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Environmental
Product
Declaration

Porcelain glazed tiles (BIII)

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Porcelánicos HDC

PORCELANICOS HDC

The holder of this Declaration is responsible for its contents and for keeping the records and the documentation that supports data and statements included during the validity period

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UNE-EN 17160: 2019 The European Standard EN 15804:2012+A2:2020 serves as the basis for CPR
Independent verification of the declaration and data in accordance with EN ISO 14025:2010 ☐ Internal ☒ External
Verification body AENOR Confía

1. General Information

1.1. The organisation

Porcelánicos HDC, S.A. is a Spanish company, dedicated to the manufacture of ceramic floor and wall tiles, in order to offer a natural product for the different architectural solutions in which it is used.
Founded on December 27, 1999. It has an area of 134,701 m2, of which 26,433 m2 are built.

1.2. Scope of the Declaration

This Environmental Product Declaration includes environmental information of a group of products manufactured in the Porcelánicos HDC Plant in a geographical and technological environment of Spain 2020.

The results shown present the environmental performance of the average porcelain glazed tiles, weighted by production, as well as the environmental data of the tiles that present a minimum and maximum impact, thus limiting the results obtained in the LCA. The scope of this Environmental Product Declaration (hereinafter DAP) is cradle to grave.

This DAP revision is issued to correct errors in the text and does not imply any change in the results

1.3. Lifecycle and compliance.

This EPD has been developed and verified in accordance with the UNE-EN ISO 14025:2010, UNE-EN 15804:2012+A2: 2020 and UNE-EN 17160:2019 (Product category rules for ceramic tiles).

PRODUCT CATEGORY RULE INFORMATION	
Descriptive title	UNE EN 1760:2019. Product Category Rules for Ceramic Tiles
Date of issue	2019
Conformity	UNE-EN 15804:2012 + A2:2020

This Environmental declaration includes the following stages of the life cycle:

Product stage	A1	Raw material supply	X
	A2	Transport to factory	X
	A3	Manufacture	X
Construction	A4	Transport to construction site	X
	A5	Installation/construction	X
Stage d use	B1	Use	X
	B2	Maintenance	X
	B3	Repair	X
	B4	Replacment	X
	B5	Refurbishment	X
	B6	Operational energy use	X
	B7	Operational water use	X
End of life	C1	Deconstruction/demolition	X
	C2	Transport	X
	C3	Waste processing	X
	C4	Waste disposal	X
	D	Potential for reuse, recovery and/or recycling	X

X = Module included in the LCA; NR = Module no relevant; MNE = Module not evaluated

This DAP may not be comparable with those developed in other Programs or according to different reference documents, in particular it may not be comparable with DAP not developed in accordance with the UNE-EN 15804+A2 Standard.

Similarly, DAPs may not be comparable if the data source is different (e.g. databases), not all relevant information modules are included, or are not based

on the same scenarios

The comparison of construction products must be done on the same function, applying the same functional unit and at the level of the building (or architectural or engineering work) i.e. including the behavior of the product throughout its life cycle, as well as the specifications of section 6.7.2 of the UNE-

2. The product

2.1. Product identification

The ceramic tiles included in this study belong to group BIII (tile classification based on the UNE-EN 14411: 2016 standard (equivalent to ISO 13006: 2018), i.e. they have a water absorption greater than 10% and their forming is by pressing. Its common name is glazed porcelain tiles.

The tiles included in this study include 4 commercial formats, with enamel, with and without mechanical treatment, of thicknesses between 8.8mm to 11.5 mm, with an average weight of 18.6 kg / m2.

33,3x90 porosa	32x89 porosa
33,3x65 porosa	25x33,3 porosa

In the annexes, you can find the results of the formats included in the scope of this EPD that present the minimum and maximum environmental impact, corresponding to the formats 25x33.3cm of 16.0 kg/m2 and 32x89cm of 19.6kg/m2 of weight in cooked respectively.

The CPC code of the product is 37370.

2.2. Product Composition

The manufacturer declares the following information on the technical specifications of the product:

Product features

Essential features	Performance	Harmonized specification
Reaction to fire1	Class A1FL/A1	EN 14411
Adhesion with cementitious adhesives type C2	>1N/mm^2	
Resistance to thermal shock	Meets	
Durability- indoor uses- outdoor uses: frost resistance	Meets	
Slide	PND	
Emission of hazardous substances- Pb-Cd	PND	
Touch properties	PND	

2.3. Product composition

The composition declared by the manufacturer is as follows:

Product composition

Composition	Content
Support (clays, feldspars, sands, etc.)	94%
Decoration materials (feldspars, carbonates, zirconium, etc.)	6%

The substances contained in the product listed in the "Candidate List of Substances of Very High Concern (SVHC) for authorisation" do not exceed 0.1% by weight of the product.

3. LCA Information

3.1. Life cycle Analysis

The LCA has been performed with the support of GaBi software 10.6.0.110 [7] and with database version 2021.2. (SP40.0) [8]) (SpheraSolutions) and ecoinvent 3.7.1 [9]. The characterization factors used are those included in the UNE EN 15804:2012+A2:2020 standard.

3.2. Declared unit

The Functional Unit considered is ***"Cover 1m^2* of a *surface (walls) of a house with ceramic tiles of group BIII for 50 years".***

3.3. Reference Service Life (RSL)

The reference service life of the product is the same as that of the building where it is installed, provided that it is installed correctly, since it is a long-lasting product that does not require replacement. It has been considered a useful life of 50 years.

Reference service life

Parameter	Unit (expressed per functional unit)
Reference service life	Minimum 50 years
Declared properties of the product (at the door), finishes, etc.	Minimum values of the relevant characteristics according to Annex L of the UNE-EN 14411 standard. For more information request technical sheets according to model.
Application design parameters (manufacturer's instructions), including references to good practices	For more information request technical sheets according to model.
Estimation of the quality of work, when installed according to the manufacturer's instructions	For more information request technical sheets according to model.
Indoor environment (for indoor applications), e.g. temperature, humidity, chemical exposure	Results of the values of the relevant characteristics according to Annex L of the UNE-EN 14411 standard. For more information, request technical sheets according to model.
Conditions of use, e.g. frequency of use, mechanical exposure	For more information, request technical sheets according to model.
Maintenance, e.g. required frequency, type and quality and replacement of replaceable components	For more information, request technical sheets according to model.

3.4. Allocation Criteria.

In accordance with the standards and PCR, whenever possible, the principle of causality has been applied when assigning inputs and outputs in processes with multiple inputs and/or outputs. Therefore, an attempt has been made to establish the physical relationship between the inputs and outputs of the system and its different products. Where this has not been possible, the criterion of mass and volume has been used.

In general, in the allocation of inputs and outputs to the declared unit, production-weighted averages have been made, both in mass and m^2, as shown below.

- To allocate to the declared unit the consumption of raw materials, water, thermal energy and electrical energy, as well as the generation of waste, and atmospheric emissions of the stage of preparation of raw materials for the support, a criterion of processed mass has been considered according to each type of ceramic tile.
- The consumption of electrical and thermal energy in the manufacturing stage of the ceramic pieces, as well as the atmospheric emissions in the combustion processes have been assigned to the declared unit considering a criterion of mass of the product classified according to each type of ceramic tile.

3.5. Cut-Off Criteria.

In this cradle-to-grave LCA study, a cut-off criterion of 1% has been applied for the use of energy (renewable and non-renewable) and 1% of the total mass in those unit processes whose data are insufficient. In total, more than 95% of all inputs and outputs of matter and energy from the system have been included, excluding those data not available or not quantified.

The excluded data are the following:

- Diffuse emissions of particles into the atmosphere generated during the transport and storage of raw materials of a powdery nature.
- Air emissions of pollutants, unregulated, emitted from piped sources of the combustion stages (drying by atomizing, drying of parts and cooking).
- The production of some auxiliary materials used in the production of tiles: grinding wheels, etc., which represent less than 0.01% of total mass. Waste treatment has not been included either.
- For atomizing and enamelling manufacturers, the production of the auxiliary materials used has not been considered. They represent a % lower than the established cut-off rule.
- The production of machinery and industrial equipment.

3.6. Representativeness, quality and selection of data

The primary data have been provided directly by the company Porcelánicos HDC located in Vilafamés (Castellón). The secondary data have been used the most updated databases of GaBi ts [8] and ecoinvent [9] and modeled with the version of GaBi 10.6.0.110. [7]. All data belong to a geographical scenario of Spain 2020.

The results presented are representative of the ceramic tiles, expressed as a weighted average for the production of ceramic tiles belonging to the range to the BIII group, limiting this average by the products that present the minimum and maximum environmental impact.

3.7. Other calculation rules and hypotheses

The assigned loads applied have been those necessary to quantify the specific data of the ceramic tile tiles, as well as the necessary calculations to be able to assign the data associated with the products that present a minimum and maximum environmental impact.

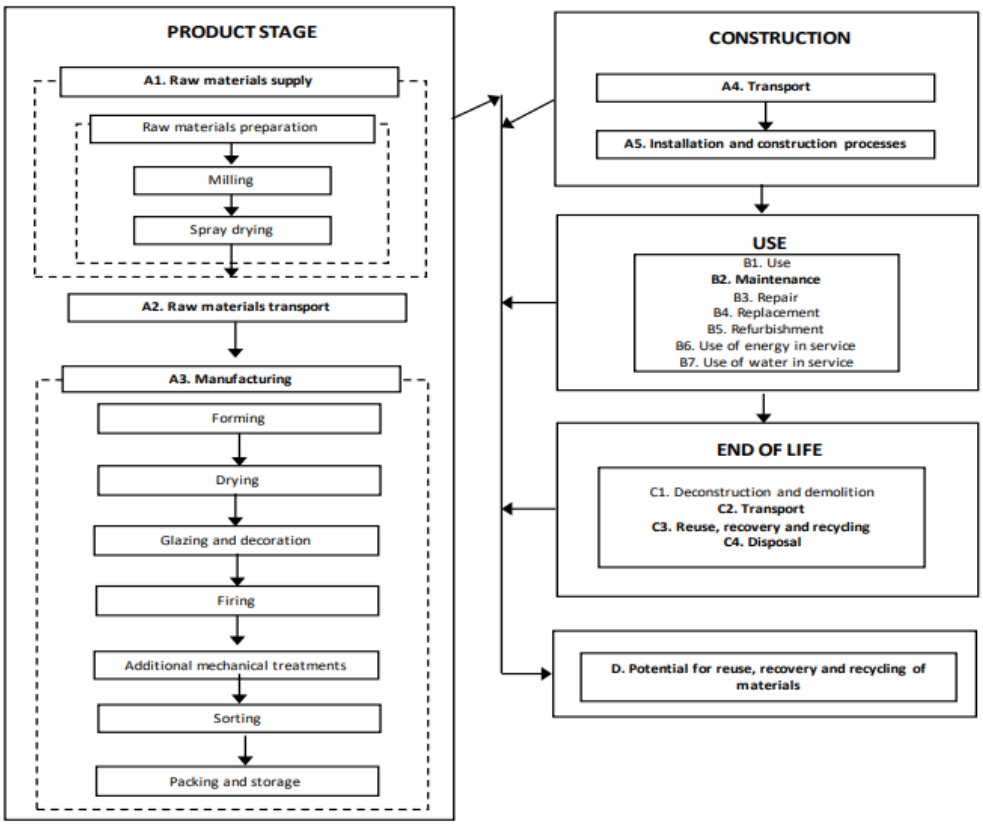
3.8. Deviations from impact outcomes

The 4 references of ceramic tiles have different environmental impacts. The following table shows the deviations that present the format of greater and lesser environmental impact with respect to the average, in relation to the product stage (A1-A3). Annex I and Annex II show the environmental impact results of the reference with minimum impact values and maximum values respectively.

Impact category	Deviation from the average scenario
GWP-total	-15%/+7%
Ap	-14%/+4%
POCP	-12%/+5%

4. System boundaries, scenarios, and additional technical information.

All life cycle modules relevant to ceramic coatings according to SPC have been included:



4.1. Pre-manufacturing processes (upstream)

Raw Materials (A1) and Transport (A2)

The raw materials necessary for the manufacture of ceramic tiles are classified as: plastic raw materials and non-plastic or degreasing raw materials. Specifically, the raw materials included in the composition of the support are clays, feldspars and sands, as well as waste from the factory itself, which can be sludge or ceramic pieces generated before the firing stage, being introduced in the milling stage of the raw materials.

As for the raw materials of enamels, the most common used in the formulation are: quartz, kaolin, borax, alkali feldspars, nepheline, calcium carbonate, dolomite, zircon, wollastonite, calcined alumina and ceramic frits.

Ceramic frits are insoluble glasses, previously prepared by complete melting of their original raw materials, called "frits". It has been estimated on average that 22% of the raw materials used in the enamels applied on porcelain stoneware tiles are subjected to the "friting" process.

The raw materials used have different origins, according to their nature and properties. The raw materials from outside Spain are transported with freighter to the port of Castellón, and from there by truck to the atomized granule production plants.
For sea transport, a type of transoceanic freighter has been chosen, whose distance traveled differs in each case depending on the origin, while for road transport a 27t cargo truck that complies with Euro 6 regulations has been chosen.

All raw materials are transported in bulk, i.e. they do not require packaging material, except decorative materials which are transported in a 17.3 t payload truck directly from the frit and enamels factory to the Porcelánicos HDC plant.

The preparation of raw materials for the support of HDC Porcelain tiles is carried out in the plants of external suppliers. In this process, the proportion of raw materials is defined and the origin of these are adjusted to the characteristics of the production process and final benefits required.

The atomized granule is obtained by wet milling of the raw materials and subsequent atomized drying. The Porcelain supplier companies have installed systems of heat and electrical energy cogeneration systems in the atomized dryers. All hot gases are used in the atomized dryer and the electrical energy generated is sold to the grid.

4.2. Manufacture of the product.

Manufacture (A3)

This process and the following treatments applied are carried out in the Porcelánicos HDC plant. The procedure is as follows: the atomized granule is unloaded into storage hoppers and through a feeding system with conveyor belts with weighing control, the granule is directed to the forming stage by unidirectional dry pressing, carried out with hydraulic or oleodynamic presses. This method is the most suitable to control the pressing cycle and thus be able to obtain large format pieces.

The formed parts are introduced in a continuous dryer to reduce their humidity, thus doubling or tripling their mechanical resistance, which allows their subsequent processing.

The pieces just out of the dryer are coated with a thin or several layers of engobe and enamel and are applied on the support by using curtain and spraying techniques. In addition, in some cases, the product is decorated using different types of applications, the majority being inkjet. This treatment is carried out to give the surface of the cooked product a series of technical and aesthetic properties, such as impermeability, ease of cleaning, gloss, color, surface texture, chemical and mechanical resistance.

Firing is the most important stage of the production process of ceramic tiles, since it is the moment in which the pieces, previously molded, undergo a fundamental modification in their properties, giving rise to a hard material, resistant to water and chemicals. The firing of the ceramic pieces is done by single firing in monostrata roller ovens.

After passing the quality control processes, the sorted parts are packed in a primary cardboard container and packed on wooden pallets, coated with LDPE film and strapping to prevent cargo movement.

4.3. Construction process

Product transport (A4)

The product is distributed 15% in Spain, 53% in Europe and 32% to the rest of the world.

For road transport, a 27 t truck classified Euro 6 (national and European transport, average distance of 300km and 1390km, respectively) has been considered. For transcontinental transport, a medium transoceanic freighter has been estimated (transport to the rest of the world, 6250 km), as indicated in UNE EN 17160.

Module A4 Transport to the construction site

Scenario information	Transport to the construction site
Parameter	Result (expressed per functional unit)
Type and fuel consumption of the vehicle	According to destinations in the distribution previously exposed: 0,342 l diesel (Euro 6 truck, 27 t) 0,036 l fuel oil (freighter)
Distance	300 km National distribution: 15% 1390 km distribution rest of Europe: 53% 6520 km distribution rest of the world: 32%
Capacity utilization (including idle return)	85% in trucks 100% freighter
Bulk density of transported products	≈1800 kg/m^3
Useful capacity factor (factor: = 1 or < 1 or ≥ 1 for products that are packaged compressed or nested)	Not applicable

Product Installation and Construction Process (A5)

Once the product is unpacked, it is installed. According to the RCP for ceramic tiles it has been established that for the installation the application of mortar is required.

Glue mortars are cementitious adhesives formed by a mixture of hydraulic binders, mineral fillers and organic additives, which only have to be mixed with water or liquid addition just before use. They are formed by a mixture of white or gray cement, mineral fillers of siliceous nature and / or limestone and organic additives: water retainers, water-redispersible polymers, rheological modifiers, fibers, etc.

The waste derived from the packaging of the pieces is managed separately depending on the geographical location of the installation site.

On the other hand, it has been considered as a hypothesis a 3% of casualties in the stage of installation of the tiles.

Module A5 - Installation

Scenario information	Unit (expressed per functional unit)
Auxiliary materials for installation (specifying each material)	3.3 kg
Water use	0.8 l
Use of other resources	Not applicable
Quantitative description of the type of energy (regional mix) and consumption during the installation process	Not applicable
Waste of materials on site before waste treatment, generated by the installation of the product	Waste ceramic parts: 557g Packaging waste: Carton: 157 g Plastic: 31g Wood: 423 g
Output of materials as a result of waste treatment on the building plot, e.g. collection for recycling, energy recovery, disposal (specified by route)	Ceramic pieces to be recycled 390g Ceramic pieces to landfill: 167g Incinerated cardboard: 1g Recycled cardboard: 156g Cardboard deposited in landfill: 0 g Incinerated plastic: 4 g Recycled plastic: 24g Landfill plastic:3g Incinerated wood: 136g Recycled wood: 280g Landfill wood 7 g
Direct emissions to ambient air, soil and water	Not applicable

4.4. Use linked to the structure of the building

B1 Usage

Once installed, the tile does not require any energy input for its use nor do they need maintenance after its commissioning, except for normal cleaning operations. For this reason, only the environmental burdens attributable to the maintenance of the product (module B2) are considered.

B2 Maintenance

Cleaning is done with a damp cloth and, if the surface has dirt or grease, cleaning agents such as detergents or bleaches can be added. In the present study, the consumption of water and disinfectant has been considered for a wall covering installed in a residential use scenario, that is, cleaning once a week with water and every two with detergent during the 50 years of useful life.

Module B2 – Maintenance

Scenario information	Unit (expressed per functional unit)
Maintenance process	According to RCP for ceramic tiles (UNE-EN17160) residential scenario for floor cleaning
Maintenance cycle	Wash 1 time a week with water and 1 every two with detergent
Auxiliary materials for maintenance (e.g. cleaning products) (specifying each material)	Detergent: 1,34E-04 kg/m^2
Material waste during maintenance (specifying type)	Not applicable
Net tap water consumption	0.1 l/m^2
Energy input during maintenance (e.g. suction cleaning), type of energy carrier (e.g. electricity) and quantity, if applicable and relevant	Not applicable

B3-B4-B5 Repair, Replacement and Refurbishment

Ceramic tiles do not require repair, replacement or refurbishment.

4.5. Use linked to the operation of the building

B6-B7 Use of energy and water for operation

These modules are not relevant for ceramic tiles.

4.6. End of life stage

C1 Deconstruction and demolition

Once its useful life has ended, the product will be removed, either as part of a rehabilitation of the building or during its demolition. In the context of the demolition of a building, the impacts attributable to the uninstallation of the product are negligible.

C2 Transport

The waste of the product is transported in a large tonnage truck (27 t) that complies with the Euro 6 standard to be managed, either by deposition in inert landfills, or recycled. An average distance of 50km from the building site to the final destination is considered. The return trip of the trucks (100% empty return) is also included.

C3 Waste management for reuse, recovery and recycling

It has been considered that 70% of tiles are recycled and/or reused, as indicated in CPR.

C4 Final elimination

It is considered that 30% of the product is sent to controlled landfill after the end of its useful life.

End of life

Parameter	Unit (expressed per functional unit)
Collection process, specified by type	25.5 kg total
	17.8 kg for recycling
Delete, specified by type	7.6 kg product or material for final disposal
Scenarios for scenario development (e.g. transport)	The waste of the product is transported in a large tonnage truck (27 t) that complies with the Euro 6 standard to be managed, either by deposition in inert landfills, or recycled. An average distance of 50km from the building site to the final destination is considered. The return trip of the trucks (100% empty return) is also included.

4.7. Benefits and loads beyond the system

Module D

The environmental load and benefits of obtaining secondary material from the waste generated at the manufacturing stage (waste such as cardboard, plastic and wood), at the installation stage (tile waste, tile packaging waste: cardboard, plastic and wood) and at the end of life of the product have been considered.

4.8. Information on biogenic carbon content

As indicated by the UNE EN 15804+A2 standard, the biogenic carbon content in the packaging can be omitted if the materials containing biogenic carbon in the packaging/product are less than 5% of the total mass of the product.

5 LCA and LCI Environmental Parameter Declaration.

The results obtained are relative expressions and do not predict impacts in endpoint categories, the exceeding of some levels, safety margins or risks.

Environmental impacts.

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	**kg_{CO2} eq**	13,5	1,1	1,6	0	7.5E-02	0	0	0	0	0	0	1,0E-01	0	1,1E-01	-1.7E-01
GWP-fossil	**kg_{CO2} eq**	13,4	1,1	1,6	0	7.5E-02	0	0	0	0	0	0	1,0E-01	0	1,1E-01	-1.7E-01
GWP-biogenic	**kg_{CO2} eq**	9.3E-02	-1,1E-03	2.7E-03	0	4,3E-04	0	0	0	0	0	0	-1.4E-04	0	1,1E-03	-4,1E-04
GWP-luluc	**kg_{CO2} eq**	5.6E-03	5,2E-03	7.6E-04	0	2,3E-06	0	0	0	0	0	0	5.7E-04	0	4.5E-04	-5.6E-04
ODP	**kg CFC11 eq**	3,8E-08	6,4E-14	1,1E-09	0	2,8E-08	0	0	0	0	0	0	6,1E-15	0	6.0E-14	-5.3E-09
Ap	**mole H+ eq**	9.6E-02	5.7E-03	5,1E-03	0	6.6E-04	0	0	0	0	0	0	8.3E-05	0	7.7E-04	-5.6E-04
EP-freshwater	**kg P eq**	1,1E-04	2,8E-06	4.9E-06	0	1,3E-06	0	0	0	0	0	0	3,1E-07	0	2,2E-06	-2.0E-06
EP-marine	**kg N eq**	1,4E-02	1,5E-03	1,1E-03	0	7.1E-05	0	0	0	0	0	0	2,3E-05	0	2,1E-04	-2.0E-04
EP-terrestrial	**mol N eq**	1,5E-01	1,7E-02	1,3E-02	0	2.7E-03	0	0	0	0	0	0	2,8E-04	0	2,3E-03	-2,2E-03
POCP	**Kg NMVOC eq**	4,2E-02	4,4E-03	3,3E-03	0	4.9E-04	0	0	0	0	0	0	7.9E-05	0	6,2E-04	-5.3E-04
ADP-minerals& metals [2]	**kg Sb eq**	7.5E-05	8.3E-08	2,3E-06	0	2,3E-09	0	0	0	0	0	0	8.6E-09	0	1,1E-08	-7.1E-08
ADP-fossil [2]	**Mj**	218,0	14,1	12,3	0	3,6E-01	0	0	0	0	0	0	1,4	0	1,4	-2,3
WDP [2]	**m^3 depriv.**	2,2	8.6E-03	1,8E-01	0	2,2	0	0	0	0	0	0	9,2E-04	0	8.0E-03	-3.7E-02

GWP - total: Global warming potential; **GWP -** fossil: Global warming potential of fossil fuels; **GWP - biogenic**: Biogenic global warming potential; **GWP - luluc** : Global warming potential of land use and land use change; **ODP**: Stratospheric ozone depletion potential; **AP:** Acidification potential, accumulated surplus; **EP-freshwater**: Eutrophication potential, fraction of nutrients reaching the final freshwater compartment; **EP-marine**: Eutrophication potential, fraction of nutrients reaching the final seawater compartment; **EP-terrestrial**: Eutrophication potential, accumulated surplus; **POCP:** Tropospheric ozone formation potential; **ADP-minerals&metals:** Potential for depletion of abiotic resources for non-fossil resources; **APD-fossil**: Abiotic resource depletion potential for fossil resources; **WDP**: Water deprivation potential (user), weighted water deprivation consumption. **NR:** Not relevant

Notice 1. This impact category deals mainly with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The potential for ionizing radiation of the soil, due to radon or some building materials is not measured in this parameter either.
Notice 2. The results of this environmental impact indicator should be used with caution since the uncertainties of the results are high and experience with this parameter is limited.

Additional environmental impact parameters

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	**Incidence of diseases**	7.0E-07	9.0E-08	5.6E-08	0	4,3E-09	0	0	0	0	0	0	5.7E-10	0	9.4E-09	-2,4E-09
IRP [1]	**kBq U235 eq**	5.8E-01	2.5E-03	5,1E-02	0	4,2E-04	0	0	0	0	0	0	2.5E-04	0	1,8E-03	-4,1E-03
ETP-fw [2]	**CTUe**	45,7	9,8	4,4	0	1,8E-01	0	0	0	0	0	0	9.5E-01	0	8.5E-01	-1,0E+00
HTP-c [2]	**CTUh**	4,1E-09	2.0E-10	2,7E-10	0	2,1E-11	0	0	0	0	0	0	1,9E-11	0	1,1E-10	-1,2E-11
HTP-nc [2]	**CTUh**	1,2E-07	1.0E-08	1,8E-08	0	5.9E-09	0	0	0	0	0	0	9.9E-10	0	1,2E-08	-1,4E-09
SQP [2]	**-**	163,0	4,3	13,4	0	71,2	0	0	0	0	0	0	4,7E-01	0	3,3E-01	-1,6

PM: Potential incidence of diseases due to emissions of particulate matter (PM); **IRP** : Human potential exposure efficiency relative to U235; **ETP-fw** : Comparative potential of toxic unit for ecosystems - freshwater; **HTP-c** : Comparative potential of toxic unit for ecosystems - carcinogenic effects; **HTP-nc** : Comparative potential of toxic unit for ecosystems - non-carcinogenic effects; **SQP** : Soil quality potential index; **NR:** Not relevant

Notice 1. This impact category deals mainly with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The potential for ionizing radiation of the soil, due to radon or some building materials is not measured in this parameter either.
Notice 2. The results of this environmental impact indicator should be used with caution since the uncertainties of the results are high and experience with this parameter is limited.

Resource usage

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	**Mj**	45,0	7,2E-01	2,9	0	1,5	0	0	0	0	0	0	7.8E-02	0	1,6E-01	-4,8
PERM	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	**Mj**	45,0	7,2E-01	2,9	0	1,5	0	0	0	0	0	0	7.8E-02	0	1,6E-01	-4,8
PENRE	**Mj**	218,0	14,1	12,3	0	3,6E-01	0	0	0	0	0	0	1,4	0	1,4	-2,3
PENRM	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	**Mj**	218,0	14,1	12,3	0	3,6E-01	0	0	0	0	0	0	1,4	0	1,4	-2,3
Sm	**kg**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fw	**m^3**	4,2E-02	8.1E-04	3.8E-03	0	2,8E-02	0	0	0	0	0	0	8.8E-05	0	2,6E-04	-2,3E-03

PERE : Use of renewable primary energy excluding renewable primary energy resources used as feedstock; **PERM:** Use of renewable primary energy used as raw material; **PERT:** Total use of renewable primary energy; **PENRE:** Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstock; **PENRM:** Use of non-renewable primary energy used as feedstock; **PENRT:** Total use of non-renewable primary energy; **SM:** Use of secondary materials; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of tap water resources; **NR:** Not relevant

Waste categories

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hwd	**kg**	8,2E-02	6.7E-11	2.5E-03	0	3.07E-12	0	0	0	0	0	0	6.6E-12	0	2,20E-08	-3.5E-08
NHWD	**kg**	4,3	2,0E-03	0,8	0	7.84E-03	0	0	0	0	0	0	2.0E-04	0	6,44	-1.5E-03
Rwd	**kg**	7.6E-03	1,7E-05	4,4E-04	0	3.78E-06	0	0	0	0	0	0	1,7E-06	0	1,9E-05	7.0E-05

HWD: Hazardous waste disposed of; **NHWD**: Non-hazardous waste disposed of; **RWD**: Radioactive waste disposed of;

Outflows

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Cru	**kg**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mfr	**kg**	3,2E-02	0	1,4E+00	0	0	0	0	0	0	0	0	0	15,0	0	0
Mer	**kg**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Usa	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CRU: Components for reuse; **MFR**: Materials for recycling; **MER**: Materials for energy recovery; **EE:** Energy exported

6 Additional environmental information

In 2014 HDC Porcelain invested in an improvement in the furnace to allow savings in gas consumption. This solution consists of the hot air sucked in from the slow cooling and final cooling modules being sent properly filtered to the combustion air fan. From here, the recovered hot air passes through the heat exchanger and is successively sent to the burners. In such a way that the combustion air is strongly preheated and reaches the burners at a temperature of approximately 170ºC.

This improvement allows an energy saving of approximately 4-5% of gas consumption and, as a consequence, the reduction of the volumes of gases emitted.

Since 2016 we started a process of recovery and storage of the cooked pot of the BIa and BIb group, to be reused in the atomizer incorporating it again as raw material.

Thanks to the installation of the grinding machine in 2018, significant savings are achieved in the consumption of packaging material (pallets, cardboard and plastic) and a significant reduction in the waste generated by this packaging.

In 2021, investments are made in the installation of solar panels on part of the roof of the ship. Thus achieving energy savings in electricity of 20%.

It is expected that in 2022 the installation will be expanded with more solar panels.

Indoor air emissions

Ceramic tiles, in their manufacturing process, undergo a thermal process that exceeds 1000 ºC. At these temperatures, any organic compound present in the compositions decomposes, resulting in an inert end product free of volatile organic compounds that may be emitted in its use phase.

Release to soil and water

Ceramic tiles do not emit any compound to the floor or water in its stage of use, since it is a totally inert product, which does not undergo physical, chemical or biological transformations, is not soluble or combustible, does not react physically or chemically or in any other way, is not biodegradable, does not adversely affect other materials with which it comes into contact in a way that may lead to contamination of the environment. environment or harm human health. It is a product that does not leach so it does not pose a risk to the quality of surface or groundwater.

Annex I. Declaration of environmental parameters for the minimum environmental impact format

The results obtained are relative expressions and do not predict impacts in endpoint categories, the exceeding of some levels, safety margins or risks.

Environmental impacts.

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	**kg_{CO2} eq**	11,5	1,0	1,4	0	6.6E-02	0	0	0	0	0	0	9,1E-02	0	9.4E-02	-1.5E-01
GWP-fossil	**kg_{CO2} eq**	11,4	0,9	1,4	0	6.6E-02	0	0	0	0	0	0	9,1E-02	0	9.3E-02	-1.5E-01
GWP-biogenic	**kg_{CO2} eq**	8.0E-02	-1.0E-03	2,3E-03	0	3.8E-04	0	0	0	0	0	0	-1,3E-04	0	9.7E-04	-3.6E-04
GWP-luluc	**kg_{CO2} eq**	4,8E-03	4,6E-03	6.6E-04	0	2,1E-06	0	0	0	0	0	0	5.0E-04	0	4.0E-04	-4.9E-04
ODP	**kg CFC11 eq**	3,3E-08	5.6E-14	1,0E-09	0	2.5E-08	0	0	0	0	0	0	5.4E-15	0	5,3E-14	-4.7E-09
Ap	**mole H+ eq**	8.3E-02	5,1E-03	4,4E-03	0	5.8E-04	0	0	0	0	0	0	7.4E-05	0	6.8E-04	-4.9E-04
EP-freshwater	**kg P eq**	9.3E-05	2.5E-06	4,3E-06	0	1,2E-06	0	0	0	0	0	0	2.7E-07	0	2.0E-06	-1.8E-06
EP-marine	**kg N eq**	1,2E-02	1,4E-03	1,0E-03	0	6.3E-05	0	0	0	0	0	0	2.0E-05	0	1,9E-04	-1.8E-04
EP-terrestrial	**mol N eq**	1,3E-01	1,5E-02	1,1E-02	0	2,4E-03	0	0	0	0	0	0	2.5E-04	0	2,0E-03	-1.9E-03
POCP	**Kg NMVOC eq**	3,7E-02	3.9E-03	2,9E-03	0	4,3E-04	0	0	0	0	0	0	7.0E-05	0	5.5E-04	-4,6E-04
ADP-minerals& metals [2]	**kg Sb eq**	6.5E-05	7.3E-08	2.0E-06	0	2.0E-09	0	0	0	0	0	0	7.6E-09	0	9.6E-09	-6.2E-08
ADP-fossil [2]	**Mj**	186,0	12,4	10,7	0	3,2E-01	0	0	0	0	0	0	1,2	0	1,2	-2,0
WDP [2]	**m^3 depriv.**	1,9	7.6E-03	1,6E-01	0	1,9	0	0	0	0	0	0	8.1E-04	0	7.0E-03	-3,3E-02

GWP - total: Global warming potential; **GWP -** fossil: Global warming potential of fossil fuels; **GWP - biogenic**: Biogenic global warming potential; **GWP - luluc** : Global warming potential of land use and land use change; **ODP**: Stratospheric ozone depletion potential; **AP:** Acidification potential, accumulated surplus; **EP-freshwater**: Eutrophication potential, fraction of nutrients reaching the final freshwater compartment; **EP-marine**: Eutrophication potential, fraction of nutrients reaching the final seawater compartment; **EP-terrestrial**: Eutrophication potential, accumulated surplus; **POCP:** Tropospheric ozone formation potential; **ADP-minerals&metals:** Potential for depletion of abiotic resources for non-fossil resources; **APD-fossil**: Abiotic resource depletion potential for fossil resources; **WDP**: Water deprivation potential (user), weighted water deprivation consumption. **NR:** Not relevant

Notice 1. This impact category deals mainly with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The potential for ionizing radiation of the soil, due to radon or some building materials is not measured in this parameter either.
Notice 2. The results of this environmental impact indicator should be used with caution since the uncertainties of the results are high and experience with this parameter is limited.

Additional environmental impact parameters

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	**Incidence of diseases**	6.0E-07	7.9E-08	4.9E-08	0	3,8E-09	0	0	0	0	0	0	5,1E-10	0	8.3E-09	-2,1E-09
IRP [1]	**kBq U235 eq**	5.0E-01	2,2E-03	4.5E-02	0	3.7E-04	0	0	0	0	0	0	2,2E-04	0	1,6E-03	-3.6E-03
ETP-fw [2]	**CTUe**	39,2	8,64	3,8	0	1,6E-01	0	0	0	0	0	0	8.4E-01	0	7.5E-01	-8.9E-01
HTP-c [2]	**CTUh**	3,6E-09	1,7E-10	2,3E-10	0	1,8E-11	0	0	0	0	0	0	1,7E-11	0	9,4E-11	-1,1E-11
HTP-nc [2]	**CTUh**	1,0E-07	8.8E-09	1,6E-08	0	5,2E-09	0	0	0	0	0	0	8.7E-10	0	1.0E-08	-1,2E-09
SQP [2]	**-**	142,0	3,8	11,7	0	62,8	0	0	0	0	0	0	4,2E-01	0	2,9E-01	-1,4

PM: Potential incidence of diseases due to emissions of particulate matter (PM); **IRP** : Human potential exposure efficiency relative to U235; **ETP-fw** : Comparative potential of toxic unit for ecosystems - freshwater; **HTP-c** : Comparative potential of toxic unit for ecosystems - carcinogenic effects; **HTP-nc** : Comparative potential of toxic unit for ecosystems - non-carcinogenic effects; **SQP** : Soil quality potential index; **NR:** Not relevant

Notice 1. This impact category deals mainly with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The potential for ionizing radiation of the soil, due to radon or some building materials is not measured in this parameter either.
Notice 2. The results of this environmental impact indicator should be used with caution since the uncertainties of the results are high and experience with this parameter is limited.

Resource usage

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	**Mj**	38,9	6.3E-01	2,5	0	1,3	0	0	0	0	0	0	6.9E-02	0	1,4E-01	-4,2
PERM	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	**Mj**	38,9	6.3E-01	2,5	0	1,3	0	0	0	0	0	0	6.9E-02	0	1,4E-01	-4,2
PENRE	**Mj**	186,0	12,5	10,7	0	3,2E-01	0	0	0	0	0	0	1,2	0	1,2	-2,0
PENRM	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	**Mj**	186,0	12,5	10,7	0	3,2E-01	0	0	0	0	0	0	1,2	0	1,2	-2,0
Sm	**kg**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fw	**m^3**	3,6E-02	7.2E-04	3,4E-03	0	2,4E-02	0	0	0	0	0	0	7.8E-05	0	2,3E-04	-2.0E-03

PERE : Use of renewable primary energy excluding renewable primary energy resources used as feedstock; **PERM:** Use of renewable primary energy used as raw material; **PERT:** Total use of renewable primary energy; **PENRE:** Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstock; **PENRM:** Use of non-renewable primary energy used as feedstock; **PENRT:** Total use of non-renewable primary energy; **SM:** Use of secondary materials; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of tap water resources; **NR:** Not relevant

Waste categories

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hwd	**kg**	8,2E-02	5.9E-11	2.5E-03	0	2.71E-12	0	0	0	0	0	0	5.8E-12	0	1.94E-08	-3.1E-08
NHWD	**kg**	3,5	1,7E-03	0,7	0	6.91E-03	0	0	0	0	0	0	1,7E-04	0	5,68	-1,3E-03
Rwd	**kg**	6.5E-03	1,5E-05	3.8E-04	0	3,33E-06	0	0	0	0	0	0	1,5E-06	0	1,7E-05	6,2E-05

HWD: Hazardous waste disposed of; **NHWD**: Non-hazardous waste disposed of; **RWD**: Radioactive waste disposed of

Outflows

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Cru	**kg**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mfr	**kg**	2,8E-02	0	1,2	0	0	0	0	0	0	0	0	0	13,2	0	0
Mer	**kg**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Usa	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CRU: Components for reuse; **MFR**: Materials for recycling; **MER**: Materials for energy recovery; **EE:** Energy exported

Annex II. Declaration of environmental parameters for the maximum environmental impact format

The results obtained are relative expressions and do not predict impacts in endpoint categories, the exceeding of some levels, safety margins or risks.

Environmental impacts.

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-fossil	**kg_{CO2} eq**	14,3	1,1	1,6	0	7.7E-02	0	0	0	0	0	0	1,1E-01	0	1,1E-01	-1.8E-01
GWP-biogenic	**kg_{CO2} eq**	9.8E-02	-1,2E-03	2,8E-03	0	4,4E-04	0	0	0	0	0	0	-1.5E-04	0	1,1E-03	-4,2E-04
GWP-luluc	**kg_{CO2} eq**	6,1E-03	5,4E-03	7.9E-04	0	2,4E-06	0	0	0	0	0	0	5.9E-04	0	4,6E-04	-5.8E-04
GWP-total	**kg_{CO2} eq**	14,4	1,1	1,6	0	7.7E-02	0	0	0	0	0	0	1,1E-01	0	1,1E-01	-1.8E-01
ODP	**kg CFC11 eq**	4.0E-08	6.6E-14	1,2E-09	0	2.9E-08	0	0	0	0	0	0	6.3E-15	0	6,1E-14	-5.5E-09
Ap	**mole H+ eq**	1,0E-01	5.9E-03	5,4E-03	0	6.8E-04	0	0	0	0	0	0	8.6E-05	0	7.9E-04	-5.7E-04
EP-freshwater	**kg P eq**	1,1E-04	2.9E-06	5,1E-06	0	1,4E-06	0	0	0	0	0	0	3,2E-07	0	2,3E-06	-2,1E-06
EP-marine	**kg N eq**	1,5E-02	1,6E-03	1,2E-03	0	7.3E-05	0	0	0	0	0	0	2,4E-05	0	2,2E-04	-2,1E-04
EP-terrestrial	**mol N eq**	1,6E-01	1,8E-02	1,3E-02	0	2,8E-03	0	0	0	0	0	0	2.9E-04	0	2,3E-03	-2,3E-03
POCP	**Kg NMVOC eq**	4,4E-02	4,6E-03	3.5E-03	0	5.0E-04	0	0	0	0	0	0	8.1E-05	0	6,4E-04	-5.4E-04
ADP-minerals& metals [2]	**kg Sb eq**	8.0E-05	8.6E-08	2.5E-06	0	2,4E-09	0	0	0	0	0	0	8.8E-09	0	1,1E-08	-7.3E-08
ADP-fossil [2]	**Mj**	233,0	14,5	12,9	0	0,4	0	0	0	0	0	0	1,4	0	1,4	-2,4
WDP [2]	**m^3 depriv.**	2,5	8.9E-03	2,0E-01	0	2,22	0	0	0	0	0	0	9.5E-04	0	8,2E-03	-3.8E-02

GWP - total: Global warming potential; **GWP -** fossil: Global warming potential of fossil fuels; **GWP - biogenic**: Biogenic global warming potential; **GWP - luluc** : Global warming potential of land use and land use change; **ODP**: Stratospheric ozone depletion potential; **AP:** Acidification potential, accumulated surplus; **EP-freshwater**: Eutrophication potential, fraction of nutrients reaching the final freshwater compartment; **EP-marine**: Eutrophication potential, fraction of nutrients reaching the final seawater compartment; **EP-terrestrial**: Eutrophication potential, accumulated surplus; **POCP:** Tropospheric ozone formation potential; **ADP-minerals&metals:** Potential for depletion of abiotic resources for non-fossil resources; **APD-fossil**: Abiotic resource depletion potential for fossil resources; **WDP**: Water deprivation potential (user), weighted water deprivation consumption. **NR:** Not relevant

Notice 1. This impact category deals mainly with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The potential for ionizing radiation of the soil, due to radon or some building materials is not measured in this parameter either.
Notice 2. The results of this environmental impact indicator should be used with caution since the uncertainties of the results are high and experience with this parameter is limited.

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Additional environmental impact parameters

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	**Incidence of diseases**	7.5E-07	9.3E-08	5.9E-08	0	4,4E-09	0	0	0	0	0	0	5.9E-10	0	9.6E-09	-2.5E-09
IRP [1]	**kBq U235 eq**	49	10,1	4,6	0	1,9E-01	0	0	0	0	0	0	9.8E-01	0	8.8E-01	-1,0E+00
ETP-fw [2]	**CTUe**	4,4E-09	2.0E-10	2.8E-10	0	2,1E-11	0	0	0	0	0	0	2.0E-11	0	1,1E-10	-1,3E-11
HTP-c [2]	**CTUh**	1,3E-07	1.0E-08	1,9E-08	0	6,1E-09	0	0	0	0	0	0	1,0E-09	0	1,2E-08	-1,4E-09
HTP-nc [2]	**CTUh**	6,2E-01	2,6E-03	5,3E-02	0	4,3E-04	0	0	0	0	0	0	2,6E-04	0	1,9E-03	-4.2E-03
SQP [2]	**-**	173,0	4,4	13,9	0	73,3	0	0	0	0	0	0	4,9E-01	0	3,4E-01	-1,7

PM: Potential incidence of diseases due to emissions of particulate matter (PM); **IRP** : Human potential exposure efficiency relative to U235; **ETP-fw** : Comparative potential of toxic unit for ecosystems - freshwater; **HTP-c** : Comparative potential of toxic unit for ecosystems - carcinogenic effects; **HTP-nc** : Comparative potential of toxic unit for ecosystems - non-carcinogenic effects; **SQP** : Soil quality potential index; **NR:** Not relevant

Notice 1. This impact category deals mainly with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The potential for ionizing radiation of the soil, due to radon or some building materials is not measured in this parameter either.
Notice 2. The results of this environmental impact indicator should be used with caution since the uncertainties of the results are high and experience with this parameter is limited.

Resource usage

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	**Mj**	47,7	7.4E-01	3,0	0	1,5	0	0	0	0	0	0	8.0E-02	0	1,7E-01	-4,9
PERM	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	**Mj**	47,7	7.4E-01	3,0	0	1,5	0	0	0	0	0	0	8.0E-02	0	1,7E-01	-4,9
PENRE	**Mj**	234,0	14,6	13,0	0	3,7E-01	0	0	0	0	0	0	1,4	0	1,4	-2,4
PENRM	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	**Mj**	234,0	14,6	13,0	0	3,7E-01	0	0	0	0	0	0	1,4	0	1,4	-2,4
Sm	**kg**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fw	**m^3**	4,6E-02	8.4E-04	4.0E-03	0	2,9E-02	0	0	0	0	0	0	9,1E-05	0	2,7E-04	-2,4E-03

PERE : Use of renewable primary energy excluding renewable primary energy resources used as feedstock; **PERM:** Use of renewable primary energy used as raw material; **PERT:** Total use of renewable primary energy; **PENRE:** Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstock; **PENRM:** Use of non-renewable primary energy used as feedstock; **PENRT:** Total use of non-renewable primary energy; **SM:** Use of secondary materials; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of tap water resources; **NR:** Not relevant

Waste categories

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hwd	**kg**	8,2E-02	6.9E-11	2.5E-03	0	3,2E-12	0	0	0	0	0	0	6.8E-12	0	2.26E-08	-3.6E-08
NHWD	**kg**	5,2	2,0E-03	0,9	0	8,1E-03	0	0	0	0	0	0	2.0E-04	0	6,63	-1.5E-03
Rwd	**kg**	8,2E-03	1,8E-05	4,6E-04	0	3.9E-06	0	0	0	0	0	0	1,7E-06	0	2.0E-05	7.2E-05

HWD: Hazardous waste disposed of; **NHWD**: Non-hazardous waste disposed of; **RWD**: Radioactive waste disposed of;

Outflows

Parameter	Units	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Cru	**kg**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mfr	**kg**	3,3E-02	0	1,4E+00	0	0	0	0	0	0	0	0	0	15,5	0	0
Mer	**kg**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Usa	**Mj**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CRU: Components for reuse; **MFR**: Materials for recycling; **MER**: Materials for energy recovery; **EE:** Energy exported;

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