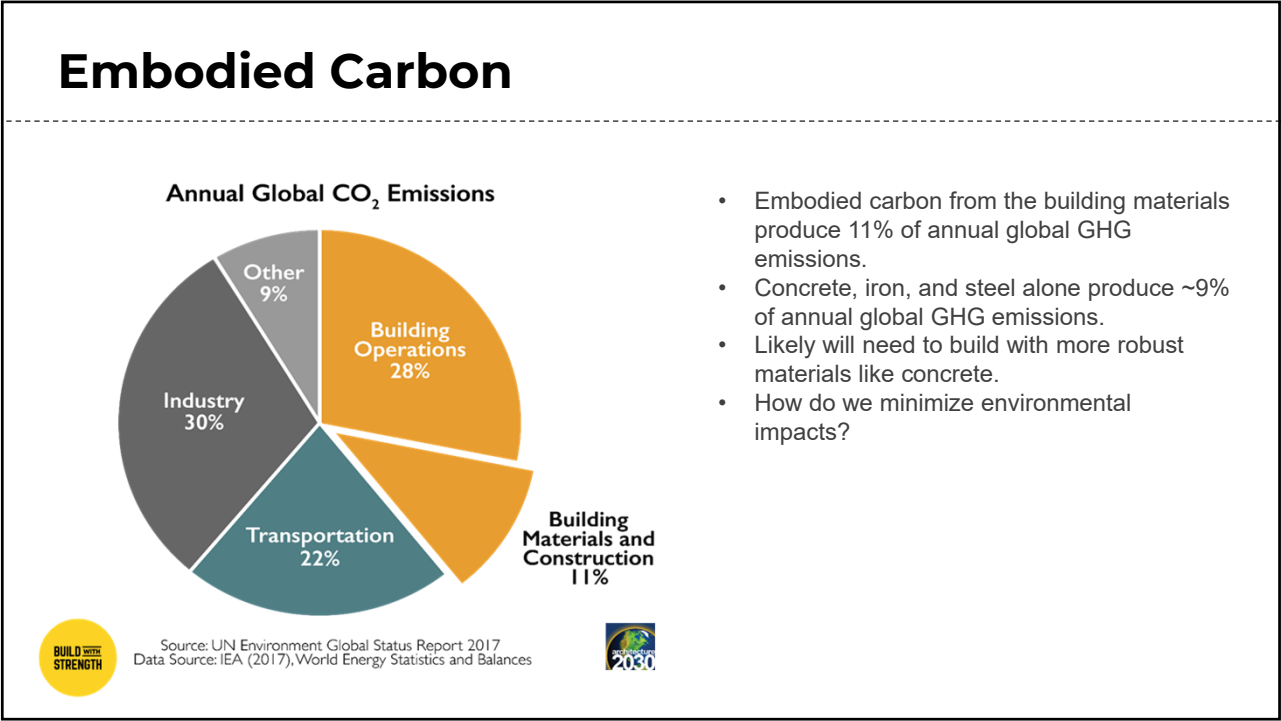


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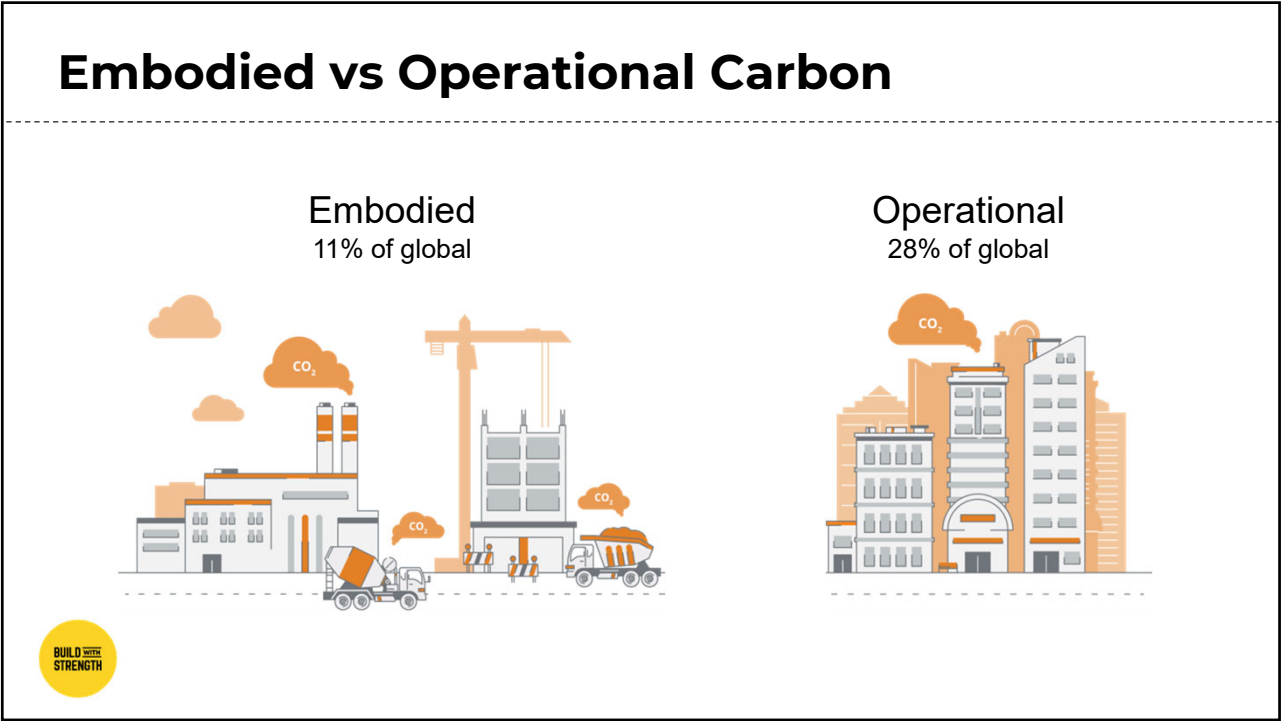
AGENDA

- Embodied Carbon
- What are EPDs?
- EPD Verification Process
- Program & PCR Updates
- Low-Carbon Benchmarks
 - Private Sector
 - Public "Buy Clean" Policies
 - Codes & Standards
- NRMCA Industry-Wide EPD & Benchmark

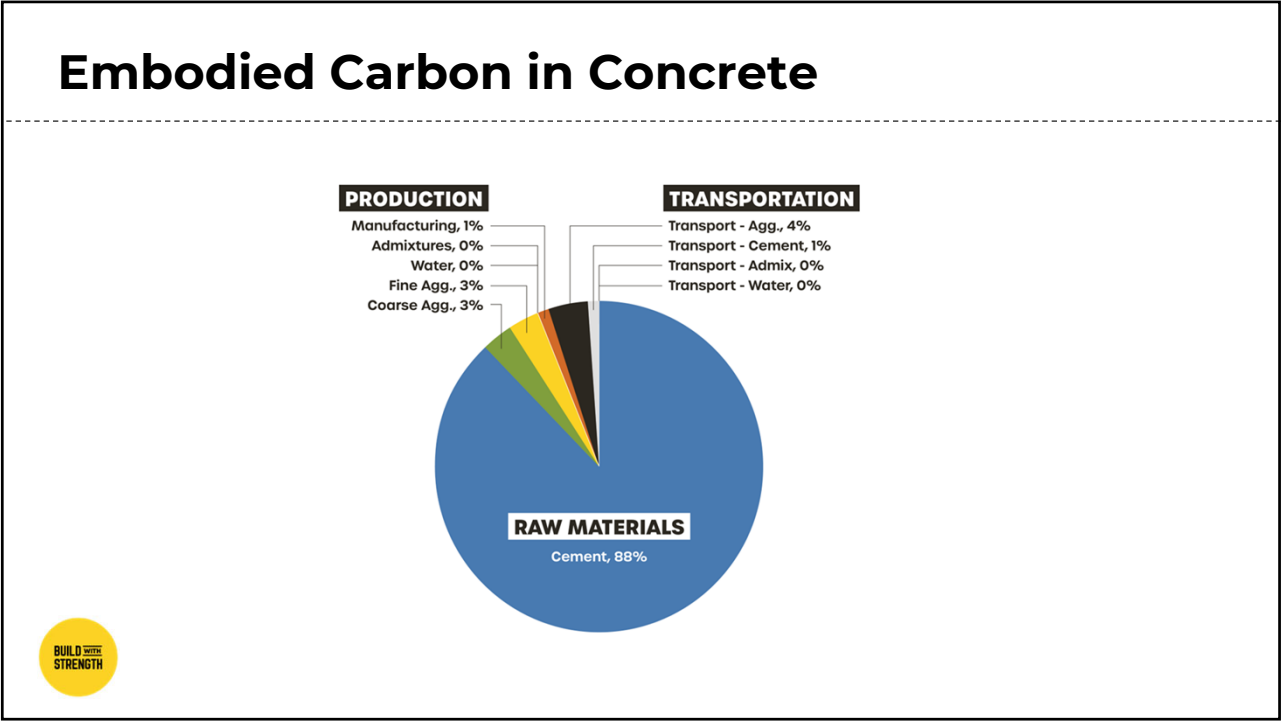
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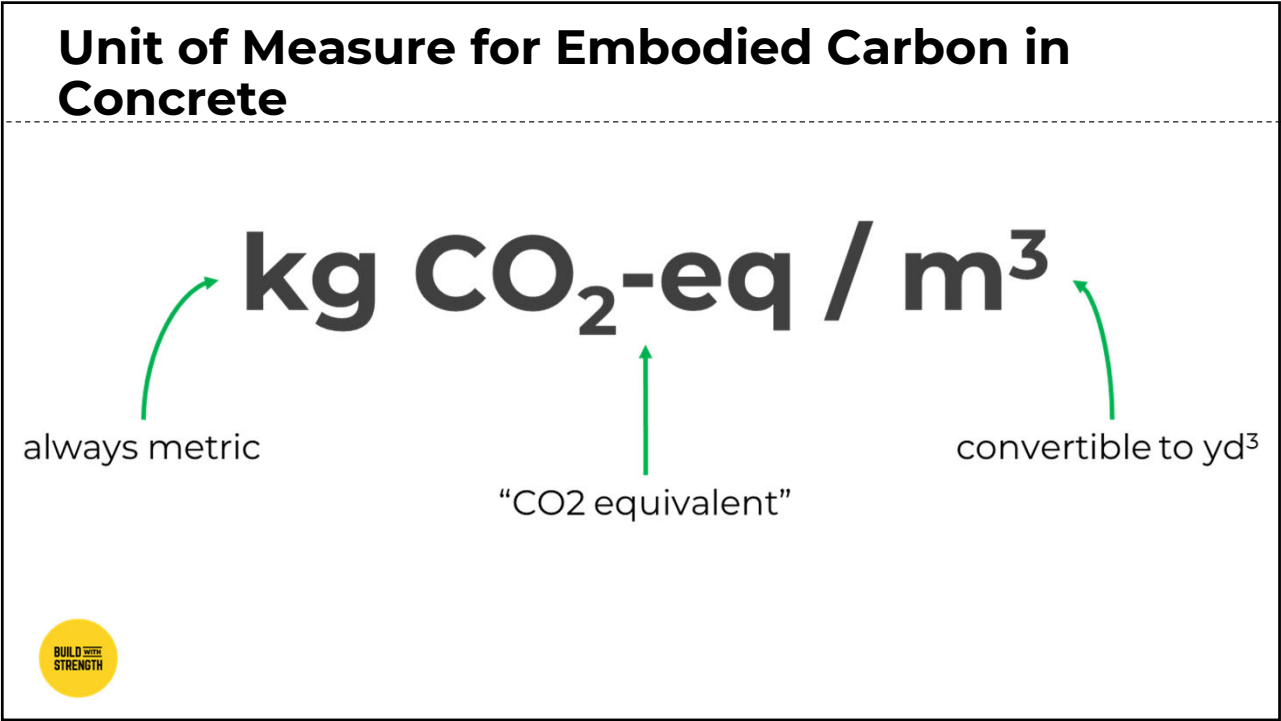
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4



5

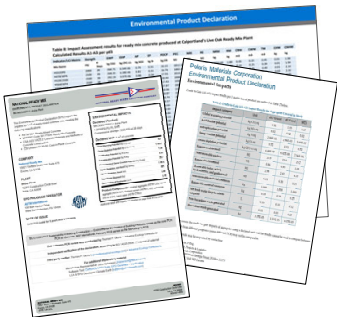


6

What is an EPD?

ENVIRONMENTAL PRODUCT DECLARATION			
READY MIX CONCRETE PRODUCED BY:			
GENSLER READY MIX CONCRETE			
FACILITY: Canal Stream			
STRENGTH: 4000 psi @ 28 days			
MIX NAME: 3403			
IMPACT INDICATOR		PER YD3	PER M3
Global Warming Potential	kg CO ₂ e	185.76	242.97
Acidification	kg SO ₂ e	4.59E-05	5.97E-05
Eutrophication	kg N	0.02	0.02
SFP (kg/m ³)	kg CO ₂ e	0.02	0.02
Non-renewable energy	MJ	14.00	18.00
GENERAL INFORMATION			
Declared Product: Ready-mixed concrete produced by			
Date of Issue: September 10, 2023			
Period of Validity: August 19th, 2025			
EPD Holder: HCL 10001 Oak Ridge Road, Ste 300, Madison, IL 60449			
Program Operator: ASTM International, 100 Bar Harbor Drive, West Conshohocken, PA 19380-2959, USA			
LCA and EPD Developer: HCL 10001 Oak Ridge Road, Ste 300, Madison, IL 60449			
Core PCR: ISO 21926:2017 Sustainability in Building Construction - Environmental Declaration of Building Products			
Sub-category PCR: ISO 21926:2017 Sustainability in Building Construction - Environmental Declaration of Building Products			
Independent LCA Reviewer and EPD Verifier: Thomas P. Glavin, Ph.D., Industrial Ecology Consultants			

Third-party verified & registered documents that communicate environmental impacts...



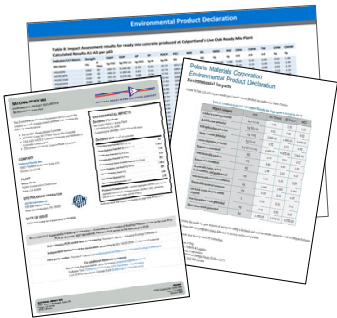
What is an EPD?

ENVIRONMENTAL PRODUCT DECLARATION			
READY MIX CONCRETE PRODUCED BY:			
GENSLER READY MIX CONCRETE			
FACILITY: Canal Stream			
STRENGTH: 4000 psi @ 28 days			
MIX NAME: 3403			
IMPACT INDICATOR		PER YD3	PER M3
Global Warming Potential	kg CO ₂ e	185.76	242.97
Acidification	kg SO ₂ e	4.59E-05	5.97E-05
Eutrophication	kg N	0.02	0.02
SFP (kg/m ³)	kg CO ₂ e	0.02	0.02
Non-renewable energy	MJ	14.00	18.00
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Third-party verified & registered documents that communicate environmental impacts...

IMPACT INDICATOR		PER YD3	PER M3
Global Warming Potential	kg CO ₂ e	185.76	242.97

...most importantly GWP (global warming potential), measured in kg CO2 equivalent per cubic yard...



What is an EPD?

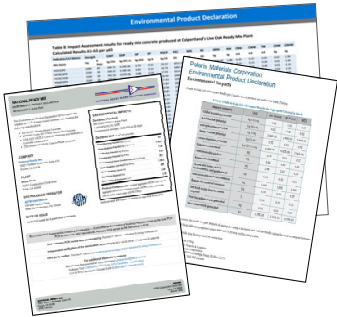
ENVIRONMENTAL PRODUCT DECLARATION			
READY MIX CONCRETE PRODUCED BY:			
GENSLER READY MIX CONCRETE			
FACILITY: Canal Station			
STRENGTH: 5000 psi @ 28 days			
MIX NAME: 3403			
IMPACT INDICATOR		PER YD3	PER M3
Global Warming Potential	kg CO ₂ e	185.76	242.97
Acidification	kg SO ₂ e	0.52	0.62
Eutrophication	kg N	0.02	0.02
Smog	kg VOC	0.02	0.02
Non-renewable energy	kg oil	0.02	0.02
GENERAL INFORMATION			
Declared Product: Ready-mixed concrete produced by			
Date of Issue: September 10, 2023			
Period of Validity: August 19th, 2025			
EPD Holder: HCL, 14001 West Laramie Road, Suite 300, Denver, CO 80233			
Program Operator: ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19380-2959, USA			
LCA and EPD Developer: Adnan Engineering, 10000 E. Harvard Avenue, Suite 400, Denver, CO 80231			
Core PCR: ISO 15959:2017 Sustainability in Building Construction - Environmental Declaration of Building Products			
Sub-category PCR: ISO 15959:2017 Sustainability in Building Construction - Environmental Declaration of Building Products			
Independent LCA Reviewer and EPD Verifier: Thomas P. Glavin, Ph.D., Industrial Ecology Consultants			

Third-party verified & registered documents that communicate environmental impacts...

IMPACT INDICATOR		PER YD3	PER M3
Global Warming Potential	kg CO ₂ e	185.76	242.97

...most importantly GWP (global warming potential), measured in kg CO₂ equivalent per cubic yard...

- ...while protecting proprietary information such as
- Quantities in mix design
 - Specific products and suppliers



How are EPDs Used?

EPDs are primarily used as a compliance document which demonstrate GWP below specified limits.

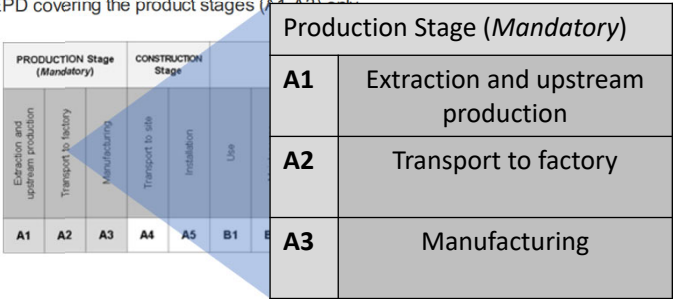
Application	28-day Compressive Strength (psi)	Maximum GWP (kg CO ₂ e/cu. Yd)
Slabs	5000	273
Walls	4000	230
Columns	6000	290
Exterior Pavements	4500	252

Cradle-to-Gate (A1-A3) Scope

LIFE CYCLE ASSESSMENT

SYSTEM BOUNDARY

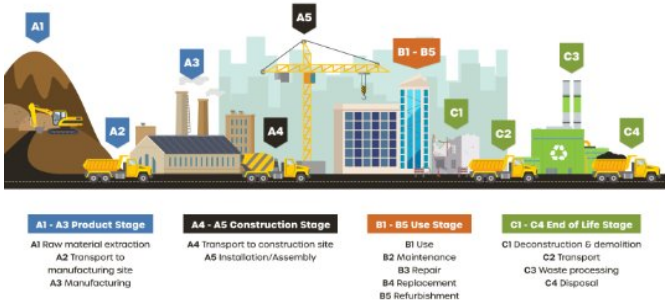
This EPD is a cradle-to-gate EPD covering the product stages (A1-A3) only.



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Whole-Project Life Cycle

Sources of embodied carbon across the construction lifecycle

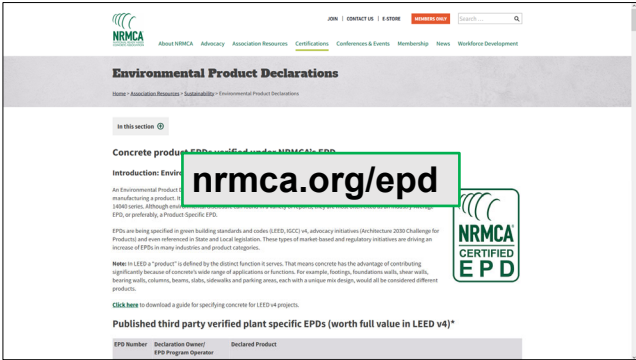


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NRMCA is an EPD Program Operator



Facilitates Verification



Publishes EPDs Online

13

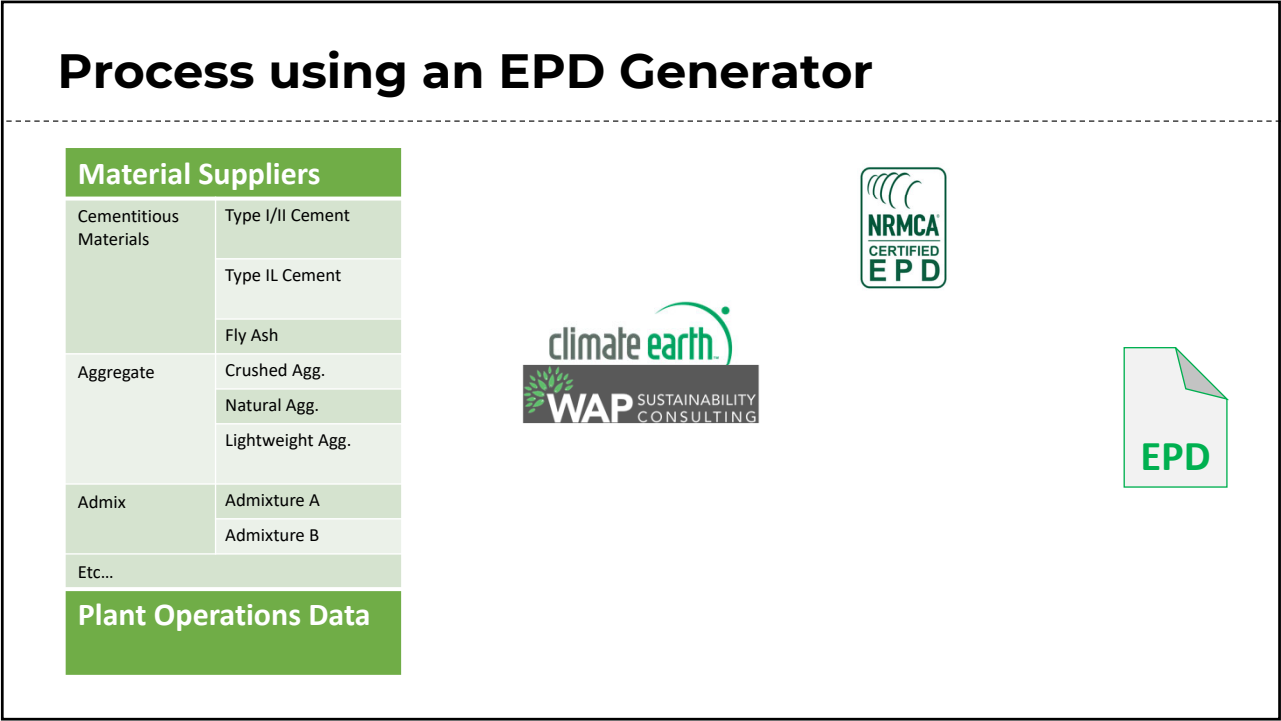
EPD Program Operators for Concrete

Major Program Operators

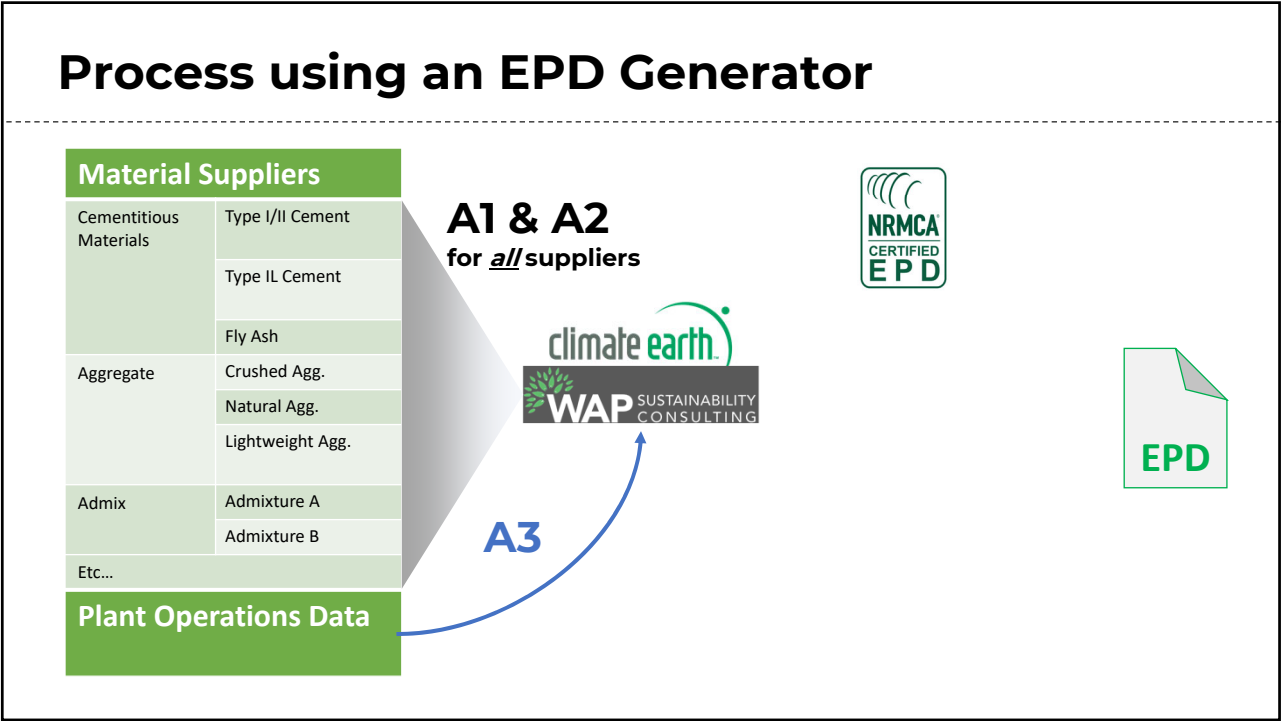
Minor Program Operators



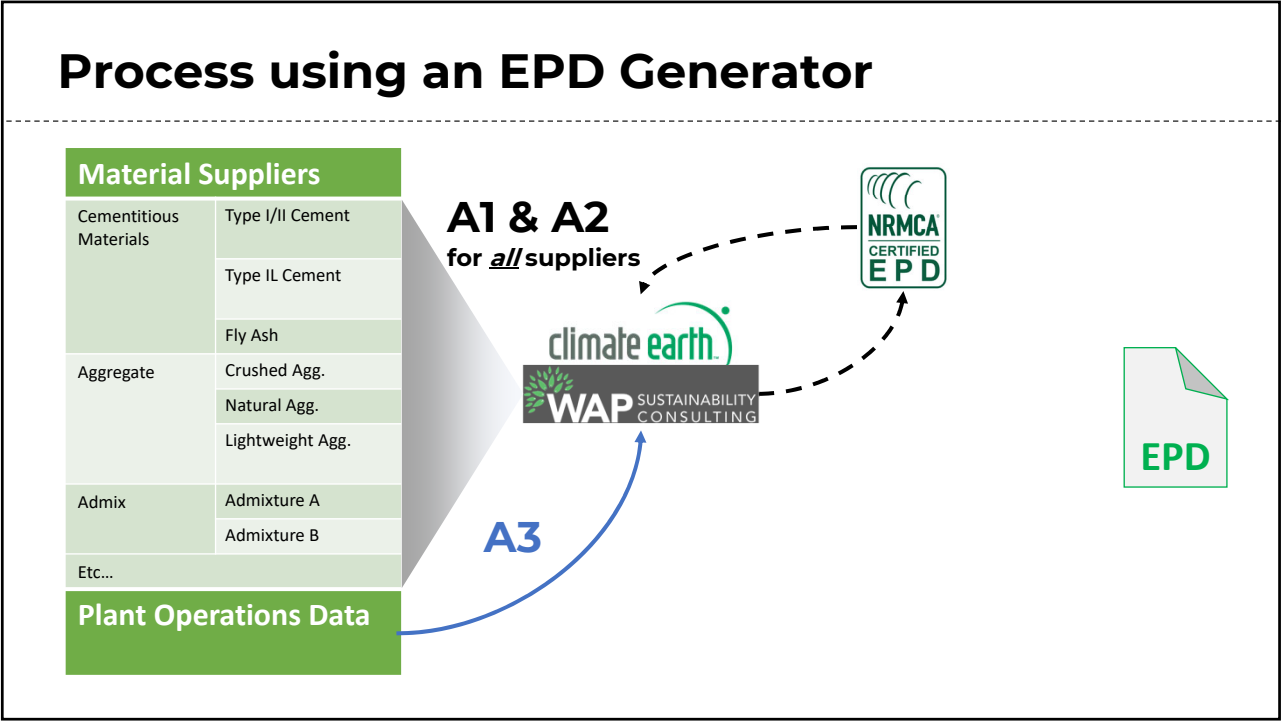
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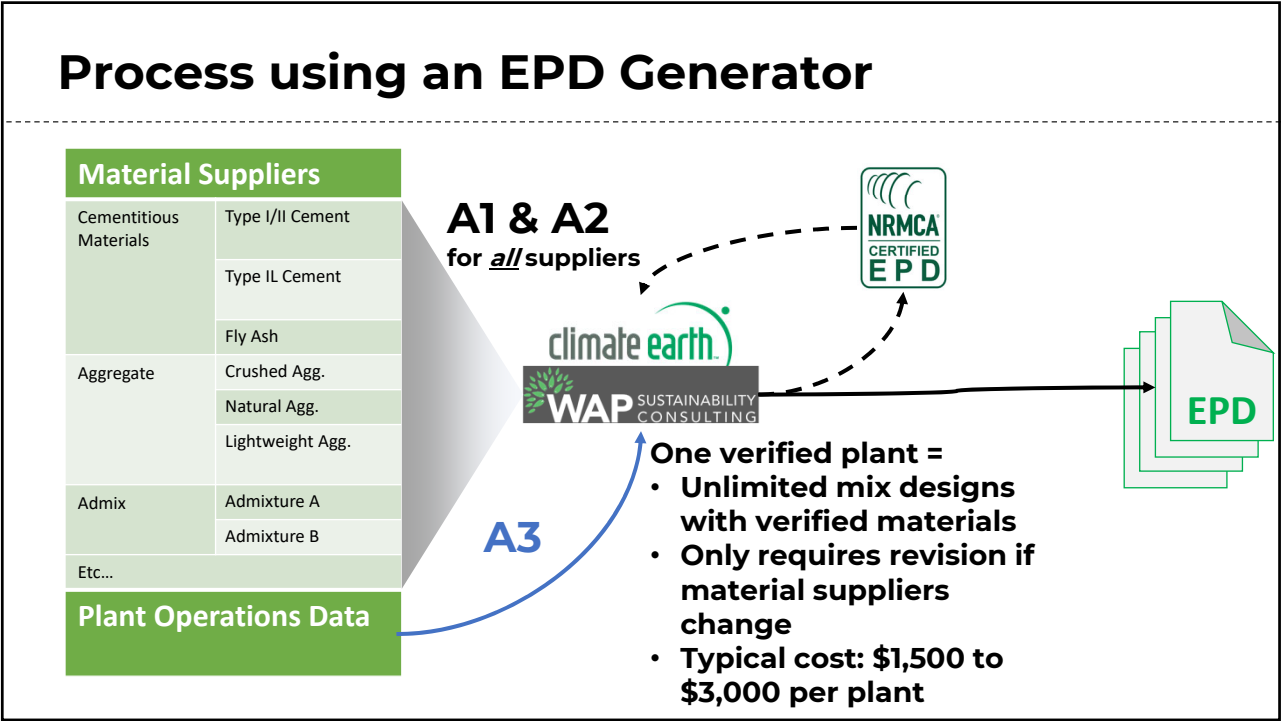
15



16



17



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EPD Verification Fees

Level 1: Initial verification

Number of Plants	NRMCA Members	Non-members
1 to 3 plants	\$1,250	\$2,000
4 to 10 plants	\$2,500	\$4,000
11 or more plants	Negotiated fee	Negotiated fee

Level 2: Additional EPDs verified within 4 months* &
Level 3: Revisions to previously verified plants

	NRMCA Members	Non-members
Per-plant rate	\$300 per plant	\$450 per plant

*If confirmed at the same time as initial plants’ verification

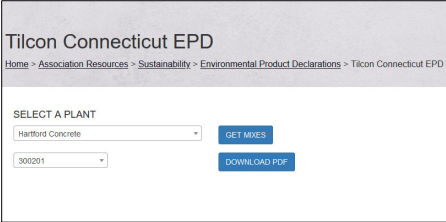
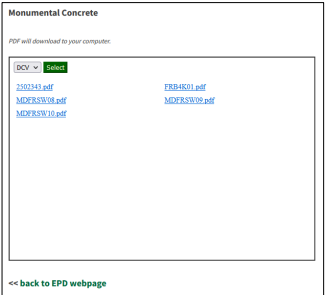


EPD Publication to [NRMCA.ORG/EPD](https://www.nrmca.org/epd)

- Published to [NRMCA.ORG/EPD](https://www.nrmca.org/epd)
- NRMCA Certified EPD logo
- Unique NRMCA EPD number
- Short description of product, no. of plants, and locations
- Link to embedded EPD browser which pulls EPDs live from the software tool



NRMCAEPD: 20094	J.G. MacLellan Concrete	This EPD reports the impacts ready mixed concrete from three plants in Massachusetts.
---------------------------	-------------------------	---



EPD Program

2 NEW NRMCA Program Verifiers

Prior to 2024



Added in 2024

GreenPlum Street LLC

Emily Lorenz
Consulting Engineer

2-3 NEW EPD Generators in 2025

Current

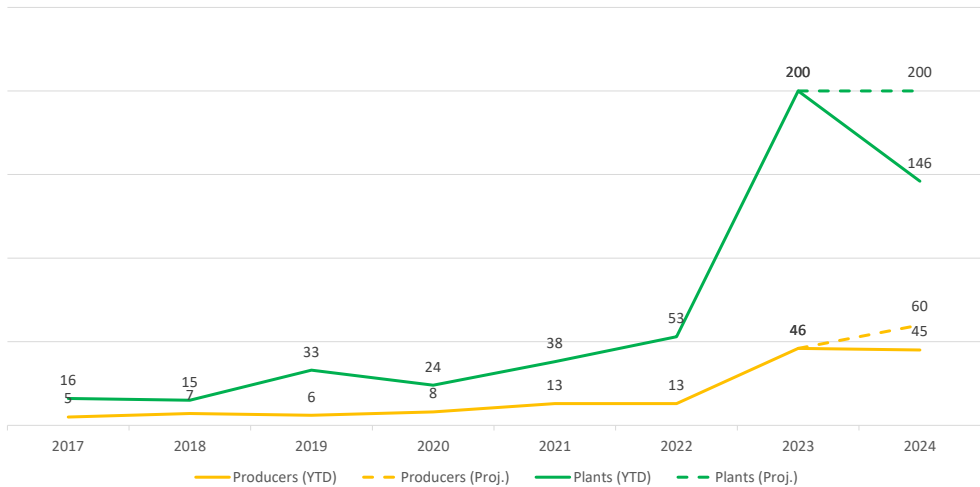


More EPD generator tools are in development. We expect 2 to 3 new tools to enter the market in 2025.

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EPD Program

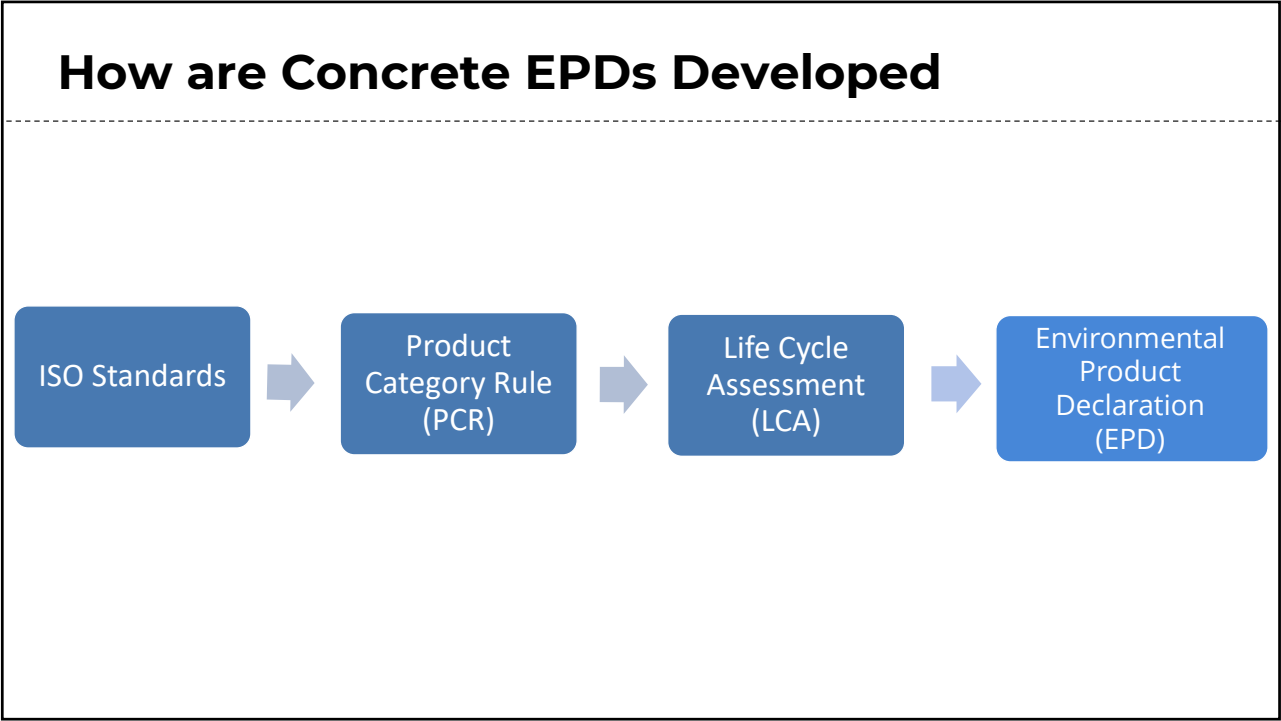
Product-Specific EPDs Published by Year



Year	Producers (YTD)	Producers (Proj.)	Plants (YTD)	Plants (Proj.)
2017	5		16	
2018	7		15	
2019	6		33	
2020	8		24	
2021	13		38	
2022	13		53	
2023	46		200	
2024	45	60	146	200


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Product Category Rule (PCR) for Concrete



Product Category Rule
for Environmental Product Declarations
PCR for Concrete



Concrete PCR Revisions 2024

Current: Version 2.2 of the Product Category Rules (PCR) for ISO 14025:2006 Type III Environmental Product Declarations (EPDs) of Concrete (w/ deviation to consider mobile concrete plants)

Updated v3 – Renew with a modifications including updated background data sets

Timeline: Completion February 2025

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How are EPDs Used?

EPDs are primarily used as a compliance document which demonstrates GWP below specified limits.

Application	28-day Compressive Strength (psi)	Maximum GWP (kg CO2e/cu. Yd)
Slabs	5000	273
Walls	4000	230
Columns	6000	290
Exterior Pavements	4500	252



Where are EPDs Used?

- Private-sector specifications, driven by design community net-zero challenges
- Federal, state, & local "Buy Clean" procurement programs
- Green building codes & standards



Design Community Actions

Architecture 2030 Challenge

All new buildings, developments, and major renovations carbon-neutral by 2030



AIA 2030 Commitment Program

Member firms annually report progress toward carbon neutral design



SE2050 Challenge

Promote/design/construct net zero embodied structures by 2050



STRUCTURAL
ENGINEERING
INSTITUTE



Infra2050 Challenge

Infrastructure counterpart to SE2050



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Private Sector Low-Carbon Commitments

- Universities & Schools
- Data Centers
- Distribution Centers

















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State & Local "Buy Clean" and Embodied Carbon Policies

Adopted



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

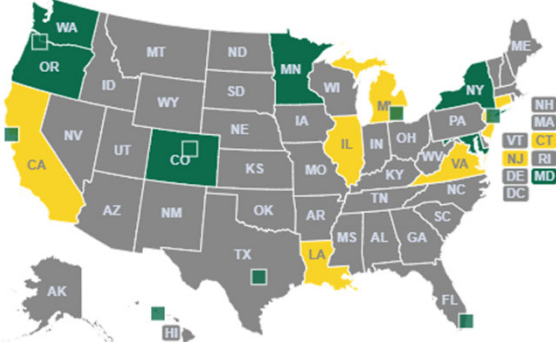
Proposed

- Connecticut
- Illinois
- Louisiana
- Michigan
- Virginia

Other

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





Local


- Marin County, CA
- Denver, CO
- Honolulu, HI
- Portland, OR


- Ann Arbor, MI (incentive)
- Austin, TX (resolution)
- Miami, FL (resolution)

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Green Building Codes & Standards

- ASHRAE 189.1/IgCC**
 - Standard for the Design of High-Performance Green Buildings
 - "The standard now requires submittal of environmental product declarations (EPD) for products meeting specific criteria, as well as the reporting of total global warming potential (GWP) from those products."***
 - GWP limit set at 125% NRMCA National Benchmarks






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Green Building Codes & Standards

ACI 323: Low-Carbon Concrete Code

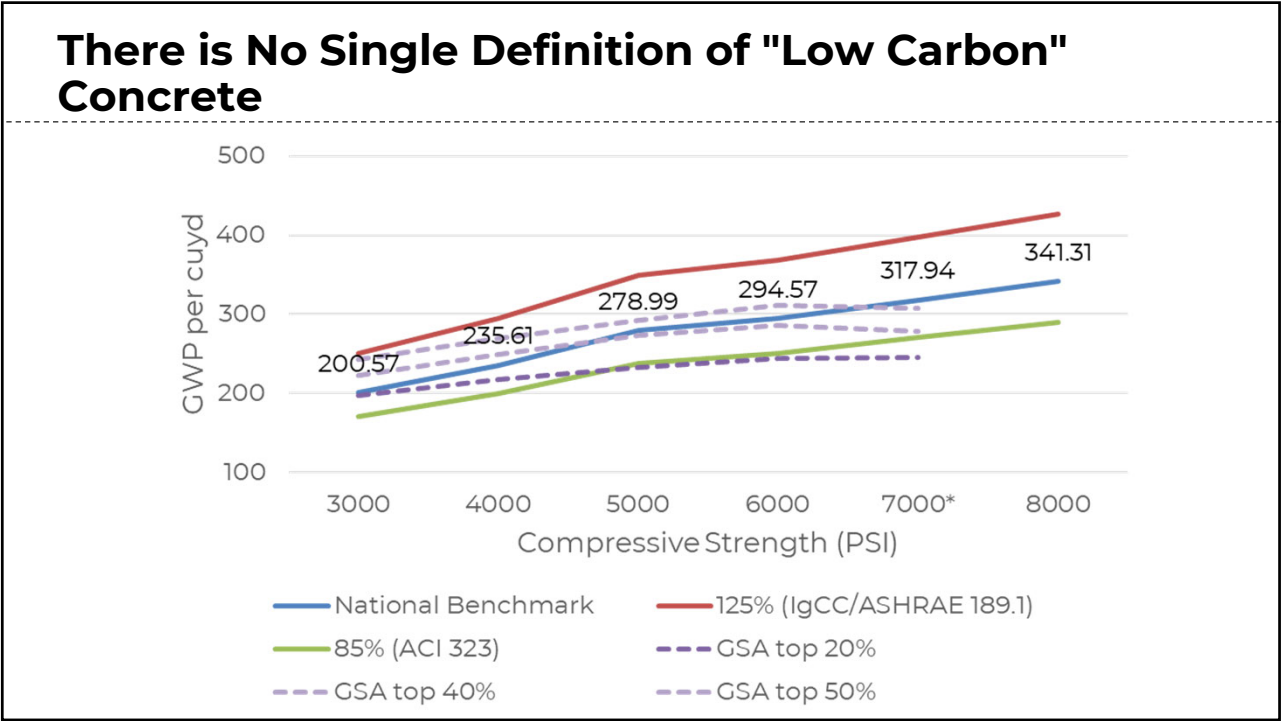
- Limited to cast-in-place concrete structures and its purpose is to provide requirements for the maximum global warming potential of concrete.
- Current draft: GWP limit set at 85% NRMCA National Benchmark
- Still in committee process



American Concrete Institute
Always advancing



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LEED V5: Embodied Carbon

Prerequisite:
Assess Embodied Carbon

"All projects must track the embodied carbon impacts... using either whole-building life-cycle assessment or EPDs."

- Whole-building comparison to benchmarks
- Based on as-built quantities
- Regional or national average EPDs acceptable

Credit:
Reduce Embodied Carbon

1-6 points

3 compliance options:

- Cradle-to-grave WBLCA & comparison to a baseline project (1-6 points)
- Procurement: Whole-building carbon budget for all materials together (1-4 points)
- EPD Analysis: material-by-material comparison to whole-building carbon budget (1-5 points)

Extra 1-2 points for tracking construction process emissions (A4 & A5)

LEED V5: Embodied Carbon

All compliance options compare embodied carbon on a whole-building basis and award more points for greater reductions.

Option	10%	20%	30%	40%	Extra
1. WBLCA	2	3	4	5	+1
2. Low-Carbon Procurement	1	2	3	4	

	1 GSA 50%	2 GSA 40%	3 GSA 20%
Concrete	1	2	3
Steel	1	2	3
Wood	1	2	
Other		1	

Option 3: EPD Analysis

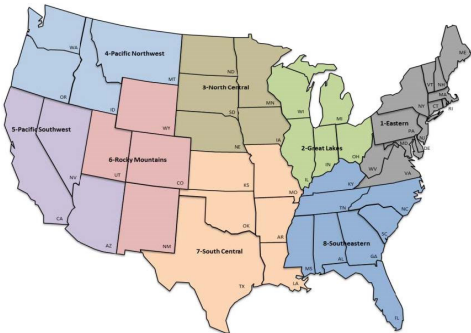
Concrete & steel have the greatest possible contributions (3 of 5 total)

LEED V5: Embodied Carbon

Concrete GWP benchmarks in the "Assess Embodied Carbon" prerequisite are identical to GSA Benchmarks

GWP/m³	2500 psi	3000 psi	4000 psi	5000 psi	6000 psi	7200 psi	8000 psi
GSA 50%	277	318	352	382	407	402	
NRMCA National	240	262	308	365	385		446
NRMCA Regional	226-257	245-279	286-323	336-378	356-401		409-456

Comment:
LEED should publish and require regional benchmarks. These are more representative than a single national benchmark.



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Industry-Wide EPD & Regional Benchmark v4



- Features**
- State & metro-level benchmarks (previously regional)
 - Accounts for increased market share of Type IL cement
 - Will use latest concrete PCR v3 (under development)

- Timeline**
- March-August 2024: Data gathering surveys
 - February 2025: Concrete PCR v3 completion
 - March-April 2025: IW-EPD v4 completion target

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Industry-Wide EPD & Regional Benchmark v4

Bigger than ever before thanks to NRMCA member participation

- Larger sample size = smaller error margins = more credibility outside industry
- Shows commitment to continuously growing green building sector

>38%

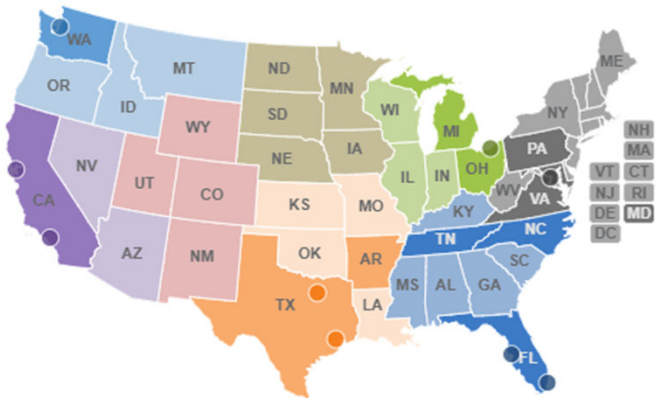
increased participation from version 3 (total plants)

V1 (2014)	V2 (2016)	V3 (2019-2021)	V4 (2025)
412 surveys	412 surveys (same plants as V1)	489 surveys	>675 surveys
48 products	72 products + lightweight	72 products	>100 products + >8000 psi + interior & exterior mixes

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Regional Benchmark v4

- Previous IW-EPDs: 8 regions + national average
- V4: **State** and **metro area** level benchmarks
- Target: 30 total benchmarks



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How Can NRMCA Help You?

EPD Verification & Program Info: [NRMCA.ORG/EPD](https://www.nrmca.org/epd)



- Training for Staff
 - Educational Presentations
- Specification and Design Assistance Center
 - <https://www.nrmca.org/association-resources/design-center>
- Policy Review and Implementation
 - <https://www.nrmca.org/advocacy/state-and-local-advocacy>
- Concrete Innovations Monthly Webinars
 - <https://www.concreteinnovations.com>
- General Consulting on Low-Carbon Solutions
 - <https://www.nrmca.org/association-resources/sustainability>

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Questions?

Matthew Lemay
Manager, Codes and Sustainability
Mlemay@nrmca.org
847-323-0413



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