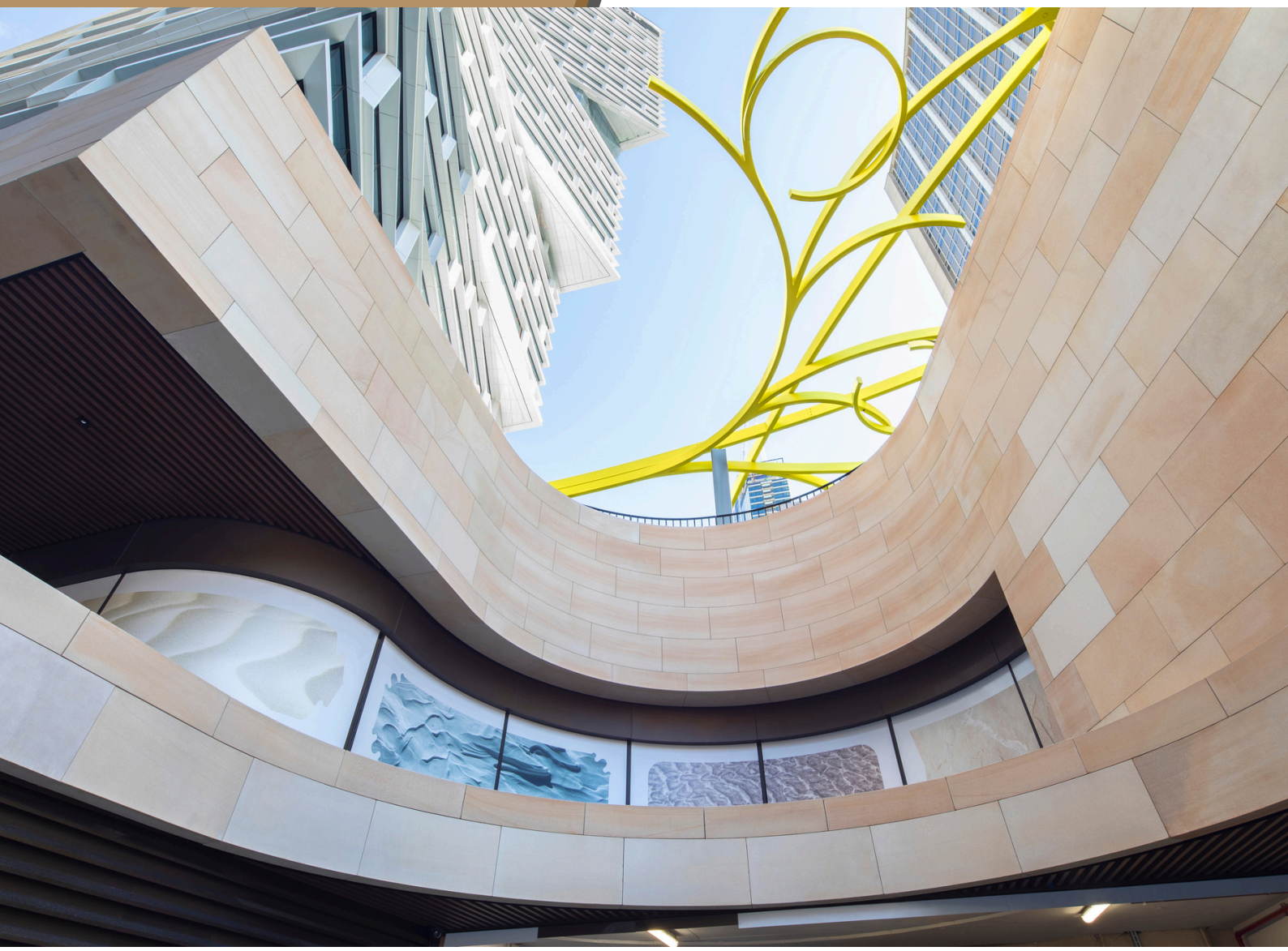
Environmental Product Declaration

GOSFORD QUARRIES SANDSTONE



Environmental Product Declaration of multiple products based on the representative product result of the identical product group in accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Product Name: Blast Walling Sandstone Product

Product Category Rules (PCR): PCR 2019:14 Construction products (EN 15804:A2), Version 1.3.3, dated 2024-03-01, International EPD System, UN CPC code: 15130 and 15310.

Programme: The International EPD® System, www.environdec.com
Programme operator: EPD International AB
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PCR Information:

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

PCR: PCR 2019:14 Construction products (EN 15804:A2), Version 1.3.3, dated 2024-03-01, International EPD System.

PCR review conducted by:
The Technical Committee of the International EPD® System.

Third Party Verifier

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

☑ EPD verification by individual verifier

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Approved by: EPD Australasia

Procedure Follow-up

Procedure for follow-up of data during EPD validity involves third party verifier:
☑ Yes ☐ No

[Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period. The follow-up can be organized entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update is identified, the EPD shall be re-verified by a verifier]

Company Information

Declaration Owner:

Gosford Quarries
Website: https://gosfordquarries.com.au
Email: sales@gosfordquarries.com.au

Gosford Quarries is Australia's largest and most experienced, premier sandstone product supplier, offering a diverse range that encompasses various colours, finishes, and dimensions. Sandstone products serve various purposes due to their unique characteristics and properties, e.g. building material, paving, landscaping etc.

Since 1922, Gosford Quarries has been a leader and innovator in the sandstone industry in Australia.
For over 100 years, they have been entrusted with the restoration of major iconic Australian landmarks and buildings as well as supplying the residential, commercial and landscaping sectors with the highest quality natural sandstone.

Their commitment to sustainably sourcing quality materials and delivering exceptional, transparent service is at the core of Gosford Quarries' vision for the next century.

As the most trusted name in Australian sandstone, Gosford Quarries is the top choice for commercial, residential, and landscape architects. With an abundance of exclusive resources, the latest CNC processing technology, a wealth of experience and the highest quality materials, Gosford Quarries continues to forge the way for the stone industry in Australia.

Name and location of production site:
Somersby factory location – 70 Quarry Road, Somersby, 2250
Glenorie Factory – 2863 Old Northen Road, Glenorie, 2157

Important Notice

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

This EPD is verified to be compliant with EN 15804.

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.

Product Information

Product Name:
Blast Walling Sandstone Product

Product Identification & Description:
Blast walling sandstone is a textured stone product characterized by its split face and often multiple split sides, providing a rugged and natural aesthetic. With a bed thickness ranging from 120mm to 160mm, the heights and lengths are random, adding to its distinctive appearance. Primarily used for solid walling applications due to its durability, the versatile texture allows it to be adapted for various architectural and landscaping purposes. Its strength and unique dimensions make it an excellent choice for both structural and decorative projects. All sandstone products weight 2.4 tonnes per cubic meter.

The two manufacturing factories of Gosford Quarries produce identical sandstone products which are not marketed as distinct products nor distinguishable by downstream customers. Therefore, according to section 2.2.2.1 of PCR 2019:14 Construction products, Version 1.3.3, the results for various impact indicators of the identical products are declared based on the representative product. Sandstone products manufactured at the Somerby factory have been chosen as the representative product due to the volume of quarried materials processed there annually.

UN CPC Code:
CPC 15310 under the UN CPC classification system v2.1

Geographical Scope:
Australia

LCA Information

Declared unit:
'1 tonne of sandstone product'. All sandstone product has a m^3 weight of 2.4 tonnes.

Reference service life:
Not applicable.

Time representativeness:
Primary data were collected from the manufacturing site for the 2021/22 financial year.

Database(s) and LCA software used:
The life cycle inventory used for this LCA combines generic and specific data, selected following section 6.3.7 of EN 15804:2012+A2:2019, 2020 (EN 15804:2012+A2:2019, 2020). Specific data includes processes involved in the raw material extraction process and the manufacturing of sandstone products in the processing factory. These data include the annual diesel consumption for overburden removal and extraction process, quantities of quarried materials from various quarry locations, annual sandstone production, the stages of sandstone manufacturing, waste generation, the annual consumption of electricity, water and diesel for the manufacturing process, diesel supplier information, transportation and final product packaging information. All the data provided by the manufacturers are based on the primary data collected from the manufacturing site. Generic and background data from the literature and LCA databases represent a reference year within 10 years.

Most of the background/generic data (e.g. for energy, resource and transport processes) for life cycle assessment are taken from ecoinvent 3.9.1 and AUSLCI v1.42. The ecoinvent 3.9.1 and AusLCI v1.42 dataset was last updated or compiled in January 2023 and March 2023, respectively.

It is to be noted that the ecoinvent dataset was chosen only if the relevant datasets were not available in the AusLCI dataset. Considering the manufacturing location of sandstone products in Australia, the ecoinvent datasets have been modified and adjusted adopting the Australian electricity dataset. The life cycle impact assessment (LCIA) was carried out using the LCA software SimaPro 9.5.0.2.

Description of system boundaries:
System diagram for this EPD is depicted in Figure 1.

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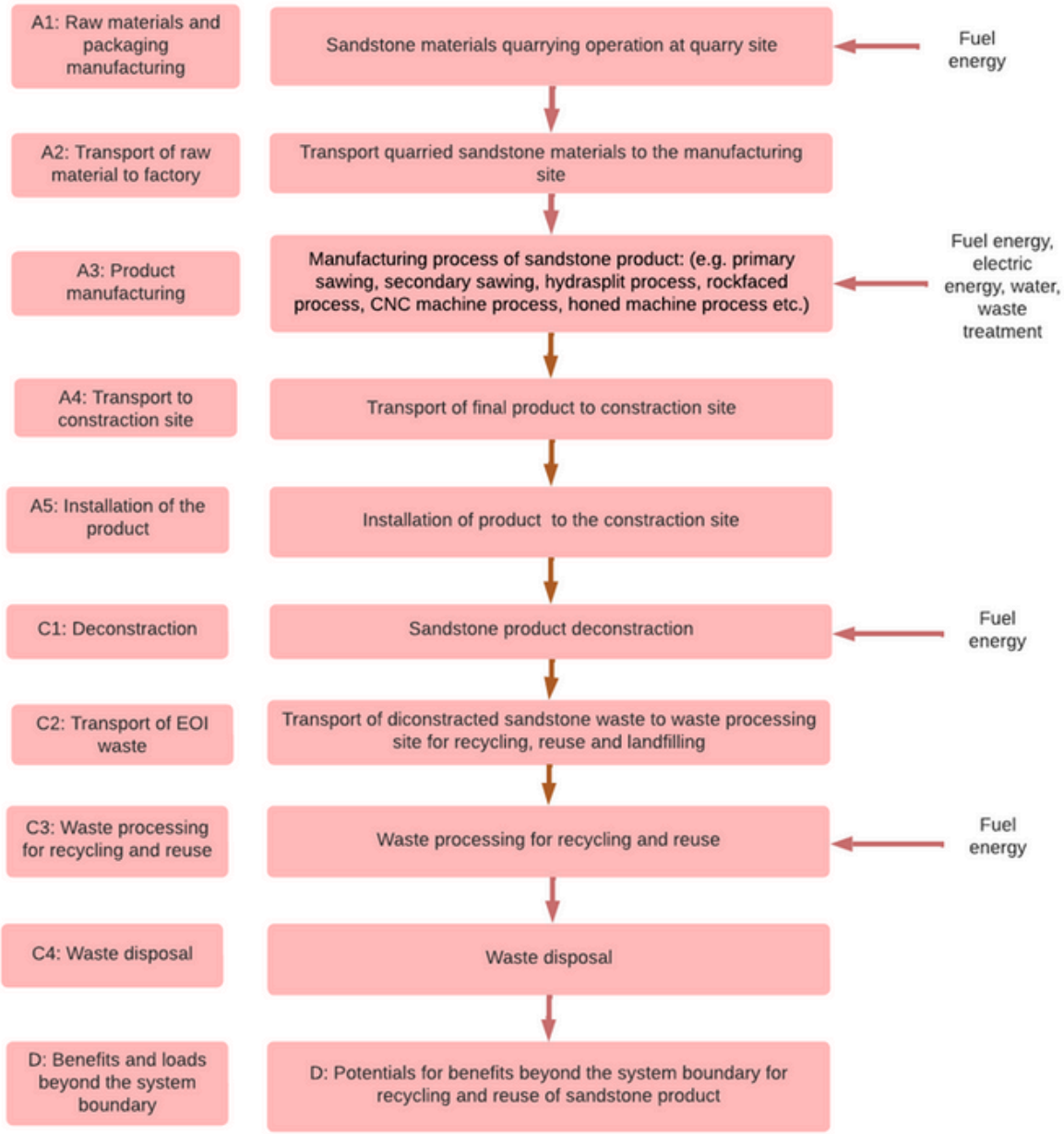

Figure 1. System diagram

Description of system boundaries:

This life cycle assessment covers lifecycle scope from cradle to gate with options, modules C1–C4 and module D (A1–A3 + C + D and additional modules A4–A5) in accordance with section 5.2 of EN 15804:2012+A2:2019, 2020. The stages include raw material supply (A1), transportation (A2), manufacturing (A3), transport to the final site (A4), construction installation (A5), deconstruction (C1), transport at end-of-life (C2), waste processing (C3), waste disposal (C4) as well as reuse, recycling, and recovery (D).

The scope selected for this study is based on the EPD type 'cradle to gate with options, modules C1–C4 and module D'. However, this study does not count the manufacturing of production equipment, buildings, vehicle production, maintenance and other capital goods, business travels of personnel and labour work. The excluded processes are assumed to have a negligible contribution to the overall LCA results. While the principal criterion is to include all flows that contribute to more than 1% of the environmental impacts if in doubt, smaller flows were rather included than excluded because the exact contribution would be difficult to determine from the start.

This EPD complies with ISO 14025:2006 (ISO 14025, 2006), PCR 2019:14 Construction products, Version 1.3.3 (International EPD system, 2024), EN 15804:2012+A2:2019/AC:2021 (EN 15804:2012+A2:2019, 2020), General Programme Instructions (GPI) for the International EPD System, Version 4 (General Programme Instructions (GPI), 2021), Instructions of the Australasian EPD program; EPD Australasia limited v4.2 (EPD, AUSTRALASIA, 2023).

Table 1 System boundary

	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	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU
Specific data used	<11%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites (GWP-GHG)	8.88%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X: Module declared, ND: Not declared

Allocation:

In the framework of the International EPD System, the methodological choices for allocation for reuse, recycling, and recovery have been set according to the polluter pays principle (PPP). This means that the generator of the waste shall carry the full environmental impact until the point in the product's life cycle at which the waste is transported to a scrapyard or the gate of a waste processing plant (collection site). The subsequent user of the waste shall carry the environmental impact from the processing and refinement of the waste but not the environmental impact caused in any previous life cycles.

Any allocations directly embedded in the LCA database processes were adopted. The energy, water and other resources for manufacturing processes are allocated based on the yearly consumption of energy and production amount of sandstone products in the processing factory, considering the total amount of product that passes through each machine according to the manufacturer's data. Gosford Quarries provided an average of 11% of wastage data across all the machines in the factory collectively, which was calculated based on the materials coming into the factory and finished stone coming out from the factory. Due to the unavailability of the data, the allocation of wastage across various machines has been done using the materials passed through various machines.

Cut-off rules:

According to EN 15804, the life cycle inventory data shall include a minimum of 95% of total inflows (mass and energy) per module. In case of insufficient input data for a unit process, the cut-off criteria shall be 1% of primary energy usage and 1% of the total mass input of that unit process. Proxy data or extrapolation should be used to achieve 100% completeness if only 95% of total inflow data is available. Inflows not included in the LCA shall be documented in the EPD. For this study, 100% of the inflows required for the manufacture of stone products are taken into consideration. However, this study does not consider the manufacturing of production equipment, buildings, vehicle production and maintenance, other capital goods, business travel of personnel, and labor work, assuming these have a negligible impact on the overall LCA results.

Electricity:

The electricity consumption mix was sourced from AusLCI database for grid electricity of NSW consisting of coal (74.98%), hydro (3.04%), biogas (0.59%), natural gas (3.07%), heat pump (0.23%), photovoltaic (16.57%) and bagasse (1.37%), oil (0.15%) with a GWP-GHG impact of 0.788 kg CO_2eq./kWh based on EF3.1.

Assumptions and limitations:

1. For this LCA modeling related to stone product packaging (A3 module), hardwood was chosen as the material for manufacturing packaging pallets, instead of softwood.
2. Based on the information provided by the manufacturers, it was assumed that the packaging pallets were transported back to the processing factory from the installation location for repurposing, covering a distance of 80 km (A5 module).
3. For the calculation in module A4, an average travel distance of 80 km has been assumed between the sandstone final product manufacturing site and the product delivery site (e.g., construction/installation site) based on the manufacturer's information. Additionally, for the calculation in module A4 regarding the waste disposal in the nearest landfill disposal, a distance of 10 km was assumed.
4. The calculation for end-of-life (C3 and C4 module) recycling, reuse and landfill disposal were assumed based on the National Waste Report 2022(Blue Environment, 2022).
5. Gravel has been considered an avoided representative product for the recycling benefit (D module) of sandstone products according to a study on the environmental benefits of recycling building materials (Department of Environment, Climate Change and Water NSW, 2010).
6. Virgin sandstone products have been considered as avoided representative products for the reuse benefit (D module) of demolished sandstone based on the EPD of concrete products.

Content declaration for products and packaging

Table 2 Content declaration for product and packaging

Sandstone product	Product components	Component weight kg/ ton product	Component amount in product (%)	Post-consumer recycled material, weight-% of product	Biogenic material, weight-% of product	Biogenic material, kg C/product or declared unit
Custom Stones	Sandstone material	1000	100	0	0	0

Packaging Material	Weight, kg	Weight-% (versus the product)	Biogenic material, kg C/product or declared unit
Pallets	9.371	0.9371	3.97E+00
Pallet wraping plastics	0.295	0.0295	0
Packaging foam	0.390	0.0390	0
Buckles	0.012	0.0012	5.36E-03
Polyethylene strap	0.003	0.0003	0
Gluts	1.401	0.1401	5.93E-01
Slats	1.291	0.1291	5.47E-01
Total	12.764	1.276	5.12E-03

The products included in this EPD do not contain any substances of very high concern as defined by European REACH regulation in concentrations >0.1% (m/m).

Environmental Impact Indicators

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

Table 3 Environmental impact indicators described

Environmental Indicators	Explanation
Core environmental impact indicators	
Global Warming Potential – total (GWP-total), kg CO_2eq.	Climate change can cause adverse effects on ecosystem health, human health, and material welfare. The indicators within this category are related to emissions of greenhouse gases into the air. Fossil CO_2eq.: This is defined as greenhouse gas emissions caused due to fossil fuels in Carbon-di-oxide equivalent. Biogenic CO_2eq.: This is defined as greenhouse gas emissions caused by the natural carbon cycle. CO_2eq. from land transformation: This is defined as Greenhouse emissions caused due to direct or indirect land use by humans.
Global Warming Potential – fossil (GWP-fossil), kg CO_2eq.	
Global Warming Potential – biogenic (GWP-biogenic), kg CO_2eq.	
Global Warming Potential – land use and land use change (GWP-luluc), kg CO_2eq.	
Stratospheric ozone depletion potential (ODP), kg CFC 11 eq.	Stratospheric ozone depletion can have harmful effects on human health, animal health, terrestrial and aquatic ecosystems, and biochemical cycles. The indicators within this category are related to hydrocarbons containing combined bromine, fluorine and chlorine, and chlorofluorocarbons (CFCs).
Acidification potential (AP), mol H^+eq.	This category considers acidifying substances that cause a wide range of effects on soil, groundwater, surface water, organisms, ecosystems, and materials.

Acidification potential (AP), mol H^+eq.	This category considers acidifying substances that cause a wide range of effects on soil, groundwater, surface water, organisms, ecosystems, and materials.
Eutrophication potential – aquatic freshwater (EP-freshwater), kg P eq.	The eutrophication process in freshwater bodies due to emissions of phosphorus-containing substances is called freshwater eutrophication.
Eutrophication potential – aquatic marine (EP-marine), kg N eq.	The eutrophication process occurring in marine water bodies due to the emission of nitrogen-containing substances is called marine water eutrophication.
Eutrophication potential – terrestrial (EP-terrestrial), mol N eq.	Air pollution due to excess atmospheric nitrogen or ammonia deposition is called terrestrial eutrophication.
Formation potential of tropospheric ozone (POCP), kg NMVOC eq.	Formation potential of tropospheric ozone.
Abiotic depletion potential – non fossil resources(ADPE), kg Sb eq.[1]	Abiotic depletion potential for non-fossil resources.
Abiotic depletion potential – fossil resources (ADPF), MJ[1]	Abiotic depletion for fossil resources potential (ADP-fossil)
Water deprivation potential (WDP), m^3 world eq. deprived[1]	The potential of water deprivation, to either humans or ecosystems, and serves in calculating the impact score of water consumption at midpoint in LCA or to calculate a water scarcity footprint as per ISO 14046.

Additional environmental impact indicators	
Particulate matter (PM), disease inc.	Potential incidence of disease due to PM emissions.
Ionizing radiation, human health[2] (IR), kBq U-235 eq.	Human health impact caused due to releases of radioactive material to the environment.
Eco-toxicity -freshwater, (ETP-fw), CTUe[1]	Comparative Toxic Unit for ecosystems (CTUe) expressing an estimate of the potentially affected fraction of species (PAF) integrated over time and volume per unit mass of a chemical emitted (PAF m3 year/kg).
Human toxicity, cancer (HTP-c), CTUh[1]	Comparative Toxic Unit for human (CTUh) expressing the estimated increase in morbidity in the total human population per unit mass of a chemical emitted (cases per kilogram).
Human toxicity, non-cancer effects, (HTP-nc), CTUh[1]	Comparative Toxic Unit for human (CTUh) expressing the estimated increase in morbidity in the total human population per unit mass of a chemical emitted (cases per kilogram).
Land use related impacts (SQP), Pt[1]	Potential soil quality index.
Additional GWP-GHG indicator	
GWP-GHG[3]	The GWP-GHG indicator includes all greenhouse gases included in GWP-total but excludes biogenic CO_2 uptake and emissions and biogenic carbon stored in the product. The assessment method of this indicator: Baseline model of 100 years of the IPCC based on IPCC 2021.

Resource use parameters	
Primary energy resources – Renewable - Excluding use as raw materials (PERE), MJ, net calorific value	PERE includes (first use) bio-based materials which are used as an energy source such as hydropower, solar and wind power.
Primary energy resources – non-renewable - Excluding use as raw materials (PENRE), MJ, net calorific value	PENRE includes (first use) materials such as oil, gas, coal and uranium which are used as an energy source.
Primary energy resources – Renewable - Used as raw materials (PERM), MJ, net calorific value	PERM includes (first use) bio-based materials which are used as raw materials (e.g. wood, hemp, etc.).
Primary energy resources – Non-renewable - Used as raw materials (PENRM), MJ, net calorific value	PENRM includes (first use) primary resources such as oil, gas and coal which are used as raw materials (e.g. plastic-based products).
Primary energy resources – Renewable – Total (PERT), MJ, net calorific value	PERT are the total use of renewable primary energy resources (primary energy and primary energy resources which are used as raw materials).
Primary energy resources – Non-renewable – Total (PENRT), MJ, net calorific value	PENRT are the total use of non- renewable primary energy resources (primary energy and primary energy resources which are used as raw materials).
Use of secondary material (SM), kg	Secondary materials are materials recycled from previous use or waste (e.g. scrap metal, broken concrete, broken glass, plastic and wood) that are used as material input from another product system. These include both renewable and non-renewable resources, with or without energy content, depending on the status of the material when it was originally extracted from the environment.

Use of renewable secondary fuels (RSF), MJ, net calorific value	Renewable secondary fuels are renewable materials with energy content that have crossed the system boundary between product systems and are used as fuel input (energy source) in another product system (e.g. biomass residue pellets, chipped waste wood).
Use of non-renewable secondary fuels (NRSF), MJ, net calorific value	Non-renewable secondary fuels are non-renewable materials with energy content that have crossed the system boundary between product systems and are used as fuel input (energy source) in another product system (e.g. processed solvents, shredded tyres).
Net freshwater use (FW), m^3	The use of net fresh water.
Waste flow parameters	
Hazardous waste disposed (HWD), kg	It calculates the amount of hazardous waste that has been disposed of.
Non-hazardous waste disposed (NHWD), kg	Non-hazardous waste disposed (NHWD), kg
Radioactive waste disposed (RWD), kg	It calculates the amount of radioactive waste that has been disposed of.
Output flows	
Components for reuse (CRU), kg	It calculates the amount of components for reuse.
Materials for recycling (MFR), kg	It calculates the amount of materials for recycle.
Materials for energy recovery (MER), kg	It calculates the amount of materials for energy recovery.
Exported energy-electrical, MJ	Exported energy-electrical, MJ
Exported energy- thermal (EET), MJ	It calculates the amount of recovered energy from thermally exported system.

Results of the environmental performance indicators

Table 4 Environmental impact of blast walling sandstone product per declared unit 'one tonne of sandstone product' (results of representative product)

Core environmental indicators	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
AP	mol H^+ eq.	3.12E-01	1.09E-01	2.80E-03	1.98E-02	6.66E-02	2.61E-03	1.01E-02	-5.14E-02
GWP-total	kg CO_2 eq.	4.95E+01	1.43E+01	7.61E+00	6.57E+00	8.78E+00	8.66E-01	2.14E+00	-9.28E+00
GWP-biogenic	kg CO_2 eq.	-2.62E+00	5.37E-03	7.57E+00	1.10E-03	3.29E-03	1.45E-04	1.02E-03	-4.58E-02
GWP-fossil	kg CO_2 eq.	5.21E+01	1.43E+01	4.58E-02	6.57E+00	8.77E+00	8.66E-01	2.14E+00	-9.23E+00
GWP-luluc	kg CO_2 eq.	3.78E-03	1.21E-04	7.29E-06	3.30E-04	7.44E-05	4.34E-05	1.33E-05	-2.08E-03
EP-marine	kg N eq.	1.23E-01	3.22E-02	2.94E-03	3.78E-03	1.97E-02	4.98E-04	2.80E-03	-1.19E-02
EP-freshwater	kg P eq.	3.15E-03	5.06E-04	6.09E-06	9.54E-05	3.10E-04	1.26E-05	4.73E-05	-9.95E-04
EP-terrestrial	mol N eq.	5.57E-01	3.53E-01	1.59E-02	3.93E-02	2.16E-01	5.17E-03	3.07E-02	-1.39E-01
ODP	kg CFC11 eq.	1.52E-06	2.23E-06	3.05E-08	9.18E-07	1.37E-06	1.21E-07	6.51E-07	-6.60E-08
POCP	kg NMVOC eq.	1.56E-01	8.70E-02	4.71E-03	1.75E-02	5.33E-02	2.30E-03	7.73E-03	-3.72E-02
ADPF [1]	MJ	6.57E+02	2.10E+02	6.92E-01	1.48E+02	1.29E+02	1.95E+01	5.12E+01	-1.05E+02
ADPE [1]	kg Sb eq.	1.71E-04	5.28E-05	5.33E-07	1.90E-06	3.24E-05	2.50E-07	3.27E-06	-4.58E-05
WDP [1]	m^3 depriv.	1.26E+01	4.28E+00	6.08E-02	7.49E-01	2.62E+00	9.87E-02	2.45E+00	-1.20E+01
Acronyms	AP = Acidification potential; GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential; ODP = Depletion potential of the stratospheric ozone layer; Accumulated Exceedance; Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption								

Additional impact categories and indicators	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
ETP-fw[1]	CTUe	1.74E+02	4.11E+01	8.56E-01	5.26E+01	2.51E+01	6.92E+00	8.02E+00	-2.23E+01
PM	disease inc.	2.19E-06	6.96E-07	1.17E-08	1.25E-07	4.26E-07	1.65E-08	8.06E-08	-7.17E-07
HTP-c[1]	CTUh	5.77E-09	5.40E-10	1.43E-12	4.65E-10	3.30E-10	6.12E-11	6.38E-11	-5.96E-09
HTP-nc[1]	CTUh	1.31E-07	2.76E-09	4.71E-09	8.37E-09	1.69E-09	1.10E-09	4.99E-10	-4.99E-08
IR[2]	kBq U-235 eq.	2.17E-01	7.91E-03	3.02E-04	1.66E-02	4.84E-03	2.18E-03	1.27E-03	-5.98E-02
SQP[1]	Pt	1.63E+03	6.44E+01	2.13E+00	1.86E+01	3.94E+01	2.46E+00	8.24E+01	-1.00E+02
Acronyms	ETP-fw = Eco-toxicity, freshwater; PM = Particulate matter; HTP-c = Human toxicity; cancer; HTP-nc = Human toxicity, non-cancer; IR = Ionising radiation; SQP = Potential Soil quality Index								

Other environmental information describing waste categories	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	1.67E-03	2.72E-04	3.54E-06	5.20E-04	1.67E-04	6.84E-05	2.14E-05	-2.96E-04
NHWD	kg	7.07E+00	1.38E+00	3.14E+00	8.24E-02	8.46E-01	1.09E-02	1.11E-01	-1.67E+00
RWD	kg	5.07E-05	1.09E-06	6.45E-08	3.28E-06	6.70E-07	4.31E-07	1.73E-07	-1.46E-05
Acronyms	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed								

Parameters describing resource use	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PENRT	MJ	6.57E+02	2.10E+02	6.92E-01	1.48E+02	1.29E+02	1.95E+01	5.12E+01	-1.05E+02
PENRM	MJ	2.93E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRE	MJ	6.28E+02	2.10E+02	6.92E-01	1.48E+02	1.29E+02	1.95E+01	5.12E+01	-1.05E+02
PERT	MJ	3.15E+02	2.37E+00	-1.65E-01	4.82E-01	1.45E+00	6.36E-02	4.58E-01	-8.20E+00
PERM	MJ	2.43E+02	0.00E+00	-1.89E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERE	MJ	7.22E+01	2.37E+00	1.88E+02	4.82E-01	1.45E+00	6.36E-02	4.58E-01	-8.20E+00
SM	kg	1.02E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.63E-01	9.80E-02	1.51E-03	1.81E-02	6.00E-02	2.39E-03	5.63E-02	-2.72E-01
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water								

Indicators describing output flows	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Components for reuse	kg	0.00E+00	0.00E+00	9.37E+00	0.00E+00	0.00E+00	1.00E+01	0.00E+00	0.00E+00
Materials for recycling	kg	4.22E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E+02	0.00E+00	0.00E+00
Materials for energy recovery	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
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Other environmental information	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG [3]	kg CO_2 -eq.	5.46E+01	1.43E+01	2.50E+00	6.57E+00	8.78E+00	8.66E-01	2.14E+00	-9.28E+00

NOTE:

1. The range/ variability of the LCIA results if significant; the description of the range can be qualitative or quantitative.
2. The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risk
3. The use of the results of modules A1-A3 (A1-A5 for services) without considering the results of module C is discouraged.

1 The results of this environmental impact indicator shall be used with care as 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 from 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.

3 This indicator is calculated using the characterisation factors from the IPCC AR6 report (IPCC 2021) and has been included in the EPD following the PCR. The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product.

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