Environmental Product Declaration

Environmental Product Declaration for various ready mix concrete products produced by Holcim México Operaciones S.A. de C.V. at their Cancún facility in Cancún, Quintana Roo

ADMINISTRATIVE INFORMATION

International Certified Environmental Product Declaration

Declared Product:	This Environmental Product Declaration (EPD) covers concrete products produced by Holcim México Operaciones S.A. de C.V.. Declared unit: 1 m3 of concrete
Declaration Owner:	Holcim México Operaciones S.A. de C.V. Av. Prolongación Vasco de Quiroga #4800 Torre II Ofic. 101 Piso 1, Santa Fe Cuajimalpa de Morelos Ciudad de México, México www.holcim.com.mx
Program Operator:	Labeling Sustainability 11670 W Sunset Blvd. Los Angeles, CA www.labelingsustainability.com/
Product Category Rule:	Core PCR: ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services SubPCR: NSF International (March 2020). Product Category Rul (PCR) for Environmental Product Declarations (EPD) PCR for Concrete, v2.1 Sub 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. Mr. Jack Geilbig, EcoForm: 2624 Abelia Way, Suite 611, Knoxville, TN 37931, jgeilbig@ecoform.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 ISO 14044 and the referenced PCR. Independent verification of the declaration, according to ISO 14025:2006 Internal ☐ ; External X Third Party Verifier Geoffrey Guest, Certified 3rd Party Verifier under the International EPD Program (www.environdec.com), CSA Group (www.csaregistries.ca)
Date of Issue:	22 July 2023
Period of Validity:	5 years; valid until 21 July 2028
EPD Number:	78a18387-cd15-452f-a7cd-2d9d6e132a1f

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COMPANY DESCRIPTION

Holcim Mexico produces and markets cement, ready-mix concrete, and other products and services for construction. The company has a nationwide presence through 7 cement plants with a current installed capacity to produce 12.6 million tons per year, 23 cement distribution centers, two maritime terminals, 1 Corporate Office, plus 35 ready-mix concrete plants, seven platforms, and a Geocycle transfer center, 26 commercial partners with more than 90 ready-mix concrete plants, more than 500 mixing pots, one aggregates plant and a Technological Innovation Center for Construction (CITEC).

Sustainable Development is an integral part of Lafarge Holcim's strategy around the world. Holcim Mexico has a clear vision of the future it wants for our country, which contributes to its development. Holcim Mexico's main objective is to create value. Creating value ensures long-term business success in covering the triple bottom line (i.e., social, economic, environmental values). Finally, good operating performance and a solid return on invested capital go hand in hand with sustainable development.

Holcim continues to invest in research and development. They have the Innovation and Development Center, located in Lyon (France), with satellite locations in various regions developing a comprehensive portfolio of innovators and sustainable solutions. These include different categories: inclusive business models, water management solutions, urban mining solutions (recycled aggregates), waste treatment services, energy-efficient solutions (insulating building materials), resource-efficient solutions (high recycled content, bags soluble cement), and low CO2 building materials.

Holcim operates with the belief that they can gain an advantage by developing knowledge and brand equity in the green building segment.

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, http://labelingsustainability.com/ . This level of study is in accordance with EPD Product Category Rule (PCR) for Ready Mix Concrete published by NSF International (2019) and is a sub-PCR of International Standards Organization (ISO) 21930:2017 Sustainability in buildings and civil works - Core rules for EPDs of construction products and services; International Standards Organization (ISO) 14025:2006 Environmental labels and declarations, Type III environmental declarations-Principles and procedures; ISO 14044:2006 Environmental management, Life cycle assessment- Requirements and guidelines; and ISO 14040:2006 Environmental management, Life cycle assessment-Principles and framework. The performance of this study and its subsequent publishing is in alignment with the business-to-business (B2B) communication requirements for the environmental assessment of building products. The study does not intend to support comparative assertions and is intended to be disclosed to the public.

This project report was commissioned to differentiate Holcim México Operaciones S.A. de C.V. from their competition for the following reasons: generate an advantage for the organization; offer customers information to help them make informed product decisions; improve the environmental performance of Holcim México Operaciones S.A. de C.V. by continuously measuring, controlling and reducing the environmental impacts of their products; help project facilitators working on Leadership

in Energy and Environmental Design (LEED) projects achieve their credit goal; and to strengthen Holcim México Operaciones S.A. de C.V.'s license to operate in the community. The intended audience for this LCA report is Holcim México Operaciones S.A. de C.V.'s employees, their suppliers, project specifiers of their products, architects, and engineers. The EPD report is also available for policy makers, government officials interested in sustainability, academic professors, and LCA professionals. This LCA report does not include product comparisons from other facilities.

DESCRIPTION OF PRODUCT AND SCOPE

This EPD reports on 41 concrete mixes manufactured at the Holcim Mexico Operaciones S.A. de C.V. Cancún concrete facility in Quintana Roo, México.

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.

Mix designs: 0 to 15 MPa

Table 1: **Declared products with Mix designs: 0 to 15MPa considered in this environmental product declaration**

Mix#	Unique name/ID	Short description	Product type	28 day strength, MPa	H2O to cement ratio
6	24015NB0518	1.67 MPa 28d strength mortars and fillers	Mortars and fillers	1.67	1.9157895
7	24020NB0518	2.26 MPa 28d strength mortars and fillers	Mortars and fillers	2.26	1.7821782
8	24025NB0518	2.75 MPa 28d strength mortars and fillers	Mortars and fillers	2.75	1.9019608
9	24030NB0518	3.33 MPa 28d strength mortars and fillers	Mortars and fillers	3.33	1.2692308
10	77035ND2010	3.53 MPa 28d strength ready mix concrete	Ready mix concrete	3.53	0.6710963
11	77036ND2010	3.63 MPa 28d strength ready mix concrete	Ready mix concrete	3.63	0.6430868
12	77038ND2010	3.82 MPa 28d strength ready mix concrete	Ready mix concrete	3.82	0.6245734
13	68038ND2010	3.92 MPa 28d strength special concrete	Special concrete	3.92	0.5975976
14	77040ND2010	4 MPa 28d strength ready mix concrete	Ready mix concrete	4.00	0.6363636
15	77042ND2010	4.12 MPa 28d strength ready mix concrete	Ready mix concrete	4.12	0.6331169

16	39045ND2010	4.41 MPa 28d strength ready mix concrete	Ready mix concrete	4.41	0.5833333
17	77048ND2010	4.9 MPa 28d strength ready mix concrete	Ready mix concrete	4.90	0.5250660
18	77050ND2010	5.1 MPa 28d strength ready mix concrete	Ready mix concrete	5.10	0.5037783
19	24050NB0518	4.9 MPa 28d strength mortars and fillers	Mortars and fillers	4.90	0.9139785
20	60080NB0518	9.81 MPa 28d strength special concrete	Special concrete	9.81	1.0315789
21	70100NB2018	13.7 MPa 28d strength ready mix concrete	Ready mix concrete	13.70	1.0198020
22	73100NB0518	12.8 MPa 28d strength mortars and fillers	Mortars and fillers	12.80	1.3113772
23	70150ND2014	14.7 MPa 28d strength ready mix concrete	Ready mix concrete	14.70	0.9049051
24	76150NB1018	14.7 MPa 28d strength special concrete	Special concrete	14.70	0.2582565

Mix designs: 15 to 20 MPa

Table 2: **Declared products with Mix designs: 15 to 20MPa considered in this environmental product declaration**

Mix#	Unique name/ID	Short description	Product type	28 day strength, MPa	H2O to cement ratio
25	73150NB0518	17.2 MPa 28d strength mortars and fillers	Mortars and fillers	17.2	1.038647

Mix designs: 21 to 25 MPa

Table 3: **Declared products with Mix designs: 21 to 25MPa considered in this environmental product declaration**

Mix#	Unique name/ID	Short description	Product type	28 day strength, MPa	H2O to cement ratio
26	70200NB2018	22.6 MPa 28d strength ready mix concrete	Ready mix concrete	22.6	0.7404580
27	81200ND1000	22.1 MPa 28d strength special concrete	Special concrete	22.1	0.2553846
28	73200NB0518	22.1 MPa 28d strength mortars and fillers	Mortars and fillers	22.1	0.7745455
30	81250ND1000	21.6 MPa 28d strength special concrete	Special concrete	21.6	0.2148997

Mix designs: 26 to 30 MPa

Table 4: **Declared products with Mix designs: 26 to 30MPa considered in this environmental product declaration**

Mix#	Unique name/ID	Short description	Product type	28 day strength, MPa	H2O to cement ratio
5	37.58NB2018	27.46 MPa 28d strength ready mix concrete	Ready mix concrete	27.46	0.5818713
29	70250NB2014	27 MPa 28d strength ready mix concrete	Ready mix concrete	27.00	0.7316176
31	73250NB0518	27 MPa 28d strength mortars and fillers	Mortars and fillers	27.00	0.6463415
32	01300NB2014	29.4 MPa 28d strength ready mix concrete	Ready mix concrete	29.40	0.6589404

Mix designs: 31 to 35 MPa

Table 5: **Declared products with Mix designs: 31 to 35MPa considered in this environmental product declaration**

Mix#	Unique name/ID	Short description	Product type	28 day strength, MPa	H2O to cement ratio
33	60300NB2018	30.9 MPa 28d strength special concrete	Special concrete	30.9	0.5108108
34	73300NB0518	31.4 MPa 28d strength mortars and fillers	Mortars and fillers	31.4	0.5608466

Mix designs: 36 to 40 MPa

Table 6: **Declared products with Mix designs: 36 to 40MPa considered in this environmental product declaration**

Mix#	Unique name/ID	Short description	Product type	28 day strength, MPa	H2O to cement ratio
2	37.40ND1018	39.23 MPa 28d strength ready mix concrete	Ready mix concrete	39.23	0.3636364
4	37.557B2018	39.23 MPa 28d strength ready mix concrete	Ready mix concrete	39.23	0.4756098
35	71350NB1014	36.3 MPa 28d strength ready mix concrete	Ready mix concrete	36.30	0.5885714
36	73350NB0518	37.3 MPa 28d strength mortars and fillers	Mortars and fillers	37.30	0.4942263

Mix designs: 41 to 45 MPa

Table 7: **Declared products with Mix designs: 41 to 45MPa considered in this environmental product declaration**

Mix#	Unique name/ID	Short description	Product type	28 day strength, MPa	H2O to cement ratio
3	3745IB2018	44.13 MPa 28d strength ready mix concrete	Ready mix concrete	44.13	0.4104167
37	13400NB2014	44.1 MPa 28d strength ready mix concrete	Ready mix concrete	44.10	0.5063939

Mix designs: 46 to 50 MPa

Table 8: **Declared products with Mix designs: 46 to 50MPa considered in this environmental product declaration**

Mix#	Unique name/ID	Short description	Product type	28 day strength, MPa	H2O to cement ratio
38	67450NB2018	47.1 MPa 28d strength ready mix concrete	ready mix concrete	47.1	0.390873

Mix designs: 51 to 55 MPa

Table 9: **Declared products with Mix designs: 51 to 55MPa considered in this environmental product declaration**

Mix#	Unique name/ID	Short description	Product type	28 day strength, MPa	H2O to cement ratio
1	3735NB2018	53.94 MPa 28d strength ready mix concrete	Ready mix concrete	53.94	0.275

Mix designs: 56 to 60 MPa

Table 10: **Declared products with Mix designs: 56 to 60MPa considered in this environmental product declaration**

Mix#	Unique name/ID	Short description	Product type	28 day strength, MPa	H2O to cement ratio
39	67550NB2018	56.9 MPa 28d strength ready mix concrete	Ready mix concrete	56.9	0.3208191
40	13600NB2018	58.8 MPa 28d strength ready mix concrete	Ready mix concrete	58.8	0.3208191

Mix designs: >60 MPa

Table 11: **Declared products with Mix designs: 56 to 60MPa considered in this environmental product declaration**

Mix#	Unique name/ID	Short description	Product type	28 day strength, MPa	H2O to cement ratio
41	14650NB2018	64.7 MPa 28d strength ready mix concrete	ready mix concrete	64.7	0.2615385

READY MIX CONCRETE DESIGN COMPOSITION

The following figures provide mass breakdown (kg per functional unit) of the material composition of each ready mix concrete design considered. Please note that the presented breakdown has been randomly altered by +/-10%, and is therefore only an approximation; this manipulation is to ensure confidentiality.

Table 12: **Design composition**

Product Components	Raw Material, weight%
Cement	Proprietary
Aggregates	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:

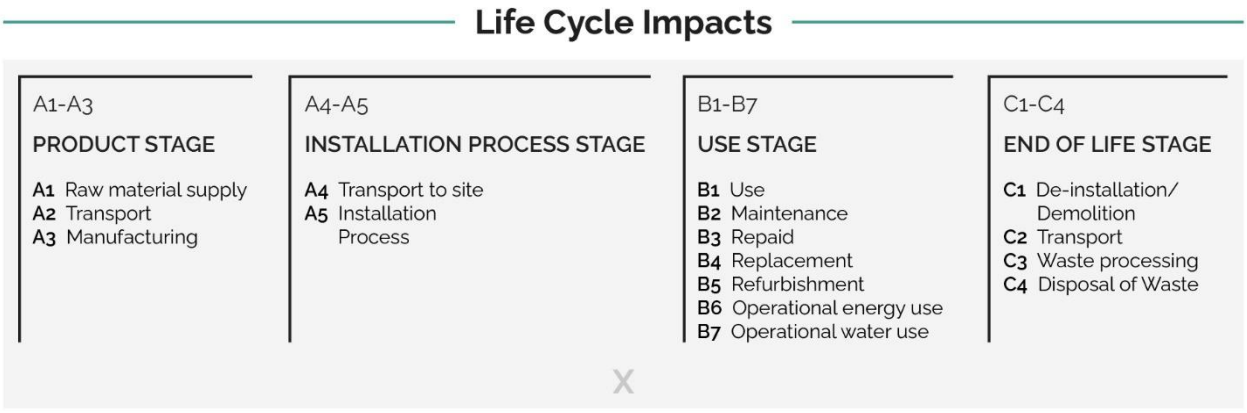

Figure 1: **General life cycle phases for consideration in a construction works system**

This is a Cradle-to-gate life cycle assessment and the following life cycle stages are included in the study:

- A1: Raw material supply (upstream processes) - Extraction, handling, and processing of the materials used in manufacturing the declared products in this LCA.

- A2: Transportation - Transportation of A1 materials from the supplier to the "gate" of the manufacturing facility (i.e. A3).
- A3: Manufacturing (core processes)- The energy and other utility inputs used to store, move, and manufacturer the declared products and to operate the facility.

As 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.

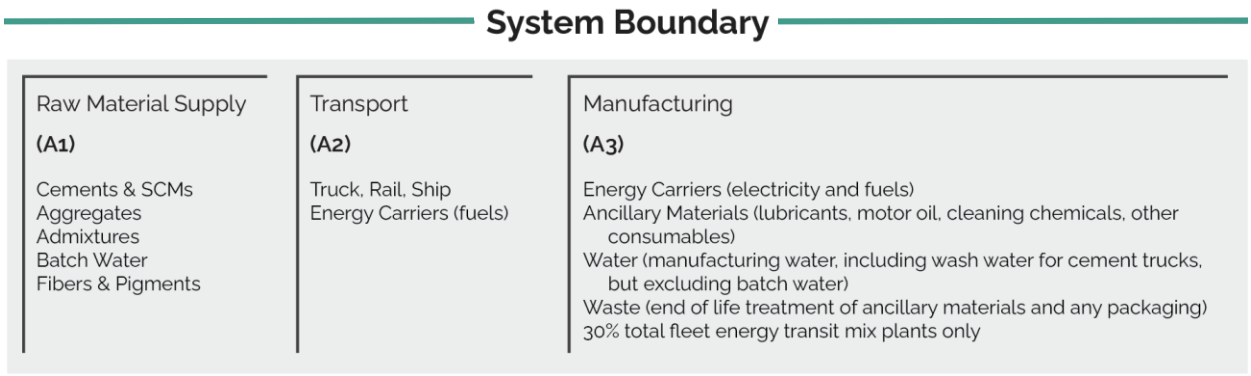

Figure 2: **General system inputs considered in the product system and categorized by modules in scope**

In addition, as according to the relevant PCR, the following requirements are excluded from this study:

- Production, manufacture and construction of A3 building/capital goods and infrastructure;
- Production and manufacture of steel production equipment, steel delivery vehicles, earth-moving equipment, and laboratory equipment;
- Personnel-related activities (travel, furniture, office supplies);
- Energy use related to company management and sales activities.

For this LCA the manufacturing plant, owned and operated by Holcim México Operaciones S.A. de C.V., is located at their Planta Cancún facility in México. All operating data is formulated using the actual data from Holcim México Operaciones S.A. de C.V.'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 spreadsheet and was then input into an RStudio environment where pre-calculated LCIA results for relevant products/activities stemming from the ecoinvent v3.8 database and a local EPD database in combination with primary data from Holcim México Operaciones S.A. de C.V. were utilized. Explanations of the contribution of each data source to this study are outlined in the section 'Data Sources and Quality'. Further LCI details for each declared product are provided in the sections 'Detailed LCI tables' and 'Transport tables' of the detailed LCA report. A parameter uncertainty analysis was also performed where key statistical results (e.g. min/mean/max etc.) are provided in the detailed LCA report.

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

Raw material transport: A combination of actual mode/distance combinations were assumed for key bulk materials whereas ecoinvent default multi-modal market mix distances were assumed for other inputs where no original data could be provided.

Electricity: Electricity consumption values are for Holcim Mexico in calendar year 2022. These values were direct reported from Holcim records. The unit process "market for electricity, medium voltage/electricity, medium voltage/MX/kWh" was used to represent the Mexico grid electricity used by the concrete plant.

Process/space heating: No fuel is used for space heating at this plant.

Fuel required for machinery: Machinery-related fuel requirements were determined from direct Holcim information. The types of machinery used include generators, pumps to pump concrete to higher elevations, and transportation equipment used for moving materials.

Waste generation: Waste generation values are directly reported from Holcim operations for both bulk waste and hazardous waste. No High-level radioactive waste is generated on-site at this facility. Wash water values are direct reported water use from Holcim México for 2022.

Recovered energy: Not applicable.

Recycled/reused material/components: The amount of returned concrete is based on Holcim primary data for the reference year, 2022..

Module A1 material losses: Due to lack of data, default loss factors of 5% were assumed. The PCR states" A3 shall include an assumption of 5% material loss unless product specific data is available and transparently reported in the project LCA report underlying the EPD;"

Direct A3 emissions accounting: Direct emissions are modeled using fuel and technology appropriate ecoinvent activities. See LCI input tables for details.

Waste transport requirements: Transportation distances are using estimated values. The waste hauler cannot guarantee the exact distances traveled due to the variation of route and actual location of disposal. Most waste disposal sites are near the plant therefore the 25 km distance is a representative estimate. Returned concrete and wash water, measured in kilograms, is based on direct Holcim reporting for the reference year 2022.

Product transport requirements: The diesel fuel used by the mixing trucks is direct primary information reported from Holcim México records for the year 2022. The concrete PCR allots 30% of the overall mixing truck total for stage A3 (manufacturing) for mixing the materials.

The following tables depict a list of assumed life cycle inventory utilized in the LCA modeling to generate the impact results across the life cycle modules in scope. An assessment of the quality of each LCI activities utilized from various sources is also provided.

Table 13: **LCI inputs assumed for module A1 (i.e. raw material supply)** ***Data Quality Assessment Key Fair=1, Good=2, Very Good =3.***

Input	LCI.activity	Data.source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
Water	tap water production, conventional with biological treatment/tap water/RoW/kg	ecoinvent v3.8	Quintana Roo	v3.8 in 2021	2	3	1	3	3
Limestone Gravel	limestone quarry operation/limestone, unprocessed/RoW/kg ; Note: modifications made (see ecoinvent activity changes table)	ecoinvent v3.8	Yucatan, Quintana Roo	v3.8 in 2021	2	3	1	3	3
Additives	market for chemical, organic/chemical, organic/GLO/kg	ecoinvent v3.8	Estado de Mexico	v3.8 in 2021	2	3	1	3	3
Cement (CPC 30) - PROVEEDOR: HOLCIM MACUSPANA	CPC 30	Progam Operator: Labeling Sustainability- EPD ID: 09cddb67-dd75-4879-9c7d-74d4664d8e10	Tabasco	30 November 2021	3	NA	3	3	3
CPC 40R CEMENTO PORTLAND GRANEL: Apaxco	CPC 40R	Progam Operator: Labeling Sustainability- EPD ID: e38f688d-1fa5-41b0-a9b1-e5b1422ea654	Estado de México	very good, 3rd party verfied facility - specific EPD dataset	3	NA	3	3	3

Cement (CPC 40) - PROVEEDOR: HOLCIM MACUSPANA	CPC 40	Progam Operator: Labeling Sustainability- EPD ID: 09cddb67-dd75-4879-9c7d-74d4664d8e10	Tabasco	30 November 2021	3	3	3	3	3
Silica fume	Waste input produced off-site	See A3 inputs	Texcoco	See A3 inputs	3	A3	3	A3	A3

DATA QUALITY ASSESSMENT

Data quality/variability requirements, as specified in the PCR, are applied. This section describes the achieved data quality relative to the ISO 14044:2006 requirements. Data quality is judged based on its precision (measured, calculated, or estimated), completeness (e.g., unreported emissions), consistency (degree of uniformity of the methodology applied within a study serving as a data source) and representativeness (geographical, temporal, and technological).

Precision: Through measurement and calculation, the manufacturers collected and provided primary data on their annual production. For accuracy, the LCA practitioner and 3rd Party Verifier validated the plant gate-to-gate data.

Completeness: All relevant specific processes, including inputs (raw materials, energy, and ancillary materials) and outputs (emissions and production volume) were considered and modeled to represent the specified and declared products. The majority of relevant background materials and processes were taken from ecoinvent v3.8 LCI datasets where relatively recent region-specific electricity inputs were utilized. The most relevant EPDs requiring key A1 inputs were also utilized where readily available.

Consistency: To ensure consistency, the same modeling structure across the respective product systems was utilized for all inputs, which consisted of raw material inputs and ancillary material, energy flows, water resource inputs, product, and co-products outputs, returned and recovered Ready Mix Concrete materials, emissions to air, water and soil, and waste recycling and treatment. The same background LCI datasets from the ecoinvent v3.8 database were used across all product systems. Crosschecks concerning the plausibility of mass and energy flows were continuously conducted. The LCA team conducted mass and energy balances at the plant and selected process level to maintain a high level of consistency.

Reproducibility: Internal reproducibility is possible since the data and the models are stored and available in a machine readable project file for all foreground and background processes, and in Labeling Sustainability's proprietary Ready Mix Concrete LCA calculator* for all production facility and product-specific calculations. A considerable level of transparency is provided throughout the detailed LCA report as the specifications and material quantity make-up for the declared products are presented and key primary and secondary LCI data sources are summarized. The provision of more detailed publicly accessible data to allow full external reproducibility was not possible due to reasons of confidentiality.

*Labeling Sustainability has developed a proprietary tool that allows the calculation of PCR-compliant LCA results for Ready Mix Concrete product designs. The tool auto-calculates results by scaling base-unit technosphere inputs (i.e. 1 kg sand, 1 kWh electricity, etc.) to replicate the reference flow conversions that take place in any typical LCA software like openLCA or SimaPro. The tool was tested against several LCAs performed in openLCA and the tool generated identical results to those realized in openLCA across every impact category and inventory metric (where comparisons could be readily made).

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

- Time related coverage of the manufacturing processes' primary collected data from 2022-01-01 to 2022-12-31.
- Upstream (background) LCI data was either the PCR specified default (if applicable) or more appropriate LCI datasets as found in the country-adjusted ecoinvent v3.8 database.
- Geographical coverage for inputs required by the A3 facility(ies) is representative of its region of focus; other upstream and background processes are based on US, North American, or global average data and adjusted to regional electricity mixes when relevant.
- Technological coverage is typical or average and specific to the participating facilities for all primary data.

ENVIRONMENTAL INDICATORS AND INVENTORY METRICS

Per the PCR, this EPD supports the life cycle impact assessment indicators and inventory metrics as listed in the tables below. As specified in the PCR, the most recent US EPA Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI), impact categories were utilized as they provide a North American context for the mandatory category indicators to be included in the EPD. Additionally, the PCR requires a set of inventory metrics to be reported with the LCIA indicators (see tables below).

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.

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.

Mix designs: 0 to 15 MPa

Table 14: **Total life cycle (across modules in scope) impact results for Mix designs: 0 to 15MPa, assuming the geometric mean point values on a per 1 m3 of concrete basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf

Unit	moles of H+-Eq	kg N	kg CO2-Eq	kg CFC-11-Eq	kg NOx-Eq	kg Sb-Eq	MJ, net calorific value
Minimum	22.1	0.0874	157	1.76e-05	0.313	0.000444	1310
Maximum	61.2	0.146	527	4.47e-05	0.859	0.00126	3310
Mean	38.5	0.113	304	2.94e-05	0.543	0.000787	2170
Median	43.4	0.121	342	3.31e-05	0.612	0.000887	2440
24015NB0518	22.1	0.0874	157	1.76e-05	0.313	0.000444	1310
24020NB0518	22.6	0.0881	162	1.79e-05	0.32	0.000455	1340
24025NB0518	22.5	0.0878	161	1.78e-05	0.318	0.000452	1330
24030NB0518	27.1	0.0946	207	2.1e-05	0.382	0.000547	1550
77035ND2010	43.9	0.121	348	3.34e-05	0.619	0.000899	2470
77036ND2010	44.9	0.123	358	3.42e-05	0.633	0.000921	2520
77038ND2010	43.4	0.121	342	3.31e-05	0.612	0.000887	2440
68038ND2010	47.3	0.127	378	3.59e-05	0.667	0.000967	2640
77040ND2010	44.8	0.123	355	3.41e-05	0.631	0.000916	2510
77042ND2010	44.8	0.123	355	3.41e-05	0.631	0.000916	2510
39045ND2010	46.9	0.126	375	3.56e-05	0.66	0.000959	2620
77048ND2010	51.6	0.133	419	3.89e-05	0.727	0.00106	2870
77050ND2010	53.4	0.136	435	4.01e-05	0.752	0.0011	2960
24050NB0518	31.5	0.102	240	2.44e-05	0.444	0.000642	1810
60080NB0518	30.1	0.099	236	2.31e-05	0.424	0.000614	1710
70100NB2018	34.9	0.108	263	2.72e-05	0.493	0.00071	2010
73100NB0518	30.3	0.1	226	2.36e-05	0.428	0.000617	1760
70150ND2014	28.5	0.0951	240	2.13e-05	0.401	0.000583	1580
76150NB1018	61.2	0.146	527	4.47e-05	0.859	0.00126	3310

b) Inventory Metrics:

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW	CBWC	CWWC	CHW	CNHW
Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m3	m3	kg waste	kg waste	m3	m3	kg	kg
Minimum	1420	37.2	1380	34.7	0.00166	0.341	72.1	0.00241	0.141	1.43e-05	0.0182	30.2
Maximum	3720	143	3580	88.2	0.00734	0.638	108	0.00457	0.23	1.43e-05	0.0182	30.2
Mean	2400	79.3	2320	57.6	0.0038	0.492	94.6	0.00362	0.201	1.43e-05	0.0182	30.2
Median	2700	90.1	2600	64.9	0.00425	0.519	101	0.00405	0.206	1.43e-05	0.0182	30.2
24015NB0518	1420	37.2	1380	34.7	0.00167	0.341	81.8	0.00268	0.191	1.43e-05	0.0182	30.2
24020NB0518	1450	37.9	1420	35.2	0.00166	0.344	81.8	0.00269	0.189	1.43e-05	0.0182	30.2
24025NB0518	1440	38.8	1400	35	0.00169	0.359	81.1	0.00265	0.204	1.43e-05	0.0182	30.2
24030NB0518	1700	51.9	1650	41	0.00235	0.405	82.6	0.00283	0.208	1.43e-05	0.0182	30.2

77035ND2010	2720	92.5	2650	65.5	0.00446	0.546	101	0.00405	0.212	1.43e-05	0.0182	30.2
77036ND2010	2790	94.6	2700	67	0.00451	0.552	102	0.00411	0.21	1.43e-05	0.0182	30.2
77038ND2010	2700	90.1	2600	64.9	0.00425	0.519	102	0.00406	0.192	1.43e-05	0.0182	30.2
68038ND2010	2930	100	2820	70.1	0.00497	0.57	105	0.00428	0.209	1.43e-05	0.0182	30.2
77040ND2010	2780	93.8	2680	66.8	0.00444	0.546	103	0.00412	0.206	1.43e-05	0.0182	30.2
77042ND2010	2780	93.4	2690	66.6	0.00452	0.544	103	0.00412	0.205	1.43e-05	0.0182	30.2
39045ND2010	2900	98.3	2810	69.5	0.00478	0.56	104	0.00423	0.202	1.43e-05	0.0182	30.2
77048ND2010	3180	112	3070	76	0.00535	0.609	107	0.00447	0.209	1.43e-05	0.0182	30.2
77050ND2010	3280	114	3160	78.2	0.0056	0.625	108	0.00457	0.21	1.43e-05	0.0182	30.2
24050NB0518	1980	60.9	1930	48.1	0.00291	0.408	89.4	0.00323	0.178	1.43e-05	0.0182	30.2
60080NB0518	1880	60.7	1820	45.4	0.00294	0.431	83.5	0.00294	0.206	1.43e-05	0.0182	30.2
70100NB2018	2210	66.3	2130	53.1	0.00305	0.469	96.9	0.00364	0.216	1.43e-05	0.0182	30.2
73100NB0518	1930	56.9	1870	46.6	0.00257	0.448	90.3	0.00324	0.23	1.43e-05	0.0182	30.2
70150ND2014	1750	63.6	1690	41.9	0.00307	0.429	72.1	0.00241	0.202	1.43e-05	0.0182	30.2
76150NB1018	3720	143	3580	88.2	0.00734	0.638	102	0.00448	0.141	1.43e-05	0.0182	30.2

Mix designs: 15 to 20 MPa

Table 15: **Total life cycle (across modules in scope) impact results for Mix designs: 15 to 20MPa, assuming the geometric mean point values on a per 1 m3 of concrete basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	**AP**	**EP**	**GWP**	**ODP**	**PCOP**	**ADPe**	**ADPf**
Unit	**moles of H+-Eq**	**kg N**	**kg CO2-Eq**	**kg CFC-11-Eq**	**kg NOx-Eq**	**kg Sb-Eq**	**MJ, net calorific value**
73150NB0518	34.3	0.107	263	2.65e-05	0.484	0.000703	1970

b) Inventory Metrics:

Indicator/LCI Metric	**TPE**	**RE**	**NRE**	**NRR**	**RR**	**WDP**	**LFW**	**LFHW**	**CBWC**	**CWWC**	**CHW**	**CNHW**

Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m3	m3	kg waste	kg waste	m3	m3	kg	kg
73150NB0518	2180	66.2	2100	52.1	0.00322	0.479	93.4	0.00347	0.226	1.43e-05	0.0182	30.2

Mix designs: 21 to 25 MPa

Table 16: **Total life cycle (across modules in scope) impact results for Mix designs: 21 to 25MPa, assuming the geometric mean point values on a per 1 m3 of concrete basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf
Unit	moles of H+-Eq	kg N	kg CO2-Eq	kg CFC-11-Eq	kg NOx-Eq	kg Sb-Eq	MJ, net calorific value
Minimum	40.2	0.116	314	3.09e-05	0.568	0.000821	2280
Maximum	47.2	0.126	385	3.57e-05	0.667	0.000953	2590
Mean	43.3	0.12	346	3.3e-05	0.611	0.00088	2420
Median	42.9	0.12	344	3.26e-05	0.605	0.000873	2400
70200NB2018	40.2	0.116	314	3.09e-05	0.568	0.000821	2280
81200ND1000	44.6	0.122	363	3.38e-05	0.63	9e-04	2450
73200NB0518	41.2	0.117	324	3.14e-05	0.58	0.000847	2340
81250ND1000	47.2	0.126	385	3.57e-05	0.667	0.000953	2590

b) Inventory Metrics:

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW	CBWC	CWWC	CHW	CNHW
Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m3	m3	kg waste	kg waste	m3	m3	kg	kg
Minimum	2520	81.9	2430	60.3	0.00387	0.426	98.5	0.00386	0.0788	1.43e-05	0.0182	30.2
Maximum	2880	102	2750	68.6	0.0049	0.535	101	0.00413	0.224	1.43e-05	0.0182	30.2
Mean	2670	90.7	2570	63.9	0.00438	0.476	99.4	0.00395	0.148	1.43e-05	0.0182	30.2
Median	2640	89.5	2550	63.4	0.00438	0.472	99	0.00391	0.146	1.43e-05	0.0182	30.2
70200NB2018	2520	81.9	2430	60.3	0.00387	0.504	99.2	0.00387	0.204	1.43e-05	0.0182	30.2
81200ND1000	2720	93.8	2610	64.8	0.00472	0.426	98.8	0.00395	0.0872	1.43e-05	0.0182	30.2
73200NB0518	2570	85.2	2490	62	0.00403	0.535	98.5	0.00386	0.224	1.43e-05	0.0182	30.2
81250ND1000	2880	102	2750	68.6	0.0049	0.439	101	0.00413	0.0788	1.43e-05	0.0182	30.2

Mix designs: 26 to 30 MPa

Table 17: **Total life cycle (across modules in scope) impact results for Mix designs: 26 to 30MPa, assuming the geometric mean point values on a per 1 m3 of concrete basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf
Unit	moles of H+-Eq	kg N	kg CO2-Eq	kg CFC-11-Eq	kg NOx-Eq	kg Sb-Eq	MJ, net calorific value
Minimum	41.9	0.119	326	3.22e-05	0.591	0.000856	2370
Maximum	48.9	0.129	389	3.72e-05	0.69	0.001	2750
Mean	45.3	0.124	359	3.46e-05	0.639	0.00093	2560
Median	45.3	0.124	361	3.44e-05	0.638	0.000931	2550
37.58NB2018	48.9	0.129	389	3.72e-05	0.69	0.001	2750
70250NB2014	41.9	0.119	326	3.22e-05	0.591	0.000856	2370
73250NB0518	46.3	0.125	371	3.5e-05	0.651	0.000954	2600
01300NB2014	44.3	0.122	351	3.38e-05	0.625	0.000908	2500

b) Inventory Metrics:

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW	CBWC	CWWC	CHW	CNHW
Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m3	m3	kg waste	kg waste	m3	m3	kg	kg
Minimum	2620	84.9	2530	62.9	0.00398	0.521	102	0.00404	0.209	1.43e-05	0.0182	30.2
Maximum	3050	103	2930	72.9	0.00505	0.582	107	0.00444	0.223	1.43e-05	0.0182	30.2
Mean	2830	94.8	2730	67.7	0.00458	0.557	103	0.00418	0.212	1.43e-05	0.0182	30.2
Median	2820	95.7	2720	67.6	0.00464	0.562	102	0.00412	0.209	1.43e-05	0.0182	30.2
37.58NB2018	3050	103	2930	72.9	0.00505	0.582	107	0.00444	0.209	1.43e-05	0.0182	30.2
70250NB2014	2620	84.9	2530	62.9	0.00398	0.521	102	0.00404	0.209	1.43e-05	0.0182	30.2
73250NB0518	2880	99.1	2790	69	0.00481	0.579	102	0.00412	0.223	1.43e-05	0.0182	30.2
01300NB2014	2760	92.3	2660	66.1	0.00446	0.545	102	0.00411	0.209	1.43e-05	0.0182	30.2

Mix designs: 31 to 35 MPa

Table 18: **Total life cycle (across modules in scope) impact results for Mix designs: 31 to 35MPa, assuming the geometric mean point values on a per 1 m3 of concrete basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf
Unit	moles of H+-Eq	kg N	kg CO2-Eq	kg CFC-11-Eq	kg NOx-Eq	kg Sb-Eq	MJ, net calorific value
Minimum	51.2	0.132	413	3.85e-05	0.72	0.00106	2860
Maximum	51.4	0.133	416	3.88e-05	0.723	0.00106	2870
Mean	51.3	0.132	414	3.87e-05	0.722	0.00106	2860
Median	51.3	0.132	414	3.87e-05	0.722	0.00106	2860
60300NB2018	51.4	0.133	413	3.88e-05	0.723	0.00106	2870
73300NB0518	51.2	0.132	416	3.85e-05	0.72	0.00106	2860

b) Inventory Metrics:

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW	CBWC	CWWC	CHW	CNHW
Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m3	m3	kg waste	kg waste	m3	m3	kg	kg
Minimum	3180	110	3070	75.9	0.00543	0.593	105	0.00439	0.198	1.43e-05	0.0182	30.2
Maximum	3190	113	3070	76.3	0.0055	0.622	108	0.00453	0.223	1.43e-05	0.0182	30.2
Mean	3180	112	3070	76.1	0.00546	0.607	106	0.00446	0.211	1.43e-05	0.0182	30.2
Median	3180	112	3070	76.1	0.00546	0.607	106	0.00446	0.211	1.43e-05	0.0182	30.2
60300NB2018	3180	110	3070	76.3	0.00543	0.593	108	0.00453	0.198	1.43e-05	0.0182	30.2
73300NB0518	3190	113	3070	75.9	0.0055	0.622	105	0.00439	0.223	1.43e-05	0.0182	30.2

Mix designs: 36 to 40 MPa

Table 19: **Total life cycle (across modules in scope) impact results for Mix designs: 36 to 40MPa, assuming the geometric mean point values on a per 1 m3 of concrete basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf
Unit	moles of H+-Eq	kg N	kg CO2-Eq	kg CFC-11-Eq	kg NOx-Eq	kg Sb-Eq	MJ, net calorific value
Minimum	48.6	0.128	392	3.67e-05	0.685	0.000997	2710

Maximum	72.9	0.167	592	5.47e-05	1.03	0.0015	4040
Mean	58.4	0.144	475	4.39e-05	0.823	0.0012	3250
Median	56	0.14	458	4.2e-05	0.788	0.00116	3120
37.40ND1018	72.9	0.167	592	5.47e-05	1.03	0.0015	4040
37.557B2018	55.5	0.139	450	4.18e-05	0.781	0.00114	3090
71350NB1014	48.6	0.128	392	3.67e-05	0.685	0.000997	2710
73350NB0518	56.6	0.141	466	4.23e-05	0.796	0.00117	3150

b) Inventory Metrics:

Indicator/LCI Metric	**TPE**	**RE**	**NRE**	**NRR**	**RR**	**WDP**	**LFW**	**LFHW**	**CBWC**	**CWWC**	**CHW**	**CNHW**
Unit	**MJ-Eq**	**MJ-Eq**	**MJ-Eq**	**kg**	**m3**	**m3**	**kg waste**	**kg waste**	**m3**	**m3**	**kg**	**kg**
Minimum	3020	103	2900	71.9	0.00497	0.591	104	0.00429	0.205	1.43e-05	0.0182	30.2
Maximum	4510	159	4320	107	0.00787	0.776	134	0.00616	0.225	1.43e-05	0.0182	30.2
Mean	3610	126	3470	86	0.00625	0.668	115	0.00498	0.214	1.43e-05	0.0182	30.2
Median	3460	121	3330	82.6	0.00608	0.653	110	0.00473	0.213	1.43e-05	0.0182	30.2
37.40ND1018	4510	159	4320	107	0.00787	0.776	134	0.00616	0.21	1.43e-05	0.0182	30.2
37.557B2018	3420	118	3290	81.8	0.00592	0.635	112	0.00478	0.205	1.43e-05	0.0182	30.2
71350NB1014	3020	103	2900	71.9	0.00497	0.591	104	0.00429	0.216	1.43e-05	0.0182	30.2
73350NB0518	3500	124	3370	83.4	0.00623	0.671	109	0.00468	0.225	1.43e-05	0.0182	30.2

Mix designs: 41 to 45 MPa

Table 20: **Total life cycle (across modules in scope) impact results for Mix designs: 41 to 45MPa, assuming the geometric mean point values on a per 1 m3 of concrete basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	**AP**	**EP**	**GWP**	**ODP**	**PCOP**	**ADPe**	**ADPf**
Unit	**moles of H+-Eq**	**kg N**	**kg CO2-Eq**	**kg CFC-11-Eq**	**kg NOx-Eq**	**kg Sb-Eq**	**MJ, net calorific value**
Minimum	54.1	0.137	435	4.08e-05	0.762	0.00111	3020
Maximum	62.1	0.149	512	4.64e-05	0.874	0.00128	3430
Mean	58.1	0.143	474	4.36e-05	0.818	0.0012	3220
Median	58.1	0.143	474	4.36e-05	0.818	0.0012	3220
37.45IB2018	62.1	0.149	512	4.64e-05	0.874	0.00128	3430
13400NB2014	54.1	0.137	435	4.08e-05	0.762	0.00111	3020

b) Inventory Metrics:

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW	CBWC	CWWC	CHW	CNHW
Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m3	m3	kg waste	kg waste	m3	m3	kg	kg
Minimum	3350	117	3220	79.9	0.00558	0.624	112	0.00475	0.207	1.43e-05	0.0182	30.2
Maximum	3820	140	3680	90.9	0.00685	0.695	116	0.00511	0.208	1.43e-05	0.0182	30.2
Mean	3580	128	3450	85.4	0.00622	0.66	114	0.00493	0.208	1.43e-05	0.0182	30.2
Median	3580	128	3450	85.4	0.00622	0.66	114	0.00493	0.208	1.43e-05	0.0182	30.2
37.45IB2018	3820	140	3680	90.9	0.00685	0.695	116	0.00511	0.207	1.43e-05	0.0182	30.2
13400NB2014	3350	117	3220	79.9	0.00558	0.624	112	0.00475	0.208	1.43e-05	0.0182	30.2

Mix designs: 46 to 50 MPa

Table 21: **Total life cycle (across modules in scope) impact results for Mix designs: 46 to 50MPa, assuming the geometric mean point values on a per 1 m3 of concrete basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf
Unit	moles of H+-Eq	kg N	kg CO2-Eq	kg CFC-11-Eq	kg NOx-Eq	kg Sb-Eq	MJ, net calorific value
67450NB2018	65.4	0.155	537	4.89e-05	0.921	0.00134	3610

b) Inventory Metrics:

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW	CBWC	CWWC	CHW	CNHW
Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m3	m3	kg waste	kg waste	m3	m3	kg	kg
67450NB2018	4030	144	3850	95.6	0.00723	0.719	121	0.00541	0.207	1.43e-05	0.0182	30.2

Mix designs: 51 to 55 MPa

Table 22: **Total life cycle (across modules in scope) impact results for Mix designs: 51 to 55MPa, assuming the geometric mean point values on a per 1 m3 of concrete basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf
Unit	moles of H+-Eq	kg N	kg CO2-Eq	kg CFC-11-Eq	kg NOx-Eq	kg Sb-Eq	MJ, net calorific value
37.35NB2018	78.5	0.182	625	6.47e-05	1.08	0.0019	4870

b) Inventory Metrics:

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW	CBWC	CWWC	CHW	CNHW
Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m3	m3	kg waste	kg waste	m3	m3	kg	kg
37.35NB2018	5370	183	5190	130	0.00878	0.776	179	0.00834	0.173	1.43e-05	0.0182	30.2

Mix designs: 56 to 60 MPa

Table 23: **Total life cycle (across modules in scope) impact results for Mix designs: 56 to 60MPa, assuming the geometric mean point values on a per 1 m3 of concrete basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf
Unit	moles of H+-Eq	kg N	kg CO2-Eq	kg CFC-11-Eq	kg NOx-Eq	kg Sb-Eq	MJ, net calorific value
Minimum	73.3	0.166	610	5.43e-05	1.03	0.00152	4030
Maximum	73.3	0.166	610	5.43e-05	1.03	0.00152	4030
Mean	73.3	0.166	610	5.43e-05	1.03	0.00152	4030
Median	73.3	0.166	610	5.43e-05	1.03	0.00152	4030
67550NB2018	73.3	0.166	610	5.43e-05	1.03	0.00152	4030
13600NB2018	73.3	0.166	610	5.43e-05	1.03	0.00152	4030

b) Inventory Metrics:

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW	CBWC	CWWC	CHW	CNHW
Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m3	m3	kg waste	kg waste	m3	m3	kg	kg
Minimum	4490	165	4310	107	0.00824	0.779	125	0.00578	0.197	1.43e-05	0.0182	30.2
Maximum	4510	166	4350	107	0.00843	0.779	125	0.00578	0.197	1.43e-05	0.0182	30.2
Mean	4500	166	4330	107	0.00834	0.779	125	0.00578	0.197	1.43e-05	0.0182	30.2
Median	4500	166	4330	107	0.00834	0.779	125	0.00578	0.197	1.43e-05	0.0182	30.2
67550NB2018	4510	166	4310	107	0.00824	0.779	125	0.00578	0.197	1.43e-05	0.0182	30.2
13600NB2018	4490	165	4350	107	0.00843	0.779	125	0.00578	0.197	1.43e-05	0.0182	30.2

Mix designs: >60 MPa

Table 24: **Total life cycle (across modules in scope) impact results for Mix designs: >60MPa, assuming the geometric mean point values on a per 1 m3 of concrete basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf
Unit	moles of H+-Eq	kg N	kg CO2-Eq	kg CFC-11-Eq	kg NOx-Eq	kg Sb-Eq	MJ, net calorific value
14650NB2018	78.4	0.174	663	5.76e-05	1.1	0.00163	4290

b) Inventory Metrics:

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW	CBWC	CWWC	CHW	CNHW
Unit	MJ-Eq	MJ-Eq	MJ-Eq	kg	m3	m3	kg waste	kg waste	m3	m3	kg	kg
14650NB2018	4820	182	4630	114	0.0093	0.809	125	0.00591	0.178	1.43e-05	0.0182	30.2

ADDITIONAL ENVIRONMENTAL INFO

No regulated substances of very high concern are utilized on site.

REFERENCES

ASTM Standards:

- ASTM A36/A36M Standard Specification for Carbon Structural Steel
- ASTM A108 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
- ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- ASTM A184 Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
- ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength
- ASTM A416/A416M Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
- ASTM A555/A555M Standard Specification for General Requirements for Stainless Steel Wire and Wire Rods
- ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
- ASTM A706/A706M Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
- ASTM A767/A767M Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
- ASTM A775/A775M Standard Specification for Epoxy-Coated Steel Reinforcing Bars
- ASTM A820/A820M Standard Specification for Steel Fibers for Fiber-Reinforced Concrete
- ASTM A884/A884M Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
- ASTM A934/A934M Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
- ASTM A1064/A1064M Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- ASTM C33/C33M Standard Specification for Concrete Aggregates
- ASTM C94 Standard Specification for Ready-Mixed Concrete
- ASTM C150/C150M Standard Specification for Portland Cement
- ASTM C260/C260M Standard Specification for Air-Entraining Admixtures for Concrete
- ASTM C595 Standard Specification for Blended Hydraulic Cements
- ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- ASTM C979/C979M Standard Specification for Pigments for Integrally Colored Concrete
- ASTM C989/C989M Standard Specification for Slag Cement for Use in Concrete and Mortars

- ASTM C1017/C1017M Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
- ASTM C1116/C1116M Standard Specification for Fiber-Reinforced Concrete
- ASTM C1157/C1157M Standard Performance Specification for Hydraulic Cement
- ASTM C1240 Standard Specification for Silica Fume Used in Cementitious Mixtures
- ASTM C1602/C1602M Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
- ASTM G109 Standard Test Method for Determining Effects of Chemical Admixtures on Corrosion of Embedded Steel Reinforcement in Concrete Exposed to Chloride Environments
- ASTM C330/C330M Standard Specification for Lightweight Aggregates for Structural Concrete
- ASTM C494/C494M Standard Specification for Chemical Admixtures for Concrete

CSA Standards:

- CAN/CGSB-1.40 Anticorrosive Structural Steel Alkyd Primer
- CAN/CSA G30.18 Carbon steel bars for concrete reinforcement
- CAN/CSA A3000 Cementitious Materials Compendium
- CAN/CSA G40.20/G40.21 General requirements for rolled or welded structural quality steel / Structural quality steel
- CAN/CSA A23.1/A23.2 Concrete Materials and Methods of Concrete Construction/Test methods and Standard Practices for Concrete
- CAN/CSA A23.4 Precast concrete - Materials and construction
- CSA S806 Design and construction of building structures with fiber-reinforced polymers

ISO Standards:

- ISO 6707-1: 2014 Buildings and Civil Engineering Works - Vocabulary - Part 1: General Terms
- ISO 14021:1999 Environmental Labels and Declarations - Self-declared Environmental Claims (Type II Environmental Labeling)
- ISO 14025:2006 Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures
- ISO 14040:2006 Environmental Management - Life Cycle Assessment - Principles and Framework
- ISO 14044:2006 Environmental Management - Life Cycle Assessment - Requirements and Guidelines
- ISO 14067:2018 Greenhouse Gases - Carbon Footprint of Products - Requirements and Guidelines for Quantification
- ISO 14050:2009 Environmental Management - Vocabulary
- ISO 21930:2017 Sustainability in Building Construction - Environmental Declaration of Building Products

EN Standards:

- EN 16757 Sustainability of construction works - Environmental product declarations - Product Category Rules for concrete and concrete elements
- EN 15804 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

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