

Environmental Product Declaration (EPD)

Dry-pressed glazed ceramic tiles - WALL TILES



In accordance with EN 15804:2012+A2:2019+ AC

Os resultados apresentados neste trabalho referem-se apenas às amostras ensaiadas. Não se assume qualquer responsabilidade relativa à exactidão da amostragem, a menos que seja efectuada sob a directa responsabilidade do CTCV. A reprodução deste trabalho é autorizada apenas na sua forma integral. Para qualquer reprodução parcial será indispensável autorização do CTCV por escrito.

Information

This environmental product declaration has been produced by the Technological Center of Ceramics and Glass (in Portuguese “Centro Tecnológico da Cerâmica e do Vidro” – CTCV) at the request of CERTECA – Indústrias Cerâmicas, S.A and Ceragni, Lda. The information contained in this EPD, related to the product dry-pressed glazed ceramic tiles, wall tiles, pressed in white paste, with water absorption $E_b > 10\%$ for internal walls, is provided under the responsibility of CTCV and Ceragni and CERTECA, in accordance with the norm EN 15804:2012+A2:2019+AC.

Any use, in whole or in part, of the information provided in this document must at least be accompanied by a complete reference to the original Environmental Product Declaration (EPD) as well as its producer, who may provide a complete copy.

The standard EN 15804:2012+A2:2019+AC serves as the Product Category Definition Rule (CPR).

In addition, the CPR for the construction products and services (version 2.2) of the DAPHabitat System and EN 17160:2019 - Product category rules for ceramic tiles was also consulted.

Reading Guide

Display Rules

The following display rules are used:

- Values are expressed according to the following scientific notation: $0,0123=1,23 \times 10^{-2}=1,23E-02$;
- For a null result, the value zero is represented;
- All values are expressed with two significant digits.

Abbreviations Used

- LCA: Life Cycle Analysis
- CTCV: Technological Center of Ceramics and Glass
- EPD: Environmental Product Declaration
- VUR: Reference Lifetime
- LCV/LHV: Lower calorific value
- DU: Declared Unit
- FU: Functional Unit

Precautions for using the EPD for product comparison

EDPs of construction products may not be comparable if they do not comply with the standard EN 15804+A2:2019+AC.

EN 15804+A2:2019+AC defines in point 5.3 – Comparability of EPD for construction products, the conditions under which construction products may be compared based on information provided by the EPD:

“Comparison of the environmental performance of construction products using EPD information shall be based on the product’s use in and its impacts on the building, and shall consider the complete life cycle (all information modules).”

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1 General information

1.1 Name and address of issuer and manufacturer

This environmental product declaration was prepared by the Technological Center of Ceramics and Glass (CTCV) at the request of Ceragni, Lda (owner) and CERTECA – Indústrias Cerâmicas, S.A. and relatively to dry-pressed glazed ceramic tiles, wall tiles (BIII). The information contained here is provided under the responsibility of CTCV and Ceragni and CERTECA, in accordance with the standard EN 15804:2012+A2:2019+AC. (PCR for construction products).

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Local of production 1: Ceragni, Lda

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Local of production 2: CERTECA – Indústrias Cerâmicas, S.A.

Address of the local of production 2: Estrada Nacional 1 IC2 - Km 219, 45, Malaposta, 3780-294 Anadia

1.2 Company

Ceragni and CERTECA from the same group that are company dedicated to the production of ceramic materials, namely ceramic floors, and wall coverings.

1.3 EPD type

This EPD is an average statement that describes the life cycle of dry-pressed glazed wall ceramic tiles (BIII), manufactured in a single production site and marketed by Ceragni, Lda and CERTECA – Indústrias Cerâmica, S.A.

This is a EDP from Cradle to Grave with module D, with the aim of contributing to the promotion of sustainable construction.

The data presented in this statement are the result of a life cycle assessment study, carried out with production data provided by the company Ceragni and Certecca, with the aim of determining the environmental impacts associated with dry-pressed glazed wall ceramic tiles produced at the industrial unit, under the form of Environmental Product Declaration (self-declaration).

The data used to obtain this declaration refer to the year 2022 (these data were also compared with the 2021 data, in order to validate the quality of the data).

1.4 Date of publication

December 2023.

1.5 Verification

This EPD is voluntary and has not been subject to verification by third parties and is intended to provide interested parties with environmental information regarding the dry-pressed glazed wall ceramic tiles, marketed and produced by Ceragni, Lda and CERTECA – Indústrias Cerâmicas, S.A.

2 Product description

2.1 Declared unit and functional unit

Considering the previous considerations and that this EPD from cradle to grave and module D, the functional unit used is **1 m² of dry-pressed glazed wall ceramic tiles**, to calculate the environmental impact of the product.

2.2 Product

The tiles from Certeca are used for interior cladding in residential, commercial, and public spaces.



Figure 1 – Examples of some ceramic wall tiles manufactured by Certeca.

This EPD is an average of the dry-pressed glazed ceramic wall tiles produced and marketed by the company Ceragni and CERTECA, with the properties of the products presented in the table below (Table 1).

The dry-pressed glazed ceramic tiles are pressed in white paste, with water absorption $E_b > 10\%$ for internal walls.

Table 1 – Dry-pressed glazed ceramic tiles properties from CERTECA.

Technical Data	Testing Standard	Norm Requirement	Certeca	
Dimensional data	Sizes	± 0,5%	± 0,5%	
	Thickness		± 0.2mm%	
	Straightness	EN ISO 10545-2	± 0,3%	± 0,2%
	Squareness		± 0,5%	± 0,3%
	Flatness		± 0,5%	-0,3/0.5%
Water absorption	EN ISO 10545-3	>10%	14...19%	

Modulus of rupture		EN ISO 10545-4	(<7,5mm) ≥ 12N/mm ² (≥7,5mm) ≥ 15N/mm ²	(<7,5mm) ≥ 16N/mm ² (≥7,5mm) ≥ 16N/mm ²
Breaking strength		EN ISO 10545-4	(<7,5mm) ≥ 200N (≥7,5mm) ≥ 600N	(<7,5mm) > 300N (≥7,5mm) > 600N
Crasing resistance		EN ISO 10545-11	Required	Resistance
Resistance to acids and alkalis	Low concentration	EN ISO 10545-13	min. LB	Guaranteed
Resistance to household chemicals		EN ISO 10545-13	min. LB	Guaranteed
Stain resistance		EN ISO 10545-14	Mín. class 3	Class 5

Os resultados apresentados neste trabalho referem-se apenas às amostras ensaiadas. Não se assume qualquer responsabilidade relativa à exactidão da amostragem, a menos que seja efectuada sob a directa responsabilidade do CTCV. A reprodução deste trabalho é autorizada apenas na sua forma integral. Para qualquer reprodução parcial será indispensável autorização do CTCV por escrito.

2.3 Application/Intended use

The final commercialized product is primarily applied in wall covering for interiors.

2.4 Main components of the product and/or materials

<i>Raw material</i>	<i>Percentage</i>
Suporte cerâmico	> 95%
Vidrado (decoreção)	< 5%
<i>Packaging</i>	<i>Percentage</i>
wooden pallets	73
card boxes	22
plastics	5

2.5 Substances on the REACH candidate list (if greater than 0.1% by mass)

The product does not contain any REACH candidate substance of very high concern candidate substances greater than 0.1% by mass.

3 Life cycle Stages

This EPD analyses and evaluates the life cycle of the product from cradle-to-gate with module D, that is, it comprises modules A1 to A3, A4-A5, B, C and D, defined in EN 15804+A2:2019 + AC.

3.1 Production stage; A1 – A3

This step includes modules A1 (Extraction and processing of raw materials), A2 (Transport) and A3 (Manufacturing).

With regard to transport (module A2), the raw materials and auxiliary materials arrive at the installation by road, in trucks.

With regard to stage A3 (Manufacturing), the manufacturing process of the dy-pressed glazed ceramic wall tiles product comprises the following stages:

- Raw Material storage;
- Pressing;
- Drying;
- Glazing;
- Firing;
- Selection;
- Packaging;
- Storage;
- Sale.

Figure 1 shows the flowchart of the manufacturing production process.

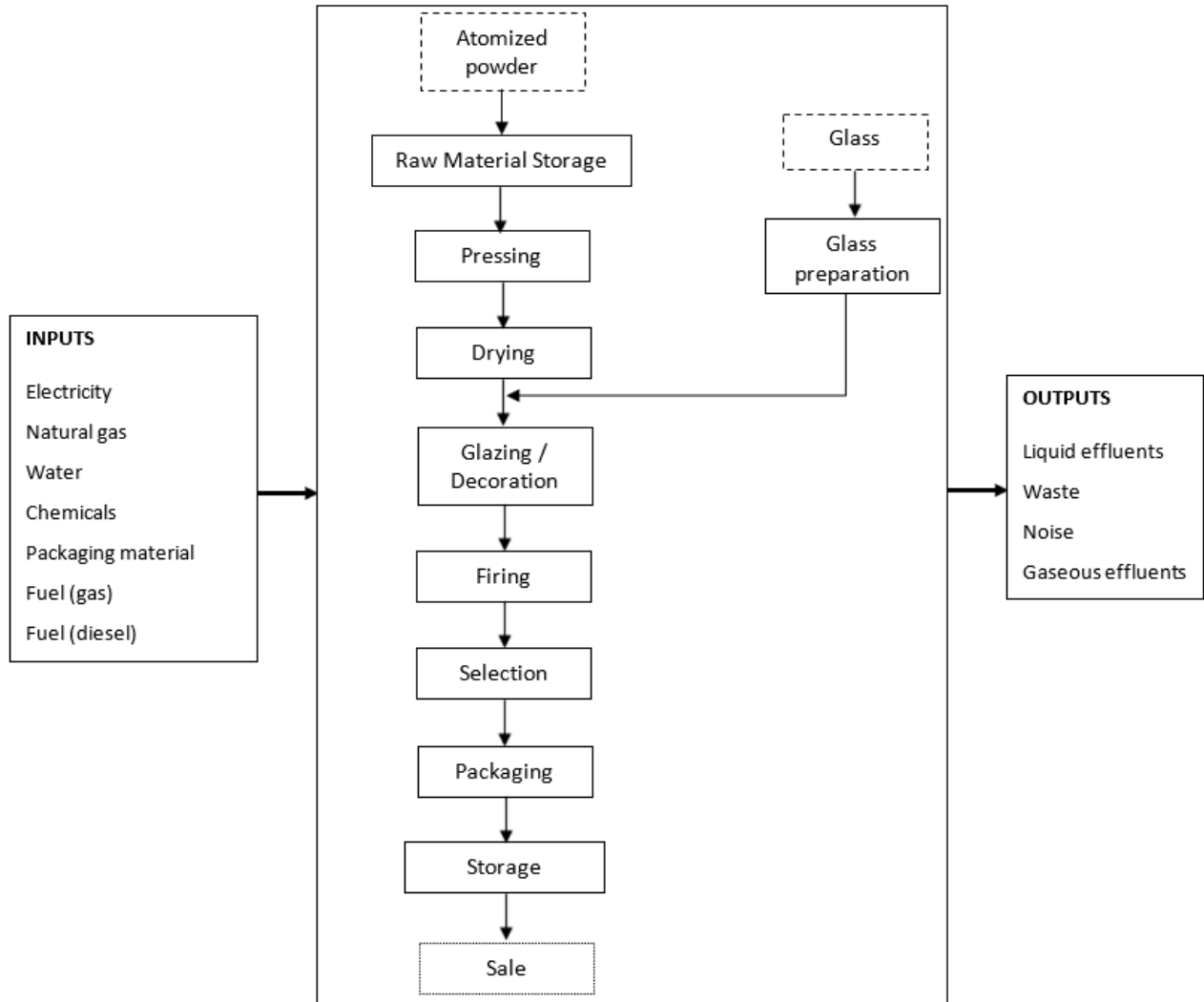


Figure 1 – Flowchart of the manufacturing production process.

The manufacturing process of this company begins with the receipt of atomized powder (floor, wall, and porcelain tiles) purchased from raw material supplier companies, which is then stored in dedicated silos.

Follows the pressing phase, which is supplied with the atomized powder acquired from external suppliers. This powder is properly stored and identified in previously defined locations.

The production process seamlessly integrates the operations of pressing, drying, and glazing in a continuous manner.

In the pressing operation it's used traditional hydraulic units, and drying is carried out in continuous dryers that use natural gas as fuel, with maximum temperatures reaching around 220°C.

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In this operation, various patterns and formats produced take shape. The glazing lines, located right after, are fed by conveyor belts, bringing to life the various patterns that make up the company's commercial range.

Depending on the characteristics of the final product, the number and type of auxiliary equipment activated along the line varies, as well as the type of applications used as surface finishes. These applications are prepared in advance in the glass and paint section. Glazed products are stored in wagons with shelves and transported to the entrance of the kilns. The thermal firing process is carried out in continuous kilns, fuelled by natural gas. Then, the material goes to the selection and packaging, with quality control processes in the selection phase.

3.2 Construction; A4 – A5

Module A4 includes transport from the place of production to the consumer or to the place where Ceragni and CERTECA products are installed. Three scenarios were considered:

- A4(1) – 300 km via road, by truck
- A4(2) – 1435 km via road, by truck
- A4(3) – 6520 km via ocean, by ship

Module A5 was considered, a scenario of 3.3 kg of cement mortar per m² of ceramic coating. The quantity of mortar was estimated based on the EN 17160:2019 standard on the rules for defining product categories for ceramic tiles (PCR for ceramic tiles).

Mortar modeling in Simapro software:

- Cement mortar {FR} | | Cut, U (Ecoinvent 3.7)»

The planned transport of the cement mortar to the structure was 50 km.

For the treatment of packaging waste, average scenarios based on EN 17160:2019 can be used.

3.3 Use stage; B1 – B7

According to EN17160, ceramic wall tiles are intrinsically inert and, therefore, do not present environmental impacts during their use to be addressed in module B1.

B2 - Throughout its useful life, the ceramic product must be cleaned regularly, to a greater or lesser extent, depending on the type of building: residential, commercial, sanitary, etc., where it is installed. If the surface is dirty or oily, cleaning agents such as detergents can be added. Therefore, you can consider the consumption of water and detergent.

According to EN 17160:2019 on Product Category Rules for ceramic tiles, we have the “Maintenance scenario for ceramic tiles”.

3.4 End of life stage; C1 – C4

The end-of-life stage comprises the following modules:

Deconstruction/demolition (C1); transportation of waste to the processing and end-of-life site (C2); waste treatment for reuse, recovery and/or recycling (C3) and disposal (C4).

The end-of-life stage is the last stage of the life cycle of a material, but it can become the first if, after demolition, recycling and reuse of waste is carried out, that is, the recovery of the material considered at end of life .

C1. Demolition process not significant (source: EN 17160).

C2. It is assumed that waste is collected and transported to the manufacturing facilities over an average distance of 500 km.

C3. 70% recycling (grinding), according to statistical data on CDW (construction and demolition waste) from the APA (Portuguese Environmental Agency).

C4. The remaining 30% is deposited in landfills.

3.5 Recycling / reuse / recovery potential; Module D

The impacts and benefits of this step were included within the system boundary and are therefore evaluated.

It was considered that 70% of the waste is used at the end of its life (conservative value), according to statistical data on CDW (construction and demolition waste) from APA (Portuguese Environmental Agency) and EN17160.

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4 Information for calculating the Life Cycle Assessment

4.1 Used PCR

This declaration is based on the norm EN 15804:2012+A2:2019+AC: Basic rules for construction product categories.

4.2 System boundaries

This EPD evaluates the life cycle of the product from cradle to grave with module D, that is, with modules A1- A3, A4-A5, B, C and D defined in EN 15804:2012+A2:2019+AC.

The System boundaries distinguish the separation between the environment and the System (ISO 14040: 2006), and their definition is fundamental to be able to identify and calculate the fluxes of mass and energy in these boundaries.

4.3 Assignments

Allocation procedures, where necessary, were based on mass.

4.4 Geographical and temporal representativeness

The data used for modelling the production process, are whenever possible based on specific Portuguese data, since it is produced in this country, or when this is not possible, European data.

The temporal representativeness is based on the data used in the Ecoinvent v3.7 database (the most recent at the date of preparation of the EPD), using the Portuguese electrical mix for the year 2022. The manufacturer's data refer to production specific data from 2022.

The dataset used to model upstream production processes and the process itself reflect the physical reality and technology used. For each process/material used in process modelling, datasets representative of the technologies used were used.

4.5 Variability of results

Not applicable, as the manufactured product represents only a single industrial unit.

5 Life Cycle Assessment Results

5.1 Environmental impacts

Results per 1 m² of ceramic covering tile, with a specific weight of 11.28 kg/m².

	Unit	A1-A3	A4			A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
			A4(1)	A4(2)	A4(3)													
Global warming potential - total; GWP-total	kg CO ₂ eq.	7,12E+00	4,57E-01	2,18E+00	6,46E-01	1,34E+00	0,00E+00	5,78E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,61E-02	3,31E-02	3,66E-02	-1,62E-02
Global warming potential - fossil; GWP-fóssil	kg CO ₂ eq.	7,71E+00	4,56E-01	2,18E+00	6,46E-01	9,04E-01	0,00E+00	5,63E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,60E-02	3,30E-02	3,65E-02	-1,52E-02
Global warming potential - biogenic; GWP-biogenic	kg CO ₂ eq.	-5,90E-01	3,65E-04	1,74E-03	4,17E-04	4,33E-01	0,00E+00	1,48E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,08E-05	2,43E-05	1,01E-04	-1,00E-03
Global warming potential - land use and land use change; GWP-luluc	kg CO ₂ eq.	9,28E-03	3,46E-06	1,66E-05	6,72E-06	3,68E-04	0,00E+00	3,36E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,77E-07	4,84E-07	8,51E-07	-8,95E-06
Depletion potential of the stratospheric ozone layer; ODP	kg CFC 11 eq.	1,32E-06	1,06E-07	5,07E-07	1,36E-07	6,62E-08	0,00E+00	6,16E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,77E-08	7,44E-09	8,21E-09	-2,82E-09
Acidification potential; AP	mol H ⁺ eq.	1,98E-02	9,00E-04	4,30E-03	2,23E-02	2,67E-03	0,00E+00	3,84E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,50E-04	3,57E-04	3,30E-04	-1,30E-04

Stage A4: Scenario A4(1) - 300 km by road (lorry); Scenario A4(2) - 1390 km by road (lorry); A4(3) – 6520 km by sea (ship) as defined in section 3.2.

Results per 1 m² of ceramic covering tile, with a specific weight of 11.28 kg/m².

	Unit	A1-A3	A4			A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
			A4(1)	A4(2)	A4(3)													
Eutrophication aquatic freshwater; EP-freshwater	kg P eq.	9,10E-05	2,49E-07	1,19E-06	3,85E-07	1,36E-05	0,00E+00	2,24E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,15E-08	2,47E-08	4,50E-08	-3,58E-07
Eutrophication aquatic marine; EP-marine	kg N eq.	5,47E-03	1,50E-04	7,18E-04	5,48E-03	7,63E-04	0,00E+00	5,18E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,50E-05	1,60E-04	1,44E-04	-5,18E-05
Eutrophication terrestrial; EP-terrestrial	kg N eq.	5,51E-02	1,67E-03	1,67E-03	6,09E-02	7,91E-03	0,00E+00	5,68E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,78E-04	1,75E-03	1,58E-03	-5,69E-04
Formation potential of tropospheric ozone; POCP	Kg COVNM eq.	2,40E-02	5,91E-04	2,83E-03	1,55E-02	2,40E-03	0,00E+00	2,50E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,85E-05	4,80E-04	4,28E-04	-1,58E-04
Abiotic depletion potential for non-fossil resources, ADP-minerals&metals	kg Sb eq.	1,34E-05	1,94E-08	9,27E-08	5,39E-09	4,21E-07	0,00E+00	2,51E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,23E-09	1,64E-09	1,77E-09	-4,35E-09
Abiotic depletion for fossil resources potential; ADP-fossil	MJ, P.C.I	9,71E+01	6,48E+00	3,10E+01	8,34E+00	6,57E+00	0,00E+00	1,94E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,08E+00	4,57E-01	5,08E-01	-3,11E-01
Water (user) deprivation potential; WDP	m ³ world eq. deprived	1,23E+00	-1,37E-03	-6,56E-03	-1,96E-03	6,41E-02	0,00E+00	1,15E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,29E-04	9,43E-05	9,44E-05	-4,67E-03

Stage A4: Scenario A4(1) - 300 km by road (lorry); Scenario A4(2) - 1435 km by road (lorry); A4(3) – 6520 km by sea (ship) as defined in section 3.2.

5.2 Additional environmental impact indicators

Results per 1 m² of ceramic covering tile, with a specific weight of 11.28 kg/m².

	Unit	A1-A3	A4			A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
			A4(1)	A4(2)	A4(3)													
Potential incidence of disease due to emissions of Particulate Matter (PM)	Disease incidence	2,36E-07	2,63E-08	1,26E-07	1,64E-08	3,09E-08	0,00E+00	3,52E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,39E-09	5,00E-08	2,55E-08	-3,44E-09
Potential Efficiency of Human Exposure in relation to U235 (IRP)	kBq U 235 eq.	1,33E-01	2,85E-02	1,36E-01	3,65E-02	2,89E-02	0,00E+00	1,67E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,75E-03	2,00E-03	2,24E-03	-3,61E-03
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	1,24E+02	2,59E+00	1,24E+01	2,67E+00	9,62E+00	0,00E+00	8,65E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,31E-01	1,53E-01	1,95E-01	-1,52E-01
Potential Comparative Toxic Unit for humans (HTP-c)	CTUh	1,27E-09	3,41E-11	1,63E-10	1,05E-10	1,47E-10	0,00E+00	1,86E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,68E-12	2,01E-12	3,94E-12	-1,17E-11
Potential Comparative Toxic Unit for humans (HTP-nc)	CTUh	3,38E-08	4,05E-09	1,94E-08	2,21E-09	5,75E-09	0,00E+00	1,87E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,75E-10	1,59E-10	2,70E-10	-1,26E-10
Potential soil quality index (SQP)	--	8,18E+01	2,06E-02	9,85E-02	2,62E-02	1,00E+01	0,00E+00	9,60E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,43E-03	1,68E-03	1,86E-01	-5,29E-01

Stage A4: Scenario A4(1) - 300 km by road (lorry); Scenario A4(2) - 1435 km by road (lorry); A4(3) – 6520 km by sea (ship) as defined in section 3.2.

5.3 Resource utilization

Results per 1 m² of ceramic covering tile, with a specific weight of 11.28 kg/m².

	Unit	A1-A3	A4			A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
			A4(1)	A4(2)	A4(3)													
EPR	MJ, PCI	1,73E+01	9,53E-03	4,56E-02	1,09E-02	1,30E+00	0,00E+00	4,37E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,59E-03	7,27E-04	9,22E-03	-1,13E-01
RR	MJ, PCI	3,87E-01	0,00E+00	0,00E+00	0,00E+00	2,19E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EPR + RR	MJ, PCI	1,77E+01	9,53E-03	4,56E-02	1,09E-02	1,51E+00	0,00E+00	4,37E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,59E-03	7,27E-04	9,22E-03	-1,13E-01
EPNR	MJ, PCI	1,06E+02	6,87E+00	3,29E+01	8,85E+00	7,04E+00	0,00E+00	2,06E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,15E+00	4,85E-01	5,45E-01	-3,24E-01
RNR	MJ, PCI	4,14E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EPRN + RNR	MJ, PCI	1,06E+02	6,87E+00	3,29E+01	8,85E+00	7,04E+00	0,00E+00	2,06E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,15E+00	4,85E-01	5,45E-01	-3,24E-01
MS	kg	3,69E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
CSR	MJ, PCI	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
CSNR	MJ, PCI	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Fresh water	m3	3,52E-02	1,45E-03	6,14E-04	1,20E-04	4,26E-03	0,00E+00	2,69E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,14E-05	1,15E-05	3,00E-05	-2,74E-03

Use of renewable primary energy excluding renewable primary energy resources used as raw materials (EPR); Use of renewable primary energy resources used as raw materials (RR); Total use of renewable primary energy resources (EPR+RR); Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials (EPNR); Use of non-renewable primary energy resources used as raw materials (RNR); Total use of non-renewable primary energy resources (EPRN + RNR); Use of secondary material (MS); Use of renewable secondary fuels (CSR); Use of non-renewable secondary fuels (CSNR); Use of the net value of fresh water

Stage A4: Scenario A4(1) - 300 km by road (lorry); Scenario A4(2) - 1435 km by road (lorry); A4(3) – 6520 km by sea (ship) as defined in section 3.2.

amostras ensaiadas. Não se assume qualquer responsabilidade relativa à exactidão da amostragem, a menos que seja efectuada sob a autorização e apenas na sua forma integral. Para qualquer reprodução parcial será indispensável autorização do CTCV por escrito.

5.4 Waste

Results per 1 m2 of ceramic covering tile, with a specific weight of 11.28 kg/m2.

	Unit	A1-A3	A4			A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
			A4(1)	A4(2)	A4(3)													
Hazardous waste disposed	kg	5,23E-04	1,72E-05	8,21E-05	4,91E-06	1,99E-05	0,00E+00	9,78E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,86E-06	1,20E-06	1,34E-06	-4,51E-07
Non-hazardous waste disposed	Kg	4,84E-01	2,71E-04	1,30E-03	3,99E-04	1,51E-01	0,00E+00	1,78E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,51E-05	2,86E-05	4,37E+00	-3,70E-04
Radioactive waste disposed	kg	1,41E-04	4,69E-05	2,25E-04	6,02E-05	2,58E-05	0,00E+00	1,54E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,82E-06	3,29E-06	3,72E-06	-2,85E-06

Stage A4: Scenario A4(1) - 300 km by road (lorry); Scenario A4(2) - 1435 km by road (lorry); A4(3) – 6520 km by sea (ship) as defined in section 3.2.

5.5 Output flows

Results per 1 m2 of ceramic covering tile, with a specific weight of 11.28 kg/m2.

	Unit	A1-A3	A4			A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
			A4(1)	A4(2)	A4(3)													
Components for reuse	kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Materials for recycling	Kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Materials for energy recovery	kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exported energy	MJ by energetic vector	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Stage A4: Scenario A4(1) - 300 km by road (lorry); Scenario A4(2) - 1435 km by road (lorry); A4(3) – 6520 km by sea (ship) as defined in section 3.2.

5.6 Information with biogenic carbon content in step A1-A3

Biogenic carbon content*	Units	Modules A1-A3 (results)
Biogenic carbon content in the product	kg C	Not applicable
Biogenic carbon content in packaging	kg C	2,5E-01
* 1 kg of biogenic carbon equals 44/12 kg of CO2 Values expressed per functional unit (1 m ²).		

6 References

- ✓ **Ecoinvent Database v3.7 (2021)** (as of www.ecoinvent.org)
- ✓ **Direção Geral de Energia e Geologia (DGEG)** - Monthly Electric Power Data (2022). (em <http://www.dgeg.gov.pt/default.aspx?cn=689170027071AAAAAAAAAAAA>)
- ✓ **Direção Geral de Energia e Geologia (DGEG)** – Energy in Portugal (2022)
- ✓ **EN 15942:2011** Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- ✓ **EN 15804:2012+A2:2019+AC** Sustainability of construction works – Environmental product declarations – Basic rules for construction product categories;
- ✓ **NP ISO 14025** Environmental labels and declarations – Type III environmental declarations – Principles and procedures;
- ✓ **Regras para a Categoria de Produto (RCP) – Modelo Base para Produtos e Serviços de Construção.** DAPHabitat System. Version 2.2. June 2022 (em www.daphabitat.pt);
- ✓ **Regras para a Categoria de Produto (RCP) – Revestimento de Paredes.** DAPHabitat System. Version 1.2. june 2022 (in www.daphabitat.pt);
- ✓ **Regras para a Categoria de Produto (RCP) – Revestimento de Pavimentos.** DAPHabitat System. Version 1.2. june 2022 (in www.daphabitat.pt);
- ✓ **Redes Energéticas Nacionais (REN)** – Information Center - Monthly Statistics (2022). (em <http://www.centrodeinformacao.ren.pt/PT/InformacaoExploracao/Paginas/EstatisticaMensal.aspx>)
- ✓ <https://www.certecca.pt>
- ✓ <https://www.ceragni.com>