Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021

AURORA CONSTRUCTION MATERIALS

AR4014 pre-mixed concrete

manufactured at

Clyde

Programme: The International EPD® System www.environdec.com
Programme operator: EPD International AB
Regional Programme: EPD Australasia www.epd-australasia.com
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EPD of a single product from a manufacturer (from one location)
An EPD may be updated or depublished if conditions change.
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EPD INTERNATIONAL EPD SYSTEM
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ECO PLATFORM EPD VERIFIED

Contents

Disclaimer

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit 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 identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

General information

An Environmental Product Declaration (EPD) is a standardised way of quantifying the potential environmental impacts of a product or system. EPDs are produced according to a consistent set of rules – Product Category Rules (PCR) – that define the requirements within a given product category. These rules are a key part of ISO 14025 as they enable transparency and comparability between EPDs. This EPD is a "cradle-to-gate with modules C1-C4, D" declaration covering production and end-of-life life cycle stages.
This EPD is verified to be compliant with EN 15804. EPDs of construction products may not be comparable if they do not comply with EN15804. EPDs within the same product category but from different programs or utilising different PCR documents may not be comparable, see the disclaimer on the previous page. Aurora Construction Materials Epping Pty Ltd (Aurora), as the EPD owner, has the sole ownership, liability, and responsibility for the EPD.

EPD Program Operator (Regional programme)	**EPD Program Operator** **EPD International AB** Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: support@environdec.com	**Regional programme** **EPD Australasia Limited** Address: 6 Cube Court Richmond 7020, New Zealand Web: www.epd-australasia.com Email: info@epd-australasia.com	EPD INTERNATIONAL EPD SYSTEM AUSTRALASIA EPD® INTERNATIONAL EPD SYSTEM
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Published:	2025-08-15	**Valid until:**	2030-08-15 (5 years)
Reference year for data:	2023-01-07 – 2024-06-30 (Note: the mix design is current at time of publication)		

Product Category Rules (PCR)	**CEN standard EN 15804 served as the core Product Category Rules (PCR)**
PCR:	PCR 2019:14 Construction Products, Version 2.0.1, 2025-06-05 (valid until 2030-04-07)
PCR review was conducted by:	The Technical Committee of the International EPD® System. See www.environdec.com for a list of members. Review chair: Rob Rouwette | start2see (chair), Noa Meron | thinkstep-anz (co-chair). The review panel may be contacted via the Secretariat www.environdec.com/contact.
c-PCR	c-PCR-003 (to 2019:14) Concrete and concrete elements, version 2025-04-08

Third-party verification:	Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ Individual EPD verification without a pre-verified LCA/EPD tool
Third party verifier: Approved by EPD Australasia Ltd	**Claudia A. Peña** PINDA LCT SpA Email: pinda.lct@gmail.com
Procedure for follow-up of data during EPD validity involves third-party verifier:	☐ Yes ☒ No

Information about the EPD Owner

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Aurora Construction Materials (Aurora) is a leading provider of sustainable aggregate, crushed rock and concrete products to the civil construction, residential and commercial building segments throughout Victoria.

Aurora's ethos of 'construction materials redefined' seeks to capture our commitment to sustainability, recycling and waste minimisation. We participate in the circular economy. Aurora understands its environmental footprint and continuously finds ways to minimise it. Our processes use excavated rock, recycled water and proprietary admixture technology to provide valuable aggregate and concrete products with a reduced environmental footprint, compared to virgin materials.

We are a 100% Australian owned business that directly employs over 100 staff and utilises the services of over 300 local suppliers that support the local economies in which we operate.

We continue to look at alternative methods and products to improve our efficiency and reliance on virgin materials.

Over the last 18 years Aurora and its partners have invested nearly $2M in developing a carbon reduced alternative to traditional concrete, called ALTRA.

Aurora currently operates four sites around Melbourne, Victoria:

- Quarry and concrete operations at 335A O'Herns Road Epping, 3076
- Quarry and concrete operations at 2-50 Meskos Road, Rockbank, 3335
- Quarry operations at 61 Minton Street, Beveridge, 3753
- Concrete operations at 1470 Ballarto Road, Clyde, 3978.

Product information

Aurora specialises in manufacturing concrete and quarry materials, ranging in properties depending on application and requirements.

Aurora has a full range of decorative and standard concrete (general and premium); see our website for details.

- Concrete products consist of a mixture of cementitious binder, supplementary cementitious materials, aggregates, natural sand, water and admixtures.
- Quarry products include aggregates, crushed rock and filling materials made from "waste rock".

This EPD covers AR4014 concrete manufactured by Aurora in Clyde, Melbourne, Victoria. The product included in this EPD, its strength grade, density and application are shown below.

Product code	Strength grade	Density	Applications
AR4014	40MPa	2 295 kg/m^3	General use concrete

Technical Compliance

Aurora concrete products comply with relevant technical specifications as per AS 1379:2007 "Specification and supply of concrete".

Geographical scope

The processes in modules A1-A3 have been modelled to represent concrete production in Clyde, near Melbourne, Australia. The raw materials are sourced from within Australia, and the end-of-life (module C) of the product has been modelled to represent Australia as well (based on the default scenario).

Content declaration

The product composition per declared unit (1 m^3 of concrete) is presented in Table 1. For reasons of confidentiality, a range is provided.

Table 1: Product content

Constituent	Mass (kg/m^3)	Post-consumer recycled material, mass %	Biogenic material, mass % of product	Biogenic material, kg C / declared unit
Cement*	50 - 375	0%	0%	0
Ground granulated blast furnace slag †	30 - 300	0%	0%	0
Coarse aggregates†	750 - 1 100	0%	0%	0
Manufactured sand†	n/a	0%	0%	0
Natural Sand †		0%	0%	0
Admixtures	0 - 70	0%	0%	0
Water	150 - 200	0%	0%	0
Total	**2 295 kg/m^3**	**0%**	**0%**	**0**

** Aurora uses General Purpose cement. Cement contains traces of Chromium VI (hexavalent).*

† Crystalline-silica (quartz) may be a constituent of sand, crushed stone, gravel, and blast furnace slag used in any particular concrete mix.

In this LCA, slag is considered a secondary material.

The product, as supplied, is non-hazardous. The product included in this EPD does not contain any substances of very high concern as defined by European REACH regulation* in concentrations >0.1% (m/m). Dust from this product is classified as Hazardous according to the Approved Criteria for Classifying Hazardous Substances 3rd Edition (NOHSC 2004). Concrete products are classified as non-dangerous goods according to the Australian Code for the Transport of Dangerous Goods by Road and Rail. When concrete products are cut, sawn, abraded or crushed, dust is created which contains crystalline silica, some of which may be respirable (particles small enough to go into the deep parts of the lung when breathed in), and which is hazardous. Exposure through inhalation should be avoided.

The product code for pre-mix concrete is UN CPC 375 (Articles of concrete, cement and plaster) and ANZSIC 20330 (Concrete – ready mixed – except dry mix).

** Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals.*

LCA information

Declared unit

1 cubic metre (m^3) of Premixed concrete with a 40MPa strength grade and identifying characteristics (as outlined in the Product information section). The declared unit is defined as the quantity ordered by the client.
The conversion factor to mass is equal to the density of the concrete: 2 295 kg/m^3.

Scope of the Environmental Product Declaration

This EPD covers the cradle-to-gate plus end-of-life life cycle stages (modules A1-A3, C1-C4, D). Construction and use stages have not been included as we cannot define a typical scenario for the range of Premixed concrete products. These impacts are best determined at project level.

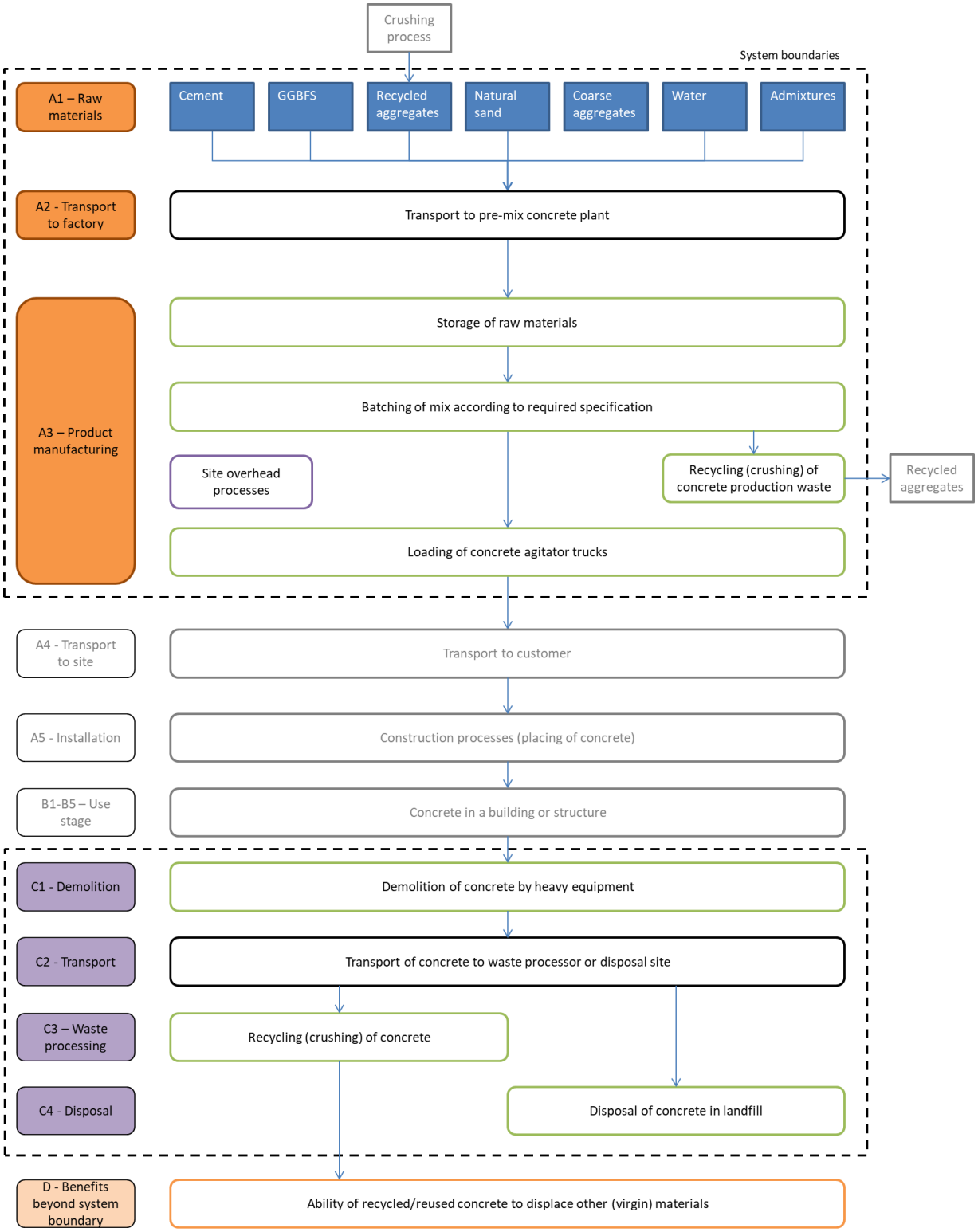
The modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation are shown in Table 2.

Table 2: Scope of this EPD

Stages	Product Stage			Construction Stage		Use Stage							End-of-life Stage				Benefits beyond system boundary
	Raw Materials	Transport	Production	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/Demolition	Transport	Waste Processing	Disposal	Reuse, recovery, recycling potential
Modules	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
				Scenario		Scenario							Scenario				Scenario
Modules Declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	AU, GLO	AU	AU										AU	AU	AU	AU	AU
Share of primary data	35%																
Variation products	0% (n/a)																
Variation sites	0% (n/a)																

X = module is included in this study
ND = module is not declared. When a module is not accounted for, the stage is marked with "ND" (Not Declared). ND is used when a typical scenario cannot be defined.

Figure 1 – System boundary diagram of premixed concrete products



Product Stage (A1-A3)

Raw Materials – Module A1

Extraction and processing of raw materials results in environmental impacts from the use of energy and resources, as well as from process emissions and waste.

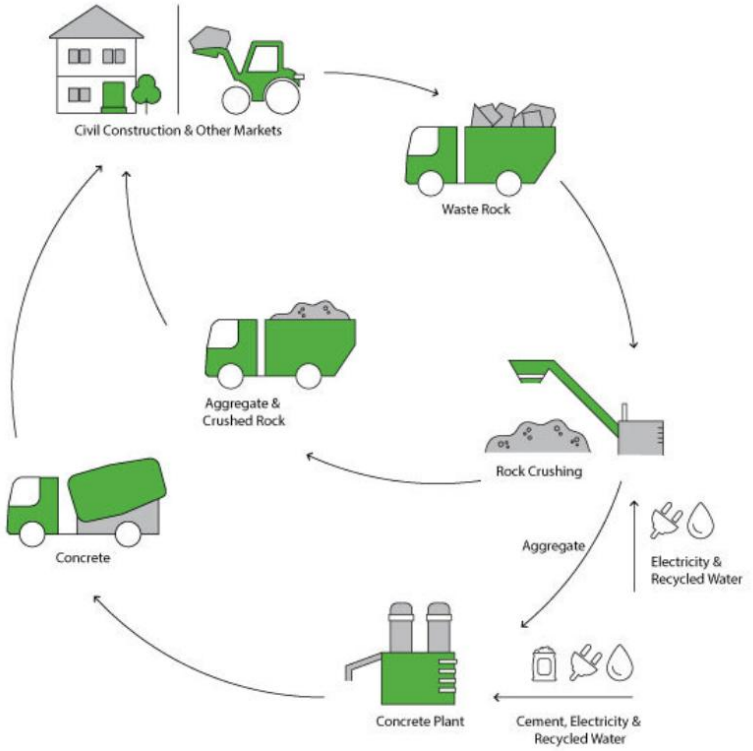
- Cement is produced from clinker (made from limestone) and gypsum.
- Aggregates and natural sand are extracted from quarries.
- Supplementary Cementitious Materials (SCM): GGBFS (ground granulated blast furnace slag) is a rest product from steel production.
- Admixtures are specialised chemical formulations that are typically produced by blending selected ingredients.

Transportation – Module A2

Raw materials are typically transported from suppliers to our site via (articulated) trucks. Transport of raw materials has been included in the LCA based upon actual transport modes and distances relevant to the site.

Manufacturing – Module A3

Ready-mix concrete products are manufactured by mixing the raw materials in selected quantities for each mix design.



The "**Construction process stage**" and "**Use stage**" have been excluded from the life cycle assessment, as the ready-mix concrete can be used for a range of different applications for which the use scenarios are unknown. The impacts of these stages are best determined at project level.

End of life stage (C1-C4)

The end-of-life modules for pre-mix concrete are based on generic scenarios. The scenarios included are currently in use and are representative for one of the most probable alternatives.

Module C1 covers demolition of the concrete at the end of its service life. We have used the end-of-life scenario representative for Victorian building & demolition materials based on the National Waste Report 2022 (NWR 2022). This scenario implies that 84% of the concrete is recycled and the remaining 16% of the concrete is sent to landfill. Additional (module C3, C4 and D) results for alternative scenarios representing 100% recycling and 100% landfill are declared in Table 13 and Table 14.

Module C2 comprises the transport from the demolition site to a recycling centre or landfill site (80km). Module C3 encompasses the recycling process (i.e. crushing of concrete), while Module C4 represents disposal of concrete in a landfill site. The concrete in module C3 reaches end-of-waste status when it is crushed and stockpiled as "recycled crushed concrete" (RCC) aggregates.

We have used the default values from Table 4 in the PCR to model the end-of-life impacts for concrete with a density of 2 295 kg/m^3.

Due to high uncertainty in the parameters and lack of data, CO_2-uptake (carbonation) has not been included at end-of-life.

Resource recovery stage (D)

Module D includes any benefits and loads from net flows leaving the product system (that have passed the end-of-waste state). For this EPD, any material collected for recycling and processed in Module C3, is considered to go through to Module D. We have assumed that Recycled Crushed Concrete aggregates (the output of module C3) replace virgin aggregates (crushed rocks) in module D.

Per cubic metre of concrete, module D credits the avoided impacts for 2 295 kg of crushed virgin aggregates. The net flow calculation is not affected by SCMs or admixtures.

Table 3: End-of-life scenario parameters

Processes	Quantity per m^3 of concrete	Unit
Collection process specified by type	2 295 0	kg collected separately kg collected with mixed construction waste
Transport from demolition site to recovery / disposal sites	80	km transport
Recovery system specified by type	0 1 929 0	kg for re-use kg for recycling kg for energy recovery
Disposal to landfill	366	kg product or material for final deposition
Assumptions for scenario development	The default values from PCR 2019:14 (v2.0.1) table 4 have been used to model modules C1, C2, C3 and C4	

Table 4: Default data for modelling modules C1, C2, C3 and C4

Module and processes	Quantity	Energy carrier / transport means
C1: Demolition/deconstruction of concrete/reinforced concrete	23 kWh/m^3	diesel
C2: Transport (for products/materials not to be incinerated)	80 km	16-32 tonne lorry (EURO 5)
C3: Loading and unloading at sorting facility **C3: Mechanical sorting** **C3: Crushing of concrete**	4.1 kWh/m^3 5.0 kWh/m^3 4.6 kWh/m^3	diesel electricity diesel
C4: Compacting of inert construction waste for landfills (including backfilling)	3.7 kWh/m^3	diesel

Background Data

Primary data covers the 2024 financial year and has been sourced from Aurora. Background data is predominantly sourced from EPDs, AusLCI and the AusLCI shadow database. Data for cement has been sourced from our supplier's EPD (registration number S-P-05506) (Boral 2023). Data for admixtures has been sourced from EPDs published by EFCA (EFCA 2021a, 2021b, 2021c, 2021d). As a result, the vast majority of the environmental profile of our products is based on life cycle data less than three years old. Background data used is less than 10 years old.

Methodological choices have been applied in line with EN 15804:2012+A2:2019; deviations have been recorded.

Data quality assessment

Table 5: Data quality assessment

Process	Source type	Source	Reference year	Data category	Share of primary data (GWP-GHG; A1-A3)
Manufacturing of concrete	Collected data	EPD owner	2024	Primary data	0-1%
Generation of electricity used in manufacturing of concrete	Database	AusLCI v1.42	2023	Primary data	0-1%
Transport of raw materials to manufacturing site	Database	EPD owner	2024	Primary data	1-8%
Production of GP cement	EPD	Supplier EPD	2023	Primary data, Secondary data	4-9%
Production of GGBFS	EPD	Supplier EPD	2023	Primary data, Secondary data	2-25%
Production of coarse aggregates and natural sand	Database	AusLCI v1.42	2023	Secondary data	0%
Admixtures	EPD	EFCA EPDs	2021	Proxy data	0%
Other	Database	AusLCI v1.42	2023	Secondary data	0%
Total share of primary data*, of GWP-GHG results for A1-A3					**35%**

** The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.*

The EPD covers pre-mixed concrete from one plant in Clyde, which provided energy and waste data for the concrete plant for the period July 2023 - June 2024. The mix designs, raw materials, and supply chain details are current (August 2025). The ingredients are mixed in the batching plant and sent to the customer as wet concrete. The EPD covers end-of-life in Australia, although the default factors from the PCR are used to model module C (see Table 4). Background data was sourced from EPDs and the AusLCI v1.42 database. Data quality was assessed according to EN 15804:2012+A2:2019, Annex E (Table E.1 - UN Environment Global Guidance on LCA database development). The use of very poor and poor data is disclosed in Table 6, together with fair data with more than 30% of impact on any core indicator.

Table 6: Data quality information

Data set	Criteria	Data quality level	Reason for level	Reason for using	Relevance
Production of admixtures	Geographical Technical	Fair to good Very poor to Fair	Proxy or Generic background data	Best available data	30-60% of ADPm&m 0-10% of other core impact indicators

Cut-off criteria

- The cut-off criteria applied are 1% of renewable and non-renewable primary energy usage, 1% of the total mass input of a process and 1% of environmental impacts.
- The contribution of capital goods (production equipment and infrastructure) and personnel is excluded, as these processes are non-attributable and they contribute less than 10% to GWP-GHG.

Allocation

The key processes that require allocation are:

- Production of concrete mixes: All shared processes are attributed to concrete products based on their volume.
- Blast Furnace Slag (BFS): BFS is a by-product from steelmaking. The supplier EPD used the AusLCI data for BFS ('Blast Furnace Slag allocation, at steel plant / AU U'), which contain impacts from pig iron production allocated to blast furnace slag using economic allocation. One tonne of slag equals the environmental impact of 0.0127 tonnes of pig iron. Drying and milling of slag is included in the supplier EPD based on their processes.
- Natural aggregates: Coarse aggregates and manufactured sand are produced through crushing of rock, which is graded in different sizes. The energy required for the crushing and screening does not differentiate between products. Therefore, impacts are allocated to products, based on the mass. In effect, all crushed aggregates have the same environmental profile.

Allocation approaches may have a material effect on concrete products containing ground granulated blast furnace slag and recycled aggregates.

Key assumptions

- The concrete composition is provided by Aurora and has been accepted as is.
- Cement and admixture data are taken from supplier-specific and generic EPDs. This is expected to greatly improve the accuracy of Aurora's EPD results.
- Additional environmental impact indicators are not declared in the admixture EPDs, which results in underreporting of these indicators.
- Allocation approaches may have a material effect on concrete products containing ground granulated blast furnace slag and recycled aggregates.
- For core processes, electricity has been modelled using adjusted AusLCI data to represent the estimated residual electricity grid mix in Victoria, Australia. This is done by removing renewables from the Australian Energy Statistics 2024 data (Table O3). The GWP-GHG of the electricity is 1.00 kg CO_2e / kWh. The proxy residual grid mix is made up of brown coal (94.2%), natural gas (5.1%), and oil products (0.8%). Given the low contribution of electricity consumption to the GWP emissions, the selection of the electricity grid mix does not have a material impact on the results.
- For other processes, electricity has been modelled using a location-based approach, mostly based on Australian average electricity generation as per AusLCI.
- The end-of-life scenario is based on landfill and recycling rates for building and demolition materials in Victoria, as per the National Waste Report 2022 (NWR 2022), table 37.
- A minor amount of biogenic carbon may be present in admixtures. The proxy admixture data show a negative GWP-biogenic value, which ends up in module A1-A3 of our concrete EPD. Although any biogenic matter in the admixtures would be bound in the concrete matrix, it is release in module C3 as per the PCR requirements.

Life Cycle Assessment (LCA) indicators

An LCA serves as the foundation for this EPD. An LCA analyses the production systems of a product. It provides comprehensive evaluations of all upstream and downstream energy inputs and outputs. The results are provided in a form which covers a range of environmental impact categories.

Table 7: Environmental indicators legend (EN 15804+A2)

Core indicators	Acronym	Unit
Climate change – total	GWP-total	kg CO_2 equivalent
Climate change – fossil	GWP-fossil	kg CO_2 equivalent
Climate change – biogenic	GWP-biogenic	kg CO_2 equivalent
Climate change – land use and land use change	GWP-luluc	kg CO_2 equivalent
Ozone layer depletion	ODP	kg CFC-11 equivalent
Acidification	AP	mol H^+ equivalent
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 formation	POCP	kg NMVOC equivalent
Abiotic depletion potential – elements[1]	ADP minerals & metals	kg Sb equivalent
Abiotic depletion potential – fossil fuels[1]	ADP fossil	MJ, net calorific value
Water use[1]	WDP	m^3 world equivalent deprived
Additional indicators	**Acronym**	**Unit**
Global Warming Potential – Greenhouse gases	GWP-GHG	kg CO_2 equivalent
Particulate matter emissions	PM	disease incidence
Ionising radiation, human health[2]	IRP	kBq U235 equivalent
Ecotoxicity (freshwater)[1]	ETP-fw	CTUe
Human toxicity, cancer effects[1]	HTP-c	CTUh
Human toxicity, non-cancer effects[1]	HTP-nc	CTUh
Land use related impacts / soil quality[1]	SQP	- (dimensionless)
Additional GHG indicator	**Acronym**	**Unit**
Carbon footprint in line with IPCC AR5[3]	**GWP-GHG (IPCC AR5)**	**kg CO_2 eq**

[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 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.

[3] Note regarding various GWP indicators: GWP-total is calculated using the European Union's Joint Research Centre's characterisation factors (CFs) based on the "EF 3.1 package" for CFs to be used in the EU's Product Environmental Footprint (PEF) framework. CFs listed by JRC are based on the IPCC AR6 method (IPCC 2021) and include indirect radiative forcing, which results in higher numerical Global Warming Potential (GWP) values than the CFs in the internationally accepted (IPCC 2013). The GWP-GHG indicator is identical to GWP-total except that the CFs for biogenic CO2 are set to zero. The GWP-GHG indicator in PCR 2019:14 v2.0.1 differs from the GWP-GHG in earlier (pre v1.3) PCR 2019:14 versions. The "GWP-GHG (IPCC AR5)" indicator is determined using the IPCC AR5 GWPs with a 100-year time horizon (IPCC 2013). This indicator is aligned with Australia's greenhouse gas reporting frameworks.

Table 8: Legend for parameters describing resource use, waste and output flows

Parameter	Acronym	Unit
Parameters describing resource use		
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	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
Waste categories		
Hazardous waste disposed	HWD	kg
Non-Hazardous waste disposed	NHWD	kg
Radioactive waste disposed	RWD	kg
Output flows		
Components for re-use	CRU	kg
Materials for recycling	MFR	kg
Materials for energy recovery	MER	kg
Exported energy	EE	MJ

Table 9: Legend for EN 15804+A1 indicators

Indicator	Acronym	Unit
Global warming potential	GWP	kg CO_2 equivalent
Ozone layer depletion potential	ODP	kg CFC-11 equivalent
Acidification potential	AP	kg SO_2 equivalent
Eutrophication potential	EP	kg PO_4^{3-} equivalent
Photochemical oxidation (Photochemical ozone creation) potential	POCP	kg ethylene equivalent
Abiotic depletion potential - elements	ADPE	kg Sb equivalent
Abiotic depletion potential – fossil fuels	ADPF	MJ_{NCV}

Environmental performance

The following section presents the results for each Life Cycle Assessment module.

The results have been calculated using Simapro software v9.6.0.1, using characterisation factors based on the "EF 3.1 package" for characterisation factors to be used in the EU's Product Environmental Footprint (PEF) framework.

Water flows have been disaggregated using the 36 ALCAS water catchments for which characterisation factors are available for both Pfister WSI and the AWARE method.

To separate the use of primary energy into energy used as raw material and energy used as energy carrier, Option B from Annex 3 of PCR 2019:14 has been applied.

Please consider the following mandatory statements when interpreting the results:

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

" *The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).*"

Table 10: Environmental indicators EN 15804+A2, AR4014, per m^3

Environmental Indicator	Unit	Module A1-A3	Module C1	Module C2	Module C3	Module C4	Module D
Core Indicators							
GWP-total	kg CO_2-eq.	2.14E+02	1.22E+01	1.47E+01	8.07E+00	8.71E-01	-1.70E+01
GWP-fossil	kg CO_2-eq.	2.14E+02	1.22E+01	1.47E+01	7.91E+00	8.71E-01	-1.70E+01
GWP-biogenic	kg CO_2-eq.	-1.81E-01	8.06E-04	9.08E-04	1.60E-01	7.02E-05	-3.34E-02
GWP-luluc	kg CO_2-eq.	1.17E-02	5.82E-06	6.94E-06	3.67E-06	4.22E-07	-2.61E-06
ODP	kg CFC11-eq.	9.40E-06	1.94E-06	2.32E-06	9.99E-07	1.42E-07	-5.80E-07
AP	mol H+ eq.	1.47E+00	1.34E-01	1.29E-01	2.18E-02	2.08E-03	-6.20E-02
EP-freshwater	kg P eq.	7.27E-04	1.62E-06	8.83E-07	5.87E-06	1.19E-07	-1.22E-05
EP-marine	kg N eq.	2.51E-01	5.82E-02	4.06E-02	3.87E-03	3.75E-04	-1.04E-02
EP-terrestrial	mol N eq.	2.77E+00	6.38E-01	4.45E-01	4.23E-02	4.10E-03	-1.12E-01
POCP	kg NMVOC eq.	6.93E-01	1.70E-01	1.09E-01	1.13E-02	1.10E-03	-2.95E-02
ADP minerals & metals[1]	kg Sb eq.	5.55E-06	1.43E-08	1.70E-08	1.96E-06	1.02E-09	-2.49E-06
ADP fossil[1]	MJ (NCV)	1.88E+03	1.70E+02	2.02E+02	1.13E+02	1.24E+01	-2.43E+02
WDP[1]	m^3 world eq. deprived	7.82E+02	1.07E+00	1.28E+00	1.16E+00	7.82E-02	-1.13E+02
Additional indicators							
GWP-GHG	kg CO_2-eq.	2.14E+02	1.22E+01	1.47E+01	7.92E+00	8.71E-01	-1.70E+01
PM	Disease incidence	8.79E-06	3.54E-06	7.26E-07	1.45E-07	1.10E-08	-5.19E-07
IRP[2]	kBq U235 eq.	4.71E-01	2.48E-04	2.95E-04	1.59E-03	1.80E-05	-1.54E-03
ETP-fw[1]	CTUe	7.15E+02	3.76E+01	4.46E+01	1.95E+01	2.70E+00	-1.16E+01
HTP-c[1]	CTUh	4.70E-08	4.70E-10	6.30E-11	1.66E-10	6.88E-12	-7.38E-10
HTP-nc[1]	CTUh	8.02E-07	2.50E-09	1.20E-09	1.08E-09	8.32E-11	-4.66E-09
SQP[1]	-	4.25E+02	8.14E-01	9.06E-01	2.15E+04	2.05E+01	-3.49E+02
Carbon footprint							
GWP-GHG (IPCC AR5)	**kg CO_2 eq**	214	12.2	14.7	7.92	0.871	-17.0

[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 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.

Table 11: **EN 15804+A2 parameters, AR4014, per m^3**

Parameter	Unit	Module A1-A3	Module C1	Module C2	Module C3	Module C4	Module D
PERE	MJ_{NCV}	5.12E+01	2.63E-01	2.89E-01	1.95E+00	2.42E-02	-1.39E+01
PERM	MJ_{NCV}	2.89E-01	0.00E+00	0.00E+00	-2.43E-01	0.00E+00	0.00E+00
PERT	MJ_{NCV}	5.15E+01	2.63E-01	2.89E-01	1.71E+00	2.42E-02	-1.39E+01
PENRE	MJ_{NCV}	1.88E+03	1.70E+02	2.02E+02	1.13E+02	1.24E+01	-2.43E+02
PENRM	MJ_{NCV}	1.27E+00	0.00E+00	0.00E+00	-1.07E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	1.88E+03	1.67E+02	2.02E+02	1.12E+02	1.24E+01	-2.43E+02
SM	kg	3.09E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ_{NCV}	4.68E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.80E+00	2.46E-02	2.92E-02	4.02E-02	1.80E-03	-2.66E+00
HWD	kg	3.99E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	1.13E+00	7.77E-04	8.56E-04	5.52E-03	3.67E+02	-4.09E-02
RWD	kg	1.99E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	2.23E+01	0.00E+00	0.00E+00	1.93E+03	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 12: **EN 15804+A1 indicators*, AR4014, per m^3**

Environmental Indicator	Unit	Module A1-A3	Module C1	Module C2	Module C3	Module C4	Module D
GWP	kg CO_2 eq	2.14E+02	1.21E+01	1.47E+01	7.89E+00	8.68E-01	-1.69E+01
ODP	kg CFC11 eq	7.44E-06	1.53E-06	1.83E-06	7.89E-07	1.12E-07	-4.58E-07
AP	kg SO_2 eq	8.69E-01	9.50E-02	7.15E-02	1.38E-02	1.67E-03	-1.95E-02
EP	kg PO_4^{3-} eq	9.80E-02	1.95E-02	1.37E-02	1.35E-03	1.29E-04	-3.61E-03
POCP	kg C_2H_4 eq	4.74E-02	9.31E-03	4.62E-03	7.68E-04	8.33E-05	-1.35E-03
ADPE	kg Sb eq	1.35E-05	1.45E-08	1.73E-08	1.96E-06	1.04E-09	-2.50E-06
ADPF	MJ_{NCV}	1.88E+03	1.70E+02	2.02E+02	1.13E+02	1.24E+01	-2.43E+02

* Note: the indicators and characterisation methods are from EN 15804:2012+A1:2013, but other LCA rules (system boundaries, allocation, etc.) are according to EN 15804:2012+A2:2019; i.e., the results of the "A1 indicators" shall not be claimed to be compliant with EN 15804:2012+A1:2013.

Additional scenarios

Table 13: Environmental indicators EN 15804+A2, 100% end-of-life scenarios, AR4014, per m^3

Environmental Indicator	Unit	Module C3	Module C4	Module D	Module C3	Module C4	Module D
Core Indicators			**100% recycling**			**100% landfill**	
GWP-total	kg CO_2-eq.	6.63E+00	0.00E+00	-2.02E+01	0.00E+00	1.14E+00	0.00E+00
GWP-fossil	kg CO_2-eq.	6.62E+00	0.00E+00	-2.02E+01	0.00E+00	1.14E+00	0.00E+00
GWP-biogenic	kg CO_2-eq.	8.84E-03	0.00E+00	-3.98E-02	0.00E+00	7.59E-05	0.00E+00
GWP-luluc	kg CO_2-eq.	1.42E-06	0.00E+00	-3.11E-06	0.00E+00	5.48E-07	0.00E+00
ODP	kg CFC11-eq.	4.41E-07	0.00E+00	-6.90E-07	0.00E+00	1.83E-07	0.00E+00
AP	mol H+ eq.	4.52E-02	0.00E+00	-7.38E-02	0.00E+00	1.26E-02	0.00E+00
EP-freshwater	kg P eq.	2.54E-06	0.00E+00	-1.45E-05	0.00E+00	1.52E-07	0.00E+00
EP-marine	kg N eq.	1.55E-02	0.00E+00	-1.24E-02	0.00E+00	5.47E-03	0.00E+00
EP-terrestrial	mol N eq.	1.70E-01	0.00E+00	-1.34E-01	0.00E+00	6.00E-02	0.00E+00
POCP	kg NMVOC eq.	4.52E-02	0.00E+00	-3.51E-02	0.00E+00	1.60E-02	0.00E+00
ADP minerals & metals[1]	kg Sb eq.	3.35E-09	0.00E+00	-2.97E-06	0.00E+00	1.35E-09	0.00E+00
ADP fossil[1]	MJ (NCV)	9.41E+01	0.00E+00	-2.89E+02	0.00E+00	1.60E+01	0.00E+00
WDP[1]	m^3 world eq. deprived	4.73E-01	0.00E+00	-1.35E+02	0.00E+00	1.01E-01	0.00E+00
Additional indicators			**100% recycling**			**100% landfill**	
GWP-GHG	kg CO_2-eq.	6.63E+00	0.00E+00	-2.02E+01	0.00E+00	1.14E+00	0.00E+00
PM	Disease incidence	9.22E-07	0.00E+00	-6.18E-07	0.00E+00	3.33E-07	0.00E+00
IRP[2]	kBq U235 eq.	5.80E-05	0.00E+00	-1.84E-03	0.00E+00	2.33E-05	0.00E+00
ETP-fw[1]	CTUe	8.87E+00	0.00E+00	-1.39E+01	0.00E+00	3.54E+00	0.00E+00
HTP-c[1]	CTUh	3.01E-10	0.00E+00	-8.79E-10	0.00E+00	4.43E-11	0.00E+00
HTP-nc[1]	CTUh	1.76E-09	0.00E+00	-5.55E-09	0.00E+00	2.36E-10	0.00E+00
SQP[1]	-	1.08E+01	0.00E+00	-4.15E+02	0.00E+00	7.66E-02	0.00E+00
Carbon footprint			**100% recycling**			**100% landfill**	
GWP-GHG (IPCC AR5)	**kg CO_2 eq**	6.63E+00	0.00E+00	-2.02E+01	0.00E+00	1.14E+00	0.00E+00

Table 14: EN 15804+A2 parameters, 100% end-of-life scenarios, AR4014, per m^3

Parameter	Unit	Module C3	Module C4	Module D	Module C3	Module C4	Module D
		100% recycling			100% landfill		
PERE	MJ_{NCV}	3.99E+00	0.00E+00	-1.39E+01	0.00E+00	2.47E-02	0.00E+00
PERM	MJ_{NCV}	-2.89E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ_{NCV}	3.70E+00	0.00E+00	-1.39E+01	0.00E+00	2.47E-02	0.00E+00
PENRE	MJ_{NCV}	9.41E+01	0.00E+00	-2.43E+02	0.00E+00	1.60E+01	0.00E+00
PENRM	MJ_{NCV}	-1.27E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ_{NCV}	9.28E+01	0.00E+00	-2.43E+02	0.00E+00	1.60E+01	0.00E+00
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ_{NCV}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.32E-02	0.00E+00	-2.66E+00	0.00E+00	2.31E-03	0.00E+00
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	1.19E-02	0.00E+00	-4.09E-02	0.00E+00	2.30E+03	0.00E+00
RWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	2.30E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Abbreviations

Abbreviation	Definition
AusLCI	Australian Life Cycle Inventory (database)
BFS / GGBFS	blast furnace slag / ground granulated blast furnace slag
CEN	European Committee for Standardization
CPC	Central Product Classification
EF	Environmental Footprint
EFCA	European Federation of Concrete Admixtures Associations
EN	European Norm (Standard)
EPD	Environmental Product Declaration
GPI	General Programme Instructions
ISO	International Organization for Standardization
kg	kilogram
km	kilometre
kWh	kilo Watt hour
LCA	Life Cycle Assessment
m^3	cubic metre
ND	Not Declared
NWR	National Waste Report
OHS	Operational Health and Safety
PCR / c-PCR	Product Category Rules / complimentary Product Category Rules
SCM	Supplementary Cementitious Materials
SVHC	Substances of Very High Concern
t	tonne
UN	United Nations

Version history

Version	Notes
1	Original version of the EPD, published 2025-08-15

References

AS 1379	Specification and supply of concrete, prepared by Committee BD-049 Manufacture of Concrete, published on 20 September 2007 by Standards Australia, Sydney
AusLCI 2023	Australian Life Cycle Inventory database v1.42 published by the Australian Life Cycle Assessment Society, 2023
Boral 2023	EPD of Victorian Bulk Cement and Cementitious Products (Geographical scope: Victoria), EPD Australasia. EPD Declaration number S-P-05506, issued 2023-05-20 (version 1.0), based on EN 15804+A2, PCR 2019:14 (v1.11) and c-PCR-001; EPD owner: Boral.
c-PCR-003	c-PCR-003 Concrete and concrete elements (EN 16757:2022), Product category rules for concrete and concrete elements, version 8 April 2025
ECHA 2025	European Chemicals Association, Candidate List of substances of very high concern for Authorisation, published in accordance with Article 59(10) of the REACH Regulation, Helsinki | Accessed on 1 June 2025 from: https://echa.europa.eu/candidate-list-table
EFCA 2021a	EPD of Air entrainers, IBU EPD Declaration number EPD-EFC-20210193-IBG1-EN, issued 2021-12-16, based on EN 15804 and PCR for concrete admixtures; EPD owner: EFCA - European Federation of Concrete Admixtures Associations
EFCA 2021b	EPD of Set Accelerators, IBU EPD Declaration number EPD-EFC-20210194-IBG1-EN, issued 2021-12-16, based on EN 15804 and PCR for concrete admixtures; EPD owner: EFCA - European Federation of Concrete Admixtures Associations
EFCA 2021c	EPD of Retarders, IBU EPD Declaration number EPD-EFC-20210195-IBG1-EN, issued 2021-12-16, based on EN 15804 and PCR for concrete admixtures; EPD owner: EFCA - European Federation of Concrete Admixtures Associations
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NWR 2022	Blue Environment, National Waste Report 2022, prepared for The Department of Climate Change, Energy, the Environment and Water, Final version 1.2, 16 December 2022 (updated 10 February 2023)
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