



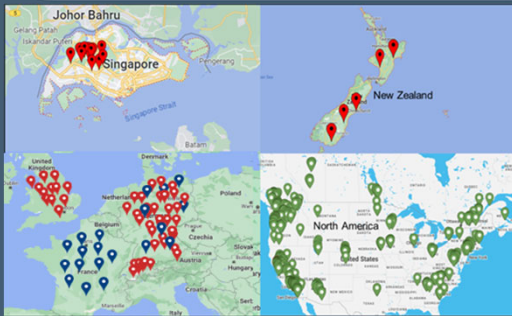
## Measurement, Control, and Improvement

*The Emergence of EPD 3.0 for Carbon Reduction Management*

- Climate Earth overview
- ABC's of EPDs
- Evolving Role of EPDs
- EPD 3.0

Chris Erickson  
 President & CEO  
[Chris@climateearth.com](mailto:Chris@climateearth.com)  
 (415) 391-2725

The Global Leader  
 in Concrete EPD Automation  
 ~1,000 plants worldwide



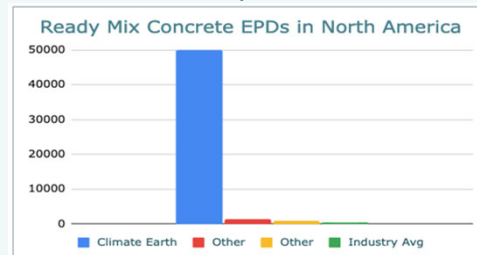
Experts in EPDs  
 For Aggregate  
 Precast  
 Advanced materials



### Global Suite of EPD Generators

- Ready Mix North America: ~900 plants
- Cement: Live in France and Germany
- Ready Mix Asia: Live in Singapore
- Ready Mix Europe: UK, Germany live in October

Over 50,000 EPDs



## Environmental Product Declarations (EPDs)

### 1. Quantitative

Nutrition Facts	
Serving Size 1 cup Servings Per Container	
Amount Per Serving	
Calories 100	Calories from Fat 15
% Daily Value*	
Total Fat 1.5g	2%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 21g	7%
Dietary Fiber 3g	12%
Sugars 1g	
Protein 3g	
Vitamin A 15%	Vitamin C 10%
Calcium 10%	Iron 50%

\*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

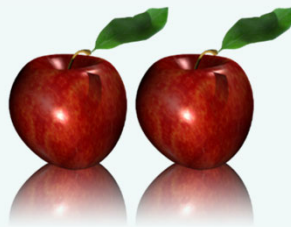
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate	Less than	300g	375g
Dietary Fiber		25g	30g

Calories per gram:  
Fat 9 • Carbohydrate 4 • Protein 4



A 3<sup>rd</sup> party verified international standardized report used to provide assured environmental performance information about products

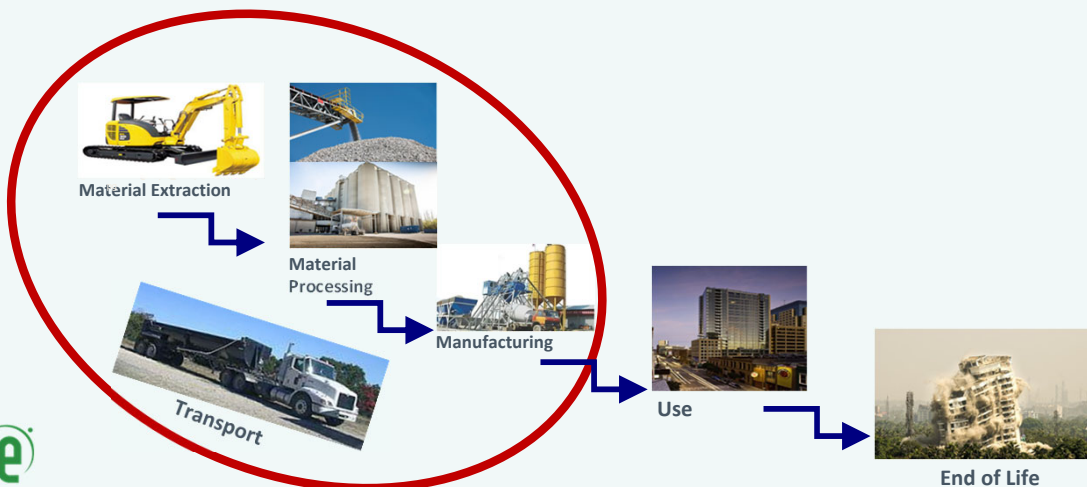
### 2. Comparable



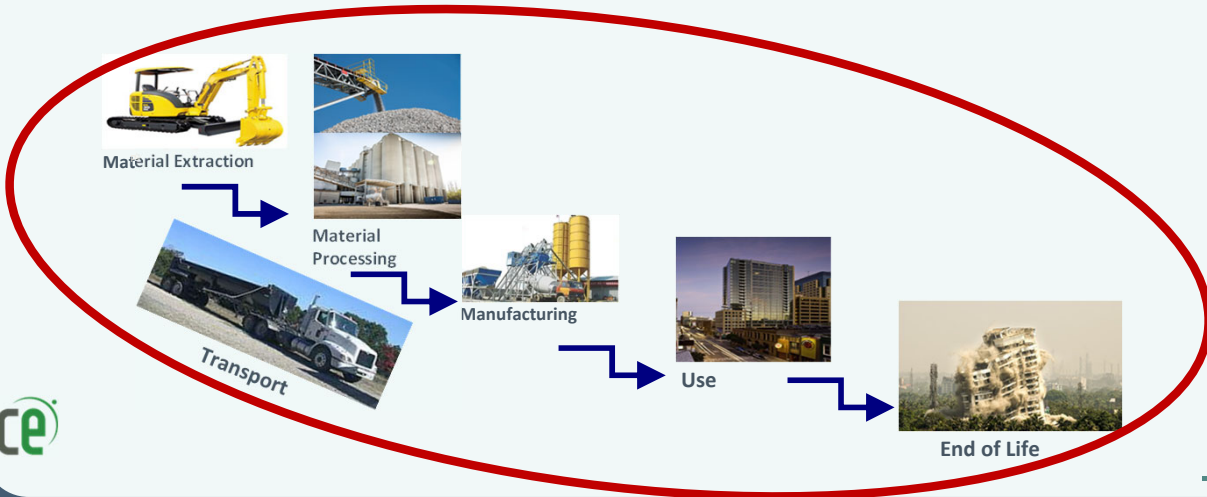
### 3. Verified



## North American Construction Industry EPDs Measure “Cradle to Gate” Embodied Impacts.



## Europe and Asia Construction Industry EPDs Measure “Cradle to Grave” Embodied Impacts.



### 1998 EPD 1.0 The First EPD- A Breakthrough

- Fixed written report
- Five year life
- Substantial LCA consulting for each EPD



#### Summary of Vattenfall AB's Certified Environmental Product Declaration of Electricity from the river Lule älv S-P-00001, 1998-02-01, updated 2002-03-01.

**MANUFACTURER**  
 Vattenfall AB Vattenkraft is responsible for the generation of electricity on the river Lule älv. Vattenfall AB Vattenkraft is a part of Vattenfall AB, SE-162 87 Stockholm, Sweden. Phone: +46-8-739 50 00; fax: +46-8-37 77 95; <http://www.vattenfall.se>. Vattenfall AB Vattenkraft has been certified in accordance with ISO-14001 since 1999, and certain installations are registered in the EMAS system.

**THE PRODUCT AND FUNCTIONAL UNIT**  
 Vattenfall AB Vattenkraft owns all 15 hydropower plants on the river Lule älv. These plants have a total installed capacity of 4350 MW and generate 13.6 TWh in an average year. The approximately 10 reservoirs on the river allow the generation to follow the load curve, and electricity can be delivered without backup sources. The functional unit is 1 kWh of electricity delivered to the main grid during the

**VALIDITY**  
 EPD® S-P-00001, which has been re-certified in accordance with the rules for the EPD® system, is valid until the 1<sup>st</sup> of March, 2005.

**ACCREDITED CERTIFYING BODY**  
 SP Sveriges Provnings och Forskningsinstitut, P.O. Box 857, SE-501 15 Borås, Sweden.

## Nov 30, 2012, North America: The First PCR for Concrete

PCRs are the product category-specific requirements for conducting life cycle assessment (LCA) studies and reporting their findings through Environmental Product Declarations (EPD), consistent with international standards ISO 14025 and ISO 14044 and ISO 21930.

**The First PCR Committee:**

**Kathrina Simonen** University of Washington (chair and primary author)

**Jeff Davis** Central Concrete

Francesca DesMarais Architecture 2030 (observer)

Chris Erickson Climate Earth

Dean Frank Precast/Pre-stressed Concrete Institute Loretta Tam UL

Environment Won Lee Independent Engineer

Lionel Lemay National Ready Mixed Concrete Association

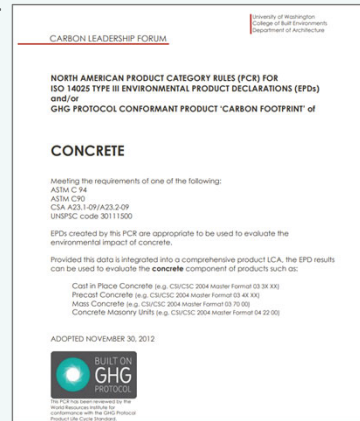
Greg McKinnon Stoneway Concrete

Helena Meryman Consultant

John Ochsendorf Massachusetts Institute of Technology

Carlo Strazza University of Genoa

Mark Webster Simpson Gumpertz & Heger



## EPD 2.0- The First Concrete EPDs in North America, and a Breakthrough: EPDs in Minutes not Months

## EPD 2.0- On-Demand EPDs

### *A big win for ready mixed concrete*

- Responsive to early adopters with EPDs for any mix in minutes
  - ✓ Apple, Google, City of San Francisco
- LEED v4.0- EPD Submittal- Concrete could maximize LEED points for any project
- **Enabled rapid innovation of low carbon mix designs**



LEED v4, December 2013. Until June of 2015, you can choose to submit projects under LEED 2009 or LEED v4.

LEED 4.1 January 2018



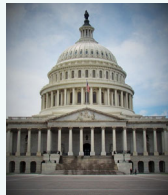
## 2023 Demand for Carbon Reduction Changes Everything

### Market



Amazon, MSFT

### Government



IRA, Local

### Financial



BlackRock, Other

### Producers



Net zero targets



## Other State Programs

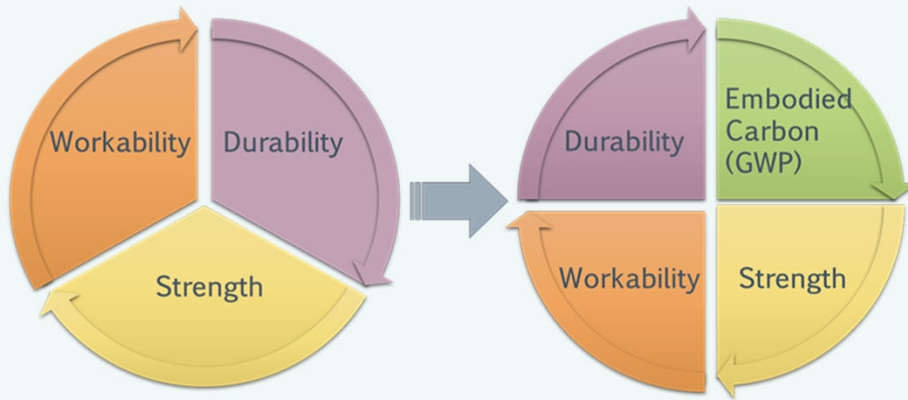
Year introduced	Source	Bill	Type of EPD required
2017	California Legislature	<a href="#">Buy Clean California Act</a>	Type III facility-specific EPD
2019	City of Portland	<a href="#">New requirements for concrete</a>	Type III product-specific EPD
2019	Minnesota Legislature	<a href="#">HF 2204</a>	Type III facility-specific EPD
2020	New York State Senate	<a href="#">5542</a> (Original)	Type III product-specific EPD
2021	California Legislature	<a href="#">AB-1365</a> , <a href="#">SB-778</a>	Type III supply chain-specific EPD Type III EPD that "makes use of supply chain-specific data for input materials whenever this data is available"
2021	Colorado State Assembly	<a href="#">HB 21-1303</a>	Type III EPD
2021	Oregon State Legislature	<a href="#">HB 2688</a>	"Product-specific measurement of the life cycle environmental impact of a product, from the point of raw material extraction to the point of manufacture, that is certified by a third party and in accordance with international standards"
2021	New Jersey Assembly	<a href="#">AB 5223</a>	Type III product-specific EPD
2021	Washington State Legislature	<a href="#">HB 1103</a>	Type III supply chain-specific EPD
2021	House of Representatives, 117th Congress	H.R. 1512 <a href="#">CLEAN Future Act – Subtitle C – Federal Buy Clean Program</a>	Type III product-specific EPD "calculated for a specific facility"

Source: <https://carbonleadershipforum.org/epd-requirements-in-procurement-policies/>

## Where Reduced Carbon Mixes are Most Commonly Required Today



### Low Carbon Concrete Makes GWP a New Performance Metric EPDs in Minutes are now necessary but not sufficient

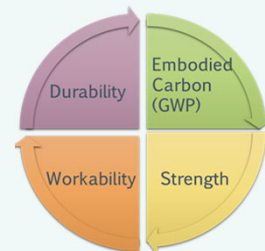


### Introducing EPD 3.0


*Analytics and Digital Integration to Optimize Carbon Reduction and Business Growth*

**Easy**

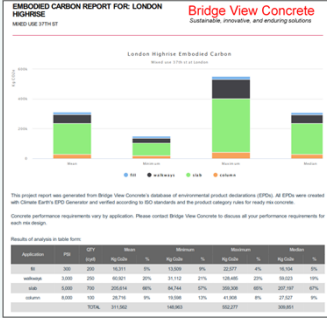
- EPD 1.0 is LCA and EPD manual reports
- EPD 2.0 is EPDs in minutes not months
- **EPD 3.0 is analytics + digital integration = right EPDs**
  1. Analyzing data
  2. Generating EPDs
  3. Sharing EPD data
    - ✓ for the project
    - ✓ for company reporting
    - ✓ for investors



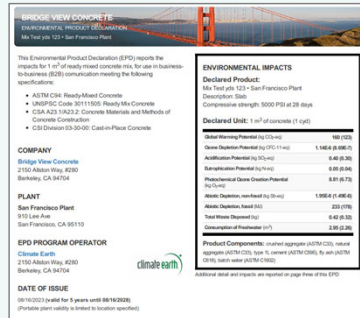





## EPD 3.0 –Fast Easy Analysis, EPDs, and Data Sharing




**Analysis**



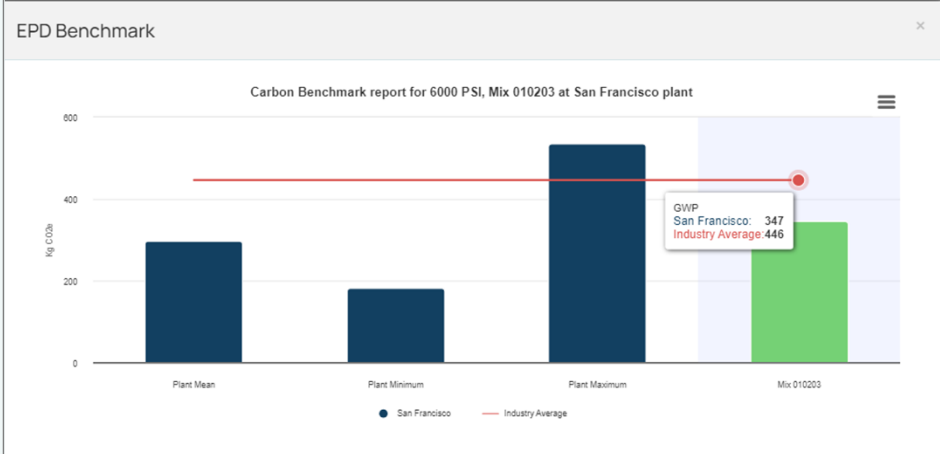
**Decision**



**Sharing**



## One-click Benchmarking- Analysis Across a Plant vs Regional Average




**EPD Benchmark**

Carbon Benchmark report for 6000 PSI, Mix 010203 at San Francisco plant

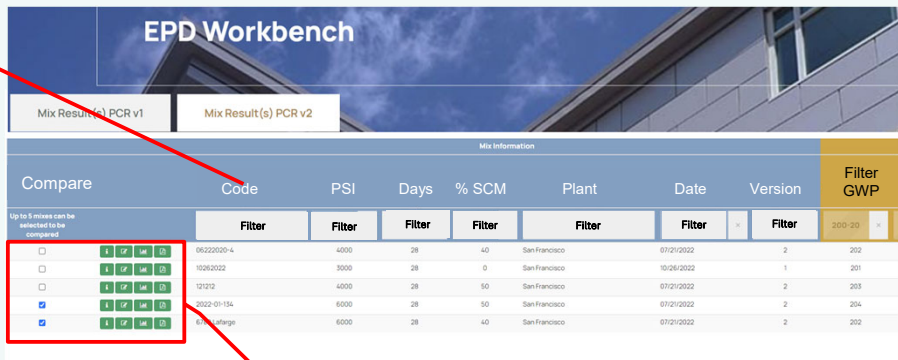
Category	Value (kg CO2e)
Plant Mean	~300
Plant Minimum	~180
Plant Maximum	~550
Mix 010203	347
Industry Average	446

Legend: ● San Francisco — Industry Average





## Analysis Across the Company

**Filter and sort**  
*Example: Select all 6,000 psi mixes in San Francisco plant, between 250 and 300Kg CO2e*

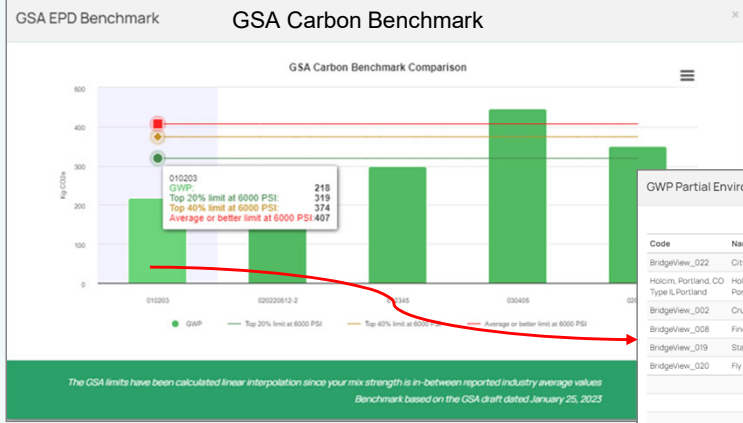


**View, analyze, edit mix, review, create draft EPD, compare, download EPD**






## GSA Deep Dive Compare Selected Mixes



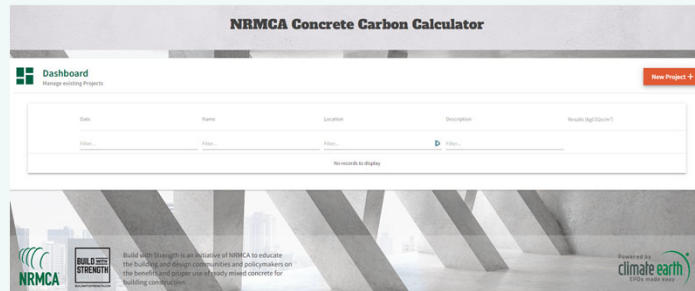
**Edit mix  
 Publish EPD  
 Or continue analysis**





## NRMCA's Concrete Carbon Calculator

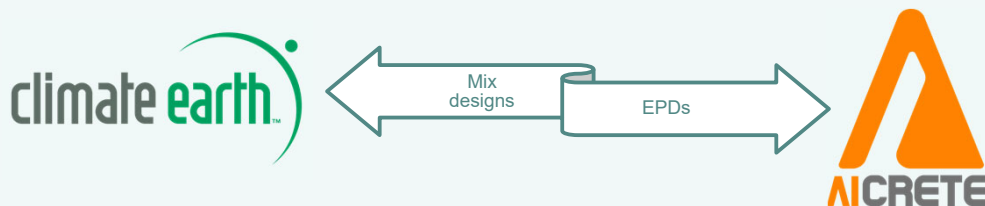
- Empowers design and build teams to specify low-carbon concrete.
- Benchmarks a baseline versus proposed low-carbon concrete.
- Benchmarks include:
  - ✓ NRMCA
  - ✓ State and local
  - ✓ GSA
  - ✓ Set your own
- Your EPDs or generate quality estimates



## AI Optimization

### The First AI Optimized EPDs and Mix Designs

- ✓ Streamlined EPD Generation for AI Mix Designs
- ✓ One-click estimated EPDs
- ✓ One-click AI cost and carbon optimized EPDs



The diagram features a central box labeled 'ce EPD Advantage' containing a database icon. This central box is connected to several external entities: 'EC3' (top left), 'STONEMONT solutions' (top left), 'Command Alkon' (top center), 'INTERNATIONAL' (top center), 'NRMCA' (top center), 'Quadrel' (top right), and 'SAP' (bottom center). Arrows also point from the central box to a box labeled 'Your Application' (top right). The background is a map of the United States with several laptop icons scattered across it, representing various plants. In the top left corner, there is a circular logo with a globe and the text 'EPD 3.0'. At the bottom of the diagram, the text reads '900 Plants -56,000 EPDs Working for Carbon Reduction'.

### EPD 3.0 is Easy Sharing with Digital Connections Anywhere

900 Plants -56,000 EPDs Working for Carbon Reduction

The slide features a circular logo with a globe and the text 'EPD 3.0' in the top left corner. The main heading is 'openEPD' in a large, teal font. To the right of the heading is the 'EC3' logo, which consists of a stylized building icon and the letters 'EC3'. Below the heading is a bolded paragraph: 'openEPD assures producers EPDs are easily and instantly accessible for analysis, procurement, compliance checking, regulatory reporting, and research.' Below this is a smaller paragraph: 'openEPD™ is an open data format for creating and exchanging digital third-party verified Environmental Product Declarations (EPDs) among Program Operators, EPD Databases, Life Cycle Analysis tools, design tools, reporting, and procurement. It takes the form of a OpenAPI 3.0 compliant, RESTful API.'

## openEPD



**openEPD assures producers EPDs are easily and instantly accessible for analysis, procurement, compliance checking, regulatory reporting, and research.**

openEPD™ is an open data format for creating and exchanging digital third-party verified Environmental Product Declarations (EPDs) among Program Operators, EPD Databases, Life Cycle Analysis tools, design tools, reporting, and procurement. It takes the form of a OpenAPI 3.0 compliant, RESTful API.

EPD 3.0 is a transformational change available for concrete. It creates a business opportunity unavailable to steel or wood for growth and for carbon reduction

*We've Just Begun*  
**Thank you**

Chris Erickson  
President & CEO  
[Chris@climateearth.com](mailto:Chris@climateearth.com)  
(415) 391-2725

