



Statement of Verification

BREG EN EPD No: 000744

Issue: 01

This is to verify that the Environmental Product Declaration provided by:

Cupa Pizarras

are in accordance with the requirements of:

EN 15804:2012+A2:2019

and

BRE Global Scheme Document SD207

This declaration is for:

1 m² of the CUPACLAD® 101 ventilated natural slate rainscreen cladding, installed with stainless steel screws, with an average weight of 30.97 kg/m² over 75 years

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Signed for BRE Global Limited

Hayley Thomson
Operator

13 October 2026
Date of this Issue

13 October 2026
Date of First Issue

12 October 2031
Expiry Date



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To check the validity of this statement of verification please, visit www.greenbooklive.com/check or contact us.

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Environmental Product Declaration

EPD Number: 000744

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Global Product Category Rules (PCR) for Type III EPD of Construction Products to EN 15804+A2, PN 514 Rev 3.2
Commissioner of LCA study	LCA consultant/Tool
Cupa Pizaras Regus, 52 Grosvenor Gardens London, SW1W 0AU T: +44 20 3318 4455 E: UK@cupapizaras.com W: www.cupapizaras.com/uk	María Lago Lorenzo Cupa Innovación SLU Calle Macal nº32 36213 Vigo Tool: SimaPro 10.3.0.1
Declared/Functional Unit	Applicability/Coverage
1 m ² of the CUPACLAD® 101 ventilated natural slate rainscreen cladding, installed with stainless steel screws, with an average weight of 30.97 kg/m ² over 75 years	Product Average. This EPD represents a product average of the CUPACLAD® 101 Logic, Parallel, and Random configurations, which share the same composition and manufacturing process and differ only in slate dimensions and arrangement.
EPD Type	Background database
Cradle to Grave	Ecoinvent 3.11
Demonstration of Verification	
CEN standard EN 15804 serves as the core PCR ^a	
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐ Internal ☒ External	
(Where appropriate ^b) Third party verifier: Bala Subramanian	
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)	
Comparability	

Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A2:2019. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A2:2019 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life				Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building						
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, Recovery and/or Recycling potential
☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Cupa Pizarras
La Medua s/n 32330
Sobradelo de Valdeorras (Ourense)
Spain

This is a declaration for a single product manufactured at multiple sites. The slate is extracted from different quarries located in north-western Spain (León and Ourense) and processed at production plants located near these quarries.

Construction Product:

Product Description

CUPACLAD®101, ventilated rainscreen cladding with natural slate of CUPA. CUPACLAD® offers a horizontal installation of slate, creating a modern, natural, and durable aesthetic. The system adapts to any type of architectural project, both new and renovation.

CUPACLAD®101, is a horizontal installation of slate with invisible fixing. The slate is laid horizontally and is secured with two stainless steel screws. The screw heads are covered by the slate of the upper row and remain invisible.

CUPACLAD® ventilated rainscreen cladding have been designed to adapt to any type of project, combining different fixing systems and natural slate formats.

The studied product is 1 m² of the CUPACLAD® 101 ventilated rainscreen cladding for the covering of façades, with the following characteristics: average thickness 7.6 mm, and average mass 30.97 kg/m², including the stainless-steel fixing screws. This average weight is calculated from 30.86 kg/m² of natural slate (29.39 kg/m² without waste, plus 1.47 kg/m² accounting for a 5% installation waste allowance), and 0.11 kg/m² of stainless-steel screws.



The CUPACLAD®101 system studied comprises three different kinds of systems:

- 101 Logic: the CUPACLAD®101 Logic system utilizes 40x20cm or 50x25 cm slates fitted horizontally with invisible fixings.
- 101 Parallel: CUPACLAD® 101 Parallel features 40x25 horizontally and vertically aligned slates fitted with invisible screws.
- 101 Random: CUPACLAD® 101 Random combines different slate sizes, creating a dynamic and unique design. The system features 50x25, 50x20 and 50x15 slates fitted horizontally with invisible fixings.

This EPD represents a product average of the CUPACLAD® 101 Logic, Parallel, and Random configurations, which share the same composition and manufacturing process and differ only in slate dimensions and arrangement.

Technical Information

Characteristic (unit)	CUPACLAD® 101 Logic	CUPACLAD® 101 Random	CUPACLAD® 101 Parallel	Standard
Slate dimensions (mm x mm)	400 x 200 500 x 250	500 x 250 500 x 200 500 x 150	400 x 250	EN-12326-1
Thickness (mm)	7.65 ± 25%	7.65 ± 25%	7.5 ± 25%	EN-12326-1
Density (kg/m ³)	2818		2815	EN-12326-1
Average water absorption (%)	0.17		0.16	EN-12326-1
Linear thermal expansion coefficient (°C ⁻¹)	4·10 ⁻⁶			EN 14581: 2006

Interconnection Elements	Type of Fasteners	Material	Dimensions (mm)	Installation Type
CUPACLAD® 101 Screws	Self-drilling flat head screws	Stainless steel A2	5.5 x 24 (14.5 head diameter)	Metal
CUPACLAD® 101 Screws	Self-drilling flat head screws	Stainless steel A4	5 x 42 (12 head diameter)	Wood

The technical characteristics declared above are independently verified in the BBA Agrément Certificate 18/5532 for the CUPACLAD® 101 and CUPACLAD® 201 Cladding Systems.

Three CUPACLAD® 101 installation systems



**CUPACLAD® 101
Logic**



**CUPACLAD® 101
Parallel**



**CUPACLAD® 101
Random**



Main Product Contents

CUPACLAD® 101 system utilizes slates fitted horizontally with fixings

Material/Chemical Input	%
Natural stone, slate	99.6
Stainless steel screws	0.4

Manufacturing Process

The production phase includes both quarry operations and the processing of the slate in the factory.

EXTRACTION

The extraction begins after stripping operations operations, which involve the removal of the overburden — composed of non-slate materials — using heavy machinery powered by diesel fuel and controlled explosives. Explosives are used in a controlled manner to fragment the rock during initial overburden removal and, occasionally, to assist extraction.

Once the slate veins are exposed, large slate blocks are extracted by sawing with diamond wire, which is guided through intersecting vertical and horizontal boreholes. The cutting process takes several hours and requires the use of diesel-powered machinery. The extracted blocks are then transported by diesel-powered trucks to the nearest transformation centre.

Water is used during extraction to cool the machinery and remove dust. This water is purified and reused in a closed-loop system, minimizing consumption and waste.

The unusable slate material (inert) is deposited in designated inert waste storage areas located on the mountainside and stored in on-site landfills, which will be used in the future as quarry backfill. Oils, diamond wires, and saws (hazardous/recyclable) are collected and managed by authorized waste managers.

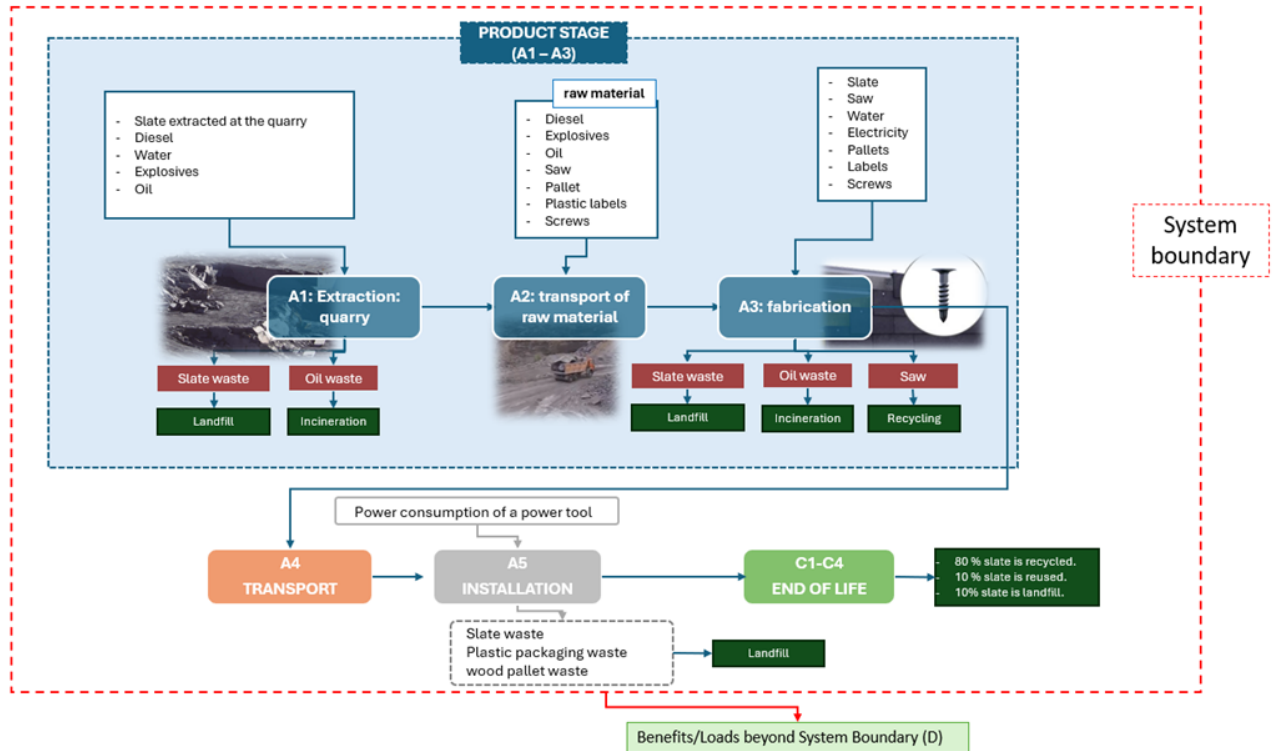
MANUFACTURING

In the factory, the slate undergoes the following stages:

- **Primary exfoliation:** The slate reaches the transformation centers in the form of slate blocks. Blocks are then divided into smaller ones, which do not exceed 30 - 35 cm in thickness, using pneumatic hammers mounted into machinery and taking advantage of the schistosity planes.
- **Sawing:** Next, the slate blocks of adequate thickness are carried by the overhead cranes or hoists toward saws with diamond blades, where they are cut into blocks, with dimensions slightly superior to the commercial sizes that are intended to be manufactured. Once the blocks have been sawn, they are deposited either in containers filled with water, of approximately 1.5 m3 to avoid drying and the consequent loss of ease of splitting, or on roller roads, to be transported directly to the working area.
- **Final exfoliation:** This stage consists of the exfoliation of the blocks to the commercial thicknesses, carrying out the work on the so-called splitting benches. First, they are divided into slabs of about 20 to 30 mm thick and then they are exfoliated to the required thickness (7.5 - 7.65 mm). Finally, workers size them according to standard forms and measures for commercialization. This operation is carried out by means of specialized scissors, guillotines, and punching machines.
- **Selection:** Once the shaping process has finished, the natural slates are subjected to final inspection and are sorted based on their quality

- Packaging: After classification, the slates are counted and placed in wooden pallets for storage and future delivery.

Process flow diagram



Construction Installation

A4. TRANSPORT

The transport of CUPACLAD®101 from the production site in northwestern Spain to the United Kingdom is carried out using a multimodal logistics system.

Approximately 37% of the cargo is transported by sea, shipped in containers from Galician ports to southeastern UK terminals, such as London Gateway or Port of Tilbury, allowing long distances to be covered efficiently.

The remaining 63% of the cargo is transported directly by truck. To cross the English Channel, trucks are loaded onto the Eurotunnel shuttle train, which enables a fast and safe passage from Coquelles (France) to Folkestone (UK). Once in the UK, the trucks continue their journey to the final point of sale.

A.5 INSTALLATION

This stage includes the installation of the external cladding, CUPACLAD®101 on the site.

The installation of the external cladding, CUPACLAD®101 is carried out by means of self-drilling screws, the latter remaining completely hidden so as not to affect the aesthetics of our facade.

The installation is performed with mechanical assistance. During this stage, the electricity consumption of a drill used for installing screws was considered.



Furthermore, the management of the waste generated on site and its transport were taken into account. The waste from this phase consists of slates broken during installation (breakage rate of 5%) and the packaging materials of the slates (polypropylene labels and wooden pallets).

Use Information

This stage is made up of B1 Use, B2 Maintenance, B3 Repair, B4 Replacement, B5 Refurbishment, B6 Use of energy in service and B7 Use of water in service.

- Use of the products in building: the environmental impacts in this module are negligible since the use of the slate cladding does not require any energy nor material consumption.
- Waste management during use: no waste derives from the slate during the use phase.
- Maintenance: under normal conditions of use, the cladding slates may require occasional inspections. replacement of plates due to damage, for example, due to extreme weather events. The impacts due to natural catastrophes are considered negligible.
- Repair: under normal conditions of use (Except extreme weather events), the slates do not require repairs during the use phase.
- Replacement: the products have a comparable long service life in building and do not require material replacement. The environmental impacts of this module are considered irrelevant.
- Rehabilitation: the products have a comparable long service life in buildings and do not require material replacement. Therefore, the environmental impacts of this module are not contemplated.

Once the installation is completed, no technical actions nor operations are required during the stages of use until end of life. Therefore, CUPA façade cladding slates have no impact at this stage.

End of Life

This stage includes the following modules: C1 Deconstruction/ demolition; C2 Transport; C3 Waste processing and C4 Final disposal.

C1. DE-CONSTRUCTION/DEMOLITION

In this phase all activities relating to the dismantling of the site are included in the dismantling of the slates, which is carried out using a drill. This demolition makes it possible to recover the parts in good condition for use on a new site. The remaining materials are considered inert, non-toxic waste, which is normally landfilled.

100% of the product waste is recovered from the demolition site and transported for further treatment (Modules C2-C4).

C2. WASTE TRANSPORTATION

This stage of the life cycle includes the transport of slates and screws after deconstruction of the site to the place of their treatment or deposit. Also, the transport of the recovered slates is included in this stage.

Transport to final disposal is by heavy truck and a distance of 30 km is considered.

C3 WASTE TREATMENT

Thanks to its high durability, slates can be removed during demolition or remain in the structure during rehabilitation or reconstruction. For this analysis, approximately 10 % of the slate is considered reusable in a new location. The end-of-waste status for reuse is achieved once the slate has been reconditioned for use in another project. This recondition includes cleaning the slate with water.

About 80 %¹, is recycled into aggregates. To reach its final waste state, this portion is coarse-crushed, allowing its reuse as recycled aggregate.

¹ BRE Global Product Category Rules (PCR) For Type III EPD of Construction Products to EN 15804+A2 PN 514 Rev 3.2 , Appendix D.



End-of-life disposal is modelled according to the scenarios defined in the BRE Global Product Category Rules (PCR) for Type III Environmental Product Declarations of Construction Products, in accordance with EN 15804+A2 PN 514 Rev 3.2, Appendix D.

C4 FINAL DISPOSAL

The waste generated is inert, non-toxic waste, which is normally deposited in landfills. It has been assumed for this study that 10 % of the material is taken to landfill and treated as inert.



Life Cycle Assessment Calculation Rules

Declared / Functional unit description

1 m² of the CUPACLAD® 101 ventilated natural slate rainscreen cladding, installed with stainless steel screws, with an average weight of 30.97 kg/m² over 75 years

System boundary

This is a cradle-to-grave Life Cycle Assessment (LCA) that covers all life cycle stages in accordance with EN 15804:2012+A2:2019 and the BRE Global Product Category Rules (PCR) for Type III EPD of Construction Products to EN 15804+A2, PN 514 Rev 3.2. It includes the extraction, transportation, and fabrication of slates (A1–A3), construction and installation (A4–A5), the use stage (B1–B7), end-of-life processes (C1–C4), and benefits and loads beyond the system boundary (Module D).

Data used in this study correspond to three manufacturing plants supplied from quarries located in León and Ourense, Spain, with results combined using a weighted average ("product average" EPD).

Secondary processes (e.g. manufacturing and maintenance of machinery, and personnel transport) are excluded from the system boundary, as they represent a very low percentage of the total environmental load, consistent with the cut-off criteria applied throughout this study.

Data sources, quality and allocation

Manufacturing data is based on specific consumption data from CUPA PIZARRAS in 2024. The data collection period for all quarry and production site data is 2024, and the results presented represent averages for this period. Generic data is obtained from Ecoinvent v.3.11. Modelling of CUPACLAD® 101 life cycle was performed using SimaPro 10.3.0.1.

There are no co-products in this study. The allocation process has been avoided as far as possible. However, when it proved necessary, the allocation of inputs and outputs to the final products was carried out in accordance with the principle of physical causality, that is, by directly attributing consumption to the products that actually generate it.

In cases where a quarry supplies several production plants, the allocation of input consumption or intermediate products (such as materials, energy, or other resources) is performed using a proportional criterion. More specifically, the total consumption of each input is distributed among the different plants according to the share of production volume destined for each one. This method enables an objective and traceable distribution of consumed resources, consistent with the principle of causality.

As this is a "product average" EPD, the results shown represent the weighted average of the three CUPACLAD® 101 configurations (Logic, Parallel, and Random). The variability of the LCIA results across these configurations is described in the section below, "Description of the variance respecting the average of the results of the LCIA", together with a summary table showing the range of results for each configuration relative to the declared average.

The main energy source during the extraction of slate is diesel, while electricity is used in the manufacturing process at CUPA PIZARRAS. Electricity data considered for the manufacturing process are based on the Spanish consumption mix, using representative datasets from ecoinvent v3.11, with a good level of temporal and technological representativeness. Therefore, the most appropriate LCA data have been used. The global warming potential (GWP) of the dataset considered is 1 kWh ES electricity = 0.203 kg CO₂ eq.

Waste generated during slate extraction is based on data provided by the company.

End-of-life disposal flows are based on the scenarios published in BRE Global Product Category Rules (PCR) for Type III EPD of Construction Products to EN 15804+A2 PN 514 Rev 3.2, Appendix D.



The LCA data quality has been assessed in accordance with EN 15804+A2, using the qualitative terminology defined in Tables E.1 and E.2 of EN 15804+A2 for time, geography, and technology representativeness.

The quality assessment of the main specific data is as follows:

- 98% of the data received an average rating of "very good."
- 2% of the data received an average rating of "good."

The quality assessment of the main generic data is as follows:

- 8% of the data received an average rating of "very good."
- 92% of the data received an average rating of "good."

No core indicator exceeds the 30% threshold for "fair" or lower data quality. No specific third-party EPD data was used in the modelling of background processes.

Cut-off criteria

All raw materials, packaging materials and consumable item inputs, and associated transport to the plant, process energy and water use are included. The production process for raw materials and energy flows that show very small amounts (<1%) are not included. This cut-off criterion has been applied consistently across all manufacturing plants and quarries considered in this study.

This study applies the "Cut-off, EN 15804+A2" system model for background ecoinvent v3.11 data, consistent with the LCA-method classification required by the BRE PCR. The characterisation factors applied correspond to the **EF 3.1** method (Environmental Footprint), as implemented in ecoinvent v3.11 / SimaPro 10.3.0.1, in line with the requirements of EN 15804:2012+A2:2019.



LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts			GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO ₂ eq	kg CO ₂ eq	kg CO ₂ eq	kg CO ₂ eq	kg CFC11 eq	mol H ⁺ eq	kg (PO ₄) ³⁻ eq
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (Consumption grid)	A1-3	3.31E+00	3.95E+00	-6.49E-01	1.60E-02	1.64E-07	1.54E-02	8.61E-05
	Total (Residual+GO)	A1-3							
Construction process stage	Transport	A4	1.54E+00	1.54E+00	8.71E-04	7.07E-05	3.46E-08	5.85E-03	2.43E-06
	Construction	A5	7.10E-01	1.00E-01	6.10E-01	9.28E-05	3.40E-09	3.02E-04	8.42E-07
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10% reused, 80% recycled add 10% landfill									
End of life	Deconstruction, demolition	C1	7.41E-02	6.99E-02	4.18E-03	9.02E-05	3.01E-09	1.62E-04	7.51E-07
	Transport	C2	6.72E-02	6.71E-02	1.56E-05	1.10E-06	1.58E-09	8.55E-05	4.29E-08
	Waste processing	C3	9.63E-03	9.29E-03	3.15E-04	2.09E-05	1.85E-10	4.38E-05	5.97E-07
	Disposal	C4	8.13E-03	8.10E-03	2.23E-05	4.97E-07	1.25E-10	7.34E-05	7.80E-09
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.20E-01	-6.11E-01	-7.88E-03	-1.79E-03	-1.78E-08	-2.83E-03	-2.22E-05

GWP-total = Global warming potential, total;
 GWP-fossil = Global warming potential, fossil;
 GWP-biogenic = Global warming potential, biogenic;
 GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
 AP = Acidification potential, accumulated exceedance; and
 EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts			EP-marine	EP-terrestrial	POCP	ADP-mineral & metal	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m ³ world eq deprived	disease incidence
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (Consumption grid)	A1-3	3.30E-03	3.90E-02	2.58E-02	2.24E-05	1.40E+02	1.57E+00	8.96E-05
	Total (Residual+GO)	A1-3							
Construction process stage	Transport	A4	1.49E-03	1.65E-02	6.73E-03	3.94E-08	2.09E+01	9.88E-03	1.99E-07
	Construction	A5	1.10E-04	1.21E-03	3.63E-04	5.00E-09	2.11E+00	-3.05E-02	3.31E-09
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10% reused, 80% recycled add 10% landfill									
End of life	Deconstruction, demolition	C1	4.29E-05	5.04E-04	1.51E-04	2.71E-09	1.84E+00	2.09E-03	6.48E-10
	Transport	C2	1.90E-05	2.07E-04	1.68E-04	1.81E-09	9.24E-01	3.02E-04	5.27E-09
	Waste processing	C3	9.79E-06	1.09E-04	3.39E-05	5.80E-10	2.03E-01	7.65E-03	3.99E-10
	Disposal	C4	3.45E-05	3.78E-04	1.13E-04	2.81E-10	1.06E-01	7.97E-05	2.15E-09
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.34E-04	-7.24E-03	-3.60E-03	-6.20E-06	-1.64E+01	-1.60E+00	-8.98E-06

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
 EP-terrestrial = Eutrophication potential, accumulated exceedance;
 POCP = Formation potential of tropospheric ozone;
 ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;

ADP-fossil = Depletion potential of the stratospheric ozone layer;
 WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
 PM = Particulate matter.

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts			IRP	ETP-fw	HTP-c	HTP-nc	SQP
			kBq U ²³⁵ eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG
	Total (Consumption grid)	A1-3	4.67E-01	1.26E+01	2.33E-09	2.41E-08	6.59E+01
	Total (Residual+GO)	A1-3					
Construction process stage	Transport	A4	5.02E-03	1.21E+00	1.62E-10	2.15E-08	6.56E-02
	Construction	A5	2.94E-02	9.90E-02	2.04E-11	1.11E-09	6.33E-01
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10% reused, 80% recycled add 10% landfill							
End of life	Deconstruction, demolition	C1	2.91E-02	3.03E-02	5.81E-12	1.54E-10	4.46E-01
	Transport	C2	8.87E-05	3.73E-02	4.47E-12	5.77E-10	1.17E-03
	Waste processing	C3	1.96E-03	1.40E-02	1.81E-12	8.63E-11	2.77E-02
	Disposal	C4	1.49E-05	3.06E-03	4.54E-13	8.87E-12	1.31E-01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-5.17E-02	-3.41E+00	-3.01E-10	-5.33E-09	-1.82E+00

IRP = Potential human exposure efficiency relative to U235;
ETP-fw = Potential comparative toxic unit for ecosystems;
HTP-c = Potential comparative toxic unit for humans;

HTP-nc = Potential comparative toxic unit for humans; and
SQP = Potential soil quality index.

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use, primary energy			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (Consumption grid)	A1-3	2.41E+01	0.00E+00	2.41E+01	1.48E+02	0.00E+00	1.48E+02
	Total (Residual+GO)	A1-3						
Construction process stage	Transport	A4	1.27E-01	0.00E+00	1.27E-01	2.22E+01	0.00E+00	2.22E+01
	Construction	A5	4.02E-01	0.00E+00	4.02E-01	2.23E+00	0.00E+00	2.23E+00
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10% reused, 80% recycled add 10% landfill								
End of life	Deconstruction, demolition	C1	3.97E-01	0.00E+00	3.97E-01	1.95E+00	0.00E+00	1.95E+00
	Transport	C2	2.30E-03	0.00E+00	2.30E-03	9.82E-01	0.00E+00	9.82E-01
	Waste processing	C3	4.07E-02	0.00E+00	4.07E-02	2.13E-01	0.00E+00	2.13E-01
	Disposal	C4	2.91E-03	0.00E+00	2.91E-03	1.13E-01	0.00E+00	1.13E-01
Potential benefits and loads beyond the system	Reuse, recovery, recycling potential	D	-1.77E+00	0.00E+00	-1.77E+00	-1.74E+01	0.00E+00	-1.74E+01

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials;
 PERM = Use of renewable primary energy resources used as raw materials;
 PERT = Total use of renewable primary energy resources;

PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
 PENRM = Use of non-renewable primary energy resources used as raw materials;
 PENRT = Total use of non-renewable primary energy resource

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m ³
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	1.98E-02
	Total (Residual+GO)	A1-3				
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	4.24E-04
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	5.61E-04
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10% reused, 80% recycled add 10% landfill						
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	4.19E-04
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	1.50E-05
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	1.85E-03
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	2.18E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-3.56E-02

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;

NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG
	Total (Consumption grid)	A1-3	6.00E-04	9.63E-02	3.20E-04
	Total (Residual+GO)	A1-3			
Construction process stage	Transport	A4	1.35E-04	8.73E-04	3.74E-06
	Construction	A5	6.72E-06	1.69E+00	1.34E-05
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00
10% reused, 80% recycled add 10% landfill					
End of life	Deconstruction, demolition	C1	5.02E-06	1.70E-04	1.32E-05
	Transport	C2	6.14E-06	3.06E-05	5.57E-08
	Waste processing	C3	5.28E-07	9.47E-05	1.31E-06
	Disposal	C4	7.24E-07	3.08E+00	8.12E-09
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-6.30E-05	-2.16E-02	-3.36E-05

HWD = Hazardous waste disposed;
 NHWD = Non-hazardous waste disposed;
 RWD = Radioactive waste disposed

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing output flows – at end of life								
			CRU	MFR	MER	EE	Biogenic carbon (product) ²	Biogenic carbon (packaging) ²
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Residual+GO)	A1-3						
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use stage	Use	B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Maintenance	B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Repair	B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Replacement	B4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Refurbishment	B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational energy use	B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Operational water use	B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10% reused, 80% recycled add 10% landfill								
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	2.94	23.60	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

² The mass of biogenic carbon content materials in the product and packaging is less than 5% of the total mass of the product; in accordance with EN 15804+A2, this value is reported as 0.

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	In this Life Cycle Assessment (LCA), the transport of slate and screw from the production site in northwestern Spain to the United Kingdom has been modelled using a combination of maritime and land transport: - 37% maritime transport - 63% land transport		
	Fuel type / Vehicle type	Litre of fuel type per distance or vehicle type	Lorry, > 32 metric tonne
	Distance:	km	1100 km by sea 1860 km by road
	Capacity utilisation (incl. empty returns)	%	Loading rate of approximately 100% by weight on delivery – zero percentage of empty return journeys, as journeys are always made with a full load.
	Bulk density of transported products	kg/m ³	2800
A5 – Installation in the building	The installation of the external cladding, CUPACLAD®101 is carried out by means of self-drilling screws. The installation is done with mechanical assistance. The waste from this stage consists of the slates broken during installation (5 %) and the packaging products of the slates (polypropylene labels and wood pallet).		
	Power consumption of a drill	kWh/m ²	0.26
	Packaging residues: Wood	Kg/m ²	0.62
	Packaging residues: Polypropylene label	Kg/m ²	0.0062
	Slate waste materials from installation wastage	Kg/m ²	1.47
B2 – Maintenance	No maintenance required		
B3 – Repair	No repair process required		
B4 – Replacement	No replacement considerations required		
B5 – Refurbishment	No refurbishment process required		
Reference service life	CUPACLAD® 101 is made of natural slate, which is a durable material, it can last up to 75 years. The determination of the Reference Service Life (RSL) of the evaluated material is based on the results obtained from tests conducted in accordance with ASTM C406.		
B6 – Use of energy; B7 – Use of water	The environmental impacts in this module are negligible since the use of natural slate as a cladding material for façades does not require any consumption of energy or water.		

Scenarios and additional technical information

Scenario	Parameter	Units	Results
C1 to C4 End of life,	The deconstruction of CUPACLAD® 101 external cladding is carried out with a drill. The power consumption of using the drill has been considered in this stage (C1). 100% of the product waste is recovered from the demolition site and transported for further treatment. Distance from the dismantling site to a disposal site will be no more than 30 km. The transport mode is a 13-32 lorry. Thanks to its high durability, slates can be removed during demolition or remain in the structure during rehabilitation or reconstruction. For this analysis, approximately 10 % of the slate is considered reusable in a new location. The end-of-waste status for reuse is achieved once the slate has been reconditioned for use in another project. This recondition includes cleaning the slate with water. About 80% is recycled into aggregates. To reach its final waste state, this portion is coarse-crushed, allowing its reuse as recycled aggregate. Stainless steel screw (0.11 kg/m²) are assumed to be collected and recycled, consistent with published industry data. According to a global life cycle study by Team Stainless/ISSF (The Global Life Cycle of Stainless Steels), stainless steel used in the building and infrastructure sector has an 85% end-of-life recycling rate. This rate has been applied to the screws in Module C3, with the remaining 15% assumed to go to landfill in Module C4. The waste generated is inert, non-toxic waste, which is normally deposited in landfills. It has been assumed for this study that 10 % of the material is taken to landfill and treated as inert End-of-life disposal is modelled according to the scenarios defined in the BRE Global Product Category Rules (PCR) for Type III Environmental Product Declarations of Construction Products, in accordance with EN 15804+A2 PN 514 Rev 3.2, Appendix D.		
	C1: Power consumption of a drill	kWh/m ²	0.26
	C2: Transport to final disposal	30	km
	C4: Disposal	Slate from demolition to landfill	%
	C4: Disposal	Screw from demolition to landfill	%
	C3 – Waste processing	Slate from demolition to recycling	%
C3 – Waste processing	Screw from demolition to recycling	%	80
C3 – Waste processing	Screw from demolition to recycling	%	85
C3 – Waste processing	Slate from demolition to reuse	%	10



Scenarios and additional technical information

Scenario	Parameter	Units	Results
Module D	Module D reports the existence of environmental loads and impacts outside the system boundaries due to the reuse and recycling of some of the system's output streams. Module D reports on 'potential' benefit –not the actual or ultimate benefits. The net impacts resulting from counting the impacts of the reuse process and subtracting the production impacts of the materials substituted for the reused materials, considering the difference in quality between the primary and secondary material, are reported. Module D covers the net benefits and loads arising from the reuse of the slate from end-of-waste state materials resulting from the end-of-life stage (C1 – C4). For this study, it is assumed that 10% of the slates are reused, replacing virgin slates and thereby avoiding energy consumption, emissions, and resource use. In addition, 80% of the slates are recycled as aggregate, preventing the production of an equivalent amount of natural aggregates. Furthermore, it is assumed that 85% of the steel used in the screw is recycled, thereby reducing the demand for virgin steel and avoiding the associated energy consumption, emissions, and depletion of natural resources.		
	Products Recycled Content (post consumer)	Kg	0.0605
	Recovered for recycling	Kg	23.60
	Recovered for re-use	Kg	2.94
	Recovered for energy	Kg	0

Summary, comments and additional information

Results interpretation

The majority of environmental impacts and primary energy demand are associated with the production phase, as defined in modules A1–A3, along with transportation module A4, according to EN 15804+A2. Within the production phase, the main contributors to environmental impacts are electricity, the screw, and the production of slate blocks, which represent the most significant inputs in the manufacturing process. In the extraction stage of slate blocks, diesel is identified as the most significant input contributing to environmental impacts.

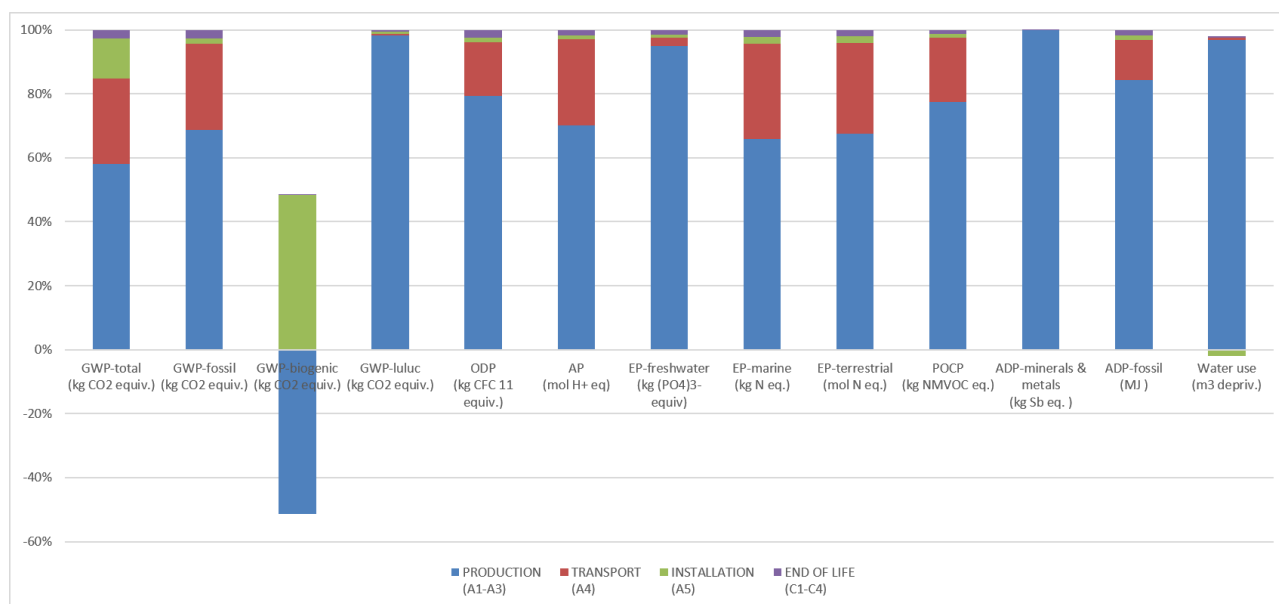


Figure 1. CUPACLAD®101 System Life Cycle Assessment Results.

Description of the variance respecting the average of the results of the LCIA

For the functional unit, a representative average of the different CUPACLAD® 101, Logic, Parallel, and Random models is used, taking into account their varying dimensions.

CUPACLAD®101									
Configuration	A	B	C	D	E	$F=A*B*C*D *E$	$G=F*1.05$	H	$I=G+H$
	Density of Slate (kg/m ³)	Length (m)	Width (m)	Thickness (m)	Number slate/m ²	Weight kg/m ²	Weight including material wastage (5%) (kg/m ²)	Mass screws (kg/m ²)	Total Weight (kg/m ²)
LOGIC	2800	0.4	0.2	0.00765	16.7	28.62	30.05	0.11	30.16
	2800	0.5	0.25	0.00765	10	26.78	28.11	0.11	28.22
PARALLEL	2800	0.25	0.4	0.0075	14.3	30.03	31.53	0.11	31.64
RANDOM	2800	0.2	0.5	0.00765	3	32.13	33.74	0.11	33.85
	2800	0.15	0.5	0.00765	6				
	2800	0.25	0.5	0.00765	6				
AVERAGE						29.39	30.86	0.11	30.97

Next, the variance of the results in the main indicators of the different sizes with respect to the average considered is shown in the table below:

Impact Category	Unit	30.16 kg/m ²	28.22 kg/m ²	31.64 kg/m ²	33.85 kg/m ²	30.97 kg/m ²
		Logic 40x20	Logic 50x25	Parallel 25x40	Random	Average
Climate change	kg CO ₂ eq	5.59E+00	5.28E+00	5.82E+00	6.17E+00	5.72E+00
Climate change - Fossil	kg CO ₂ eq	5.61E+00	5.30E+00	5.84E+00	6.20E+00	5.74E+00
Climate change - Biogenic	kg CO ₂ eq	-3.27E-02	-2.89E-02	-3.56E-02	-4.00E-02	-3.43E-02
Climate change - Land use and LU change	kg CO ₂ eq	1.59E-02	1.49E-02	1.66E-02	1.77E-02	1.63E-02
Ozone depletion	kg CFC11 eq	2.02E-07	1.90E-07	2.11E-07	2.25E-07	2.07E-07
Acidification	mol H ⁺ eq	2.14E-02	2.02E-02	2.23E-02	2.36E-02	2.19E-02
Eutrophication, freshwater	kg P eq	8.96E-05	8.68E-05	9.17E-05	9.49E-05	9.08E-05
Eutrophication, marine	kg (PO ₄) ³⁻ eq	4.89E-03	4.62E-03	5.10E-03	5.41E-03	5.00E-03
Eutrophication, terrestrial	mol N eq	5.66E-02	5.34E-02	5.90E-02	6.26E-02	5.79E-02
Photochemical ozone formation	kg NMVOC eq	3.25E-02	3.06E-02	3.40E-02	3.62E-02	3.34E-02
Resource use, minerals and metals	kg Sb eq	2.21E-05	2.13E-05	2.27E-05	2.36E-05	2.24E-05
Resource use, fossils	MJ	1.62E+02	1.52E+02	1.69E+02	1.80E+02	1.66E+02
Water use	m ³ depriv.	1.52E+00	1.43E+00	1.59E+00	1.68E+00	1.56E+00
Particulate matter	disease inc.	8.75E-05	8.18E-05	9.18E-05	9.82E-05	8.98E-05
Ionising radiation	kBq U-235 eq	5.20E-01	4.92E-01	5.42E-01	5.74E-01	5.32E-01
Ecotoxicity, freshwater	CTUe	1.38E+01	1.33E+01	1.41E+01	1.47E+01	1.40E+01
Human toxicity, cancer	CTUh	2.48E-09	2.37E-09	2.56E-09	2.69E-09	2.52E-09
Human toxicity, non-cancer	CTUh	4.66E-08	4.42E-08	4.84E-08	5.10E-08	4.75E-08
Land use	Pt	6.55E+01	6.15E+01	6.87E+01	7.33E+01	6.72E+01



References

BSI. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. BS EN 15804:2012+A2:2019. London, BSI, 2019.

BSI. Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. BS EN ISO 14025:2010 (exactly identical to ISO 14025:2006). London, BSI, 2010.

BSI. Environmental management – Life cycle assessment – Principles and framework. BS EN ISO 14040:2006. London, BSI, 2006.

BSI. Environmental management – Life cycle assessment – requirements and guidelines. BS EN ISO 14044:2006. London, BSI, 2006.

BRE Global Methodology for the environmental assessment of Buildings using EN 15978:2011. PN 326 Rev0.0

Dr Jo Mundy. The Green Guide Explained. BRE Centre for sustainable Products. March 2015.

J A Walsh. La durabilité des ardoises de couverture Heavy 3 de San Pedro de Trones, Ourense, Espagne. Mars 2007, 18 pages.

Declaration of performance Slate Cupa 12. February 9, 2022

Installation Manual. Cupa Pizarras. <https://www.cupapizarras.com/uk/resource-centre/documentation/>

'EeBGuide – Operational guidance for Life Cycle Assessment Studies of the Energy-Efficient Buildings Initiative' <https://www.eebguide.eu/?p=4404>

UNE EN 12326-1:2015: Slate and stone for discontinuous roofing and external cladding - Part 1: Specification for slate and carbonated slate

Slate and stone for discontinuous roofing and external cladding - Part 1: Specifications for slate and carbonate slate. UNE-EN 12326-1:2015

Life Cycle Inventories of Building Products. Data V2.0 (2007). Ecoinvent report No.7 pag 731

Standard Specification for Roofing Slate, ASTM C406