GLOBAL GREEN TAG INTERNATIONAL PTY LTD Level 38, 71 Eagle Street, Brisbane City QLD 4000, Australia

EPD™

Environmental Product Declaration

in accordance with ISO 14025 and EN 15804+A2

Island Block & Paving

Sustainable Bricks, Blocks, Pavers & Freestone ECO Retaining Walls

Company Adress: 281 Haggerston Rd, Perth TAS 7300
Issued Date: 05 July 2024
Valid to 05 July 2029

ECO PLATFORM EPD VERIFIED

ECO PLATFORM

ISLAND BLOCK & PAVING ISLAND

1. Environmental Product Declaration Details

EPD Type	Cradle to Gate A1-A3 、C1-C4 and D	**Product Image**	
EPD Number	IBK:CE01:2024:EP		
Issue Date	05 July 2024		
Valid Until	05 July 2029		
GPI Version	Version 2.2		
Demonstration of Verification			
PCR	Masonry roofing, cladding, paving, piping or lining Sub-PCR MAU:2024 V1 (07 2024)		
Verification Statement	Independent verification of the declaration and data, according to EN ISO 14025:2010		
	☐Internal ☒External		
Internal	Direshni Naiker, Gaia Conscious Consulting Nana Bortsie-Aryee, Global GreenTag International Pty Ltd		
Verification	Independent external verification of the declaration and data, mandatory for business-to-consumer communication according to ISO 14025:2010[2].		
Communication	This EPD discloses potential environmental outcomes compliant with EN 15804 for business-to-business communication.		
Comparability	EPD of construction products may not be comparable if they do not comply with EN 15804. Different program EPDs may not be comparable. Comparability is further dependent on the product category rules and data source used.		
Reliability	LCIA results are relative expressions that do not predict impacts on category endpoints, exceeding of thresholds, safety margins or risks.		
Owner	This EPD is the property of the declared manufacturer.		
Explanations	Further explanatory information is available at info@globalgreentag.com or by contacting epd@globalgreentag.com [3].		

Program Operator	LCA and EPD Producer	Declaration Owner
Global GreenTag International Pty Ltd	**IKE Environmental Technology Co. Ltd.**	**Island Block & Paving**
Level 38, 71 Eagle Street Brisbane City QLD 4000 Australia	No.139 Kehua Middle Road, Wuhou District	281 Haggerston Rd, Perth TAS 7300
Phone: +61 1300 263 586	Phone: +86 13882129195	Phone: +61 1800 004 499
http://www.globalgreentag.com	http://www.ike-global.com	https://www.islandblock.com.au

2. Program Description

EPD Scope	Cradle to gate with options (A1 to A3,C1-C4 and D) as defined by EN 15804+A2 and depicted in Figure 1
EPD Type	Product Specific EPD
System boundary	The system boundary with nature included processing material and energy system inputs, transport to factory gate, manufacturing plus packing, waste disposal, as well as waste removal and waste disposal after the expiration of product life.
Stages included	A1-A3,C1-C4,D
Stages excluded	A4-A5,B1-B7
Information Modules	Figure 1 depicts all modules being declared including some with zero results. Any module not declared (MND) does not indicate a zero result.

Information Stages	Building Life Cycle Assessment															Supplementary
	Product			Construct		Use							End-of-Life				Benefit & load beyond system
						Fabric					Operation						
Unit Operations	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Cradle to grave phases	Resources	Transport	Manufacture	Transport	Construct	Use	Maintain	Repair	Replace	Refurbish	Energy Use	Water use	Demolish	Transport	Process Waste	Disposal	Reuse
Modules Declared	✓	✓	✓	ND	ND	ND	ND	ND	ND	ND	ND	ND	✓	✓	✓	✓	✓

ND = Module not declared ✓= included

Figure 1 EPD Life Cycle Modules Cradle to Grave

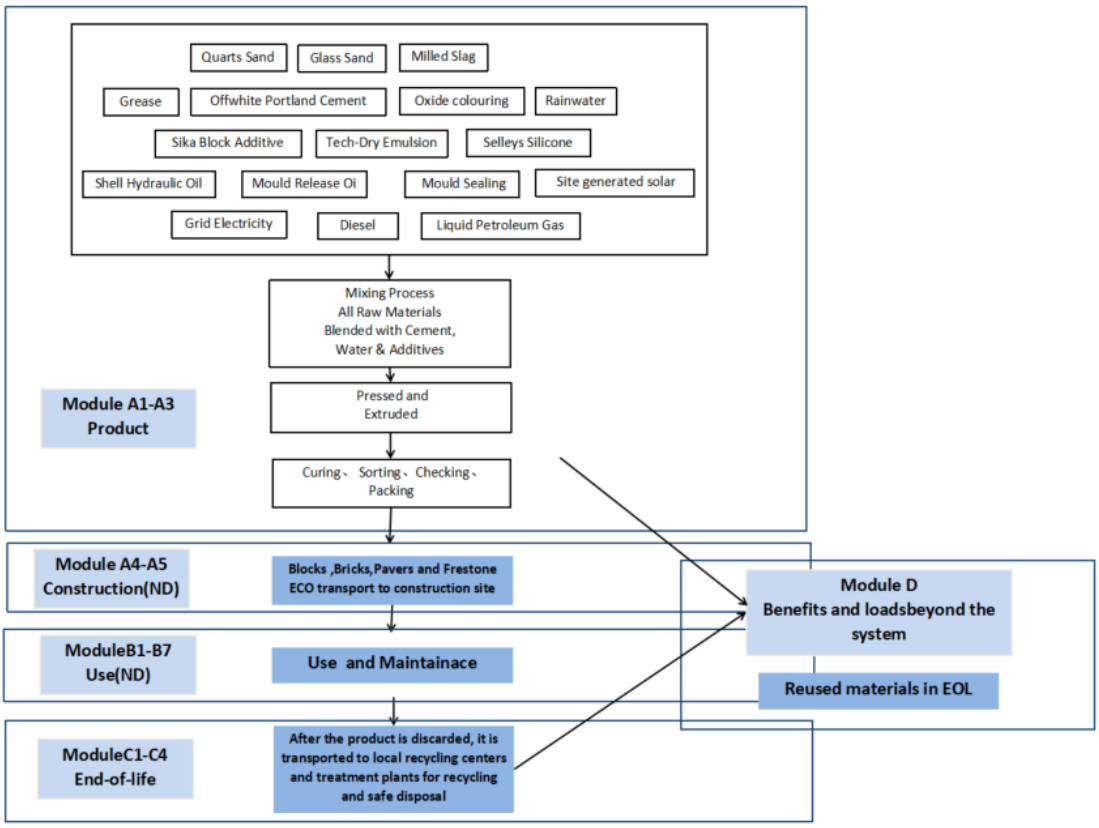
3. Product Information

3.1 General Information

Brand Name & Code	Island Block & Paving
Range Names	"Sustainable Products for the Future" range incorporating Bricks for the Future, Blocks for the Future, Pavers for the Future and Freestone ECO Retaining Walls products.
Manufacturer Warranty	30 years
Manufacturing Site	Island Block & Paving, 281 Haggerston Rd, Perth TAS 7300
Geographical Area	Australia
Application	Building, Construction and Landscaping
Function in Building	load/non-load bearing walling, external wall cladding / veneer, Walls and retaining walls, Municipal / non-municipal paving.
Reference Service Life	100 years
Functional OR Declared Unit	1 tonne (1000 kgs)
Manufacturing Site	281 Haggerston Rd, Perth TAS 7300 Issued Date: 04 Month 2024
Site Representation & Geography	Australia
Substances Of Very High Concern	None
Range and Variability	NA
Average Calculations and Range Representation	NA

Table 1 Product specifications

	Standard / Certification	Status	Last Date Completed
Product Specifications	**AS/NZS 4455.1:2008 Masonry Units**	Compliant	10/12/2021
	AS/NZS 4456 Masonry Units and Segmental Pavers	Compliant	25/11/2022
	ISO 9001:2015	Compliant	12/11/2021
	AS/NZS 4801:2001	Compliant	12/11/2021
	AS4040.3 Cyclonic testing	Available on request	N/A
	Global Greentag	Greenrate level A	17/10/2023
	Global Greentag Health Rate	Platinum level	18/10/2023
Typical Sizes	Bricks for the Future-230x110x76mm, 230x25mmx76mm, 390mmx110x60mm. Blocks for the Future- 390mm long x 190mm high by widths 90mm,140mm,190mm, 240mm, 290mm. Pavers for the Future- 400x300x65mm, 300x200x65mm, 400x300x50mm, 400x400x50mm. Freestone ECO Retaining Wall Blocks- sizes 400x240x250mm, 390x225x200mm.		
Material Density	2150 kg/m^3		
Breaking Load	>15 Mpa		



4. Manufacturing Process

Figure 2. Sustainable Bricks, Blocks, Pavers & Freestone ECO Retaining Walls

4.1 Product Components

In product content listed below the % mass has a ±5% range and a confidence interval that is 90% certain to contain true population means at any time. Listing such 90±5% certainty considers normal resource acquisition, supply chain, sedimentation, seasonal, manufacturing and product colour variation over this EPD's 5-year validity period. This also allows for intellectual property protection whilst ensuring fullest possible transparency.

Table 2 List of key components and additives by function, type, key operation, source and amount

Function	Component	Source	Amount
Ingredients for Sustainable Bricks, Blocks Pavers & Freestone ECO Retaining Walls	Quarts Sand	Australia	>50%
	Glass Sand	Australia	30-40%
	Off-white Portland Cement	Australia	5-10%
	Milled Slag	Australia	2-3%
	Lanxess Oxide	Germany	<1%
	Block Emulsion	Australia	<1%
	Sika Block	Australia	<1%
Packing	**Component**	**Source**	**Amount**
Packing for Sustainable Bricks, Blocks Pavers & Freestone ECO Retaining Walls	Palette Wood	Australia	<1%
	Black Coreflute	Australia	<0.1%
	Stretch Wrap	Australia	<0.1%
	Pallet Bags	Australia	<0.1%
	PP30 Packer Tape	Australia	<0.01%
	Polly Foam Sheets	Australia	<0.01%
	12mm Poly Strapping	Australia	<0.01%

5. Program Description

Product Stages Included	A1 Raw material supply • Raw material acquisition, extraction, refining and processing • Secondary material acquisition and processing • Reuse of scrap product or material from a previous product system • Electricity generated from all sources with extraction, refining & transport • Secondary fuel energy and recovery processes A2 Transport internal and to the factory gate A3 Manufacture of product co-products and packaging plus • Production of inputs and ancillary material • System flows leaving at end-of-waste boundary allocated as coproducts C1, Deconstruction demolition C2, Transport to waste processing C3, Waste processing for reuse, recovery and/or recycling C4, Disposal D, Reuse, recovery and/or recycling potentials, expressed as net impacts and benefits.
Cut off criteria	In this study, all raw materials and energy sources were taken into account. The manufacturer provides transport expenditure data for all relevant material flows. Excluding machines and facilities required in the production process.
Data collection Year	2022-2023
Background Data	Table 3
Allocations Method	For the distribution of the production stage, a distinction should be made between multi-input and multi-output processes - Multi-input process: Allocation is based on physical properties and based on weights. For example, various block products are produced in one factory. The weight ratio of the target product is obtained by dividing the total annual production weight of each product by the total weight of all products produced by the factory, and then multiplying the total data to find the consumption per tonne of product. - Multi-output process: second-class products are sold in the production process, and the sales price of second-class products is 30%-90% of the retail price, and they are distributed as by-products according to economic value. For reuse, recycling, and recovery allocation, the 50/50 allocation approach is adopted In the case of any recycled content. Allocation 50/50 is the most common recycling methods, which has been discussed and accepted by PEF guide It “allocates the impacts and benefits due to recycling equally between the producer using recycled material and the producer producing a recycled product”.

Scenario Modelling Assumption	Stage C - End of life: It is assumed that non-recyclable products are disposed of in landfills and do not require waste treatment, that the emission data of the landfill process is from the Ecoinvent database, that recyclable products are recycled, and that the transportation distance of the products to both landfills and recycling sites is 100km. Stage D – benefits and loads beyond the system boundary: Assume that a local recycling centre will recycle 81% of the products.
Product Average Information	"Sustainable Products for the Future" range incorporating Bricks for the Future, Blocks for the Future, Pavers for the Future and Freestone ECO Retaining Walls products in various sized shapes are all made with the same mix designs regarding ingredients. All products are made from the same materials and moulded into different shapes and should share the same emissions per tonne produced as the shaping requires minimal energy changes.

6. Background data

Table 3 Data sources for Product

Component	Material Description	Material Dataset	Data Source	Publication Date
Sustainable Bricks, Blocks, Pavers and Freestone ECO Retaining Walls				
Quarts Sand	Quartz	Silica sand production	Ecoinvent 3.9.1	2022
Recycled Glass Sand	Glass	Silica sand production	Ecoinvent 3.9.1	2022
Off-white Portland Cement	Cement	Cement production, Portland	Ecoinvent 3.9.1	2022
Milled Slag	Slag	Market for blast furnace slag	Ecoinvent 3.9.1	2022
Oxide colouring	Ferric oxide	Iron sinter production	Ecoinvent 3.9.1	2022
Sika Block Additive	Sodium salts	Market for sodium	Ecoinvent 3.9.1	2022
Tech-Dry Emulsion	Siloxane emulsion	Chemical production, organic	Ecoinvent 3.9.1	2022
Process additive				
Shell Hydraulic Oil	Hydraulic oil	Base oil production, petroleum refinery operation	Ecoinvent 3.9.1	2022
Selleys Silicone	Silica gel	Activated silica production	Ecoinvent 3.9.1	2022
Mould Release Oil	Distillates (petroleum), hydrotreated light paraffinic	Market for petroleum	Ecoinvent 3.9.1	2022
Grease	Lubricating oil	Lubricating oil production	Ecoinvent 3.9.1	2022
Packing				
Palette Wood	Wood	Wood pellet, measured as dry mass	Ecoinvent 3.9.1	2022

Black Coreflute	Polypropylene	Polypropylene production, granulate	Ecoinvent 3.9.1	2022
Stretch Wrap	Linear low density polyethylene	Packaging film production, low density polyethylene	Ecoinvent 3.9.1	2022
Pallet Bags	Low-Density Polyethylene	Packaging film production, low density polyethylene	Ecoinvent 3.9.1	2022
PP30 Packer Tape	Polypropylene	Polypropylene production, granulate	Ecoinvent 3.9.1	2022
Polly Foam Sheets	Low-Density Polyethylene	Packaging film production, low density polyethylene	Ecoinvent 3.9.1	2022
12mm Poly Stapping	Polypropylene	Polypropylene production, granulate	Ecoinvent 3.9.1	2022
Transportation				
Quartz Sand by truck	Diesel Truck	Transport, freight, lorry >32 metric ton, EURO6	Ecoinvent 3.9.1	2022
Recycled Glass by truck	Diesel Truck	Transport, freight, lorry 16-32 metric ton, EURO5	Ecoinvent 3.9.1	2022
Offwhite Cement by truck	Diesel Truck	Transport, freight, lorry 16-32 metric ton, EURO5	Ecoinvent 3.9.1	2022
Offwhite Cement by ship	Container shipping	Transport, freight, sea, container ship	Ecoinvent 3.9.1	2022
Milled Slag by truck	Diesel Truck	Transport, freight, lorry 3.5-7.5 metric ton, EURO3	Ecoinvent 3.9.1	2022
Milled Slag by ship	Container shipping	Transport, freight, sea, container ship	Ecoinvent 3.9.1	2022
Tech-Dry Block Emulsion by truck	Diesel Truck	Transport, freight, lorry, all sizes, EURO4 to generic market for transport, freight, lorry, unspecified	Ecoinvent 3.9.1	2022
Tech-Dry Block Emulsion by ship	Container shipping	Transport, freight, sea, container ship	Ecoinvent 3.9.1	2022
Sika Block by truck	Diesel Truck	Transport, freight, lorry, all sizes, EURO4 to generic market for transport, freight, lorry, unspecified	Ecoinvent 3.9.1	2022
Sika Block by ship	Container shipping	Transport, freight, sea, container ship	Ecoinvent 3.9.1	2022
All Packaging by truck	Diesel Truck	Transport, freight, lorry, all sizes, EURO4 to generic market for transport, freight, lorry, unspecified	Ecoinvent 3.9.1	2022
Pallets by ute	Diesel Truck	Transport, freight, lorry 16-32 metric ton, EURO5	Ecoinvent 3.9.1	2022
All Oils& Lubrication by truck	Diesel Truck	Transport, freight, lorry, all sizes, EURO4 to generic market for transport, freight, lorry, unspecified	Ecoinvent 3.9.1	2022
Waste Product for recycling by truck	Diesel Truck	Transport, freight, lorry >32 metric ton, EURO6	Ecoinvent 3.9.1	2022

Energy				
Grid Electricity	Hydroelectric	Electricity production, hydro, run-of-river	Ecoinvent 3.9.1	2022
Diesel	Diesel Oil	Diesel production, petroleum refinery operation	Ecoinvent 3.9.1	2022
Liquid Petroleum Gas	Liquid Petroleum Gas	Market for liquefied petroleum gas	Ecoinvent 3.9.1	2022
Site generated solar	Solar energy	Electricity production, photovoltaic, 570kWp open ground installation, multi-Si-Australia	Ecoinvent 3.9.1	2022
Waste treatment				
General waste to landfill	Landfill	Process-specific burdens, sanitary landfill	Ecoinvent 3.9.1	2022
Production Waste & Broken Product	Recycle	Market for sand	Ecoinvent 3.9.1	2022
Renewable masonry material	Recycle	Market for sand	Ecoinvent 3.9.1	2022

7. Data Quality Assessment

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 4 Data quality assessment for the Product Name product system

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: **Age of data and the minimum length of time over which data is collected**	The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 3 years old (typically 2022 and 2023). All of the data used represented an average of at least one year's worth of data collection, and up to three years in some cases. Manufacturer-supplied data (primary data) are based on annualized production for 2022-2023.
Geographical Coverage: **Geographical area from which data for unit processes is collected to satisfy the goal of the study**	The data used in the analysis provide the best possible representation available with current data. Electricity use for product manufacture is modeled using representative data for Australia. Surrogate data used in the assessment are representative of global or rest of world operations. Data representative of rest of world operations are considered sufficiently similar to actual processes. Data representing product disposal are based on regional statistics.
Technology Coverage: **Specific technology or technology mix**	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative fabrication datasets, specific to the type of material, are used to represent the actual processes, as appropriate.
Precision: **Measure of the variability of the data values for each data expressed**	Data collected for operations were typically averaged for one year and over multiple operations, which is expected to reduce the variability of results.

Completeness: **Percentage of flow that is measured or estimated**	The LCA model included all known mass and energy flows for production of Sustainable Bricks, Blocks, Pavers and Freestone ECO Retaining Walls. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded.
Representativeness: **Qualitative assessment of the degree to which the data set reflects the true population of interest**	Data used in the assessment represent typical or average processes as currently reported from multiple data sources, and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.
Consistency: **Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis**	The consistency of the assessment is considered to be high. Different portions of the product life cycle are equally considered; however, it must be noted that final disposition of the product is based on assumptions of current practices in Australia.
Reproducibility: **Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study**	Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
Sources of the Data: **Description of all primary and secondary data sources**	Data representing energy use at facility in Australia represent an annual average and are considered of high quality due to the length of time over which these data are collected. For secondary LCI datasets, Ecoinvent v3.9.1 LCI data are used.
Uncertainty of the Information: **Uncertainty related to data, models, and assumptions**	Uncertainty related to materials in the Sustainable Bricks, Blocks, Pavers and Freestone ECO Retaining Walls and packaging is low. Actual supplier data for upstream operations was not available for all suppliers and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<3 years)

8. LCA Scenarios and Additional Technical Information

8.1 End of Life stages (C1 - C4, D)

The disposal stage includes demolition of the products (C1); transport of the Sustainable Bricks, Blocks, Pavers and Freestone ECO Retaining Walls products to waste treatment facilities (C2); waste processing (C3); and associated emissions as the product degrades in a landfill (C4). For the Sustainable Bricks, Blocks, Pavers and Freestone ECO Retaining Walls products, no emissions are generated during demolition (C1) while no waste processing (C3) is required for underground deposit. After demolition, non-recyclable waste is disposed of in landfills (C4), and the landfill process is connected to the Ecoinvent database.

Transportation of waste materials at end-of-life (C2) assumes a 100 km average distance to disposal. 81% of waste products are recycled and 19% of waste products go to landfill.

The data for waste transportation of per t*km are obtained from Ecoinvent. The functional unit was defined as diesel trucks completing 1t*km on the suburbs highway.

Data from the landfill comes from Ecoinvent 3.9.1. It represents the treatment of waste, including foundation sealing, leachate collection systems and leachate wastewater treatment plants.

Table 5 C1-C4 and D Scenario Information

Processes	Unit	Sustainable Bricks, Blocks, Pavers and Freestone ECO Retaining Walls
Collection process by type	kg collected separately	100%
	kg collected with mixed construction waste	0%
Recovery system by type	Kg for re-use	0%
	Kg for recycling	81%
	Kg for energy recovery	0%
Safe disposal	Kg or product or material for final disposal	19%
Transportation	km	100

9. Additional Technical Information

9.1 Product Average

"Sustainable Products for the Future" range incorporating Bricks for the Future, Blocks for the Future, Pavers for the Future and Freestone ECO Retaining Walls products in various sized shapes are all made with the same mix designs regarding ingredients. All products are made from the same materials and moulded into different shapes and should share the same emissions per kg produced as the shaping requires minimal energy changes.

10. Product Results

Table 6 LCA impact indicators, resource use, waste and other measured flows

Acronyms, methods and units of impact potentials plus inventory inputs and outputs, are defined below:

Impact Potentials	Acronym	Description of Methods	Units
Climate Change biogenic	GWP $_{bio}$	GWP biogenic	kg CO_{2eq}
Climate Change luluc	GWP $_{luluc}$	GWP land use & change	kg CO_{2eq}
Climate Change fossil	GWP $_{ff}$	GWP fossil fuels	kg CO_{2eq}
Climate Change total	GWP $_{t}$	Global Warming Potential	kg CO_{2eq}
Stratospheric Ozone Depletion	ODP	Stratospheric Ozone Loss	kg CFC_{11eq}
Photochemical Ozone Creation	POCP	Summer Smog	kg NMOC $_{eq}$
Acidification Potential	AP	Accumulated Exceedance	mol H^{+} $_{eq}$
Eutrophication Freshwater	EP $_{fresh}$	Excess nutrients freshwater	kg Po_{4} $_{eq}$
Eutrophication Marine	EP $_{marine}$	Excess marine nutrients	kg N $_{eq}$
Eutrophication Terrestrial	EP $_{land}$	Excess Terrestrial nutrients	mol N $_{eq}$
Mineral & Metal Depletion[1]	ADP $_{min}$	Abiotic Depletion minerals	kg Sb $_{eq}$
Fossil Fuel Depletion[1]	ADP $_{ff}$	Abiotic Depletion fossil fuel	MJ $_{ncv}$
Water Depletion[1]	WDP	Water Deprivation Scarcity	m^3 $_{WDP\ eq}$
Particulate Matter Emissions	PM	SETAC-UNE	Disease incidence
Ionizing Radiation, Human Health[2]	IRP	Human health effect model	kBq U235 eq
Eco-toxicity (freshwater)[1]	ETP-fw	USEtox	CTUe
Human toxicity, cancer effects[1]	HTP-c	USEtox	CTUh
Human toxicity, non-cancer effects[1]	HTP-nc	USEtox	CTUh
Land use related impacts/ Soil quality[1]	SQP	Soil quality index	Dimensionless

[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 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.

Resource Use	Acronym	Units
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 (primary energy and primary energy resources used as raw materials)	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 (primary energy and primary energy resources used as raw materials)	PENRT	MJ_{NCV}
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ_{NCV}
Use of non-renewable secondary fuels	NRSF	MJ_{NCV}
Use of net fresh water	FW	m3
Waste Type	**Acronym**	**Units**
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed	RWD	kg
Other Outputs	**Acronym**	**Units**
Components for re-use	CRU	kg
Materials for recycling	MFR	kg
Materials for energy recovery	MER	kg
Exported energy	EE	Mj_{pec}

Note: MJ_{NCV} is MJ, net calorific value, $Mj_{pec\ is}$ Mj, per energy carrier

10.1 Cradle to Gate + Options Inventory

Table 7 Inventory Resource Use Results/per tonne

		Product			End of life stage				Resource recovery stage	Total
		A1	A2	A3	C1	C2	C3	C4	D	
Module Codes	Unit	Raw material supply	Transport	Manufacturing	De-construction demolition	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling	
GWP-fossil	kg CO2 eq	7.87E+01	3.40E+01	4.59E+00	0.00E+00	1.48E+01	0.00E+00	6.57E-01	-3.75E+00	1.29E+02
GWP-biogenic	kg CO2 eq	5.96E-02	9.23E-03	5.10E-03	0.00E+00	4.05E-03	0.00E+00	1.62E-04	-2.57E-03	7.55E-02
GWP-luluc	kg CO2 eq	2.46E-02	1.84E-02	4.46E-03	0.00E+00	7.73E-03	0.00E+00	8.91E-05	-2.67E-03	5.26E-02
GWP-total	kg CO2 eq	7.88E+01	3.40E+01	4.60E+00	0.00E+00	1.48E+01	0.00E+00	6.57E-01	-3.75E+00	1.29E+02
ODP	kg CFC 11 eq.	3.37E-07	4.31E-07	7.48E-08	0.00E+00	1.96E-07	0.00E+00	6.93E-09	-4.49E-08	1.00E-06
AP	mol H^+ eq.	3.30E-01	1.43E-01	1.73E-02	0.00E+00	6.46E-02	0.00E+00	5.53E-03	-2.61E-02	5.35E-01
ADP-fossil[3]	MJ, net calorific value	5.07E+02	4.86E+02	1.18E+02	0.00E+00	2.14E+02	0.00E+00	7.96E+00	-5.07E+01	1.28E+03
ADP-minerals&metals	kg Sb eq.	1.90E-04	1.11E-04	1.95E-05	0.00E+00	4.58E-05	0.00E+00	2.49E-07	-1.47E-05	3.51E-04
EP-freshwater	kg PO_4 eq.	1.06E-02	2.84E-03	7.68E-04	0.00E+00	1.22E-03	0.00E+00	6.61E-05	-5.36E-04	1.50E-02
EP-marine	kg N eq.	7.99E-02	4.64E-02	3.49E-03	0.00E+00	2.35E-02	0.00E+00	2.26E-03	-9.04E-03	1.46E-01
EP-terrestrial	mol N eq	8.78E-01	4.95E-01	3.52E-02	0.00E+00	2.51E-01	0.00E+00	2.45E-02	-9.87E-02	1.59E+00
POCP	kg NMVOC eq.	5.79E-02	6.86E-02	1.61E-01	0.00E+00	3.01E-02	0.00E+00	2.03E-03	-8.46E-03	1.61E-01
ADP- fossil	kg Sb eq.	5.07E+02	4.86E+02	1.18E+02	0.00E+00	2.14E+02	0.00E+00	7.96E+00	-5.07E+01	1.28E+03
WDP	m3 world eq	3.33E+01	2.85E+00	-2.52E+00	0.00E+00	1.31E+00	0.00E+00	2.74E-02	-1.36E+01	2.14E+01

[3] 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.

See table 10 for additional information

Table 8 Optional Indicators

		Product			End of life stage				Resource recovery stage	Total
		A1	A2	A3	C1	C2	C3	C4	D	
Module Codes	Unit	Raw material supply	Transport	Manufacturing	De-construction demolition	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling	
PM	Disease incidence	4.50E-06	2.82E-06	1.85E-07	0.00E+00	1.31E-06	0.00E+00	1.44E-07	-4.57E-07	8.51E-06
IRP[4]	kBq U235 eq	8.02E-01	4.28E-01	1.72E-01	0.00E+00	1.90E-01	0.00E+00	4.46E-03	-1.12E-01	1.48E+00
ETP-fw	CTUe	2.17E+02	2.67E+02	3.58E+01	0.00E+00	1.15E+02	0.00E+00	3.56E+00	-2.47E+01	6.14E+02
HTP-c	CTUh	2.55E-08	1.66E-08	1.59E-09	0.00E+00	6.67E-09	0.00E+00	2.22E-10	-2.77E-09	4.78E-08
HTP-nc	CTUh	5.74E-07	3.57E-07	3.43E-08	0.00E+00	1.54E-07	0.00E+00	2.32E-09	-3.55E-08	1.09E-06
SQP	Dimensionless	ND	ND	ND	ND	ND	ND	ND	ND	ND

See table 10 for additional information

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

[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.

Table 9 Resource Use and other environmental flows

		Product			End of life stage				Resource recovery stage	Total
		A1	A2	A3	C1	C2	C3	C4	D	
Resource Use	Unit	Raw material supply	Transport	Manufacturing	De-construction demolition	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling	
PERE	MJ_{NCV}	1.21E+01	4.62E+00	8.06E+01	0.00E+00	2.03E+00	0.00E+00	4.72E-02	-1.13E+00	9.83E+01
PERM	MJ_{NCV}	0.00E+00	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_{NCV}	1.21E+01	4.62E+00	8.06E+01	0.00E+00	2.03E+00	0.00E+00	4.72E-02	-1.13E+00	9.83E+01
PENRE	MJ_{NCV}	2.98E+02	8.81E+01	3.71E+01	0.00E+00	3.83E+01	0.00E+00	1.80E+00	-1.45E+01	4.49E+02
PENRM	MJ_{NCV}	0.00E+00	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_{NCV}	2.98E+02	8.81E+01	3.71E+01	0.00E+00	3.83E+01	0.00E+00	1.80E+00	-1.45E+01	4.49E+02
SM	kg	3.77E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E+02
RSF	MJ_{NCV}	0.00E+00	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	MJNCV	0.00E+00	0.00E+00	4.28E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.28E+01
FW	m^3	1.65E+00	3.15E-02	8.41E-03	0.00E+00	1.35E-02	0.00E+00	3.66E-04	-7.16E-01	9.89E-01
Waste	Unit									
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	0.00E+00
NHWD	kg	0.00E+00	0.00E+00	1.99E+00	0.00E+00	0.00E+00	0.00E+00	1.90E+02	0.00E+00	1.92E+02
RWD	kg	1.62E-04	8.12E-05	4.69E-05	0.00E+00	3.61E-05	0.00E+00	8.15E-07	-2.17E-05	3.05E-04
Outputs	Unit									
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	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.20E+02	8.20E+02
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	0.00E+00
EE	M_{jpec}	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

See table 10 for additional information

10.2 Interpretation

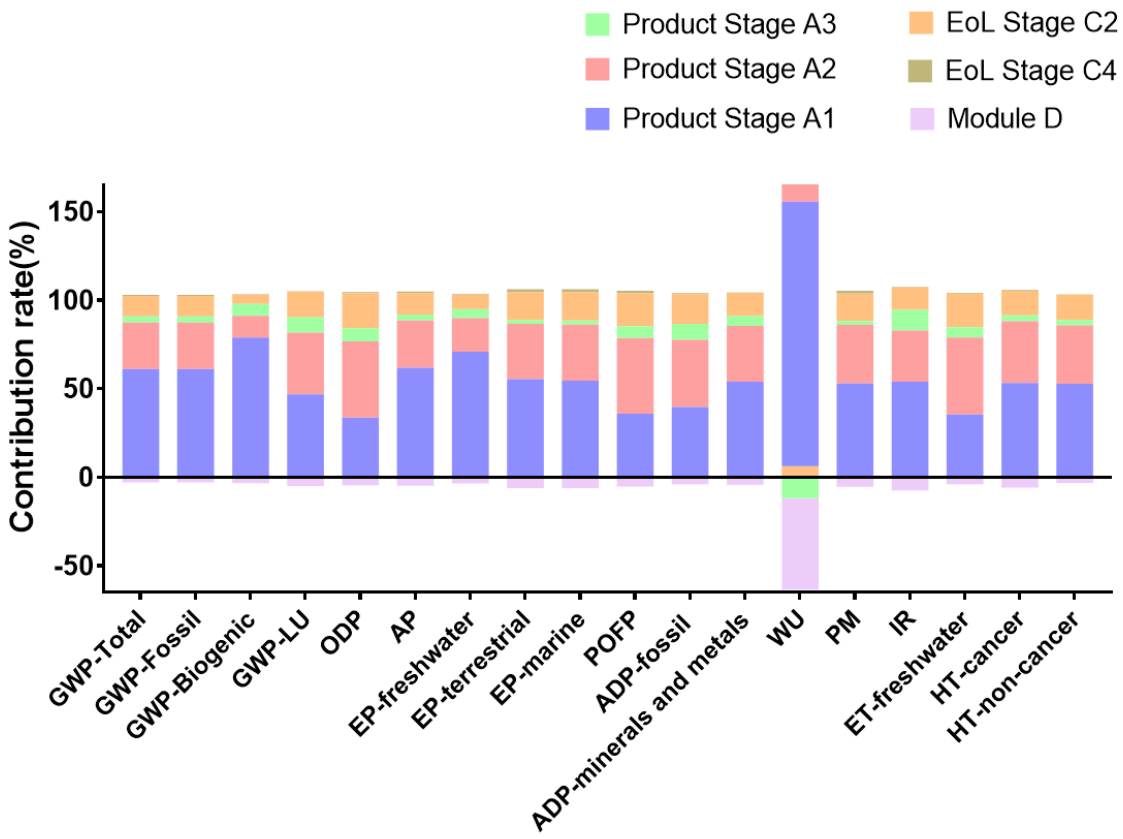


Figure 3. Sustainable Bricks, Blocks, Pavers & Freestone ECO Retaining Walls each stage contribution to LCA results

For brick products, the vast majority of environmental impacts occur at the product stage (A1-A3). Phase A2 has the largest environmental impact on ODP, POFP and ET-freshwater, while phase A1 has the largest environmental impact on other remaining indicators.

According to the GWP-total index, the A1 stage accounted for 61.02%, of which cement acquisition caused the largest environmental impact, accounting for 42.60%; The A2 stage accounted for 26.34%, of which the recyclable glass transport accounted for the largest proportion, 11.51%; The A3 phase accounts for 3.56%, with the largest environmental impact caused by on-site burning of fossil fuels at 0.87%.

Final demolition, transport, waste treatment and disposal (Module C) account for between 5% and 21% of the impact of all indicators. It accounts for 20.29% of OPD index and 5.58% of GWP-Biogenic index.

The potential benefits of product recovery and recycling (Module D) can provide significant benefits in avoiding the production of primary materials. The environmental impact ratio (absolute value) of each index in this stage ranges from 2.91% to 63.46%. The GWP-total index accounted for 2.91%, and the WU index accounted for 63.46%.

11. Sensitivity Analysis

As can be seen from the calculation results, because the block material is a high-recovery waste, it will offset some of the environmental impact, and the 81% recovery rate of waste products is assumed from the Australian 2018 statistics.

Assuming that recycling technology improves over time, Australia now recycles 95% of its block material, with the remaining 5% going to landfill.

In order to understand the effect of a 95% product recovery rate on the LCIA results of products, a sensitivity analysis was performed, assuming that 5% of waste products were landfilled in module C and 95% of waste products were recycled in module D.

The results showed that the recovery rate of the product increased and some environmental indexes changed obviously, and the indexes of ADP-fossil and ET-freshwater were significantly affected.

Table 14. Sensitivity analysis for the Sustainable Bricks, Blocks, Pavers & Freestone ECO Retaining Walls

Product/ LCIA Impact	Core environmental impact indicators								
	GWP-total	GWP-Fossil	GWP-Biogenic	GWP-LULUC	ODP	AP	EP-Freshwater	EP-terrestrial	EP-marine
81% product recovery	1.29E+02	1.29E+02	7.55E-02	5.26E-02	1.00E-06	5.35E-01	1.50E-02	1.59E+00	1.46E-01
95% product recovery	1.28E+02	1.28E+02	7.48E-02	5.19E-02	9.88E-07	5.26E-01	1.48E-02	1.55E+00	1.43E-01
Percentage change (%)	-0.78%	-0.78%	-0.93%	-1.33%	-1.20%	-1.68%	-1.33%	-2.52%	-2.05%

Product/ LCIA Impact	Core environmental impact indicators				Additional environmental impact indicators					
	POCP	ADP-fossil	ADP-mineral and metal	WU	PM	IRP	ET-freshwater	HT-cancer	HT-non cancer	SQP
81% product recovery	1.61E-01	1.28E+03	3.51E-04	2.14E+01	8.51E-06	1.48E+00	6.14E+02	4.78E-08	1.09E-06	ND
95% product recovery	1.58E-01	1.27E+03	3.48E-04	1.82E+01	8.33E-06	1.46E+00	6.06E+02	4.70E-08	1.08E-06	ND
Percentage change(%)	-1.86%	-0.78%	-0.85%	-14.95%	-2.12%	-1.35%	-1.30%	-1.67%	-0.92%	ND

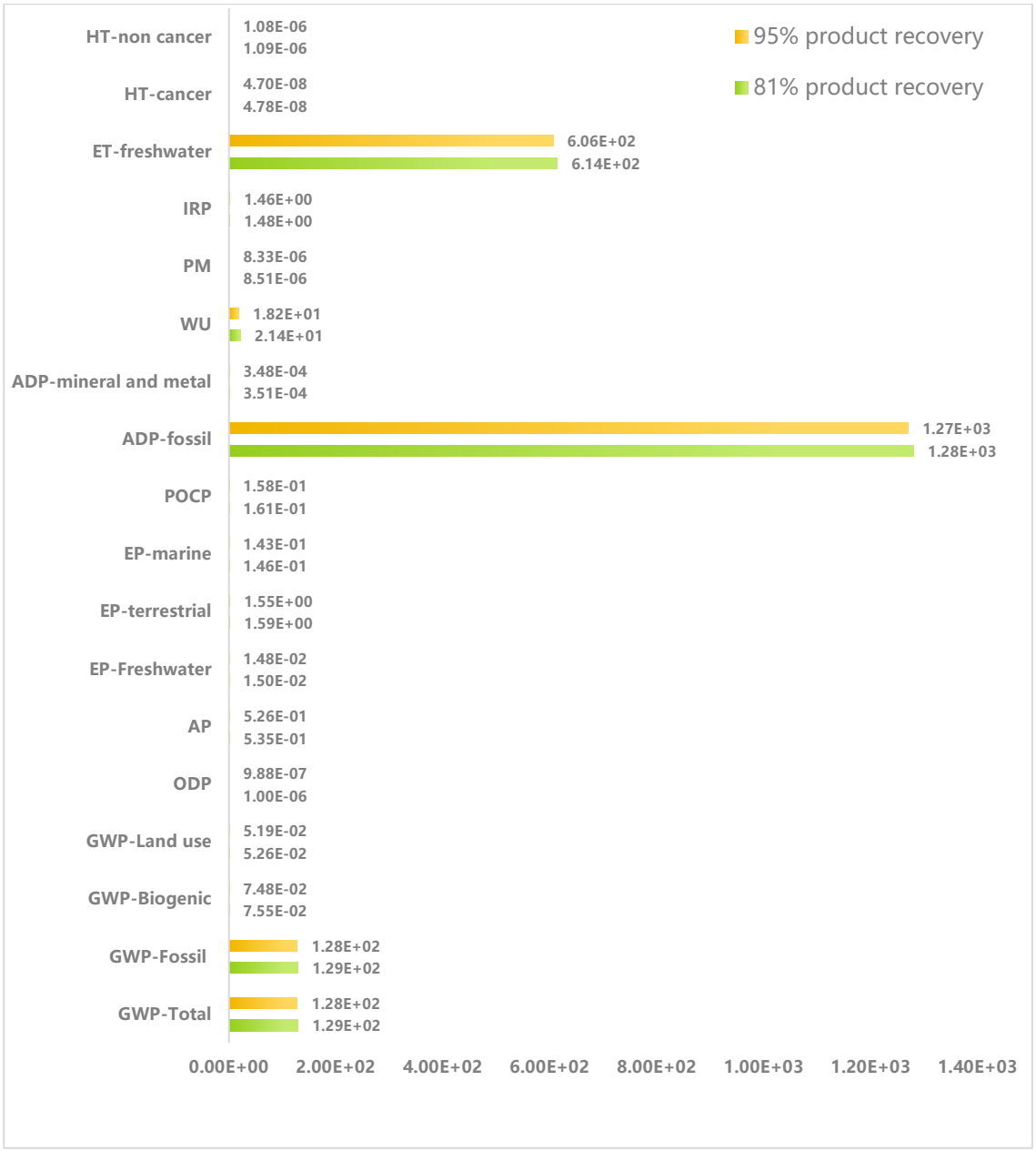


Figure 4. Sensitivity analysis results

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