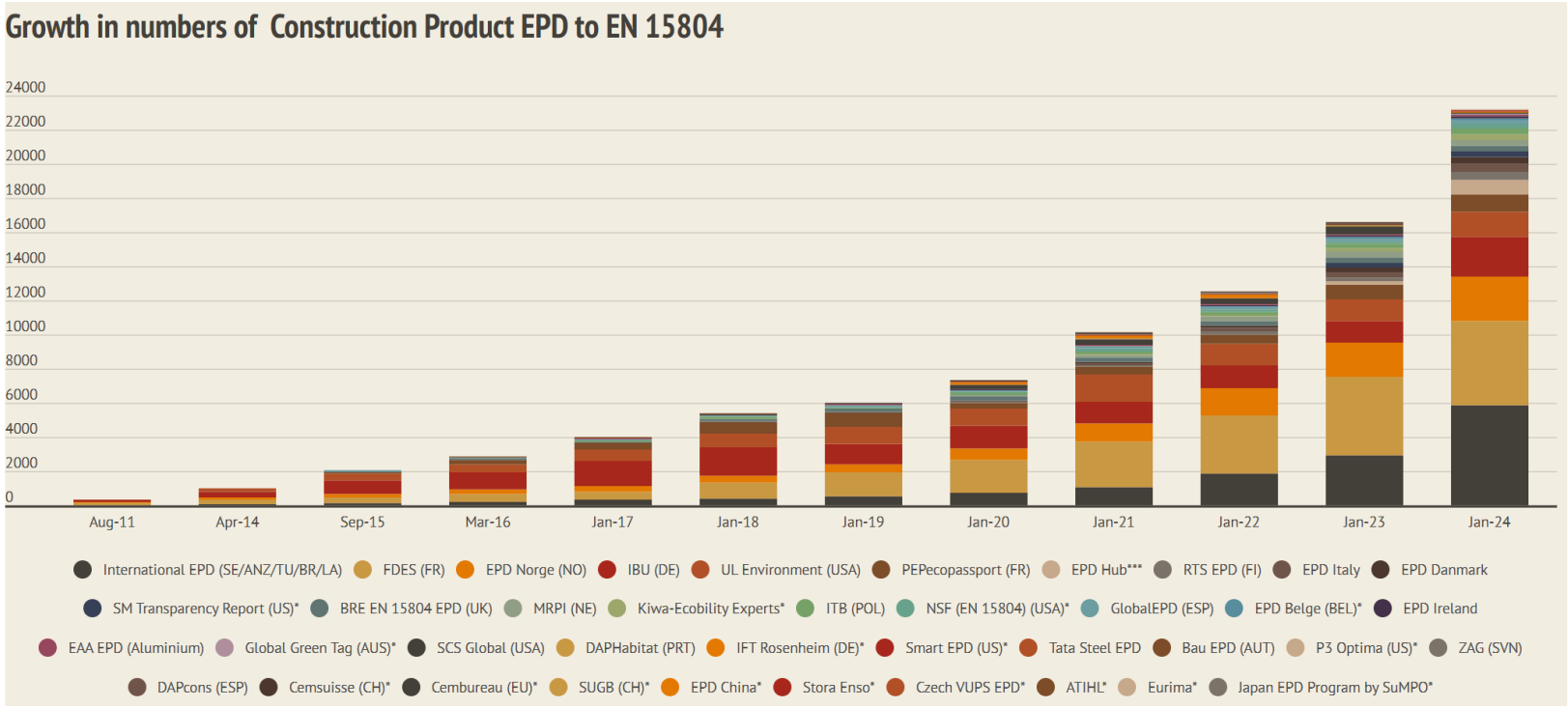
# Why are EPDs important?

EPDs drive sustainable construction and manufacturing by:

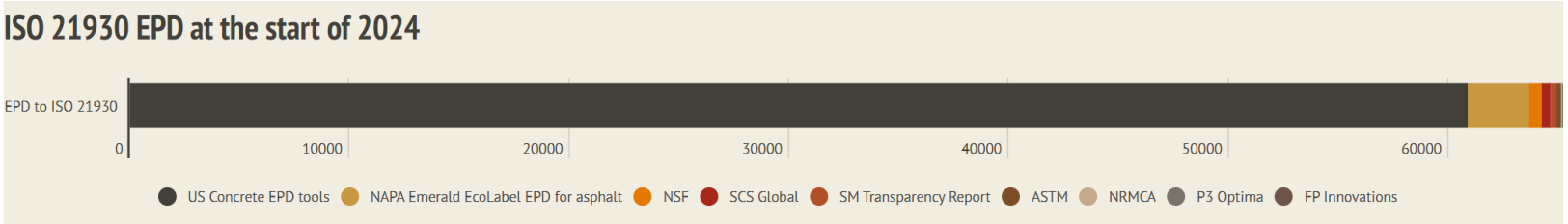
- Enabling data-driven **comparison between similar products** by architects, designers and specifiers
- **Supporting certification** requirements (LEED, BREEAM, CSC)
- Helping organisations **meet carbon reduction targets**
- **Demonstrate commitment** of manufacturers to environmental transparency
- Informing **low carbon procurement** decisions based on verified environmental performance data

# EPDs in numbers

- More than 23,000 registered EPDs to ISO 21930 & EN 15804 published globally in 2024

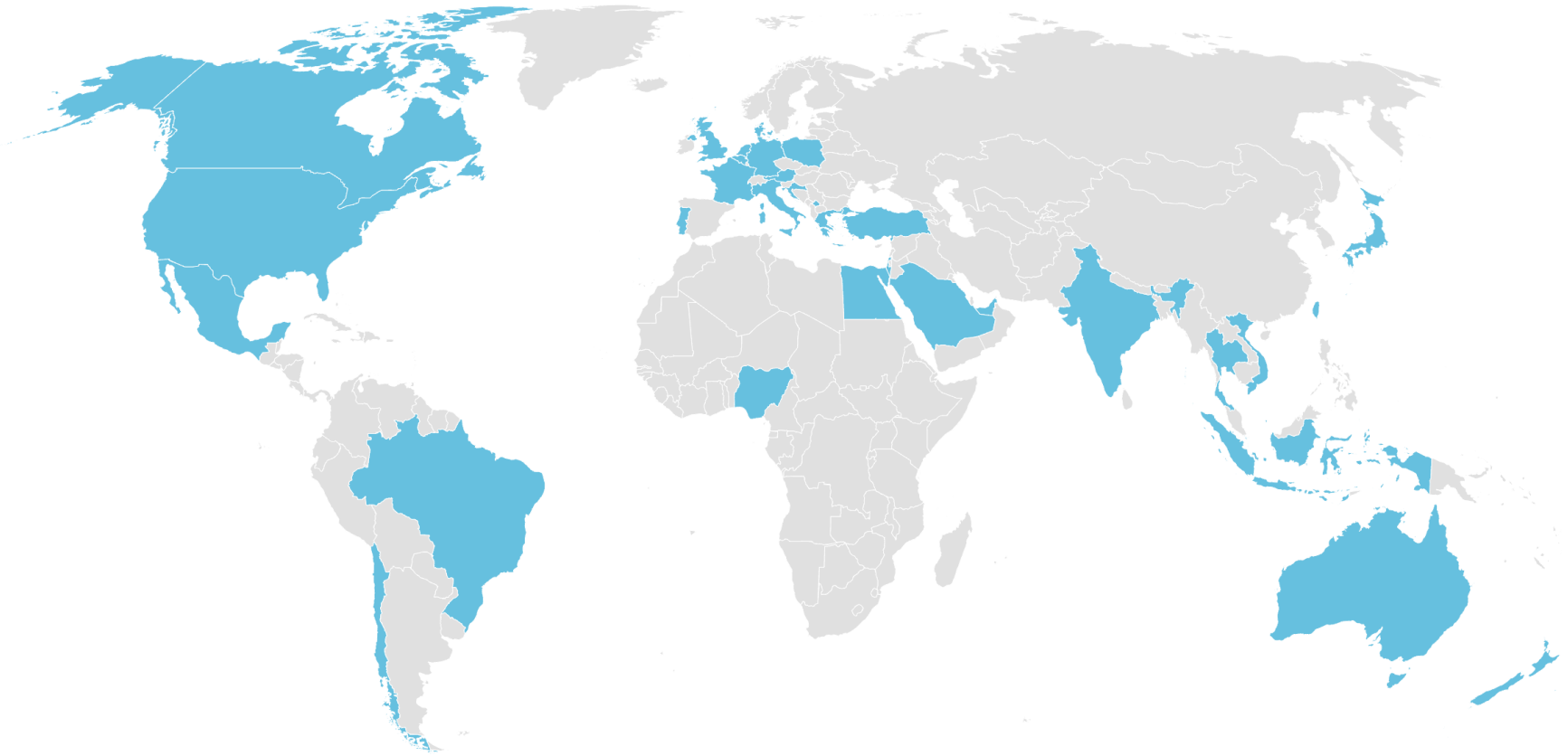



- Approximate 65,000 EPDs to ISO 21930 and Nth American PCRs are registered in EC3 with 60,000 produced by US concrete EPD tools

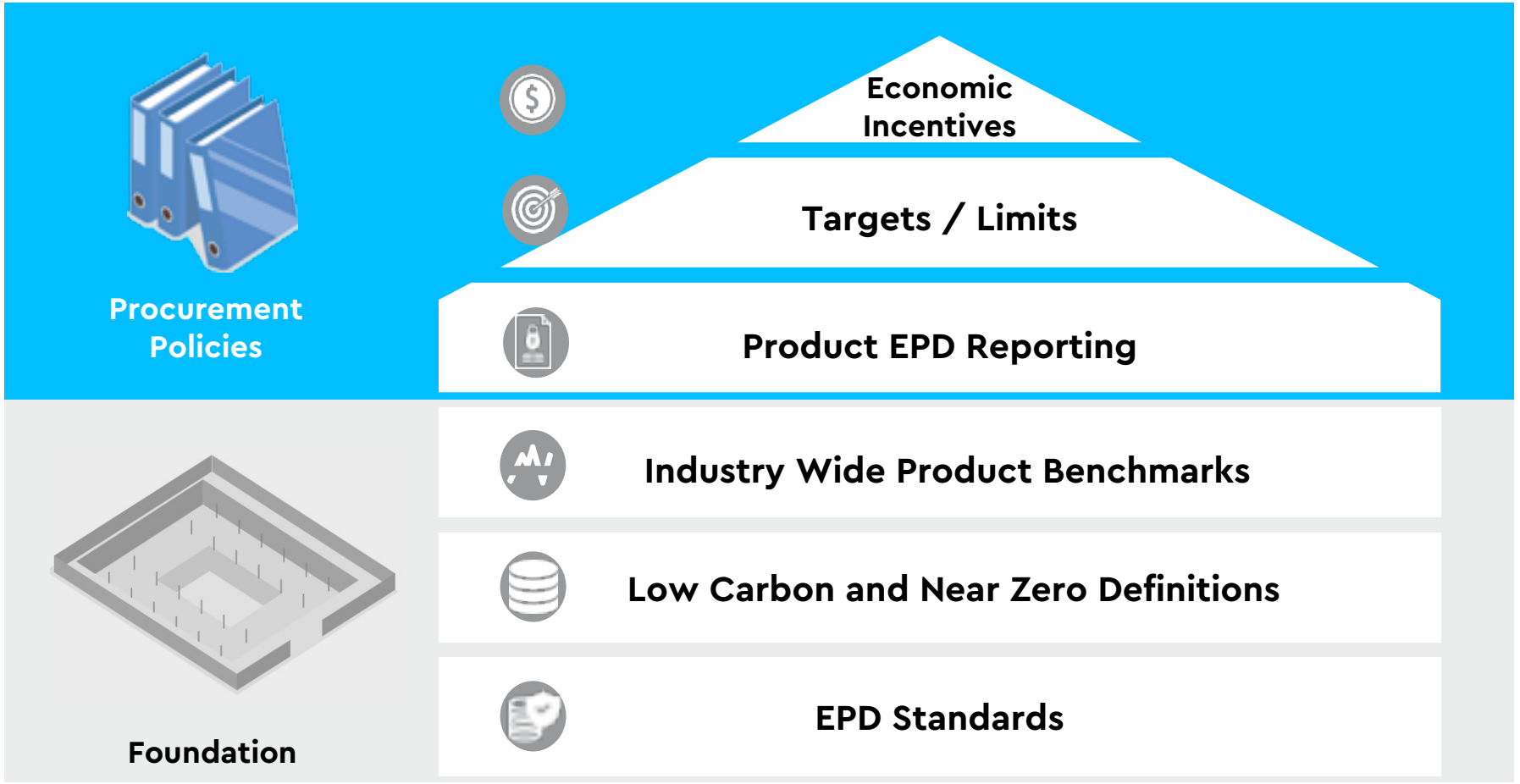



Source: Jane Anderson, ConstructionLCA, 2024

# Use of GCCA EPD tool by countries



# Low Carbon Product Procurement



# Sustainable Procurement

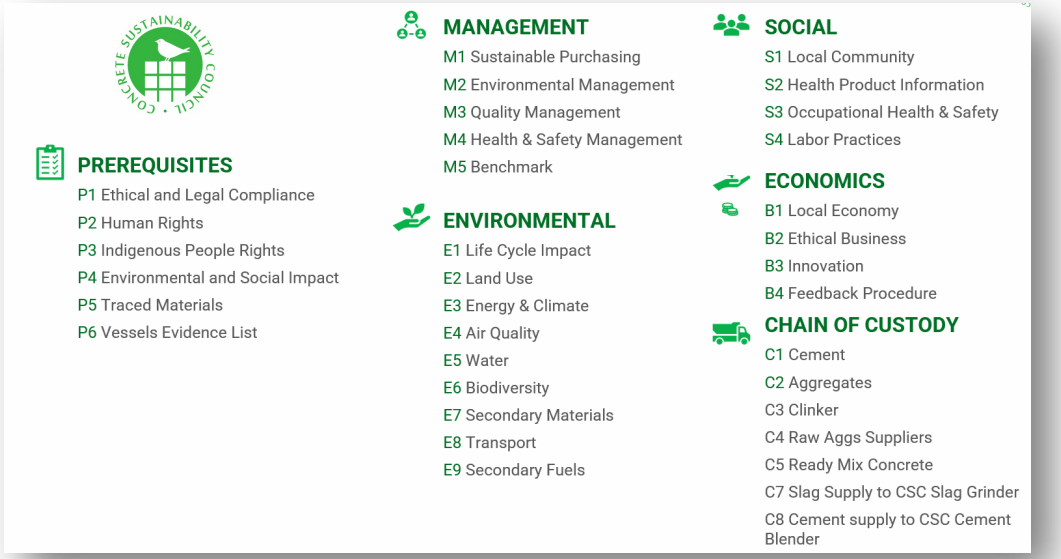
## EPD Indicators

| Indicator name and abbreviation (EN) |
|---|
| Core environmental impact indicators (MANDATORY) |
| Global warming potential - total (GWP-total) |
| Global warming potential - fossil fuels (GWP-fossil) |
| Global warming potential - biogenic (GWP-biogenic) |
| Global warming potential - land use and land use change (GWP-luluc) |
| Depletion potential of the stratospheric ozone layer (ODP) |
| Acidification potential, accumulated exceedance (AP) |
| Eutrophication potential - freshwater (EP-freshwater) |
| Eutrophication potential - marine (EP-marine) |
| Eutrophication potential - terrestrial (EP-terrestrial) |
| Photochemical ozone creation potential (POCP) |
| Abiotic depletion potential - non-fossil resources (ADPE) |
| Abiotic depletion potential - fossil resources (ADPF) |
| Water (user) deprivation potential (WDP) |
| Additional mandatory environmental impact indicators (MANDATORY) |
| Global warming potential (GWP-GHG) |
| Additional voluntary environmental impact indicators (OPTIONAL) |
| Particulate matter emissions (PM) |
| Ionizing radiation, human health (IRP) |
| Eco-toxicity - freshwater (ETP-fw) |
| Human toxicity, cancer effect (HTP-c) |
| Human toxicity, non-cancer effects (HTP-nc) |
| Land use related impacts/Soil quality (SQP) |

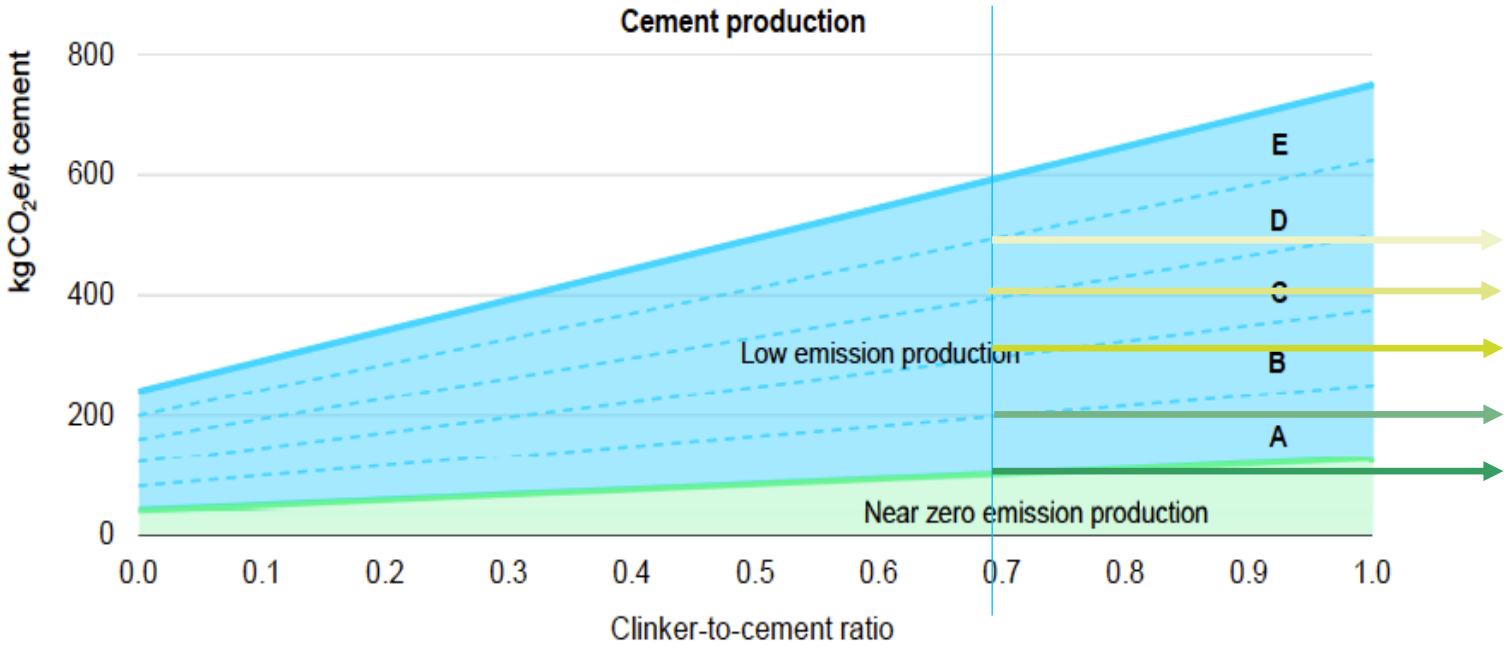
| Indicator name and abbreviation (EN) |
|---|
| Indicators describing resource use (MANDATORY) |
| Use of renewable primary energy as energy carrier (PERE) |
| Use of renewable primary energy resources used as raw materials (PERM) |
| Total use of renewable primary energy (PERT) |
| Use of non renewable primary energy as energy carrier (PENRE) |
| Use of non renewable primary energy resources used as raw materials (PENRM) |
| Total use of non renewable primary energy resource (PENRT) |
| Use of secondary material (SM) |
| Use of renewable secondary fuels (RSF) |
| Use of non-renewable secondary fuels (NRSF) |
| Net use of fresh water (FW) |
| Environmental information describing waste categories (MANDATORY) |
| Hazardous waste disposed (HWD) |
| Non-hazardous waste disposed (NHWD) |
| Radioactive waste disposed (RWD) |
| Environmental information describing output flows (MANDATORY) |
| Components for re-use (CRU) |
| Materials for recycling (MFR) |
| Materials for energy recovery (MER) |
| Exported electrical energy (EEE) |
| Exported thermal energy (EET) |

## Concrete Sustainability Council Certification

## Responsible Sourcing



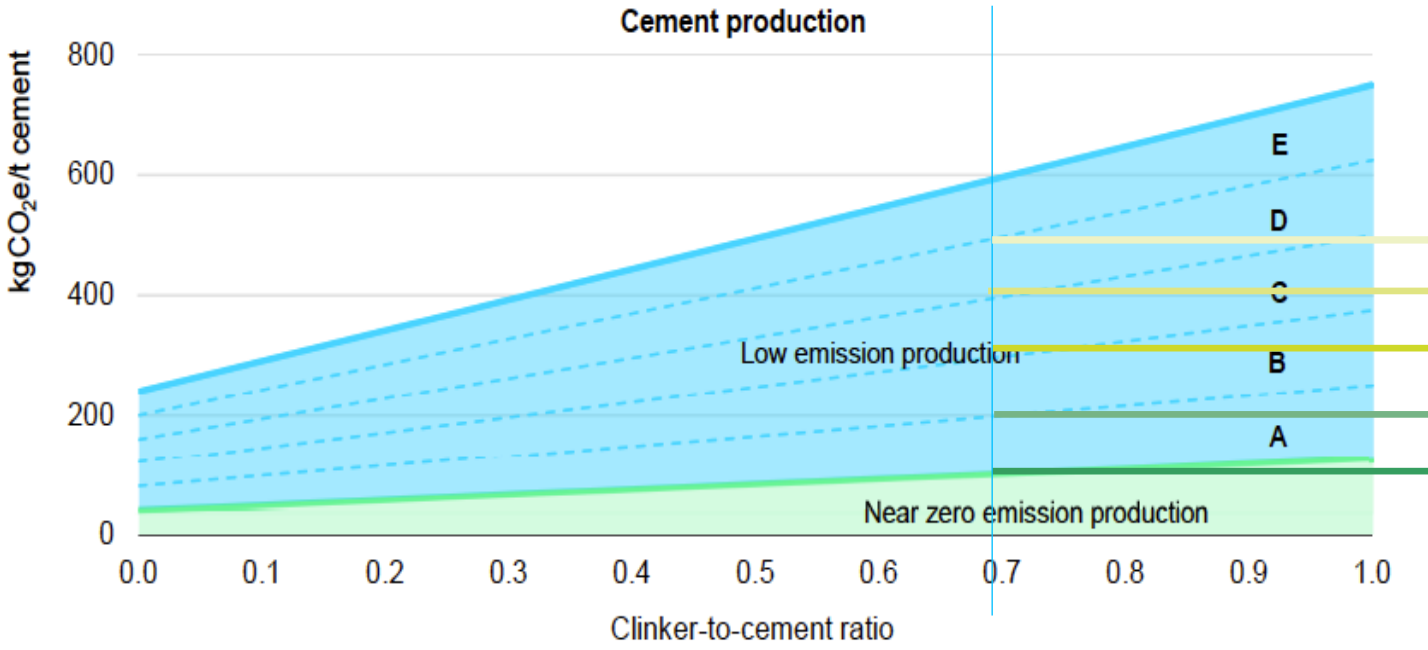
# IEA Cement Definition





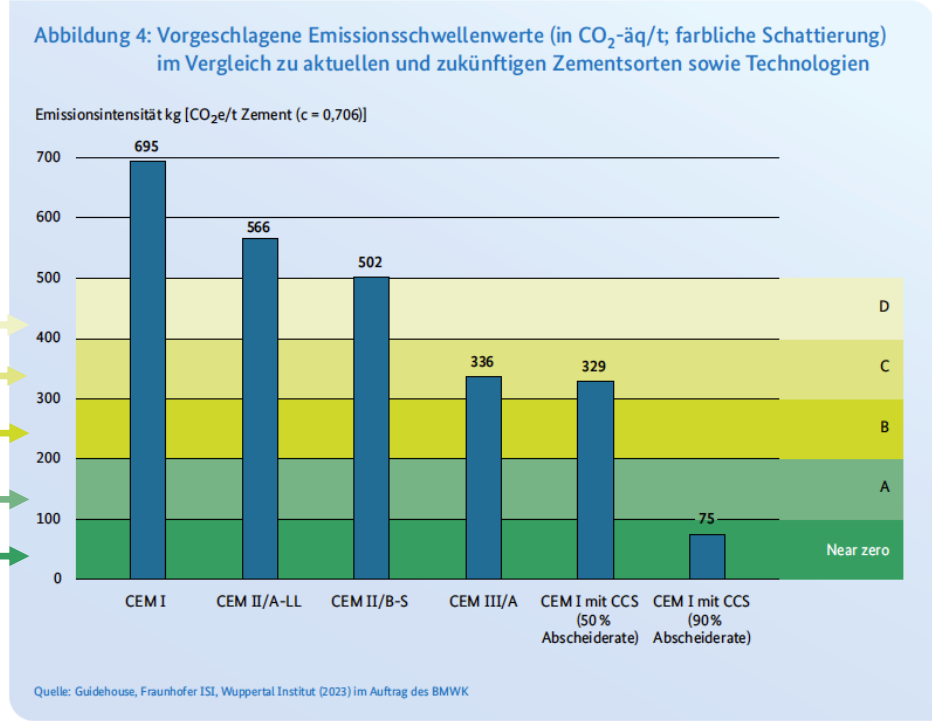

Notes: See the Technical Annex for the formulation of the low emission production thresholds.

# IEA Cement Definition and German Application (member of IDDI)



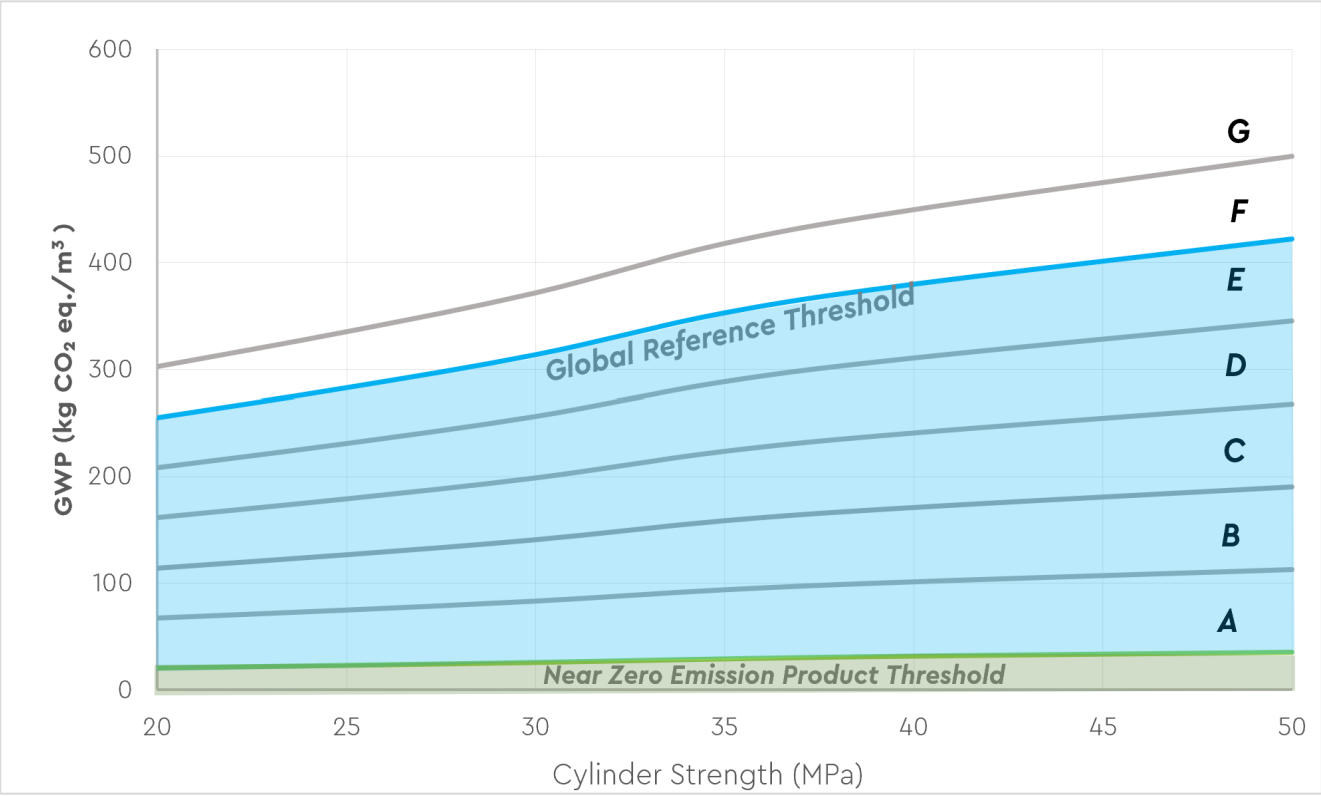



Notes: See the Technical Annex for the formulation of the low emission production thresholds.



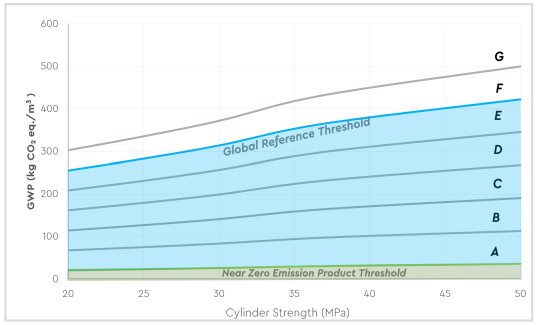

- Exercised option to fix clinker cement ratio. Chose 0.706
- Guidance to use net EPD values to determine what band product is in

# GCCA Global Concrete Definitions

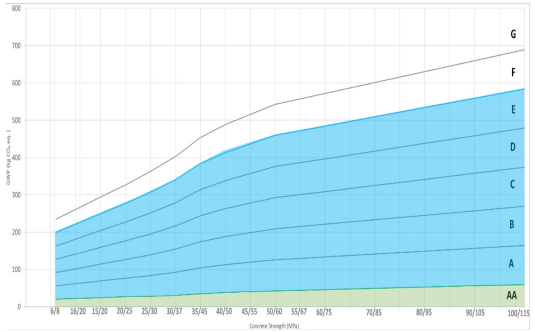


# GCCA Global Concrete Definitions: how to implement

**Global definitions** → **National adaptation if needed** → **Benchmarks overlaid** → **Targets and ambitions set by country**

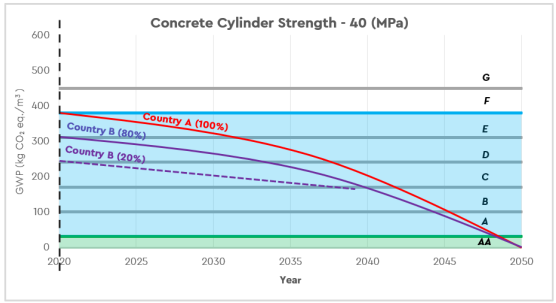



*UK adaptation*




*USA Benchmarks*

*NRMCA Member National and Regional LCA Benchmark*

# COP29



Vice Chancellor of Germany, Robert Habeck

Launch of GCCA Definitions

Building Breakthrough (ICBC*)

Steel Breakthrough

Cement & Concrete Break'gh

Climate Club

ITA

*Intergovernmental Council for Buildings & Climate

# EPDs act as a common reporting mechanism

**Benefits:**

- **Standardised** rules for creating EPDs across construction materials
- **Existing infrastructure** for EPDs (program operators, verifiers, software tools)
- **Familiarity** with EPDs among project stakeholders

**Challenges:**

- **Inconsistencies** in EPDs arise from variations in Product Category Rules (PCRs), standards, assessment scopes, and background data.
- Traditional EPD production processes **can be costly and time-intensive**.
- Regulatory changes (e.g. CPR) will require **mandatory** product declarations.

**Solution:**

- The IDDI initiative promotes **alignment** of EPD standards across industries.
- Leverage grants, subsidies, and streamlined LCA/EPD tools to **reduce production costs** and complexity.
- Closely monitor regulatory updates and **prepare for future** requirements to stay compliant.

# Pete Hemingway

Policy Advisor

UNIDO

INDUSTRIAL DEEP DECARBONISATION

AN INITIATIVE OF THE CLEAN ENERGY MINISTERIAL

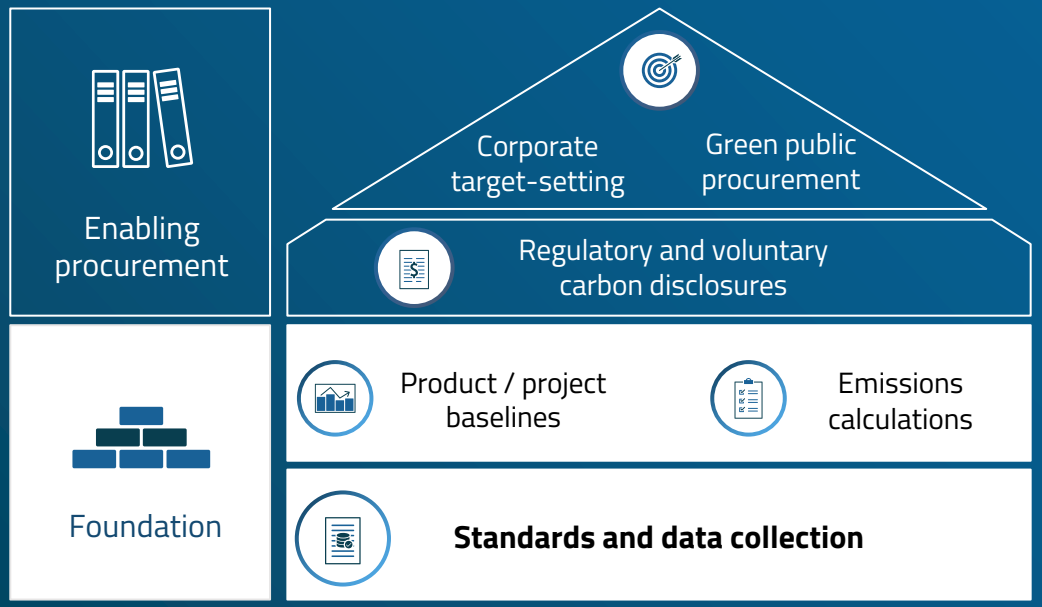
# Setting a foundation for carbon capture and storage (CCS) in product life cycle assessments

Pete Hemingway

UNIDO

10 DECEMBER 2024

# Overview | Carbon accounting standards are the foundation of green markets




## However, existing standards landscape suffers from challenges that are critical to address

1. Inconsistency: Major reporting methodologies for cement and concrete products and products from other industries, do not produce comparable results

2. Gaps: Most major reporting methodologies do not address a set of key accounting questions, e.g., CCS

3. Limited uptake: Use of reporting methodologies varies significantly, with limited use of standards in many geographies & sectors

These concerns are expected to become more salient as demand for green products continues to grow and investment decisions are made.

This requires urgent reform in the standards 'foundation'

# We have identified six discrete topics that require guidance

## System boundaries

1. What CCS processes, inputs and capital equipment are included in the accounting?
2. How long are manufacturers liable for $CO_2$ once stored?

## $CO_2$ Chain of Custody

3. How is $CO_2$ tracked through CCS networks, how is $CO_2$ storage verified, and how is it allocated to manufacturers?
4. How are fugitive emissions modelled and allocated among manufacturers using a CCS network?

## Integration

5. How are CCS activities integrated into existing life cycle assessment frameworks for industrial products?

## Carbon removals

6. How is biogenic carbon accounted for and should negative emissions be achievable through point-source CCS?

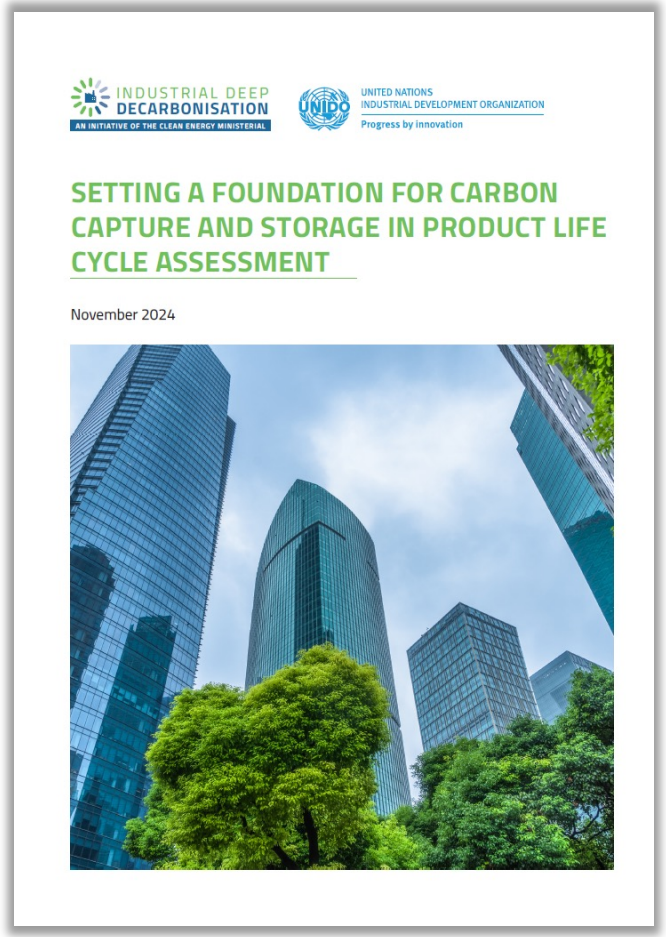
# Key takeaways | Setting a foundation for carbon capture in product life cycle assessments

Integrating CCS data into Environmental Product Declarations will enable manufacturers to **derive financial value from investments** in carbon capture

Build methodologies on **common, existing standards** to ensure changes are easily adopted and data outputs are interoperable

Standards must be ready **in time to enable the deployment of CCS** and deep decarbonized cement

Maximise **collaboration and knowledge exchange** between stakeholders and initiatives (CEM IDDI, CEM CCUS Initiative, MICDR, GHG Protocol, etc.)

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# Tiffany Reed-Villarreal

Director Sustainability Codes and Standards

NRMCA

# Accelerating Concrete's Drive to Carbon Neutrality

Tiffany Reed-Villarreal, P.E., Director Sustainability Codes, NRMCA

# Our Journey to Carbon Neutrality

2009 | 2012 | 2014 | 2016 | 2021 | 2023

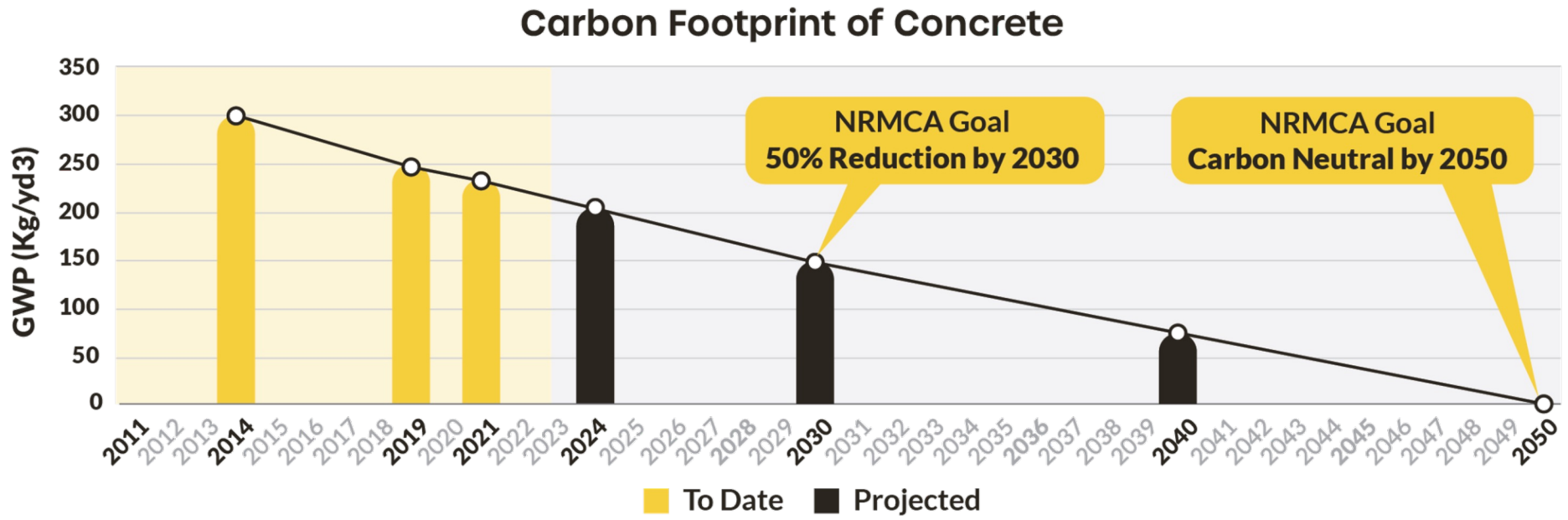
ADOPTER architecture 2030 CHALLENGE

NRMCA CERTIFIED EPD

BUILD WITH STRENGTH

$CO_2$ 21%

$CO_2$



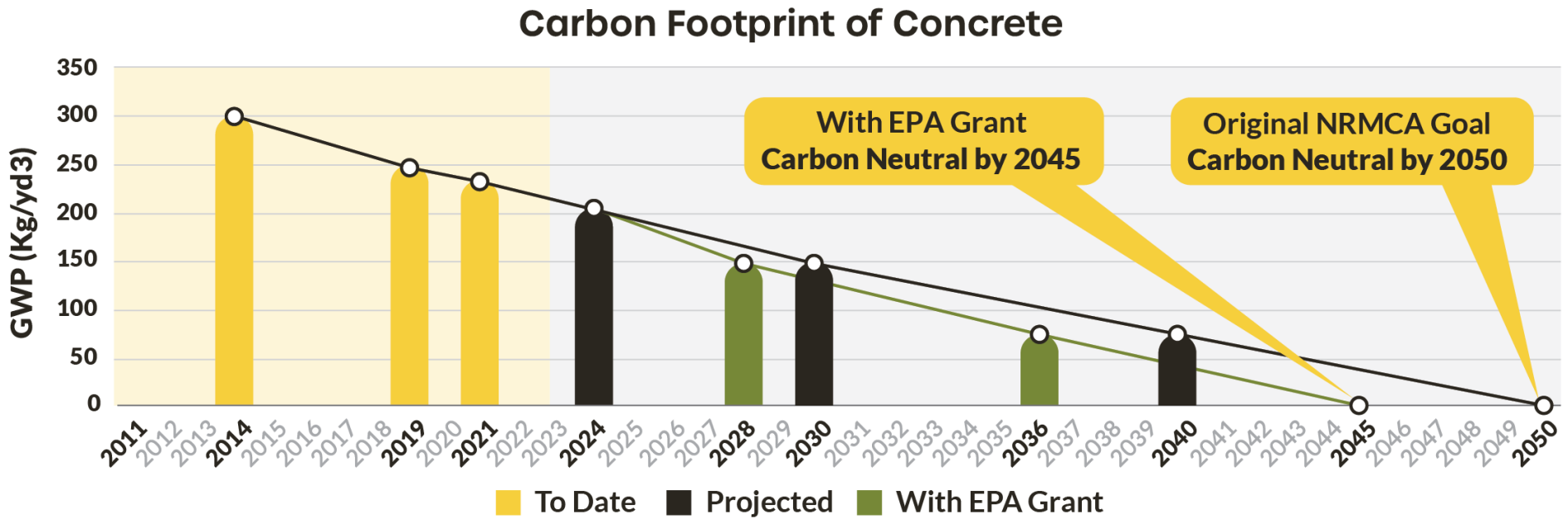
# Inflation Reduction Act (IRA) of 2022

| | |
|---|---|
| **Procure Low-Carbon Materials** | $2.15 billion to GSA<br>$2 billion to the FHWA |
| **Develop EPDs** | $250 million to EPA |
| **Label Materials with Lower GWP** | $100 million to EPA, FHWA, and GSA |

# Accelerating Concrete's Drive To Carbon Neutrality

## NRMCA Selected for $9.63 Million EPA Grant

**GOAL:** Reduce the carbon footprint of concrete by 50% by 2028 and achieve carbon neutrality by 2045.




**www.nrmca.org/EPAGrant**

# Objective 1: Increase Number of Ready Mixed Concrete EPDs

## Goal: Increase plants with EPDs to 4500

| Plant | Amount |
|---|---|
| **Companies that did not have EPDs[1]** | $5,000 for first plant |
| **Companies that already have EPDs[2]** | $2,000 per plant |

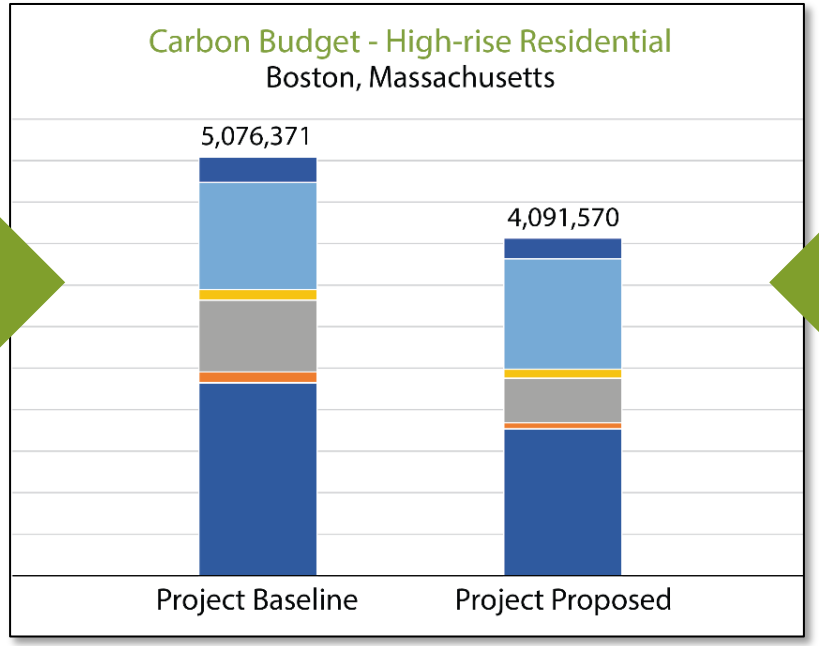
1. Companies who have never published an EPD at any plant.
2. For second plant and beyond.
   a. Publish EPDs at a plant that did not have EPDs
   b. Publish new EPDs lower than NRMCA Benchmarks at a plant with EPDs

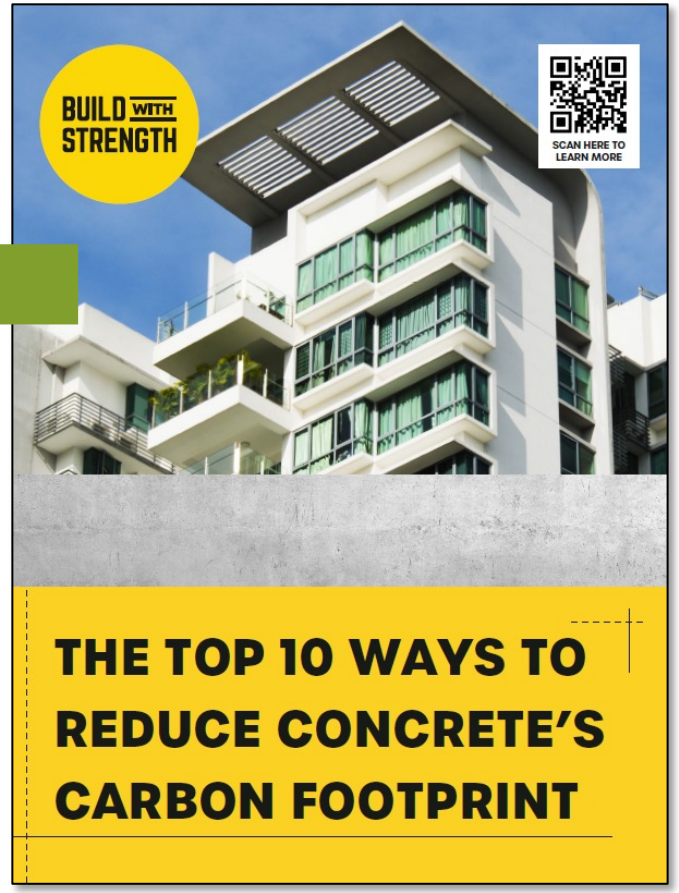
# Objective 2: Ensure Technical Proficiency of Concrete Industry Personnel

## Goal: Certify 500 Individuals

- Develop and maintain education and certification program
- Establish EPD Help Center
- Roundtable events
- Enhance Concrete Design Center

# Objective 3: Enhance Low-Carbon Concrete Design Tools

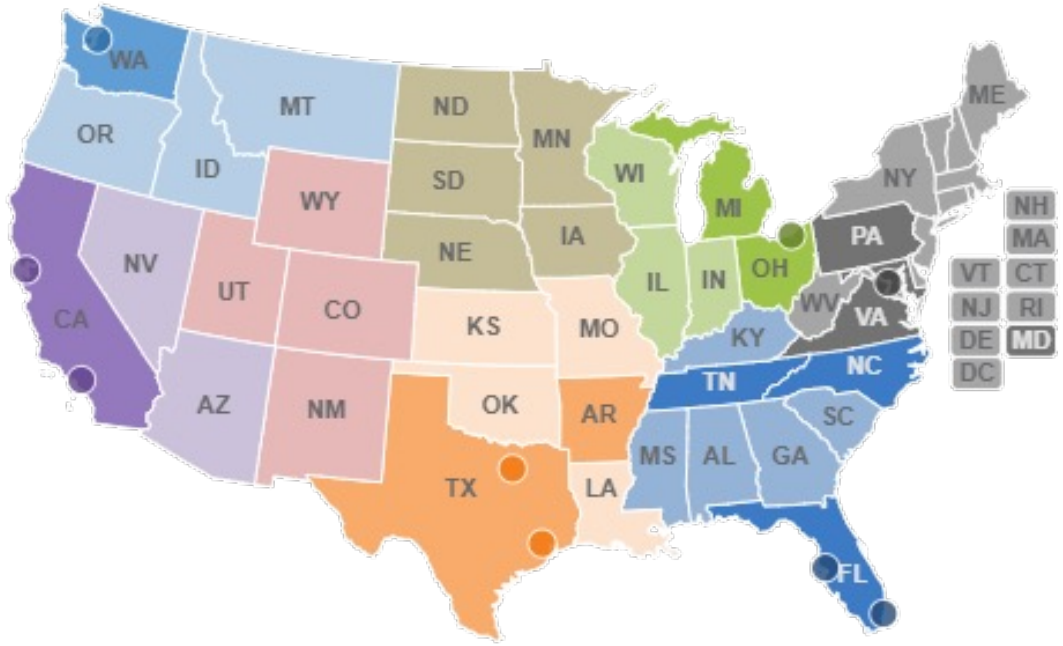




- Enhance Carbon Calculator
  - **Specification guidance**
  - **Low-carbon concrete strategies**
  - **AI specification review tool**

# Objective 4: Improve Benchmarks for Concrete

- Publish **benchmarks in 30 regions** in 2025
- Publish **benchmarks in 50 regions** in 2029



# Objective 5: Improve PCRs and EPDs for Constituent Materials

- Develop PCR, benchmarks and EPDs for **admixtures**
- Update PCR and develop benchmarks and EPDs for **lightweight aggregates**
- Develop benchmarks for **RCC pavements**

# Funding and Timeline

- NRMCA was notified of selection – June 18, 2024
- Public announcement of grant selection – July 16, 2024
- Grant will likely start funding in 2025
- NRMCA will begin administering pass-through grants – mid-2025
  - **Develop ADA compliant, searchable EPD website**
  - Develop online application and payment system
  - Develop online**/helpline**
- Funding is for 5 years


# Proposed EPD Technical Assistance for the Cementitious Materials Industry

# PCA Project Overview

**Title:** *EPD Technical Assistance for the US Cementitious Materials Industry*

**Total funding:** $2.4M over five years

1. $1.5M in **reimbursement funding** available to US cementitious materials producers to develop **facility-specific EPDs**
2. Provide **Training** and **On-Call Technical Assistance**
3. Fund development of robust **industry-average EPDs**
4. Support development of a **unified cementitious materials PCR**
5. Develop and maintain an **LCA Calculator and Benchmarking Tool** for concrete mix design

**Attack key 'pain points':**
**- cost of EPDs**
**- staff know-how**

ROADMAP TO CARBON NEUTRALITY
Portland Cement Association



PCA America's Cement Manufacturers

# Key Goal of Program

- **Increase cementitious materials EPDs for US users:**
  - Over 90% of cement plants have EPDs (up from ~50%).
  - Over 80% of eligible SCM facilities have EPDs (up from ~0%).
  - Enhance robustness and accessibility of cement/SCM EPDs

- **Current status is that PCA has been selected for funding and is working with EPA to finalize the program**

- **For more information:**
  - www.cement.org/epagrant

ROADMAP TO CARBON NEUTRALITY
Portland Cement Association



PCA America's Cement Manufacturers

# Robust Industry-Average EPDs


**11.6% reduction from 2016 to 2021**

**PLC is 8.2% lower than OPC in 2021**

GWP improvements per 2016 and 2021 cement industry-average EPDs

- Industry averages serve as **benchmarks** and provide a way to **show progress.**
- Useful in design stage of projects before suppliers are known.
- Proposed efforts
  - **New:** Coal ash (fresh and harvested), Natural Pozzolans (raw and calcined).
  - **Revised/improved:** Cements and slag cement.
  - **Regional averages** where possible.
  - Report statistical distribution of data.
  - **Revise all** by end of project (2029).

ROADMAP TO CARBON NEUTRALITY
Portland Cement Association



PCA America's Cement Manufacturers

# Federal, State & Local Buy Clean/Embodied Carbon Policies

## Adopted

- Colorado
- New York
- Washington (2025)
- Maryland (2026)
- Minnesota (concrete 2026, other materials 2028)
- Oregon (paving, 2027)

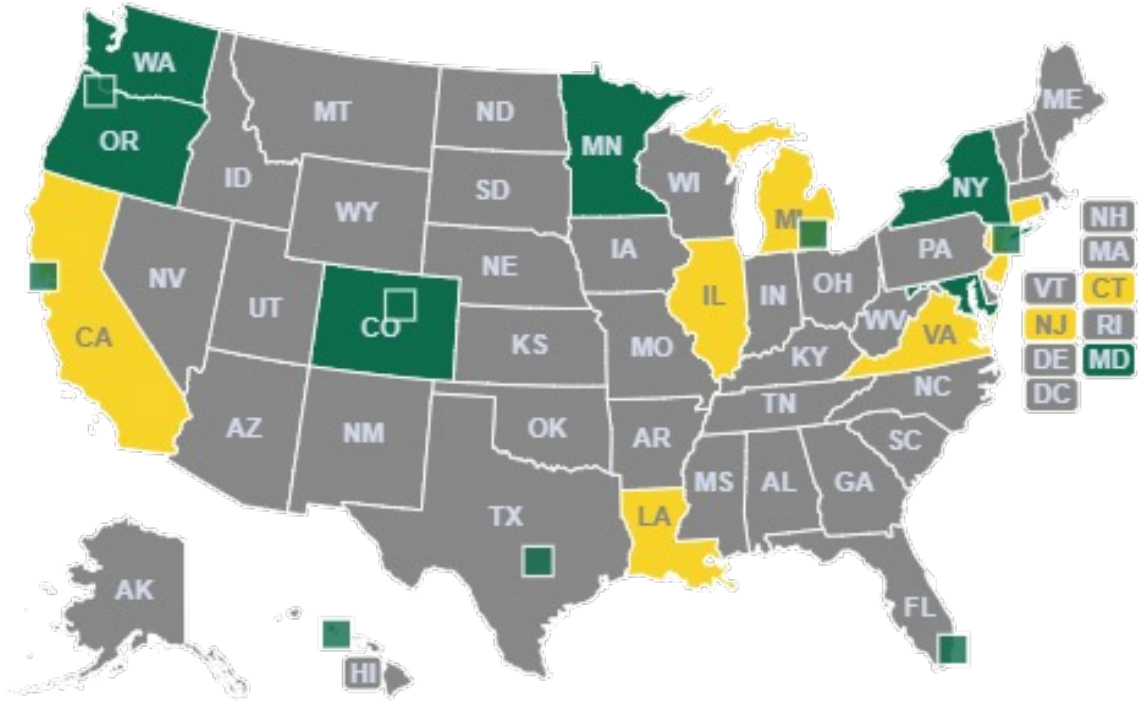
## Proposed

- Connecticut
- Illinois
- Louisiana
- Michigan
- Virginia

## Other

- California (excludes concrete)
- New Jersey (tax incentive)

U.S. Department of Transportation
Federal Highway Administration




## Local

- Marin County, CA
- Denver, CO
- Honolulu, HI
- Portland, OR
- Ann Arbor, MI (incentive)
- Austin, TX (resolution)
- Miami, FL (resolution)

# Vagner Maringolo

Sustainable Construction Manager

CEMBUREAU

# New Construction Products Regulation

## GCCA webinar 'An Overview of EPDs and the GCCA EPD Tool' (Dec 10, 2024)

Vagner Maringolo

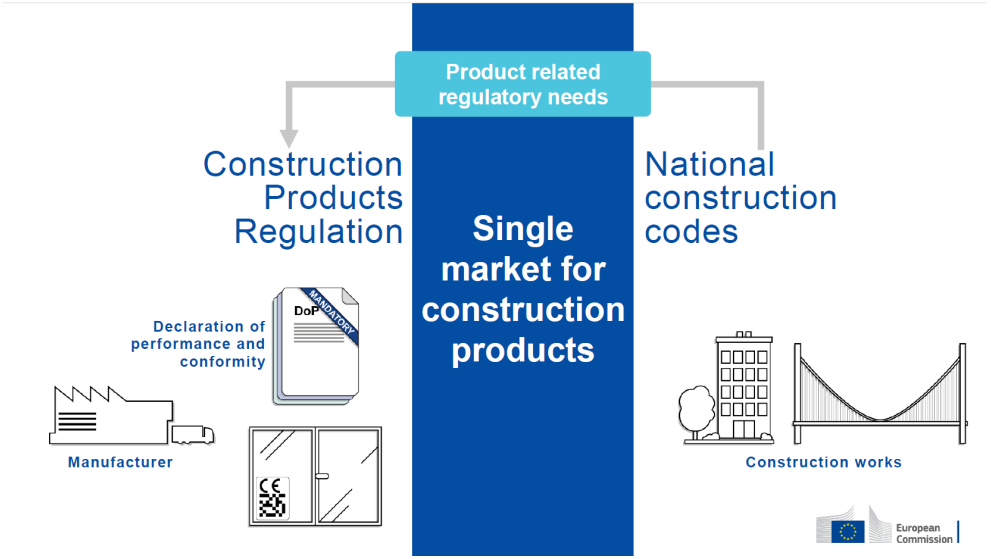
# What is the CPR?

The Construction Products Regulation (CPR) sets **harmonised** rules for the free circulation of construction products in the EU Single Market through the **CE marking**, based on common technical specifications (harmonised standards).

By affixing the CE marking to the product the economic operator becomes responsible (**liable**) for the conformity of the product with the declared performance and applicable product requirements.

CPR links to National Building Codes through 7 basic requirements for construction works, i.e., Member State have the responsibility to fulfil those BRCWs into the national legislation:

1. Structural integrity
2. Fire safety
3. Protection against adverse hygiene & health impacts
4. Safety and accessibility
5. Protection against noise
6. Energy efficiency and thermal performance
7. Sustainable use of natural resources



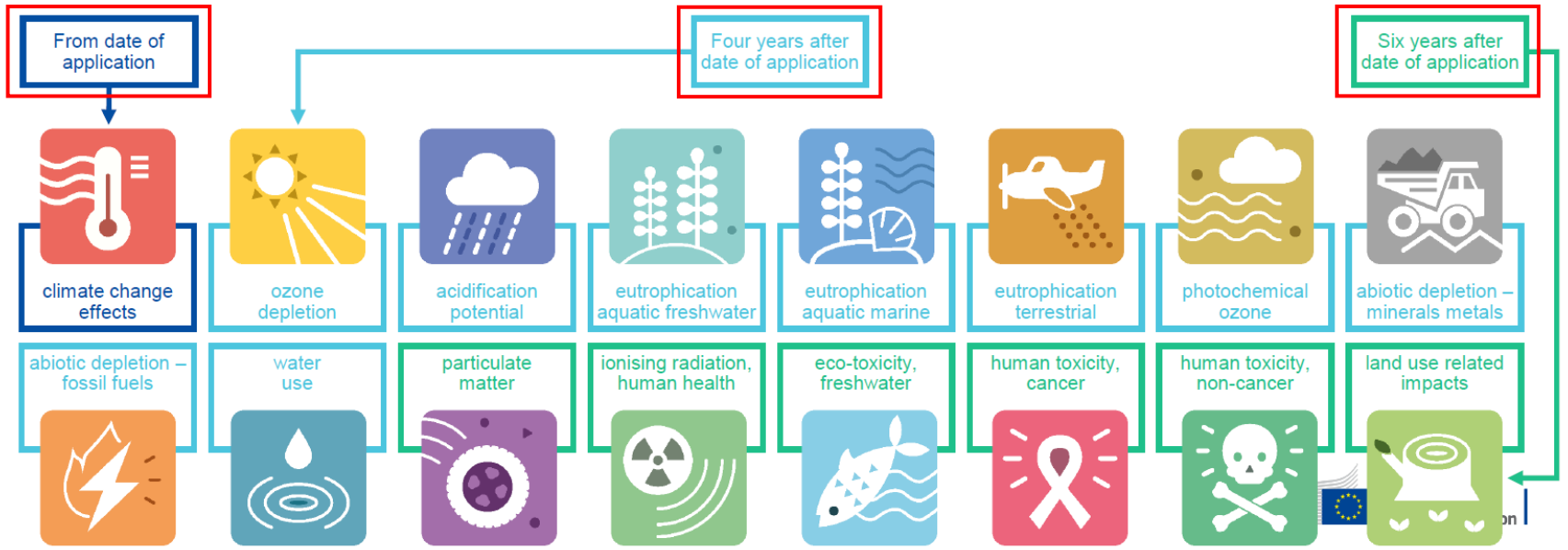
# Entering into force

Originally from 2011, the CPR has been through a deep **review** to **tackle issues with its implementation** and to **deliver on the EU green and digital transitions**.

The final legislative step for its **adoption** was in November 2024.

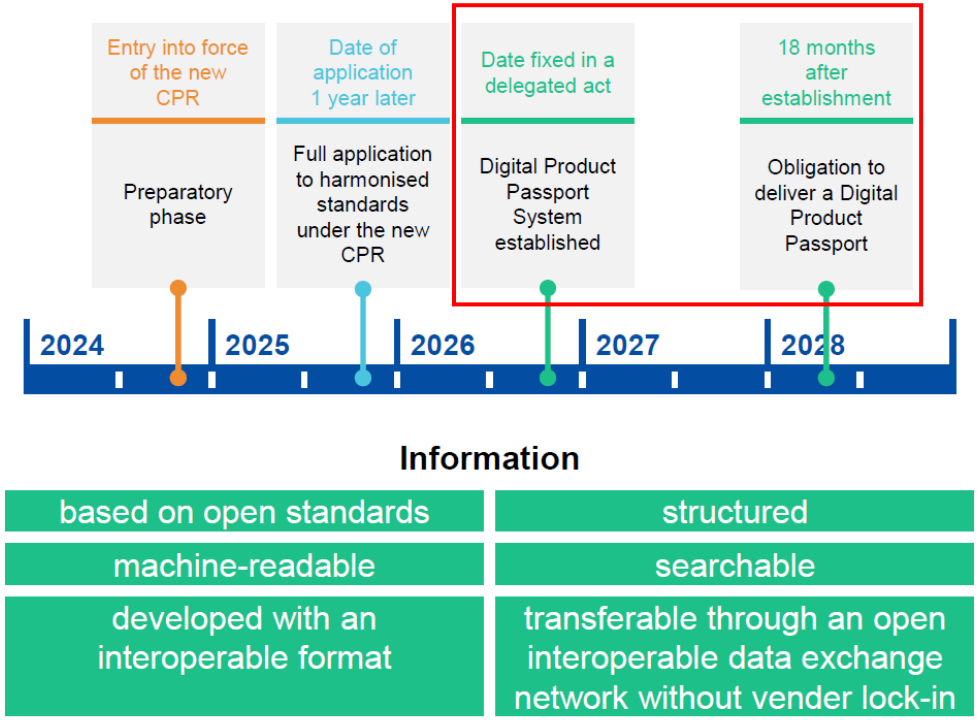
The new CPR will **enter into force** on the 20th day following its publication in the Official Journal of the EU.

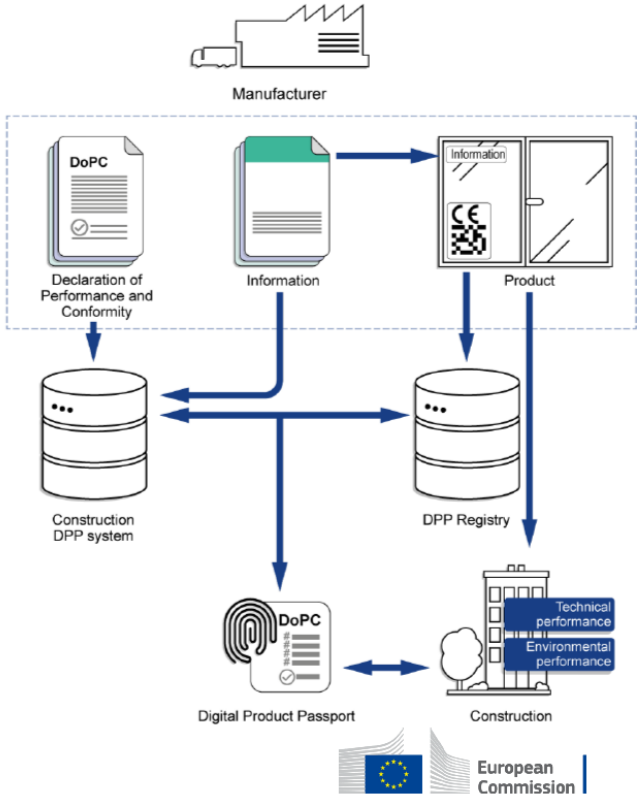
**Mandatory declaration (EN 15804 + A2) of essential characteristics:** Global Warming Potential (GWP) from date of application & other indicators added gradually.



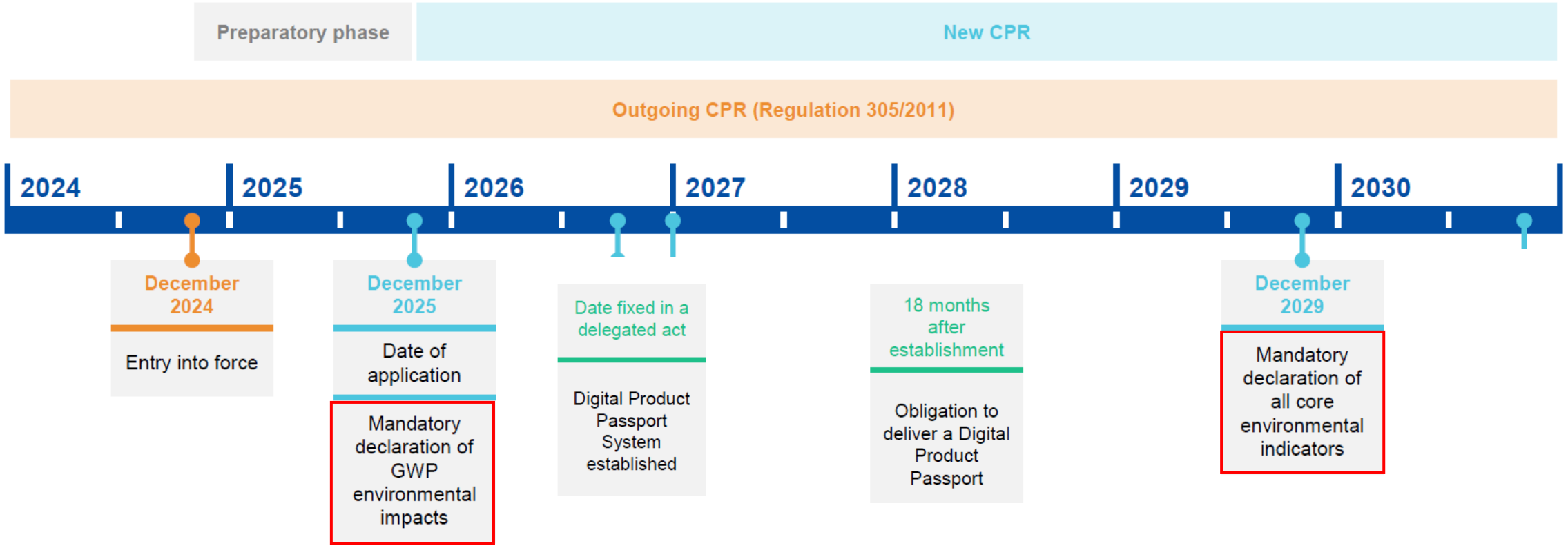
# New measures for manufacturers: digitalisation

Establishing a **digital product passport (DPP)** system to collect and share data (technical specifications, environmental data etc.) about a product and its supply chain across the entire value chain, facilitating compliance and traceability.



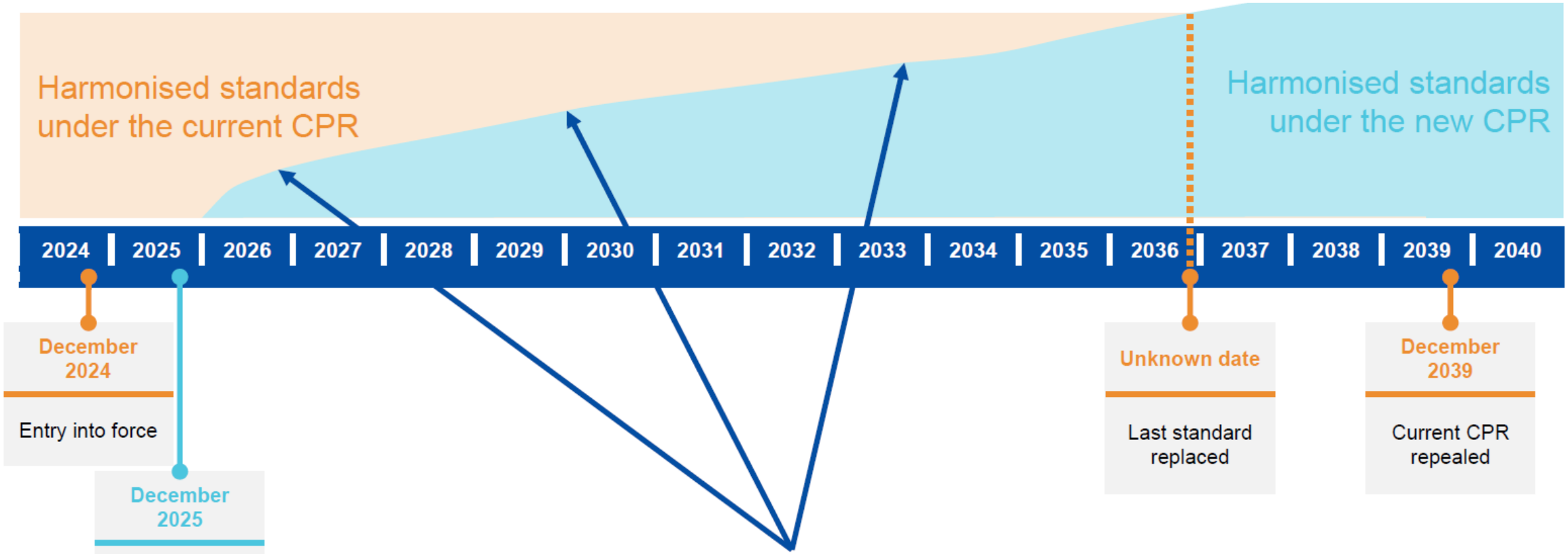
# Overview of the new CPR timeframe



# Environmental information: the future of EPDs and DoPs

| LCA output in a separate document, as an Environmental Product Declaration (EPD) | LCA output as essential characteristics in the Declaration of Performance (DoP) |
|---|---|
| Available in the marked as **B2B** documents | Implemented progressively by construction product family |
| Useful as generic information | Integrated in the regulatory framework of the CPR |
| Valid reference during the design phase | Linked to the product placing on the market |
| Program operator + verifiers | Third party validation by notified bodies |
| Governance: program operator and building tool owners determine the information to be supplied by the manufacturer and the procedures on how to that | Governance: the European Commission together with the Committee on Standards that decides |

# CPR transition – harmonised standards




The number of product covered by the new CPR will gradually grow as there will be new harmonised standards cited under the new CPR!

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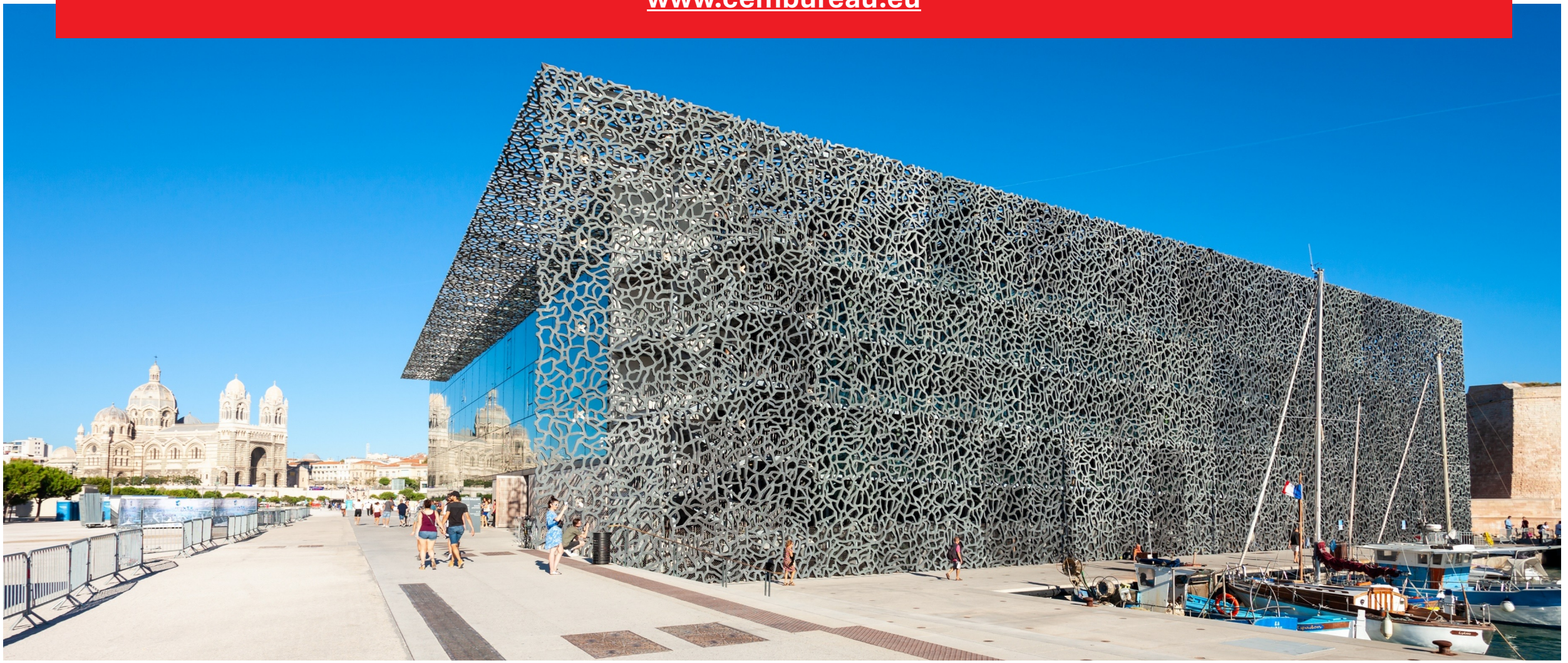
**www.cembureau.eu**



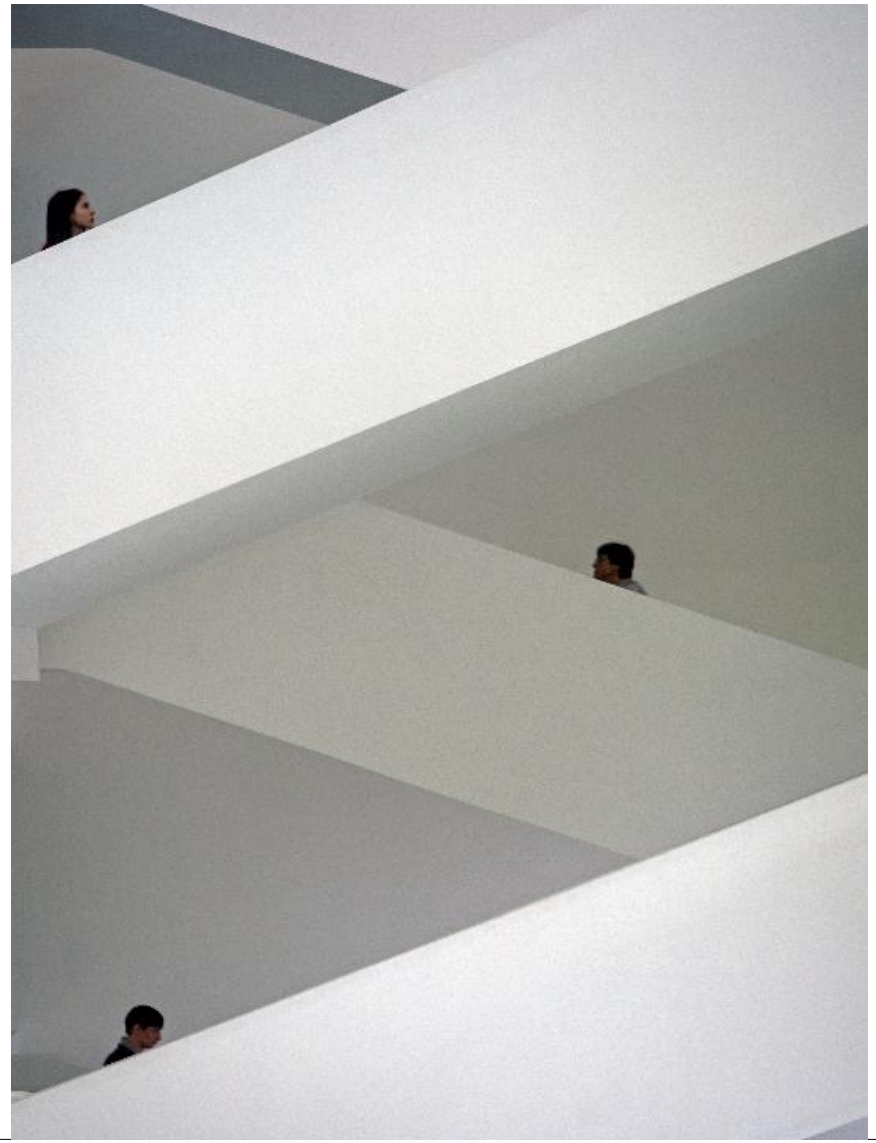
# Nicolas Antoniou

Sustainable Design and Construction Manager

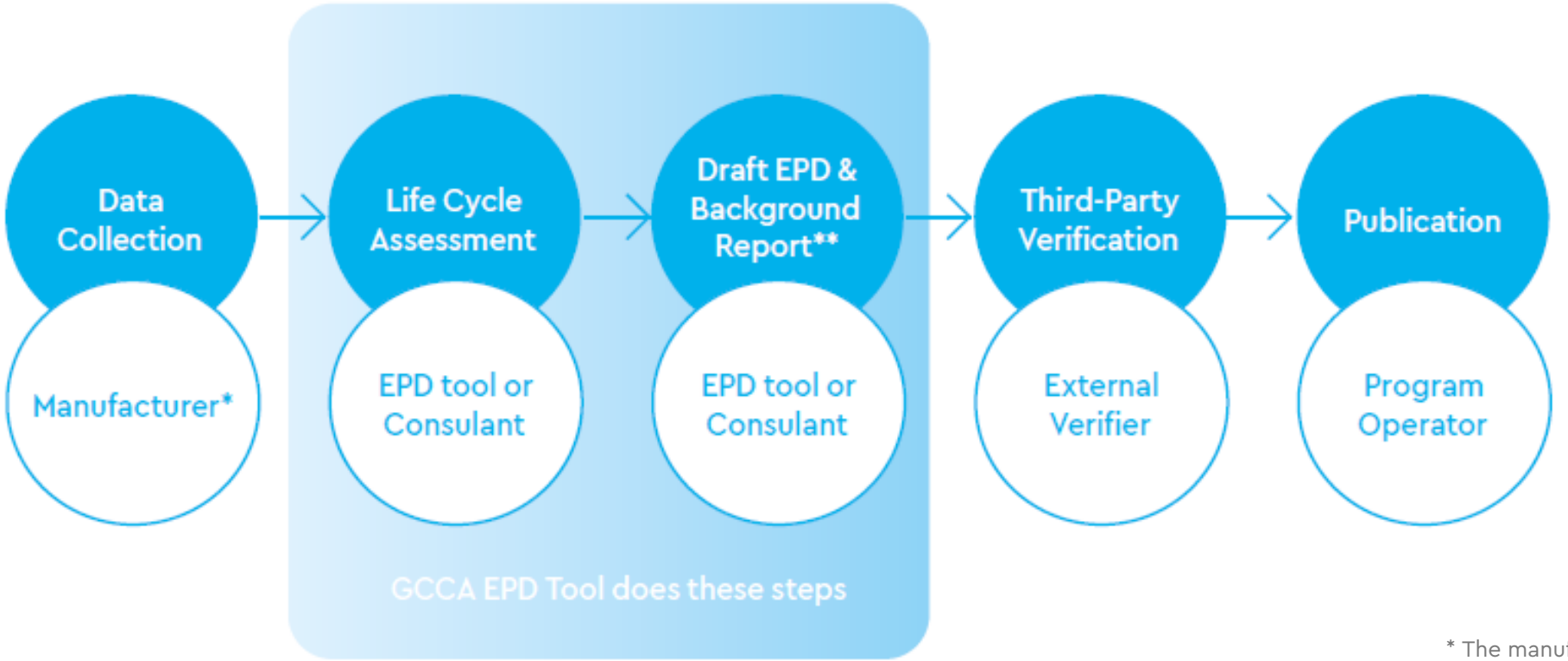
GCCA

# GCCA EPD Tool

Supports companies to prepare Environmental Product Declarations (EPDs) for **clinker, cement, concrete, aggregates and precast products**

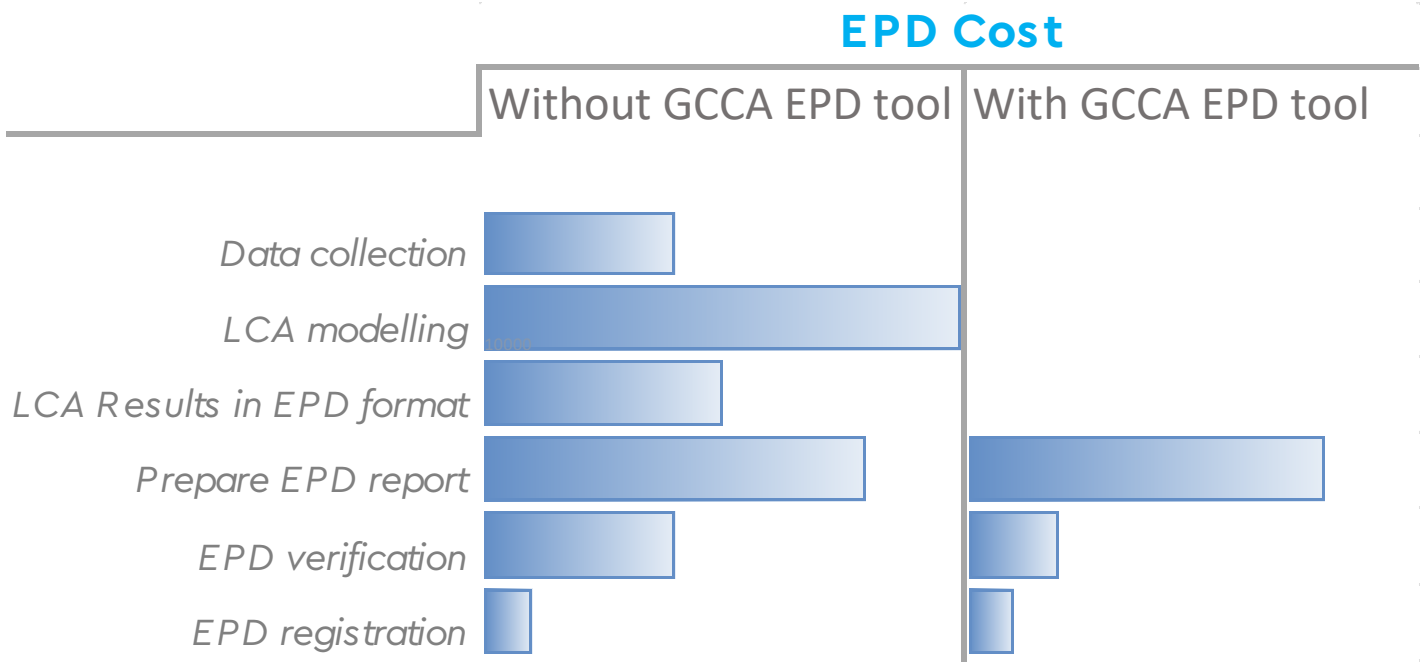


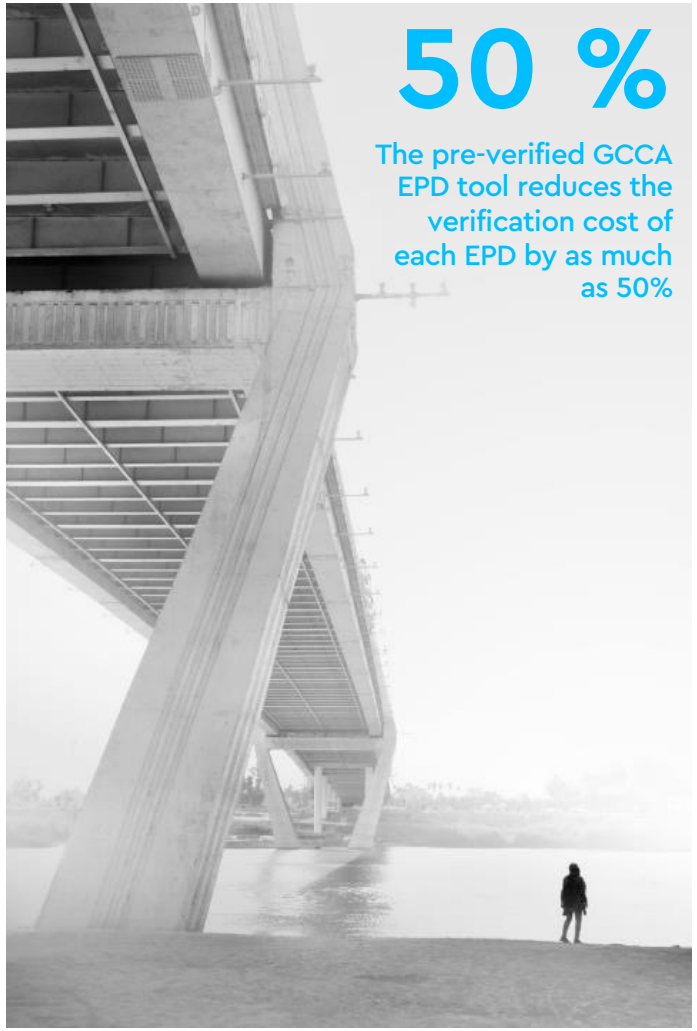
# Traditional EPD process




* 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

# GCCA EPD Tool: Significant potential cost reduction

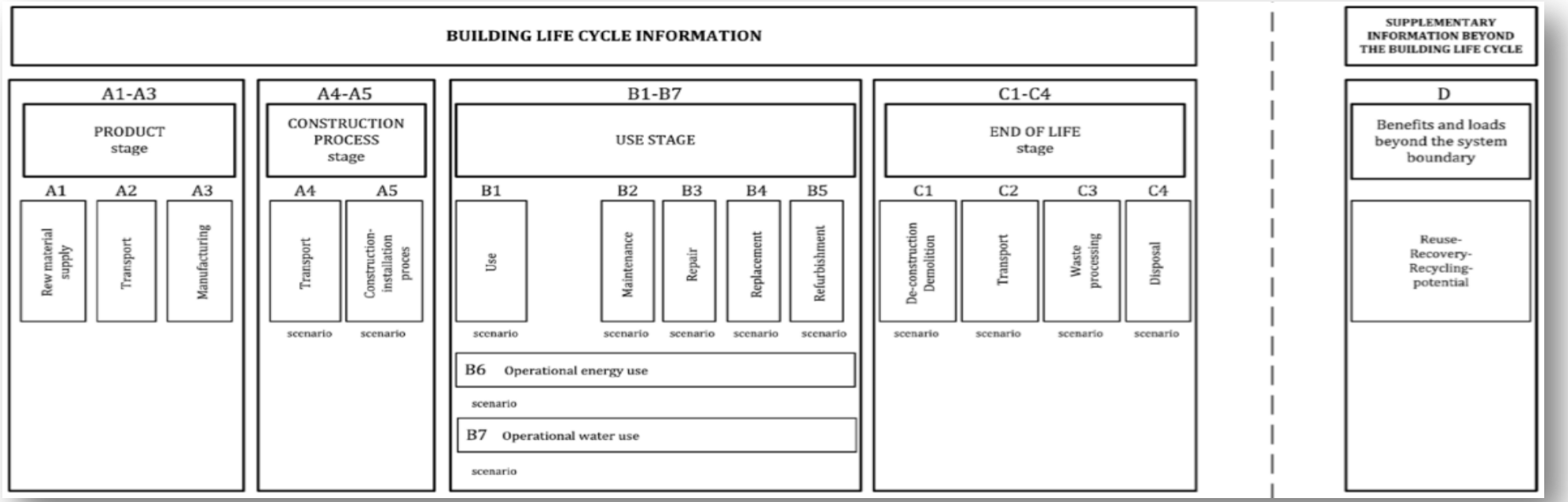


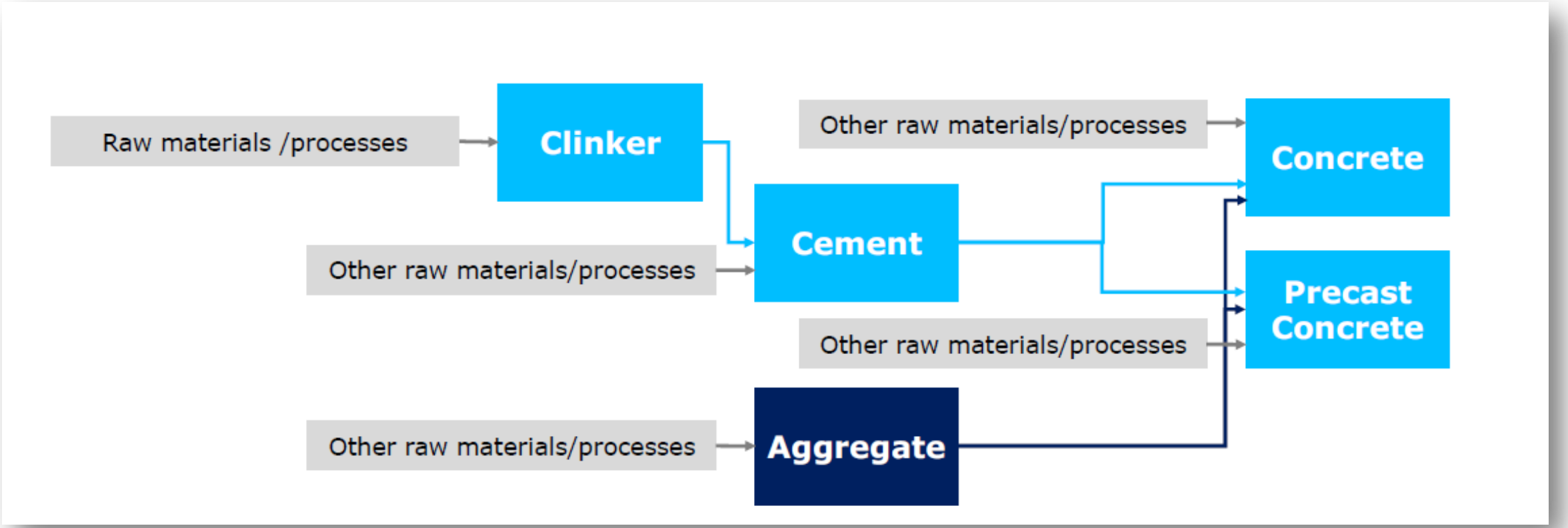
# GCCA EPD Tool: Versions and Standards

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

# GCCA EPD Tool: Life Cycle Assessment modules



# Verified EPDs can be used to produce EPDs for other products



# Additional information

- The EPD tool is free for GCCA members
- A 50% discount is provided to companies who are members of a GCCA regional/national partner
- A 30-day free trial version is available - Find out more: **ggcaepd.org**

**Version 5.0 International (Released November 2024)**

- EcoInvent Database Update: Now Using Version 3.10
- Inclusion of Radioactive Waste Disposal (RWD) Calculations
- Updated Characterisation Factors (CF): Aligned with EF 3.1 Standards

Global Cement and Concrete Association

CONCRETE FUTURE

If you have any questions, please reach out to us at:

Nicolas.Antoniou@gccassociation.org

**You can download our EPD brochure here.**

Global Cement and Concrete Association

CONCRETE FUTURE

# Thank you for joining us!