NEILSENS CONCRETE

Environmental Product Declaration

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

Premixed Concrete – S40 20mm 100mm slump Internal floor

EPD of a single product, based on the volume weighted average results of multiple sites. 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 http://www.environdec.com.

Programme:	The International EPD® System www.environdec.com
Programme operator:	EPD International AB www.epd-australasia.com
Regional Programme:	EPD Australasia
EPD registration number:	EPD-IES-0023079:001
Publication date:	2025-06-13
Valid until:	2030-06-13
Geographical Scope:	Queensland

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Programme information and verification

EPD Owner	Neilsens Concrete Pty Ltd Johnstone Rd, Brendale Q 4500 Web: www.neilsens.com.au Phone: +61 7 3205 5599
EPD Programme Operator	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden Email: info@environdec.com
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EPD Registration number	EPD-IES-0023079:001
Date of Publication	2025-06-13
Revision number	1
Valid until	2030-06-13
Product group classification	UN CPC 375 (Articles of concrete, cement and plaster)
Geographical Scope	Queensland, Australia
Reference Year for Data	01-04-2023 to 31-03-24

CEN standard EN 15804:2012+A2:2019/AC:2021 served as the core Product Category Rules (PCR)

Product category rules	PCR 2019:14 Construction Products, Version 1.3.4, 2024-04-30 c-PCR-003 Concrete and Concrete Elements, 2024-04-30
PCR review was conducted by	The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact
Independent third-party verification of the declaration and data, according to ISO 14025:2006:	☒ EPD verification by individual verifier Third Party Verifier: Sazal Kundu Edge Environment Pty Ltd Level 3, Greenhouse, 180 George Street, Sydney NSW 2000 Australia Web: www.edgeimpact.global Phone: +61 2 9438 0100. Approved by: EPD Australasia®
Procedure for follow-up of data during EPD validity involves third party verifier:	☐ Yes ☒ No

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.

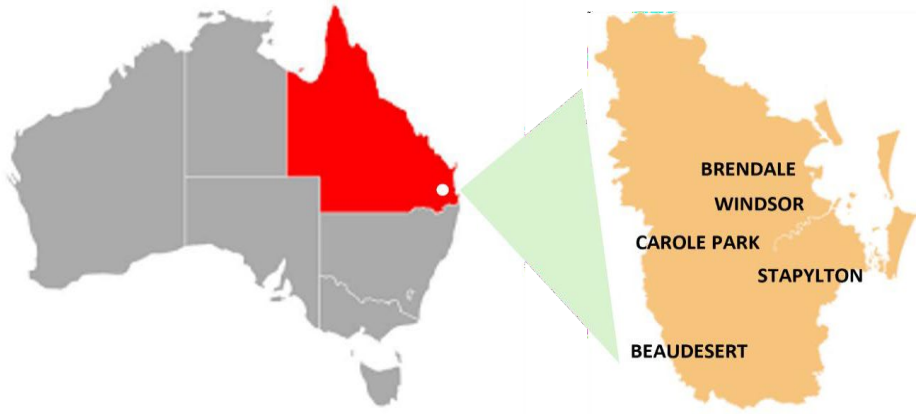
Company information

The Neilsens Group is a wholly owned, independent family business operating in the Greater Brisbane region and is one of the largest independently owned concrete and quarry operations based in Queensland. Its core business is the manufacture and supply of construction materials: pre-mixed concrete, concrete aggregate and general quarry products, cement and fly ash; and associated transport logistics and technical services.

The quarry operations commenced at Brendale QLD in 1976 as Neilsens Quality Gravels Pty Ltd. The pre-mixed concrete operations commenced at Brendale QLD in 1993 as Neilsens Concrete Pty Ltd.

Neilsens Quality Gravels operates from three quarry sites: Brendale north of Brisbane, and Beaudesert and Bromelton both located in the Scenic Rim. An additional quarry is in development at Warrell View in the Scenic Rim.

Neilsens Concrete Pty Ltd operates from five sites: Brendale, Windsor, Carole Park, Stapylton, and Beaudesert. An additional site is in development at Coorparoo.



Neilsens Technical Services operates a construction materials testing laboratory at Carole Park that has maintained continuous NATA Accreditation since 1998.

Neilsens is committed to the quality and reliability of its products and services. It begins when our customer first contacts Neilsens, and achieved through the skills and knowledge of our sales, dispatch, transport, administration, and technical teams.

Neilsens interacts with the general public, both as customers and in community, and with builders, contractors, professional consultants, and industry regulators. Our product knowledge, our experience, our service skills, and our regulatory compliance are the criteria by which we are judged.

Owner of the EPD:	Neilsens Concrete Pty Ltd
Contact:	Ph: 1300 266 273 https://neilsens.com.au/contact-us/
Description of the organisation:	Pre Mixed Concrete Supplier
Product-related or management system-related certifications:	ISO 9001:2015 Accredited (certificate FS 520402)
Name and location of production site(s):	Brendale, Windsor, Carole Park, Stapylton, Beaudesert,

Product information

Product name:

40MPa Internal Floors Premixed Concrete (or ready-mixed concrete)

Product manufacturing process:

Concrete is a construction material composed of primary and secondary cementitious materials, water, fine aggregates, coarse aggregates and performance enhancing admixtures. Premixed concrete is produced in concrete batching plants whereby bulk quantities of all constituents in a concrete mix are stored and then blended together in defined proportions to produce the desired concrete properties. Neilsens operate 'dry batch' concrete plants at each of the five locations covered by the EPD. Dry batching refers to the process by which all constituent ingredients in a concrete mix are added together 'dry' in the back of a concrete agitator truck in which they are mixed with water to produce the wet or 'plastic' concrete that is then transported to construction job sites in the same mixing vehicle before being discharged from the vehicle for placement on the customer's site.

Product description:

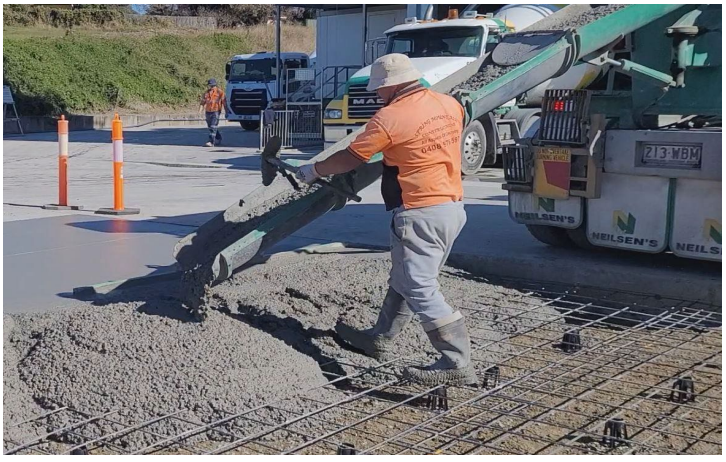
Australian Standard *AS1379 Specification and supply of concrete* informs the requirements for specifying concrete, and for concrete production and supply. The Standard classifies concrete into two classes: Normal and Special Class. Within Special Class there is provision for Special Class – Prescription concrete. Neilsens Concrete supplies both Normal Class and Special Class concrete to this Standard.

Normal class concrete is used broadly across all sectors of construction. It is specified and supplied based on six basic parameters: compressive strength, aggregate type and nominal size, workability, method of placement, and air content.

Special class concrete is any concrete, other than Normal class, where additional parameters are specified, for specific performance and/or prescribed content, to meet end use requirements.

Normal and Special Class concrete comprises mixtures of primary cementitious material Cement; and secondary cementitious materials [SCMs]: Classified Flyash and Ground Granulated Blast Furnace Slag; Aggregates; Water; and Chemical Admixtures.

UN CPC code:	375 (Articles of concrete, cement and plaster)
CPV code:	44114000-3 [Ready-mixed concrete]
ANZSIC code:	20330 (Concrete – ready mixed – except dry mix)
Geographical scope:	Queensland



LCA information

Declared unit:	1 m^3 or pre-mixed concrete
Time representativeness:	The plant data for the LCA is based on the 12 months 1st April 2023 to 31st March 2024 inclusive.
Database(s) and LCA software used:	GCCA Industry EPD Tool for Cement and Concrete (V5.1), International version. The life cycle inventory database used in the tool is the ecoinvent database (v3.10), 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.

Basis of EPD data

This EPD is a generic geographic multi-site, single product EPD covering Neilsens' five concrete batching plants in south east Queensland. Individual product volumes vary between plants, the values for this product were assigned based on the volume weighted average of total production of each site.

The products covered by this EPD are manufactured, used, and disposed of in Queensland, Australia. Several raw materials are sourced internationally.

Cut off criteria

In accordance with the PCR 2019:14, the following system boundaries are applied to manufacturing equipment and employees:

- Environmental impact from infrastructure, construction, production equipment, and tools that are not directly consumed in the production process are not accounted for in this LCI. Capital equipment and buildings typically account for less than a few percent of nearly all LCIs and this is usually smaller than the error in the inventory data itself. For this project it is assumed that the capital equipment makes a negligible contribution to the impacts as per Frischknecht et al. (2007) with no further investigation.
- Personnel related impacts, for example transportation to and from work, are also not accounted for in this LCI. The impacts of employees are also excluded form the inventory impacts on the basis that if they were not employed for this production or service function, they would be employed for another. It is very difficult to determine what proportion of the impacts from their whole lives should count toward their employment. For this project , the impact of employees are excluded.

Based on this guidance, no energy or mass flows, except packaging of materials were excluded. All materials required for manufacturing are delivered via trucks and ships without packaging.

Allocations

- No co-products are generated during clinker and cement production, eliminating the need for allocation in by-products.
- This concrete is delivered to site immediately after its production. No packaging is used for its raw materials nor in this distribution of the final product and therefore there are no packaging materials requiring end-of-life treatment and thus no co-product allocation is required.

Data Quality

Foreground data on raw material requirements, manufacture and distribution was provided as primary source by Neilsens Concrete for the year 1st April 2023 – 31st March 2024. Schemes for data quality assessment of generic and specific data from EN 15804+A2 (table E.1) are used to perform this data quality assessment activity, as shown in the following Table 1.

Table 1 – Data quality by module

Module	Life Cycle Stage	Data Source and LCA Factor	Year	Data Quality
A1	Raw Material – Cement	Published EPD, supplier mix design	EPD 2023, mix design supplied by Neilsens Concrete 2024	Very good
	Raw Materials – Supplementary cementitious materials	Ecoinvent, supplier mix design	2024	Good
	Raw Materials – Aggregates	Ecoinvent, supplier mix design	2024	Good
	Raw Materials – Admixtures	Ecoinvent, supplier mix design	2024	Good
A2	Raw material transport from suppliers	Actual distances from source to manufacturing site, GCCA default factors	2024	Good
A3	Manufacturing	Actual metered energy and water inputs. Estimated waste outputs. Annual production volumes	2024	Very Good
A4	Transport to site	Actual concrete truck fuel usage and distance travelled. GCCA default factors for truck type.	2024	Good
A5	Construction	Default scenario , EcoInvent	Estimate using Ecoinvent factors	Fair
C1	Deconstruction and demolition	Default scenario, EcoInvent	Estimate using Ecoinvent factors	Fair
C2	Transport to waste processing	Default scenario, EcoInvent	Estimate using Ecoinvent factors	Fair
C3	Waste processing	Default scenario, EcoInvent	Estimate using Ecoinvent factors	Fair
C4	Disposal	Default scenario, EcoInvent	Estimate using Ecoinvent factors	Fair
D	Reuse-Recovery-Recycling- potential	Default scenario, EcoInvent	Estimate using Ecoinvent factors	Fair

Assumptions:

- The GCCA Industry EPD Tool for Cement and Concrete (V5.1), International version uses global characterisation factors for Water Deprivation Potential (WDP) and does not use regionalized Australian catchment level data.
- Values for Module C are determined from predefined values within the GCCA tool, including use of default values for construction materials recycling of 81%. The results of modules A1-A3 should be assessed in conjunction with the results of module C.
- In the GCCA tool direct (foreground) infrastructure is excluded, as it is commonly accepted to contribute negligibly to the environmental footprint of clinker, cement, aggregates, concrete and precast. The (background) infrastructure is, however, included by default in the Ecoinvent 3.10 database used in the model.
- As this is a multi-site single product EPD it is assumed that the relative total volume of each product produced by each batching plant is proportional to the total plant volumes.
- The energy balancing as per PCR 2019:14 Construction Products v1.3.4 is performed according to Option B (see Annex 3 of the PCR).
- Fly ash is a supplementary cementitious material derived from burning of coal in electricity production and used as a raw material in the product. It is considered to carry no environmental impact for the purposes of this EPD, hence an economic allocation of $0 has been applied. The transport of flyash to concrete batching sites has been taken into account when carrying out the LCA
- Blast furnace slag is a by-product of steel production that is dried and ground for use in concrete production as a supplementary cementitious material. Slag imported into Brisbane is assumed sourced from Japan. The Japanese Economic allocation from LCI Cement and Concrete Life

Cycle Strategies (2015) is 0.318%. 1% is used in this case as a conservative allocation figure.

Description of system boundaries:

The EPD covers the life cycle of Neilsens ready-mixed concrete from cradle to grave (modules A1-A3, A4-A5, C1-C4 & D), excluding module B (use stage). Refer to the system diagram and modules declared below:

System diagram:

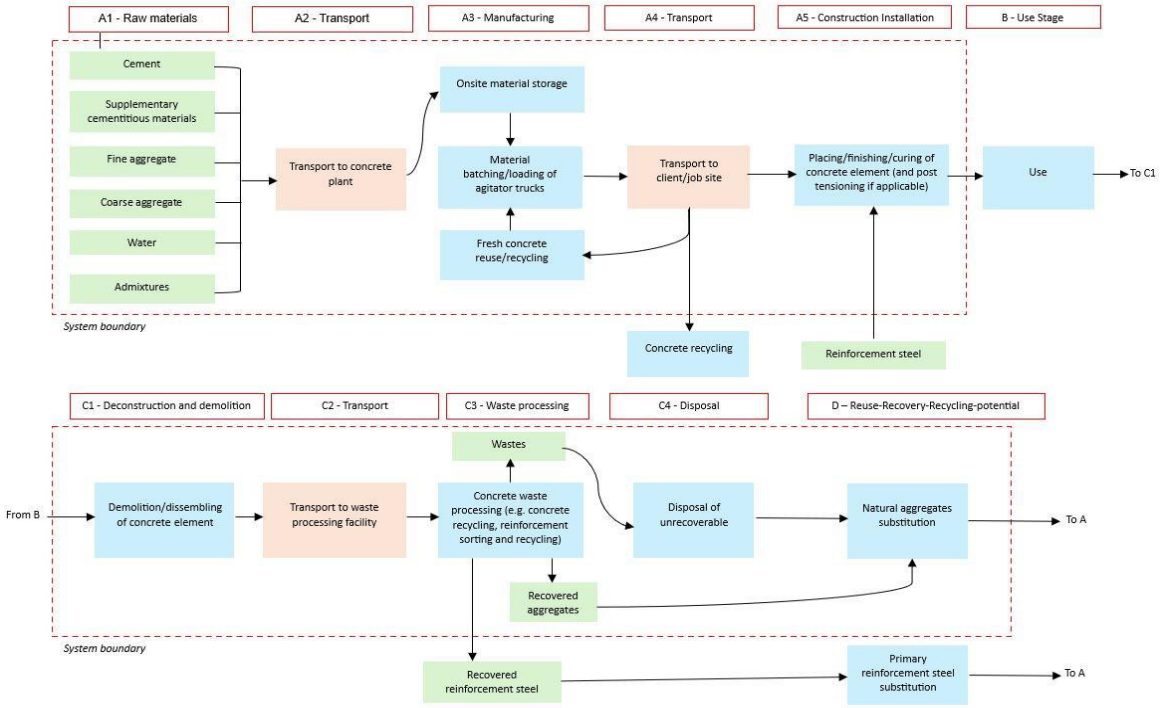


Table 2 - Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results)

	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	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	AU	AU	AU	-	-	-	-	-	-	-	AU	AU	AU	AU	AU
Specific data used	>90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	+3%/-3%					-	-	-	-	-	-	-	-	-	-	-	-

Note - It is discouraged to use the results of modules A1-A3 without taking into consideration the results of module C.

Product description and use

Table 3 – Product information

Strength Grade	Mix Code	Mix Description	Applications
S40	S4021001	S40 20mm 100mm slump Internal floors	Internal floors

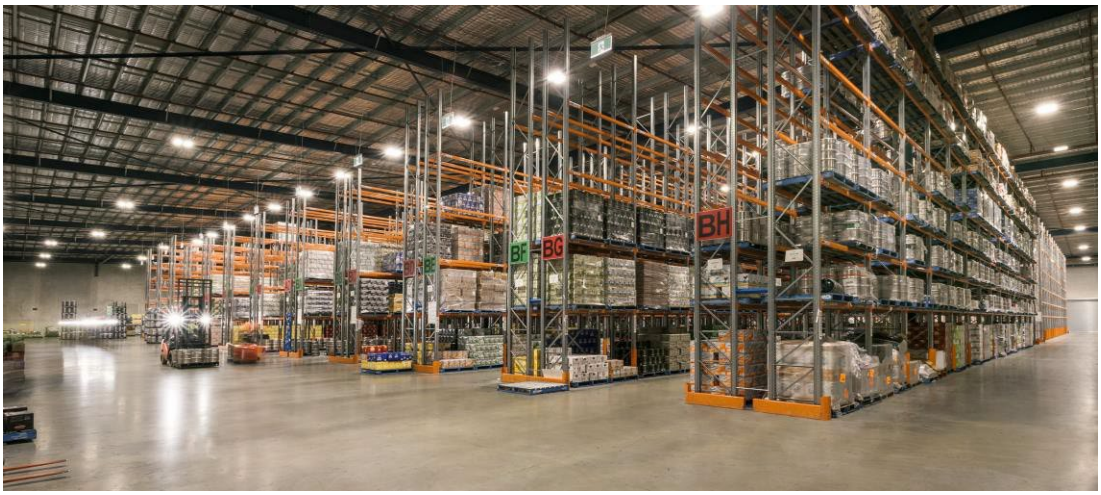
The table below provides estimated contributions of materials used in the range of Normal class concrete produced by Neilsens Concrete.

The gross weighted average of this declared material, 2350 kg per cubic metre, makes up a minimum of 99% of the products covered by this EPD. The following table provides a summary of the materials included in Neilsens Concrete ready-mix concrete and the relative composition by weight.

Ready-mix concrete is classified as Non-Dangerous Goods according to the Australian Code for the Transport of Dangerous Goods by Road and Rail. None of the products contain one or more substances that are listed in the “Candidate List of Substances of Very High Concern for authorisation”.

Table 4 – Content declaration of the product

Product components	% by weight	Post-consumer material, weight % of product	Biogenic material, weight % of product	Biogenic material, weight - kg C/m^3
GP Cement	5-20	0	0	0
Secondary Cementitious Material	0-15	0	0	0
Aggregates	65-85	0	0	0
Water	7-12	0	0	0
Admixtures	0-1	0	0	0
SUM	***100***	***0***	***0***	***0***



Cradle to Gate (Modules A1-A3)

Raw materials used in production of Neilsens' premix concrete covered by this EPD include cement, supplementary cementitious materials, aggregates, admixtures and water. These materials are transported to the batching plant from their place of manufacture by road, rail and sea and stored in silos, hoppers, ground bins or tanks. During the batching process they are conveyed to a batching hopper where they are weighed and discharged into a concrete agitator truck and mixed together to form a heterogenous concrete mixture.

The impact of electricity usage at concrete batching plants was calculated based on metered values during the reference period. Electricity mix sourced from Table O4.2, "Electricity generation in Queensland, by fuel type, physical units, calendar year" (Calendar Year 2023-QLD), https://www.energy.gov.au/publications/australian-energy-statistics-table-o-electricity-generation-fuel-type-2022-23-and-2023.

As the composition of the residual grid mix on the market has not been publicly disclosed, it has been conservatively estimated by subtracting renewables from the consumption mix of the market. The breakdown of supply is thus - Coal + Peat (79.23%), Oil (2.26%), Gas (16.38%), Biomass (2.13%).

The impact of this electricity on the GWP-GHG of modules A1-A3 is 1.08kg CO_2 eq. per kWh.

Gate to Site (Module A4)

The GCCA tool utilises a default truck emission standard of Euro 4 for Oceania. An assumed average load size of 4.5m^3 in a 6.0m^3 capacity was used as a conservative figure estimating that not all delivery loads would be full and nor would all back loads be empty. Fuel consumption and distance travelled data is as per recorded by Neilsens Concrete during the period.

Table 5 – Truck transport Content declaration of the product

Vehicle	Fuel consumption (l/km)	Fuel type	Average distance travelled (km)	Density of products (kg/m^3)	Average load factor	Volume capacity utilisation factor
Euro 4 truck	0.43	Diesel	13.98	2350	37.5%	<1

Construction (Module A5)

As Neilsens does not have operational control over the placement of ready-mix concrete at the construction site assumptions for construction inputs and waste are made based on the GCCA tool default values. These values cover pumping, placing and finishing of concrete but do not include pre-installation activities such as form work and steel placing.

Table 6 – Construction site default values from GCCA tool

Construction inputs and waste	Value	Unit of measure
Concrete losses	3	%
Electricity	2.776	kWh
Diesel, in building machine	1.669	l
Water	669	kg
Wastewater	0.669	m^3

End-of-life (Modules C1-C4)

Concrete manufacturers such as Neilsen Concrete have no control over the end-of-life use of their product. At the end of its use stage, concrete products are demolished, crushed and either sent to landfill or recycled.

All other values associated with demolition, transport, waste processing and disposal are fixed default values based on ecoinvent 3.10 database which in turn is specifically found at:

C1 – Deconstruction/demolition: The energy for dismantling and handling from the waste management dataset *"Treatment of waste concrete, not reinforced, sorting plant, GLO".* This assigns a value for the use of diesel fuel in this stage of 96.1MJ per cubic metre of concrete. 100% of the product (2350kg) is assumed to be separately collected during deconstruction.

C2 – Transport after demolition: The transportation means of concrete waste flows at the end-of-life are derived from ecoinvent 3.10 dataset "*Market for waste concrete, GLO".* The transportation distance considered comes from the JRC Technical Report, Model for Life Cycle Assessment (LCA) of buildings, 2018, Section 6.1.4, Table 20 and the transportation modelling is described in section 3.1.4. The default distance to landfill or processing facility is set at 50km and transport mode split between train and truck.

C3 – Waste processing: The life-cycle inventory for the processing of concrete waste to be recycled is based on the values provided in ecoinvent 3.10 for "Dry sorting plant for building wastes with pre-sorting of mixed waste, crushing and manual sorting", from dataset *Treatment of waste concrete, not reinforced, sorting plant, GLO.* Those values are weighted by the recycling rate. In the GCCA tool, the recycling rate is a region-specific rate manually entered by the LCA producer. That value of 81% is sourced from DCCEEW 2024 data.

C4 – Disposal: The remaining waste concrete undergoes inert waste landfill.

During its life, chemicals within the concrete react with carbon dioxide in the atmosphere in a process known as carbonation, often referred to as 'recarbonation' in the context of concrete Life Cycle Analysis. As concrete is demolished, the exposed surface area of concrete particles increases and so does the rate of this carbonation reaction. The actual amount of carbonation is impacted by the exposed surface area, temperature and humidity and thus an exact figure is impossible to ascertain and default values from GCCA Tool are used in this EPD.

Benefits and Loads Beyond the System Boundary (Module D)

The impacts beyond the system boundaries are calculated, for each flow of recycled material, as the difference between the impacts of recycling 1 kg of material and the impacts of 1 kg of the primary materials avoided, multiplied by the mass flow sent to recycling minus its initial recycled material content.

Only concrete is taken into consideration when calculating benefits and loads beyond the system boundaries. Other materials are excluded as there is no recycling.

Results of the environmental performance indicators

EN 15804 reference package based on EF 3.1 (Environmental Footprint) or a later version has been used. The environmental impacts considered in this EPD, along with their description, unit of measure and calculated values are shown in Tables 7a-e below. 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.

Table 7a - Core environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG **	kg CO_2 eq.	3.05E+02	7.90E-01	1.85E+01	9.64E+00	1.02E+01	3.64E+00	-1.61E+00	-1.38E+01
GWP-tot *	kg CO_2 eq.	3.05E+02	7.90E-01	1.85E+01	9.64E+00	1.02E+01	3.64E+00	-1.61E+00	-1.38E+01
GWP-fos	kg CO_2 eq.	3.05E+02	7.87E-01	1.85E+01	9.63E+00	1.02E+01	3.63E+00	-1.61E+00	-1.37E+01
GWP-bio	kg CO_2 eq.	1.91E-01	3.24E-05	1.58E-02	1.05E-03	2.19E-03	6.94E-03	3.85E-04	-3.41E-02
GWP-luc	kg CO_2 eq.	4.92E-02	3.20E-04	4.11E-03	8.36E-04	4.90E-03	7.15E-03	1.44E-03	-1.08E-02
ODP	kg CFC 11 eq.	3.74E-06	1.23E-08	3.15E-07	1.47E-07	1.48E-07	4.45E-08	8.07E-08	-1.12E-07
AP	mol H+ eq.	1.32E+00	3.29E-03	1.22E-01	8.69E-02	5.31E-02	3.21E-02	1.98E-02	-8.67E-02
EP-fw	kg P eq.	5.03E-02	2.02E-05	1.98E-03	9.17E-05	3.42E-04	7.89E-04	7.56E-05	-1.24E-03
EP-mar	kg N eq.	6.37E-02	1.19E-03	3.23E-02	4.03E-02	1.98E-02	7.45E-03	7.54E-03	-2.06E-02
EP-ter	mol N eq.	2.76E+00	1.30E-02	4.08E-01	4.41E-01	2.16E-01	7.73E-02	8.23E-02	-2.60E-01
POCP	kg NMVOC eq.	7.35E-01	4.77E-03	1.20E-01	1.32E-01	7.24E-02	2.31E-02	2.95E-02	-7.05E-02
ADPE ***	kg Sb eq.	2.60E-04	2.22E-06	2.69E-05	3.53E-06	2.79E-05	3.06E-05	4.45E-06	-7.28E-05
ADPF ***	MJ, net calorific value	1.75E+03	1.15E+01	1.75E+02	1.26E+02	1.44E+02	7.53E+01	6.85E+01	-1.64E+02
WDP ***	m^3 world eq. deprived	5.38E+01	5.53E-02	2.36E+00	3.09E-01	8.39E-01	1.20E+00	1.92E-01	-2.76E+01

* The indicated values (gross values) include the greenhouse gas emissions from the incineration of secondary fuels at clinker production. The net GWP-tot (excluding the emissions from the incineration of secondary fuels at clinker production) is 3.05E2 kg CO_2–eq. The net GWP-fos is 3.05E2 kg CO_2-eq. The net GWP-bio is 1.91E-1 kg CO_2-eq. This information was sourced from the GCCA tool.
** The indicated values (gross values) include the greenhouse gas emissions from the incineration of secondary fuels at clinker production. The net GWP-GHG (excluding the emissions from the incineration of secondary fuels at clinker production) is 3.05E2 kg CO_2–eq. This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero. This information was sourced from the GCCA tool.
*** The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high, or there is limited experience with the indicator.
It should be noted that the net/gross differentiation applies to GWP indicators only and is ignored for other indicators where gross is applied by default.

Core environmental impact indicators	• **GWP-GHG** (Global Warming Potential, GHG) • **GWP-tot** (Global Warming Potential, total) • **GWP-fos** (Global Warming Potential, fossil fuels) • **GWP-bio** (Global Warming Potential, biogenic) • **GWP-luc** (Global Warming Potential, land use and land use change) • **ODP** (Depletion potential of the stratospheric ozone layer) • **AP** (Acidification potential, Accumulated Exceedance) • **EP-fw** (Eutrophication potential, fraction of nutrients reaching freshwater end compartment) • **EP-mar** (Eutrophication potential, fraction of nutrients reaching marine end compartment) • **EP-ter** (Eutrophication potential, Accumulated Exceedance) • **POCP** (Formation potential of tropospheric ozone) • **ADPE** (Abiotic depletion potential for non- fossil resources) • ADPF (Abiotic depletion potential for fossil resources potential) • WDP (Water (user) deprivation potential, deprivation-weighted water consumption)

Table 7b - Additional environmental impact indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	9.47E-06	8.07E-08	1.97E-06	2.47E-06	1.12E-06	3.73E-07	4.50E-07	-1.41E-06
IRP *	kBq U235 eq.	1.85E+03	1.02E-02	5.57E+01	5.65E-02	1.85E-01	7.17E-01	4.37E-02	-1.18E+00
ETP **	CTUe	2.07E+02	2.77E+00	1.73E+02	1.79E+01	4.14E+01	1.86E+01	9.36E+00	-8.79E+01
HTPC **	CTUh	8.05E-07	3.94E-09	6.54E-08	3.77E-08	6.54E-08	1.44E-08	1.26E-08	-1.62E-07
HTPNC **	CTUh	1.36E-05	7.61E-09	4.68E-07	1.72E-08	9.22E-08	5.25E-08	1.23E-08	-1.11E-07
SQP **	dimensionless	1.36E+03	1.16E+01	6.89E+01	8.86E+00	1.34E+02	4.10E+01	1.35E+02	-1.75E+02

* 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 from some construction materials is also not measured by this indicator.

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

Additional environmental impact indicators	• **PM** (Potential incidence of disease due to PM emissions) • **IRP** (Potential Human exposure efficiency relative to U235) • **ETP** (Potential Comparative Toxic Unit for ecosystems) • **HTPC** (Potential Comparative Toxic Unit for humans - cancer) • **HTPNC** (Potential Comparative Toxic Unit for humans - non-cancer) • **SQP** (Potential soil quality index)

Table 7c - Parameters describing resource use

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ, net calorific value	2.95E+01	1.51E-01	6.23E+00	7.73E-01	2.81E+00	9.56E+00	6.36E-01	-1.36E+01
PERM	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ, net calorific value	2.95E+01	1.51E-01	6.23E+00	7.73E-01	2.81E+00	9.56E+00	6.36E-01	-1.36E+01
PENRE	MJ, net calorific value	4.74E+02	1.15E+01	1.37E+02	1.26E+02	1.44E+02	7.53E+01	6.85E+01	-1.64E+02
PENRM	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ, net calorific value	4.74E+02	1.15E+01	1.37E+02	1.26E+02	1.44E+02	7.53E+01	6.85E+01	-1.64E+02
SM	kg	7.80E+01	0.00E+00	2.34E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NFW	m^3	1.50E+00	1.70E-03	6.21E-02	8.19E-03	2.40E-02	3.42E-02	7.10E-02	-6.52E-01

Parameters describing resource use	• **PERE** (Use of renewable primary energy excluding renewable primary energy resources used as raw materials) • **PENRE** (Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials) • **SM** (Use of secondary materials) • **RSF** (Use of renewable secondary fuels) • **NRSF** (Use of non- renewable secondary fuels) **PERM** (Use of renewable primary energy resources used as raw materials) • **PERT** (Total use of renewable primary energy resources) • **PENRM** (Use of non-renewable primary energy resources used as raw materials) • **PENRT** (Total use of non-renewable primary energy resources) •**NFW** (Net use of fresh water)

Table 7d - Other environmental information describing waste categories

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	9.23E+01	0.00E+00	1.54E+01	0.00E+00	0.00E+00	0.00E+00	4.19E+02	0.00E+00
RWD	kg	5.33E-01	2.49E-06	1.60E-02	1.38E-05	4.56E-05	1.75E-04	1.06E-05	-2.88E-04

Other environmental information describing waste categories	• **HWD** (Hazardous waste disposed) • **NHWD** (Non-hazardous waste disposed) • **RWD** (Radioactive waste disposed)

Table 7e - Environmental information describing output flows

CRU	kg	A1-A3	A4	A5	C1	C2	C3	C4	D
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	5.71E+01	0.00E+00	0.00E+00	1.90E+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	0.00E+00	0.00E+00
EEE	MJ per energy carrier	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ per energy carrier	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Environmental information describing output flows	• **CRU** (Components for re-use) • **MFR** (Materials for recycling) • **MER** (Materials for energy recovery) • EEE (Exported electrical energy) • EET (Exported thermal energy)

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