Environmental Product Declaration

Angelus Block Concrete Masonry Units

Company information
Product description
Declared unit
Life cycle assessment
Data sources and quality
Product components
Impact assessment methods

EPD impacts per m^3 of concrete mix
EPD impacts per CMU

References

Angelus
BLOCK CO., INC.
Since 1946

Environmental Product Declaration

Angelus Block Concrete Masonry Units

Company information

Founded in 1946, Angelus Block is California's leading producer of concrete masonry units, interlocking concrete pavers, permeable pavers, decorative site wall units, and segmental planter wall units.

Headquarters
11374 Tuxford St
Sun Valley, CA 91352
(818) 767-8576

Fontana Plant (FO)
14515 Whittram Ave
Fontana, CA 92335
(909) 350-0244

Tuxford Plant (TX)
11374 Tuxford St
Sun Valley, CA 91352
(818) 767-8576

Gardena Plant (RB)
252 E Redondo Beach Blvd
Gardena, CA 90248
(310) 323-8841

Sheldon Plant (SH)
11740 Sheldon St
Sun Valley, CA 91352
(818) 768-0315

Oxnard Plant (VT)
4575 E Vineyard Ave
Oxnard, CA 93036
(805) 485-1137

Orange Plant (OC)
1705 N Main St
Orange, CA 92865
(714) 637-8594

Indio Plant (CV)
88-100 Fargo Canyon Rd
Indio, CA 92202
(760) 347-3245

Product description

This Environmental Product Declaration (EPD) reports the impacts of concrete masonry unit (CMU) products:

- ASTM C90 Load Bearing Concrete Masonry Units
- CSI Specification Section 04 22 00 Concrete Unit Masonry
- UNSPSC:
  - 30131502 Concrete blocks
  - 30131507 Light concrete blocks

Declared unit

The declared unit is **1 m³ of concrete mix** formed into CMUs. Impacts are also reported per 8″×8″×16″ standard CMU with 50% voids.

Declared Product
This Environmental Product Declaration (EPD) covers 69 concrete masonry unit (CMU) products produced at seven plants owned and operated by Angelus Block.

Declaration Owner
Angelus Block Co., Inc. ▪ http://www.angelusblock.com

LCA and EPD Developer
Rick Betita ▪ rick@climateearth.com
Climate Earth, Inc. ▪ http://www.climateearth.com

Product Category Rule
The Carbon Leadership Forum PCR: *North American Product Category Rules (PCR) for ISO 14025 Type III Environmental Product Declarations (EPDs) and GHG Protocol Compliant Product 'Carbon Footprint' of Concrete*, Version 1.0 dated 11/30/2012, serves as the PCR for this EPD. http://www.carbonleadershipforum.org (Carbon Leadership Forum 2012a)

[Note: This EPD is based on the CLF Concrete PCR since no CMU-specific PCR exists. When a PCR for CMU becomes available, the LCA will be updated and this EPD will be reissued to be in compliance with the new PCR.]

Verification
Independent verification of the declaration, according to ISO 14025:2006: ☒ internal ☐ external

Date of Issue and Period of Validity
Issued November 12, 2013 and valid for 5 years until November 12, 2018.

Life cycle assessment

A summary of the life cycle processes included in the EPD is as follows:

1. Raw material supply (upstream processes): Extraction, handling, and processing of the raw materials used in production of concrete: cement, supplementary cementitious materials, aggregate (coarse and fine), water, admixtures, and other materials or chemicals used in concrete mixtures.
2. Transportation: Transportation of these materials from supplier to the 'gate' of the concrete producer.
3. Manufacturing (core processes): Energy used to store, batch, mix, and distribute the concrete within the plant and form, cure, and handle the concrete product.
4. Water use in mixing, forming, and handling for production of concrete product.

A summary of processes excluded from the EPD is as follows:

1. Production, manufacture, and construction of buildings, capital goods, and infrastructure.
2. Production and manufacture of concrete production equipment, concrete delivery vehicles, earthmoving equipment, and laboratory equipment.
3. Personnel-related activities (travel, furniture, office supplies).
4. Energy and water use related to company management and sales activities.
5. Water use in upstream manufacturing processes and in installation of CMU. Better data and methodology is required to track and report these numbers.

A summary of limitations of this EPD include:

1. This EPD does not report all of the environmental impacts due to manufacturing of the product, but rather environmental impacts for categories with established LCA-based methods to track and report. Unreported environmental impacts include (but are not limited to) factors attributable to human health, land use change, water use in the upstream manufacturing process, and habitat destruction.
2. This EPD reports the results of an LCA for 'cradle-to-gate' analysis and thus declarations are not comparative assertions. A comparative assertion is an environmental claim regarding the superiority or equivalence of one product versus a competing product that performs the same function. An EPD does not make any statements that the product covered by the EPD is better or worse than any other product.
3. In order to assess the local impacts of the product manufacturing, additional analysis is required.
4. Life cycle impact assessment (LCIA) results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins, or risks.

Note: The product manufacturer has the option of declaring additional information about their product including conformance with any other sustainability certification programs that often have performance and prescriptive requirements that aim to capture environmental best practices that cannot be captured by LCA.

EPDs of concrete products may not be comparable if they do not comply with this standard and data from this EPD. The data cannot be used to compare between different concrete systems unless the data is integrated into a comprehensive LCA.

Data sources and quality

This EPD was created using plant-specific data for upstream materials. Potential variations due to supplier locations, manufacturing processes, and efficiencies and fuel use are thus accounted for in this EPD.

This section provides the sources of data used to compute the upstream material life cycle inventory (LCI) in this study, accompanied by qualitative data quality assessments using the five indicators outlined in the "Product Life Cycle Accounting and Reporting Standard" (GHG Protocol 2011). Data quality is rated "very good", "good", "fair", or "poor" for each indicator.

Most LCI data comes from two databases: USLCI (NREL 2012) and Ecoinvent v2.2 (Ecoinvent Centre 2007). Processes from the USLCI database, the preferred LCI database per the PCR, are geographically relevant; however, many do not have sufficient documentation for an assessment of completeness and provide the disclaimer: "although most of the data in the US LCI database has undergone some sort of review, the database as a whole has not yet undergone a formal validation process." For these processes, data quality is rated "very good" for geography and "poor" for reliability (no formal validation process). The following sources of data were used in developing the upstream material LCI for this EPD:

Process (unit)	LCI data source	Data quality assessment
	Material processes	
Portland cement (lb)	• **name:** Portland cement, at plant • **database:** USLCI • **geography:** USA • **year:** 2002	• **technology:** *good* – Process uses national average of four cement plant processes: wet, long dry, preheater, and precalciner. • **time:** *fair* – Data is within ten years. • **geography:** *very good* • **completeness:** *very good* – Process includes quarry and crush, raw meal preparation, pyroprocess, finish grind, transportation of materials and fuels to the cement plant, and combustion of fuel in the cement kin. • **reliability:** *good* – Data based on surveys and emission factors; verified by mass balance.
Natural aggregate (lb)	• **name:** Gravel, round, at mine • **database:** Ecoinvent 2.2 • **geography:** Switzerland • **year:** 2001	• **technology:** *good* – Process represents mining of aggregate. • **time:** *poor* – Data is older than ten years. • **geography:** *fair* – Process models Swiss production (no US data in USLCI). • **completeness:** *very good* – Process includes the whole manufacturing process, internal processes (transport), and infrastructure. • **reliability:** *good* – Data is verified by Ecoinvent.
Plasiticizing admixture (oz)	• **name:** 324 Plasticiser EPD • **reference:** (EFCA 2006) • **geography:** Europe • **year:** 2006	• **technology:** *very good* – EPD represents manufacture of chemical admixtures for concrete. • **time:** *fair* – Data is within ten years. • **geography:** *good* – EPD models European production (no US process in USLCI). • **completeness:** *good* – LCI data includes substances that contribute more than 1% of environmental impact for selected impact categories, amounting to 90-95% of the environmental impact in any category. • **reliability:** *good* – "Eco-profile" is not an ISO-compliant EPD, but data has been verified by INTRON, an independent consultancy from the Netherlands.
Recycled aggregate (lb)	• **name:** Recycled aggregate • **reference:** company source data • **geography:** Southern California • **year:** 2012	• **technology:** *fair* – Energy used to run the crusher is modeled as a percentage of total plant energy. • **time:** *very good* – Data is based on 2012 data. • **geography:** *very good* – Data is based on Angelus Block manufacturing plants. • **completeness:** *fair* – Data includes approximated energy use of the crusher but excludes transportation of material by customers from the jobsite to the crusher. • **reliability:** *fair* – Non-verified data based on a qualified estimate by an expert within the company.
Sand (lb)	• **name:** Sand, at mine • **database:** Ecoinvent 2.2 • **geography:** Switzerland • **year:** 2001	• **technology:** *good* – Process represents mining of sand. • **time:** *poor* – Data is older than ten years. • **geography:** *fair* – Process models Swiss production (no US data in USLCI). • **completeness:** *very good* – Process includes the whole manufacturing process, internal processes (transport), and infrastructure. • **reliability:** *good* – Data is verified by Ecoinvent.
Pumice (lb)	• **name:** Pumice, at mine • **database:** Ecoinvent 2.2 • **geography:** Denmark • **year:** 2000	• **technology:** *fair* – Process represents pumice mining based on proxy data from limestone, bentonite, sand, and bauxite mining processes. • **time:** *poor* – Data is older than ten years. • **geography:** *fair* – Process models Danish production (no US data in USLCI). • **completeness:** *good* – Process includes excavation by digger, transportation within mine, washing, land use of the mine recultivation, and dust emisions. • **reliability:** *fair* – Data is verified by Ecoinvent, using some proxy data.
Expanded clay (lb)	• **name:** Expanded clay, at plant • **database:** Ecoinvent 2.2 • **geography:** Denmark • **year:** 2000	• **technology:** *good* – Expanded clay is used to represent Ridgelite 1/4-in. • **time:** *poor* – Data is older than ten years. • **geography:** *fair* – Process models Danish production (no US data in USLCI). • **completeness:** *very good* – Process includes raw materials, transport to the finishing plant, energy use (rotary furnace, 1200°C, heavy fuel oil), packaging materials, and infrastructure involved in manufacturing expanded clay. • **reliability:** *fair* – Data is verified by Ecoinvent, using some proxy data.
Limestone (lb)	• **name:** Limestone, at mine • **database:** USLCI • **geography:** US • **year:** 2008	• **technology:** *fair* – Limestone is used to represent calcite. • **time:** *good* – Data is within six years. • **geography:** *very good* • **completeness:** *good* – Process includes limestone blast mining, mechanical crushing, and screening. • **reliability:** *poor* – USLCI database has not undergone a formal validation process.

Process (unit)	LCI data source	Data quality assessment
Batch water (gal)	• **name:** Angelus Block batch water • **reference:** company source data • **geography:** Southern California • **year:** 2012	• **technology:** *good* – Batch water data based on plant annual water consumption allocated to "production" divided by plant production (water use not documented in concrete mix designs). • **time:** *very good*– Data is based on 2012 data. • **geography:** *very good* – Data is based on Angelus Block manufacturing plants. • **completeness:** *very good* – Data includes all water allocated to "production". • **reliability:** *fair* – Data is allocated at the plant level based on company source data but does not account for differences between mix designs.
Pigment (lb)	• **name:** Magnetite, at plant • **database:** Ecoinvent 2.2 • **geography:** Global • **year:** 2007	• **technology:** *good* – Pigments are made of iron oxide, listed as a synonym for magnetite. • **time:** *good* – Data is within six years. • **geography:** *good* – Process models global production (no US data in USLCI). • **completeness:** *poor* – Process includes raw materials consumed and energy for precipitation reaction, filtration, and drying; excludes direct emissions and infrastructure. • **reliability:** *fair* – Data is verified by Ecoinvent, based on rough stoichiometric assumptions: "This dataset is established on estimations and shall not be used in cases where magnetite contributes significantly to the total mass of an inventory."
	Transportation processes	
Truck transport (lb*mi)	• **name:** Transport, single unit truck, diesel powered • **database:** USLCI • **geography:** US • **year:** 2008	• **technology:** *good* – Process represents transportation of goods in a single-unit truck. • **time:** *good* – Data is within six years. • **geography:** *very good* • **completeness:** *good* – Process includes combustion of diesel in a single-unit truck. • **reliability:** *poor* – USLCI database has not undergone a formal validation process.
	Manufacturing processes	
Natural gas (therm)	• **name:** Natural gas, combusted in industrial boiler • **database:** USLCI • **geography:** US • **year:** 2008	• **technology:** *good* – Process represents industrial natural gas combustion. • **time:** *good* – Data is within six years. • **geography:** *very good* • **completeness:** *good* – Process includes direct emissions and transportation via rail, road, and natural gas pipeline (USLCI dummy pipeline process replaced by Ecoinvent data). • **reliability:** *poor* – USLCI database has not undergone a formal validation process.
Electricity (kWh)	• **name:** WECC electricity, at consumer • **reference:** eGRID2012 (with specific resources from USLCI and Ecoinvent) • **geography:** US • **year:** 2009	• **technology:** *good* – Process represents electricity grid mix for the Western Electricity Coordinating Council (WECC). • **time:** *good* – Data is within six years. • **geography:** *good* – Process models electricity grid mix in the western US; data for individual electricity resources are mostly from US, with data on wind and hydro from Europe. • **completeness:** *very good* – Process includes direct and upstream impacts for all electricity resources (coal, natural gas, hydro, solar, etc.) • **reliability:** *good* – Ecoinvent data is verified; USLCI database has not undergone a formal validation process.
Diesel (gal)	• **name:** Diesel, combusted in industrial equipment • **database:** USLCI • **geography:** US • **year:** 2008	• **technology:** *good* – Process represents diesel combustion in industrial applications such as mobile refrigeration units, generators, pumps, and portable well-drilling equipment. • **time:** *good* – Data is within six years. • **geography:** *very good* • **completeness:** *good* – Process includes direct emissions and transportation via rail, road, and crude oil pipeline (USLCI dummy pipeline process replaced by Ecoinvent data). • **reliability:** *poor* – USLCI database has not undergone a formal validation process.
Process water (gal)	• **name:** Angelus Block process water • **reference:** company source data • **geography:** Southern California • **year:** 2012	• **technology:** *good* – Process water data based on plant annual water consumption allocated to "production", "curing", "dust control", and "operating buildings", divided by plant production. • **time:** *very good*– Data is based on 2012 data. • **geography:** *very good* – Data is based on Angelus Block manufacturing plants. • **completeness:** *very good* – Data includes all water allocated to "production", "curing", "dust control", and "operating buildings". • **reliability:** *good* – Data is allocated at the plant level based on company source data.

Environmental Product Declaration

Angelus Block Concrete Masonry Units

Product components

The components of the mixes included in this EPD meet the following standards:

Component	Standard
Portland cement	ASTM C150: Standard Specification for Portland Cement
Aggregates	ASTM C33: Standard Specification for Concrete Aggregates
Lightweight aggregates	ASTM C331: Standard Specification for Lightweight Aggregates for Concrete Masonry Units
Pigments	ASTM C979: Standard for Pigments for Integrally Colored Concrete

Impact assessment methods

Life cycle inventories are characterized into impacts using TRACI 2.1 (2012) and Cumulative Energy Demand (2003) impact assessment methods in SimaPro. Gross Calorific Values (GCVs) are used to calculate total primary energy consumption. Where relevant, global warming potential values calculated from LCI data are replaced by default values provided by the Carbon Leadership Forum (Carbon Leadership Forum 2012b). The impacts of Angelus Block products are reported for the following impact categories:

Impact Category	Unit	Abbreviation
Total primary energy consumption	MJ	TPE
Batch water use	m^3	BWU
Process water use	m^3	PWU
Global warming potential	kg CO_2-eq	GWP
Ozone depletion	kg CFC-11-eq	ODP
Acidification	kg SO_2-eq	AP
Eutrophication	kg N-eq	EP
Photochemical ozone creation/smog	kg O_3-eq	POCP

EPD impacts per m^3 of concrete mix

#	Plant	Mix	psi	TPE	BWU	PWU	GWP	ODP	AP	EP	POCP
1	Tuxford	Normalweight 1900	1900	1435	0.055	0.081	169.6	3.00E-06	1.27	4.35E-02	15.96
2	Tuxford	Normalweight 2800	2800	1568	0.055	0.081	191.0	3.23E-06	1.43	4.72E-02	18.02
3	Tuxford	Normalweight 3750	3750	1696	0.055	0.081	211.7	3.45E-06	1.58	5.07E-02	20.01
4	Tuxford	Mediumweight 1900	1900	1488	0.055	0.081	167.5	2.75E-06	1.24	4.35E-02	16.52
5	Tuxford	Mediumweight 2800	2800	1600	0.055	0.081	185.6	2.95E-06	1.38	4.66E-02	18.25
6	Tuxford	Mediumweight 3750	3750	1736	0.055	0.081	206.1	3.17E-06	1.52	5.07E-02	20.29
7	Tuxford	Mediumweight 1900 w/ Pumice	1900	1649	0.055	0.081	197.5	3.14E-06	1.47	4.83E-02	19.11
8	Tuxford	Lightweight 1900	1900	1686	0.055	0.081	190.8	2.89E-06	1.40	4.83E-02	19.32
9	Tuxford	Lightweight 2800	2800	1800	0.055	0.081	209.5	3.09E-06	1.54	5.15E-02	21.09
10	Tuxford	Lightweight 3750	3750	1956	0.055	0.081	230.9	3.25E-06	1.69	5.53E-02	23.41
11	Tuxford	Lightweight 1900 w/ Pumice	1900	1688	0.055	0.081	196.0	2.96E-06	1.45	4.80E-02	19.53
12	Sheldon	Slump	1900	1830	0.093	0.165	217.3	3.33E-06	1.62	7.78E-02	20.35
13	Orange	Slump	1900	1741	0.053	0.071	206.1	3.09E-06	1.51	5.85E-02	20.70
14	Orange	Normalweight 1900	1900	1490	0.053	0.071	164.4	2.63E-06	1.20	5.14E-02	16.77
15	Orange	Normalweight 2800	2800	1618	0.053	0.071	185.7	2.86E-06	1.36	5.49E-02	18.77
16	Orange	Normalweight 3750	3750	1742	0.053	0.071	206.2	3.08E-06	1.51	5.84E-02	20.71
17	Orange	Mediumweight 1900	1900	1618	0.053	0.071	178.5	2.60E-06	1.30	5.36E-02	18.60
18	Orange	Mediumweight 2800	2800	1725	0.053	0.071	196.5	2.79E-06	1.43	5.66E-02	20.29
19	Orange	Mediumweight 3750	3750	1830	0.053	0.071	213.9	2.99E-06	1.56	5.96E-02	21.93
20	Orange	Mediumweight 1900 w/ Pumice	1900	1690	0.053	0.071	195.5	2.86E-06	1.43	5.63E-02	19.88
21	Orange	Lightweight 1900	1900	1697	0.053	0.071	192.9	2.71E-06	1.41	5.54E-02	19.92
22	Orange	Lightweight 2800	2800	1779	0.053	0.071	206.7	2.87E-06	1.51	5.77E-02	21.21
23	Orange	Lightweight 3750	3750	1883	0.053	0.071	224.0	3.05E-06	1.64	6.06E-02	22.83
24	Orange	Lightweight 1900 w/ Pumice	1900	1649	0.053	0.071	190.2	2.71E-06	1.40	5.38E-02	19.35

Environmental Product Declaration

Angelus Block Concrete Masonry Units

#	Plant	Mix	psi	TPE	BWU	PWU	GWP	ODP	AP	EP	POCP
25	Fontana	Slump	1900	1671	0.046	0.084	213.0	3.30E-06	1.57	6.01E-02	21.26
26	Fontana	Normalweight 1900	1900	1341	0.046	0.084	159.7	2.71E-06	1.18	5.06E-02	16.17
27	Fontana	Normalweight 2800	2800	1494	0.046	0.084	185.2	2.99E-06	1.37	5.48E-02	18.57
28	Fontana	Normalweight 3750	3750	1641	0.046	0.084	209.8	3.26E-06	1.55	5.89E-02	20.87
29	Fontana	Mediumweight 1900	1900	1370	0.046	0.084	156.1	2.50E-06	1.14	5.05E-02	16.40
30	Fontana	Mediumweight 2800	2800	1501	0.046	0.084	178.1	2.75E-06	1.30	5.41E-02	18.45
31	Fontana	Mediumweight 3750	3750	1747	0.046	0.084	216.8	3.15E-06	1.58	6.12E-02	22.23
32	Fontana	Mediumweight 1900 w/ Pumice	1900	1593	0.046	0.084	196.6	2.99E-06	1.44	5.69E-02	19.99
33	Gardena	Slump	1900	1624	0.060	0.142	194.0	2.69E-06	1.41	4.83E-02	20.01
34	Gardena	Normalweight 1900	1900	1549	0.060	0.142	182.2	2.59E-06	1.32	4.65E-02	18.84
35	Gardena	Normalweight 2800	2800	1693	0.060	0.142	205.9	2.84E-06	1.50	5.05E-02	21.09
36	Gardena	Normalweight 3750	3750	1832	0.060	0.142	228.8	3.09E-06	1.67	5.44E-02	23.27
37	Gardena	Mediumweight 1900	1900	1565	0.060	0.142	179.1	2.38E-06	1.29	4.57E-02	18.98
38	Gardena	Mediumweight 2800	2800	1679	0.060	0.142	198.0	2.59E-06	1.43	4.89E-02	20.76
39	Gardena	Mediumweight 3750	3750	1841	0.060	0.142	225.0	2.90E-06	1.63	5.35E-02	23.29
40	Gardena	Mediumweight 1900 w/ Pumice	1900	1664	0.060	0.142	200.5	2.68E-06	1.46	4.88E-02	20.67
41	Gardena	Lightweight 1900	1900	1733	0.060	0.142	202.6	2.57E-06	1.46	5.00E-02	21.49
42	Gardena	Lightweight 2800	2800	1789	0.060	0.142	211.9	2.67E-06	1.53	5.15E-02	22.36
43	Gardena	Lightweight 3750	3750	1844	0.060	0.142	221.0	2.77E-06	1.59	5.31E-02	23.22
44	Gardena	Lightweight 1900 w/ Pumice	1900	1707	0.060	0.142	203.6	2.61E-06	1.47	4.90E-02	21.26
45	Oxnard	Slump	1900	2124	0.052	0.153	230.6	3.74E-06	1.70	7.07E-02	23.27
46	Oxnard	Normalweight 1900	1900	1960	0.052	0.153	204.7	3.42E-06	1.51	6.54E-02	20.79
47	Oxnard	Normalweight 2800	2800	2107	0.052	0.153	228.4	3.67E-06	1.68	6.95E-02	23.07
48	Oxnard	Normalweight 3750	3750	2249	0.052	0.153	251.3	3.91E-06	1.85	7.34E-02	25.27
49	Oxnard	Mediumweight 1900	1900	1966	0.052	0.153	205.1	3.28E-06	1.51	6.43E-02	20.94
50	Oxnard	Mediumweight 2800	2800	2090	0.052	0.153	225.0	3.49E-06	1.66	6.77E-02	22.85
51	Oxnard	Mediumweight 3750	3750	2138	0.052	0.153	232.7	3.58E-06	1.71	6.91E-02	23.60
52	Oxnard	Mediumweight 1900 w/ Pumice	1900	2102	0.052	0.153	226.9	3.56E-06	1.67	6.85E-02	23.01
53	Oxnard	Lightweight 1900	1900	3658	0.052	0.153	344.8	1.80E-05	2.47	1.80E-01	30.10
54	Oxnard	Lightweight 2800	2800	3716	0.052	0.153	355.2	1.80E-05	2.54	1.81E-01	31.14
55	Oxnard	Lightweight 3750	3750	3788	0.052	0.153	374.8	1.77E-05	2.69	1.81E-01	33.08
56	Oxnard	Lightweight 1900 w/ Pumice	1900	2212	0.052	0.153	241.6	3.59E-06	1.77	7.01E-02	24.67
57	Indio	Slump	1900	1530	0.136	0.064	196.8	2.34E-06	1.48	5.18E-02	20.08
58	Indio	Normalweight 1900	1900	1256	0.136	0.064	153.4	1.89E-06	1.16	4.43E-02	15.86
59	Indio	Normalweight 2800	2800	1432	0.136	0.064	181.7	2.19E-06	1.36	4.91E-02	18.58
60	Indio	Normalweight 3750	3750	1566	0.136	0.064	203.2	2.41E-06	1.52	5.28E-02	20.66
61	Indio	Mediumweight 1900	1900	1341	0.136	0.064	161.4	1.80E-06	1.21	4.52E-02	17.06
62	Indio	Mediumweight 2800	2800	1427	0.136	0.064	175.5	1.95E-06	1.31	4.76E-02	18.40
63	Indio	Mediumweight 3750	3750	1503	0.136	0.064	187.7	2.08E-06	1.40	4.97E-02	19.58
64	Indio	Mediumweight 1900 w/ Pumice	1900	1410	0.136	0.064	169.3	1.86E-06	1.26	4.69E-02	18.02
65	Indio	Lightweight 1900	1900	1724	0.136	0.064	195.5	1.84E-06	1.41	5.42E-02	22.15
66	Indio	Lightweight 2800	2800	1757	0.136	0.064	200.9	1.90E-06	1.45	5.51E-02	22.65
67	Indio	Lightweight 3750	3750	1765	0.136	0.064	201.4	1.89E-06	1.46	5.52E-02	22.76
68	Indio	Lightweight 1900 w/ Pumice	1900	1781	0.136	0.064	200.6	1.84E-06	1.44	5.52E-02	22.91
69	Indio	White MW 1900	1900	1866	0.136	0.064	207.8	1.56E-06	1.49	4.56E-02	23.65

EPD impacts per m^3 concrete mix

Environmental Product Declaration

Angelus Block Concrete Masonry Units

EPD impacts per CMU

#	Plant	Mix	psi	TPE	BWU	PWU	GWP	ODP	AP	EP	POCP
1	Tuxford	Normalweight 1900	1900	12.0	4.65E-04	6.84E-04	1.42	2.52E-08	1.07E-02	3.65E-04	0.134
2	Tuxford	Normalweight 2800	2800	13.2	4.65E-04	6.84E-04	1.60	2.71E-08	1.20E-02	3.96E-04	0.151
3	Tuxford	Normalweight 3750	3750	14.2	4.65E-04	6.84E-04	1.78	2.89E-08	1.33E-02	4.26E-04	0.168
4	Tuxford	Mediumweight 1900	1900	12.5	4.65E-04	6.84E-04	1.41	2.31E-08	1.04E-02	3.65E-04	0.139
5	Tuxford	Mediumweight 2800	2800	13.4	4.65E-04	6.84E-04	1.56	2.47E-08	1.15E-02	3.91E-04	0.153
6	Tuxford	Mediumweight 3750	3750	14.6	4.65E-04	6.84E-04	1.73	2.66E-08	1.28E-02	4.25E-04	0.170
7	Tuxford	Mediumweight 1900 w/ Pumice	1900	13.8	4.65E-04	6.84E-04	1.66	2.63E-08	1.23E-02	4.05E-04	0.160
8	Tuxford	Lightweight 1900	1900	14.1	4.65E-04	6.84E-04	1.60	2.42E-08	1.17E-02	4.05E-04	0.162
9	Tuxford	Lightweight 2800	2800	15.1	4.65E-04	6.84E-04	1.76	2.59E-08	1.29E-02	4.32E-04	0.177
10	Tuxford	Lightweight 3750	3750	16.4	4.65E-04	6.84E-04	1.94	2.73E-08	1.42E-02	4.64E-04	0.196
11	Tuxford	Lightweight 1900 w/ Pumice	1900	14.2	4.65E-04	6.84E-04	1.64	2.48E-08	1.21E-02	4.03E-04	0.164
12	Sheldon	Slump	1900	15.4	7.80E-04	1.39E-03	1.82	2.79E-08	1.36E-02	6.52E-04	0.171
13	Orange	Slump	1900	14.6	4.45E-04	5.99E-04	1.73	2.59E-08	1.27E-02	4.91E-04	0.174
14	Orange	Normalweight 1900	1900	12.5	4.45E-04	5.99E-04	1.38	2.21E-08	1.01E-02	4.31E-04	0.141
15	Orange	Normalweight 2800	2800	13.6	4.45E-04	5.99E-04	1.56	2.40E-08	1.14E-02	4.61E-04	0.158
16	Orange	Normalweight 3750	3750	14.6	4.45E-04	5.99E-04	1.73	2.59E-08	1.27E-02	4.90E-04	0.174
17	Orange	Mediumweight 1900	1900	13.6	4.45E-04	5.99E-04	1.50	2.18E-08	1.09E-02	4.50E-04	0.156
18	Orange	Mediumweight 2800	2800	14.5	4.45E-04	5.99E-04	1.65	2.34E-08	1.20E-02	4.75E-04	0.170
19	Orange	Mediumweight 3750	3750	15.4	4.45E-04	5.99E-04	1.79	2.51E-08	1.31E-02	5.00E-04	0.184
20	Orange	Mediumweight 1900 w/ Pumice	1900	14.2	4.45E-04	5.99E-04	1.64	2.40E-08	1.20E-02	4.73E-04	0.167
21	Orange	Lightweight 1900	1900	14.2	4.45E-04	5.99E-04	1.62	2.28E-08	1.18E-02	4.65E-04	0.167
22	Orange	Lightweight 2800	2800	14.9	4.45E-04	5.99E-04	1.73	2.41E-08	1.27E-02	4.84E-04	0.178
23	Orange	Lightweight 3750	3750	15.8	4.45E-04	5.99E-04	1.88	2.56E-08	1.37E-02	5.08E-04	0.192
24	Orange	Lightweight 1900 w/ Pumice	1900	13.8	4.45E-04	5.99E-04	1.60	2.27E-08	1.17E-02	4.51E-04	0.162
25	Fontana	Slump	1900	14.0	3.89E-04	7.05E-04	1.79	2.77E-08	1.32E-02	5.05E-04	0.178
26	Fontana	Normalweight 1900	1900	11.3	3.89E-04	7.05E-04	1.34	2.27E-08	9.88E-03	4.24E-04	0.136
27	Fontana	Normalweight 2800	2800	12.5	3.89E-04	7.05E-04	1.55	2.51E-08	1.15E-02	4.60E-04	0.156
28	Fontana	Normalweight 3750	3750	13.8	3.89E-04	7.05E-04	1.76	2.73E-08	1.30E-02	4.94E-04	0.175
29	Fontana	Mediumweight 1900	1900	11.5	3.89E-04	7.05E-04	1.31	2.10E-08	9.54E-03	4.23E-04	0.138
30	Fontana	Mediumweight 2800	2800	12.6	3.89E-04	7.05E-04	1.49	2.30E-08	1.09E-02	4.54E-04	0.155
31	Fontana	Mediumweight 3750	3750	14.7	3.89E-04	7.05E-04	1.82	2.65E-08	1.33E-02	5.13E-04	0.187
32	Fontana	Mediumweight 1900 w/ Pumice	1900	13.4	3.89E-04	7.05E-04	1.65	2.51E-08	1.21E-02	4.78E-04	0.168
33	Gardena	Slump	1900	13.6	5.02E-04	1.19E-03	1.63	2.26E-08	1.18E-02	4.05E-04	0.168
34	Gardena	Normalweight 1900	1900	13.0	5.02E-04	1.19E-03	1.53	2.17E-08	1.11E-02	3.91E-04	0.158
35	Gardena	Normalweight 2800	2800	14.2	5.02E-04	1.19E-03	1.73	2.39E-08	1.26E-02	4.24E-04	0.177
36	Gardena	Normalweight 3750	3750	15.4	5.02E-04	1.19E-03	1.92	2.59E-08	1.40E-02	4.56E-04	0.195
37	Gardena	Mediumweight 1900	1900	13.1	5.02E-04	1.19E-03	1.50	2.00E-08	1.08E-02	3.83E-04	0.159
38	Gardena	Mediumweight 2800	2800	14.1	5.02E-04	1.19E-03	1.66	2.17E-08	1.20E-02	4.10E-04	0.174
39	Gardena	Mediumweight 3750	3750	15.4	5.02E-04	1.19E-03	1.89	2.43E-08	1.37E-02	4.49E-04	0.195
40	Gardena	Mediumweight 1900 w/ Pumice	1900	14.0	5.02E-04	1.19E-03	1.68	2.25E-08	1.22E-02	4.09E-04	0.173
41	Gardena	Lightweight 1900	1900	14.5	5.02E-04	1.19E-03	1.70	2.15E-08	1.22E-02	4.19E-04	0.180
42	Gardena	Lightweight 2800	2800	15.0	5.02E-04	1.19E-03	1.78	2.24E-08	1.28E-02	4.32E-04	0.188
43	Gardena	Lightweight 3750	3750	15.5	5.02E-04	1.19E-03	1.85	2.32E-08	1.34E-02	4.45E-04	0.195
44	Gardena	Lightweight 1900 w/ Pumice	1900	14.3	5.02E-04	1.19E-03	1.71	2.19E-08	1.24E-02	4.11E-04	0.178
45	Oxnard	Slump	1900	17.8	4.40E-04	1.28E-03	1.94	3.14E-08	1.42E-02	5.93E-04	0.195
46	Oxnard	Normalweight 1900	1900	16.4	4.40E-04	1.28E-03	1.72	2.87E-08	1.26E-02	5.49E-04	0.174
47	Oxnard	Normalweight 2800	2800	17.7	4.40E-04	1.28E-03	1.92	3.08E-08	1.41E-02	5.83E-04	0.194
48	Oxnard	Normalweight 3750	3750	18.9	4.40E-04	1.28E-03	2.11	3.28E-08	1.55E-02	6.16E-04	0.212
49	Oxnard	Mediumweight 1900	1900	16.5	4.40E-04	1.28E-03	1.72	2.75E-08	1.27E-02	5.40E-04	0.176

Environmental Product Declaration

Angelus Block Concrete Masonry Units

#	Plant	Mix	psi	TPE	BWU	PWU	GWP	ODP	AP	EP	POCP
50	Oxnard	Mediumweight 2800	2800	17.5	4.40E-04	1.28E-03	1.89	2.93E-08	1.39E-02	5.68E-04	0.192
51	Oxnard	Mediumweight 3750	3750	17.9	4.40E-04	1.28E-03	1.95	3.00E-08	1.44E-02	5.80E-04	0.198
52	Oxnard	Mediumweight 1900 w/ Pumice	1900	17.6	4.40E-04	1.28E-03	1.90	2.98E-08	1.40E-02	5.75E-04	0.193
53	Oxnard	Lightweight 1900	1900	30.7	4.40E-04	1.28E-03	2.89	1.51E-07	2.07E-02	1.51E-03	0.253
54	Oxnard	Lightweight 2800	2800	31.2	4.40E-04	1.28E-03	2.98	1.51E-07	2.13E-02	1.52E-03	0.261
55	Oxnard	Lightweight 3750	3750	31.8	4.40E-04	1.28E-03	3.14	1.48E-07	2.26E-02	1.51E-03	0.278
56	Oxnard	Lightweight 1900 w/ Pumice	1900	18.6	4.40E-04	1.28E-03	2.03	3.01E-08	1.49E-02	5.89E-04	0.207
57	Indio	Slump	1900	12.8	1.14E-03	5.35E-04	1.65	1.97E-08	1.24E-02	4.34E-04	0.168
58	Indio	Normalweight 1900	1900	10.5	1.14E-03	5.35E-04	1.29	1.59E-08	9.71E-03	3.71E-04	0.133
59	Indio	Normalweight 2800	2800	12.0	1.14E-03	5.35E-04	1.52	1.84E-08	1.15E-02	4.12E-04	0.156
60	Indio	Normalweight 3750	3750	13.1	1.14E-03	5.35E-04	1.71	2.03E-08	1.28E-02	4.43E-04	0.173
61	Indio	Mediumweight 1900	1900	11.2	1.14E-03	5.35E-04	1.35	1.51E-08	1.01E-02	3.80E-04	0.143
62	Indio	Mediumweight 2800	2800	12.0	1.14E-03	5.35E-04	1.47	1.64E-08	1.10E-02	4.00E-04	0.154
63	Indio	Mediumweight 3750	3750	12.6	1.14E-03	5.35E-04	1.57	1.75E-08	1.18E-02	4.17E-04	0.164
64	Indio	Mediumweight 1900 w/ Pumice	1900	11.8	1.14E-03	5.35E-04	1.42	1.56E-08	1.06E-02	3.94E-04	0.151
65	Indio	Lightweight 1900	1900	14.5	1.14E-03	5.35E-04	1.64	1.55E-08	1.19E-02	4.54E-04	0.186
66	Indio	Lightweight 2800	2800	14.7	1.14E-03	5.35E-04	1.69	1.60E-08	1.22E-02	4.62E-04	0.190
67	Indio	Lightweight 3750	3750	14.8	1.14E-03	5.35E-04	1.69	1.59E-08	1.22E-02	4.63E-04	0.191
68	Indio	Lightweight 1900 w/ Pumice	1900	14.9	1.14E-03	5.35E-04	1.68	1.55E-08	1.21E-02	4.63E-04	0.192
69	Indio	White MW 1900	1900	15.7	1.14E-03	5.35E-04	1.74	1.31E-08	1.25E-02	3.83E-04	0.198

References

Carbon Leadership Forum. 2012a. Product Category Rules (PCR) for ISO 14025 Type III Environmental Product Declarations (EPDs) of Concrete - Version 1.0. Seattle, WA.

Carbon Leadership Forum. 2012b. Default Life Cycle Inventories v1.0 (for Concrete PCR). Seattle, WA, November.

Ecoinvent Centre. 2007. Ecoinvent Data v2.2 (Ecoinvent Reports No. 1-25). Dübendorf, Switzerland. http://db.ecoinvent.org/ecoquery/index.php?newlanguage=en.

EFCA. 2006. Environmental Declaration: Plasticising Admixtures. Sittard, The Netherlands, April. http://efca.info/downloads/324 ETG Plasticiser EPD.pdf.

GHG Protocol. 2011. Product Life Cycle Accounting and Reporting Standard. http://www.ghgprotocol.org/standards/product-standard. Accessed January 21, 2013.

NREL. 2012. U.S. Life Cycle Inventory Database. https://www.lcacommons.gov/nrel/search.