GOLIATH | General Purpose Cement

ENVIRONMENTAL PRODUCT DECLARATION

CEMENT AUSTRALIA®

ECO PLATFORM EPD VERIFIED

AUSTRALASIA EPD® ENVIRONMENTAL PRODUCT DECLARATION

Program: The International EPD® System, www.environdec.com
Program Operator: EPD Australasia
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In accordance with ISO 14025 and EN 15804: 2012+A2:2019
For Goliath General Purpose Cement from Cement Australia

MADE Right Here

Program Information and Verification

Program

The International EPD ® System

Program Operator

EPD Australasia Ltd

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Declaration owner

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The EPD owner has the sole ownership, liability and responsibility for the EPD.

Third Party Verifier accredited or approved by EPD Australasia Ltd

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In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Goliath Type GP Cement from Cement Australia Pty Ltd

101 Cement Works Road, Railton TAS 7305 Australia

Product Category Rules:

Version 1.11, 2021-02-05
Complementary Product Category Rules (C-PCR) to PCR 2019:14, Cement and Building Lime, Version 2022-05-18

EPD Tool:

GCCA's Industry EPD Tool for Cement and Concrete (V3.1), International version

Reference Year for Data:

01/01/2021-31/12/2021

General Information

To serve increasing market demand and in particular, to facilitate whole-project, whole-life environmental impact assessment, the cement and concrete industry can provide “cradle to gate” environmental product declarations (EPDs) for their products.

The intention is that EPDs are used by engineers, architects, developers and clients to compare products that have functional equivalence and to pass environmental information down the value chain.

However, EPD’s within the same product category but from different programmes may not be comparable. They also may not be comparable if they do not comply with EN15804+A2. For further information about comparability, see EN15804+A2 and ISO14025.

The Global Cement and Concrete Association (GCCA) makes available to the concrete industry across the world a verified EPD tool (GCCA EPD Tool).

This enables producers to derive EPD data to run comparisons during product development stage and data to input into EPDs.

The GCCA EPD tool is verified against recognised international standards and relevant product category rules.

The EPD tool was originally developed under the Cement Sustainability Initiative, part of the World Business Council for Sustainable Development.

Company information

Owner of the EPD

Cement Australia Pty Ltd

Description of the organisation

Cement Australia Holdings Pty Ltd is owned by controlled entities of Holcim Group Ltd (Switzerland) and Heidelberg Cement AG (Germany) in the proportions of 50% and 50% respectively.

Separately, a partnership has been formed between controlled entities of Holcim Group Ltd and Heidelberg Cement AG with interests held in the Cement Australia Partnership in the same proportions of 50% and 50% respectively.

Cement Australia's main business involves the manufacture and sale of cement and cementitious products in Australia. Cement Australia manufactures high performance cement products including customised blends for special applications.

In addition, we supply concrete-grade fly ash and ground granulated blast furnace slag along with high-grade lime products in bulk and packaged forms.

Our products meet required Australian Standards, and have been tested to withstand Australian climate conditions.

Cement Australia operates in accordance with its management systems which are certified to the following International Standards:

- **ISO 9001** Quality Management Systems
- **ISO 14001** Environmental Management Systems
- **ISO 45001** Occupational Health and Safety Management Systems.

Name and location of production site(s)

101 Cement Works Road, Railton TAS 7305 Australia

The Cement Australia operations located at Railton operate 24 hours a day, 7 days a week by a skilled and experienced team with intelligent control systems, utilising the latest milling technology providing a consistent and reliable product to meet the demands of the construction materials industry.

The site employs industry best practice environmental controls at all stages of the production process going beyond compliance, to setting the industry standard in minimising our operational impacts on the receiving environment.

Declared Products

Product Name

Goliath General Purpose Cement

Product Identification

Goliath GP

Product Description

Goliath General Purpose Cement fully complies with the Australian Standards requirements for Type GP cement described in AS3972: *General purpose and blended cements*. Goliath GP also meets the requirements of Type SL and SR as per AS 3972.

Type GP Cement can be used as a cementitious binder in a broad range of applications including concrete, mortars, renders and grouts. It is ideal for a wide range of applications including:

- Domestic construction such as concrete slabs, driveways and footpaths
- Structural concrete such as pre-stressed slabs, columns and tilt-up walls
- Pavers, blocks, panels and pipes
- Mining applications
- Major engineering/civil projects requiring high quality and consistency
- Specialty formulations such as adhesives, renders, mortars and grouts.

It is produced to consistent quality standards. Type GP can be used on its own or in conjunction with other supplementary materials such as fly ash.

UN CPC Code

3744

Product Composition

Nominal product composition of GP per tonne of cement.

Material Description	Composition (%)	Post Consumer Material (%)	Renewable Material (%)
Clinker	87.5	0.0	0.0
High grade limestone	7.5	0.0	0.0
Gypsum	5	0.0	0.0

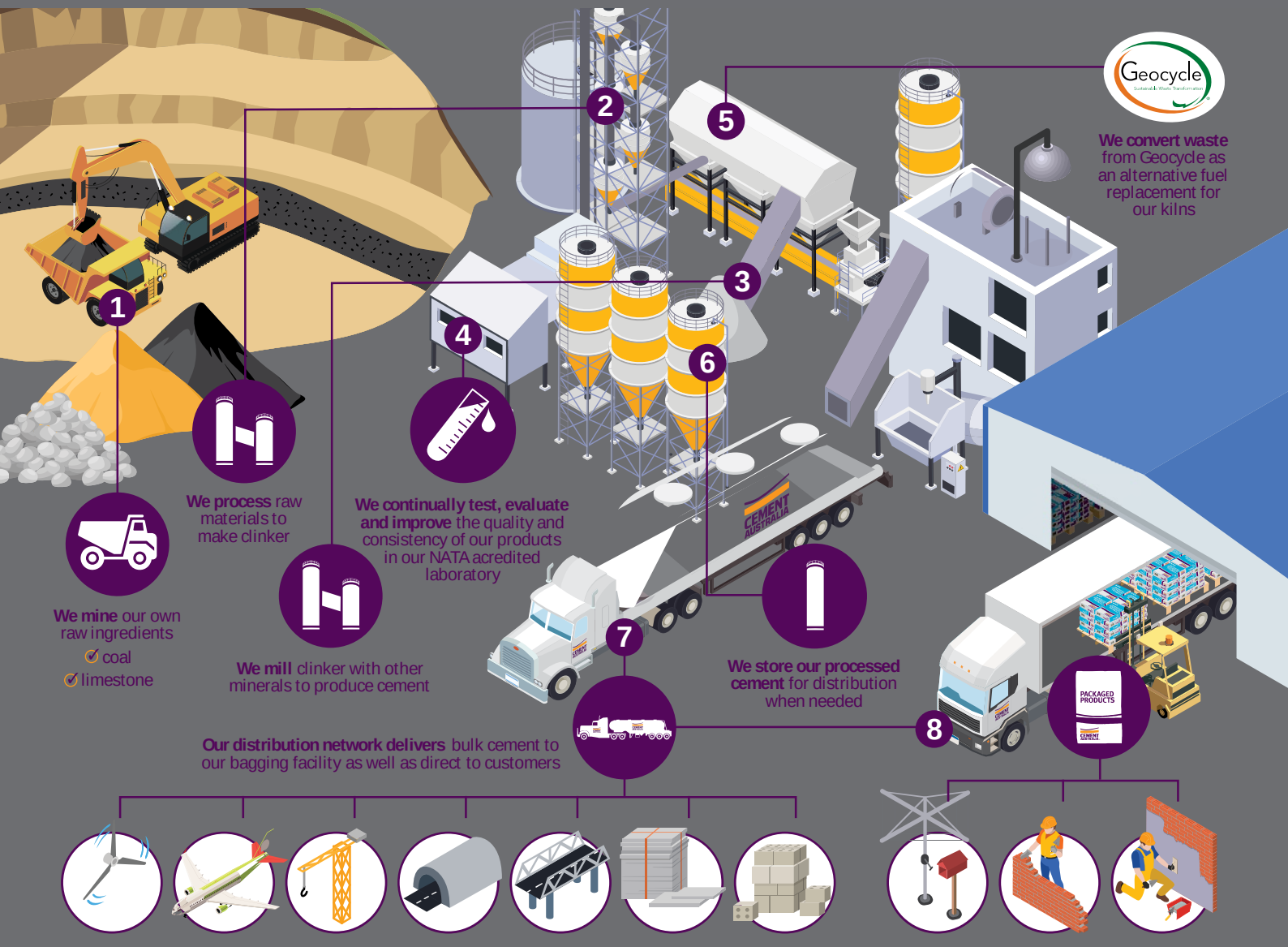
*Product is sold as bulk, therefore no packaging component.

*This product is classified as Hazardous according to the Safe Work Australia guidelines for Globally Harmonised System of Classification and Labelling of Chemicals (GHS)

Cement Australia Process Overview

Mined. Milled. Manufactured.

Our cement has been proudly Made Right Here in Tasmania since 1922



Bulk product is available directly from Cement Australia and is used in a wide range of civil, construction, government and infrastructure sectors, as well as for producing other cement based products

Bagged product is available through retailers across Queensland and is suitable for a variety of projects around the home

Life Cycle Assessment (LCA) Information

Description of System Boundaries

This EPD covers the cradle to gate life cycle stages (A1–A3) of cement production.

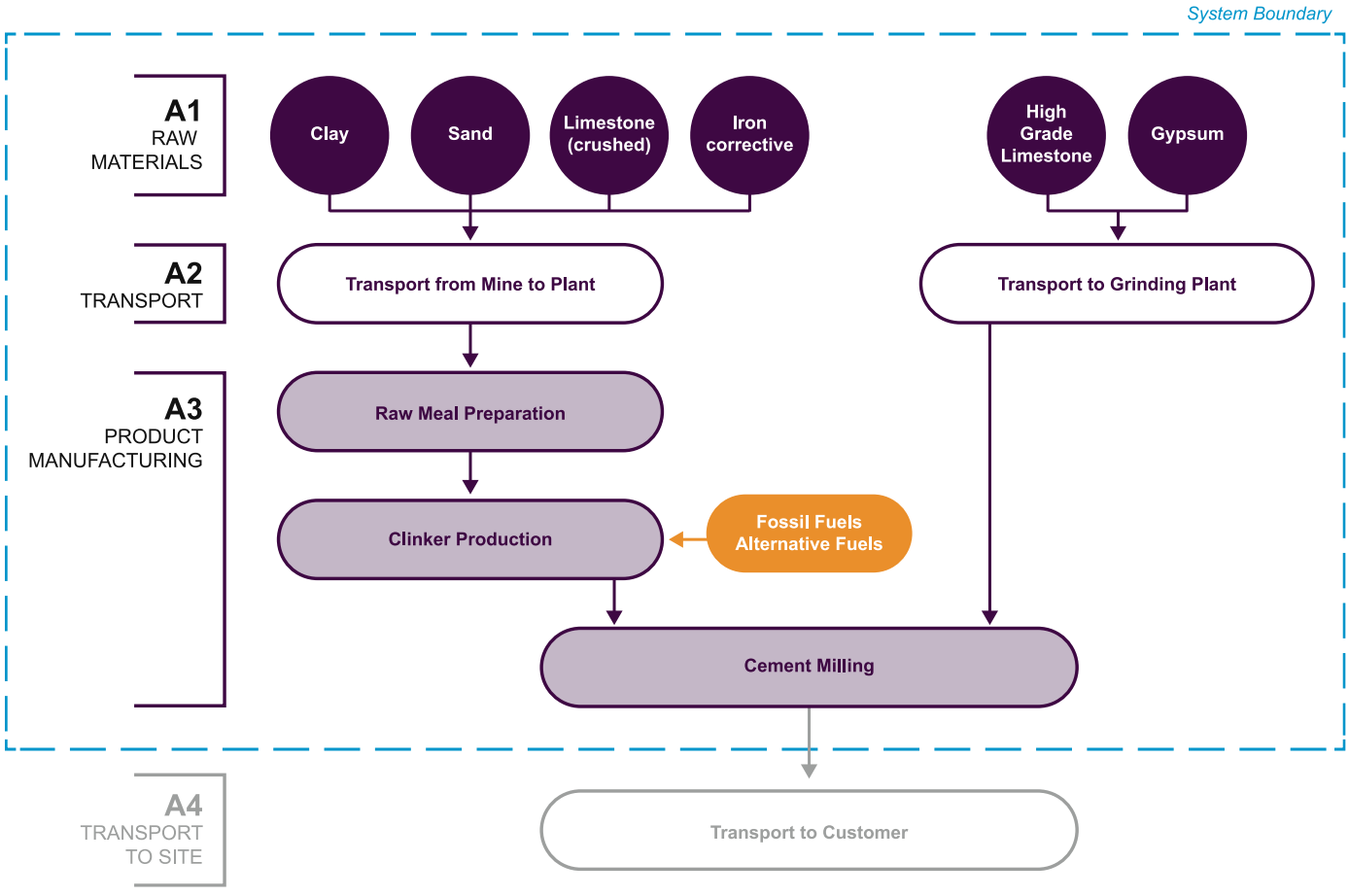
This system includes the extraction and production of raw materials, transportation of raw materials to the cement plant, cement manufacturing process (including onsite transportation) and treatment of waste produced within the processes throughout the cement plant.

According to EN 15804+A2 Section 5.2, EPDs of this type shall only be used where the following three conditions are valid:

- the product or material is physically integrated with other products during installation so they cannot be physically separated from them at end of life, and
- the product or material is no longer identifiable at end of life as a result of a physical or chemical transformation process, and
- the product or material does not contain biogenic carbon.

All processes related to the use stage, and end of life of cement and module D are outside the scope of this EPD as cement will be used as a mix component in manufacturing for other products (i.e., concrete and masonry) and cement cannot be physically separated from other products at end of life.

System Diagram



Life Cycle Assessment (LCA) Information

Scope of EPD

	Product stage			Construction Process Stage		Use Stage							End of Life Stage				Resource Recovery Stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-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

X - Module is included in this study, ND - Module is not declared

Declared Unit

1 tonne

Reference Service Life

Not applicable

Time Representativeness

All material and energy flows within the scope of the study are based on plant specific data collected between 01/01/2021 – 31/12/2021.

Database(s) and LCA Software Used

GCCA EPD tool EN59 A2 software. Industry EPD Tool for Cement and Concrete (V3.1), International version.

The life cycle inventory database used in the tool is the ecoinvent database (v3.5), cut-off system model. The ecoinvent LCI database is the most widely used LCI database worldwide and the reference database for a large number of EPDs and sector-specific LCI datasets.

Life Cycle Assessment (LCA) Information

Background Data

The data provided for use in this EPD has been taken directly from the Railton Technical Information System (TIS) network and reflects real time data measured and collated by our process systems. All applicable data is derived by devices and instrumentation that are calibrated against the relevant Australian and International standards.

The source of Electricity supply data is the Department of Industry, Science, Energy and Resources (2021) Australian Energy Statistics, Table O. Energy usage data is monitored through site meters and energy billing information.

Australian electricity generation, by fuel type, physical units, calendar year 2020 - TAS

Non Renewable Fuels	GWh	Renewable Fuels	GWh
Black Coal	0.0E0	Biomass	2.97E1
Brown Coal	0.0E0	Wind	1.53E3
Natural Gas	1.86E2	Hydro	9.07E3
Oil Products	2.07E1	Large-scale solar PV	2.50E0
		Small-scale solar PV	1.29E1
		Geothermal	0.0
Total	**2.07E2**	**Total**	**1.08E4**
Percentage supply	**1.9%**	**Percentage supply**	**98.1%**

Transport distances were calculated based on the distance between the material source and its destination.

Life Cycle Assessment (LCA) Information

Data Quality

Information and data utilised in this document is correct and factual at time of development.

High data quality is achieved through the use of real time, independently calibrated monitoring systems which capture resource use. Overall, the data quality for this LCA was considered High.

The EPD will be updated if changes in its life cycle inventory led to a variation of 10% or more in any of the included environmental indicators during its validity period.

Module	Input/Output	Data Source	Temporal Scope	Quality
A1	Clinker (CA produced at plant)	Railton Technical Information System	2021	High
	Gypsum			
	Limestone			
A2	Transport	Actual Transport distances per trip	2021	High
A3	Electricity and natural gas used for manufacturing of cement	Site Electricity and gas meters & billing information	2021	High

Life Cycle Assessment (LCA) Information

Cut Off Rules

According to EN15804+A2, Section 6.3.6, LCA data shall include a minimum of 95% of total inflows (mass and energy) per module. In addition, if less than 100% of the inflows are accounted for, proxy data or extrapolation should be used to achieve 100% completeness.

For this LCA, it has been assumed that capital equipment and personnel have an impact that is not material and thus have not been included in the system boundary.

In addition, personnel travel to and from work has also not been included as it is assumed if they were not employed by Cement Australia for the production of cement, they would be employed by another business.

Based on this guidance, all inflows and outflows have been accounted for.

Allocation Rules

For Secondary Materials (Co-Products), EN15804+A2 allocation rules require allocation to be based on physical properties (e.g., mass or volume) when the difference in value from the co-products is low (difference in revenue of the main and co-product is less than 25%).

For co-products where the difference in revenue from the main and co-product is greater than 25% (e.g co-product revenue is 10% of main product revenue), an economic allocation factor shall be determined and reported in the data survey.

Regarding inputs into Clinker, iron corrective has been allocated economically. Other secondary material inputs are defined as waste and have a zero allocation as they have no end use.

Assumptions

The key choices and assumptions in this LCA are:

- The environmental profiles are largely influenced by the primary data, which are considered high quality.
- Transport distances have been calculated as a direct route from material source to plant.

Environmental Indicators

Impact categories included in this assessment

Core environmental impact indicators	Acronym	Unit
Global warming potential, excluding biogenic uptake, emissions and storage	GWP-GHG	kg CO_2 equivalent
Global warming potential (total)	GWP (total)	kg CO_2 equivalent
Global warming potential (fossil)	GWP (fossil)	kg CO_2 equivalent
Global warming potential (biogenic)	GWP (biogenic)	kg CO_2 equivalent
Global warming potential (land use / land transformation)	GWP (luluc)	kg CO_2 equivalent
Ozone depletion potential	ODP	kg CFC-11 equivalent
Acidification Potential	AP	mol H^+ eq.
Eutrophication – aquatic freshwater	EP - freshwater	kg P equivalent
Eutrophication – aquatic marine	EP - marine	kg N equivalent
Eutrophication – terrestrial	EP - terrestrial	mol N equivalent
Photochemical ozone creation potential	POCP	Kg NMVOC equivalent
Abiotic depletion potential for mineral elements	ADPE	kg Sb equivalent
Abiotic depletion potential for fossil fuels	ADPF	MJ
Water Depletion Potential	WDP	m^3 equivalent

Environmental Indicators

Parameters describing resource use

Resource Use indicators	Acronym	Unit
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ_{NCV}
Use of renewable primary energy resources used as raw materials	PERM	MJ_{NCV}
Total use of renewable primary energy resources	PERT	MJ_{NCV}
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ_{NCV}
Use of non-renewable primary energy resources used as raw materials	PENRM	MJ_{NCV}
Total use of non-renewable primary energy resources used as raw materials	PENRT	MJ_{NCV}
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ_{NCV}
Use of non-renewable secondary fuels	NRSF	MJ_{NCV}
Use of net fresh water	FW	m^3

Parameters describing waste

Waste Category	Acronym	Unit
Hazardous waste disposed	HWP	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed	RWD	kg

Environmental Indicators

Parameters Describing Output Flows

Output flows	Acronym	Unit
Components for re-use	CRU	kg
Materials for recycling	MFR	kg
Materials for energy recovery	MER	kg
Exported Energy	EE	MJ

Additional Environmental Impacts

Disease potential	Acronym	Unit
Potential incidence of disease due to PM emissions	PM	Disease incidence
Potential Human exposure efficiency relative to U235	IRP	kBq U-235 eq
Potential Comparative Toxic Unit for ecosystems	ETP-fw	CTUe
Potential Comparative Toxic Unit for humans - cancer	HTP-c	CTUh
Potential Comparative Toxic Unit for humans - non-cancer	HTP-nc	CTUh
Potential soil quality index	SQP	dimensionless

Extra Indicators

Disease potential	Acronym	Unit
Emissions from calcination and removals from carbonation	CC	kg CO_2 equivalent
Emissions from combustion of secondary fuels from renewable sources used in production processes	CWRS	kg CO_2 equivalent
Emissions from combustion of secondary fuels from non-renewable sources used in production processes	CWNRS	kg CO_2 equivalent
Removals and emissions associated with biogenic carbon content of the bio-based product	GWP-Prod	kg CO_2
Removals and emissions associated with biogenic carbon content of the bio-based packaging	GWP-Pack	kg CO_2

Environmental Performance Results

Potential Environmental Impact – Mandatory Indicators according to EN 15804+A2

Core Environmental Indicators

Indicator	Unit	Tot.A1-A3
GWP-GHG	kg CO_2 equivalents	7.58E2
GWP-total	kg CO_2 eq.	7.58E2
GWP-fossil	kg CO_2 eq.	7.57E2
GWP-biogenic	kg CO_2 eq.	1.35E-1
GWP-luluc	kg CO_2 eq.	2.56E-1
ODP	kg CFC 11 eq.	2.82E-6
AP	mol H^+ eq.	2.06E0
EP-freshwater	kg P eq.	1.08E-1
EP-marine	kg N eq.	6.75E-3
EP-terrestrial	mol N eq.	4.96E0
POCP	kg NMVOC eq.	1.15E0
ADPE	kg Sb eq.	1.04E-4
ADPF	MJ	2.77E3
WDP	m^3	4.18E1

Per tonne cement produced

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Environmental Performance Results

Parameters describing resource use

Indicator	Unit	Tot.A1-A3
PERE	MJ	4.48E2
PERM	MJ	0E0
PERT	MJ	4.48E2
PENRE	MJ	2.77E3
PENRM	MJ.	0E0
PENRT	MJ	2.77E3
SM	kg	7.3E0
RSF	MJ	0E0
NRSF	MJ	3.86E2
FW	m^3	1.09E0

Per tonne cement produced

Environmental Performance Results

Parameters describing waste production

Indicator	Unit	Tot.A1-A3
HWD	kg	0E0
NHWD	kg	5.83E-1
RWD	kg	0E0

Per tonne cement produced

Parameters describing output flows

Indicator	Unit	Tot.A1-A3
CRU	kg	0E0
MFR	kg	6.98E-2
MFRE	kg	0E0
EE	MJ per energy carrier	0E0

Per tonne cement produced

Extra Indicators

Indicator	Unit	Tot.A1-A3
CC	kg CO_2 eq.	4.58E2
CWRS	kg CO_2 eq.	0E0
CWNRS	kg CO_2 eq.	3.06E1
GWP-Prod	Kg CO_2	0E0
GWP-Pack	Kg CO_2	0E0

Per tonne cement produced

Environmental Performance Results

Potential Environmental Impact – Additional Mandatory and Voluntary Indicators

Indicator	Unit	Tot.A1-A3
PM	Disease incidence	1.74E-5
IRP	kBq U235 eq	1.83E3
ETP	CTUe	5.15E1
HTPC	CTUh	1.29E-6
HTPNC	CTUh	4.04E-5
SQP	dimensionless	9.33E2

Per tonne cement produced

References

Australasian EPD Programme (2018), Guidance on the use of background LCI data.

Australasian EPD Programme (2019), Instructions of the Australasian EPD Programme V3.01.

AS/NZS 3972:2010, General purpose and blended cements.

AS 3582.1:2016, Supplementary cementitious materials Part1: Fly Ash.

AusLCI 2021, Australian Life Cycle inventory database v1.3.6, published by the Australian Life Cycle Assessment Society, 2021.

CEN2017, EN16908:2017, Cement and building lime. Environmental product declarations. Product category rules complementary to EN15804+A2, European Committee for Standardisation (CEN), Brussels, February 2017.

GCCA2022, EPD Tool: GCCA's Industry EPD Tool for Cement and Concrete (V3.1), International version.

The International EPD System, General Program Instruction for The International EPD System version 3.01 (2019). *Retrieved from www.envirodec.com*

ISO14040:2006 Environment Management – Life cycle assessment – Principles and framework. International Organisation for Standardisation, Geneva Switzerland, 2006.

ISO14044:2006, Environmental Management, Life cycle assessment – Requirements and guidelines, International Organisation for Standardisation, Geneva, Switzerland, 2006.

ISO14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures. International Organisation for Standardisation, Geneva, Switzerland, 2006.

The International EPD System, Product Category Rules (PCR) for Construction Products, PCR 2019:14 v1.11. (2021). *Retrieved from www.envirodec.com*

The International EPD System, Complementary Product Category Rules (C-PCR) to PCR 2019:14 Cement and Building Lime. (2022). *Retrieved from www.envirodec.com*