LCA and EPD 101 for the concrete industry

CAROLINAS READY MIXED CRMCA CONCRETE ASSOCIATION

ACPA

WAP SUSTAINABILITY CONSULTING

WAP Sustainability Consulting provides technical sustainability and carbon accounting expertise to associations, producers, and clients using its 15+ years of experience in sustainable procurement.

These programs include programs to support product certifications, LEED requirements and now Federal and State Buy Clean Requirements.

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The North America Market Leader in LCA & EPDs

WAP's team of LCA and EPD experts is among the most experienced in the world.

2011, WAP creates its first EPD for J+J Flooring	In preparation for "LEED 2012", WAP creates one of the first 10 EPDs in the US market for J+J Flooring, a commercial carpet manufacturer in Dalton Georgia.
2015, WAP helps manufacturers with LEED v4	LEED v4 is formalized, WAP accelerates EPD development with Manufacturers. >50% of EPDs on the market have WAP involvement.
2017, WAP helps manufacturers with Buy Clean California	Buy Clean California created the 1st public policy requiring EPDs for sustainable procurement. WAP expands services to support Buy Clean compliant EPDs.

← Federal Buy Clean & Inflation Reduction Act introduced in 2021

2022, WAP acquires Trisight Engineering	WAP acquires Trisight Engineering, developer of the NAPA Emerald Eco Tool to further EPD generator and software capabilities.
2022, WAP acquires Coldstream Consulting	WAP acquires Coldstream Consulting, developer of the Athena Concrete EPD Tool to further EPD generator and software capabilities.
2023, WAP launches Theta EPD	WAP launches the Theta EPD, as the "Buy Clean Compliance Software" with EPD generator solutions for Concrete (rebranded Athena Tool), Asphalt (via Emerald Eco), Steel, Glass, Slag, Aggregate with more to come.

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Outline

1) What is an LCA?
2) How does it become an EPD?
3) How are EPDs used?
4) Drivers of EPD adaptation
5) Where and how can you generate an EPD?

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Acronyms to Know

- EPD – Environmental Product Declaration
- ISO – International Organization for Standardization
- LCA – Life Cycle Assessment
- PCR – Product Category Rule
- PO – Program Operators

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What is an Life Cycle Assessment (LCA)

LCA is a methodology of environmental accounting which measures the potential environmental impacts of a product from raw material extraction to the end of life (cradle to grave)

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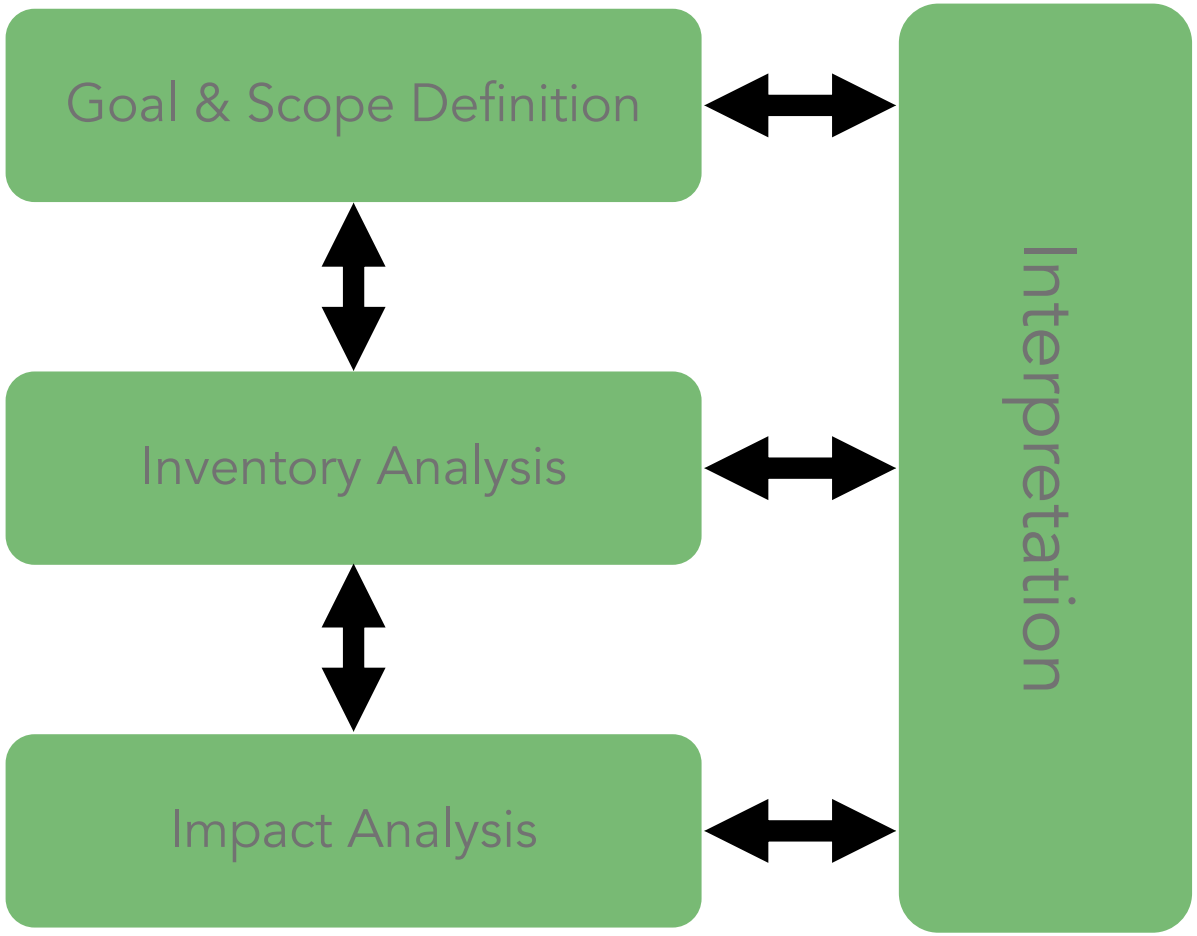
LCA is governed by a set of standards

ISO 14040/14044 Family of Standards



Guiding framework of ISO 14040/44 is a four-step methodology:

- Goal and Scope → Define
- Inventory Analysis → Measure
- Impact Analysis → Calculate
- *Interpretation* happens iteratively and at every stage

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The outputs of an LCA are a suite of environmental impacts




Impacts	Acronym	Unit of Measure
Global Warming Potential	GWP	kg CO_2-eq
Acidification Potential	AP	kg SO_2-eq
Eutrophication Potential	EP	kg N-eq
Smog Formation Potential	SPF	kg O_3-eq
Ozone Depletion Potential	ODP	kg CFC11-eq
Blue Water Consumption	BWC	kg
…	…	…

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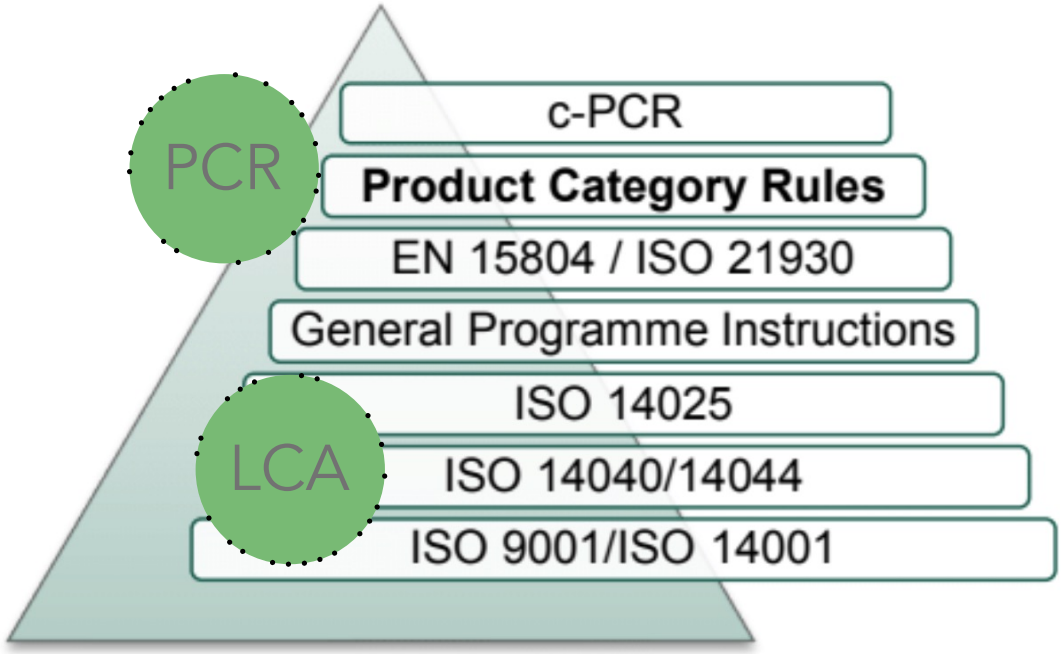
LCA is the foundational methodology for the generation of an Environmental Product Declaration (EPD)



- Product Category Rules define how to perform an LCA for a specific type of product
- PCRs dictate:
  - *Scope*
  - *Functional/declared unit*
  - *What impacts are to be reported*
  - *Data quality requirements*
  - *etc.*
- Life cycle impact results from an LCA, conducted according to a PCR, are summarized and published as an EPD

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PCR Dictates what life cycle phases are included in the results

- Product Stage (Modules A1-A3): Raw Material and Manufacturing (required)
- Construction Stage (Modules A4-A5): Transportation and Installation
- Use Stage (Modules B1-B7): Use, Maintenance, Repair, and Replacement
- End of Life Stage (Modules C1-C4): Demolition, Waste Processing

PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS/LOADS BEYOND SYSTEM BOUNDARY
Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/ Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse-/ recovery-/ Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
✓	✓	✓														

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LCA → PCR → EPD

INTERNATIONAL STANDARD **ISO 14044**

First edition
2006-07-01

Environmental management — Life cycle assessment — Requirements and guidelines

Management environnemental — Analyse du cycle de vie — Exigences et lignes directrices

Reference number
ISO 14044:2006(E)

PRODUCT CATEGORY RULES (PCR)
DATE 2023-06-20

EPD®

CONSTRUCTION PRODUCTS

PCR 2019:14
VERSION 1.3.0

VALID UNTIL: 2024-12-20

ENVIRONMENTAL PRODUCT DECLARATION

READY MIX CONCRETE PRODUCTS

PROGRAMME:	The International EPD® System www.environdec.com
PROGRAMME OPERATOR:	EPD Australasia www.epd-australasia.com
EPD REGISTRATION NUMBER:	S-P-09353
VALID FROM:	2023-07-31
VALID UNTIL:	2028-07-31
GEOGRAPHICAL SCOPE:	Australia

In accordance with ISO 14025 and EN15804:2012 +A2:2019

EPD® AUSTRALASIA

EPD VERIFIED

HALLETT GROUP

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LCA results communicated in an EPD are not meant for comparison across industries.

PCR A ≠ PCR B

LCA A ≠ LCA B

TRACI v2.1	A1	A2	A3	TOTAL (A1-A3)
GWP 100 [kg CO_2 eq]	2.14E+02	4.06E+01	6.78E+02	9.32E+02
ODP [kg CFC-11 eq]	4.37E-07	1.94E-11	5.34E-10	4.38E-07
AP [kg SO_2 eq]	1.13E+00	3.10E-01	2.96E+00	4.39E+00
EP [kg N eq]	2.52E-02	2.14E-02	8.56E-02	1.32E-01
SFP [kg O_3 eq]	1.15E+01	8.35E+00	2.09E+01	4.08E+01
ADP_{fossil} [MJ, LHV]	1.42E+02	7.60E+01	7.34E+02	9.52E+02

Parameter	Parameter	Unit	A1. Raw Materials	A2. Raw Material Transport	A3. Manufacturing	A1 – A3 Total
TRACI 2.1						
GWP	Global warming (GWP100a)	kg CO2 eq	1.28E+01	5.31E-02	1.58E+02	1.71E+02
ODP	Stratospheric ozone layer depletion potential	kg CFC-11 eq	1.36E-11	1.81E-12	-6.74E-13	1.47E-11
AP	Acidification potential	kg SO2 eq	1.23E+00	3.06E-02	1.54E+01	1.66E+01
EP	Eutrophication potential	kg N eq	7.92E-02	9.40E-04	1.71E+00	1.79E+00
POCP	Photochemical ozone creation potential	kg O3 eq	3.72E-03	5.71E-05	3.78E-02	4.20E-02

What is an EPD

Type III label, third party verified, and internationally recognized!

A single transparent disclosure of a product's impacts throughout its life cycle.

EPDs are an evaluation tool to help manufacturers, purchasers, suppliers and distributors from government to institutional facilities evaluate a product's characteristics. Further, they enhance awareness of the overall impact of a product.

EPDs can represent one product, a group of similar products from one or more manufacturer's site, or multiple manufacturers (e.g. an industry average EPD)

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What is in an EPD

- General declaration information
- The product definition and information about building physics
- Declared or functional unit of assessment (e.g. m2 of installed product, 1 ton, 100,000 hand drying instances)
- Information about basic materials and the materials' origins
- A description of the product's manufacturing and processing
- Information about installation, in-use conditions and end of life
- LCA results by impact category
- Testing results and verifications

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EPD Program and Program Operator Name, Address, Logo, and Website	ICC-ES
General Program Instructions and Version Number	General Program Instructions v.2.4 July 2018
Manufacturer Name and Address	Resilient Floor Covering Institute 115 Broad St, Suite 201, La Grange, GA 30240
Declaration Number	4788753451.101.1
Declared Product & Functional Unit or Declared Unit	Heterogeneous Vinyl Flooring, 1 m^2
Reference PCR and Version Number	Part B: Flooring EPD requirements [UL Environment], v.2.0 September 2018
Description of Product Application/Use	Commercial and residential flooring
Product RSL Description (if Appl.)	30 years
Markets of Applicability	North America
Date of Issue	January 1, 2019
Period of Validity	5 Years
EPD Type	Industry-average
Range of Dataset Variability	Industry-average only
EPD Scope	Cradle-to-grave
Year(s) of Reported Primary Data	2016-2017
LCA Software & Version Number	GaBi ts, 8.7
LCI Database(s) & Version Number	GaBi 2018 (service pack 36)
LCIA Methodology & Version Number	TRACI 2.1

The PCR review was conducted by:	PCR Peer Review Panel Chair: Jack Geibig (Ecoform)
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☐ EXTERNAL	
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria, Industrial Ecology Consultants

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

The 2nd Page, It's Importance and What to Look for

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The most important aspect....results

Parameters (Weighted Average)	Units	Modules Included in LCA							
		A1 - A3	A4	A5	B1 - B7	C1	C2	C3	C4
Global Warming Potential (GWP)	kg CO2 eq	2.13E+02	2.12E+01	3.93E+01	0	2.1E+00	3.2E+00	1.6E+00	0
Ozone depletion (ODP)	kg CFC 11 eq	6.47E-06	1.16E-05	3.81E-06	0	2.6E-07	2.2E-06	1.1E-06	0
Acidification potential (AP)	kg SO2 eq	8.13E-01	1.29E-01	1.13E-01	0	1.6E-02	1.9E-02	1.2E-02	0
Eutrophication potential (EP)	kg N - eq	1.68E-01	2.62E-02	3.27E-02	0	3.7E-03	4.8E-03	2.5E-03	2.1E-02
Photochemical ozone creation (POCP) -	kg O3 - eq	7.66E-02	9.30E-03	1.24E-02	0	4.7E-03	1.4E-03	8.9E-04	0
Abiotic depletion potential for fossil resources (ADP-fossil fuels)	MJ	3.00E+02	1.87E+01	6.88E+02	0	2.9E+01	4.0E+01	2.0E+01	0

EPD use cases

- Marin County, California*
- State of CA AB2446/Buy Clean, CALGreen
- State of Colorado*
- State of Washington
- State of Oregon
- New York City, New York/State of NY*
- Portland, Oregon*
- Federal Highway/Local DoT
- US General Services Administration
- Certification Programs

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Marin County, California Low Carbon Concrete Requirements

19.07.050 – Compliance

Compliance with the requirements of this chapter shall be demonstrated through any of the compliance options in Sections 19.07.050.2 through 19.07.050.5.

Table 19.07.050 Cement and Embodied Carbon Limit Pathways

	Cement limits for use with any compliance method 19.07.050.2 through 19.07.050.5	**Embodied Carbon limits** for use with any compliance method 19.07.050.2 through 19.07.050.5
Minimum specified compressive strength f'_c, psi (1)	Maximum ordinary Portland cement content, lbs/yd^3 (2)	Maximum embodied carbon kg CO_2e/m^3, per EPD
up to 2500	362	260
3000	410	289
4000	456	313
5000	503	338
6000	531	356
7000	594	394
7001 and higher	657	433
up to 3000 light weight	512	578
4000 light weight	571	626
5000 light weight	629	675

Notes
(1) For concrete strengths between the stated values, use linear interpolation to determine cement and/or embodied carbon limits.
(2) Portland cement of any type per ASTM C150.

Amends CA Building & Residential Code

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State of Colorado Concerning Measures to Limit the Global Warming Potential for Certain Materials Used in Public Projects – Buy Clean Colorado Act

(a) "ELIGIBLE MATERIAL" MEANS MATERIALS USED IN THE CONSTRUCTION OF A PUBLIC PROJECT, INCLUDING:

(I) ASPHALT AND ASPHALT MIXTURES;

(II) CEMENT AND CONCRETE MIXTURES;

(III) GLASS;

(IV) POST-TENSION STEEL;

(V) REINFORCING STEEL;

(VI) STRUCTURAL STEEL; AND

(VII) WOOD STRUCTURAL ELEMENTS.

(b) "ELIGIBLE PROJECT" MEANS A PUBLIC PROJECT AS DEFINED IN SECTION 24-92-102, FOR WHICH AN AGENCY OF GOVERNMENT ISSUES A SOLICITATION ON OR AFTER JANUARY 1, 2024; EXCEPT THAT "ELIGIBLE PROJECT" DOES NOT INCLUDE ANY MAINTENANCE PROGRAM FOR THE UPKEEP OF A PUBLIC PROJECT OR ANY ROAD, HIGHWAY, OR BRIDGE PROJECT.

Starts 1/1/24
Used for setting
Maximum GWP

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City of New York Executive Order 23 – Clean Construction/State of NY

§ 2. Low-carbon concrete specifications. Capital project agencies shall make their best efforts to incorporate low-carbon concrete specifications for all batch plant ready-mixed concrete used in capital projects and for concrete sidewalks, where such agency determines that such specifications are practicable and not preempted by State or Federal requirements. Such agencies shall, to the extent practicable, follow guidance from the Mayor's office of climate and environmental justice ("Office") for these specifications.

§ 3. Environmental product declarations. Capital project agency construction managers shall submit environmental product declarations (EPDs) to the Building Transparency database, a publicly available database of EPDs, using the OpenEPD format, as set forth below:

- Projects using concrete shall provide a product-specific EPD for all batch plant ready-mixed and precast concrete;
- Projects using steel shall provide a product-specific EPD for structural steel delivered to the jobsite.

The Office will provide guidance to agencies submitting EPDs to the Building Transparency database. To the extent practicable, such agencies shall also submit EPDs for such project to any database that the Office determines to be comparable and in wide usage.

All capital projects for the City of New York

State of NY -

Environmental Product Declaration (EPD) Requirement: To be used on state construction projects, all concrete mixes must have EPDs starting January 1, 2025.

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City of Portland, Oregon – New Requirements for Concrete

1.1 Concrete Embodied Carbon Thresholds – Per Mix
The embodied carbon of a concrete mix, based on an approved EPD, shall not exceed the value given in Tabl
(per yd3) or Table 2 (per m3).

Table 1: Concrete Embodied Carbon Thresholds (per yd3)

	Maximum GWP (kg CO2e)/yd3					
Concrete Strength (psi) (1)	Portland Cement Concrete (PCC) including: Commercial Grade Concrete (CGC), Concrete Pavement, High-Performance Concrete (HPC)/Structural Concrete	Lightweight Concrete	Controlled Low-Strength Material (CLSM)	Shotcrete	Drilled-Shaft	Grout
2500	180		180	n/a	n/a	n/a
3000	200	396				
4000	242	440				
5000	295	483				
6000	312					
8000	373					

(1) For concrete strengths between the stated values, use linear interpolation to determine cement and/or embodied carbon limits, rounded to the nearest whole number.
Example: for a 3300psi CGC mix:
(242-200)/(4000-3000) = 0.042
(0.042*(3300-3000)) + 200 = 212.6
213 is the Maximum GWP/yd3 for a 3300psi mix.

Table 2: Concrete Embodied Carbon Thresholds (per m3)

	Maximum GWP (kg CO2e)/m3					
Concrete Strength (psi) (1)	Portland Cement Concrete (PCC) including: Commercial Grade Concrete (CGC), Concrete Pavement, High-Performance Concrete (HPC)/Structural Concrete	Lightweight Concrete	Controlled Low-Strength Material (CLSM)	Shotcrete	Drilled-Shaft	Grout
2500	235		235	n/a	n/a	n/a
3000	261	518				
4000	316	575				
5000	386	632				
6000	408					
8000	487					

(1) For concrete strengths between the stated values, use linear interpolation to determine cement and/or embodied carbon limits, rounded to the nearest whole number.
Example: for a 3300psi CGC mix:
(316-261)/(4000-3000) = 0.055
(0.055*(3300-3000)) + 261 = 277.5
278 is the Maximum GWP/m3 for a 3300psi mix.

1.2 Concrete Embodied Carbon Thresholds – Project Average
Total embodied carbon (EC_{proj}) of all concrete mix designs within the same project shall not exceed the project limit ($EC_{allowed}$) determined using Table 1 or Table 2 (as applicable based on units) and Equation EC1.

Equation EC1
$EC_{proj} < EC_{allowed}$
where
$EC_{proj} = \Sigma EC_n \, v_n$ *and* $EC_{allowed} = \Sigma EC_{th} \, v_n$
and
n = the total number of concrete mixtures for the project
EC_n = the embodied carbon for mixture n per approved EPD, GWP/yd3
EC_{th} = the embodied carbon threshold for mixture n per Table 1, GWP/yd3
v_n = the volume of mixture n concrete to be placed, yd3

Applicant can use yd3 or m3 for calculation, but must keep same units throughout

Project Average Example
Project includes the following mixes:

Type/Strength	Total Volume used on project (yd3)	Mix-Specific GWP per approved EPD (GWP [kg CO2e]/yd3)
CGC 3300psi	5,000	185
HPC 5000psi	4,000	330
CGC 4000psi	8,000	230

$EC_{allowed}$ = (5,000*213) + (4,000*295) + (8,000*242)
= 4,181,000
EC_{proj} = (5,000*185) + (4,000*330) + (8,000*230)
= 4,085,000
Confirmed. $EC_{proj} < EC_{allowed}$

1/1/23 Implementation

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EPDs also used in certification schemes for code compliance

Low-Carbon Transportation Materials Grants

	Inflation Reduction Act (IRA)
Fiscal year (FY)	2022
Appropriation (General Fund)	$2 B*

*Funds were appropriated in FY22 and remain available until September 30, 2026.

Note: Except as indicated, all references in this document are to the Inflation Reduction Act (IRA), enacted as Pub. L. 117-169 (Aug. 16, 2022).

Program Purpose

The IRA establishes the Low-Carbon Transportation Materials Grants program to reimburse or provide incentives to eligible recipients for the use, in projects, of construction materials and products that have substantially lower levels of embodied greenhouse gas emissions associated with all relevant stages of production, use, and disposal as compared to estimated industry averages of similar materials or products as determined by the Administrator of the Environmental Protection Agency.

Statutory Citation

- § 60506; 23 U.S.C. 179

Funding Features

Type of Budget Authority or Authorization of Appropriations

Low Embodied Carbon Concrete Standards for all GSA Projects
March 2022 version

1. The [prime contractor] shall provide a product-specific cradle-to-gate Type III environmental product declaration (**EPD**) for each concrete mix design specified in the contract and used at the project, using NSF International's product category rule for concrete. Please send EPD(s) with each concrete mix batch design (including type [e.g. standard or lightweight mix] and volume) to embodiedcarbon@gsa.gov, and upload the submittals into GSA's project management information system.

2. The [prime contractor] shall provide **low embodied carbon concrete** that meets the global warming potential (GWP) limits of the table below, for concrete of the mix type and strength class.

	Maximum Global Warming Potential Limits for GSA Low Embodied Carbon Concrete (kilograms of carbon dioxide equivalent per cubic meter - CO_2e kg/m^3)		
Specified compressive strength (f'c in PSI)	**Standard Mix**	**High Early Strength**	**Lightweight**
up to 2499	**242**	**326**	**462**
2500-3499	**306**	**413**	**462**
3500-4499	**346**	**466**	**501**
4500-5499	**385**	**519**	**540**
5500-6499	**404**	**546**	**N/A**
6500 and up	**414**	**544**	**N/A**
These numbers reflect a 20% reduction from GWP (CO_2e) limits in proposed code language: "Lifecycle GHG Impacts in Building Codes" by the New Buildings Institute, January 2022.			

3. These requirements apply to all GSA projects that use at least ten (10) cubic yards of concrete.

4. If it is not feasible to meet GSA's EPD requirement or GWP limits, the [prime contractor] shall ask the GSA project manager to request a **P100 waiver**.
   a. The [prime contractor] shall outline and provide evidence of the specific circumstances that make compliance infeasible. For example, the only concrete suppliers within the maximum transport range for the mix design:
      i. are small businesses that have not yet invested in EPDs; or
      ii. do not yet offer mixes that meet GSA's GWP limits, e.g. because lower-carbon materials are unavailable, or do not meet specific client-driven performance requirements.
   b. Any requests for waivers from the GWP limits must include the strategies, if any, that will be used to reduce GWP to the extent feasible. Such strategies include, but are not limited to, the use of alternative cements, supplementary cementitious materials, or alternative aggregates.
   c. For each concrete mix for which GSA has granted a waiver from the EPD requirement, the [prime contractor] shall send a GWP estimate generated with a tool such as ZGF's LCA Tool, Athena IE, or the Federal Highway Administration's LCA Pave Tool to embodiedcarbon@gsa.gov.
   d. GSA will respond to each complete P100 waiver request with a decision or a request for more detail within ten (10) business days. A complete waiver request is deemed granted if no response is provided within that time.

Environmentally Preferable Asphalt Standards for all GSA Projects
Revised March 29, 2022

1. The [prime contractor] shall provide a product-specific cradle-to-gate Type III environmental product declaration (EPD) for each asphalt mix specified in the design and used at the project, using version 2 of the National Asphalt Paving Association's product category rule for asphalt mixtures. Please send EPD(s) to embodiedcarbon@gsa.gov, and upload EPD(s) into GSA's project management information system.

2. The [prime contractor] shall provide **environmentally preferable asphalt**, which is defined in this context as material manufactured or installed using at least two (2) of the following techniques. Please send each asphalt mix batch design (including type, volume, and a description of the proposed techniques) to embodiedcarbon@gsa.gov, and upload the submittals into GSA's project management information system.

   a. Greater than 20% recycled asphalt pavement (RAP) content (specify percentage, and whether in-place or central plant recycling is used);
   b. Warm mix technology (reduced onsite mix temperature);
   c. Non-pavement recycled content (e.g. roof shingles, rubber, or plastic);
   d. Bio-based or other alternative binders;
   e. Improved energy/ carbon efficiency of manufacturing plants or equipment (e.g. using natural gas or electric for heating materials); or
   f. Other environmentally preferable features or techniques (please specify).

3. These requirements apply to all GSA projects that use at least ten (10) cubic yards of asphalt.

4. If it is not feasible to meet GSA's EPD requirement or to implement at least two of the listed environmentally preferable features or techniques, the [prime contractor] shall ask the GSA project manager to request a **P100 waiver**.
   a. The [prime contractor] shall outline and provide evidence of the specific circumstances that make compliance infeasible. For example, the only asphalt suppliers within the maximum transport range for the mix design:
      i. are small businesses that have not yet invested in EPDs; or
      ii. do not yet offer mixes that use at least two environmentally preferable features or techniques while meeting specific client-driven performance requirements.
   b. For each asphalt mix for which GSA has granted a waiver from the EPD requirement, the [prime contractor] shall send a GWP estimate generated with a tool such as Athena Pavement LCA or the Federal Highway Administration's LCA Pave Tool to embodiedcarbon@gsa.gov.
   c. GSA will respond to each complete P100 waiver request with a decision or a request for more detail within ten (10) business days. A complete waiver request is deemed granted if no response is provided within that time.

https://www.gsa.gov/cdnstatic/Low%20embodied%20carbon%20concrete%20SOW%20language%203-29-22_0.pdf
https://www.gsa.gov/cdnstatic/Environmentally%20preferable%20asphalt%20SOW%20language%203-29-2022_0.pdf

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So who wants an EPD?

Think WAP theta

WAP SUSTAINABILITY CONSULTING

Theta EPD, “the buy clean compliance software”®

Launched in 2023, Theta provides LCA and EPD generation software with services options.

Rebranded + Solutions

theta
by WAP Sustainability

AthenaInstitute

Emerald
ECO LABEL

Expanded to include

Concrete

Steelmaking

Aggregate

Asphalt

Steel Products

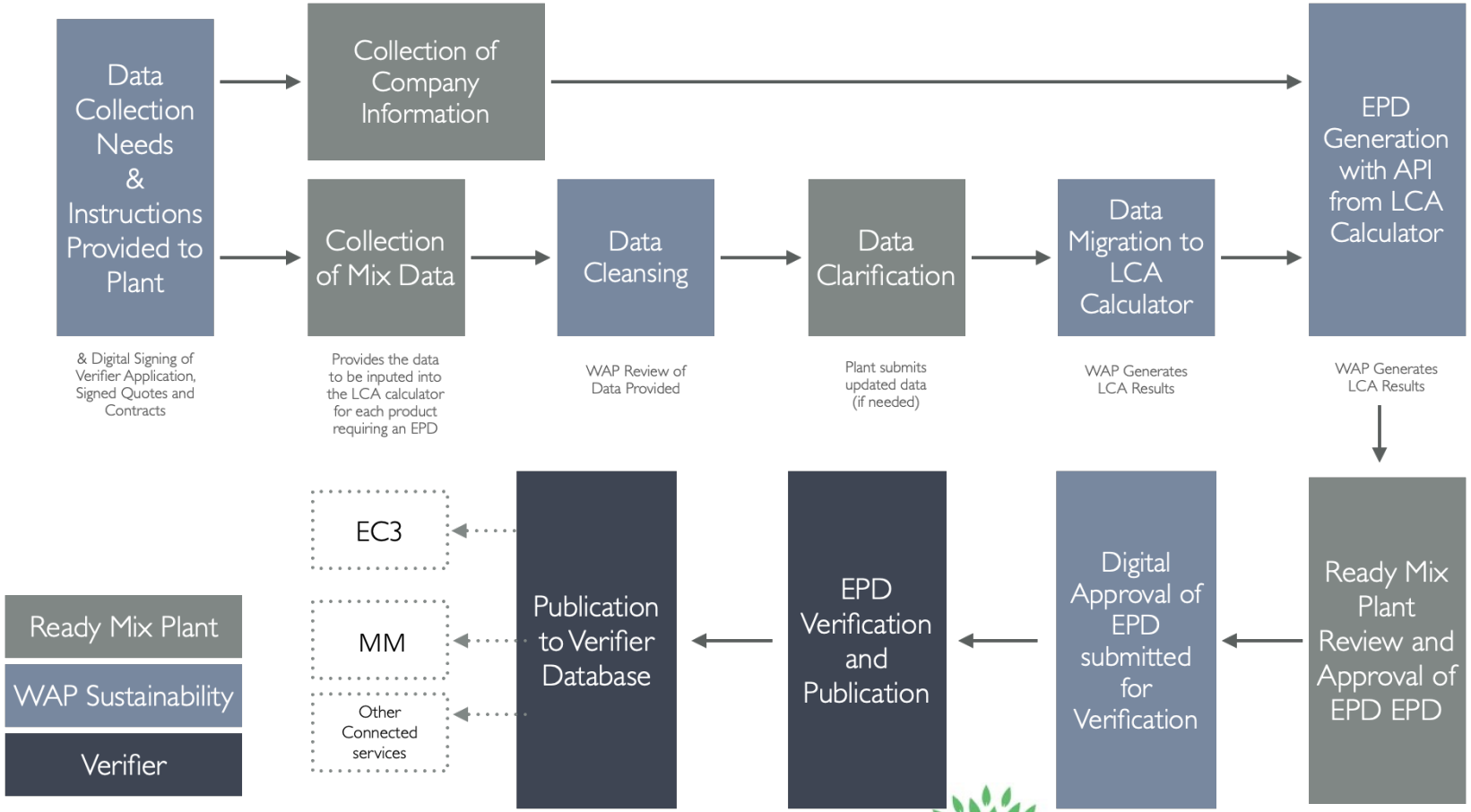
Glass

WAP SUSTAINABILITY CONSULTING

Producer LCA and EPD Workflow

How the LCA and EPD Process unfolds

Proven workflow designed to streamline the EPD process with software + services including.
--data collection
--data processing
--EPD generation
--EPD publication



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What will Organizations Need?

Performance Information

- Required
  - UNSPC Product code and CSI Specification number
  - Specified compressive strength at specified age in days (e.g., 4,000 psi (28 MPa) at 28 days
- Optional
  - Specified environmental exposure class (per ACI 318-14, CSA A23.1 or other specified or accepted standard) (e.g., Exposure Class F1, S0, P0, C1 or F0-F3, S0, P0-P1, C0-C2);
  - Design slump or slump flow. Example: 4-6 in (10-15 cm);

    and
  - any other specified characteristic that affects concrete performance (e.g. air entrainment, unit weight, high early strength requirements, etc.). (EC3 = Aggregate Size Mix, Min Pipeline Size, W./C Ratio, SCM Min, SCN Max)

Company Information

- Company name and primary address
- Plant name and address

Mix Data

- Mix proportions/weighs (kg/M3)
  - Cement & SCMs
  - Aggregates
  - Admixtures
  - Batch Water
  - Fibers & Pigments
  - Packaging
- Transport from source
  - Method and distance of each above
- Manufacturing
  - 12 Month Energy
  - Ancillary Materials (lubricants, motor oils, other consumables)
  - Water (wash water/not batch water)
  - Waste (end of life treatment of ancillary materials & any packaging)
  - Fleet Energy for transit mix plants (fuel / miles / truck info)
  - Annual Production at plant for allocation purposes.
    - (NOTE: Manufacturing data can be provided on an annual allocated basis meaning amount divided by annual production at plant)

WAP SUSTAINABILITY CONSULTING

State Level Association Program

Accelerating EPD education, resources and adoption through collaboration

The Challenge

80% of producers only interact at the State Level

Many national associations have revenue generating programs from LCA and EPD generation. WAP recognized that in most industries, 80% of the producers only interact at the State Level.

WAP designed its state level association program to create a revenue producing program for state level associations that included industry leading support, education and resources.

The State Level Association Program provides associations access to WAP's expertise in LCAs & EPDs, educational & speaker resources and policy interpretation expertise. Associations are also provided a discounted LCA and EPD solution only available for members with a revenue share aspect of the program.

In turn, WAP receives educational and marketing access opportunities to State Level Association Members.

Case Study

TENNESSEE CONCRETE ASSOCIATION

Tennessee Concrete Association

Alan Sparkman recognized the growing importance of EPDs for concrete producers. To support his membership. WAP and TCA collaborated to provide EPD education, resources and an EPD program for TCA members.

-- WAP presents at TCA Meetings on EPDs

-- WAP and TCA conducted a training at WoC

-- WAP collaborates on Podcasts with TCA

-- WAP became a sponsor of TCA

-- TCA + WAP created a EPD Program for TCA members that provided a discounted EPD program for members.

-- TCA created a revenue share program with WAP for the EPD Program

WAP SUSTAINABILITY CONSULTING

State Level Association Program Overview

1. WAP and CRMCA enter into a MOU for the program
2. WAP and CRMCA announce the program to members and create educational content
   (webinar / website / email news etc.)
3. CRMCA supports WAP in creating or opening opportunities for LCA and EPD related content
   (presentations, webinars, speaking, podcasts etc)
4. EPD Programming is provided to members

WAP SUSTAINABILITY CONSULTING

Thank you!

Questions….
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