Environmental Product Declaration

Environmental Product Declaration for ready mix concrete products produced by Holcim Ecuador at their Manta facility in El Arroyo, 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:	HOLECU08222504

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 20 concrete mixes manufactured at the Manta Holcim Ecuador concrete facility in El Arroyo, 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	14 day strength, MPa	28 day strength, MPa	H2O to cement ratio
1	10083834 054.5NS1922001 PAVIMENTO	4.5MPa 28d strength ready mix concrete.	Ready Mix			**4.5**	Proprietary
2	10063015 054.5NS1918001 PAVIMENTO.	4.5MPa 28d strength ready mix concrete.	Ready Mix			4.5	Proprietary
3	10063015 054.5NS1918001 PAVIMENTO.	4.5MPa 28d strength ready mix concrete.	Ready Mix			4.5	Proprietary
4	10016137 03180NS1918001 ALTA FLUIDEZ	18MPa 28d strength ready mix concrete.	Ready Mix			18	Proprietary

5	10067768 23180NS1918001 ECOPACT	18MPa 28d strength ready mix concrete.	Ready Mix			18	Proprietary
6	10016164 03210NS1218001 ALTA FLUIDEZ	21MPa 28d strength ready mix concrete.	Ready Mix			**21**	Proprietary
7	10066839 03210NS0918001 ALTA FLUIDEZ	21MPa 28d strength ready mix concrete.	Ready Mix			21	Proprietary
8	10016138 03210NS1918001 ALTA FLUIDEZ	21MPa 28d strength ready mix concrete.	Ready Mix			21	Proprietary
9	10058490 03240NS1218010 ESTRUCTURAL	24MPa 28d strength ready mix concrete.	Ready Mix			24	Proprietary
10	10067789 23240NS1918001 ECOPACT	24MPa 28d strength ready mix concrete.	Ready Mix			24	Proprietary
11	10016140 03240NS1918001 ALTA FLUIDEZ	24MPa 28d strength ready mix concrete.	Ready Mix			24	Proprietary
12	10016141 03250NS1918001 ALTA FLUIDEZ	25MPa 28d strength ready mix concrete.	Ready Mix			25	Proprietary
13	10084433 27280NS1918001 PISOS+Link Ever	28MPa 28d strength ready mix concrete.	Ready Mix			28	Proprietary
14	10056083 01280NS1915001 ESTRUCTURAL.	28MPa 28d strength ready mix concrete.	Ready Mix			28	Proprietary
15	10016142 03280NS1918001 ALTA FLUIDEZ	28MPa 28d strength ready mix concrete.	Ready Mix			28	Proprietary
16	10067794 23280NS1918001 ECOPACT	28MPa 28d strength ready mix concrete.	Ready Mix			28	Proprietary
17	10072520 27280NS1918001 PISOS A/C 0.60+Link Ever	28MPa 28d strength ready mix concrete.	Ready Mix			28	Proprietary
18	10043120 043503S1218001 DYNAMax	35MPa 28d strength ready mix concrete.	Ready Mix			35	Proprietary
19	10047401 043503S1913001 DYNAMax	35MPa 3d strength ready mix concrete.	Ready Mix	35			Proprietary
20	10081261 054.5RS1915001 TCP	4.5MPa 14d strength ready mix concrete.	Ready Mix		4.5		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)

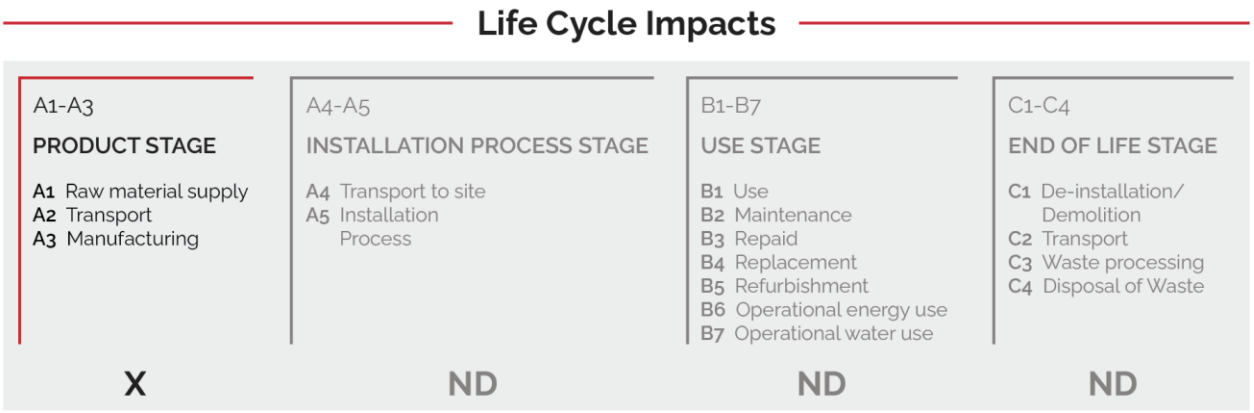

Figure 1: **General life cycle phases for consideration in a construction works system**

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.

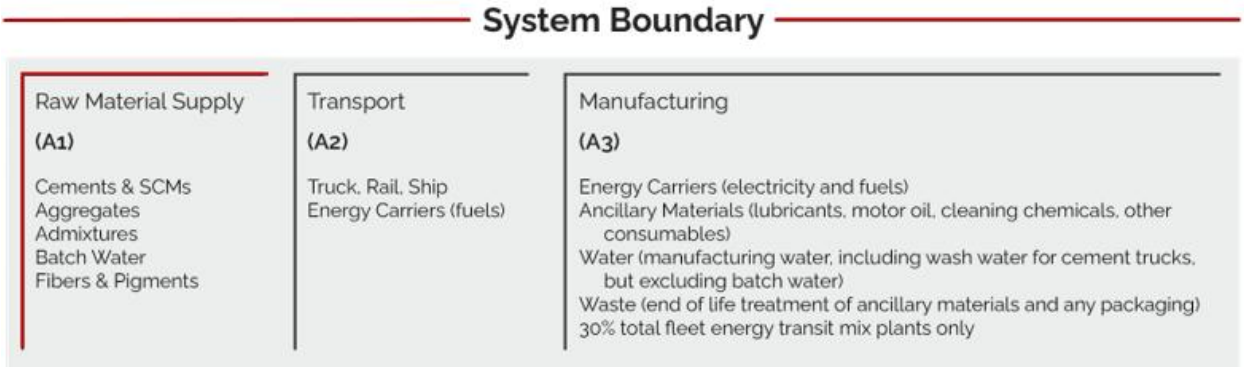

Figure 2: **General system inputs considered in the product system and categorized by modules in scope**

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			GWP100	ODP	AP	EP	SFP	ADPfossil
Unit	**3 days**	**14 days**	**28 days**	**kg CO2-eq**	**kg CFC-11-eq**	**kg SO2-eq**	**kg N-eq**	**kg O3-eq**	**MJ**
10083834 054.5NS1922001 PAVIMENTO			4.5	379.38	3.00E-06	0.433	1.837	8.061	1389.348
10063015 054.5NS1918001 PAVIMENTO.			4.5	369.61	2.90E-06	0.4232	1.780	7.917	1342.454
10063015 054.5NS1918001 PAVIMENTO.			4.5	369.61	2.90E-06	0.4232	1.780	7.917	1342.454
10016137 03180NS1918001 ALTA FLUIDEZ			18	224.05	1.86E-06	0.30567	1.056	6.278	902.801
10067768 23180NS1918001 ECOPACT			18	165.13	1.39E-06	0.26871	0.903	5.397	650.709
10016164 03210NS1218001 ALTA FLUIDEZ			**21**	**254.07**	**2.08E-06**	**0.32894**	**1.208**	**6.580**	**994.492**
10066839 03210NS0918001 ALTA FLUIDEZ			21	271.78	2.20E-06	0.34114	1.298	6.732	1047.817
10016138 03210NS1918001 ALTA FLUIDEZ			21	242	1.00E-06	0.32	1.150	6.480	959.000
10058490 03240NS1218010 ESTRUCTURAL			24	279.93	2.35E-06	0.35816	1.364	7.013	1124.331
10067789 23240NS1918001 ECOPACT			24	184.3	1.52E-06	0.28476	1.018	5.560	698.804
10016140 03240NS1918001 ALTA FLUIDEZ			24	259.81	2.12E-06	0.33527	1.236	6.694	1015.193
10016141 03250NS1918001 ALTA FLUIDEZ			25	270.28	2.20E-06	0.34794	1.320	6.819	1038.724
10084433 27280NS1918001 PISOS+Link Ever			28	280.21	2.29E-06	0.3522	1.346	6.919	1089.332
10056083 01280NS1915001 ESTRUCTURAL.			28	274.03	2.22E-06	0.34595	1.309	6.822	1057.363

10016142 03280NS1918001 ALTA FLUIDEZ			28	282.33	2.31E-06	0.35512	1.356	6.968	1096.852
10067794 23280NS1918001 ECOPACT			28	222.24	1.79E-06	0.32052	1.242	6.011	801.360
10072520 27280NS1918001 PISOS A/C 0.60+Link Ever			28	318	2.55E-06	0.38018	1.530	7.295	1194.516
10043120 043503S1218001 DYNAMax			35	468.4	3.67E-06	0.50717	2.291	9.086	1676.680
10047401 043503S1913001 DYNAMax	35			455.11	3.56E-06	0.49574	2.218	8.951	1627.972
10081261 054.5RS1915001 TCP		4.5		393.69	3.13E-06	0.44742	1.920	8.239	1448.552

b) Resource Inventory Metrics

Indicator/LCI Metric	Strength, MPa			RPRE	PRM	NRPRE	NRPRM	SM	RSF	RE	FW
Unit	3 days	14 days	28 days	MJ	MJ	MJ	kg	MJ	MJ	MJ	m3
10083834 054.5NS1922001 PAVIMENTO			4.5	326.244	1.046	1302.962	86.469	14.805	0.029	0.181	0.976
10063015 054.5NS1918001 PAVIMENTO.			4.5	318.127	1.034	1263.278	79.258	14.439	0.029	0.177	0.951
10063015 054.5NS1918001 PAVIMENTO.			4.5	318.127	1.034	1263.278	79.258	14.439	0.029	0.177	0.951
10016137 03180NS1918001 ALTA FLUIDEZ			18	193.331	0.833	852.869	49.991	8.436	0.021	0.103	0.791
10067768 23180NS1918001 ECOPACT			18	167.232	0.758	611.040	39.718	6.428	0.018	0.076	0.779
10016164 03210NS1218001 ALTA FLUIDEZ			21	219.159	0.874	937.410	57.145	9.676	0.023	0.118	0.823
10066839 03210NS0918001 ALTA FLUIDEZ			21	234.398	0.899	986.605	61.278	10.409	0.024	0.127	0.857

10016138 03210NS1918001 ALTA FLUIDEZ			21	209.000	0.857	905.000	54.200	9.170	0.022	0.112	0.811
10058490 03240NS1218010 ESTRUCTURAL			24	240.576	0.906	1046.627	77.773	10.634	0.024	0.130	0.871
10067789 23240NS1918001 ECOPACT			24	186.943	0.785	654.598	44.258	7.276	0.019	0.086	0.805
10016140 03240NS1918001 ALTA FLUIDEZ			24	223.923	0.882	956.802	58.455	9.902	0.023	0.121	0.831
10016141 03250NS1918001 ALTA FLUIDEZ			25	237.913	0.897	976.311	62.480	10.403	0.024	0.127	0.859
10084433 27280NS1918001 PISOS+Link Ever			28	241.286	0.909	1022.512	66.888	10.719	0.024	0.131	0.863
10056083 01280NS1915001 ESTRUCTURAL.			28	236.223	0.901	995.649	61.781	10.494	0.024	0.129	0.844
10016142 03280NS1918001 ALTA FLUIDEZ			28	243.075	0.912	1029.529	67.391	10.804	0.024	0.132	0.864
10067794 23280NS1918001 ECOPACT			28	225.444	0.839	748.482	52.935	8.926	0.021	0.106	0.869
10072520 27280NS1918001 PISOS A/C 0.60+Link Ever			28	273.849	0.962	1122.429	72.160	12.297	0.026	0.151	0.921
10043120 043503S1218001 DYNAMax			35	402.374	1.168	1566.252	110.525	18.441	0.034	0.226	1.074
10047401 043503S1913001 DYNAMax	35			390.964	1.150	1523.763	104.305	17.905	0.033	0.219	1.056
10081261 054.5RS1915001 TCP		4.5		338.456	1.065	1353.450	95.189	15.369	0.030	0.188	0.975

c) Waste/output Inventory Metrics

Indicator/LCI Metric	Strength, MPa			HWD	NHWD	HLRW	MR	MER
Unit	3 days	14 days	28 days	kg	kg	kg	kg	kg
10083834 054.5NS1922001 PAVIMENTO			4.5	25.49833	85.69739	0.0019	0.00111	0.07566
10063015 054.5NS1918001 PAVIMENTO.			4.5	24.82887	82.52358	0.00185	0.00109	0.07378
10063015 054.5NS1918001 PAVIMENTO.			4.5	24.82887	82.52358	0.00185	0.00109	0.07378
10016137 03180NS1918001 ALTA FLUIDEZ			18	14.6937	52.18963	0.00109	0.00067	0.04309
10067768 23180NS1918001 ECOPACT			18	11.20873	48.51094	0.00086	0.00031	0.04035
10016164 03210NS1218001 ALTA FLUIDEZ			21	16.79339	58.66566	0.00125	0.00076	0.04943
10066839 03210NS0918001 ALTA FLUIDEZ			21	18.0305	62.42564	0.00134	0.00081	0.05318
10016138 03210NS1918001 ALTA FLUIDEZ			21	15.9	56.1	0.00118	0.00072	0.0468
10058490 03240NS1218010 ESTRUCTURAL			24	18.56578	67.47713	0.00139	0.00082	0.05433
10067789 23240NS1918001 ECOPACT			24	12.62974	53.72382	0.00097	0.00034	0.04568
10016140 03240NS1918001 ALTA FLUIDEZ			24	17.1809	59.92447	0.00128	0.00077	0.05058
10016141 03250NS1918001 ALTA FLUIDEZ			25	18.02774	64.3135	0.00135	0.00076	0.05476
10084433 27280NS1918001 PISOS+Link Ever			28	18.59923	65.09194	0.00139	0.00083	0.05476
10056083 01280NS1915001 ESTRUCTURAL.			28	18.18091	62.97719	0.00135	0.00081	0.05361
10016142 03280NS1918001 ALTA FLUIDEZ			28	18.74552	65.58282	0.0014	0.00083	0.05519

10067794 23280NS1918001 ECOPACT			28	15.40647	64.01	0.00119	0.00041	0.05605
10072520 27280NS1918001 PISOS A/C 0.60+Link Ever			28	21.2378	72.4265	0.00158	0.00094	0.06283
10043120 043503S1218001 DYNAMax			35	31.69441	105.5959	0.00237	0.00137	0.09425
10047401 043503S1913001 DYNAMax	35			30.75972	102.049	0.0023	0.00133	0.09151
10081261 054.5RS1915001 TCP		4.5		26.50447	89.9919	0.00198	0.00115	0.07854