EPD Development Within the Concrete Industry

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National Ready Mixed Concrete Association
NRMCA Sustainability Initiatives

Sustainable Plant and Personnel Certifications:

Sustainability Research:

www.nrmca.org/sustainability/
Sustainability in the Concrete Industry
Transparency

• Concrete EPD development was in response to building market factors.

• Need for concrete producers to be able to respond to specifiers wanting to make more informed and responsible decisions.
Market Landscape

LEED as a Driver for EPDs
### LEED v4

<table>
<thead>
<tr>
<th>MATERIALS &amp; RESOURCES</th>
<th>POSSIBLE 13</th>
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<tbody>
<tr>
<td>MRp1</td>
<td>Storage and collection of recyclables</td>
</tr>
<tr>
<td>MRp2</td>
<td>Construction and demolition waste management planning</td>
</tr>
<tr>
<td>MRC1</td>
<td>Building life-cycle impact reduction</td>
</tr>
<tr>
<td>MRC2</td>
<td>Building product disclosure and optimization – environmental product declarations</td>
</tr>
<tr>
<td>MRC3</td>
<td>Building product disclosure and optimization – sourcing of raw materials</td>
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<td>MRC4</td>
<td>Building product disclosure and optimization – material ingredients</td>
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<td>MRC5</td>
<td>Construction and demolition waste management</td>
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Green Building Growth

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

- Green: 48-55%
- Conventional: 0-55%

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

- Green: 29-38%
- Conventional: 0-38%

Source: McGraw Hill
EPD DEVELOPMENT IN CONCRETE INDUSTRY
Concrete Industry EPD Development

- CLF PCR
- v1 Nov 2012
- v1.1 Dec 2013

- 2013
- EPD Program Operator
- 13 companies
- 2100+ products
- More coming

- Oct 2014
- 90 companies
- 2700 plants
- 95% production
- Baselines
Industry Wide EPD

- Provides average industry wide environmental impacts
  - identified various compression strengths and mix designs of various SCMs % and LW aggregate
  - 72 mix designs that represents >95% of production
- 90 producers / 2,700 plants
- Contribution by smaller companies with limited resources
- Version 1 Published in 2014 and Version 2 upcoming in 2017
## IW-EPD: 72 Mixture Designs

### Normal Weight Agg.
- 2500 psi
- 3000 psi
- 4000 psi
- 5000 psi
- 6000 psi
- 8000 psi

### Light-Weight Agg.
- 3000 psi
- 4000 psi
- 5000 psi

### SCMs
- <20% Fly Ash and/or Slag
- 20-29% Fly Ash
- 30-39% Fly Ash
- 40-49% Fly Ash
- 30-39% Slag
- 40-49% Slag
- 50% Slag
- ≥ 20% Fly Ash and ≥ 30% Slag

### Admixtures
- <5000 psi w/ A-E admix
- >5000 psi w/o A-E, w/HRWR admix
- All mixes with WR & Accel admix
- LW w/ A-E admix
### Industry-Wide EPD

#### Table 8a. Summary Results (A1-A3): 3001-4000 psi (20.69-27.58 MPa) RMC product, per cubic yard

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<tr>
<th>Indicator/LCI Metric</th>
<th>GWP</th>
<th>ODP</th>
<th>AP</th>
<th>EP</th>
<th>POCP</th>
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<td>Minimum</td>
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<td>5.50E-6</td>
<td>0.75</td>
<td>0.24</td>
<td>15.77</td>
<td>1466</td>
<td>1437</td>
<td>27</td>
<td>1538</td>
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<td>20.54</td>
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<td>1981</td>
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<td>8.00E-6</td>
<td>1.00</td>
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<td>20.54</td>
<td>2020</td>
<td>1981</td>
<td>39</td>
<td>1779</td>
<td>2.33</td>
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</tbody>
</table>
NRMCA EPD Program Operator

• Became an EPD program operator in 2013
  – execute verification of EPDs
  – encourage members to engage disclosure

• Built a network of LCA/EPD partners to expedite the development of LCA reports and verification of EPDs

• Costs* range from $1,250 to $5,000 depending on verification services provided and NRMCA membership status

*Fee covers an EPD for up to 3 plants with up to 30 mix designs per plant.
Product Specific (i.e. Producer) EPDs

• Initiated by the Producer
• 13 ready-mix concrete EPDs
  – NRMCA program
  – Other program
Tracking EPDs (cumulative)

EPDs

70% verified through NRMCA EPD program
Tracking EPD Mix/Product (cumulative)

- 98% verified through NRMCA EPD program
- Expect >3,500 Verified EPDs by 2020

<table>
<thead>
<tr>
<th>Year</th>
<th>Mixes</th>
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<tr>
<td>2013</td>
<td>1489</td>
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<td>2014</td>
<td>1863</td>
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<td>2015</td>
<td>2048</td>
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<tr>
<td>2016</td>
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+ 300
Industry Baselines/Averages

Average Impacts
- 2500 psi
- 3000 psi
- 4000 psi
- 5000 psi
- 6000 psi
- 8000 psi
Compare to Benchmark Report
Tools for Developing LCA Reports & Draft EPDs for Verification

• Athena
  – A web-based tool for instant, custom environmental footprint data

• Climate Earth
  – Links production software with environmental impact data

• WBCSD CSI* tool
  – online calculation tool
    • PCA / Quantis

*World Business Council for Sustainable Development’s Cement Sustainability Initiative
“...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 (CO$_2$e) as compared to NRMCA Benchmarks for Northwest Region.
EPDs for Transportation Projects

The Next Challenge...
Pavement EPD/LCA: Implementation Strategies

1) Incorporate into matls/const specifications.
2) Incorporate into design optimization.
3) Utilize in pavement type selection process.
4) Use as part of asset management decisions.
5) Make integral to green rating system(s).
6) Assess effectiveness of recycling program.
7) Report adherence to legislative mandate.
Green Rating Systems: Roads and Highways
Thank You

?? Questions ??

PAVE AHEAD
DURABLE. SUSTAINABLE. CONCRETE.

BUILD WITH STRENGTH
A COALITION OF THE NATIONAL READY MIXED CONCRETE ASSOCIATION