Meeting New LEED v4 Product Transparency Requirements with System Verified EPDs

December 15, 2016 | 1:00 – 2:00 pm ET
Housekeeping

Open and close your control panel

Join audio:
• Choose **Mic & Speakers** to use VoIP
• Choose **Telephone** and dial using the information provided

Submit questions and comments via the Questions panel

**Note: Technical Issues:**

Our end, we will reschedule
On your end, presentation is being recorded and will be provided within 48 hours.
Meeting New LEED v4 Product Transparency Requirements with System Verified EPDs

December 15, 2016 | 1:00 – 2:00 pm ET
Agenda

- Generalize transparency trends
- Product transparency credits in LEED v4
  - Material Ingredient Disclosure
  - Responsible Sourcing
  - Environmental Product Declarations
- Green building market landscape
- EPD experience summary by Martin Marietta
- Climate Earth enterprise EPD tool
- Q&A
Transparency

• Marketing in the age of transparency
• Customers are investigating the risks from the products or companies
• Effort of making more informed and responsible decisions
Product Trends – Env Marketing

Trend Direction

- Self-Declared 3rd Party Certs
  - Product Health Impacts
- EPDs Multi-impacts
  - Corporate & Supply Chain Responsibility

Product / Enterprise Transparency
<table>
<thead>
<tr>
<th>MATERIALS &amp; RESOURCES</th>
<th>POSSIBLE 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRp1 Storage and collection of recyclables</td>
<td>REQ</td>
</tr>
<tr>
<td>MRp2 Construction and demolition waste management planning</td>
<td>REQ</td>
</tr>
<tr>
<td>MRC1 Building life-cycle impact reduction</td>
<td>5</td>
</tr>
<tr>
<td>MRc2 Building product disclosure and optimization – environmental product declarations</td>
<td>2</td>
</tr>
<tr>
<td>MRc3 Building product disclosure and optimization – sourcing of raw materials</td>
<td>2</td>
</tr>
<tr>
<td>MRc4 Building product disclosure and optimization – material ingredients</td>
<td>2</td>
</tr>
<tr>
<td>MRc5 Construction and demolition waste management</td>
<td>2</td>
</tr>
</tbody>
</table>
Responsible Sourcing

Welcome to the Sustainable Concrete Toolbox

Welcome on the responsible sourcing toolbox for concrete. How responsibly sourced is your concrete? What are your responsible sourcing ambitions? This Toolbox enables you to analyse the environmental and social performance of your concrete and determine your ambition. Use the Quickscan for a quick impression, the AmbitionTool to determine your ambition, the Pre AssessmentTool to prepare you for a qualification and a certificate that you can get with the AssessmentTool.

![Sustainable Concrete Toolbox](http://www.concretesustainabilitycouncil.com)

http://www.concretesustainabilitycouncil.com
NRMCA Material Ingredient Reporting Guidance

- Released April 2016
- 2 year research by Arup funded by RMCREF
- Reviewed all pathways to meet credit criteria
- Input from over 30 stakeholders
- Recommended that concrete producers start with the Health Product Declaration v2.0 pathway
- Economical, efficient, and effective method
  - For engaging supply chain for the information necessary to contribute
- [http://www.nrmca.org/sustainability/](http://www.nrmca.org/sustainability/)
PRODUCT DISCLOSURE & OPTIMIZATION

- Option 1: **Disclose** environmental impacts
  - Product specific self-declaration
    - publicly available (1/4 product)
  - **Industry average EPD**
    - third party certified Type III (1/2 product)
  - **Product specific EPD**
    - third party certified Type III (Full product)
- Option 2: **Optimizing**
  - Demonstrate impact reduction from Option 1
Green Building Market Landscape

Why Prepare for Transparency
Green Building Growth

U.S. NON-residential Green Building Market 2005-2016 ($Billions)

U.S. Residential Green Building Market 2005-2016 ($Billions)

Source: McGraw Hill

48-55%

29-38%
Market Value of Materials


(Source: Navigant Research)
“…will target Platinum … is pursuing the EPD credit”

“…provide EPDs for concrete mix designs, including pre-cast and cast-in-place concrete, and all steel.”

Proposed Spec: 90% by volume of the cast-in-place concrete submit EPDs…demonstrate lower GWP (CO₂e) as compared to NRMCA Benchmarks for Northwest Region.
Disclosure reports “Demanded” by A/E Firms
More detailed information on the Top 100 Green Contractors:

The Top 100 Green Buildings Contractors

Current Top 100 Green Contractors Story:

Green Building Standards Grow

Click below for earlier editions:


<table>
<thead>
<tr>
<th>Rank 2016/2015</th>
<th>Firm</th>
<th>Green Accredited Staff</th>
<th>Green Contracting Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/1</td>
<td>THE TURNER CORP., New York, N.Y.</td>
<td>1,477</td>
<td>5,701.00</td>
</tr>
<tr>
<td>2/2</td>
<td>CLARK GROUP, Bethesda, Md.</td>
<td>375</td>
<td>2,620.00</td>
</tr>
<tr>
<td>3/16</td>
<td>HENSEL PHELPS, Greeley, Colo.</td>
<td>304</td>
<td>2,285.83</td>
</tr>
<tr>
<td>4/6</td>
<td>SKANSKA USA, New York, N.Y.</td>
<td>481</td>
<td>1,941.40</td>
</tr>
<tr>
<td>5/10</td>
<td>SWINERTON INC., San Francisco, Calif.</td>
<td>350</td>
<td>1,918.00</td>
</tr>
<tr>
<td>6/4</td>
<td>GILBANE BUILDING CO., Providence, R.I.</td>
<td>424</td>
<td>1,746.36</td>
</tr>
<tr>
<td>7/5</td>
<td>THE WHITING-TURNER CONTRACTING CO., Baltimore, Md.</td>
<td>296</td>
<td>1,602.63</td>
</tr>
<tr>
<td>8/9</td>
<td>STRUCTURE TONE, New York, N.Y.</td>
<td>163</td>
<td>1,460.80</td>
</tr>
<tr>
<td>9/7</td>
<td>DAVID E. HARVEY BUILDERS, Houston, Texas</td>
<td>56</td>
<td>1,339.00</td>
</tr>
<tr>
<td>10/19</td>
<td>HOLDER CONSTRUCTION CO., Atlanta, Ga.</td>
<td>190</td>
<td>1,335.00</td>
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</tbody>
</table>

$20B / $53B total revenue
## Material Category EPD’s

<table>
<thead>
<tr>
<th>Div</th>
<th>Industry</th>
<th># company EPDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>Concrete</td>
<td>49</td>
</tr>
<tr>
<td>04</td>
<td>Masonry</td>
<td>10</td>
</tr>
<tr>
<td>05</td>
<td>Metals</td>
<td>12</td>
</tr>
<tr>
<td>06</td>
<td>Wood / Plastic / Composite</td>
<td>10</td>
</tr>
<tr>
<td>07</td>
<td>Thermal &amp; Moisture</td>
<td>26</td>
</tr>
<tr>
<td>08</td>
<td>Openings</td>
<td>19</td>
</tr>
<tr>
<td>09</td>
<td>Finishes</td>
<td>80</td>
</tr>
</tbody>
</table>
Progress: EPD Tools

• Climate Earth
  – Links Command Alkon production software with Climate Earth environmental impact data

• Athena
  – Customized, plant specific calculator

• Quantis / PCA tool
  – Launched August 2016
Meeting New LEED v4 Product Transparency Requirements with System Verified EPDs

December 15, 2016
Martin Marietta Company Overview

**COMPANY SNAPSHOT**

Martin Marietta, an American-based company and a member of the S&P 500 Index, is a leading supplier of aggregates and heavy building materials, with operations spanning 26 states, Canada, the Bahamas and the Caribbean Islands. Dedicated teams at Martin Marietta supply the resources for the roads, sidewalks and foundations on which we live. Martin Marietta’s Magnesia Specialty business provides a full range of magnesium oxide, magnesium hydroxide and dolomite lime products.

- **Employees:** 7,200+
- **Aggregate Operations & Yards:** 347
- **Asphalt Plants:** 8
- **Cement Plants:** 2
- **Ready Mix Concrete Facilities:** 124
- **Magnesia Specialty Facilities:** 2

**OUR NATIONAL FOOTPRINT**

Map showing the national footprint of Martin Marietta's operations across various states in the United States, including aggregates, cement, and magnesia specialty facilities.
Martin Marietta’s Commitment to Sustainability

Martin Marietta’s Sustainability Approach

- Safe Operations
- Community Well-Being
- Employee Well-Being
- Environmental Stewardship
Why LEED? Why now?

Why LEED?
• Improves how buildings and communities are planned, constructed, maintained and operated
• Supports green building and transparency focus by developers and owners
• Works for all buildings at all phases
• Promotes double bottom line – environmental and cost benefits

Why now?
• Serves local customer demand
• Expands value proposition
• Aligns with Martin Marietta commitment to environmental stewardship
• Supports industry efforts on transparency
• LEED v4 exclusive as of 11/1/16

Over 1.8 million square feet are LEED certified every day
Local LEED Certified Projects

“Colorado Ranks 5th in the Nation for LEED Green Building in 2015”

Announced by Gov. John Hickenlooper on 1/26/16, as released by the USGBC
## What is concrete’s contribution to LEEDv4?

Concrete can contribute to most LEED v4 credits, but EPDs are for Materials & Resources.

<table>
<thead>
<tr>
<th>Credit Category</th>
<th>LEED v4 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrative Process</td>
<td>1</td>
</tr>
<tr>
<td>Location &amp; Transportation</td>
<td>16</td>
</tr>
<tr>
<td>Sustainable Sites</td>
<td>10</td>
</tr>
<tr>
<td>Water Efficiency</td>
<td>11</td>
</tr>
<tr>
<td>Energy &amp; Atmosphere</td>
<td>33</td>
</tr>
<tr>
<td><strong>Materials &amp; Resources</strong></td>
<td><strong>13</strong></td>
</tr>
<tr>
<td>Indoor Environmental Quality</td>
<td>16</td>
</tr>
<tr>
<td>Innovation</td>
<td>6</td>
</tr>
<tr>
<td>Regional Priority</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>110</strong></td>
</tr>
</tbody>
</table>

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**LEED v4**

- Materials & Resources
  - Environmental Product Declarations
    - “EPDs”
What are EPDs contribution to LEEDv4?

- **Disclosure**
  - 1 LEED Point
  - Disclosure only
  - 20 total products required
  - Up to 10 concrete mixes per project

- **Optimization**
  - 1 LEED Point
  - Awarded for favorable comparison to benchmarks

Product-specific Environmental Product Declarations (EPDs) count for nearly 2x more LEED points than LEED 2009 mixes (regional material only).
Martin Marietta EPDs

Environmental Product Declarations

- Known as “EPDs”
- Nutrition label format
- Reports environmental impact of each unit of concrete
- Does not disclose ingredients
- Provides transparency, not superiority
- On-demand and product specific
- Valid for 5 years
Martin Marietta’s EPD Approach

- EPDs for Top Mix Designs
  - Upfront development
  - Specific to each plant

- EPD Calculator
  - Ongoing subscription
  - On-demand EPDs
  - Updated annually

- 6 Ready Mix Concrete Plants
EPD Development

- Track ALL constituents of mixes
- Track shipping distances and methods
- Track chemicals
- Track plant utilities
- Track water usage
## On-Demand EPDs

### EPD 'On-Demand' Ready-Mix Calculator

**CHAMBERS PLANT | 5000 PSI AT 28 DAYS**

<table>
<thead>
<tr>
<th>Material</th>
<th>Amount</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Batch Water</td>
<td>30</td>
<td>GAL</td>
</tr>
<tr>
<td>67-57-CR</td>
<td>1000</td>
<td>LB</td>
</tr>
<tr>
<td>SAND</td>
<td>1000</td>
<td>LB</td>
</tr>
<tr>
<td>CEM 1-2</td>
<td>660</td>
<td>LB</td>
</tr>
<tr>
<td>Selected Material</td>
<td>-</td>
<td>Amount</td>
</tr>
</tbody>
</table>

[Image of the calculator interface]
On-Demand EPDs (continued)

Environmental Impacts

DEclared Product:

xxxxx • Chambers Plant

Declared Unit:

1 MS of Concrete

Global Warming Potential [kg CO₂eq]: 407
Ozone Depletion Potential [kg CFC-11 eq]: 1.26 × 10⁻⁵
Acidification Potential [kg SO₂ eq]: 1.39
Eutrophication Potential [kg N-to-NH₃ eq]: 0.35
Reemission of NOx [kg NOx]: 26.3

Total Primary Energy Consumption [GJ]: 2.895

Non-renewable [GJ]: 2.739
Renewable [GJ]: 0.16

Total Concrete Water Consumption [m³]: 2.28
Batching Water [m³]: 0.16
Washing Water [m³]: 0.13

Non-renewable Material Resource Consumption [GJ]: 1.895
Renewable Material Resource Consumption [GJ]: 3.22

Hazardous Waste Production [GJ]: 0.02
Non-hazardous Waste Production [GJ]: 4.10

Company

Martin Marietta
2710 Wrenn Road
Raleigh, NC 27607

EPA Program Operator
National Ready Mixed Concrete Association
300 Spring St. • Silver Spring • MD 20910

Date of Issue

07/16/2013 (valid for 5 years until 07/16/2018)
Chris Erickson

Climate Earth
A New Approach to Verified Product Specific EPDs
Simple
Immediate
Very low cost

Chris Erickson
President and CEO
415.391.2725
Chris@climateearth.com
Agenda

Climate Earth

The EPD Process

EPD Challenges for Ready Mix Producers

Streamlining the Process with Database

A Look at Costs
Climate Earth- Systems for Sustained Performance

Founded 2008, Berkeley, CA

We Provide:

• Environmental Product Declarations (EPDs)
• Supply chain life cycle analysis
• Business advisory services

Our Expertise:

• Life cycle assessment
• Software and data management

Selected Customers:

![Company Logos]

Key Affiliations:

![Institute Logos]
Climate Earth and Concrete Industry Since 2009

Founder of Carbon Leadership Forum: Created First PCR

First EPDs for ready mix, block and aggregates

First volume EPD (1479 mixes)

First to integrate EPDs with Command Alkon

First system to generate EPD’s on demand
# The Top 10 LEED States

## 2013

<table>
<thead>
<tr>
<th>Rank</th>
<th>State</th>
<th>Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Illinois</td>
<td>226.8</td>
</tr>
<tr>
<td>2</td>
<td>Maryland</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Virginia</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Massachusetts</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>(tie) New York</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(tie) California</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oregon</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>North Carolina</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Colorado</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Hawaii</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Minnesota</td>
<td></td>
</tr>
</tbody>
</table>

## 2015

<table>
<thead>
<tr>
<th>Rank</th>
<th>State</th>
<th>Square Feet</th>
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<tbody>
<tr>
<td>1</td>
<td>Illinois</td>
<td>274.9</td>
</tr>
<tr>
<td>2</td>
<td>Maryland</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Massachusetts</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Washington</td>
<td></td>
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<tr>
<td>5</td>
<td>Colorado</td>
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<tr>
<td>6</td>
<td>Nevada</td>
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<tr>
<td>7</td>
<td>California</td>
<td></td>
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<tr>
<td>8</td>
<td>Texas</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Virginia:</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Utah</td>
<td></td>
</tr>
</tbody>
</table>

1,633 commercial and institutional projects

+21%
All EPDs are Developed Under a Structured Process

A global standard formula for consistent, scientifically grounded environmental impact measurement

Recipe Book
ISO 14025 & 21930

Product Recipe
PCR

Cooking
LCA

Tasting
Verification

Result
EPD
What Does the process produce?

**EPD Standard**

- Comes as a single booklet
- Includes all EPD information for about 30 selected mixes per plant
- Fixed for 5 years

**EPD Enterprise**

- Generate new EPDs any time from your PC
- Data refreshed annually
- EPDs are renewed every year
EPD Standard Does Not All Serve All Producers Well

1. 5 year fixed life
2. One time, slow, manual, costly process
3. Not responsive to new product and new mix designs
4. Not updated as products, suppliers and processes change
5. Not effective when the numbers matter
How Can We make EPDs More Responsive (and Cheaper)?

ISO 14025  PCR  LCA  System Verification

Add database, systems and cloud technology to streamline the process.
The One Minute Demo

- Easy on-line access
- Generate unlimited branded EPDs
- Ready for bid submittal
The Full Process with System Verification

1. LCA → System Verification
2. System Verification → Refresh Verification
3. Refresh Verification → Annual Database Update
4. Annual Database Update → EPDs On-Demand
5. EPDs On-Demand → Unlimited
6. Unlimited → LCA Report

Climate Earth (415) 391-2725
How Do Producers Benefit from EPD Enterprise ‘On-Demand’

- Create unlimited EPDs
- Optimal mix designs for any job, max LEED points
- EPDs always current (new mixes, new suppliers, etc)
- No hassle, low cost per EPD
EPD ‘On-Demand’- Strong Transparency

- Industry Average EPD
  - Not transparent
- EPD Standard
  - Year 2, 3, 4, 5?
- EPD ‘On Demand’
  - Always current
  - Always transparent
How Much Do They Cost?

First Year LCA and Set-Up

<table>
<thead>
<tr>
<th># Plants</th>
<th>Price</th>
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<tbody>
<tr>
<td>2</td>
<td>~$12,000</td>
</tr>
<tr>
<td>10</td>
<td>~ $25,000</td>
</tr>
</tbody>
</table>

EPD Enterprise

Annual Subscription and Database Update with Unlimited EPDs

<table>
<thead>
<tr>
<th># Plants</th>
<th>$ per month/plant</th>
<th>2 EPDs Month</th>
<th>5 EPDs per month</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>$68</td>
<td>$34</td>
<td>$14</td>
</tr>
<tr>
<td>10</td>
<td>$52</td>
<td>$26</td>
<td>$10</td>
</tr>
</tbody>
</table>

Pricing does not include verification
EPDs On-Demand- Easy and Cost Effective

- Instant web access
- On-Demand
- Low Cost

Integrated with CommandQC if desired
Thank you
Thank You

Questions