EN 15804+A2 EPD

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2.
Owner of the Declaration – SMET BUILDING PRODUCTS LTD

Declaration number: EPDIE-22-93
Issue date 31st August 2022
Valid to 31st August 2027

EPD Programme - EPD Ireland
Programme Operator - Irish Green Building Council
www.epdireland.org

baseTherm®

Bound EPS ballasting (BEPS) floor insulation

baseTherm® Low Lambda

baseTherm® 150

baseTherm® 200

baseTherm® 250

1. General information

PROGRAMME OPERATOR	OWNER OF DECLARATION
Irish Green Building Council 19 Mountjoy Square, Dublin D01 E8P5 info@igbc.ie	SMET BUILDING PRODUCTS LTD 93A Belfast Road, Newry BT34 1QH, Northern Ireland info@smetbuildingproducts.com
DECLARATION NUMBER	**MANUFACTURER ADDRESS**
EPDIE-22-93	baseTherm Ltd Cappagh Enfield, County Kildare A83 VF21 Ireland
ECO PLATFORM EPD	**DECLARED UNIT**
Yes	1 m² of Bound EPS ballasting (BEPS) floor insulation, thickness 170mm
APPLICABLE PRODUCT CATEGORY RULES	**DECLARED PRODUCT**
1. EN 15804:2012+A2:2019 2. Product Category Rules : Part A Implementation and use of I.S. EN 15804:2012+A1 and + A2, and CEN TR 16970:2016 in Ireland for the development of Environmental Product Declarations (issued 05.03.2022), Version 2.1. 3. I.S. EN 16783:2017 Thermal insulation products – Product category rules (PCR) for factory made and in-situ formed products for preparing environmental product declarations.	Bound EPS ballasting (BEPS) floor insulation 1 m² of baseTherm® Low Lambda, thickness 170mm, R-value 4.146 m²K/W 1 m² of baseTherm® 150, thickness 170mm, R-value 3.269 m²K/W 1 m² of baseTherm® 200, thickness 170mm, R-value 2.881 m²K/W 1 m² of baseTherm® 250, thickness 170mm, R-value 2.463 m²K/W
DATE OF ISSUE	**SCOPE OF EPD**
31st August 2022	Cradle to gate, with options including Modules C and D
DATE OF EXPIRY	**LCA CONSULTANT OR PERSON RESPONSIBLE FOR LCA**
31st August 2027	Ecoreview, Kilkenny, Ireland. +353 (087) 258 9783 www.ecoreview.ie
TYPE OF EPD: SINGLE OR MULTI PRODUCT	**LCA SOFTWARE AND DEVELOPER IF APPLICABLE**
Multi product EPD	Ecochain LCA tool version 3.5.13 (2022)
PRODUCT CLASSIFICATION OR NACE CODE	**NAME AND VERSION OF INVENTORY USED**
Bound EPS ballasting (BEPS) floor insulation	Ecoinvent version 3.6
COMPARABILITY	
Environmental Product Declarations from different programmes may not be directly 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	
The CEN Norm /EN 15804 serves as the core PCR	
Independent verification of the declaration according to ISO 14025	

Internally ☐ Externally ✕

SIGNATURE OF PROGRAMME OPERATOR	SIGNATURE VERIFIER
Pat Barry - CEO - Irish Green Building Council	Chris Foster - EuGeos SRL

2. Scope and Type of EPD

Scope

This is a Cradle to Gate, with options EPD. The Modules that are declared are shown in the table below.

PRODUCT STAGE			CONSTRUCTION ON PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse – Recovery – Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
MDT	MDT	MDT	OP	OP	OP	OP	OP	OP	OP	OP	OP	MDT	MDT	MDT	MDT	MDT

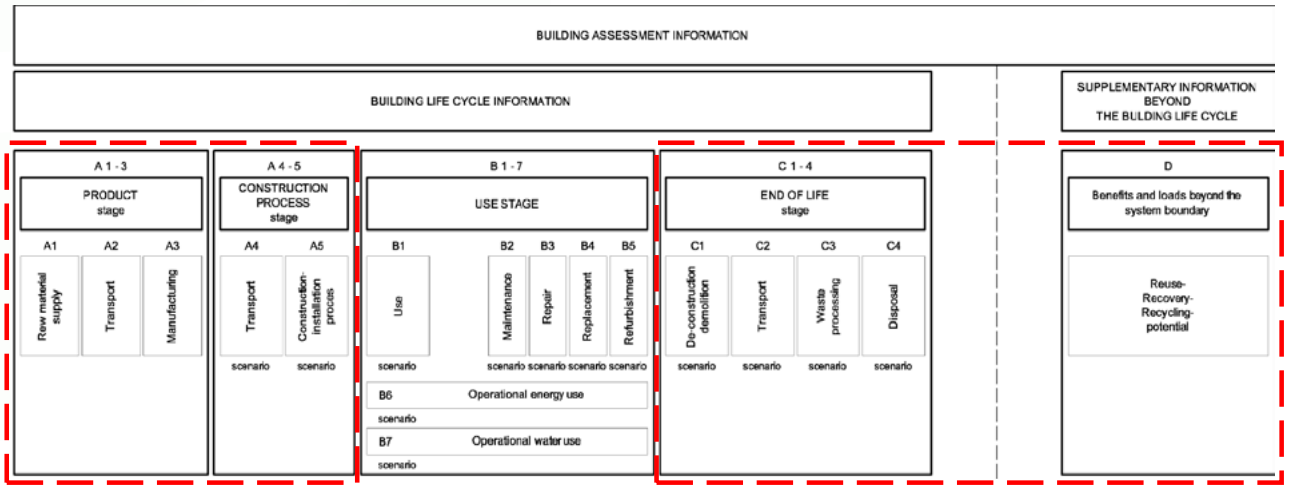
X = Module declared; ND = Module not declared; MDT = Mandatory; OP = Optional.

Declared Functional Unit

1 m² of baseTherm® Low Lambda, thickness 170mm, R-value 4.146 m²K/W
1 m² of baseTherm® 150, thickness 170mm, R-value 3.269 m²K/W
1 m² of baseTherm® 200, thickness 170mm, R-value 2.881 m²K/W
1 m² of baseTherm® 250, thickness 170mm, R-value 2.463 m²K/W

System Boundaries

This LCA covers the Product (A1 - A3), Construction Process (A4 - A5), end of Life (C1 - C4), and benefits and loads beyond the system boundary (D).



3. Detailed product description

This EPD is for baseTherm's bound EPS ballasting floor insulation material. The raw materials for the bound EPS ballasting floor insulation are Portland cement, expanded polystyrene (EPS) beads, water and admixtures. The raw materials are mixed on-site before being pumped into place on the floor of the structure.

The bound EPS ballasting provides a firm insulating floor surface. It is manufactured in accordance with I.S. EN 16025-1:2013, "Thermal and/or sound insulating products in building construction. Bound EPS ballasting requirements for factory premixed EPS dry plaster". The intended use of the bound EPS ballasting is in domestic and commercial construction as a bound EPS ballasting floor insulation, providing the dual functions of insulation and a solid floor bearing surface.

General technical specifications and performance characteristics are given below:

	Low Lambda	150	200	250	Standard
Particle size group of EPS N	≤ 6mm	≤ 6mm	≤ 6mm	≤ 6mm	EN 933-1
Apparent density of fresh mortar ± 10%	± 178 kg/m³	± 246 kg/m³	± 297 kg/m³	± 353 kg/m³	EN 12350-6
Thermal Conductivity λ 90/90	0.041 W/mK	0.052 W/mK	0.059 W/mK	0.069 W/mK	EN 12667
Bound EPS Density ± 10%	± 85 kg/m³	± 150 kg/m³	± 200 kg/m³	± 250 kg/m³	EN 1602
Reaction to Fire	Class A2	Class A2	Class A1	Class A1	EN 13501-1
Compressive Strength σ10	CS (10)100	CS (10)150	CS (10)400	CS (10)600	EN 826
Compressibility	≤ 2mm	≤ 2mm	≤ 2mm	≤ 2mm	EN 12431
Creep	CC(2/2/10)3.5	CC(3/3/10)3.5	CC(2/2/10)3.5	CC(2/2/10)3.5	EN 1606
	CC(2/2/10)6.5	CC(3/3/10)6.5	CC(1.5/1.5/10)6.5	CC(1.5/1.5/10)6.5	
	CC(2/2/10)6.5	CC(3/3/10)6.5	CC(1.5/1.5/10)6.5	CC(1.5/1.5/10)6.5	
Water Vapour Diffusion Resistance	5 to 20	5 to 20	5 to 20	5 to 20	EN 12086
Water absorption by short term partial immersion	≤ 2.6 kg/m²	≤ 2.0 kg/m²	≤ 1.6 kg/m²	≤ 0.8 kg/m²	EN 1609
Dynamic Stiffness	127 MN/m³	226 MN/m³	253 MN/m³	475 MN/m³	EN 29052-1

baseTherm® Characteristics to I.S. EN 16025-1:2013

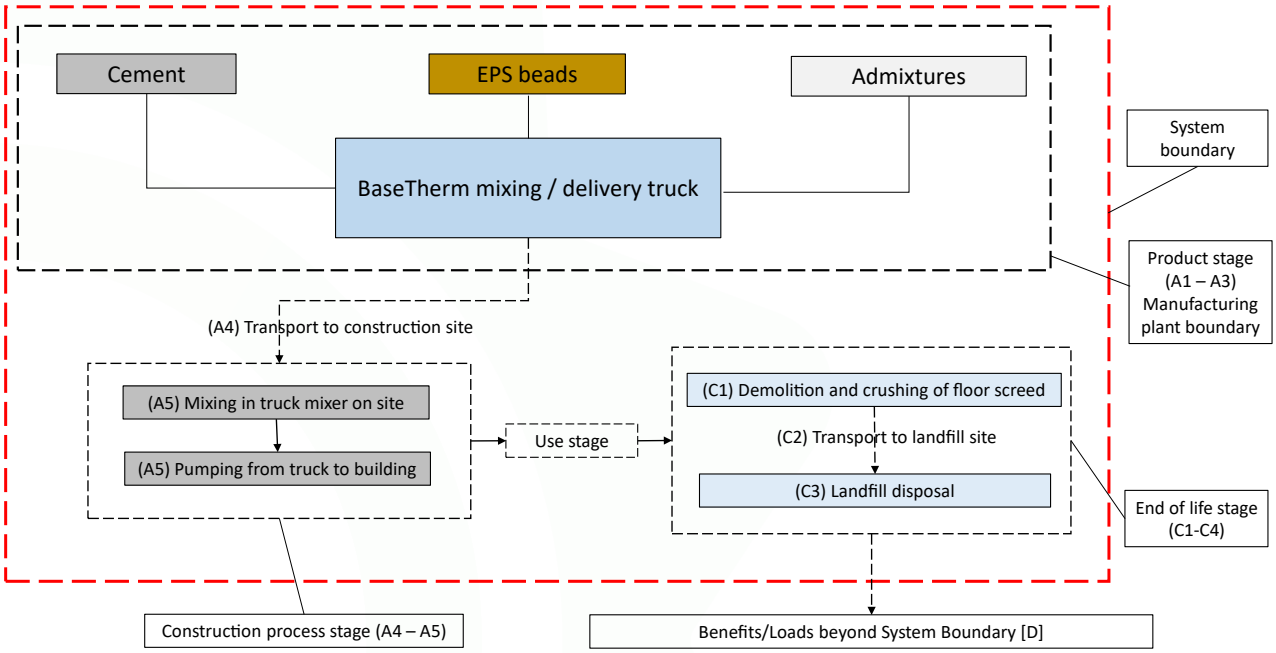
The bound EPS density is the mass of the dried mortar, after installation and hardening/drying. This density is to be used to convert the volume of the installed BEPS to a mass (kg) value. [The apparent density is the mass density of the fresh (wet) mortar mix during installation].

Further technical details can be found at:
https://basetherm.com/downloads/

3.1 Manufacturing Process Description

The bound EPS ballasting is made by mixing the ingredients on site in a specially designed mixing truck, and then pumped into place on the floor of the building.

The manufacturing process and life-cycle stages are illustrated below:



baseTherm® Low Lambda

4.1.A. LCA results - baseTherm® Low Lambda

Core Environmental impact per 1 m² of baseTherm® Low Lambda, thickness 170mm, R-value 4.146 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	[kg CO_2 eq.]	1.40E+01	9.63E-02	2.41E-02	1.41E+01	3.56E-01	3.16E-01	MND	MND	MND	MND	MND	MND	MND	2.02E-01	2.56E-01	0.00E+00	3.10E-01	0.00E+00
GWP-fossil	[kg CO_2 eq.]	1.39E+01	9.62E-02	2.41E-02	1.41E+01	3.55E-01	3.16E-01	MND	MND	MND	MND	MND	MND	MND	2.02E-01	2.55E-01	0.00E+00	3.10E-01	0.00E+00
GWP-biogenic	[kg CO_2 eq.]	1.70E-02	5.81E-05	-6.88E-06	1.71E-02	1.91E-04	1.16E-04	MND	MND	MND	MND	MND	MND	MND	5.61E-05	1.37E-04	0.00E+00	6.13E-04	0.00E+00
GWP-luluc	[kg CO_2 eq.]	1.35E-03	3.66E-05	1.71E-06	1.39E-03	1.27E-04	1.94E-05	MND	MND	MND	MND	MND	MND	MND	1.59E-05	9.09E-05	0.00E+00	4.60E-05	0.00E+00
ODP	[kg CFC-11 eq.]	3.74E-07	2.14E-08	3.04E-09	3.99E-07	8.09E-08	4.89E-08	MND	MND	MND	MND	MND	MND	MND	4.36E-08	5.81E-08	0.00E+00	5.64E-08	0.00E+00
AP	[mol H+ eq.]	3.77E-02	5.82E-04	1.35E-04	3.84E-02	1.02E-03	2.49E-03	MND	MND	MND	MND	MND	MND	MND	2.11E-03	7.34E-04	0.00E+00	1.17E-03	0.00E+00
EP-freshwater[1]	[kg P eq.]	8.02E-05	8.88E-07	7.83E-08	8.11E-05	2.84E-06	9.95E-07	MND	MND	MND	MND	MND	MND	MND	7.34E-07	2.04E-06	0.00E+00	3.29E-06	0.00E+00
EP-marine	[kg N eq.]	8.99E-03	1.14E-04	5.57E-05	9.16E-03	2.02E-04	1.08E-03	MND	MND	MND	MND	MND	MND	MND	9.32E-04	1.45E-04	0.00E+00	4.00E-04	0.00E+00
EP-terrestrial	[mol N eq.]	1.02E-01	1.29E-03	6.12E-04	1.04E-01	2.26E-03	1.18E-02	MND	MND	MND	MND	MND	MND	MND	1.02E-02	1.62E-03	0.00E+00	3.91E-03	0.00E+00
POCP	[kg NMVOC eq.]	2.94E-02	4.01E-04	1.70E-04	3.00E-02	8.66E-04	3.24E-03	MND	MND	MND	MND	MND	MND	MND	2.81E-03	6.22E-04	0.00E+00	1.23E-03	0.00E+00
ADP-minerals&metals[2]	[kg Sb eq.]	1.42E-04	2.28E-06	9.48E-08	1.45E-04	9.81E-06	4.15E-07	MND	MND	MND	MND	MND	MND	MND	3.09E-07	7.05E-06	0.00E+00	1.43E-06	0.00E+00
ADP-fossils[2]	[MJ] ncv	1.37E+02	1.44E+00	3.67E-01	1.39E+02	5.37E+00	3.13E+00	MND	MND	MND	MND	MND	MND	MND	2.78E+00	3.86E+00	0.00E+00	4.00E+00	0.00E+00
WDP[2]	m^3 world eq. deprived	2.27E+00	5.12E-03	1.16E-03	2.27E+00	1.52E-02	4.83E-03	MND	MND	MND	MND	MND	MND	MND	3.72E-03	1.09E-02	0.00E+00	1.92E-01	0.00E+00

GWP-total = Global Warming Potential total; GWP-fossil= Global Warming Potential fossil fuels (GWP-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; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&fossils = Abiotic depletion potential for non-fossil resources; ADP-fossils= Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

The measurement of environmental impacts uses the recommended default LCIA methods for the PEF 3.0 method. These methods include amongst others: USEtox® 2.0, ReCiPe (2016), CML-2001, EDIP 2003, IPCC.

[1]To express EP freshwater as kg of PO43- eq, multiply the value for kg P eq. by 3.067

[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.

ND = Module not declared; INA = Indicator not assessed.

4.1.B. LCA results - baseTherm® Low Lambda

Resource use per 1 m² of baseTherm® Low Lambda, thickness 170mm, R-value 4.146 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	9.08E+00	2.23E-02	4.86E-02	9.15E+00	7.69E-02	8.38E-02	MND	MND	MND	MND	MND	MND	MND	1.50E-02	5.53E-02	0.00E+00	4.02E-02	0.00E+00
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	9.08E+00	2.23E-02	4.86E-02	9.15E+00	7.69E-02	8.38E-02	MND	MND	MND	MND	MND	MND	MND	1.50E-02	5.53E-02	0.00E+00	4.02E-02	0.00E+00
PENRE	[MJ]	8.36E+01	1.53E+00	3.99E-01	8.55E+01	5.71E+00	3.32E+00	MND	MND	MND	MND	MND	MND	MND	2.95E+00	4.10E+00	0.00E+00	4.25E+00	0.00E+00
PENRM	[MJ]	5.63E+01	0.00E+00	0.00E+00	5.63E+01	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	1.40E+02	1.53E+00	3.99E-01	1.42E+02	5.71E+00	3.32E+00	MND	MND	MND	MND	MND	MND	MND	2.95E+00	4.10E+00	0.00E+00	4.25E+00	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m³]	1.70E+00	1.70E-04	3.63E-05	1.70E+00	5.75E-04	1.76E-04	MND	MND	MND	MND	MND	MND	MND	1.43E-04	4.13E-04	0.00E+00	4.61E-03	0.00E+00

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.

ND = Module not declared; INA = Indicator not assessed.

4.1.C. LCA results - baseTherm® Low Lambda

Output flows and waste categories per 1 m^2 of baseTherm® Low Lambda, thickness 170mm, R-value 4.146 m^2K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	5.28E-05	3.38E-06	4.15E-07	5.66E-05	1.41E-05	8.48E-06	MND	MND	MND	MND	MND	MND	MND	7.56E-06	1.01E-05	0.00E+00	5.21E-06	0.00E+00
NHWD	[kg]	2.88E-01	6.10E-02	1.85E-04	3.49E-01	2.61E-01	5.02E-03	MND	MND	MND	MND	MND	MND	MND	3.29E-03	1.88E-01	0.00E+00	1.57E+01	0.00E+00
RWD	[kg]	1.03E-04	9.77E-06	1.06E-06	1.14E-04	3.66E-05	2.17E-05	MND	MND	MND	MND	MND	MND	MND	1.93E-05	2.63E-05	0.00E+00	2.52E-05	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.

ND = Module not declared; INA = Indicator not assessed.

4.1.D. LCA results - baseTherm® Low Lambda

Additonal Environmental impact per 1 m² of baseTherm® Low Lambda, thickness 170mm, R-value 4.146 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	3.23E-07	5.66E-09	3.13E-09	3.32E-07	2.26E-08	6.28E-08	MND	MND	MND	MND	MND	MND	MND	5.58E-08	1.62E-08	0.00E+00	1.97E-08	0.00E+00
IRP[1]	kBq U235 eq	7.79E-01	6.33E-03	6.60E-04	7.86E-01	2.35E-02	1.34E-02	MND	MND	MND	MND	MND	MND	MND	1.19E-02	1.69E-02	0.00E+00	1.59E-02	0.00E+00
ETP-fw[2]	CTUe	3.20E+02	1.14E+00	1.65E-01	3.21E+02	4.33E+00	2.39E+00	MND	MND	MND	MND	MND	MND	MND	1.67E+00	3.11E+00	0.00E+00	4.25E+01	0.00E+00
HTP-c[2]	CTUe	1.79E-03	3.24E-11	5.99E-12	1.79E-03	1.21E-10	1.79E-05	MND	MND	MND	MND	MND	MND	MND	5.85E-11	8.66E-11	0.00E+00	3.58E-09	0.00E+00
HTP-nc[2]	CTUe	5.11E-08	1.16E-09	1.63E-10	5.25E-08	4.56E-09	1.72E-09	MND	MND	MND	MND	MND	MND	MND	1.44E-09	3.28E-09	0.00E+00	1.26E-07	0.00E+00
SQP[2]	dimensionless	7.06E+00	9.04E-01	3.63E-02	8.00E+00	3.76E+00	4.21E-01	MND	MND	MND	MND	MND	MND	MND	3.55E-01	2.70E+00	0.00E+00	1.46E+01	0.00E+00

PM = Potential incidence of disease due to PM emissions, 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, SQP = Potential soil quality index.

[1] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuelcycle. 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.

[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.

ND = Module not declared; INA = Indicator not assessed.

baseTherm® 150

4.2.A. LCA results - baseTherm® 150

Core Environmental impact per 1 m² of baseTherm® 150, thickness 170mm, R-value 3.269 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	[kg CO_2 eq.]	2.09E+01	1.07E-01	3.26E-02	2.10E+01	5.00E-01	3.75E-01	MND	MND	MND	MND	MND	MND	MND	2.02E-01	3.59E-01	0.00E+00	4.88E-01	0.00E+00
GWP-fossil	[kg CO_2 eq.]	2.08E+01	1.07E-01	3.26E-02	2.10E+01	5.00E-01	3.75E-01	MND	MND	MND	MND	MND	MND	MND	2.02E-01	3.58E-01	0.00E+00	4.88E-01	0.00E+00
GWP-biogenic	[kg CO_2 eq.]	2.60E-02	6.04E-05	-9.33E-06	2.60E-02	2.69E-04	1.51E-04	MND	MND	MND	MND	MND	MND	MND	5.61E-05	1.93E-04	0.00E+00	9.93E-04	0.00E+00
GWP-luluc	[kg CO_2 eq.]	8.17E-04	3.92E-05	2.32E-06	8.58E-04	1.78E-04	2.05E-05	MND	MND	MND	MND	MND	MND	MND	1.59E-05	1.27E-04	0.00E+00	7.50E-05	0.00E+00
ODP	[kg CFC-11 eq.]	3.15E-07	2.42E-08	4.12E-09	3.44E-07	1.14E-07	4.93E-08	MND	MND	MND	MND	MND	MND	MND	4.36E-08	8.15E-08	0.00E+00	9.24E-08	0.00E+00
AP	[mol H+ eq.]	4.86E-02	4.37E-04	1.83E-04	4.92E-02	1.44E-03	2.58E-03	MND	MND	MND	MND	MND	MND	MND	2.11E-03	1.03E-03	0.00E+00	1.91E-03	0.00E+00
EP-freshwater[1]	[kg P eq.]	6.86E-05	9.07E-07	1.06E-07	6.96E-05	3.99E-06	1.11E-06	MND	MND	MND	MND	MND	MND	MND	7.34E-07	2.86E-06	0.00E+00	5.40E-06	0.00E+00
EP-marine	[kg N eq.]	1.28E-02	8.62E-05	7.56E-05	1.29E-02	2.84E-04	1.10E-03	MND	MND	MND	MND	MND	MND	MND	9.32E-04	2.04E-04	0.00E+00	6.49E-04	0.00E+00
EP-terrestrial	[mol N eq.]	1.44E-01	9.67E-04	8.30E-04	1.46E-01	3.18E-03	1.22E-02	MND	MND	MND	MND	MND	MND	MND	1.02E-02	2.28E-03	0.00E+00	6.39E-03	0.00E+00
POCP	[kg NMVOC eq.]	3.98E-02	3.32E-04	2.31E-04	4.04E-02	1.22E-03	3.31E-03	MND	MND	MND	MND	MND	MND	MND	2.81E-03	8.73E-04	0.00E+00	2.00E-03	0.00E+00
ADP-minerals&metals[2]	[kg Sb eq.]	6.99E-05	2.80E-06	1.29E-07	7.29E-05	1.38E-05	4.61E-07	MND	MND	MND	MND	MND	MND	MND	3.09E-07	9.89E-06	0.00E+00	2.33E-06	0.00E+00
ADP-fossils[2]	[MJ] ncv	1.75E+02	1.62E+00	4.97E-01	1.77E+02	7.56E+00	3.15E+00	MND	MND	MND	MND	MND	MND	MND	2.78E+00	5.42E+00	0.00E+00	6.56E+00	0.00E+00
WDP[2]	m^3 world eq. deprived	2.16E+00	5.02E-03	1.57E-03	2.17E+00	2.14E-02	5.29E-03	MND	MND	MND	MND	MND	MND	MND	3.72E-03	1.53E-02	0.00E+00	3.15E-01	0.00E+00

GWP-total = Global Warming Potential total; GWP-fossil= Global Warming Potential fossil fuels (GWP-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; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&fossils = Abiotic depletion potential for non-fossil resources; ADP-fossils= Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

The measurement of environmental impacts uses the recommended default LCIA methods for the PEF 3.0 method. These methods include amongst others: USEtox® 2.0, ReCiPe (2016), CML-2001, EDIP 2003, IPCC.

[1]To express EP freshwater as kg of PO43- eq, multiply the value for kg P eq. by 3.067

[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.

ND = Module not declared; INA = Indicator not assessed.

4.2.B. LCA results - baseTherm® 150

Resource use per 1 m² of baseTherm® 150, thickness 170mm, R-value 3.269 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	1.35E+01	2.39E-02	6.60E-02	1.36E+01	1.08E-01	1.27E-01	MND	MND	MND	MND	MND	MND	MND	1.50E-02	7.75E-02	0.00E+00	6.55E-02	0.00E+00
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	1.35E+01	2.39E-02	6.60E-02	1.36E+01	1.08E-01	1.27E-01	MND	MND	MND	MND	MND	MND	MND	1.50E-02	7.75E-02	0.00E+00	6.55E-02	0.00E+00
PENRE	[MJ]	9.05E+01	1.72E+00	5.40E-01	9.28E+01	8.02E+00	3.35E+00	MND	MND	MND	MND	MND	MND	MND	2.95E+00	5.75E+00	0.00E+00	6.97E+00	0.00E+00
PENRM	[MJ]	8.60E+01	0.00E+00	0.00E+00	8.60E+01	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	1.77E+02	1.72E+00	5.40E-01	1.79E+02	8.02E+00	3.35E+00	MND	MND	MND	MND	MND	MND	MND	2.95E+00	5.75E+00	0.00E+00	6.97E+00	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m³]	2.57E+00	1.79E-04	4.92E-05	2.57E+00	8.08E-04	1.87E-04	MND	MND	MND	MND	MND	MND	MND	1.43E-04	5.79E-04	0.00E+00	7.55E-03	0.00E+00

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.

ND = Module not declared; INA = Indicator not assessed.

4.2.C. LCA results - baseTherm® 150

Output flows and waste categories per 1 m² of baseTherm® 150, thickness 170mm, R-value 3.269 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	4.70E-05	4.07E-06	5.63E-07	5.17E-05	1.98E-05	8.52E-06	MND	MND	MND	MND	MND	MND	MND	7.56E-06	1.42E-05	0.00E+00	8.53E-06	0.00E+00
NHWD	[kg]	2.96E-01	7.48E-02	2.51E-04	3.71E-01	3.68E-01	5.90E-03	MND	MND	MND	MND	MND	MND	MND	3.29E-03	2.63E-01	0.00E+00	2.57E+01	0.00E+00
RWD	[kg]	1.13E-04	1.10E-05	1.43E-06	1.26E-04	5.15E-05	2.18E-05	MND	MND	MND	MND	MND	MND	MND	1.93E-05	3.69E-05	0.00E+00	4.13E-05	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.

ND = Module not declared; INA = Indicator not assessed.

4.2.D. LCA results - baseTherm® 150

Additonal Environmental impact per 1 m² of baseTherm® 150, thickness 170mm, R-value 3.269 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	4.20E-07	6.62E-09	4.24E-09	4.31E-07	3.18E-08	6.33E-08	MND	MND	MND	MND	MND	MND	MND	5.58E-08	2.28E-08	0.00E+00	3.22E-08	0.00E+00
IRP[1]	kBq U235 eq	1.14E+00	7.08E-03	8.95E-04	1.15E+00	3.30E-02	1.35E-02	MND	MND	MND	MND	MND	MND	MND	1.19E-02	2.37E-02	0.00E+00	2.60E-02	0.00E+00
ETP-fw[2]	CTUe	4.66E+02	1.29E+00	2.23E-01	4.68E+02	6.09E+00	2.73E+00	MND	MND	MND	MND	MND	MND	MND	1.67E+00	4.36E+00	0.00E+00	6.99E+01	0.00E+00
HTP-c[2]	CTUe	2.95E-03	3.63E-11	8.13E-12	2.95E-03	1.69E-10	2.95E-05	MND	MND	MND	MND	MND	MND	MND	5.85E-11	1.21E-10	0.00E+00	5.89E-09	0.00E+00
HTP-nc[2]	CTUe	6.01E-08	1.34E-09	2.21E-10	6.17E-08	6.41E-09	1.80E-09	MND	MND	MND	MND	MND	MND	MND	1.44E-09	4.60E-09	0.00E+00	2.08E-07	0.00E+00
SQP[2]	dimensionless	6.98E+00	1.09E+00	4.92E-02	8.12E+00	5.29E+00	4.38E-01	MND	MND	MND	MND	MND	MND	MND	3.55E-01	3.79E+00	0.00E+00	2.40E+01	0.00E+00

PM = Potential incidence of disease due to PM emissions, 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, SQP = Potential soil quality index.

[1] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuelcycle. 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.

[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.

ND = Module not declared; INA = Indicator not assessed.

baseTherm® 200

4.3.A. LCA results - baseTherm® 200

Core Environmental impact per 1 m² of baseTherm® 200, thickness 170mm, R-value 2.881 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	[kg CO_2 eq.]	2.55E+01	1.27E-01	4.04E-02	2.57E+01	6.14E-01	4.18E-01	MND	MND	MND	MND	MND	MND	MND	2.02E-01	4.39E-01	0.00E+00	5.71E-01	0.00E+00
GWP-fossil	[kg CO_2 eq.]	2.55E+01	1.27E-01	4.04E-02	2.57E+01	6.14E-01	4.18E-01	MND	MND	MND	MND	MND	MND	MND	2.02E-01	4.39E-01	0.00E+00	5.70E-01	0.00E+00
GWP-biogenic	[kg CO_2 eq.]	3.00E-02	7.04E-05	-1.16E-05	3.00E-02	3.30E-04	1.76E-04	MND	MND	MND	MND	MND	MND	MND	5.61E-05	2.36E-04	0.00E+00	1.24E-03	0.00E+00
GWP-luluc	[kg CO_2 eq.]	8.02E-04	4.60E-05	2.87E-06	8.51E-04	2.18E-04	2.13E-05	MND	MND	MND	MND	MND	MND	MND	1.59E-05	1.56E-04	0.00E+00	9.45E-05	0.00E+00
ODP	[kg CFC-11 eq.]	3.31E-07	2.87E-08	5.10E-09	3.65E-07	1.40E-07	4.95E-08	MND	MND	MND	MND	MND	MND	MND	4.36E-08	9.98E-08	0.00E+00	1.18E-07	0.00E+00
AP	[mol H+ eq.]	5.65E-02	4.67E-04	2.26E-04	5.71E-02	1.76E-03	2.65E-03	MND	MND	MND	MND	MND	MND	MND	2.11E-03	1.26E-03	0.00E+00	2.42E-03	0.00E+00
EP-freshwater[1]	[kg P eq.]	7.42E-05	1.05E-06	1.32E-07	7.54E-05	4.90E-06	1.19E-06	MND	MND	MND	MND	MND	MND	MND	7.34E-07	3.50E-06	0.00E+00	6.87E-06	0.00E+00
EP-marine	[kg N eq.]	1.51E-02	9.22E-05	9.36E-05	1.53E-02	3.49E-04	1.12E-03	MND	MND	MND	MND	MND	MND	MND	9.32E-04	2.49E-04	0.00E+00	8.09E-04	0.00E+00
EP-terrestrial	[mol N eq.]	1.71E-01	1.03E-03	1.03E-03	1.73E-01	3.90E-03	1.24E-02	MND	MND	MND	MND	MND	MND	MND	1.02E-02	2.79E-03	0.00E+00	8.09E-03	0.00E+00
POCP	[kg NMVOC eq.]	4.63E-02	3.65E-04	2.86E-04	4.70E-02	1.50E-03	3.36E-03	MND	MND	MND	MND	MND	MND	MND	2.81E-03	1.07E-03	0.00E+00	2.53E-03	0.00E+00
ADP-minerals&metals[2]	[kg Sb eq.]	6.17E-05	3.38E-06	1.59E-07	6.52E-05	1.69E-05	4.95E-07	MND	MND	MND	MND	MND	MND	MND	3.09E-07	1.21E-05	0.00E+00	2.96E-06	0.00E+00
ADP-fossils[2]	[MJ] ncv	1.88E+02	1.92E+00	6.16E-01	1.90E+02	9.28E+00	3.17E+00	MND	MND	MND	MND	MND	MND	MND	2.78E+00	6.63E+00	0.00E+00	8.34E+00	0.00E+00
WDP[2]	m^3 world eq. deprived	2.30E+00	5.77E-03	1.95E-03	2.31E+00	2.63E-02	5.62E-03	MND	MND	MND	MND	MND	MND	MND	3.72E-03	1.88E-02	0.00E+00	4.01E-01	0.00E+00

GWP-total = Global Warming Potential total; GWP-fossil= Global Warming Potential fossil fuels (GWP-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; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&fossils = Abiotic depletion potential for non-fossil resources; ADP-fossils= Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

The measurement of environmental impacts uses the recommended default LCIA methods for the PEF 3.0 method. These methods include amongst others: USEtox® 2.0, ReCiPe (2016), CML-2001, EDIP 2003, IPCC.

[1]To express EP freshwater as kg of PO43- eq, multiply the value for kg P eq. by 3.067

[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.

ND = Module not declared; INA = Indicator not assessed.

4.3.B. LCA results - baseTherm® 200

Resource use per 1 m² of baseTherm® 200, thickness 170mm, R-value 2.881 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	1.68E+01	2.80E-02	8.17E-02	1.69E+01	1.33E-01	1.59E-01	MND	MND	MND	MND	MND	MND	MND	1.50E-02	9.50E-02	0.00E+00	8.26E-02	0.00E+00
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	1.68E+01	2.80E-02	8.17E-02	1.69E+01	1.33E-01	1.59E-01	MND	MND	MND	MND	MND	MND	MND	1.50E-02	9.50E-02	0.00E+00	8.26E-02	0.00E+00
PENRE	[MJ]	9.58E+01	2.03E+00	6.69E-01	9.85E+01	9.85E+00	3.37E+00	MND	MND	MND	MND	MND	MND	MND	2.95E+00	7.04E+00	0.00E+00	8.86E+00	0.00E+00
PENRM	[MJ]	9.38E+01	0.00E+00	0.00E+00	9.38E+01	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	1.90E+02	2.03E+00	6.69E-01	1.92E+02	9.85E+00	3.37E+00	MND	MND	MND	MND	MND	MND	MND	2.95E+00	7.04E+00	0.00E+00	8.86E+00	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m³]	2.80E+00	2.10E-04	6.09E-05	2.80E+00	9.92E-04	1.96E-04	MND	MND	MND	MND	MND	MND	MND	1.43E-04	7.09E-04	0.00E+00	9.62E-03	0.00E+00

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.

ND = Module not declared; INA = Indicator not assessed.

4.3.C. LCA results - baseTherm® 200

Output flows and waste categories per 1 m² of baseTherm® 200, thickness 170mm, R-value 2.881 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	4.97E-05	4.89E-06	6.97E-07	5.53E-05	2.43E-05	8.56E-06	MND	MND	MND	MND	MND	MND	MND	7.56E-06	1.74E-05	0.00E+00	1.08E-05	0.00E+00
NHWD	[kg]	3.49E-01	9.01E-02	3.12E-04	4.39E-01	4.51E-01	6.54E-03	MND	MND	MND	MND	MND	MND	MND	3.29E-03	3.23E-01	0.00E+00	3.27E+01	0.00E+00
RWD	[kg]	1.26E-04	1.30E-05	1.78E-06	1.41E-04	6.32E-05	2.19E-05	MND	MND	MND	MND	MND	MND	MND	1.93E-05	4.52E-05	0.00E+00	5.26E-05	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.

ND = Module not declared; INA = Indicator not assessed.

4.3.D. LCA results - baseTherm® 200

Additonal Environmental impact per 1 m² of baseTherm® 200, thickness 170mm, R-value 2.881 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	4.73E-07	7.92E-09	5.25E-09	4.87E-07	3.90E-08	6.36E-08	MND	MND	MND	MND	MND	MND	MND	5.58E-08	2.79E-08	0.00E+00	4.08E-08	0.00E+00
IRP[1]	kBq U235 eq	1.25E+00	8.38E-03	1.11E-03	1.25E+00	4.06E-02	1.36E-02	MND	MND	MND	MND	MND	MND	MND	1.19E-02	2.90E-02	0.00E+00	3.31E-02	0.00E+00
ETP-fw[2]	CTUe	5.22E+02	1.54E+00	2.76E-01	5.24E+02	7.47E+00	2.98E+00	MND	MND	MND	MND	MND	MND	MND	1.67E+00	5.34E+00	0.00E+00	8.98E+01	0.00E+00
HTP-c[2]	CTUe	3.79E-03	4.30E-11	1.01E-11	3.79E-03	2.08E-10	3.79E-05	MND	MND	MND	MND	MND	MND	MND	5.85E-11	1.49E-10	0.00E+00	7.57E-09	0.00E+00
HTP-nc[2]	CTUe	6.73E-08	1.60E-09	2.74E-10	6.92E-08	7.87E-09	1.86E-09	MND	MND	MND	MND	MND	MND	MND	1.44E-09	5.63E-09	0.00E+00	2.67E-07	0.00E+00
SQP[2]	dimensionless	7.99E+00	1.31E+00	6.09E-02	9.36E+00	6.49E+00	4.51E-01	MND	MND	MND	MND	MND	MND	MND	3.55E-01	4.64E+00	0.00E+00	3.07E+01	0.00E+00

PM = Potential incidence of disease due to PM emissions, 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, SQP = Potential soil quality index.

[1] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuelcycle. 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.

[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.

ND = Module not declared; INA = Indicator not assessed.

baseTherm® 250

4.4.A. LCA results - baseTherm® 250

Core Environmental impact per 1 m² of baseTherm® 250, thickness 170mm, R-value 2.463 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	[kg CO_2 eq.]	2.97E+01	1.46E-01	4.95E-02	2.99E+01	7.28E-01	4.61E-01	MND	MND	MND	MND	MND	MND	MND	2.02E-01	5.20E-01	0.00E+00	6.27E-01	0.00E+00
GWP-fossil	[kg CO_2 eq.]	2.97E+01	1.46E-01	4.95E-02	2.99E+01	7.28E-01	4.61E-01	MND	MND	MND	MND	MND	MND	MND	2.02E-01	5.19E-01	0.00E+00	6.26E-01	0.00E+00
GWP-biogenic	[kg CO_2 eq.]	3.25E-02	8.00E-05	-1.41E-05	3.26E-02	3.91E-04	2.02E-04	MND	MND	MND	MND	MND	MND	MND	5.61E-05	2.79E-04	0.00E+00	1.46E-03	0.00E+00
GWP-luluc	[kg CO_2 eq.]	7.89E-04	5.25E-05	3.51E-06	8.45E-04	2.59E-04	2.21E-05	MND	MND	MND	MND	MND	MND	MND	1.59E-05	1.85E-04	0.00E+00	1.13E-04	0.00E+00
ODP	[kg CFC-11 eq.]	3.37E-07	3.31E-08	6.24E-09	3.76E-07	1.65E-07	4.98E-08	MND	MND	MND	MND	MND	MND	MND	4.36E-08	1.18E-07	0.00E+00	1.42E-07	0.00E+00
AP	[mol H+ eq.]	6.25E-02	4.96E-04	2.77E-04	6.33E-02	2.09E-03	2.72E-03	MND	MND	MND	MND	MND	MND	MND	2.11E-03	1.49E-03	0.00E+00	2.91E-03	0.00E+00
EP-freshwater[1]	[kg P eq.]	7.85E-05	1.19E-06	1.61E-07	7.99E-05	5.81E-06	1.28E-06	MND	MND	MND	MND	MND	MND	MND	7.34E-07	4.15E-06	0.00E+00	8.30E-06	0.00E+00
EP-marine	[kg N eq.]	1.70E-02	9.80E-05	1.15E-04	1.72E-02	4.14E-04	1.14E-03	MND	MND	MND	MND	MND	MND	MND	9.32E-04	2.95E-04	0.00E+00	9.58E-04	0.00E+00
EP-terrestrial	[mol N eq.]	1.92E-01	1.10E-03	1.26E-03	1.94E-01	4.63E-03	1.26E-02	MND	MND	MND	MND	MND	MND	MND	1.02E-02	3.30E-03	0.00E+00	9.74E-03	0.00E+00
POCP	[kg NMVOC eq.]	5.12E-02	3.97E-04	3.50E-04	5.20E-02	1.77E-03	3.42E-03	MND	MND	MND	MND	MND	MND	MND	2.81E-03	1.27E-03	0.00E+00	3.03E-03	0.00E+00
ADP-minerals&metals[2]	[kg Sb eq.]	5.40E-05	3.93E-06	1.95E-07	5.81E-05	2.01E-05	5.29E-07	MND	MND	MND	MND	MND	MND	MND	3.09E-07	1.43E-05	0.00E+00	3.56E-06	0.00E+00
ADP-fossils[2]	[MJ] ncv	1.87E+02	2.20E+00	7.54E-01	1.90E+02	1.10E+01	3.19E+00	MND	MND	MND	MND	MND	MND	MND	2.78E+00	7.85E+00	0.00E+00	1.01E+01	0.00E+00
WDP[2]	m^3 world eq. deprived	2.36E+00	6.49E-03	2.38E-03	2.37E+00	3.11E-02	5.95E-03	MND	MND	MND	MND	MND	MND	MND	3.72E-03	2.22E-02	0.00E+00	4.85E-01	0.00E+00

GWP-total = Global Warming Potential total; GWP-fossil= Global Warming Potential fossil fuels (GWP-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; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&fossils = Abiotic depletion potential for non-fossil resources; ADP-fossils= Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

The measurement of environmental impacts uses the recommended default LCIA methods for the PEF 3.0 method. These methods include amongst others: USEtox® 2.0, ReCiPe (2016), CML-2001, EDIP 2003, IPCC.

[1]To express EP freshwater as kg of PO43- eq, multiply the value for kg P eq. by 3.067

[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.

ND = Module not declared; INA = Indicator not assessed.

4.4.B. LCA results - baseTherm® 250

Resource use per 1 m² of baseTherm® 250, thickness 170mm, R-value 2.463 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	1.98E+01	3.19E-02	1.00E-01	2.00E+01	1.57E-01	1.91E-01	MND	MND	MND	MND	MND	MND	MND	1.50E-02	1.12E-01	0.00E+00	9.89E-02	0.00E+00
PERM	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	[MJ]	1.98E+01	3.19E-02	1.00E-01	2.00E+01	1.57E-01	1.91E-01	MND	MND	MND	MND	MND	MND	MND	1.50E-02	1.12E-01	0.00E+00	9.89E-02	0.00E+00
PENRE	[MJ]	9.51E+01	2.34E+00	8.19E-01	9.82E+01	1.17E+01	3.39E+00	MND	MND	MND	MND	MND	MND	MND	2.95E+00	8.34E+00	0.00E+00	1.07E+01	0.00E+00
PENRM	[MJ]	9.38E+01	0.00E+00	0.00E+00	9.38E+01	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	1.89E+02	2.34E+00	8.19E-01	1.92E+02	1.17E+01	3.39E+00	MND	MND	MND	MND	MND	MND	MND	2.95E+00	8.34E+00	0.00E+00	1.07E+01	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m³]	2.80E+00	2.39E-04	7.45E-05	2.80E+00	1.18E-03	2.04E-04	MND	MND	MND	MND	MND	MND	MND	1.43E-04	8.40E-04	0.00E+00	1.16E-02	0.00E+00

PERE = Use of renewable primary energy excluding renewable primary energy resources 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.

ND = Module not declared; INA = Indicator not assessed.

4.4.C. LCA results - baseTherm® 250

Output flows and waste categories per 1 m² of baseTherm® 250, thickness 170mm, R-value 2.463 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	5.06E-05	5.67E-06	8.53E-07	5.71E-05	2.88E-05	8.59E-06	MND	MND	MND	MND	MND	MND	MND	7.56E-06	2.06E-05	0.00E+00	1.31E-05	0.00E+00
NHWD	[kg]	4.01E-01	1.05E-01	3.81E-04	5.06E-01	5.35E-01	7.19E-03	MND	MND	MND	MND	MND	MND	MND	3.29E-03	3.82E-01	0.00E+00	3.95E+01	0.00E+00
RWD	[kg]	1.34E-04	1.50E-05	2.18E-06	1.51E-04	7.49E-05	2.20E-05	MND	MND	MND	MND	MND	MND	MND	1.93E-05	5.35E-05	0.00E+00	6.36E-05	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy.

CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.

ND = Module not declared; INA = Indicator not assessed.

4.4.D. LCA results - baseTherm® 250

Additonal Environmental impact per 1 m² of baseTherm® 250, thickness 170mm, R-value 2.463 m²K/W

PARAMETER	UNIT	A1	A2	A3	TOTAL A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	5.03E-07	9.15E-09	6.43E-09	5.19E-07	4.62E-08	6.40E-08	MND	MND	MND	MND	MND	MND	MND	5.58E-08	3.30E-08	0.00E+00	4.91E-08	0.00E+00
IRP[1]	kBq U235 eq	1.25E+00	9.63E-03	1.36E-03	1.26E+00	4.81E-02	1.37E-02	MND	MND	MND	MND	MND	MND	MND	1.19E-02	3.43E-02	0.00E+00	4.00E-02	0.00E+00
ETP-fw[2]	CTUe	5.45E+02	1.77E+00	3.38E-01	5.47E+02	8.86E+00	3.23E+00	MND	MND	MND	MND	MND	MND	MND	1.67E+00	6.32E+00	0.00E+00	1.10E+02	0.00E+00
HTP-c[2]	CTUe	4.63E-03	4.94E-11	1.23E-11	4.63E-03	2.47E-10	4.63E-05	MND	MND	MND	MND	MND	MND	MND	5.85E-11	1.76E-10	0.00E+00	9.25E-09	0.00E+00
HTP-nc[2]	CTUe	7.17E-08	1.85E-09	3.35E-10	7.38E-08	9.34E-09	1.91E-09	MND	MND	MND	MND	MND	MND	MND	1.44E-09	6.66E-09	0.00E+00	3.27E-07	0.00E+00
SQP[2]	dimensionless	8.93E+00	1.51E+00	7.46E-02	1.05E+01	7.70E+00	4.63E-01	MND	MND	MND	MND	MND	MND	MND	3.55E-01	5.49E+00	0.00E+00	3.72E+01	0.00E+00

PM = Potential incidence of disease due to PM emissions, 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, SQP = Potential soil quality index.

[1] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuelcycle. 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.

[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.

ND = Module not declared; INA = Indicator not assessed.

5. Calculation rules

The measurement of environmental impacts in this EPD uses the LCIA methodologies recommended for PEF3.0.

The process descriptions and input quantities detailed and used in this study are a true representation of the actual processes and quantities used in the manufacturing and use of the products. The references of all sources, both primary and public sources and literature, have been documented in the LCA report. The 'polluter pays' and 'modularity' principles have been followed.

In addition, to facilitate the reproducibility of this LCA, a full set of data records has been generated which can be accessed via the LCA tool. This data portfolio contains a summary of all the data used in this LCA.

Cut-off criteria

The cut-off criteria of section 6.3.6 of EN15804:2012+A2:2019 have been followed, where 99% of the total energy and materials are included, and the total neglected input flows for the modules reported on in the LCA are less than 5% of the energy usage and mass.

Data Quality

The dataset is representative for the production processes used in 2021, in Ireland. The data Quality Level, according to Table E.1 of EN 15804 +A2, Annex E, is as follows:
Geographical representativeness: Very Good.
Technical representativeness: Very Good.
Time representativeness: Very Good.

Allocations

Allocation of energy and electricity types and amounts to the various manufacturing processes has been provided by the manufacturers along with production waste. Allocation of impacts to the products is based on the product composition mass.

Flows related to human activities such as employee transport are excluded. The construction of capital assets such as buildings, manufacture of machines and transportation systems are also excluded since the related flows are assumed to be negligible compared to the manufacture of the building material when compared to these systems over a full lifetime of operation.

6. Scenarios and additional technical information

A4. Transport to site

The transport to market is based on the transport from the production base in Cappagh, Enfield, Co. Kildare, by a mean distance of 74km to the construction site (value supplied by baseTherm).

Parameter	Value / Description
Road transport	Transport, freight, lorry 16-32 metric ton, EURO6 engine
Distance, road	74 km
Capacity utilisation road freight	46% (% assumed in the Ecoinvent V 3.6 database)

A5. Installation on site

The installation phase (A5) comprises mixing the raw materials in the delivery truck and pumping the wet mix into place on site. Diesel is used to generate energy for mixing and pumping on site.

On-site construction losses are minimal, as the process of mixing and placing is very precisely controlled, to tie in with the volume of space to be filled. Any unused materials are returned to the production location at Cappagh, for use on future projects. It is assumed from site experience that losses are in the order of 1%, but in all cases, the EPS beads are recovered from these on-site losses and re-used again in the next project. So on-site losses in this LCA are applied only to the cement.

C1. De-construction demolition

In the deconstruction/demolition stage C1 it is assumed that the BEPS is removed during the demolition process. It is assumed that crushing of the BEPS occurs concurrently with the demolition/removal of the material from its in-situ configuration.

C2. Transport

In the transport phase C2, it is assumed that the removed materials travel 50km to landfill, as per default values in the Product Category Rules PCR for EPD Ireland.

C3. Waste processing

N/A.

C4. Disposal

The end of life processing scenario is assumed to be landfill, C4. This is the default scenario for mixed materials in the Product Category Rules PCR for EPD Ireland [5], where 100% of mixed materials are assumed to go to landfill, which is appropriate for the BEPS, as they are made of a mix of different materials.

D. Reuse – Recovery – Recycling potential

N/A.

Declaration of biogenic carbon content at the production gate

There is no biogenic carbon in any of the raw materials, thus the biogenic carbon content of the BEPS products is zero.

No packaging is used, as the product materials are delivered to site in bulk containers on the delivery/mixing truck.

Additional Technical Information

N/A.

7. Mandatory additional information on release of dangerous substances to indoor air, soil and water

None of the substances contained in the product are listed in the “Candidate List of Substances of Very High Concern for authorisation”, or they do not exceed the limit for registration with the European Chemicals Agency.

8. Other optional additional environmental information

N/A.

9. References

[1] ISO 14040: Environmental management - Life cycle assessment – Principles and Framework', International Organization for Standardization, ISO14040:2006.

[2] ISO 14044: Environmental management - Life cycle assessment - Requirements and guidelines', International Organization for Standardization, ISO14044:2006.

[3] ISO 14025: Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures', International Organization for Standardization, ISO14025:2006.

[4] I.S. EN 15804:2012+A2:2019,: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products', EN 15804:2012+A2:2019.

[5] Ecochain, Version 3.5.13 (2022), web: http://app.ecochain.com.

[6] Product Category Rules : Part A Implementation and use of I.S. EN 15804:2012+A1 and + A2, and CEN TR 16970:2016 in Ireland for the development of Environmental Product Declarations (issued 05.03.2022), version 2.1.

[7] CML - Department of Industrial Ecology, CML-IA Characterisation Factors, Dated August 2016, Leiden University, Leiden, Netherlands Available at: https://www.universiteitleiden.nl/en/research/research-output/science/cml-ia-characterisation-factors

[8] Ministerie van Verkeer en Waterstaat, 8 maart 2004, Toxiciteit heeft z'n prijs, Schaduwprijzen voor (eco-) toxiciteit en uitputting van abiotische grondstoffen binnen DuboCalc.

[9] PEF methodology final draft.pdf (europa.eu)

10. Annex

N/A.