

PORCELANOSA

Porcelanosa Group

XTONE Countertop Tile

12540 Vila-real, Castellón, Spain

Global **GreenTag**
International EPD Program



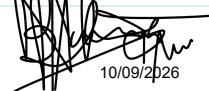
EN15804+A2 2019 & ISO14025 Compliant

EPD Number PA202026EP
PA212026EP,
PA222026EP
PA232026EP

Issued 10 September 2026
Valid to 10 September 2031



Mandatory Disclosures

Range Name	XTONE Counter Tile1.6*3.2m ²	EPD type	Cradle to Grave
Product Name	12mm or 20mm XTONE Counter	Issue Date	10 September 2026
Product Types	Tile white or colour body	Valid Until	10 September 2031
EPD Number	PA202026EP	12mm White body Interior	
	PA212026EP	20mm White body Interior	
	PA222026EP	12mm Colour body Interior	
	PA232026EP	20mm Colour body Interior	
Objectives	To show environmental inventory, impacts and damages and timely imperatives to secure viable climate and biodiversity on earth against a background of increasing disasters attributable to anthropogenic climate change.		
Communication	This Environmental Product Declaration (EPD) discloses potential environmental outcomes compliant with ISO14025:2010 and independent external verification of this EPD and data ensures it is fit for business-to-consumer communication. [1]		
Product Category Rules	Standard EN 15804+A2 2019 serves as core Product Category Rules (PCR) [2]. Ceramic Tile Sub-PCR CTL 2026 V2 also applies [3].		
Reliability	Life Cycle Impact Assessment (LCIA) results are relative expressions that do not predict impacts on category endpoints, exceeded thresholds, safety margins or risks.		
Comparability	Different program EPDs may not be comparable. Comparability is further dependent on the product category rules and data source used.		
EPD Owner	This EPD is the property of the declared manufacturer tabled below		
Explanations	Further explanatory information is available at info@globalgreentag.com or by contacting certification@globalgreentag.com [3].		
Signed and Dated	Demonstration of Internal and External Verification		
Internal	 08 Sept 2026	Life Cycle Assessment (LCA) and EPD developed by Delwyn Jones, Principal Scientist The Evah Institute	
	 10/09/2026	EPD Platform Operator review by Dr Nana Bortsie-Aryee of Global GreenTag International Pty Ltd	
External Verifier Statement	I, the undersigned, verifier, hereby confirm my examination did not find any relevant deviations by the EPD 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 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.		
	 08/09/2026	Verified by Dr Sharmina Begum Engineer Perth Western Australia	
EPD Program Operator	LCA and EPD Producer	Declaration Owner	

EPD Program Operator

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PORCELANOSA

Program Description

EPD Scope	The scope is cradle to grave (C ₂ G) as defined by ISO14025 [1]. Figure 1 depicts C ₂ G system boundary modules A1 to C4 and D beyond it.																		
System boundary	The system boundary with nature includes material and energy acquisition, processing, manufacture, transport, installation, use plus waste to end of life.																		
Stages included	All known operations and stages in modules A1 to D3 are included. Modules B1, B4, B5, B6, B7 or C3 had zero flows and results.																		
Model Information	Building Life Cycle Assessment															Beyond system			
	Actual			Scenarios															
Stages	Product			Construct		Use							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
	Resources	Transport	Manufacture	Transport	Construct	Use	Maintain	Repair	Replace	Refurbish	Energy use	Water use	Demolish	Transport	2-Process Waste	Disposal	Reuse	Recovery	Recycling

Figure 1 Modules A1 to C4 Within the System Boundary and D Beyond

Data Sources

Primary Data	Data is from primary sources 2023 to 2026 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 fate of all flows at end of life.
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

As tabled below data quality is very good, U= ±0.01, <10 years and cut-off complies with EN15804 [2].

Background	Data Quality	Parameters and Uncertainty (U)			
Correlation	Metric σ	U ±0.01	U ±0.05	U ±0.10	U ±0.20
Reliability	Reporting	Site Audit	Expert verified	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. European, 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. Operations include 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

Stage A4 to C4 are modelled on typical scenarios to forecast operations such as listed above, depicted below and defined overleaf.

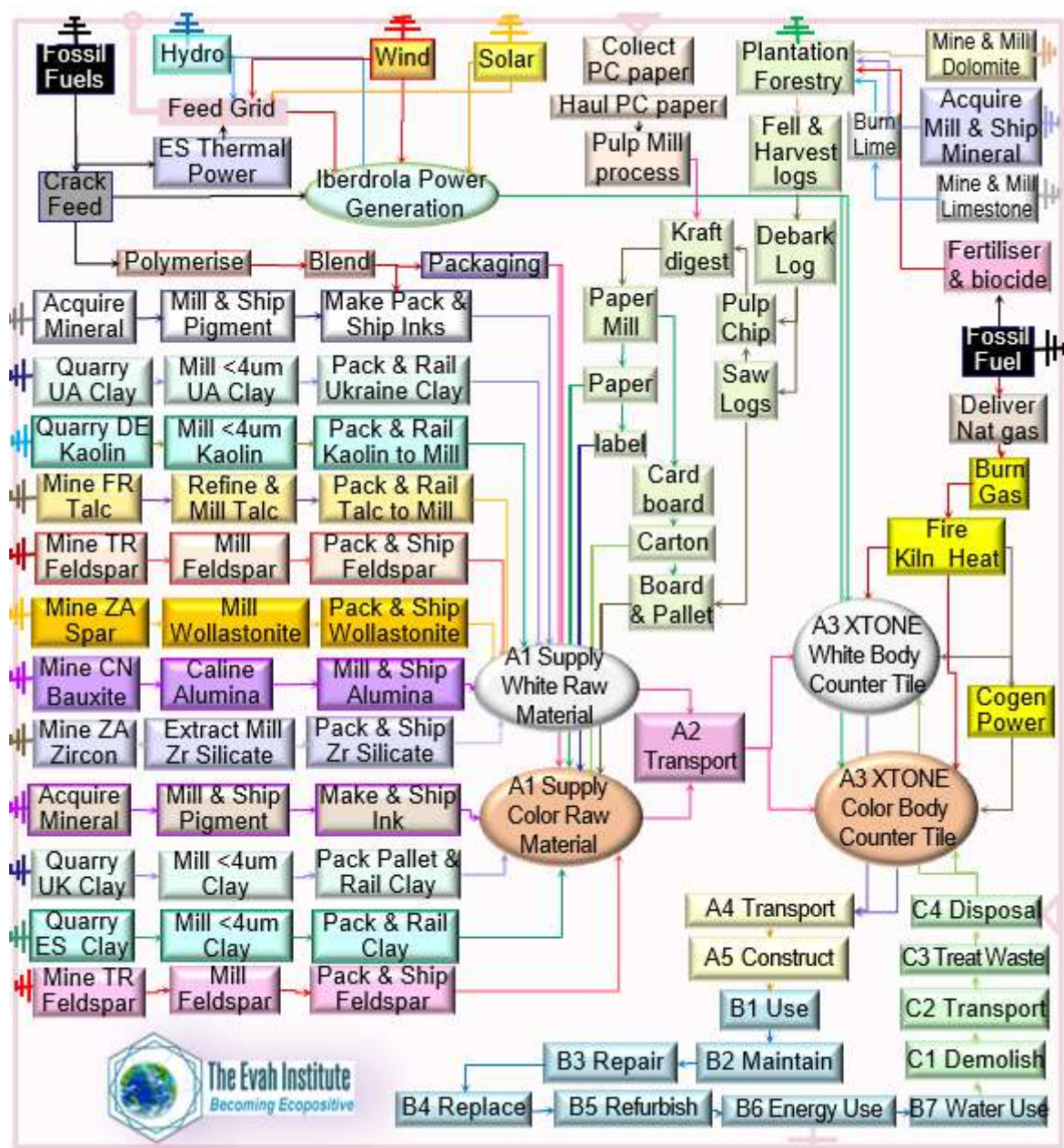


Figure 2 White & Colour Body Products Process Flow Charts

Details of Manufacturer

Porcelanosa manufacturer of premium ceramic tiles in Castellón Spain, is committed to decreasing their environmental impact. Testing and accelerated wear assessment ensures materials are used to their potential. 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 warehousing to use rail not road. The Porcelanosa Group supplier companies are committed to global practice in sustainable manufacturing.

Porcelanosa tiles are used for interior and exterior applications in commercial and residential sectors. Porcelanosa is committed to quality, innovation and the environment with strict testing and quality controls. Their manufacturing is certified to ISO 9001 in Quality Management, ISO 14001 in Environmental Management and ISO 50001 Energy Management System. Heat from natural gas fired kilns is used in spray driers and boilers powering turbines to cogenerate electricity for factory use. 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 Name	XTONE Counter Tile
Product Name	XTONE Counter Tile 1.6*3.2m ² area
Manufacturer	Porcelanosa S. A. U.
Factory address	P.O. Box: 131, 12540 Vila-real, Castellón, Spain
Site represented	Made in Spain. Uses are assumed as for Australasia
Time	Made and sold in 2026 for single use
Application	Residential building countertop tile
Function	Tiling interior residential countertop wet and dry area
Factory warranty	Fit for purpose use, 10 years only
Lifetime	Residential building refits vary but 60 year life is assumed typical
Declared units	12mm white body 30.2 kg/m ² XTONE interior counter tile
	20mm white body 53.4kg/m ² XTONE interior counter tile
	12mm colour body 30.2kg/m ² XTONE interior counter tile
	20mm colour body 53.4kg/m ² XTONE interior counter tile
Functional units	Use for 60-years declared units of installed product /kg 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 Ecospecifier 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.

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://www.xtone-surface.com/en/
Practices Reference	https://www.xtone-surface.com/en/
Disposal	The 5% scrap installation is assumed recycled or reused in maintenance.

Product Components

This section summarises factory product and packaging components.

Base Material Origin and Detail

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

Function	Component	Source	Amount%
Binder and flux	Feldspar	Turkey	>48<49
Structural backbone	Kaolin	Germany	>18 <19
Structural binder	Clay	Ukraine	>11 <12
Mineralising flux	Talc	France	>4 <6
Filler	Home Scrap	Spain	>5<7
Reinforcement and flux	Wollastonite	South Africa	>4 <5
Refractory aggregate filler	Calcined Alumina	China	>3 <4
Flow additive	Zirconium silicate	South Africa	>2<3
Colour Body Tile			
Binder and flux	Feldspar	Turkey	>61 <62
Structural binder	Clay	Spain	>19 <21
Structural binder	Clay	Ukraine	>19 <21
Flow additive	Zirconium silicate	South Africa	>2.0 <3.0
Function	Component	Source	Amount%
Pallet & crate	Wood	EU	>2.5 <3.0
Spacers & Carton	Cardboard	EU	>1.0 <1.1
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.

Sizes Modelled	All 1.6*3.2m ² area. 12mm thick 30.2 kg/m ² and 20mm thick 53.4kg/m ² . Note density varies with wet compression across tile size ranges.
Finishes	Polished, Silk, Texture and Nature in their natural shade and pattern.
Pattern	>30 realistic cement, marble, stone, wood and metal collections
Applicable Standards	
ISO 14001	Covers the whole process, from design through to sales of end products.
ISO 50001	Reduce energy consumption, and minimise greenhouse gas emissions.

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	Ship Spain to Brisbane, Sydney or Melbourne	21,000km	85% Capacity	Full back load
	Road 25t semi Vila Real mill to export	11km	85% Capacity	Full back load
	Road 25t semi port to AU state capital city depot	25km	85% Capacity	No back load
	Road van depot to site	20km	85% Capacity	No back load
A5 Install	VOCs indoors	0%	Packaging Scrap	All recycled
			Polymer Waste	All to landfill
	Installation scrap	5%	Recycled or reused	5%
Building Modules				
B1 Use	VOCs	0%	No other flows	0%
B2 Maintain	fit for purpose	100%	Wet spray wipe 3*day post meals	0%
B3 Repair	fit for purpose	95%	Repair damaged only	5%
B4 Replace	fit for purpose	100%	None modelled apart from repair	0%
B5 Refurbish	fit for purpose	100%	None modelled apart from repair	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 in situ	95%	No other flows	0%
D2 Recover	fit for purpose other use e.g mosaic	2.5%	No other flows	0%
D3 Recycle	fit for repurpose e.g aggregate	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, NO _x , 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.

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

This section lists environmental impact and inventory result types, descriptions, method references and disclaimers. Additional impact indicators not declared are listed in Table a. on page 19 of this EPD.

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	EP _{FRESH}	kg P _{eq}	Excess freshwater nutrients [8]
Eutrophication Marine	EP _{MARINE}	kg N _{eq}	Excess marine nutrients [9]
Eutrophication Terrestrial	EP _{LAND}	mol N _{eq}	Excess nutrients to land [8]
Mineral and Metal Depletion ²	ADP _{MIN}	kg Sb _{eq}	Abiotic Depletion minerals [10]
Fossil Depletion ³	ADP _{FF}	MJ _{ncv}	Abiotic Depletion fossil fuel [11]
Water Scarcity Depletion ⁴	WDP	m ³ _{WDP eq}	Water Deprivation Scarcity
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

² ADP MIN indicator results shall be used with care as uncertainties are high or there is limited experienced with them.

³ ADP FF indicator results shall be used with care as uncertainties are high or there is limited experienced with them.

⁴ WDP indicator results shall be used with care as uncertainties are high or there is limited experienced with them.

Results for Module A to C 12mm White 1.6*3.2m² Counter Tile Cradle to Grave

Table 1a lists 12mm White 1.6*3.2m² Counter Tile results within and Table 1b beyond the system boundary.

Table 1a Impact, Input & Output Results/kg 12mm White Counter Tile Functional Unit

Module	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Results	C2Gate	Deliver	Construct	Use	Maintain	Repair	Replace	Refurbish	Water use	Energy use	Demolish	Transport	Process waste	Disposal
Impacts														
GWP_{Bio}	-0.11	3.7E-06	-2.1E-02	0	-6.2E-02	-3.6E-02	0	0	0	0	-2.2E-08	-9.3E-07	0	-3.5E-04
GWP_{Luluc}	-2.8E-04	0	-6.1E-06	0	-2.3E-04	1.3E-06	0	0	0	0	-4.0E-11	2.4E-06	0	7.0E-04
GWP_{FF}	2.5	0.10	0.6	0	0.46	1.0	0	0	0	0	3.2E-06	6.2E-03	0	3.2E-03
GWP_{Total}	2.4	0.10	0.55	0	0.40	0.98	0	0	0	0	3.2E-06	6.2E-03	0	3.6E-03
ODP	7.1E-08	2.9E-13	5.4E-09	0	1.9E-09	7.7E-09	0	0	0	0	1.4E-19	1.1E-13	0	1.1E-11
POCP	7.4E-03	9.3E-04	2.3E-03	0	1.9E-03	4.3E-03	0	0	0	0	1.3E-08	6.0E-05	0	2.3E-05
AP	4.9E-03	1.1E-04	1.3E-03	0	7.5E-04	2.5E-03	0	0	0	0	7.5E-09	5.1E-06	0	4.6E-06
EP_{Fresh}	5.2E-07	2.1E-09	2.2E-06	0	4.1E-07	4.3E-06	0	0	0	0	6.3E-16	3.1E-10	0	2.4E-09
EP_{Marine}	1.3E-03	1.7E-05	2.0E-04	0	1.3E-04	3.4E-04	0	0	0	0	1.1E-09	9.4E-07	0	8.0E-07
EP_{Land}	3.1E-03	5.5E-05	7.4E-04	0	2.0E-04	1.3E-03	0	0	0	0	6.8E-09	3.2E-06	0	5.2E-06
ADP_{Min}	1.2E-03	1.1E-05	1.1E-04	0	9.6E-04	1.6E-04	0	0	0	0	1.7E-14	4.0E-06	0	2.1E-06
ADP_{FF}	1.5	0.20	0.41	0	0.29	0.74	0	0	0	0	1.4E-06	7.5E-03	0	3.2E-03
WDP	1.7E-03	1.6E-05	5.8E-04	0	6.2E-03	1.1E-03	0	0	0	0	1.5E-10	1.4E-06	0	6.4E-06
Inputs														
FW	1.1E-02	1.0E-04	3.6E-03	0	3.8E-02	6.8E-03	0	0	0	0	9.2E-10	8.7E-06	0	3.9E-05
SM	4.0E-02	1.4E-06	8.9E-03	0	2.3E-02	1.6E-02	0	0	0	0	1.5E-09	6.0E-07	0	1.3E-04
RSF	0.31	2.4E-06	5.6E-02	0	2.6E-02	9.6E-02	0	0	0	0	3.2E-15	1.0E-06	0	7.5E-04
NRSF	2.5E-02	1.1E-03	0.19	0	0.13	0.38	0	0	0	0	1.5E-12	4.8E-04	0	2.4E-04
PERM	1.4	3.7E-03	0.23	0	0.68	0.39	0	0	0	0	-2.7E-08	1.6E-03	0	4.2E-03
PERE	1.9	7.4E-04	0.28	0	0.50	0.46	0	0	0	0	8.0E-04	3.3E-04	0	2.1E-03
PERT	3.6	4.4E-03	0.56	0	1.3	0.95	0	0	0	0	8.0E-04	1.9E-03	0	7.1E-03
PENRM	2.2	0.58	2.3	0	0.88	4.4	0	0	0	0	4.0E-07	3.7E-02	0	1.3E-02
PENRE	29	0.98	5.3	0	4.5	9.2	0	0	0	0	2.6E-05	6.3E-02	0	3.6E-02
PENRT	31	1.6	8	0	5.4	14	0	0	0	0	2.6E-05	0.10	0	5.0E-02
Outputs														
HWD	1.8E-03	3.3E-04	4.1E-02	0	6.2E-04	8.1E-02	0	0	0	0	1.2E-10	1.2E-05	0	6.3E-06
NHWD	2.5E-02	2.9E-03	0.15	0	6.3E-02	0.26	0	0	0	0	2.0E-08	9.6E-05	0	3.8E-04
RWD	1.3E-15	1.3E-31	7.7E-17	0	1.4E-17	9.6E-17	0	0	0	0	1.6E-40	6.4E-32	0	8.0E-20
CRU	3.0E-05	1.0E-05	1.5E-06	0	2.4E-08	1.5E-06	0	0	0	0	1.0E-05	1.0E-05	0	1.4E-10
MFR	3.4E-02	8.9E-06	0.06	0	4.9E-02	1.1E-01	0	0	0	0	3.6E-08	3.9E-06	0	5.0E-02
MFE	8.2E-04	3.4E-07	1.3E-04	0	2.1E-05	2.2E-04	0	0	0	0	4.7E-16	1.5E-07	0	1.5E-07
EEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 1b Module D 12mm White Counter Tile Impact, Input & Output Results/ kg Functional Unit

Modules	D1	D2	D3
Results	Reuse	Recovery	Recycling
Impacts			
Climate Change biogenic	0.12	2.0E-02	7.8E-02
Climate Change luluc	2.8E-04	5.8E-06	2.3E-04
Climate Change fossil	-2.99	-0.64	-0.98
Climate Change total	-2.87	-0.62	-0.90
Stratospheric Ozone Depletion	-7.3E-08	-5.1E-09	-6.9E-09
Photochemical Ozone Creation	-1.0E-02	-3.1E-03	-4.0E-03
Acidification Potential	-6.1E-03	-1.4E-03	-2.0E-03
Eutrophication Freshwater	-2.5E-06	-2.1E-06	-2.4E-06
Eutrophication Marine	-1.5E-03	-2.1E-04	-3.2E-04
Eutrophication Terrestrial	-3.7E-03	-7.5E-04	-8.9E-04
Mineral and Metal Depletion	-1.2E-03	-1.1E-04	-1.0E-03
Fossil Depletion	-2.04	-0.58	-0.67
Water Scarcity Depletion	-2.2E-03	-5.6E-04	-6.4E-03
Inputs			
Net Fresh Water Use	-1.4E-02	-3.5E-03	-3.9E-02
Secondary Material	-4.7E-02	-8.4E-03	-3.0E-02
Secondary Renewable Fuel	-0.35	-5.3E-02	-7.8E-02
Primary Renewable Material	-0.21	-0.18	-0.31
Primary Energy Renewable Not Feedstock	-1.60	-0.22	-0.86
Primary Energy Renewable Total	-2.06	-0.26	-0.74
Secondary Non-renewable Fuel	-4.01	-0.54	-1.78
Primary Energy Non-renewable Material	-4.74	-2.70	-2.98
Primary Non-renewable Energy Not Feedstock	-33.76	-5.98	-9.33
Primary Energy Non-renewable Total	-38.51	-8.68	-12.31
Outputs			
Hazardous Waste Disposed	-4.1E-02	-3.9E-02	-3.9E-02
Non-hazardous Waste Disposed	-0.17	-0.14	-0.20
Radioactive Waste Disposed	-1.3E-15	-7.3E-17	-8.7E-17
Components For Reuse	-3.9E-05	-1.1E-05	-1.4E-06
Material For Recycling	-9.1E-02	-5.8E-02	-0.10
Material For Energy Recovery	-9.0E-04	-1.2E-04	-1.4E-04
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Results for Module A to C 20mm White 1.6*3.2m² Counter Tile Cradle to Grave

Table 2a lists 20mm White 1.6*3.2m² Counter Tile results within and Table 2b beyond the system boundary.

Table 2a 20mm White Counter Tile Impact, Input & Output Results/kg Functional Unit

Module	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Results	C2Gate	Deliver	Construct	Use	Maintain	Repair	Replace	Refurbish	Water use	Energy use	Demolish	Transport	Process waste	Disposal
Impacts														
GWP_{Bio}	-0.11	3.7E-06	5.0E-03	0	-3.5E-02	-3.6E-02	0	0	0	0	-2.2E-08	-9.3E-07	0	-3.5E-04
GWP_{Luluc}	-2.8E-04	0	1.9E05	0	-1.3E-04	1.3E-06	0	0	0	0	-4.0E-11	2.4E-06	0	7.0E-04
GWP_{FF}	2.5	0.10	0.18	0	0.26	1.0	0	0	0	0	3.2E-06	6.2E-03	0	3.2E-03
GWP_{Total}	2.4	0.10	0.17	0	0.23	0.98	0	0	0	0	3.2E-06	6.2E-03	0	3.6E-03
ODP	7.1E-08	2.9E-13	1.6E09	0	1.1E-09	7.7E-09	0	0	0	0	1.4E-19	1.1E-13	0	1.1E-11
POCP	7.4E-03	9.3E-04	9.4E04	0	1.1E-03	4.3E-03	0	0	0	0	1.3E-08	6.0E-05	0	2.3E-05
AP	4.9E-03	1.1E-04	5.3E04	0	4.3E-04	2.5E-03	0	0	0	0	7.5E-09	5.1E-06	0	4.6E-06
EP_{Fresh}	5.2E-07	2.1E-09	1.4E06	0	2.3E-07	4.3E-06	0	0	0	0	6.3E-16	3.1E-10	0	2.4E-09
EP_{Marine}	1.3E-03	1.7E-05	3.4E05	0	7.4E-05	3.4E-04	0	0	0	0	1.1E-09	9.4E-07	0	8.0E-07
EP_{Land}	3.1E-03	5.5E-05	2.5E04	0	1.1E-04	1.3E-03	0	0	0	0	6.8E-09	3.2E-06	0	5.2E-06
ADP_{Min}	1.2E-03	1.1E-05	1.5E05	0	5.4E-04	1.6E-04	0	0	0	0	1.7E-14	4.0E-06	0	2.1E-06
ADP_{FF}	1.5	0.20	0.15	0	0.17	0.74	0	0	0	0	1.4E-06	7.5E-03	0	3.2E-03
WDP	1.7E-03	1.6E-05	2.7E04	0	3.5E-03	1.1E-03	0	0	0	0	1.5E-10	1.4E-06	0	6.4E-06
Inputs														
FW	1.1E-02	1.0E-04	1.7E03	0	2.1E-02	6.8E-03	0	0	0	0	9.2E-10	8.7E-06	0	3.9E-05
SM	4.0E-02	1.4E-06	3.3E03	0	1.3E-02	1.6E-02	0	0	0	0	1.5E-09	6.0E-07	0	1.3E-04
RSF	0.31	2.4E-06	1.2E02	0	1.5E-02	9.6E-02	0	0	0	0	3.2E-15	1.0E-06	0	7.5E-04
NRSF	2.5E-02	1.1E-03	0.13	0	7.4E-02	0.38	0	0	0	0	1.5E-12	4.8E-04	0	2.4E-04
PERM	1.4	3.7E-03	3.5E02	0	0.38	0.39	0	0	0	0	-2.7E-08	1.6E-03	0	4.2E-03
PERE	1.9	7.4E-04	3.0E02	0	0.28	0.46	0	0	0	0	8.0E-04	3.3E-04	0	2.1E-03
PERT	3.6	4.4E-03	7.7E02	0	0.74	0.95	0	0	0	0	8.0E-04	1.9E-03	0	7.1E-03
PENRM	2.2	0.58	1.3	0	0.50	4.4	0	0	0	0	4.0E-07	3.7E-02	0	1.3E-02
PENRE	29	0.98	1.1	0	2.5	9.2	0	0	0	0	2.6E-05	6.3E-02	0	3.6E-02
PENRT	31	1.6	2.5	0	3.0	14	0	0	0	0	2.6E-05	0.10	0	5.0E-02
Outputs														
HWD	1.8E-03	3.3E-04	2.8E02	0	3.5E-04	8.1E-02	0	0	0	0	1.2E-10	1.2E-05	0	6.3E-06
NHWD	2.5E-02	2.9E-03	4.0E02	0	3.6E-02	0.26	0	0	0	0	2.0E-08	9.6E-05	0	3.8E-04
RWD	1.3E-15	1.3E-31	4.6E17	0	7.9E-18	9.6E-17	0	0	0	0	1.6E-40	6.4E-32	0	8.0E-20
CRU	3.0E-05	1.0E-05	1.5E06	0	1.3E-08	1.5E-06	0	0	0	0	1.0E-05	1.0E-05	0	1.4E-10
MFR	3.4E-02	8.9E-06	1.3E02	0	2.8E-02	1.1E-01	0	0	0	0	3.6E-08	3.9E-06	0	5.0E-02
MFE	8.2E-04	3.4E-07	2.5E05	0	1.2E-05	2.2E-04	0	0	0	0	4.7E-16	1.5E-07	0	1.5E-07
EEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2b Module D 20mm White Counter Tile Impact & Inventory Results/kg Functional Unit

Modules	D1	D2	D3
Results	Reuse	Recovery	Recycling
Impacts			
Climate Change biogenic	0.10	1.3E-04	1.3E-04
Climate Change luluc	2.9E-04	1.8E-05	1.4E-04
Climate Change fossil	-2.3	7.0E-02	-8.1E-02
Climate Change total	-2.2	6.5E-02	-5.3E-02
Stratospheric Ozone Depletion	-6.9E-08	-1.5E-09	-2.5E-09
Photochemical Ozone Creation	-7.0E-03	1.2E-05	-1.2E-04
Acidification Potential	-4.3E-03	4.0E-04	9.5E-05
Eutrophication Freshwater	8.5E-07	1.3E-06	1.1E-06
Eutrophication Marine	-1.3E-03	1.7E-05	-3.8E-05
Eutrophication Terrestrial	-2.8E-03	1.8E-04	1.3E-04
Mineral and Metal Depletion	-1.1E-03	-2.5E-05	-5.3E-04
Fossil Depletion	-1.5	-4.6E-02	-1.6E-02
Water Scarcity Depletion	-1.4E-03	2.4E-04	-3.1E-03
Inputs			
Net Fresh Water Use	-8.6E-03	1.5E-03	-1.9E-02
Secondary Material	-3.5E-02	3.1E-03	-9.2E-03
Secondary Renewable Fuel	-0.29	1.1E-02	-2.8E-03
Primary Renewable Material	0.10	0.12	5.1E-02
Primary Energy Renewable Not Feedstock	-1.3	3.0E-02	-0.33
Primary Energy Renewable Total	-1.8	2.7E-02	-0.24
Secondary Non-renewable Fuel	-3.4	6.9E-02	-0.63
Primary Energy Non-renewable Material	-1.3	0.72	0.80
Primary Non-renewable Energy Not Feedstock	-28	0.14	-1.3
Primary Energy Non-renewable Total	-29	0.86	-0.55
Outputs			
Hazardous Waste Disposed	2.4E-02	2.6E-02	2.6E-02
Non-hazardous Waste Disposed	1.1E-02	3.5E-02	4.2E-03
Radioactive Waste Disposed	-1.3E-15	-4.4E-17	-5.1E-17
Components For Reuse	-3.9E-05	-1.1E-05	-1.4E-06
Material For Recycling	-2.0E-02	1.3E-02	-1.4E-02
Material For Energy Recovery	-7.6E-04	2.4E-05	1.2E-05
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Results Module A to C 12mm Colour 1.6*3.2m² Counter Tile Cradle to Grave

Table 3a lists 12mm Colour 1.6*3.2m² Counter Tile results in the system boundary and Table 3b beyond it.

Table 3a 12mm Colour Counter Tile Impact & Input and Output Results/kg Functional Unit

Module	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Results	C:Gate	Deliver	Construct	Use	Maintain	Repair	Replace	Refurbish	Water use	Energy use	Demolish	Transport	Process waste	Disposal
Impacts														
GWP_{Bio}	-0.11	3.7E-06	-2.1E-02	0	-6.2E-02	-3.6E-02	0	0	0	0	-2.2E-08	-9.3E-07	0	-3.5E-04
GWP_{Luluc}	-2.7E-04	0	-5.3E-06	0	-2.3E-04	2.2E-06	0	0	0	0	-4.0E-11	2.4E-06	0	7.0E-04
GWP_{FF}	2.2	0.10	0.6	0	0.46	1.0	0	0	0	0	3.2E-06	6.2E-03	0	3.2E-03
GWP_{Total}	2.1	0.10	0.54	0	0.40	0.96	0	0	0	0	3.2E-06	6.2E-03	0	3.6E-03
ODP	5.7E-08	2.9E-13	5.1E-09	0	1.9E-09	7.4E-09	0	0	0	0	1.4E-19	1.1E-13	0	1.1E-11
POCP	6.5E-03	9.3E-04	2.3E-03	0	1.9E-03	4.2E-03	0	0	0	0	1.3E-08	6.0E-05	0	2.3E-05
AP	4.2E-03	1.1E-04	1.3E-03	0	7.5E-04	2.4E-03	0	0	0	0	7.5E-09	5.1E-06	0	4.6E-06
EP_{Fresh}	4.7E-07	2.1E-09	2.2E-06	0	4.1E-07	4.3E-06	0	0	0	0	6.3E-16	3.1E-10	0	2.4E-09
EP_{Marine}	1.1E-03	1.7E-05	2.0E-04	0	1.3E-04	3.4E-04	0	0	0	0	1.1E-09	9.4E-07	0	8.0E-07
EP_{Land}	2.8E-03	5.5E-05	7.3E-04	0	2.0E-04	1.3E-03	0	0	0	0	6.8E-09	3.2E-06	0	5.2E-06
ADP_{Min}	9.3E-04	1.1E-05	1.0E-04	0	9.6E-04	1.6E-04	0	0	0	0	1.7E-14	4.0E-06	0	2.1E-06
ADP_{FF}	1.4	0.20	4.0E-01	0	0.29	0.74	0	0	0	0	1.4E-06	7.5E-03	0	3.2E-03
WDP	1.4E-03	1.6E-05	5.7E-04	0	6.2E-03	1.1E-03	0	0	0	0	1.5E-10	1.4E-06	0	6.4E-06
Inputs														
FW	8.6E-03	1.0E-04	3.5E-03	0	3.8E-02	6.8E-03	0	0	0	0	9.2E-10	8.7E-06	0	3.9E-05
SM	3.2E-02	1.4E-06	8.8E-03	0	2.3E-02	1.6E-02	0	0	0	0	1.5E-09	6.0E-07	0	1.3E-04
RSF	0.31	2.4E-06	0.06	0	2.6E-02	9.6E-02	0	0	0	0	3.2E-15	1.0E-06	0	7.5E-04
NRSF	2.3E-02	1.1E-03	0.19	0	0.13	0.38	0	0	0	0	1.5E-12	4.8E-04	0	2.4E-04
PERM	1.4	3.7E-03	0.23	0	0.68	0.39	0	0	0	0	-2.7E-08	1.6E-03	0	4.2E-03
PERE	1.8	7.4E-04	0.27	0	0.50	0.45	0	0	0	0	8.0E-04	3.3E-04	0	2.1E-03
PERT	3.5	4.4E-03	0.56	0	1.3	0.94	0	0	0	0	8.0E-04	1.9E-03	0	7.1E-03
PENRM	1.9	0.58	2.2	0	0.88	4.4	0	0	0	0	4.0E-07	3.7E-02	0	1.3E-02
PENRE	27	0.98	5.2	0	4.5	9.0	0	0	0	0	2.6E-05	6.3E-02	0	3.6E-02
PENRT	29	1.6	7	0	5.4	13	0	0	0	0	2.6E-05	0.10	0	5.0E-02
Outputs														
HWD	9.0E-04	3.3E-04	4.1E-02	0	6.2E-04	8.1E-02	0	0	0	0	1.2E-10	1.2E-05	0	6.3E-06
NHWD	2.1E-02	2.9E-03	1.5E-01	0	6.3E-02	0.26	0	0	0	0	2.0E-08	9.6E-05	0	3.8E-04
RWD	1.1E-15	1.3E-31	7.2E-17	0	1.4E-17	9.1E-17	0	0	0	0	1.6E-40	6.4E-32	0	8.0E-20
CRU	3.0E-05	1.0E-05	1.5E-06	0	2.4E-08	1.5E-06	0	0	0	0	1.0E-05	1.0E-05	0	1.4E-10
MFR	3.3E-02	8.9E-06	6.1E-02	0	4.9E-02	0.11	0	0	0	0	3.6E-08	3.9E-06	0	5.0E-02
MFE	7.1E-04	3.4E-07	1.3E-04	0	2.1E-05	2.2E-04	0	0	0	0	4.7E-16	1.5E-07	0	1.5E-07
EEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3b Module D 12mm Colour Counter Tile Impact & Inventory Results/ kg Functional Unit

Modules	D1	D2	D3
Results	Reuse	Recovery	Recycling
Impacts			
Climate Change biogenic	0.12	2.0E-02	7.8E-02
Climate Change luluc	2.6E-04	5.0E-06	2.3E-04
Climate Change fossil	-2.7	-0.63	-0.97
Climate Change total	-2.6	-0.61	-0.89
Stratospheric Ozone Depletion	-5.9E-08	-4.9E-09	-6.7E-09
Photochemical Ozone Creation	-9.2E-03	-3.1E-03	-4.0E-03
Acidification Potential	-5.4E-03	-1.4E-03	-2.0E-03
Eutrophication Freshwater	-2.5E-06	-2.0E-06	-2.4E-06
Eutrophication Marine	-1.3E-03	-2.0E-04	-3.1E-04
Eutrophication Terrestrial	-3.4E-03	-7.4E-04	-8.8E-04
Mineral and Metal Depletion	-9.9E-04	-1.1E-04	-1.0E-03
Fossil Depletion	-1.9	-0.57	-0.66
Water Scarcity Depletion	-1.9E-03	-5.6E-04	-6.4E-03
Inputs			
Net Fresh Water Use	-1.2E-02	-3.5E-03	-3.9E-02
Secondary Material	-3.9E-02	-8.4E-03	-3.0E-02
Secondary Renewable Fuel	-0.35	-5.3E-02	-7.7E-02
Primary Renewable Material	-0.20	-0.18	-0.31
Primary Energy Renewable Not Feedstock	-1.6	-0.22	-0.86
Primary Energy Renewable Total	-1.9	-0.26	-0.73
Secondary Non-renewable Fuel	-3.9	-0.53	-1.8
Primary Energy Non-renewable Material	-4.5	-2.7	-3.0
Primary Non-renewable Energy Not Feedstock	-31	-5.9	-9.2
Primary Energy Non-renewable Total	-36	-8.6	-12
Outputs			
Hazardous Waste Disposed	-4.0E-02	-3.9E-02	-3.9E-02
Non-hazardous Waste Disposed	-0.16	-0.14	-0.20
Radioactive Waste Disposed	-1.1E-15	-6.9E-17	-8.2E-17
Components For Reuse	-3.9E-05	-1.1E-05	-1.4E-06
Material For Recycling	-9.0E-02	-5.8E-02	-1.0E-01
Material For Energy Recovery	-7.9E-04	-1.2E-04	-1.4E-04
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Results Module A to C 20mm Colour 1.6*3.2m² Counter Tile Cradle to Grave

Table 4a lists 20mm Colour 1.6*3.2m² Counter Tile results in the system boundary and Table 4b beyond it.

Table 4a 20mm Colour Counter Tile Impact & Input and Output Results/kg Functional Unit

Modules	A1-3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Results	C _{Gate}	Deliver	Construct	Use	Maintain	Repair	Replace	Refurbish	Water use	Energy use	Demolish	Transport	Process waste	Disposal
Impacts														
GWP_{Bio}	-0.11	3.7E-06	5.1E03	0	-3.5E-	-3.6E-02	0	0	0	0	-2.2E-08	-9.3E-07	0	-3.5E-
GWP_{Luluc}	-2.7E-	0	2.3E05	0	-1.3E-	2.2E-06	0	0	0	0	-4.0E-11	2.4E-06	0	7.0E-04
GWP_{FF}	2.2	0.10	0.4	0	0.26	1.0	0	0	0	0	3.2E-06	6.2E-03	0	3.2E-03
GWP_{Total}	2.1	0.10	0.39	0	0.23	0.96	0	0	0	0	3.2E-06	6.2E-03	0	3.6E-03
ODP	5.7E-08	2.9E-13	4.2E10	0	1.1E-09	7.4E-09	0	0	0	0	1.4E-19	1.1E-13	0	1.1E-11
POCP	6.5E-03	9.3E-04	1.9E03	0	1.1E-03	4.2E-03	0	0	0	0	1.3E-08	6.0E-05	0	2.3E-05
AP	4.2E-03	1.1E-04	1.1E03	0	4.3E-04	2.4E-03	0	0	0	0	7.5E-09	5.1E-06	0	4.6E-06
EP_{Fresh}	4.7E-07	2.1E-09	2.5E06	0	2.3E-07	4.3E-06	0	0	0	0	6.3E-16	3.1E-10	0	2.4E-09
EP_{Marine}	1.1E-03	1.7E-05	1.0E04	0	7.4E-05	3.4E-04	0	0	0	0	1.1E-09	9.4E-07	0	8.0E-07
EP_{Land}	2.8E-03	5.5E-05	5.4E04	0	1.1E-04	1.3E-03	0	0	0	0	6.8E-09	3.2E-06	0	5.2E-06
ADP_{Min}	9.3E-04	1.1E-05	1.2E05	0	5.4E-04	1.6E-04	0	0	0	0	1.7E-14	4.0E-06	0	2.1E-06
ADP_{FF}	1.4	0.20	3.2E01	0	0.17	0.74	0	0	0	0	1.4E-06	7.5E-03	0	3.2E-03
WDP	1.4E-03	1.6E-05	5.2E04	0	3.5E-03	1.1E-03	0	0	0	0	1.5E-10	1.4E-06	0	6.4E-06
Inputs														
FW	8.6E-03	1.0E-04	3.2E03	0	2.1E-02	6.8E-03	0	0	0	0	9.2E-10	8.7E-06	0	3.9E-05
SM	3.2E-02	1.4E-06	6.9E03	0	1.3E-02	1.6E-02	0	0	0	0	1.5E-09	6.0E-07	0	1.3E-04
RSF	0.31	2.4E-06	0.03	0	1.5E-02	9.6E-02	0	0	0	0	3.2E-15	1.0E-06	0	7.5E-04
NRSF	2.3E-02	1.1E-03	0.22	0	7.4E-02	0.38	0	0	0	0	1.5E-12	4.8E-04	0	2.4E-04
PERM	1.4	3.7E-03	0.11	0	0.38	0.39	0	0	0	0	-2.7E-08	1.6E-03	0	4.2E-03
PERE	1.8	7.4E-04	0.12	0	0.28	0.45	0	0	0	0	8.0E-04	3.3E-04	0	2.1E-03
PERT	3.5	4.4E-03	0.27	0	0.74	0.94	0	0	0	0	8.0E-04	1.9E-03	0	7.1E-03
PENRM	1.9	0.58	2.4	0	0.50	4.4	0	0	0	0	4.0E-07	3.7E-02	0	1.3E-02
PENRE	27	0.98	3.0	0	2.5	9.0	0	0	0	0	2.6E-05	6.3E-02	0	3.6E-02
PENRT	29	1.6	5	0	3.0	13	0	0	0	0	2.6E-05	0.10	0	5.0E-02
Outputs														
HWD	9.0E-04	3.3E-04	4.8E02	0	3.5E-04	8.1E-02	0	0	0	0	1.2E-10	1.2E-05	0	6.3E-06
NHWD	2.1E-02	2.9E-03	9.6E02	0	3.6E-02	0.26	0	0	0	0	2.0E-08	9.6E-05	0	3.8E-04
RWD	1.1E-15	1.3E-31	3.6E17	0	7.9E-18	9.1E-17	0	0	0	0	1.6E-40	6.4E-32	0	8.0E-20
CRU	3.0E-05	1.0E-05	1.5E06	0	1.3E-08	1.5E-06	0	0	0	0	1.0E-05	1.0E-05	0	1.4E-10
MFR	3.3E-02	8.9E-06	3.5E02	0	2.8E-02	0.11	0	0	0	0	3.6E-08	3.9E-06	0	5.0E-02
MFE	7.1E-04	3.4E-07	7.1E05	0	1.2E-05	2.2E-04	0	0	0	0	4.7E-16	1.5E-07	0	1.5E-07
EEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4b Module D 20mm Colour Counter Tile Impact & Inventory Results/kg Functional Unit

Modules	D1	D2	D3
Results	Reuse	Recovery	Recycling
Impacts			
Climate Change biogenic	9.8E-02	-4.8E-03	2.8E-02
Climate Change luluc	2.7E-04	2.1E-05	1.5E-04
Climate Change fossil	-1.8	0.28	0.13
Climate Change total	-1.7	0.27	0.15
Stratospheric Ozone Depletion	-5.4E-08	-4.0E-10	-1.4E-09
Photochemical Ozone Creation	-5.2E-03	9.4E-04	8.1E-04
Acidification Potential	-3.1E-03	9.3E-04	6.3E-04
Eutrophication Freshwater	1.9E-06	2.4E-06	2.1E-06
Eutrophication Marine	-9.8E-04	8.3E-05	2.9E-05
Eutrophication Terrestrial	-2.2E-03	4.6E-04	4.1E-04
Mineral and Metal Depletion	-8.8E-04	1.8E-06	-5.1E-04
Fossil Depletion	-1.2	0.11	0.14
Water Scarcity Depletion	-8.5E-04	4.8E-04	-2.8E-03
Inputs			
Net Fresh Water Use	-5.2E-03	2.9E-03	-1.7E-02
Secondary Material	-2.4E-02	6.6E-03	-5.7E-03
Secondary Renewable Fuel	-0.27	3.0E-02	1.6E-02
Primary Renewable Material	0.19	0.21	0.14
Primary Energy Renewable Not Feedstock	-1.3	0.11	-0.26
Primary Energy Renewable Total	-1.6	0.11	-0.15
Secondary Non-renewable Fuel	-3.1	0.25	-0.45
Primary Energy Non-renewable Material	-0.10	1.7	1.8
Primary Non-renewable Energy Not Feedstock	-23	2.0	0.47
Primary Energy Non-renewable Total	-23	3.70	2.3
Outputs			
Hazardous Waste Disposed	4.4E-02	4.5E-02	4.5E-02
Non-hazardous Waste Disposed	6.9E-02	8.9E-02	5.7E-02
Radioactive Waste Disposed	-1.1E-15	-3.5E-17	-4.2E-17
Components For Reuse	-3.9E-05	-1.1E-05	-1.4E-06
Material For Recycling	1.8E-03	3.4E-02	7.5E-03
Material For Energy Recovery	-6.0E-04	6.7E-05	5.6E-05
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Interpretation

This section interprets key results. Table 5 lists component share % mass/kg Cradle to Gate (C₂Gate). The major component in both white and coloured body tiles is Feldspar mineral used as a flux to bind all mineral particles lowering porosity. On firing it melts to a vitrified glass matrix increasing finished mechanical strength and density. Clays comprising 29% of white and 39% of coloured body tiles provide green binder strength, plasticity and shaping structure before firing then form a stable matrix in kiln vitrification.

For making white body tiles, highly refractory Kaolin with white fired color is a key structural component during green shaping, drying and high-temperature kiln firing. The 5.7% Talc containing magnesias and silica fluxes and stabilizers reduces vitrification melting point and moisture expansion and increasing mechanical strength. Wollastonite 4.8%, a white flux lowers firing temperature and shrinkage and acts a structural reinforcer improving green and fired strength of tile bodies and glaze. Home scrap makes up 5% of components. Alumina provides high temperature, refractoriness, hardness, wear, corrosion resistance and electrical insulation. Zircon improves surface strength, chemical and crazing resistance and glaze opacity.

Table 5 Components Mass %/kg Tile Body Hue C₂Gate

Components	Chemical formulae types	White %	Colour %
Feldspar	7:2:1 SiO ₂ :18:Al ₂ O ₃ :Na ₂ O +<3% K ₂ O, CaO, TiO ₂ & Fe ₂ O ₃	48	62
Clay 1	SiO ₂ & Al ₂ O ₃ + Fe ₂ O ₃ , FeO, K ₂ O, Na ₂ O, CaO, MgO	0	20
Clay 2	SiO ₂ & Al ₂ O ₃ +K ₂ O, Na ₂ O, CaO, MgO	11	19
Clay Kaolin	Al ₂ Si ₂ O ₅ (OH) ₄	18	0
Talc	Mg ₃ Si ₄ O ₁₀ (OH) ₂	5.7	0
Wollastonite	CaSiO ₃	4.8	0
Alumina	Al ₂ O ₃	3.8	0
Zircon	ZrSiO ₄	2.9	0
Home Scrap	Grog mix of these components	5.0	0

Table 6 lists gross embodied energy types in the product cradle to gate. For both colours, gross energy converted comprised 90% fossil sources and 10% renewable feedstock material. Of total energy converted (mostly burnt) fossil sources comprised 94% and 6% renewable. Feedstock energy retained for white bodied tile was 39% biomass and 61% fossil matter, in colour ones 42% biomass and 58% fossil matter.

Table 6 Gross Embodied Energy EE MJ/kg Tile Body Hue C₂Gate

	White	Colour
Fuel & Feedstock Types	MJncv	MJncv
Fossil Energy	29	27
Fossil Feedstock	2.2	1.9
Renewable Energy	1.9	1.8
Biomass Feedstock	1.4	1.4

No biogenic carbon was in the product but at 64% of total packaging total its GWP_{BIO} impact was -0.40kg kg CO_{2eq}. Figure 3 charts greenhouse effect forcing Global Warming Potential (GWP) in CO_{2eq} 100yr for each body hue/kg tile cradle to gate. It shows most GWP emissions from Modules A1 to A3. Figure 4 charts gross Potential Photochemical Ozone Creation (POCP), Acidification (AP) Marine Eutrophication (EPm) /kg cradle to gate. It shows all air emission trends associated with body hue and module. All 3, mainly from kiln fuel use, are all highest in A1-and least in D1.

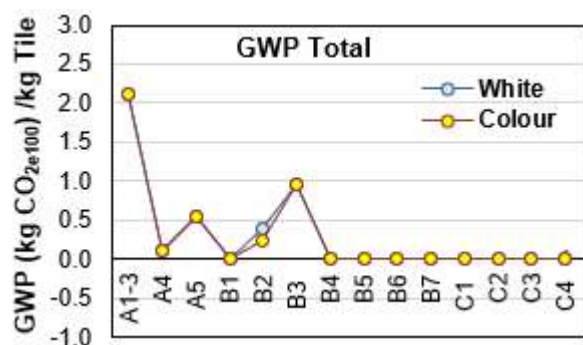


Figure 3 A1-C4GWP /kg C₂Gate

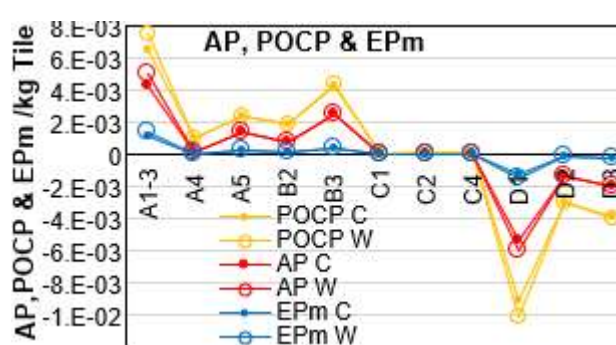


Figure 4 POCP Vs AP & EP/kg A to D3

Life Cycle Assessment Method

LCA Author	The Evah Institute is described at https://evah.institute/
Study Period	Factory data was collected from 2023 to 2026.
LCA Method	Compliant with ISO 14040 and ISO 14044 Standards
LCIA method	ReCiPe 2016 Life Cycle Impact Assessment (LCIA)
LCI Database	EvahLCI ₂₀₂₆
LCIA Software	LCADesign ₂₀₂₆
Scope	Cradle to fate including all supply chain phases and stages depicted in Figure 1.
Phases	The LCA covered all known flows in all known stages cradle to end of life fate.
Assumptions	Use is to typical Australasian Facility Management and building industry 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.



Additional environmental impact indicators not declared are in Table a. as all such results uncertainties are high or there is limited experience with them so they shall be used with care.

Table a. Additional Impact Indicators Not Declared

Impact category	Environmental Indicator Potential	Acronym	Unit
Particulate Matter emissions	Incidence of disease due to PM Emission	PM	Disease Incidence
Ionizing radiation, human health	Human exposure efficiency relative to U ₂₃₅	IRP	kBq U235eq
Eco-toxicity of freshwater	Comparative Toxic Unit for Ecosystems	ETP-fw	CTUe
Human toxicity, cancer effects	Comparative Toxic Unit for Humans	HTP-c	CTUh
Human toxicity, non-cancer effects	Comparative Toxic Unit for Humans	HTP-nc	CTUh
Land use related impact/Soil quality	Soil quality index	(SQP)	dimensionless

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, tabled under LCA Data Quality on page 3 a pedigree matrix of uncertainty estimates to 95% confidence levels of Geometric Standard Deviation² (σ_g) is applied. No data set with $\geq 30\%$ 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 year.
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 practice.
Functional Unit	A 20 or 60 year period typical service life, use, cleaning & disposal/kg or m ² applies.
System Control	
Primary Sources	Client and supplier mills, publications, websites, specifications and manuals are used.
Other Sources	Recent IEA, GGT, SimaPro, IBIS, EcolInvent sources used & cited in the LCA reports.
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 & emissions.
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 & others is cited & in LCA reports.
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 & emissions are modelled from Earth cradles to end of life fate.
System flows	All known flows are modelled from & to air, land, water & community sources & sinks.
Capital inclusions	Natural stocks Δ , industry stockpiles Δ , 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	20 th generation study is ± 5 to 10% 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 & EcolInvent libraries.
Validity Checks	Checks are versus Plastics Europe, Bath U RICE & or Industry LCA Literature.

LCIA Methodology References

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