By: HR CEMENT limited

Environmental Product Declaration

FOR ECO-CEM High Performance, Low Carbon

Ground granulated blast furnace slag

In accordance with ISO 14025:2006 and EN 15804:2021+A2:2019/AC:2021

AUSTRALASIA EPD® ENVIRONMENTAL PRODUCT DECLARATION

EPD® THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM EPD VERIFIED

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https://www.environdec.com/

Programme operator: EPD International AB

Regional Programme: EPD Australasia Limited
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at https://epd-australasia.com/


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Contents

HR Cement Limited has the sole ownership, liability, and responsibility for this EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

HR Cement Ltd

Concrete relies heavily on cement as a key ingredient. In New Zealand alone, traditional cement use amounts to over 1.5 million tonnes annually, resulting in the generation of 1.23 million tonnes of CO_2.

Aotearoa New Zealand is committed to achieve net zero carbon by 2050. HR Cement is a leading company in the cementitious products sector helping to achieve the nation's climate goals.

We are committed to producing a range of high-performance, low-carbon cement-replacement materials, such as ground granulated blast-furnace slag (GGBFS).

We are working to provide robust decarbonisation solutions for our nation.

HR Cement is a leading cement and GGBFS manufacturer, servicing key markets in the upper North Island from its integrated plant in Mount Maunganui, Bay of Plenty. Since starting production in 2012, our goal has been to produce better quality cement and GGBFS, and this philosophy has resulted in market leading products.

Eco-Cem is classed as a GGBFS, as per AS 3582.2-2016.

We produce 12 kilo tonnes of Eco-cem per year and up to 200 kilo tonnes of Xtra-cem which are delivered to our many satisfied customers with one of our 16 dedicated tankers. HR Cement brings a fresh and innovative approach to the industry.

Certified Processing

HR Cement is ISO 9001 certified for the entire production process. In addition to our on-site quality control laboratory, products are independently tested by IANZ / NATA accredited laboratories to ensure our results can be trusted to always conform with AS 3582.2-2016. HR Cement continually tests their products on a 24/7 and year-round basis and publishes results on our website.

New Zealand Owned and Operated

HR Cement was born of a desire to provide a better cement to the New Zealand market by Managing Director Chris Hall (53 Aerodrome Rd, Mount Maunganui 3116, New Zealand, phone 0508 236-368). The concept is simple - to provide an alternative cement supply at a competitive rate.

Satisfied Customers

Our customer base has grown as our reputation has spread and we look forward to continuing growth with new products and new markets.

A Culture of Environmental Responsibility

A formal Environmental Management System is used to ensure all facets are well managed.

Product Information

Product covered by EPD

This EPD applies to HR Cement's cementitious material product Eco-cem (ground granulated blast furnace slag (GGBFS)) produced at 60 Aerodrome Road, Mount Maunganui 3116.

Eco-cem is a low-carbon cementitious material designed as a replacement for standard cement. Eco-cem can be used in commercial and domestic concrete, precast, and masonry products. Eco-cem is manufactured to provide a consistent strength, durability, workability and finished appearance.

All HR Cement products are manufactured according to strict quality control levels to ensure product performance and uniformity. Use the QR code on page 2 for product data sheet and test certificate.

Table 1: Industry classification

Product	Classification	Code	Category
Product name/type	UN CPC Ver.2.1	3931	Slag, dross, scalings and other waste from the manufacture of iron or steel
	UN CPC Ver.2.1	374	Plaster, lime and cement
	ANZSIC 2006	2090	Other Non-Metallic Mineral Product Manufacturing

Declared Unit

The declared unit is 1 000 kg of Eco-cem slag at HR Cement plant gate, ready to be distributed in bulk, to be used in the preparation of concretes, mortars and grouts.

Content Declaration

Table 2: Content declaration

Product components	Weight, kg	Post-consumer recycled material, weight-% of product	Biogenic material, weight-% of product	Biogenic material, kg C/product or declared unit
Granulated blast furnace slag (GBFS)*	1 000	0	0	0
Sum	1 000	0	0	0

* Granulated blast furnace slag component contains 6% moisture content which is removed from the final product.

Table 3: Content declaration of packaging for Eco-cem (per 1 000 kg)

Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/product or declared unit
Sum	**0**	**0**	**0**

Application

Eco-Cem can be used in commercial and domestic concrete, precast, and masonry products. Eco-Cem is manufactured to provide a consistent strength, durability, workability and finished appearance. Ecocem is a low-carbon cementitious material designed as a replacement for standard cement. Carbonation, which depends on application, is not included in this EPD.

Standards

Eco-Cem complies with the requirements specified in Australian Standard: AS 3582.2-2016 (Supplementary cementitious materials Part 2: Slag—Ground granulated blast-furnace).

Dangerous substances from the candidate list of SVHC for Authorisation

HR Cement's Eco-cem does not contain — or release during use — any of the hazardous materials identified in the 'Candidate List of Substances of Very High Concern' (SVHC) at a concentration of greater than 0.1% of the mass. For more information, the material Safety Data Sheet can be found at: https://hrcl.co.nz/wp-content/uploads/2023/06/SDS-HR-Cement-Eco-Cem_May-2023.pdf.

Regular Testing

Eco-Cem is tested regularly in accordance with the relevant sections of AS3583:2006: Supplementary cementitious materials Part 2: Slag—Ground granulated blast-furnace. Sample testing is performed utilising our internal Quality Control laboratory and also external IANZ / NATA approved Laboratories.

Packaging

Eco-Cem is supplied in bulk tanker, so there is no packaging.

Manufacturing Process

Bulk Store

Granulated blast furnace slag (GBFS) is stored in our indoor bulk storage facility located in our manufacturing location at HR Cement Limited, 60 Aerodrome Rd, Mount Maunganui.

Feed

GBFS raw material is then loaded by front-end loader from the bulk stores into the weigh bins and conveyed to the dryer.

Drying

A 10 m natural gas fuelled rotary dryer is used to dry the GBFS to less than 1% moisture. Exit temperature for the dryer is 85 °C. Air and fine dust from the dryer are split between the grinding classifier circuit and the ball mill. Higher particle size material drops through a chute into the ball mill 2 inlet.

Grinding Mill & Classification

GBFS is ground to produce the fine GGBFS in a single chamber ball mill. The finer on-grade GGBFS is pneumatically conveyed to the ball mill cyclone and baghouse as a finished product. Coarser material is conveyed to the air classifier, where it is classified by a spinning rotor into two streams. Finer material is sent to the classifier cyclones and bag filter as finished product. The coarser cut from the classifier is recirculated back to the ball mill for regrinding. Recirculation load is around 200%.

Quality Control

Ensuring consistent high-quality GGBFS is what we must do to satisfy the needs of our customers. We have five 100-tonne silos that are used for Quality Assurance.

Before being released to the dispatch silos, all products are held in these Quality Control silos until it is shown through two hourly compliance testing in in our Quality Control laboratory, to meet standards.

In addition we use Verum (IANZ accredited) in Christchurch and Cement Australia (NATA accredited) to ensure independent validity as well.

Storage

Finished GGBFS product from the mill and classifier is collected in a screw conveyor and then pneumatically conveyed to the quality control silos. After quality control checks the material is conveyed pneumatically to the Eco-cem bulk silo.

Dispatch

Finished GGBFS product is conveyed pneumatically from the bulk silo to the dispatch silo. From here Eco-cem is loaded into bulk cement tankers for transport to customers.

System Boundaries

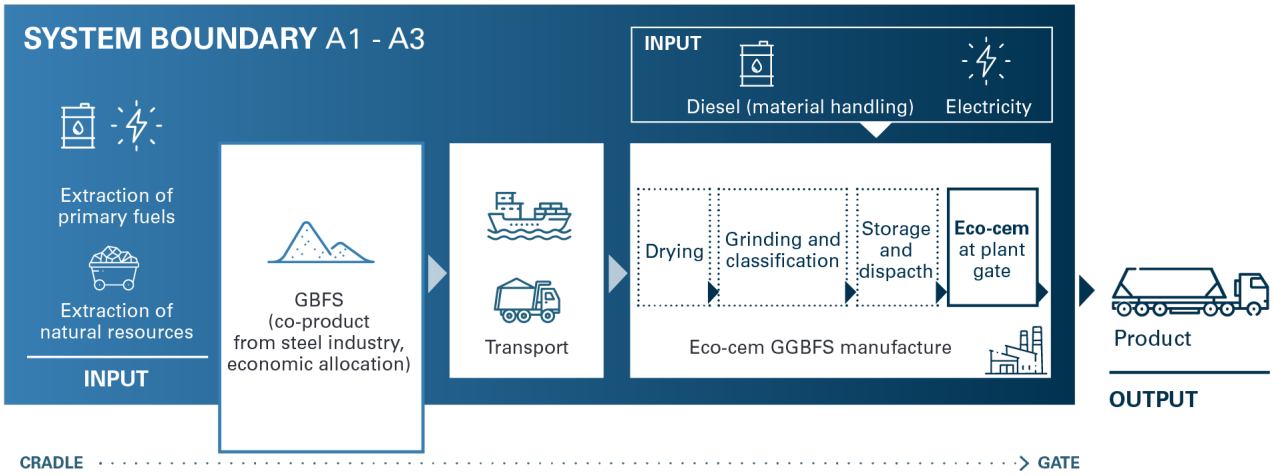


Figure 1: High level processes (A1-A3)

As shown in the table 4, this EPD is of the type '*Cradle to gate (A1–A3)*'. Other life cycle stages (Modules A4-A5, B1-B7, C1-C4, D) are dependent on particular scenarios and best modelled at the building level.

Eco-cem fulfils the conditions for cradle-to-gate EPD: Eco-cem is physically integrated into concrete during concrete mixing and cannot be easily separated from concrete at end-of-life; Eco-cem is no longer identifiable once mixed to form concrete; Eco-cem does not contain biogenic carbon.

Table 4: Modules included in the scope of the EPD

	Product stage			Construction process stage		Use stage							End-of-life stage				Recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport	Waste processing	Disposal	Future reuse, recycling or energy recovery potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	JP*	GLO	NZ	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific data		74%		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation: products		0%		-	-	-	-	-	-	-	-	-	-	-	-	-	-

X = included in the EPD; ND = Module not declared (such a declaration shall not be regarded as an indicator result of zero)
* Note: although raw material supply of GBFS is from Japan, AusLCI data is used instead (see section Upstream Data)

The processes below are included in the product system.

Product stage (Modules A1-A3)

The production stage includes the environmental impacts associated with raw materials extraction and processing of inputs, transport to, between and within the manufacturing site, and manufacturing of average product at the exit gate of the manufacturing site. The impacts include the production and use of fuels and electricity.

The GBFS is supplied from Japan. Raw GBFS material arrives in bulk to a bulk storage facility at the HR Cement plant. None of the raw materials have packaging. To manufacture Eco-cem, GBFS stored in an indoor bulk storage facility and is loaded by front-end loaders from the bulk stores into the weigh bins and conveyed to the dryer. A rotary dryer is used to dry GBFS to less than 1% moisture. The dried GBFS is ground in the ball mill. Finally, particles pass through an air classifier, and are then pneumatically conveyed as finished product to quality control silos and then bulk storage. There are no wastes produced during the manufacture of Eco-cem.

Eco-cem is physically integrated with other products such as cement and cannot be physically separated at end of life. The product is not identifiable at end of life as a result of physical/chemical transformation processes. Therefore, the end of life stages are not included in the EPD.

Life Cycle Inventory (LCI) data and assumptions

The EPD has been produced according to ISO 14040 (ISO, 2006a), ISO 14044 (ISO, 2006b), ISO 14025 (ISO, 2006c), EN 15804:2012+A2:2019/AC:2021 (CEN, 2019), and PCR 2019:14 Construction products v1.3.4, published 2024-04-30 of the International EPD® (EPD International, 2024).

Primary data

Primary data was used for all HR Cement manufacturing operations up to the factory gate. Primary data for cement manufacturing operations was sourced from the period between July 2023 and April 2024.

Upstream data

The most relevant LCI datasets used in modelling the product systems are detailed below. Region-specific (i.e. New Zealand) average data sets were used when available. All background datasets except for GBFS and land use were obtained from ecoinvent, Allocation, cut-off, EN15804, ecoinvent database version 3.9.1 (Wernet, et al., 2016).

No specific dataset was available for slag production for Japan in ecoinvent. Therefore, the background dataset for GBFS was obtained from the AusLCI Database version 34 (Grant, 2022).

Similarly, no specific dataset was available to model land use for New Zealand in ecoinvent. The background dataset for land use was thus modelled using the Managed LCA Content (MLC) Database 2023.

LCA software and database

The LCA was conducted in Microsoft Excel. The LCA utilises life cycle inventory data from "ecoinvent, Allocation, cut-off, EN15804", ecoinvent database version 3.9.1 (Wernet, et al., 2016) for several of the raw and process materials obtained from the background system. For GBFS, life cycle inventory data was obtained from AusLCI Database version 34 (Grant, 2022). Land use data for New Zealand was modelled using Sphera's MLC database.

Most datasets have a reference year between 2020 and 2023 and all fall within the 10-year limit allowable for generic data under EN 15804.

Electricity

The residual electricity mix on the market is used for the A3 processes that HR Cement has control over. Purchased electricity accounts for 100% of electricity use at HR Cement. The emission factor for the New Zealand residual grid mix for the GWP-GHG indicator is 0.151 kg CO2e/kWh, (based on EF3.1) modelled via SimaPro based on published data for the year 1st April 2021 – 31st March 2022, (BraveTrace, 2023). The New Zealand residual electricity mix is made up of hydro (56.6%), geothermal (19.7%), natural gas (12.5%), wind (6.55%), coal (4.25%), biomass (0.266%) and biogas (0.160%).

Onsite consumption (3.00%), and the medium voltage (1kV-60kV) grid's transmission and distribution losses (6.73%) are calculated based on data from the Ministry of Business, Innovation & Employment (MBIE, 2023). Electricity for the upstream GBFS dataset (A1) is based on the Australian market mix.

Transport

Average transportation distances and modes of transport are included for the transport of the raw materials, operating materials, and auxiliary materials to production and assembly facilities.

Ecoinvent, Allocation, cut-off, EN15804, ecoinvent database version 3.9.1 (Wernet, et al., 2016) was used to model transportation. Transportation was modelled using the ecoinvent global (GLO) or Rest-of-World (ROW) transportation datasets. Fuels were modelled using the geographically appropriate datasets.

Cut off criteria

Personnel-related processes are excluded as per section 4.3.2 in the PCR (EPD International, 2024).

According to section 4.3.2 of the PCR (EPD International, 2024), the production and end-of-life processes of infrastructure or capital goods used in the product system should be excluded.

In this study, capital goods and infrastructure have been included in the background datasets as provided by ecoinvent (Wernet, et al., 2016). It is not possible, within reasonable effort, to subtract the data on infrastructure/capital goods from these datasets. Infrastructure/ capital goods are excluded from the MLC dataset used to model land use.

High-quality infrastructure-related data isn't always available, and there is no clear cut-off for what to include. For this reason, capital goods data are applied to LCA studies inconsistently. This is expected to lead to reduced consistency and comparability of EPDs. Capital goods were previously excluded from EPDs, thus including capital goods in current EPDs would further reduce their comparability.

For the processes within the system boundary, all available energy and material flow data have been included in the model. In cases where no matching life cycle inventories are available to represent a flow, proxy data have been applied based on conservative assumptions regarding environmental impacts.

Allocation

Multi-output allocation generally follows the requirements of ISO 14044, section 4.3.4.2. Site level data for electricity, diesel for loaders, water, and lubricant usage are allocated by mass, based on the production at HR Cement plant during the data collection period.

Co-product allocation generally follows the requirements of PCR v 1.3.4, section 4.5.1. For externally sourced pre-consumer material, allocation is based on the economic values of the iron and blast furnace slag when they leave the unit process for pig iron production.

Allocation of background data (energy and materials) is dependent on the database:

For ecoinvent, documentation can be found online at https://ecoinvent.org/wpcontent/uploads/2020/10/dataqualityguideline_ecoinvent_3_20130506_.pdf

For MLC, documentation can be found online at https://sphera.com/product-sustainability-gabi-data-search/

For AusLCI database, processes are modelled with a shadow database that is based off ecoinvent database version 3.3. General documentation is available online at Australian LCA Data Guidelines

(https://auslci.com.au/Documents/AUSLCI_Manual%20V1.26.pdf) and specific documentation for the production of GBFS is available online at: https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fauslci.com.au%2FDatasets%2FExcelFiles%2Fground%2520granulated%2520blast%2520furnace%2520slag%2C%2520at%2520cement%2520plant%2520AU%2520U.xlsx

Assessment Indicators

The results tables describe the different environmental indicators for each product per declared unit, for the declared module. The EN 15804 reference package based on EF 3.1 is used.

- Table 5 outlines the core environmental impact indicators in accordance with EN 15804:2012+A2:2019, describing the potential environmental impacts of the product.
- Table 6 gives the life cycle inventory indicators for resource use.
- Table 7 displays the life cycle inventory indicators for waste and other outputs.
- Table 8 provides additional environmental impact indicators in accordance with EN 15804:2012+A2:2019
- Table 9 provides results using the indicators and characterisation factors of EN15804+A1 to aid comparison and backwards compatibility with rating tools. While the indicators and characterisation methods are from EN 15804:2012+A1:2013, other LCA rules for the study (system boundaries, allocation, etc.) are according to EN 15804:2012+A2:2019; i.e., this study does not claim that the results of the “A1 indicators” are compliant with EN 15804:2012+A1:2013.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Energy indicators (MJ) are always given as net calorific value.

Table 5: EN15804+A2 Core Environmental Impact Indicators

Indicator	Abbreviation	Unit
Global warming potential – total	GWP-total	kg CO_2-eq.
Global warming potential – fossil	GWP-fossil	kg CO_2-eq.
Global warming potential – biogenic	GWP-biogenic	kg CO_2-eq.
Global warming potential – land use and land use change	GWP-luluc	kg CO_2-eq.
Depletion potential of the stratospheric ozone layer	ODP	kg CFC11-eq.
Acidification potential, accumulated exceedance	AP	Mole of H^+ eq.
Eutrophication potential - freshwater	EP-freshwater	kg P eq.
Eutrophication potential - marine	EP-marine	kg N eq.
Eutrophication potential - terrestrial	EP-terrestrial	Mole of N eq.
Photochemical ozone formation potential	POCP	kg NMVOC eq.
Abiotic depletion potential - non-fossil resources[1]	ADP-m&m	kg Sb-eq.
Abiotic depletion potential – fossil resources[1]	ADP-fossil	MJ, net caloric value
Water (user) deprivation potential[1]	WDP	m^3 world equiv. deprived

Table 6: Life cycle inventory indicators on use of resources

Indicator	Abbreviation	Unit
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ
Use of renewable primary energy resources used as raw materials	PERM	MJ
Total use of renewable primary energy resources	PERT	MJ
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ
Use of non-renewable primary energy resources used as raw materials	PENRM	MJ
Total use of non-renewable primary energy resources	PENRT	MJ
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ
Use of non-renewable secondary fuels	NRSF	MJ
Total use of net fresh water	FW	m^3

Table 7: Life cycle inventory indicators on waste categories and output flows

Indicator	Abbreviation	Unit
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed	RWD	kg
Components for reuse	CRU	kg
Materials for energy recovery	MER	kg
Materials for recycling	MFR	kg
Exported electrical energy	EEE	MJ
Exported thermal energy	EET	MJ

Table 8: EN15804+A2 Additional Environmental Impact Indicators

Indicator	Abbreviation	Unit
Climate Change[2]	GWP-GHG	kg CO_2-eq.
GWP-GHG (IPCC AR5)[3]	GWP-GHG (IPCC AR5)	kg CO_2-eq.
Particulate Matter emissions	PM	Disease incidences
Ionising Radiation – human health[4]	IRP	kBq U235 eq.
Eco-toxicity (freshwater)[1]	ETP-fw	CTUe
Human Toxicity, cancer[1]	HTP-c	CTUh
Human Toxicity, non-cancer[1]	HTP-nc	CTUh
Land use related impacts / soil quality[1]	SQP	Dimensionless

[1]The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

[2]This indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero. It has been included in the EPD following the PCR (EPD International, 2024).

[3]GWP-GHG (IPCC AR5) is an additional GWP100 indicator that is aligned with the Intergovernmental Panel on Climate Change (IPCC) 2013 Fifth Assessment Report (AR5) (IPCC, 2013), national greenhouse gas reporting frameworks in Australia and New Zealand and previous versions of the Construction Products PCR (PCR2019:14 v1.11 (EPD International, 2021)). It excludes biogenic carbon and indirect radiative forcing."

[4]This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and some construction materials, is also not measured by this indicator.

Results using the indicators and characterisation factors of EN15804+A1 are included to aid comparison and backwards compatibility with rating tools (Table 9). While the indicators and characterisation methods are from EN 15804:2012+A1:2013, other LCA rules for the study (system boundaries, allocation, etc.) are according to EN 15804:2012+A2:2019; i.e., this study does not claim that the results of the "A1 indicators" are compliant with EN 15804:2012+A1:2013.

Table 9: EN15804+A1 environmental indicators

Indicator	Abbreviation	Unit
Global warming potential	GWP (EN15804+A1)	kg CO_2-eq.
Ozone depletion potential	ODP (EN15804+A1)	kg CFC11-eq.
Acidification potential	AP (EN15804+A1)	kg SO_2-eq.
Eutrophication potential	EP (EN15804+A1)	kg PO_4^{3-}-eq.
Photochemical ozone creation potential	POCP (EN15804+A1)	kg C_2H_4-eq.
Abiotic depletion potential for non-fossil resources	ADPE (EN15804+A1)	kg Sb-eq.
Abiotic depletion potential for fossil resources	ADPF (EN15804+A1)	MJ

The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, non-cancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

For Eco-cem, the following indicators are not relevant, hence result in zero values:

- Components for re-use (CRU) is zero since there are none produced.
- Use of non-renewable secondary fuels (NRSF) is zero since there is none used.

Environmental Performance

Table 10: EN 15804+A2 results for 1 000 kg of Eco-cem

Environmental impact indicator	Abb.	Unit	A1-A3
Global warming potential - total	GWP-total	kg CO_2-eq.	149
Global warming potential - fossil	GWP-fossil	kg CO_2-eq.	149
Global warming potential - biogenic	GWP-biogenic	kg CO_2-eq.	0
Global warming potential - land use and land use change	GWP-luluc	kg CO_2-eq.	0.0771
Depletion potential of the stratospheric ozone layer	ODP	kg CFC11-eq.	1.99E-06
Acidification potential, accumulated exceedance	AP	Mole of H+ eq.	2.43
Eutrophication potential - freshwater	EP-freshwater	kg P eq.	0.00669
Eutrophication potential - marine	EP-marine	kg N eq.	0.539
Eutrophication potential - terrestrial	EP-terrestrial	Mole of N eq.	5.96
Photochemical ozone formation potential	POCP	kg NMVOC eq.	1.69
Abiotic depletion potential - non-fossil resources	ADP-minerals&metals	kg Sb-eq.	1.54E-04
Abiotic depletion potential - fossil resources	ADP-fossil	MJ, net calorific value	1 570
Water (user) deprivation potential	WDP	m^3 world equiv. deprived	891

Table 11: EN15804+A2 results on use of resources for 1 000 kg of Eco-cem

Resource use	Abb.	Unit	A1-A3
Renewable primary energy as energy carrier	PERE	MJ	797
Renewable primary energy resources as material utilization	PERM	MJ	313
Total use of renewable primary energy resources	PERT	MJ	1 110
Non-renewable primary energy as energy carrier	PENRE	MJ	1 180
Non-renewable primary energy as material utilization	PENRM	MJ	543
Total use of non-renewable primary energy resources	PENRT	MJ	1 720
Use of secondary material	SM	kg	0.575
Use of renewable secondary fuels	RSF	MJ	0.00135
Use of non-renewable secondary fuels	NRSF	MJ	0
Use of net fresh water	FW	m^3	20.7

Table 12: EN15804+A2 results on waste categories and output flows for 1 000 kg of Eco-cem

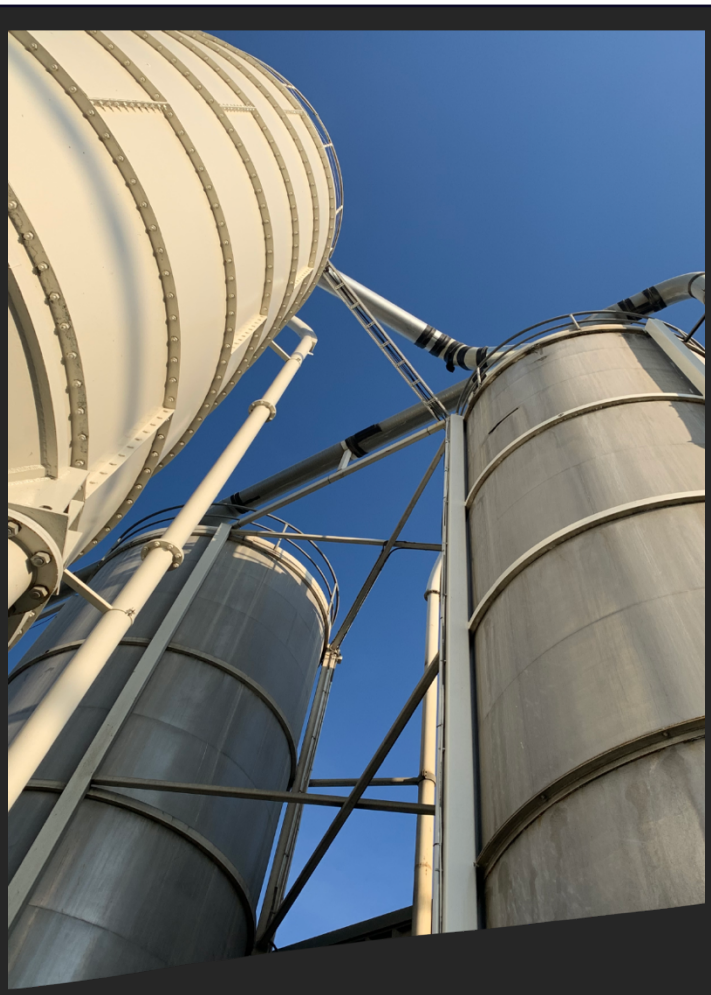
Waste categories and output flows	Abb.	Unit	A1-A3
Hazardous waste disposed	HWD	kg	0.668
Non-hazardous waste disposed	NHWD	kg	17.1
Radioactive waste disposed	RWD	kg	5.57E-05
Components for re-use	CRU	kg	0
Materials for recycling	MFR	kg	0.128
Materials for energy recovery	MER	kg	2.25E-05
Exported electrical energy	EEE	MJ	0.0561
Exported thermal energy	EET	MJ	0.0402

Table 13: EN15804+A2 results on additional environmental impact indicators for 1 000 kg of Eco-cem

Additional Indicators	Abb.	Unit	A1-A3
GWP-GHG	GWP-GHG	kg CO_2-eq.	149
GWP-GHG (IPCC AR5)	GWP-GHG (IPCC AR5)	kg CO_2-eq.	173
Respiratory inorganics	PM	Disease incidences	6.14E-06
Ionizing radiation - human health	IRP	kBq U235 eq.	0.662
Eco-toxicity - freshwater	ETP-fw	CTUe	877
Human toxicity, cancer	HTPc	CTUh	1.08E-07
Human toxicity, non-canc.	HTPnc	CTUh	1.13E-06
Land use related impacts / soil quality	SQP	Pt	219

Table 14: EN 15804+A1 results on environmental impacts for 1 000 kg of Eco-cem

EN15804+A1 Environmental impact	Abb.	Unit	A1-A3
Global warming potential	GWP (EN15804+A1)	kg CO_2-eq.	145
Depletion potential of the stratospheric ozone layer	ODP (EN15804+A1)	kg CFC11-eq.	1.59E-06
Acidification potential of land and water	AP (EN15804+A1)	kg SO_2-eq.	1.81
Eutrophication potential	EP (EN15804+A1)	kg PO_4^{3-}eq.	0.231
Photochemical ozone creation potential	POCP (EN15804+A1)	kg C_2H_4-eq.	0.0995
Abiotic depletion potential – elements	ADPE (EN15804+A1)	kg Sb-eq.	1.51E-04
Abiotic depletion potential – fossil fuels	ADPF (EN15804+A1)	MJ	1 540



Additional Environmental Information

Eco-cem complies with the requirements specified in Australian Standard: AS 3582.2-2016 (Supplementary cementitious materials Part 2: Slag—Ground granulated blast-furnace).

Our manufacturing site is certified to ISO 9001.

HR Cement is working toward getting ISO 14001 Certification for the existing Environmental Management System.

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General Information

An Environmental Product Declaration, or EPD, is a standardised and verified way of quantifying the environmental impacts of a product based on a consistent set of rules known as a PCR.

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

The results for EN15804+A1 compliant EPDs are not comparable with EN15804+A2 compliant studies as the methodologies are different. Results that are EN15804+A1 compliant are given in this document to assist comparability across EPDs.

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Geographical Scope	New Zealand
Reference Year for Data	2023-07-01 to 2024-04-30

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Product Category Rules (PCR)

CEN standard EN 15804 served as the core Product Category Rules (PCR)

Product Category Rules (PCR)	C-PCR-001 (to PCR 2019:14) Cement and Building Lime (16908:2017+A1:2022) Version: 2022-05-18. Stockholm: EPD International. PCR 2019.14 Construction Products, version 1.3.4, published 2024-04-30, valid till 2025-06-20.
PCR review was conducted by	The Technical Committee of the International EPD® System. See www.environdec.com for a list of members.
Review Chair	No Chair appointed Contact via the Secretariat www.environdec.com/contact.

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Third-party verification

Independent verification of the declaration and data, according to ISO 14025:2006, via:

☑ EPD verification by individual verifier.

Third party verifier:	Claudia A. Peña (Director) PINDA LCT SpA, Alonso de Ercilla 2996, Ñuñoa, Santiago, Chile. Tel: +56 2 2 3260 183, Mobile: +56 9 9359 9210 Email: pinda.lct@gmail.com
Verifier approved by:	EPD Australasia Limited
Procedure for follow-up of data during EPD validity involved third-party verifier	☐ Yes ☑ No