Environmental Product Declaration

Environmental Product Declaration for ready mix concrete products produced by Holcim Ecuador at their San Eduardo facility in Guayaquil, Ecuador

ADMINISTRATIVE INFORMATION

International Certified Environmental Product Declaration

Declared Product:	This Environmental Product Declaration (EPD) covers concrete products produced by Holcim Ecuador. Declared unit: 1 m3 of concrete
Declaration Owner:	Holcim Ecuador S/N Av. Barcelona y José Rodríguez Bonin, Edif. El Caimán Piso 2 Guayaquil, Ecuador www.holcim.com.ec
Program Operator:	Labeling Sustainability Address, 11670 W Sunset Blvd. City, State, Los Angeles, CA www.labelinsustainability.com/
Product Category Rule:	ISO 21930:2017 Sustainability in Building Construction – Environmental Declaration of Building Products: serves as the core PCR Product Category Rule of Environmental Product Declarations PCR for Concrete serves as the sub-category PCR. PCR Program Operator: NSF International Sub-category PCR review was conducted by: Thomas P. Gloria, Ph. D. of Industrial Ecology Consultants: 35 Bracebridge, Rd., Newton, MA 02459-1728, t.gloria@industrial-ecology.com. Dr. Michael Overcash of Environmental Clarity: 2908 Chipmunk Lane, Raleigh, NC 27607-3117, mrovercash@earthlink.net. Mr. Bill Stough of Sustainable Research Group: PO Box 1684, Grand Rapids, MI 49501-1684, bstough@sustainableresearchgroup.com.
Independent LCA Reviewer and EPD Verifier:	This EPD was independently verified in accordance with ISO 14025 and ISO 21930. The life cycle assessment was independently reviewed in accordance with ISO 14044 and the referenced PCR. Independent verification of the declaration, according to ISO 14025:2006 External Third Party Verifier Denice V. Staaf, Certified 3rd Party Verifier under Labeling Sustainability (www.labelingsustainability.com)
Date of Issue:	22 August 2025
Period of Validity:	5 years; valid until 22 August 2030
EPD Number:	HOLECU08222500

STUDY GOAL

The intended application of this life cycle assessment (LCA) is to comply with the procedures for creating a Type III environmental product declaration (EPD) and publish the EPD for public review on the website, www.labelingsustainability.com. This EPD was independently verified in accordance with ISO 14025:2006 and ISO 21930:2017. The life cycle assessment was independently reviewed in accordance ISO 14044:2006 and the referenced PCR.

EPDs are comparable only if prepared from cradle-to-grave life cycle results and based on the same function, quantified by the same functional unit, and taking account of replacement based on the product reference service life (RSL) relative to an assumed building service life, can be used to assist purchasers and users in making informed comparisons between products. This EPD is meant for B2B communication.

DESCRIPTION OF PRODUCT AND SCOPE

This EPD reports on 25 concrete mixes manufactured at the Planta San Eduardo Holcim Ecuador concrete facility in Guayaquil, Ecuador.

This LCA assumes the impacts from products manufactured in accordance with the standards outlined in this report. This LCA is a cradle-to-gate study, and therefore, stages extending beyond the plant gate are not included in this LCA. Excluded stages include transportation of the manufactured material to the construction site; on-site construction processes and components; building (infrastructure) use and maintenance; and "end-of-life" effects.

READY MIX CONCRETE DESIGN SUMMARY

The following tables provide a list of the ready mix concrete products considered in this EPD along with key performance parameters.

Table 1: **Declared products considered in this environmental product declaration**

Mix#	Unique name/ID	Short description	Product type	3 day strength, MPa	28 day strength, MPa	H2O to cement ratio
1	06210NS0900033 PERMEABLE Color verde	21 MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
2	06210NS0900033 PERMEABLE Color Naranja	21 MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
3	06210NS0900001 PERMEABLE Gris o sin color	21 MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
4	23210NS1218001 ECOPACT	21 MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
5	23210NS1913001 ECOPACT	21 MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary

6	23210NS1913001 ECOPACT A2	21 MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
7	23210NS1910001 ECOPACT.	21 MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
8	03210NS1218001 ALTA FLUIDEZ	21 MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
9	01210NS1913001 ESTRUCTURAL	21 MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
10	06210NS0900033 PERMEABLE Color rojo	21 MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
11	06210NS0900033 PERMEABLE Color Amarillo	21 MPa 28d strength ready mix concrete.	Ready Mix		21	Proprietary
12	23240NS1913001 ECOPACT	24 MPa 28d strength ready mix concrete.	Ready Mix		24	Proprietary
13	23280NS1913001 ECOPACT	28 MPa 28d strength ready mix concrete.	Ready Mix		28	Proprietary
14	23280NS1915010 ECOPACT	28 MPa 28d strength ready mix concrete.	Ready Mix		28	Proprietary
15	01280NS1913001 ESTRUCTURAL	28 MPa 28d strength ready mix concrete.	Ready Mix		28	Proprietary
16	01350NS1913001 ESTRUCTURAL	35 MPa 28d strength ready mix concrete.	Ready Mix		35	Proprietary
17	27350NS1915092 PISOS	35 MPa 28d strength ready mix concrete.	Ready Mix		35	Proprietary
18	14350NS1918001 PISOS	35 MPa 28d strength ready mix concrete.	Ready Mix		35	Proprietary
19	10350NS1915024 CONCRETO CLASE F A/C 0.40	35 MPa 28d strength ready mix concrete.	Ready Mix		35	Proprietary
20	11450NS1913001 ALTA RESISTENCIA	45 MPa 28d strength ready mix concrete.	Ready Mix		45	Proprietary
21	11450NS1913001 ALTA RESISTENCIA	45 MPa 28d strength ready mix concrete.	Ready Mix		45	Proprietary
22	11600NS1918001 DYNAMax	60 MPa 28d strength ready mix concrete.	Ready Mix		60	Proprietary
23	054.53S1910001 PAVIMENTO	4.5 MPa 3d strength ready mix concrete.	Ready Mix	4.5		Proprietary
24	044203S1920024 DYNAMax	42 MPa 3d strength ready mix concrete.	Ready Mix	42		Proprietary
25	043503S1913001 DYNAMax	35 MPa 3d strength ready mix concrete.	Ready Mix	35		Proprietary

READY MIX CONCRETE DESIGN COMPOSITION

The following figures provide mass breakdown (kg per functional unit) of the material composition of each ready mix design considered. Please note that the breakdown has been randomly altered and is therefore only an approximation; this manipulation is to ensure confidentiality.

Table 2: **Ready mix concrete composition**

Product Components	Raw Material, weight%
Cement	Proprietary
Mineral Additions (River sand and Gravel)	30-60.00
Others	0.01-5.00
Total	100.00

SYSTEM BOUNDARIES

The following figure depicts the cradle-to-gate system boundary considered in this study (ND= Not Defined)

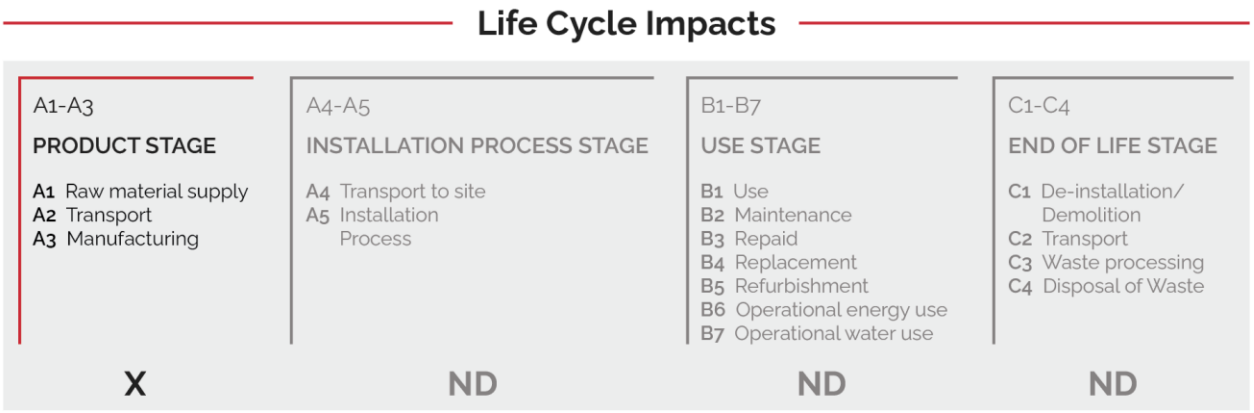

Figure 1: **General life cycle phases for consideration in a construction works system**

According to the PCR, the following figure illustrates the general activities and input requirements for producing ready mix concrete products and is not necessarily exhaustive.

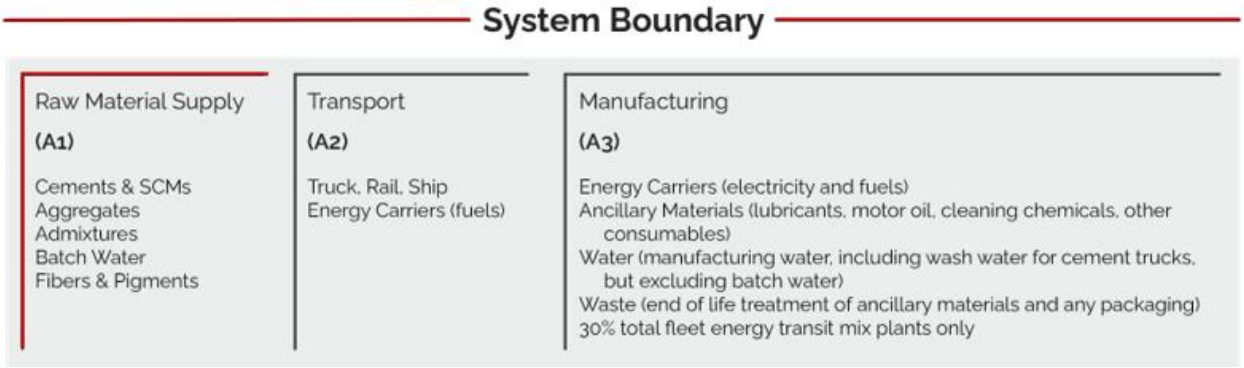

Figure 2: **General system inputs considered in the product system and categorized by modules in scope**

All operating data is formulated using the actual data from Holcim Ecuador's plant at the above location, including water, energy consumption and waste generation. All inputs for this system boundary are calculated for the plant.

This life cycle inventory was organized in a LCA spreadsheet and was then input into LCA.no EPD generator. Primary data were utilized. Explanations of the contribution of each data source to this study are outlined in the section "Data Sources and Quality".

Allocation procedures shall be uniformly applied to similar inputs and outputs of the system under consideration. Whenever possible allocation can be avoided as per ISO 14044:2006, Section, 4.3.4.2. This subcategory PCR recognizes fly ash, silica fume, granulated blast furnace slag, cement kiln dust, flue gas desulfurization (FGD) gypsum, and post-consumer gypsum as recovered materials. Thus, the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a cement material input.

CUT-OFF CRITERIA

ISO 14044:2006 and the focus PCR requires the LCA model to contain a minimum of 95% of the total inflows (mass and energy) to the upstream and core modules be included in this study. The cut-off criteria were applied to all other processes unless otherwise noted above as follows. A 1% cut-off is considered for all renewable and non-renewable primary energy consumption and the total mass of inputs within a unit process where the total of the neglected inputs does not exceed 5%.

DATA SOURCES AND DATA QUALITY ASSESSMENT

Table 3: **LCI inputs assumed for module A1 (i.e., raw material supply)**

Input	LCI.activity	Data.source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
Water	tap water production, conventional treatment/tap water/RoW/kg	ecoinvent v3.10 in 2024	Guayas	2024	2	3	1	3	3
Limestone gravel	limestone quarry operation/limestone, unprocessed/RoW/kg ; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.10 in 2024	Guayas	2024	2	3	1	3	3
Additives	chemical production, organic/chemical, organic/GLO/kg	ecoinvent v3.10 in 2024	Guayas	2024	2	3	1	3	3
Inorganic chemical	chemical production, inorganic/chemical, inorganic/GLO/kg	ecoinvent v3.10 in 2024	Antioquía	2024	2	3	1	3	3

River sand	sand quarry operation, extraction from river bed/sand/BR/kg; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.10 in 2024	Guayas	2024	2	3	1	3	3
HE Cement	HE Cement	Program Operator: Labeling Sustainability- EPD ID: e717da92-6eee-4fdb-b7d3-acfac1d3df01	Guayas	29 November 2022	3	3	3	3	3
GU Cement	GU Cement	Program Operator: Labeling Sustainability- EPD ID: e717da92-6eee-4fdb-b7d3-acfac1d3df01	Guayas	29 November 2022	3	3	3	3	3

LIMITATIONS

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. Further, LCA offers a wide array of environmental impact indicators, and this EPD reports a collection of those, as specified by the PCR.

In addition to the impact results, this EPD provides several metrics related to resource consumption and waste generation. While these data may be informational in other ways, they do not provide a measure of impact on the environment.

TOTAL IMPACT SUMMARY

The following table reports the total LCA results for each product produced at the given ready mix concrete facility on a per 1m3 of concrete basis.

It should be noted that emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in any of the following categories.

Table 4: **Total life cycle (across modules in scope) impact results for Mix designs, assuming the geometric mean point values on a per 1 m3 of concrete basis**

a) Midpoint Impact Categories

Indicator/LCI Metric	Strength, MPa	Strength, MPa	GWP100	ODP	AP	EP	SFP	ADPfossil
Unit	**3 days**	**28 days**	**kg CO2-eq**	**kg CFC-11-eq**	**kg SO2-eq**	**kg N-eq**	**kg O3-eq**	**MJ**
06210NS0900033 PERMEABLE Color verde		21	301	2.31E-06	0.45	2.49	6.97	1040
06210NS0900033 PERMEABLE Color Naranja		21	300.67	2.30E-06	0.45	2.5	6.78	1034.56
06210NS0900001 PERMEABLE Gris o sin color		21	277.74	1.81E-06	0.3	2.4	5.58	778.84
23210NS1218001 ECOPACT		21	221.68	1.66E-06	0.3	2.26	5.7	779.78
23210NS1913001 ECOPACT		21	207.23	1.58E-06	0.29	2.18	5.58	756.34
23210NS1913001 ECOPACT A2		21	198.67	1.49E-06	0.28	2.12	5.47	717
23210NS1910001 ECOPACT.		21	208.42	1.52E-06	0.29	2.17	5.59	723.91
03210NS1218001 ALTA FLUIDEZ		21	266.1	1.90E-06	0.31	2.36	6.04	875.94
01210NS1913001 ESTRUCTURAL		21	232.94	1.66E-06	0.29	2.18	5.73	781.6
06210NS0900033 PERMEABLE Color rojo		21	300.67	2.30E-06	0.45	2.5	6.78	1034.56
06210NS0900033 PERMEABLE Color Amarillo		21	300.67	2.30E-06	0.45	2.5	6.78	1034.56
23240NS1913001 ECOPACT		24	217.71	1.65E-06	0.3	2.24	5.72	782.08
23280NS1913001 ECOPACT		28	227.24	1.69E-06	0.31	2.29	5.74	789.93
23280NS1915010 ECOPACT		28	236.11	1.78E-06	0.32	2.35	5.91	831.73
01280NS1913001 ESTRUCTURAL		28	261.52	1.87E-06	0.31	2.34	5.99	864.56
01350NS1913001 ESTRUCTURAL		35	295.45	2.07E-06	0.33	2.5	6.35	937.48
27350NS1915092 PISOS		35	308.68	2.17E-06	0.34	2.57	6.51	976.5
14350NS1918001 PISOS		35	292.15	2.06E-06	0.33	2.49	6.32	935.57

10350NS1915024 CONCRETO CLASE F A/C 0.40		35	330.03	2.32E-06	0.36	2.67	6.76	1038.9
11450NS1913001 ALTA RESISTENCIA		45	325.27	2.29E-06	0.36	2.66	6.64	1022.49
11450NS1913001 ALTA RESISTENCIA		45	325.27	2.29E-06	0.36	2.66	6.64	1022.49
11600NS1918001 DYNAMax		60	371.44	2.45E-06	0.38	2.84	7.05	1060.09
054.53S1910001 PAVIMENTO	4.5		356.56	2.46E-06	0.38	2.82	6.92	1076.26
044203S1920024 DYNAMax	42		412.67	2.78E-06	0.42	3.06	7.61	1196.37
043503S1913001 DYNAMax	35		373.39	2.53E-06	0.39	2.89	7.04	1095.83

b) Resource Inventory Metrics

Indicator/LCI Metric	Strength, MPa	Strength, MPa	RPRE	PRM	NRPRE	NRPRM	SM	RSF	RE	FW
Unit	**3 days**	**28 days**	**MJ**	**MJ**	**MJ**	**kg**	**MJ**	**MJ**	**MJ**	**m3**
06210NS090003 3 PERMEABLE Color verde		21	248	506	672	369	10.2	0.025	0.124	0.84
06210NS090003 3 PERMEABLE Color naranja		21	218.21	506.48	665.45	369.2	10.15	0.0251	0.124363	0.85
06210NS090001 PERMEABLE Gris o sin color		21	239.34	506.48	409.71	369.2	10.15	0.0218	0.124363	0.42
23210NS1218001 ECOPACT		21	269.2	506.39	400.56	379.28	7.55	0.0207	0.089318	0.63
23210NS1913001 ECOPACT		21	284.27	506.36	376.36	380.04	6.88	0.0199	0.081445	0.62
23210NS1913001 ECOPACT A2		21	292.79	506.35	345.02	372.03	6.54	0.0195	0.077373	0.61
23210NS1910001 ECOPACT.		21	282.69	506.37	356.91	367.06	7	0.0202	0.082803	0.62
03210NS1218001 ALTA FLUIDEZ		21	253.57	506.45	487.86	388.14	9.31	0.0226	0.114	0.63
01210NS1913001 ESTRUCTURAL		21	282.9	506.41	405.58	376.08	7.9	0.021	0.096727	0.57
06210NS090003 3 PERMEABLE Color rojo		21	218.21	506.48	665.45	369.2	10.15	0.0251	0.124363	0.85
06210NS090003 3 PERMEABLE Color Amarillo		21	218.21	506.48	665.45	369.2	10.15	0.0251	0.124363	0.85

23240NS1913001 ECOPACT		24	273.67	506.38	401.07	381.07	7.34	0.0206	0.086875	0.64
23280NS1913001 ECOPACT		28	263.46	506.39	410.9	379.09	7.8	0.0209	0.092305	0.64
23280NS1915010 ECOPACT		28	254.95	506.41	446.19	385.6	8.14	0.0215	0.096377	0.67
01280NS1913001 ESTRUCTURAL		28	257.63	506.45	477.49	387.13	9.11	0.0223	0.111581	0.6
01350NS1913001 ESTRUCTURAL		35	227.97	506.5	550.34	387.2	10.57	0.0243	0.129545	0.65
27350NS1915092 PISOS		35	216.17	506.52	583.34	393.22	11.14	0.025	0.136454	0.67
14350NS1918001 PISOS		35	230.59	506.49	544.44	391.19	10.43	0.024	0.127818	0.64
10350NS1915024 CONCRETO CLASE F A/C 0.40		35	198.13	506.54	643.7	395.26	12.01	0.0262	0.147163	0.72
11450NS1913001 ALTA RESISTENCIA		45	201.57	506.54	624.31	398.25	11.84	0.0256	0.14509	0.69
11450NS1913001 ALTA RESISTENCIA		45	201.57	506.54	624.31	398.25	11.84	0.0256	0.14509	0.69
11600NS1918001 DYNAMax		60	160.56	506.61	681.79	378.37	13.96	0.0285	0.170999	0.7
054.53S1910001 PAVIMENTO	4.5		173.22	506.59	676.01	400.32	13.25	0.0272	0.162363	0.69
044203S1920024 DYNAMax	42		124.95	506.67	802.01	394.44	15.65	0.0308	0.191727	0.76
043503S1913001 DYNAMax	35		158.29	506.61	700.54	395.36	14.01	0.0281	0.17169	0.71

c) Waste/output Inventory Metrics

Indicator/LCI Metric	Strength, MPa	Strength, MPa	HWD	NHWD	HLRW	MR	MER
Unit	**3 days**	**28 days**	**kg**	**kg**	**kg**	**kg**	**kg**
06210NS0900033 PERMEABLE Color verde		21	19.9	400	0.000157	0.001	5.19E-02
06210NS0900033 PERMEABLE Color naranja		21	19.96	400.64	0.001573	0.001	5.19E-02
06210NS0900001 PERMEABLE Gris o sin color		21	17.24	334.27	0.001276	0.001	5.19E-02
23210NS1218001 ECOPACT		21	13.27	340.54	0.001012	0.001	4.74E-02

23210NS1913001 ECOPACT		21	12.2	337.52	0.000931	0.001	4.32E-02
23210NS1913001 ECOPACT A2		21	11.56	333.93	0.000877	0.001	4.11E-02
23210NS1910001 ECOPACT		21	12.27	335.07	0.000927	0.001	4.40E-02
03210NS1218001 ALTA FLUIDEZ		21	16.12	337.32	0.001204	0.001	4.76E-02
01210NS1913001 ESTRUCTURAL		21	13.74	329.7	0.001019	0.001	4.04E-02
06210NS0900033 PERMEABLE Color rojo		21	19.96	400.64	0.001573	0.001	5.19E-02
06210NS0900033 PERMEABLE Color Amarillo		21	19.96	400.64	0.001573	0.001	5.19E-02
23240NS1913001 ECOPACT		24	12.96	340.08	0.000989	0.001	4.61E-02
23280NS1913001 ECOPACT		28	13.68	341.75	0.001042	0.001	4.90E-02
23280NS1915010 ECOPACT		28	14.31	345.13	0.001094	0.001	5.12E-02
01280NS1913001 ESTRUCTURAL		28	15.8	336.42	0.001179	0.001	4.65E-02
01350NS1913001 ESTRUCTURAL		35	18.19	341.7	0.001354	0.001	5.40E-02
27350NS1915092 PISOS		35	19.15	344.98	0.00143	0.001	5.69E-02
14350NS1918001 PISOS		35	17.98	341.98	0.001343	0.001	5.33E-02
10350NS1915024 CONCRETO CLASE F A/C 0.40		35	20.61	348.88	0.001537	0.001	6.14E-02
11450NS1913001 ALTA RESISTENCIA		45	20.34	348.6	0.001521	0.001	6.05E-02
11450NS1913001 ALTA RESISTENCIA		45	20.34	348.6	0.001521	0.001	6.05E-02
11600NS1918001 DYNAMax		60	23.6	351.34	0.001746	0.001	7.13E-02
054.53S1910001 PAVIMENTO	4.5		22.63	353.67	0.001692	0.001	6.77E-02
044203S1920024 DYNAMax	42		26.5	361.27	0.00197	0.001	8.00E-02
043503S1913001 DYNAMax	35		23.82	355.16	0.001776	0.001	7.16E-02