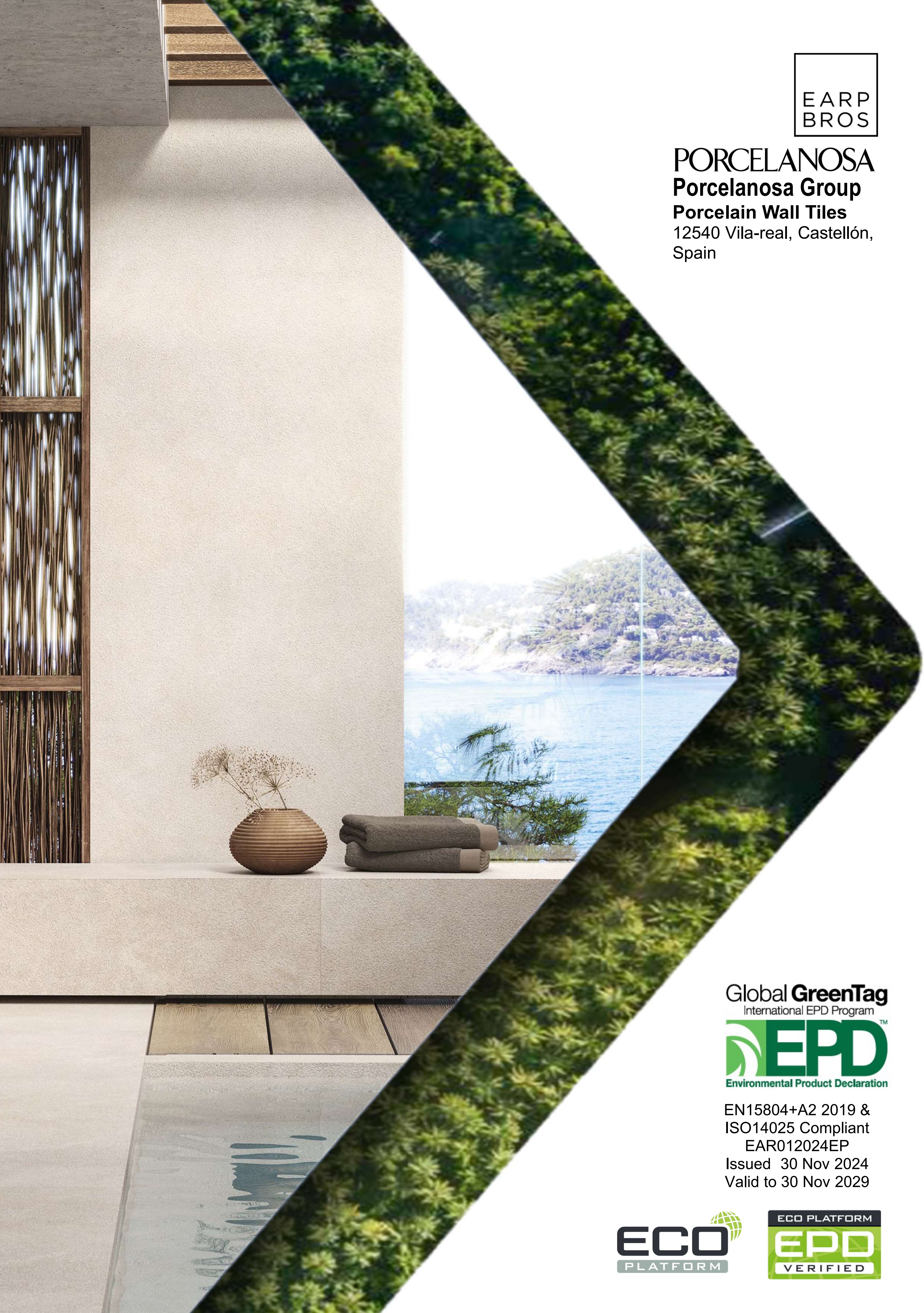

EARP BROS

PORCELANOSA

Porcelanosa Group

Porcelain Wall Tiles

12540 Vila-real, Castellón,
Spain

Global GreenTag
International EPD Program
EPD
Environmental Product Declaration

EN15804+A2 2019 &
ISO14025 Compliant
EAR012024EP
Issued 30 Nov 2024
Valid to 30 Nov 2029

ECO PLATFORM

ECO PLATFORM EPD VERIFIED

EARP BROS PORCELANOSA

Porcelain Wall Tiles

Mandatory Disclosures

EPD type	Cradle to grave A1 to C4 + D	**Issue Date**	30 Nov 2024
Range Name	Porcelanosa Ceramic Tile	**Valid Until**	30 Nov 2029
Product Name	Wall Tiles	**EPD Number**	EAR012024EP

Demonstration of Verification

Communication	This EPD discloses potential environmental outcomes compliant with ISO14025:2010 and independent external verification of this declaration and data[a] ensures it is fit for business-to-consumer communication. [1]
Comparability	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.
Objectives	To show improved, net-zero, net-positive and regenerative results and timely imperatives to secure viable climate and biodiversity on earth against a background of increasing disasters attributable to anthropogenic climate change.

EPD Program Operator	**LCA and EPD Producer**	**Declaration Owner**
Global GreenTag International Pty Ltd L38, 71 Eagle St., Brisbane QLD 4000 Australia Phone: +61 (0)7 33 999 686 http://www.globalgreentag.com	Ecquate Pty Ltd PO Box 123 Thirroul NSW 2515 Australia Phone: +61 (0)7 5545 0998 http://www.evah.com.au	Porcelanosa Grupo P.O. Box: 131 12540 Vila-real, Castellón, Spain. Phone: +34 964 507 140 https://porcelanosa.com

Global GreenTag International green product certification trust brands — Ecquate building ecopositive — PORCELANOSA

PCR	Standard EN 15804+A2 2019 serves as core Product Category Rules (PCR) [1]. Sub PCR WNB: 2023 also applies [3].
EPD Owner	This EPD is the property of the declared manufacturer tabled above.

Signed and Dated Demonstration of Internal and External Verification

Internal	Delwyn Jones 27Nov2024	Life Cycle Assessment (LCA) developed by Delwyn Jones, The Evah Institute
	S Begum 27Nov-2024	LCA peer reviewed by Dr Sharmina Begum, Ecquate Pty Ltd
	28/11/2024	EPD Platform Operator review by Dr Nana Bortsie-Aryee, Global GreenTag International Pty Ltd
External Verifier Statement	I, the undersigned, verifier, hereby confirm my examination did not find any relevant deviations by the EDP owner, LCA report or PCRs based on EN 15804 2012+A2:2019 and ECO Platform agreed interpretations by CEN TR 16970. Company-specific, upstream and downstream data in the LCA & environmental features report files held at The Evah Institute were plausible and consistent. This verification applied Global GreenTag International adopted ECO Platform checklists and this EPD states where to find PCRs and programme rules.	
	M Jones 27/11/2024	Verified by Murray Jones Ecquate Pty Ltd
Explanations	Further explanatory information is available at info@globalgreentag.com or by contacting certification1@globalgreentag.com [3].	

Program Description

EPD Scope	The scope is cradle to grave A1 to C4 + D as defined by ISO14025. [1]
System boundary	The system boundary with nature includes material and energy acquisition, processing, manufacture, transport, installation, use plus waste arising to end of life.
Stages included	All known operations and stages in modules A1 to D3 are included.
Information	Figure 1 depicts A1 to C4 modules inside this cradle to grave system boundary.

Model	**Building Life Cycle Assessment**																**Beyond system**		
Information	**Actual**				**Scenarios**														
Stages	Product			Construct		Use Fabric					Use Operate		End-of-Life				Benefit & load		
Modules	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D1	D2	D3
Operations Cradle to Grave Fate C_2F & beyond system to Cradle (C_2C)	Resources	Transport	Manufacture	Transport	Construct	Use	Maintain	Repair	Replace	Refurbish	Energy use	Water use	Demolish	Transport	Process Waste	Disposal	Reuse	Recovery	Recycling
C_2F	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	O	O	O
C_2Gate+Options	M	M	M	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O

Figure 1 Modules A to C Within the Cradle to Grave System Boundary and D Beyond

Data Sources

Primary Data	Data is from primary sources 2018 to 2023 including manufacturer and supplier standards, logistics, technology, market share and management system in accordance with EN ISO 14044:2006, 4.3.2. All are physically allocated not economically allocated.
A1-A3 Stage inclusions	Operations include all known raw material acquisition, refining and processing plus scrap or material reuse from prior systems; electricity generated from all sources with extraction, refining & transport plus secondary fuel energy and recovery processes. Also, transport to factory gate; manufacture of inputs, ancillary material, product, packaging, maintenance, replacement plus flows leaving at end-of-waste boundary and
Variability	Significant differences of average LCIA results are declared.
Chemicals of Concern	Contains no substances in the European Chemicals Agency “Authorised or Candidate Lists of Substances of Very High Concern (SVHCs)”.

LCA Data Quality

Data quality parameters are tabled below. Data was <10 years, cut-off & quality complies with ISO14025. [1]

Background	**Data Quality**	**Parameters and Uncertainty (U)**			
Correlation	**Metric σg**	U ±0.01	U ±0.05	U ±0.10	U ±0.20
Reliability	**Reporting**	Site Audit	Expert verify	Region	Sector
	Sample	>66% trend	>25% trend	>10% batch	>5% batch
Completion	**Including**	>50%	>25%	>10%	>5%
	Cut-off	0.01%w/w	0.05%w/w	0.1%w/w	0.5%w/w
Temporal	**Data Age**	<3 years	≤5 years	<7.5 years	<10 years
	Duration	>3 years	<3 years	<2 years	1 year
Technology	**Typology**	Actual	Comparable	In Class	Convention
Geography	**Focus**	Process	Line	Plant	Corporate
	Range	Continent	Nation	Plant	Line
	Jurisdiction	Representation is Global. Australasia and Pacific Rim			

System Scope and Boundaries

Figure 2. shows included processes in a cradle to grave system boundary to end of life fates reuse, recycling, or landfill grave.

Stages A1 to 3 model actual operations to acquire, refine, transport, fabricate, coat, use, clean, repair, reuse and dispose of metal, masonry, ceramic, timber, glass, plastic and composites.

Stage A4 to C4 are modelled on typical scenarios to forecast operations including those of:

- Mining, extracting and refining resources to make commodities and packaging;
- Acquiring, cultivating, harvesting, extracting, refining produce and biomass;
- Fuel production to supply power and process energy and freight;
- Chemicals use in processing resources, intermediates and ancillaries;
- Process energy, fuel and freight of resources, intermediates and ancillaries;
- Use, cleaning, recoating, repair, recycling, re-use and landfill, as well as
- Infrastructure process energy transformed and material wear loss e.g. tyres.

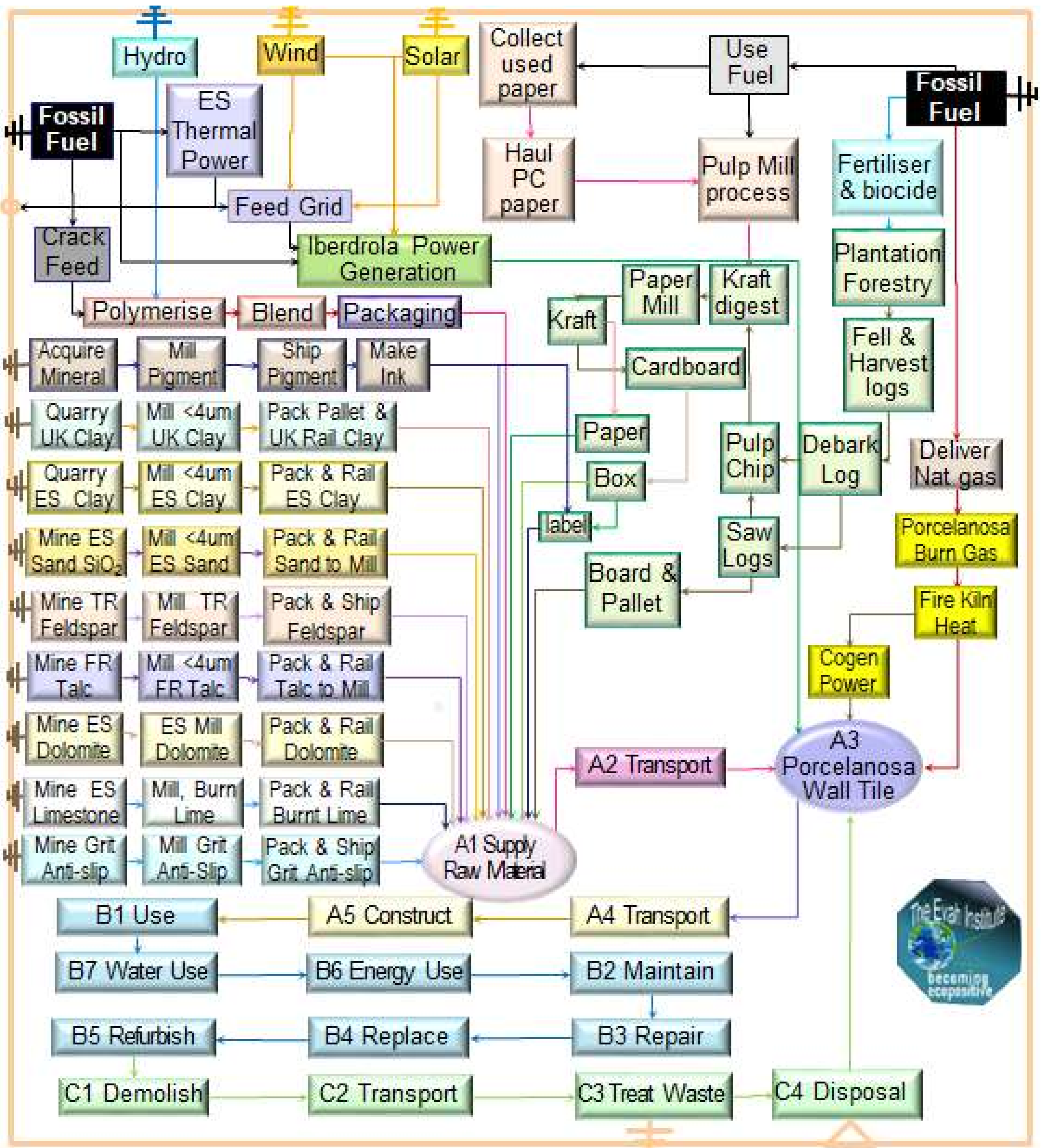

Figure 2. Product Process Flow Chart

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Details of Manufacturer

Earp Bros Tiles, a distributor of premium ceramic tiles in Australasia, is committed to decreasing their environmental impact. Testing ensures materials are used to their potential, along with accelerated wear assessment. Slip resistance is a key focus for improving occupational health and safety.

They support low impact tiles, facilitate scrap re-use in road base and relocated their warehousing to use rail not road. They import from companies such as Porcelanosa Group committed to international practice in sustainable manufacturing sources.

Porcelanosa tiles are used for interior applications in commercial and residential sectors. They are committed to quality, innovation and the environment with strict testing and quality controls. Their manufacturing is certified to ISO 14001 in Environmental Management and ISO 9001 in Quality Management.

Heat from natural gas fired kilns is used in spray driers and boilers powering turbines to cogenerate electricity for use in the Porcelanosa tile factory at Castellón in Spain. Also, tiles are delivered in recyclable cardboard packaging and are fully recyclable at the end of life.

Product Information

This section provides data required to calculate assessment results factoring different mass and periods.

Range Names	Porcelanosa Wall Tiles
Brand Name & Code	BIII Porcelain Wall Tile
Factory warranty	Fit for purpose use, 10 years only
Manufacturer	Porcelanosa S.A. U
Factory address	P.O. Box: 131, 12540 Vila-real, Castellón, Spain
Site representation	Made in Spain. Uses are assumed as for Australasia
Time	Made and sold in 2024 for single use
Application	Commercial, Residential, Industrial building in-/exterior wet/dry area tiling
Function	Interior and exterior wet and dry area wall covering
Lifetime	Residential and commercial refits vary but 60 year life is assumed typical.
Declared unit	Porcelanosa 17.1kg/m^2 coverage BIII wall tile
Functional unit	Declared Product at given coverage per kg 60-year use cradle to grave

Whole of life Health Safety & Environment Performance

This section provides qualitative information on Health Safety & Environment whole of life performance.

Environmental Health Effects	No potential in-use impacts on environment or health are known.
Health Safety & Environment	Apart from compliance to occupational and workplace health safety and environmental laws no additional personal protection is considered essential for manufacture, use or reuse.
Health Protection	The product does not contain levels of carcinogenic, toxic or hazardous substances that warrant ecological or human health concern cradle to grave. It passed the Eco specifier Cautionary Assessment Process (ESCAP) and no issues or red-light concerns existed for product human or ecological toxicity.
Environmental Protection	Continuous improvement under the maker's uncertified management system avoids toxics, waste and pollution plus reduce their material and energy use.

Product Components

This section summarises factory components, packaging functions, source nation and % mass share.

Base Material Origin and Detail

This section lists Porcelanosa key components by function, type, sources and % mass share.

Function	Component	Source	Amount%
Ceramic	Clay	Spain	>47 <48
Flux	Feldspar	Turkey	>15 <16
Whiting & Vitreous Agent	Limestone	Spain	>12 <14
Home Scrap	Clay, Sand and Feldspar	Spain	>8.0 >9.0
Coalescent	Sand	Spain	>7.5 <8.0
Stabiliser flux	Talc	France	>4.5 <5.0
Flux, fill & glaze	Dolomite	Spain	>3.0 <4.0
Flow additives	Confidential	Global	>0.1 <0.2

Function	Component	Source	Amount%
Pallet & crate	Wood	EU	>3.0 <4.0
Spacers & Carton	Cardboard	EU	>1.5 <2.5
Strapping	Polypropylene	EU	>1.0 <2.0
Wrap, plate, sling etc	Polyethylene	EU	>0.3 <0.4

Product Functional & Technical Performance Information

This section provides manufacturer specifications and additional information.

Applicable Standards	
ISO 14001	Covers the whole process, from design through to sales of end products.
ISO 50001	Reduce energy consumption and, minimize greenhouse gas emissions
Length*Width (mm)	Varies

Whole of life Performance

This section provides qualitative information on whole of life performance.

Effluent	LCI results and ESCAP raised no red-light concerns in emissions to water.1
Waste	Cradle to grave waste to landfill was non-hazardous.
Standard Reference	https://porcelanosa.com/
Practices Reference	https://porcelanosa.com/
Disposal	It assumes 30% is recycled.

1 According with national standards in ANZECC Guideline For Fresh & Marine Water Quality (2000)

Scenarios Descriptions

This section defines modelling stages scenarios A4 to D3 beyond actual operations in module A1 to A3.

Module	Type specified	Amount	Type specified	Amount
Construct				
A4 Transport factory to depot then to site	Sea Shipping	13,000	85% Capacity	Full back load
	Interstate Rail	1,300 km	85% Capacity	Full back load
	25t semi-trailer	200 km	85% Capacity	No back load
A5 Install	VOCs indoors	0%	Packaging & Waste	0%
Building Modules				
B1 Use	VOCs	0%	No other flows	0%
B2 Maintain	fit for purpose	100%	fit for purpose	0%
B3 Repair	fit for purpose	95%	Repair damaged	5%
			Repaint 8 yearly	100%
B4 Replace	fit for purpose	100%	No other flows	0%
B5 Refurbish	fit for purpose	100%	fit for purpose	100%
B6 Energy use	off grid	100%	Solar and wind energy	100%
B7 Water use	off grid	100%	Rain and dew	100%
End of Life Modules				
C1 Demolish	fit for purpose	100%	No other flows	0%
C2 Transport	fit for purpose	100%	No other flows	0%
C4 Disposal	fit for purpose	100%	No other flows	0%
Beyond System Boundary Modules				
D1 Reuse	fit for purpose	75%	No other flows	0%
D2 Recover	fit for purpose	22.5%	No other flows	0%
D3 Recycle	fit for purpose	2.5%	No other flows	0%

Environmental Impact Terminology

Environmental impacts contributing to risks of social and ecological issues and collapse are tabled below with common names and remedies given for each indicator.

Global warming forcing Climate Change	Greenhouse gases absorb infra-red radiation. This heat reduces thermal energy differentials, from equator to poles, forcing ocean current and wind circulation to blend and regulate climate. Weakly blended "lumpier" weather has more frequent, extreme heat wave, fire-storm, cyclone, rain-storm, flood and blizzard events. Accumulation of carbon dioxide, natural gas methane, nitrous oxides and volatile organic compounds from burning fossil fuels causes global warming. Forest and wilderness growth absorbing air-borne carbon in biomass can drawdown such accumulation. Urgent renewable energy reliance is vital in time to avoid imminent tipping points and the worsening "***climate emergency***".
Ozone layer depletion	Stratospheric ozone loss weakens the planet's solar shield so more shorter wavelength ultraviolet (UVB) light reaching earth damages plants and increases malignant melanoma and skin cancer in humans and animals. Chlorofluorocarbons, hydrochlorofluorocarbons (HCFC), chlorobromomethane, hydrobromofluorocarbons, carbon tetrachloride, methyl chloroform, methyl bromide and halon gas cause ozone layer loss. To repair the "***ozone hole***" reliance on ozone-safe refrigerants, aerosols and solvents is essential to avoid further its depletion and enable accumulation of naturally-formed ozone.
Acidification	Acidification reduces soil and waterway pH, impedes nitrogen fixation vital for plant growth and inhibits natural decomposition. It increases rates and incidence of fish kills, forest loss and deterioration of buildings and materials. Chief synthetic causes of "***acid rain***" are emissions of sulphur and nitrogen oxides, hydrochloric and hydrofluoric acids and ammonia from burning fossil fuels polluting precipitation of rain and snow world-wide.
Eutrophication of terrestrial, freshwater and marine life	Eutrophication from excessively high macronutrient levels added to natural waters promotes excessive plant growth that severely reduces oxygen, water and habitat security for aquatic and terrestrial organisms across related ecosystems. Chief synthetic cause of "***algal blooms***" is nitrogen (N, NOx, NH_4) and phosphorus (P, PO_4^{3-}) in rain run-off over-fertilised land catchments.
Photochemical ozone creation	Tropospheric photochemical ozone, called "***summer smog***" near ground level, is created from natural and synthetic compounds in UV sunlight. Low concentration smog damages vegetation and crops. High concentration smog is hazardous to human health. Chief synthetic causes are nitrogen oxides, carbon monoxide and volatile organic compounds (VOC) pollutants. Avoiding reliance on dirtiest coal fuel and volatile chemicals has reduced smog incidence in many areas globally.
Depletion of minerals, metals & water	Abiotic depletion of finite mineral resources increases time, effort and money required to obtain more resources to the point of extinction of naturally viable reserves. This can limit access to available, valuable and scarce elements vital for human-life. The youth movement "***extinction rebellion***" calls on adults to secure climate, reserves and biodiversity for current and future generations.
Depletion of fossil fuel reserves	Abiotic depletion of resources by consuming finite oil, natural gas, coal and yellowcake fossil fuel reserves leaves current and future generations suffering limited available, accessible, plentiful, essential valuable as well as scarce raw material, medicinal, chemical, feedstock and fuel stock. Approaching "***peak oil***" acknowledged fossil fuel reserves are finite and the need for decision-makers to act to avoid market instability, insecurity and or oil and gas wars.

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Inventory and Damage Impact Result Categories, Units and References to Methods

This section summarises impact and inventory result units with descriptions and references to methods.

Impact & Inventory Results/Functional Unit

Result		Units	Description of Methods
Climate Change biogenic	GWP BIO	kg CO_{2eq}	GWP sequestered from air [4]
Climate Change luluc	GWP LULUC	kg CO_{2eq}	GWP land use & change (luluc) [4]
Climate Change fossil	GWP FF	kg CO_{2eq}	GWP fossil fuels [4]
Climate Change total	GWP TOTAL	kg CO_{2eq}	Global Warming Potential [4]
Stratospheric Ozone Depletion	ODP	kg CFC_{11e}	Stratospheric Ozone Loss [5]
Photochemical Ozone Creation	POCP	kg $NVOC_e$	Summer Smog [6]
Acidification Potential	AP	mol H^+_{eq}	Accumulated Exceedance [7]
Eutrophication Freshwater	EPFRESH	kg P_{eq}	Excess freshwater nutrients [8]
Eutrophication Marine	EP MARINE	kg N_{eq}	Excess marine nutrients [9]
Eutrophication Terrestrial	EPLAND	mol N_{eq}	Excess nutrients to land [8]
Fossil Depletion	ADP MIN	kg Sb_{eq}	Abiotic Depletion minerals [9]
Mineral and Metal Depletion	ADP FF	MJ_{ncv}	Abiotic Depletion fossil fuel [10]
Water Scarcity Depletion	WDP	$m^3_{WDP\,eq}$	Water Deprivation Scarcity [11,12]
Input flows	Input		
Net Fresh Water Use	FW	m^3	Lake, river, well & town water
Secondary Material	SM	kg	Post-consumer recycled (PCR)
Secondary Renewable Energy Use	RSF	MJ_{ncv}	PCR biomass burnt
Secondary Fossil Energy Use	NRSF	MJ_{ncv}	PCR fossil-fuels burnt
Primary Renewable Feedstock Material	PERM	MJ_{ncv}	Biomass retained material
Primary Renewable Energy Used	PERE	MJ_{ncv}	Biomass fuels burnt
Total Primary Renewable Energy	PERT	MJ_{ncv}	Biomass burnt + retained
Primary Fossil Feedstock Material	PENRM	MJ_{ncv}	Fossil feedstock retained
Primary Fossil Energy Use	PENRE	MJ_{ncv}	fossil-fuel used or burnt
Total Primary Fossil Energy Use	PENRT	MJ_{ncv}	Fossil feedstock & fuel use
Output flows	Output		
Hazardous Waste Disposed	HWD	kg	Reprocessed to contain risks
Non-hazardous Waste Disposed	NHWD	kg	Municipal landfill facility waste
Radioactive Waste Disposed	RWD	kg	Most ex nuclear power stations
Components For Reuse	CRU	kg	Product scrap for reuse as is
Material For Recycling	MFR	kg	Factory scrap to remanufacture
Material For Energy Recovery	MFE	kg	Factory scrap use as fuel
Exported Energy Electrical	EEE	MJ_{ncv}	Uncommon for building products
Exported Energy Thermal	EET	MJ_{ncv}	Uncommon for building products

Results Cradel to Grave within the System Boundary

Table 1 lists A1 Resources, A2 Transport, A3 Manufacture, A4 Delivery, A5 Construct, B2 Maintain, B3 Repair, B4 Replace, B5 Refurb, C1 Demolish, C2 Transport and C4 Disposal results. Modules B1 Use, B4 Replace, B5 Refurbish, B6 Water use, B7 energy use or C3 Processing waste had no flows or result.

Table 1 Impact & Input and Output Results/kg Functional Unit

Impacts	A1-3	A4	A5	B2	B3	C1	C2	C4
GWP_{BIO}	-5.5E-02	-1.0E-06	-2.8E-03	-0.10	-1.7E-04	-1.3E-19	-5.4E-07	-4.1E-06
GWP	2.5E-02	1.8E-03	9.6E-03	6.2E-06	1.4E-04	1.0E-08	7.9E-10	6.0E-05
GWP_{FF}	1.7	0.17	0.10	0.71	1.2E-02	1.9E-03	6.1E-03	7.8E-03
GWP	1.6	0.17	9.8E-02	0.61	1.2E-02	1.9E-03	6.1E-03	7.7E-03
ODP	2.1E-08	2.9E-13	1.1E-09	3.1E-09	5.1E-11	7.0E-17	1.1E-13	2.1E-12
POCP	3.8E-03	9.3E-04	2.9E-04	2.9E-03	5.9E-05	7.6E-06	6.0E-05	4.9E-05
AP	1.9E-03	1.1E-04	1.1E-04	1.2E-03	1.4E-05	3.5E-06	5.0E-06	8.9E-06
EP_{FRESH}	2.6E-07	2.1E-09	1.3E-08	6.4E-07	9.8E-10	3.9E-13	3.1E-10	3.8E-10
EP_{MARINE}	3.3E-04	1.7E-05	1.9E-05	2.0E-04	2.4E-06	6.4E-07	9.4E-07	1.6E-06
EP_{LAND}	1.4E-03	5.5E-05	8.0E-05	1.4E-03	1.1E-05	4.1E-06	3.2E-06	7.5E-06
ADP_{MIN}	0.97	0.20	6.6E-02	3.1E-04	1.0E-02	6.2E-12	4.0E-06	7.6E-03
ADP_{FF}	1.4E-04	1.1E-05	9.2E-06	0.52	1.9E-06	9.2E-04	7.5E-03	1.6E-06
WDP	1.1E-03	1.6E-05	6.0E-05	9.7E-03	4.1E-06	8.5E-08	1.4E-06	2.0E-06
Inputs								
FW	7.1E-03	1.0E-04	3.7E-04	6.0E-02	2.6E-05	5.2E-07	8.7E-06	1.2E-05
SM	0	2.6E-06	0	2.7E-03	0	1.5E-05	1.7E-06	0
RSF	0.19	0	9.9E-03	0	9.2E-04	2.9E-04	9.2E-05	3.1E-04
NRSF	2.4E-02	1.1E-03	1.4E-03	4.2E-02	-2.3E-04	3.9E-10	-4.8E-04	1.8E-04
PERM	0.66	3.7E-03	3.4E-02	1.1	2.4E-03	1.3E-09	1.6E-03	4.8E-04
PERE	1.4	5.1E-04	7.5E-02	0.56	6.0E-03	2.0E-03	2.0E-04	3.0E-03
PERT	2.1	4.2E-03	0.11	1.7	8.5E-03	2.0E-03	1.8E-03	3.8E-03
PENRM	1.3	0.97	0.15	1.7	3.6E-02	2.5E-04	3.7E-02	7.4E-02
PENRE	17	1.6	1.0	7.4	0.12	1.6E-02	6.3E-02	3.2E-02
PENRT	19	2.6	1.2	9.1	0.15	1.7E-02	0.10	0.11
Outputs								
HWD	3.1E-04	3.3E-04	4.4E-05	9.9E-04	1.2E-05	7.2E-08	1.2E-05	1.1E-05
NHWD	2.2E-02	2.9E-03	0	0.10	0	4.3E-06	9.6E-05	0
RWD	1.2E-16	1.6E-31	6.0E-18	2.5E-17	2.4E-19	5.0E-38	8.0E-32	2.2E-20
CRU	3.3E-12	1.0E-05	1.0E-06	0	5.0E-08	0	0	3.7E-12
MFR	2.8E-02	9.2E-06	1.5E-03	7.6E-02	1.5E-04	2.2E-05	4.0E-06	9.1E-05
MER	2.3E-06	3.4E-07	2.2E-07	3.4E-05	8.0E-08	1.2E-13	1.5E-07	7.7E-08
EEE	0	0	0	0	0	0	0	0
EET	0	0	0	0	0	0	0	0

Results for Module D: Beyond System Boundaries

Table 4 has results for benefit and loads in D1 reuse, D2 recovery and D3 recycling.

Table 4 D1 to D3 Impact & Inventory Results/Functional Unit

Result	D1	D2	D3
Climate Change biogenic	5.5E-03	1.8E-05	1.4E-03
Climate Change luluc	-1.5	1.7E-09	-4.8E-03
Climate Change fossil	-1.3	2.2E-04	-5.0E-02
Climate Change total	-1.2	2.3E-04	-4.9E-02
Stratospheric Ozone Depletion	-1.6E-08	5.7E-13	-5.3E-10
Photochemical Ozone Creation	-2.8E-03	9.9E-07	-1.4E-04
Acidification Potential	-1.4E-03	4.3E-07	-5.4E-05
Eutrophication Freshwater	-1.9E-07	1.2E-10	-6.7E-09
Eutrophication Marine	-2.5E-04	7.6E-08	-9.6E-06
Eutrophication Terrestrial	-1.0E-03	5.2E-07	-4.0E-05
Mineral and Metal Depletion	-7.3E-01	5.7E-08	-3.3E-02
Fossil Depletion	-1.0E-04	1.5E-04	-4.6E-06
Water Scarcity Depletion	-8.6E-04	1.8E-05	-3.0E-05
Inputs			
Net Fresh Water Use	-5.3E-03	1.1E-04	-1.9E-04
Secondary Material	0	0	0
Secondary Renewable Fuel	-7.6E-02	4.7E-05	-4.7E-03
Secondary Non-renewable Fuel	-3.1E-03	7.7E-06	-5.9E-04
Primary Renewable Material	-1.9E-02	2.0E-04	-1.7E-02
Primary Energy Renewable Not Feedstock	-9.2E-01	2.2E-04	-3.6E-02
Primary Energy Renewable Total	-9.4E-01	4.2E-04	-5.3E-02
Primary Energy Non-renewable Material	-1.0	3.2E-04	-3.3E-02
Primary Non-renewable Energy Not Feedstock	-14	2.4E-03	17
Primary Energy Non-renewable Total	-15	2.7E-03	19
Outputs			
Hazardous Waste Disposed	-2.3E-04	1.9E-07	-2.2E-05
Non-hazardous Waste Disposed	-1.6E-02	1.8E-05	0
Radioactive Waste Disposed	-8.9E-17	4.6E-21	-3.0E-18
Components For Reuse	-2.4E-12	1.0E-05	-5.0E-07
Material For Recycling	-2.1E-02	1.5E-05	-7.5E-04
Material For Energy Recovery	-1.8E-06	6.2E-09	-1.1E-07
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

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Life Cycle Assessment Method

LCA Author	The Evah Institute is described at www.evah.com.au.
Study Period	Factory data was collected from 2021 to 2023
LCA Method	Compliant with ISO 14040 and ISO 14044 Standards
LCIA method	ReCiPe 2016 Life Cycle Impact Assessment (LCIA)
Scope	Cradle to fate including all supply chain phases and stages depicted in Figure a.
Phases	The LCA covered all known flows in all known stages cradle to end of life fate.
Assumptions	Use is to typical Australian wildlife conservation professional practice.
Scenarios	Use, cleaning, maintenance plus disposal and re-use were scenario-based using Facility Management Association denoted and published typical operations.
Processes	All known processes are included from resource acquisition, water, fuel & energy use, power generation & distribution, freight, refining, intermediates, manufacture, scrap re-use, packing and dispatch, installation, use, maintenance and landfill. All significant waste and emission flows from all supply chain operations used to make, pack and install the product are included.

Evah industry databases cover all known domestic and global scope 1 and 2 operations. They exclude scope 3 burdens from capital facilities, equipment churn, noise and dehydration as well as incidental activities and employee commuting. Electricity supply models in active databases are updated annually. As each project is modelled and new data is available the databases are updated. They are then audited by external Type 1 ecolabel certifiers. The databases exist in top zones of commercial global modelling and calculating engines. Quality control methods are applied to ensure:

- Coverage of place in time with all information for each dataset noted, checked and updated;
- Consistency to Evah guidelines for all process technology, transport and energy demand;
- Completeness of modeling based on in-house reports, literature and industry reviews;
- Plausibility in 2 way checks of LCI input and output flows of data checked for validity, plus
- Mathematical correctness of all calculations in mass and energy balance cross checks.

Data Sources Representativeness and Quality

Primary data used for modelling the state of art of each operation includes all known process for:

- Technology sequences;
- Energy and water use;
- Landfill and effluent, plus
- Reliance on raw and recycled material;
- High and reduced process emissions;
- Freight and distribution systems.

Primary data is sourced from client annual reports and publications on corporate locations, logistics, technology use, market share, management systems, standards and commitment to improved environmental performance. Information on operations is also sourced from client:

- Supply chain mills, their technical manuals, corporate annual reports and sector experts, and
- Manufacturing specifications websites and factory site development license applications.

Background data is sourced from the International Energy Agency, IBISWorld, USGS Minerals, Franklin Associates, Plastics Europe, CML2, Simapro 9.5, EcoInvent 3.9 and NREL USLCI databases plus:

- Library, document, NPI and web searches, review papers, building manuals and
- Global industry association and Government reports on best available technology (BAT).

For benchmarking, comparison and integrity checks inventory data is developed to represent BAT, business as usual and worst practice options with operations covering industry sector supply and infrastructure in Australia and overseas.

Such technology, performance and license conditions were modelled and evaluated across mining, farming, forestry, freight, infrastructure and manufacturing and building industry sectors since 1995.

As most sources do not provide estimates of accuracy, a pedigree matrix of uncertainty estimates to 95% confidence levels of Geometric Standard Deviation[2] (σ_g) is used to define quality as on page 3.

No data set with >±30% uncertainty is used.

Supply Chain Modelling Assumptions

Australian building sector rules and Evah assumptions applied are defined in Table b.

Table b Scope Boundaries Assumptions and Metadata

Quality/Domain	National including Import and Export
Process Model	It is typical industry practice with currently most common or best (BAT) technology.
Resource flows	LCI uses regional data for resource mapping, fuels, energy, electricity and logistics.
Temporal	Project data collated over the previous 4 years represents averages over the last
Geography	Jurisdiction is of the declared client, site, regional, national, Pacific Rim then Europe.
Representation	It represents the declared client, their suppliers and energy providers to each cradle.
Consistency	All known operations are modelled according to operations with closest proximity.
Technology	The industry supply chain modelled is typical recent Pacific Rim technology and
Functional Unit	A 20 or 60 year period of typical service life, use, cleaning and disposal/kg or m^2
System Control	
Primary Sources	Client and supplier mills, publications, websites, specifications and manuals are
Other Sources	Recent IEA, GGT, Simapro, IBIS, EcoInvent sources used and cited in the LCA
Data mix	Power grid and renewable shares are updated according to the latest IEA reports.
Operational	Company data is used for process performance, product share, waste and
Logistics	Local data is used for power, fuel mix, water supply, logistics share & capacity.
New Data Entry	New data is entered by current researchers at Malaika LCT, Evah and GGTI.
Data Generator	All via current manufacturers, Evah, GGTI, IBIS and others is cited and in LCA
Data Publisher	Publishers include the Evah Institute, GGTI and designated clients only.
Contributors	All professional and personal contributors are cited in Evah & GGTI records.
Data Flow & Mix	
System Boundary	All known resources and emissions are modelled from Earth cradles to end of life
System flows	All known flows are modelled from & to air, land, water & community sources & sinks.
Capital inclusions	Natural stocksΔ, industry stockpilesΔ, capital wear Δ, system losses and usage.
Arid Practice	Dry technology adopted; Water use is factored by 0.1 as for e.g. mining.
Transportation	Distance >20% than EU; >20% fuel efficient larger vehicles, load & distance.
Industrial	Company or industry sector data for manufacturing and minerals involved.
Mining	All raw material extraction is based on Australian or Pacific Rim technology.
Imported fuel	The fuel mix is from nearest sources such as UAE, SE Asia, Canada or New Zealand.
Finishes	Processing inputs with finishing burdens are factored in otherwise that is denoted.
Validation	
Accuracy	10th generation study is ± 5 to 15% uncertain due to some background data.
Completeness	All significant operations are tracked and documented from the cradle to grave.
Precision	Tracking of >90% flows apply a 90:10 rule sequentially to 99.9% and beyond.
Allocation	All is allocated to co products on reaction stoichiometry by energetic or mass fraction.
Burdens	All known resource use from & emissions to community air land, water are included.
Plausibility	Results are checked and benchmarked against BAT, BAU & worst practice.
Sensitivity	Calculated U is reported & compared to Bath U RICE & EcoInvent libraries.
Validity Checks	Checks are versus Plastics Europe, Bath U RICE & or Industry LCA Literature.

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Further and explanatory information is found at

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Environmental Product Declaration

Compliant to ISO 14025 and EN15804