Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for

Porcelain Tile

manufactured by Hitit Seramik

Programme:
The International EPD® System
www.environdec.com

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EPD Turkey

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HİTİT SERAMİK

EPD® THE INTERNATIONAL EPD® SYSTEM

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Product Category Rules (PCR): 2019:14 Version 1.2.5, 2024-12-20, Construction Products and CPC 54 Construction Services, EN 15804:2012 + A2:2019 Sustainability of Construction Works

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

EPD process certification ◯ EPD verification ☑

Third party verifier: Prof. Vladimír Kocí
Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes ◯ No ☑

About Hitit Seramik

Established on October 17, 1989 for the production of Ceramic Floor and Wall Tiles, Hitit Seramik Sanayi ve Ticaret A.Ş. started its activities on February 22, 1991 with a total capacity of 2 million m^2 including 1,000,000 m^2 Wall Tiles and 1,000,000 m^2 Floor Tiles in the first stage on 500,000 m^2 land located in Uşak Organized Industrial Zone. Hitit Seramik entered into a rapid growth process as a result of the new investment activities that were accelerated following the installation and production and the production capacity of 10 million m^2 was achieved in 76,000 m^2 closed factories complex within a short period of time.

Capacity and product type increase was required and so, a decision on new investments made in 2004 and works were started rapidly in the face of domestic and international markets' trust and intense demands of Hitit Seramik products, brand, and quality in the 2000s. 40,000 m^2 additional closed factory buildings were built and completed with the company's own resources in a short period of time and 20 million m^2 capacity was achieved by reaching to an additional production capacity of 10 million m^2.

The history of ***Hitit Seramik***

that always aims to produce and present

the ***cutting edge and bettermost***

...

It was aimed to present new and pioneering products that can be produced with special technologies and machines to Turkey and world markets by conducting extensive researches in investment studies and this has been achieved. Hitit Seramik has become one of the rare production facilities of the world that can produce the most sizes and types of coating materials in a production facility today with the power of its new investments.

These targets of Hitit Seramik, which always aims to produce the cutting edge and the bettermost, were achieved by identifying the needs of the user accurately, capturing innovative and creative approaches to respond to these constantly changing needs, creating a competitive structure within itself, conducting rigorous and forward-looking research in all investments, selecting the right technology and machinery, allocating large financial resources, and exhausting, but tasteful studies.

About Porcelain Tile

Product Description

Porcelain tile is a compact ceramic material with high density (2380-2450 kg/m^3), low water absorption (< 0.5%) and small pore size (<50 µm) and low porosity (pore ratio in the structure).

Porcelain tiles are widely used in the construction industry, interior and exterior floor coverings, thanks to their excellent technical properties such as high breaking strength, high frost resistance, high abrasion resistance and high chemical resistance. The optimum firing temperature of porcelain tiles is between 1200-1250 C.

UN CPC code for Porcelain Tiles is 37310.

Product Area of Application

Porcelain tiles are used in terraces, gardens and public areas that are exposed to all external weather conditions with temperature difference due to their low water absorption coefficient. They should also be preferred for shopping malls and airports with heavy traffic conditions. All wet areas and general areas of use are suitable for porcelain tile flooring due to easy surface cleaning.

Raw Material	Composition, %
Kaolin	30-40
Clay	20-30
Feldspar	30-40
Others	0-5

Packaging Material	Weight, %/m^2
Cardboard	7
Wood	89
Plastic	3
Glue	<1
Label	<1

LCA Information

> Goal and Scope

Evaluation of environmental impacts for 1 m^2 average porcelain tiles from cradle to grave.

> System Boundary

The system boundary of the Hitit Seramik Tiles are craddle to grave with module D.

	Product Stage			Constrcution Process Stage		Use Stage							End of Life Stage				Benefits and Loads
	Raw Material Supply	Transport	Manufacturing	Transport	Construction/ Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction & Demolition	Transport	Waste Processing	Disposal	Future reuse. recycling or energy recovery potentials
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	TR			GLO													
Specific Data Used	>90%					-											
Variation - products	0%					-											
Variation - Sites	0%					-											

*Description of the system boundary (X = Included in LCA, NR: Not Relevant)**

> Database and LCA Software

Ecoinvent 3.8 and SimPro 9.3 is used for the calculation.

> Data Quality

Raw materials, energy and water consumption, waste generation, material and product transport data are primary data collected from Hitit Seramik.

> Period Under Review

All primary data collected from Yurtbay is for the period year of 2021.

> Declared Unit

1 m^2 average tile with an average weight of 32 kg.

> Geographical Scope

The geographical scope of this EPD is Türkiye.

**Note: The LCA was modelled for specific product at plant so there is no variation.*
**Note: All primary data is taken from Hitit Seramik and Ecoinvent was used for secondary data.*

System Boundary

A1-A3

Raw Material Supply, Transport & Manufacturing

A1 represents raw material supply which includes raw material extraction and pre-treatment processes before production. A2 relevant to raw material transportation to the plant and A3 refers to the impact occurs from manufacturing process.

A4

Product Transport

This stage is relevant to the transportation of the final product from the factory gate to the customers.

A5

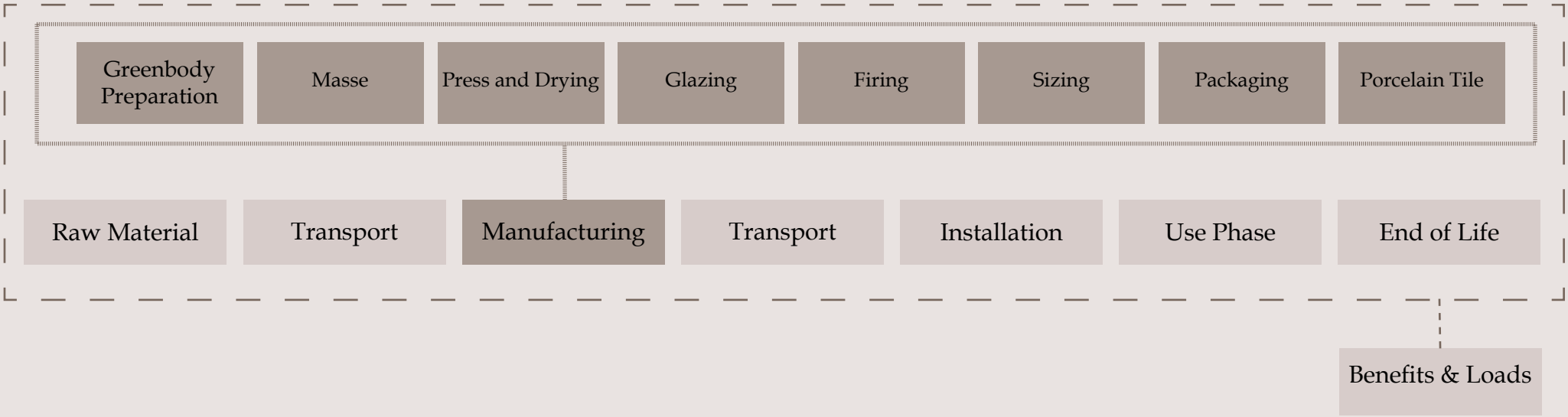
Installation

This stage includes the adhesive mortar and water usage in the construction site. For 1 m^2 tile installation; 6 kg mortar and 1.5L water usage was adviced by Hitit Seramik.

B1

Use

Tiles do not cause any emissions in the use stage because of their inert feature.



System Boundary

B2

Maintenance

Hitit Seramik advices to use 0.2 mL detergent and rinse with 0.1 L tap water after cleaning. The results are given for a one-time cleaning activity, as the activity will vary by user.

B3-B5

Repair, Replacement, Refurbishment

Tiles do not require any repairment during the use phase and therefore no impacts should be declared.

B6-7

Operational Energy Use and Operational Water Use

Tiles do not require any water and energy in the use phase and therefore no impacts ocurred in this module.

C1

Deconstruction/Demolition

Deconstruction of tiles at the end of their life is done manually. So no impact occurs in this module.

C2

Waste Transport

Waste transport includes diiscarded tiles and mortar to disposal area. Distance from demolition site to inert landfill site for final disposal is assumed as 50 km.

C3

Waste Processing

Environmental impacts generated during the crushing of discarded tiles before recycle or reuse are very low. Therefore, impacts are neglected.

C4

Disposal

Tiles end up at construction and demolition waste landfills at their end of life and modelled as such in this LCA.

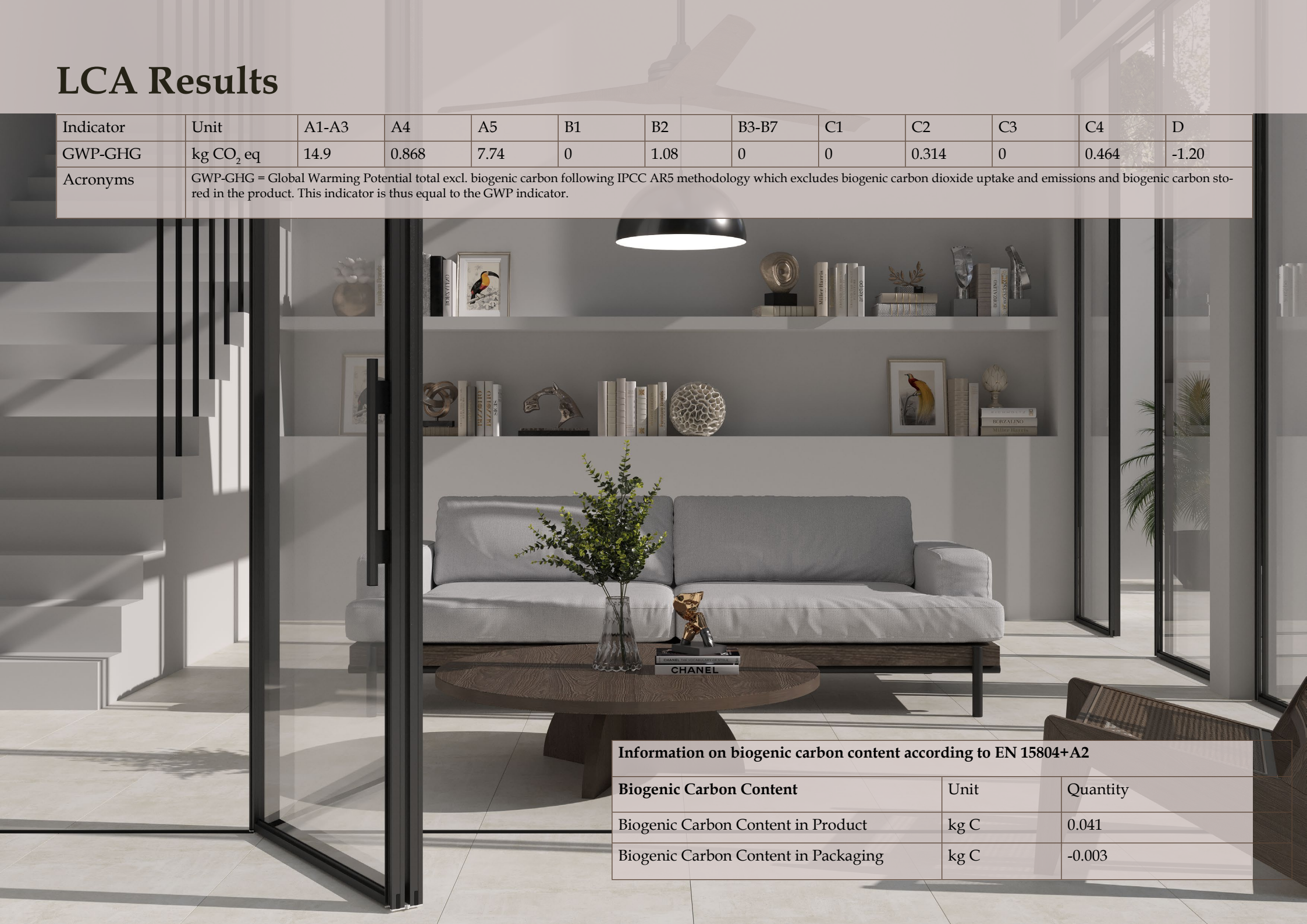
D

Benefits & Loads

Inert filler benefits and recycling of packaging materials specified in the disposal stage.

LCA Results

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
GWP-GHG	kg CO_2 eq	14.9	0.868	7.74	0	1.08	0	0	0.314	0	0.464	-1.20
Acronyms	GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology which excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator.											



Information on biogenic carbon content according to EN 15804+A2		
Biogenic Carbon Content	Unit	Quantity
Biogenic Carbon Content in Product	kg C	0.041
Biogenic Carbon Content in Packaging	kg C	-0.003

LCA Results

POTENTIAL ENVIRONMENTAL IMPACTS												
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP- Fossil	kg CO_2 eq	15.1	0.876	7.92	0	0.405	0	0	0.316	0	0.471	-1.21
GWP- Biogenic	kg CO_2 eq	0.139	0.002	0.151	0	0.255	0	0	848E-6	0	0.005	-0.004
GWP- Luluc	kg CO_2 eq	0.036	383E-6	0.008	0	0.627	0	0	126E-6	0	477E-6	-0.004
GWP- Total	kg CO_2 eq	15.2	0.878	8.08	0	1.29	0	0	0.317	0	0.476	-1.22
ODP	kg CFC11 eq	1.54E-6	188E-9	770E-9	0	63.2E-9	0	0	73.2E-9	0	143E-9	-234E-9
AP	mol H^+ eq	0.057	0.008	0.052	0	0.005	0	0	897E-6	0	0.004	-0.011
***EP - Freshwater**	kg P eq	0.006	78.7E-6	0.003	0	0.004	0	0	20.7E-6	0	137E-6	-136E-6
EP - Freshwater	kg PO_4 eq	0.018	241E-6	0.008	0	0.011	0	0	63.3E-6	0	419E-6	-416E-6
EP - Marine	kg N eq	0.011	0.002	0.009	0	0.005	0	0	182E-6	0	0.001	-0.003
EP - Terrestrial	mol N eq	0.107	0.021	0.089	0	0.017	0	0	0.002	0	0.015	-0.037
POCP	kg NMVOC eq	0.028	0.005	0.026	0	0.003	0	0	515E-6	0	0.004	-0.009
ADPE	kg Sb eq	27.4E-6	2.30E-6	142E-6	0	8.42E-6	0	0	1.12E-6	0	1.54E-6	-7.08E-6
ADPF	MJ	218	12.8	114	0	4.21	0	0	4.79	0	11.1	-17.2
WDP	m^3 depriv.	4.71	0.053	4.87	0	2.43	0	0	0.014	0	0.481	-1.49
PM	disease inc.	322E-9	52.0E-9	457E-9	0	70.9E-9	0	0	20.04E-9	0	77.2E-9	-114E-9
IR	kBq U-235 eq	0.793	0.064	0.478	0	30.0E-3	0	0	0.025	0	0.052	-0.088
ETP-FW	CTUe	112	10.5	267	0	62.5	0	0	3.76	0	7.88	-16.3
HTP-C	CTUh	2.91E-9	317E-12	10.5E-9	0	1.17E-9	0	0	121E-12	0	339E-12	-933E-12
HTP-NC	CTUh	87.3E-9	9.65E-9	255E-9	0	24.0E-9	0	0	3.79E-9	0	5.25E-9	-16.8E-9
SQP	Pt	33.5	7.39	66.2	0	39.5	0	0	3.46	0	27.4	-38.6
Acronyms	GWP-total: Climate change. GWP-fossil: Climate change- fossil. GWP- biogenic: Climate change - biogenic. GWP-luluc: Climate change - land use and transformation. ODP: Ozone layer depletion. AP: Acidification terrestrial and freshwater. EP-freshwater: Eutrophication freshwater. EP-marine: Eutrophication marine. EP-terrestrial: Eutrophication terrestrial. POCP: Photochemical oxidation. ADPE: Abiotic depletion - elements. ADPF: Abiotic depletion - fossil resources. WDP: Water scarcity. PM: Respiratory inorgawnics - particulate matter. IR: Ionising radiation. ETP-FW: Ecotoxicity freshwater. HTP-c: Cancer human health effects. HTP-nc: Non-cancer human health effects. SQP: Land use related impacts. soil quality.											
Legend	A1: Raw Material Supply. A2: Transport. A3: Manufacturing. A1-A3: Sum of A1. A2. and A3. A4: Transport to Site. A5: Installation. B1: Use. B2: Maintenance. B3: Repair. B4: Replacement. B5: Refurbishment. B6:Operational Energy Use. B7: Operational Water Use C1: De-Construction. C2: Waste Transport. C3: Waste Processing. C4: Disposal. D: Benefits and Loads Beyond the System Boundary.											
Disclaimer 1	This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents. occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil. from radon and from some construction materials is also not measured by this indicator.											
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.											
Disclaimer 3*	EP-freshwater: This indicator has been calculated as "kg P eq"as required in the characterization model. (EUTREND model. Struijs et al. 2009b. as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml)											

LCA Results

RESOURCE USE												
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3-B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	**MJ**	16.2	0.183	7.29	0	18.6	0	0	0.068	0	0.189	-0.376
PERM	**MJ**	0	0	0	0	0	0	0	0	0	0	0
PERT	**MJ**	16.2	0.183	7.29	0	18.6	0	0	0.068	0	0.189	-0.376
PENRE	**MJ**	218	12.8	114	0	4.98	0	0	4.79	0	11.1	-17.2
PENRM	**MJ**	0	0	0	0	0	0	0	0	0	0	0
PENRT	**MJ**	218	12.8	114	0	4.98	0	0	4.79	0	11.1	-17.2
SM	**kg**	0	0	0	0	0	0	0	0	0	0	0
RSF	**MJ**	0	0	0	0	0	0	0	0	0	0	0
NRSF	**MJ**	0	0	0	0	0	0	0	0	0	0	0
FW	**m^3**	0.176	0.002	0.111	0	0.123	0	0	802E-6	0	0.012	-0.113
Acronyms	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding 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, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water.											

WASTE OUTPUT FLOWS												
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3-B7**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	**kg**	0.002	0	0	0	0	0	0	0	0	0	0
NHWD	**kg**	0.064	0	0	0	0	0	0	0	0	38.0	0
RWD	**kg**	0	0	0	0	0	0	0	0	0	0	0
CRU	**kg**	0	0	0	0	0	0	0	0	0	0	0
MFR	**kg**	0	0	0	0	0	0	0	0	0	0	0
MER	**kg**	0	0	0	0	0	0	0	0	0	0	0
EE (Electrical)	**MJ**	0	0	0	0	0	0	0	0	0	0	0
EE (Thermal)	**MJ**	0	0	0	0	0	0	0	0	0	0	0
Acronyms	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy thermal.											

References

/GPI/ General Programme Instructions of the International EPD® System. Version 4.0.

/EN ISO 9001/ Quality Management Systems - Requirements

/EN ISO 14001/ Environmental Management Systems - Requirements

/Ecoinvent / Ecoinvent Centre. www.ecoinvent.org

/ISO 14020:2000/ Environmental Labels and Declarations — General principles

/EN 15804:2012+A2:2019/ Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products

/ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

/ISO 14040/44/ DIN EN ISO 14040:2006-10. Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)

/PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL Swedish Environmental Research Institute. Swedish Environmental Protection Agency. SP Trä. Swedish Wood Preservation Institute. Swedisol. SCDA. Svenskt Limträ AB. SSAB. The International EPD System. 2019:14 Version 1.11 DATE 2019-12-20

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