Environmental Product Declaration

NRMCA
NATIONAL READY MIXED CONCRETE ASSOCIATION

A cradle-to-gate EPD of five cement products according to ISO 14025 and ISO 21930

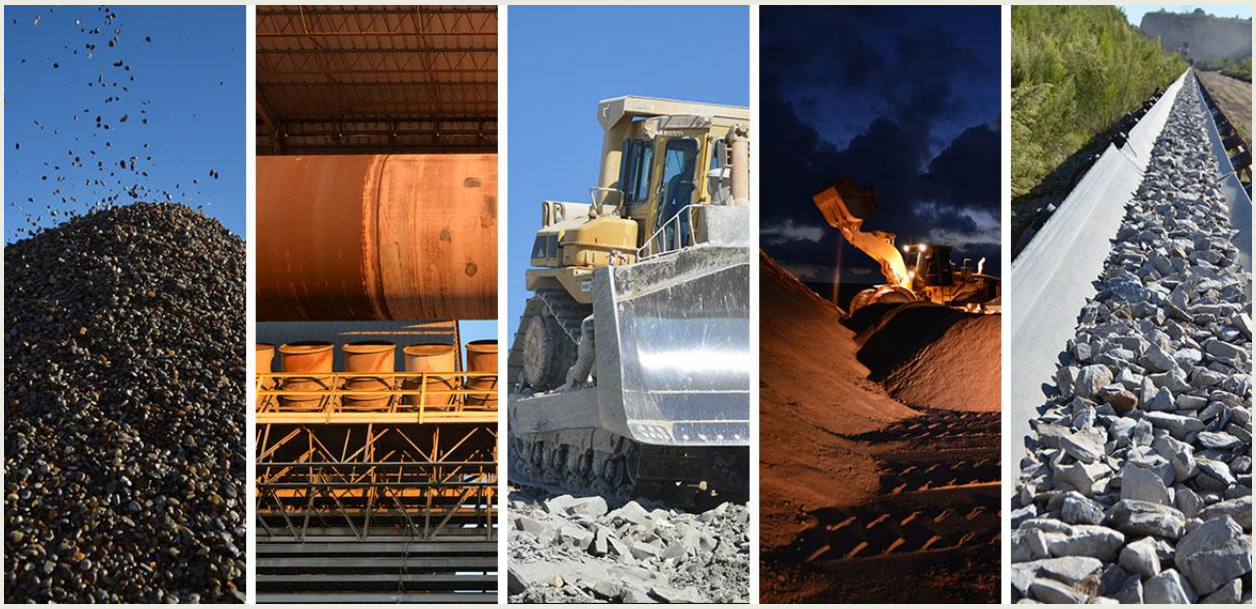
■ Type I ■ Type III ■ EcoMent Endure ® ■ EcoMent Spec ® ■ Type N&S

CAPITOL AGGREGATES INC

NRMCA Certified Environmental Product Declaration

This is a business-to-business Type III environmental product declaration for cement products as manufactured by Capitol Aggregates Inc. in San Antonio, Texas. This declaration has been prepared in accordance with ISO 14025 and ISO 21930, the cement category rules and NRMCA EPD Program Operator Instructions.

The intent of this document is to further the development of environmentally compatible and more sustainable construction products by providing comprehensive environmental information related to potential impacts of cement available in the USA in accordance with international standards.



About Capitol Aggregates Inc.

With its humble beginnings as a sand and gravel producer in Austin, Texas, Capitol Aggregates has grown into a strong regional supplier of construction materials. With the ability to produce a wide variety of aggregates and cement, Capitol Aggregates truly has been A Texas Tradition since 1957.

Our long, rich history has been made possible by dedicated, hard working people committed to doing great things together. Located across South, Central, and West Texas, Capitol Aggregates is poised to serve your material needs. Whether large or small, our highly competent team of dedicated professionals is ready to assist you with developing a customized solution to meet your material requirements.

NRMCA Certified Environmental Product Declaration

This environmental product declaration was conducted in accordance with ISO 14025:2006
☐ Internal Verification ☒ External Verification

Declared Product:	This is a business-to-business Type III environmental product declaration for five cement products manufactured by Capitol Aggregates Inc. in San Antonio, Texas.
Declaration Owner:	Capitol Aggregates Inc. 1-800-292-5315 http://www.capitolaggregates.com
Program Operator:	**National Ready Mix Concrete Association** 301-587-1400 www.nrmca.org/sustainability Lionel Lemay
LCA and EPD Developer:	**Athena Sustainable Materials Institute** 613-729-9996 www.athenaasmi.org Matt Bowick
Independent Verifier:	**Sustainable Solutions Corporation** (610) 248-8224 www.sustainablesolutionscorporation.com Tad Radzinski
Product Category Rule:	ASTM International, Product Category Rules For Preparing an Environmental Product Declaration For Portland, Blended Hydraulic, Masonry, Mortar, and Plastic (Stucco) Cements.
Date of Issue:	December 10, 2015
Period of Validity:	5 Years (until December 10, 2020)
EPD Number	NRMCAEPD:10008

1. PRODUCT IDENTIFICATION

This EPD reports environmental information for the five cement products noted in Table 1, produced by Capitol Aggregates Inc. at their facility in San Antonio, Texas – see Figure1for a visual representation of typical cement.

Table 1: Capitol Aggregates Cement Products

Product Name	Product Description	Product Code	Type
Type I	ASTM C 150 Type I	026-071-000	Portland Cement
Type III	ASTM C 150 Type III	030-071-000	Portland Cement
EcoMent Endure ®	ASTM C 595 Type IP (25)	031-071-000	Blended Hydraulic Cement
EcoMent Spec ®	ASTM C 595 Type IL (15)	045-071-000	Blended Hydraulic Cement
Type N & S	ASTM C 91 Type N ASTM C 91 Type S	034-071-000 024-071-000	Masonry Cement

Figure 1: Portland Cement

Applicable product standards for portland, blended hydraulic, and masonry cements (UN CPC 3744) include:

Portland Cement

- ASTM C150 – Standard Specification for Portland Cement
- ASTM C1157 – Standard Performance Specification for Hydraulic Cement
- AASHTO M 85 – Standard Specification for Portland Cement (Chemical and Physical)
- CSA A3001 – Cementitious Materials for Use in Concrete

Blended Hydraulic Cement

- ASTM C595 – Standard Specification for Blended Hydraulic Cements
- ASTM C1157 – Standard Performance Specification for Hydraulic Cement
- AASHTO M 240 – Standard Specification for Blended Hydraulic Cement
- CSA A3001 – Cementitious Materials for Use in Concrete

Masonry Cement

- ASTM C91 – Standard Specification for Masonry Cement
- CSA A3002 – Masonry and Mortar Cement

Cements are primarily used as binding agents in concrete and mortar, or used for other purposes such as engineered soils, fiber cement board, and solidification/stabilization of contaminated materials and wastes. Table 2 summarizes the intended applications for the five products.

Table 2: Cement Product Applications

Cement Type	Product Application
Type I	For use in concrete when the special properties specified for any other type are not required.
Type III	For use when high early-strength concrete is desired.
EcoMent Endure ® (Type IP)(HS)	Capitol EcoMent Endure® Cement can be used to make concrete either in ready mix, volumetric, or concrete products manufacturing operations. General construction elements and structural components can be produced as well. Approved for use in High Sulfate mitigation applications.
EcoMent Spec ® (Type IL)	Capitol EcoMent Spec® Cement can be used to make concrete either in ready mix, volumetric, or concrete products manufacturing operations. General construction elements and structural components can be produced as well.
Type N & S	**Type N**: For use in Type N mortar without further addition of cements or hydrated lime, or Type S or Type M mortar when cement is added. **Type S**: For use in Type S mortar without further addition of cements or hydrated lime.

2. DECLARED UNIT

The declared unit is 1 metric ton of cement. Data is additionally presented per short ton.

3. REFERENCE SERVICE LIFE

The reference service life of cement is dependent on its end-use and therefore not declared herein.

4. MATERIAL CONTENT

Table 2 below presents the average material content by input material for the five cement products, as derived from the facility LCI data for the year 2014.

Table 3: Average Material Content of Cement Products, kg/metric ton (lbs/short ton)

Material Inputs	Type I	Type III	EcoMent Endure	EcoMent Spec	Type N & S
Clinker	915 (1,829)	884 (1,769)	650 (1,301)	797 (1,594)	613 (1,226)
Limestone	5 (10)	-	-	135 (269)	369 (738)
Gypsum, natural	32 (63)	54 (107)	19 (37)	22 (44)	8 (15)
Gypsum, synthetic	41 (82)	62 (124)	52 (105)	46 (92)	11 (22)
Fly ash	-	-	279 (558)	-	-
Slag Cement (GGBFS)	8 (16)	-	-	-	-

5. SYSTEM BOUNDARY

As per the ASTM PCR for cement, the system boundary is the product stage, which includes the following modules:

A1 Raw material supply;
A2 Transport (to the manufacturer); and
A3 Manufacturing.

Figure 2 shows the production stage system boundary for cement.

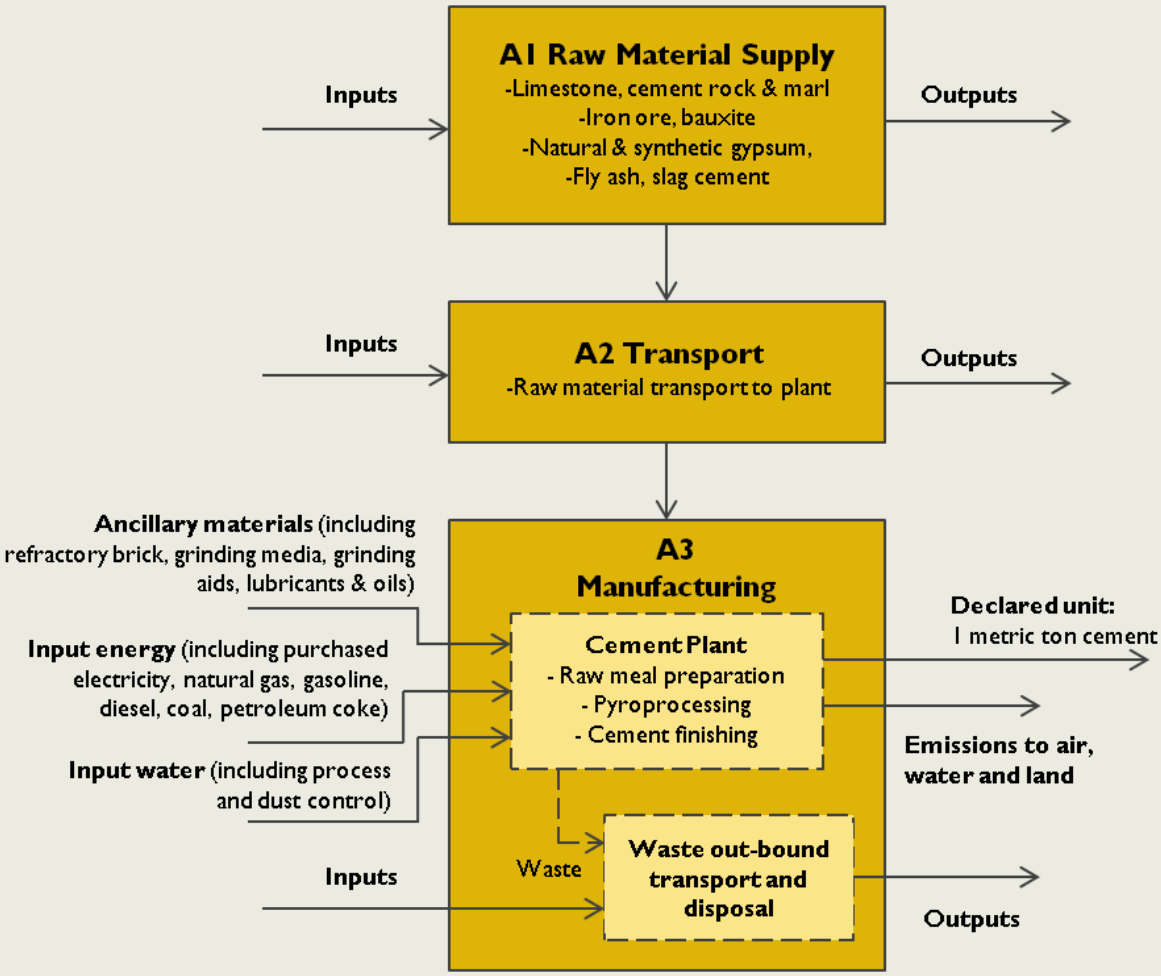


Figure 2: Product Stage (module A1 to A3) System Boundary

6. LIFE CYCLE INVENTORY

6.1. PRIMARY LCI DATA

Data collection was based on a survey of Capitol Aggregate's cement production facility operations. The following primary data was obtained for the 2014 calendar year:

- Clinker and finished cement raw material inputs;
- Cement production amounts;
- Inbound transportation distances and modes for raw materials, fuels, and ancillary materials;
- Ancillary material use and water use;

- Electricity and fuel consumption;
- Process air emissions;
- Waste outputs and outbound transportation distances and modes.

Calcination carbon dioxide emissions from clinker production (pyroprocessing) were calculated according to IPCC best-practice methodology.

6.2. SECONDARY LCI DATA

See Table 4 for a summary of secondary LCI data sources used to complete a production stage LCA model for the five cement products.

Table 4: Secondary LCI Data Sources Summary

Item	Source
A1 - Raw Material Supply	
Limestone, cement rock/marl, bauxite	US LCI database
Iron ore	Ecoinvent 3.1 database
Natural & synthetic gypsum, slag cement	Athena LCI database
A2 - Transport	
Truck (diesel) & rail (diesel)	US LCI database
A3 - Manufacturing	
Ancillary materials, including refractory brick, grinding media & aids, cement bags, oils, greases & hydraulic fluids	Ecoinvent 3.1 database
Purchased Electricity	Athena LCI database
Bituminous coal, gasoline, diesel, natural gas, petroleum coke combustion	US LCI database
Water discharges & emissions	MIT Concrete Sustainability Hub (CSHub)
Outbound waste transport (truck, diesel)	US LCI database
Non-hazardous waste to landfill	Ecoinvent 3.1 database

6.3. Cut-off and Allocation

With the exception of filter bags, all input/output flow data reported by the facility were included in the LCI modelling.

Allocation procedures observed the requirements and guidance of ISO 14044:2006, clause 4.3. and those specified in ASTM PCR for cement, Section 7.5. Cement plant LCI environmental flows (inputs and outputs) were allocated according to mass of finished cement or mass of clinker in finished cement, as appropriate.

6.4. Data Quality

Data quality requirements, as specified in ASTM cement PCR: 2014, Section 7.3, were observed. This section describes the achieved data quality relative to the ISO 14044:2006 requirements.

Precision: Capitol Aggregates, through measurement and calculation, collected primary data on their production of cement. For accuracy the LCA team individually validated these plant gate-to-gate input and output data.

Completeness: All relevant, specific processes, including inputs and outputs were considered and modeled in SimaPro software v.8.0.4, October 2015.

Consistency: System boundaries, and allocation and cut-off rules have been uniformly applied across the product life cycles and the five cement products. The study predominantly relies on two sources of secondary data (US LCI and Ecoinvent databases); adjustments were uniformly applied to all US LCI electricity, fuel, and transport processes. Crosschecks concerning the plausibility of mass and energy flows were continuously conducted.

Reproducibility: Internal reproducibility is possible since the data and the models are stored and available in Athena LCI database developed in SimaPro, 2015. A high level of transparency is provided throughout the supporting LCA report as the LCI profile is presented for the declared product. Key secondary (generic) LCI data sources are summarized in the LCA report.

Representativeness: The representativeness of the data is summarized as follows:

- Time related coverage: *primary* collected data for the cement manufacturing process: 2014; all *secondary* data has been validated within the past 7 years.
- Geographical coverage: the geographical coverage is the state of Texas.

- Technological coverage: typical or average. Cement plant is representative of a contemporary technology (long dry process) in use in the US.

7. LIFE CYCLE ASSESSMENT

This section summarizes the results of the life cycle impact assessment (LCIA) based on the cradle-to-gate life cycle inventory inputs and outputs analysis. The results are calculated on the basis of one metric ton of cement (Tables 5-9), but are also provided for one short ton (2000 lbs.) of cement (Tables 10-14). The cement production results are delineated by information modules A1 through A3.

As per ASTM PCR for cement, Section 8, US EPA Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI, version 2.1) impact categories are used as they provide a North American context for the mandatory category indicators to be included in this EPD. These are relative expressions only and do not predict category impact end-points, the exceeding of thresholds, safety margins or risks. Total primary and sub-set energy consumption was compiled using a cumulative energy demand model. Material resource consumption and generated waste reflect cumulative life cycle inventory flow information.

Table 5: LCA results – Type I , per metric ton cement

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufac-turing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO_2 eq.	15	2	952	969
Acidification potential	kg SO_2 eq.	0.13	0.02	3.73	3.88
Eutrophication potential	kg N eq.	0.003	0.001	0.051	0.054
Smog creation potential	kg O_3 eq.	0.8	0.5	24.5	25.8
Ozone depletion potential	kg CFC-11 eq.	1.41E-07	1.14E-10	1.04E-05	1.06E-05
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	248	31	6,016	6,295
Non-renewable nuclear	MJ (HHV)	12	0	184	196
Renewable (non-biomass)	MJ (HHV)	2.8	0.1	53.2	56.1
Renewable (biomass)	MJ (HHV)	0.153	0.000	0.805	0.958
Material resources consumption					
Non-renewable material resources	kg	1,541	0	0	1,542
Renewable material resources	kg	0.000	0.000	0.036	0.037
Net fresh water	l	5	0	399	404
Waste generated					
Non-hazardous waste generated	kg	0.5	0.0	9.7	10.2
Hazardous waste generated	kg	0.000	0.000	0.044	0.043

Table 6: LCA results – Type III , per metric ton cement

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufac-turing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO_2 eq.	17	2	939	958
Acidification potential	kg SO_2 eq.	0.13	0.02	3.75	3.90
Eutrophication potential	kg N eq.	0.002	0.001	0.051	0.054
Smog creation potential	kg O_3 eq.	0.7	0.6	24.7	26.0
Ozone depletion potential	kg CFC-11 eq.	8.86E-09	1.11E-10	1.05E-05	1.05E-05
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	278	31	6,055	6,363
Non-renewable nuclear	MJ (HHV)	8	0	185	193
Renewable (non-biomass)	MJ (HHV)	2.3	0.1	53.3	55.7
Renewable (biomass)	MJ (HHV)	0.015	0.000	0.190	0.205
Material resources consumption					
Non-renewable material resources	kg	1,477	0	0	1,477
Renewable material resources	kg	0.001	0.000	0.007	0.008
Net fresh water	l	8	0	384	392
Waste generated					
Non-hazardous waste generated	kg	0.5	0.0	9.7	10.2
Hazardous waste generated	kg	0.000	0.000	0.044	0.043

Table 7: LCA results – EcoMent Endure, per metric ton cement

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufac-turing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO_2 eq.	13	5	807	825
Acidification potential	kg SO_2 eq.	0.10	0.03	3.66	3.79
Eutrophication potential	kg N eq.	0.001	0.002	0.050	0.053
Smog creation potential	kg O_3 eq.	0.5	0.9	24.4	25.8
Ozone depletion potential	kg CFC-11 eq.	5.38E-09	2.39E-10	1.04E-05	1.04E-05
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	215	66	5,878	6,159
Non-renewable nuclear	MJ (HHV)	6	1	238	245
Renewable (non-biomass)	MJ (HHV)	1.7	0.1	61.3	63.1
Renewable (biomass)	MJ (HHV)	0.005	0.000	0.180	0.185
Material resources consumption					
Non-renewable material resources	kg	1,087	0	0	1,087
Renewable material resources	kg	0.000	0.000	0.007	0.007
Net fresh water	l	3	0	293	296
Waste generated					
Non-hazardous waste generated	kg	0.4	0.0	8.2	8.6
Hazardous waste generated	kg	0.000	0.000	0.044	0.043

Table 8: LCA results – EcoMent Spec, per metric ton cement

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufac-turing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO_2 eq.	14	1	913	929
Acidification potential	kg SO_2 eq.	0.11	0.01	3.91	4.03
Eutrophication potential	kg N eq.	0.002	0.001	0.055	0.058
Smog creation potential	kg O_3 eq.	0.6	0.3	25.8	26.7
Ozone depletion potential	kg CFC-11 eq.	7.05E-09	7.26E-11	1.14E-05	1.14E-05
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	235	20	6,327	6,582
Non-renewable nuclear	MJ (HHV)	8	0	195	203
Renewable (non-biomass)	MJ (HHV)	2.2	0.0	56.6	58.9
Renewable (biomass)	MJ (HHV)	0.006	0.000	0.767	0.774
Material resources consumption					
Non-renewable material resources	kg	1,466	0	1	1,467
Renewable material resources	kg	0.000	0.000	0.030	0.030
Net fresh water	l	4	0	380	383
Waste generated					
Non-hazardous waste generated	kg	0.5	0.0	10.1	10.5
Hazardous waste generated	kg	0.000	0.000	0.044	0.043

Table 9: LCA results – Type N & S, per metric ton cement

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufac-turing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO_2 eq.	9	1	771	782
Acidification potential	kg SO_2 eq.	0.07	0.01	3.54	3.62
Eutrophication potential	kg N eq.	0.001	0.000	0.059	0.060
Smog creation potential	kg O_3 eq.	0.4	0.2	23.7	24.3
Ozone depletion potential	kg CFC-11 eq.	5.88E-09	4.24E-11	1.16E-05	1.16E-05
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	149	12	5,775	5,935
Non-renewable nuclear	MJ (HHV)	7	0	186	193
Renewable (non-biomass)	MJ (HHV)	2.0	0.0	55.3	57.3
Renewable (biomass)	MJ (HHV)	0.002	0.000	136.844	136.846
Material resources consumption					
Non-renewable material resources	kg	1,393	0	2	1,395
Renewable material resources	kg	0.000	0.000	6.546	6.546
Net fresh water	l	1	0	517	518
Waste generated					
Non-hazardous waste generated	kg	0.4	0.0	9.0	9.4
Hazardous waste generated	kg	0.000	0.000	0.044	0.043

Table 10: LCA results – Type I, per short ton cement

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufac-turing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO_2 eq.	14	2	863	879
Acidification potential	kg SO_2 eq.	0.12	0.02	3.38	3.52
Eutrophication potential	kg N eq.	0.003	0.001	0.046	0.049
Smog creation potential	kg O_3 eq.	0.7	0.5	22.2	23.4
Ozone depletion potential	kg CFC-11 eq.	1.28E-07	1.04E-10	9.48E-06	9.61E-06
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	225	29	5,457	5,711
Non-renewable nuclear	MJ (HHV)	11	0	167	178
Renewable (non-biomass)	MJ (HHV)	2.5	0.1	48.3	50.9
Renewable (biomass)	MJ (HHV)	0.139	0.000	0.730	0.869
Material resources consumption					
Non-renewable material resources	kg	1,398	0	0	1,399
Renewable material resources	kg	0.000	0.000	0.033	0.033
Net fresh water	l	5	0	362	367
Waste generated					
Non-hazardous waste generated	kg	0.4	0.0	8.8	9.2
Hazardous waste generated	kg	0.000	0.000	0.039	0.039

Table 11: LCA results – Type III, per short ton cement

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufac-turing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO_2 eq.	15	2	852	869
Acidification potential	kg SO_2 eq.	0.12	0.02	3.40	3.54
Eutrophication potential	kg N eq.	0.002	0.001	0.046	0.049
Smog creation potential	kg O_3 eq.	0.6	0.5	22.4	23.5
Ozone depletion potential	kg CFC-11 eq.	8.04E-09	1.01E-10	9.52E-06	9.52E-06
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	252	28	5,493	5,772
Non-renewable nuclear	MJ (HHV)	8	0	168	175
Renewable (non-biomass)	MJ (HHV)	2.1	0.1	48.3	50.5
Renewable (biomass)	MJ (HHV)	0.014	0.000	0.173	0.186
Material resources consumption					
Non-renewable material resources	kg	1,340	0	0	1,340
Renewable material resources	kg	0.000	0.000	0.007	0.007
Net fresh water	l	8	0	348	356
Waste generated					
Non-hazardous waste generated	kg	0.4	0.0	8.8	9.3
Hazardous waste generated	kg	0.000	0.000	0.039	0.039

Table 12: LCA results – EcoMent Endure, per short ton cement

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufac-turing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO_2 eq.	12	4	732	748
Acidification potential	kg SO_2 eq.	0.09	0.03	3.32	3.44
Eutrophication potential	kg N eq.	0.001	0.002	0.045	0.048
Smog creation potential	kg O_3 eq.	0.4	0.8	22.2	23.4
Ozone depletion potential	kg CFC-11 eq.	4.88E-09	2.17E-10	9.42E-06	9.42E-06
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	195	60	5,333	5,587
Non-renewable nuclear	MJ (HHV)	6	0	216	222
Renewable (non-biomass)	MJ (HHV)	1.5	0.1	55.6	57.2
Renewable (biomass)	MJ (HHV)	0.005	0.000	0.163	0.168
Material resources consumption					
Non-renewable material resources	kg	986	0	0	986
Renewable material resources	kg	0.000	0.000	0.006	0.007
Net fresh water	l	3	0	266	268
Waste generated					
Non-hazardous waste generated	kg	0.3	0.0	7.5	7.8
Hazardous waste generated	kg	0.000	0.000	0.039	0.039

Table 13: LCA results – EcoMent Spec, per short ton cement

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufac-turing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO_2 eq.	13	1	829	843
Acidification potential	kg SO_2 eq.	0.10	0.01	3.54	3.65
Eutrophication potential	kg N eq.	0.001	0.001	0.050	0.052
Smog creation potential	kg O_3 eq.	0.5	0.3	23.4	24.2
Ozone depletion potential	kg CFC-11 eq.	6.40E-09	6.59E-11	1.04E-05	1.04E-05
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	214	18	5,740	5,971
Non-renewable nuclear	MJ (HHV)	7	0	177	185
Renewable (non-biomass)	MJ (HHV)	2.0	0.0	51.4	53.4
Renewable (biomass)	MJ (HHV)	0.006	0.000	0.696	0.702
Material resources consumption					
Non-renewable material resources	kg	1,330	0	1	1,331
Renewable material resources	kg	0.000	0.000	0.027	0.027
Net fresh water	l	3	0	345	348
Waste generated					
Non-hazardous waste generated	kg	0.4	0.0	9.1	9.6
Hazardous waste generated	kg	0.000	0.000	0.039	0.039

Table 14: LCA results – Type N & S , per short ton cement

Environmental Indicator	Unit	A1 Raw Material Supply	A2 Transport	A3 Manufac-turing	Total
TRACI 2.1 impact categories					
Global warming potential	kg CO_2 eq.	8	1	700	709
Acidification potential	kg SO_2 eq.	0.06	0.01	3.21	3.28
Eutrophication potential	kg N eq.	0.001	0.000	0.053	0.055
Smog creation potential	kg O_3 eq.	0.4	0.2	21.5	22.1
Ozone depletion potential	kg CFC-11 eq.	5.33E-09	3.85E-11	1.05E-05	1.05E-05
Total primary energy consumption					
Non-renewable fossil	MJ (HHV)	135	11	5,239	5,385
Non-renewable nuclear	MJ (HHV)	6	0	168	175
Renewable (non-biomass)	MJ (HHV)	1.8	0.0	50.2	52.0
Renewable (biomass)	MJ (HHV)	0.002	0.000	124.142	124.145
Material resources consumption					
Non-renewable material resources	kg	1,264	0	2	1,266
Renewable material resources	kg	0.000	0.000	5.939	5.939
Net fresh water	l	l	0	469	470
Waste generated					
Non-hazardous waste generated	kg	0.4	0.0	8.2	8.6
Hazardous waste generated	kg	0.000	0.000	0.039	0.039

8. ADDITIONAL ENVIRONMENTAL INFORMATION

8.1. ENVIRONMENTAL INDICATORS

Table 15 reports two additional environmental indicators:

- *Recovered materials* sums the mass of recovered materials used in the cement formulations (i.e. the mass after processing has occurred);
- *Respiratory effects* is a TRACI 2.1 impact category.

Table 15: Additional Cradle-to-gate Environmental Indicator Results

Environmental Indicator	Unit	Type I	Type III	EcoMent Endure	EcoMent Spec	Type N & S
Recovered materials	kg	49	62	331	46	11
Respiratory effects	kg PM2.5 eq.	0.598	0.744	0.495	0.548	0.417

8.2. CAPITOL SKYMINE

The SkyMine® process is a technology patented by Skyonic Corporation (http://skyonic.com/) that removes carbon dioxide and other emissions from industrial waste streams.

The first SkyMine® facility opened October 2014 at the Capitol Aggregates cement plant; it is expected to capture 75,000 tons annually of CO_2 and also remove mercury, metals, sulfur dioxide, nitrogen oxides and particulates from flue emissions. Capitol SkyMine draws on the captured emissions to produce the commercially saleable products hydrochloric acid, baking soda (sodium bicarbonate) and bleach.

9. DECLARATION TYPE

The type of EPD based on the EPD project report is defined as "cradle-to-gate" EPD of cement covering the product stage (modules A1 to A3) and is intended for use in Business-to-Business communication.

10. DECLARATION COMPARABILITY LIMITATION STATEMENT

The following ISO statement indicates the EPD comparability limitations and intent to avoid any market distortions or misinterpretation of EPDs based on the ASTM's Cement PCR: 2014:

- EPDs from different programs (using different PCR) may not be comparable.
- Declarations based on the ASTM Cement PCR are not comparative assertions; that is, no claim of environmental superiority may be inferred or implied.

11. REFERENCES

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NRMCA Program Operator Instructions For Environmental Product Declarations, November 2013.

MIT CSHub, Variation in the Life Cycle Inventory of Portland Cement Production in the US, 2010.

Marceau, M., Nisbet, M, & VanGeem, M. (2010). Life Cycle Inventory of Portland Cement Manufacture. Portland Cement Association R&D Serial No. SN2095b.02. Original 2006, revised 2010.