

B-EPD ENVIRONMENTAL PRODUCT DECLARATION

ISOPROC Loose-fill cellulose insulation iQ3

1 m² of thermal insulation with 3 distinct applications

- Open blowing for attics
- Blown into pitched roof
- Blown into walls

Issued 17.03.2021
Valid until 17.03.2026

Third party verified
Conform to ISO 14025, EN 15804+A2 and NBN/DTD B08-001
NBN EN 16783

Modules declared (cradle to grave)					
A123	A4	A5	B	C	D
•	•	•	•	•	•

[B-EPD n° 21-0048-002-00-00-EN]



OWNER OF THIS ENVIRONMENTAL PRODUCT DECLARATION
ISOPROC



EPD PROGRAM OPERATOR
**Federal Public Service of Health, Food Chain Safety
and Environment**
www.b-epd.be

The intended use of this EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings. This EPD is only valid when registered on www.b-epd.be. The FPS Public Health cannot be held responsible for the information provided by the owner of the EPD.

PRODUCT DESCRIPTION

PRODUCT NAME

Loose-fill cellulose insulation, iQ3

Included brand names are:

- iQ3
- iQ3-cellulose
- Cellulose-iQ3



PRODUCT DESCRIPTION AND INTENDED USE

Loose-fill cellulose insulation products are made from recycled newspaper with additives of inorganic flame-retardant. This insulation material is used for thermal and acoustical insulation of buildings. It is used to insulate walls, roofs, attics, and mezzanine floors.

The EPD is conducted for ISOPROC cellulose insulation product applied in open blowing for attics, blown into pitched roofs and blown into walls.

REFERENCE FLOW / DECLARED UNIT

The declared unit is 1 kg of cellulose loose-fill insulation. The functional unit is defined for each application: open blowing for attics, blown into pitched roofs and blown into walls (3 functional units).

Functional unit for open blowing attics application:

"The thermal insulation of 1m² open attic, with a cellulose loose-fill insulation, the density of 30 kg/m³ with a thickness of 266 mm that gives an overall thermal resistance, R-value, of 7 m².K/W, with a design life span of 60 years."

Functional unit for the pitched roof application:

"The thermal insulation of 1m² pitched roof applications, with a cellulose loose-fill insulation, the density of 48 kg/m³ with a thickness of 266 mm that gives an overall thermal resistance, R-value, of 7 m².K/W, with a design life span of 60 years."

Functional unit for the wall application:

"The thermal insulation of 1m² wall applications, with a cellulose loose-fill insulation, the density of 50 kg/m³ with a thickness of 133 mm that gives an overall thermal resistance, R-value, of 3.5 m².K/W, with a design life span of 60 years."

Packaging and installation are included.

Ancillary materials for installation are included.

There are no materials needed for mounting and/or installing the product.

The weight per reference flow depends on the application (open blowing for attics, blown into a pitched roof, blown into walls).

- Open blowing attics: 7,98 kg/m²
- Pitched roof: 12,77 kg/m²
- Wall: 6,65 kg/m².

IMAGES OF THE PRODUCT AND ITS INSTALLATION



Fig 1: Loose fill cellulose insulation material



Fig 2: Cellulose insulation in open attics



Fig 3: Cellulose insulation in a pitched roof



Fig 4: Cellulose insulation in a wall

INSTALLATION

Energy consumption for blowing the cellulose insulation is included in this EPD. The impact of blowing machine is neglected and consider as part of cut-off.

COMPOSITION AND CONTENT

This paragraph shall be split up in following parts:

- The main components of the product
- For every main component of the product its composition

The program operator decides case per case on the level of detail needed. It should be sufficiently detailed and ranges are allowed.

Components	Composition / content / ingredients	Quantity
Product	-Recycled newspaper -Inorganic flame retardants	88-92% 8-12%
Fixation materials	-	-
Jointing materials	-	-
Treatments	-	-
Packaging	PE bags PE film Wood pallets	0,0056 kg/m ² 0,00056 kg/m ² 0,0094 kg/m ²

The loose-fill cellulose insulation contains boric acid – SVHC substance registered at ECHA – in a concentration above 0.1% of final product mass, as a fire retardant.

REFERENCE SERVICE LIFE

The reference service life is estimated at 60 years.

The conditions under which this RSL is valid are as following: If installed correctly according to manufacturer's guidelines, loose fill cellulose insulation products need no further maintenance, repair, replacement or refurbishment during the full life span of the product. If the product is applied and maintained following the installation and maintenance instructions the life span of 60 years is applicable.

DESCRIPTION OF GEOGRAPHICAL REPRESENTATIVITY

The EPD is representative for the Belgian market.

DESCRIPTION OF THE PRODUCTION PROCESS AND TECHNOLOGY

This product is made following the production protocols of ISOPROC.

Product stage (A1-3): The recycled newspaper is transported to the cellulose insulation production plant. The impurities are separated, and the paper is shredded. A paper that contains a tiny amount of impurities is recycled into the process. When milling the shredded paper, fire retardants are added. The final product is packed and transported to the construction site.

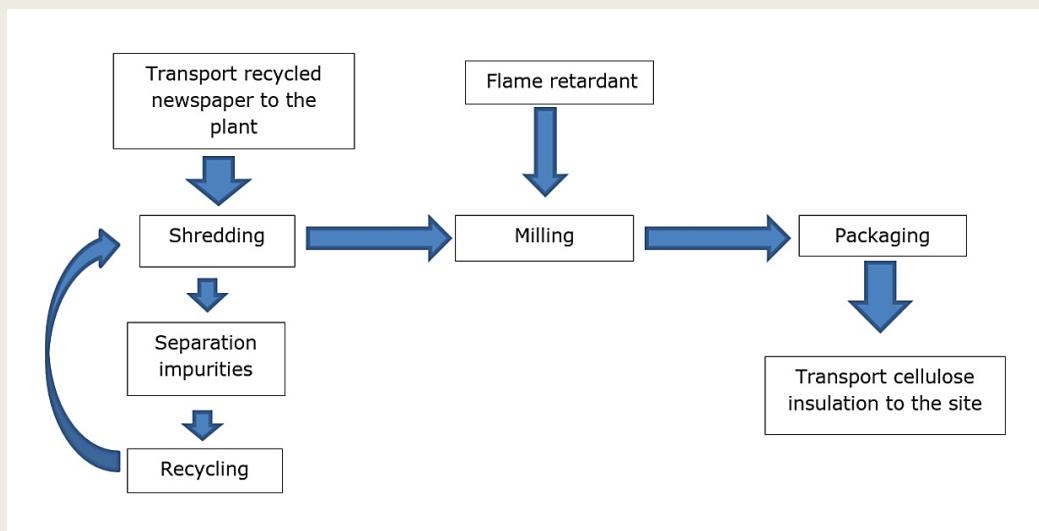


Fig.5: Flowchart illustrating the production process of cellulose insulation material

TECHNICAL DATA / PHYSICAL CHARACTERISTICS

Technical property	Standard	Value	Unit	Comment
Lambda value (λ)		0,038	W/(m·K)	Average EPB database *
Settlement according to ISO/CD 18393, Method C – Settling of wall cavity insulation by vibration	ISO/CD 18393	0	%	
Water vapour diffusion resistance factor (μ -value)		1	μ	
Fire resistance class (EN 13501-01) 40 – 100 mm \geq 100 mm	EN 13501-01	40-100mm: B, \geq 100mm: B, s2-d0		
Specific heat value (decrement delay)		12,14	MJ/kg	
<i>Open blowing attics product description</i>				
Lowest density		23	kg/m ³	
Highest density		35	kg/m ³	
Average** gross density		30	kg/m ³	
<i>Pitched roof product description</i>				
Lowest density		35	kg/m ³	
Highest density		57	kg/m ³	
Average gross density		48	kg/m ³	
<i>Wall applications product description</i>				
Lowest density		40	kg/m ³	
Highest density		65	kg/m ³	
Average gross density		50	kg/m ³	

*Lambda Value which is declared (and verified) in the EPB database <http://www.epbd.be/>
The Average density is obtained based on the weighted average (based on sale volumes) of the declared density provided by the participating companies.

LCA STUDY

DATE OF LCA STUDY

The LCA study is conducted in December 2020 and verified. The information contained in this document is provided under the responsibility of ISOPROC according to EN 15804.

SOFTWARE

When calculating the environmental impact categories, SimaPro version 9.1.0.7 was used as well as environmental data from the Ecoinvent database, version 3.6.

INFORMATION ON ALLOCATION

No co-product allocation occurs in the product foreground system. No multi-input allocation occurs in the product system. The allocations from the background database are kept intact.

INFORMATION ON CUT OFF

The company reported the data. Some plausibility and completeness assessments and checks were conducted for some inputs. For a few remaining data, no extended assessment was conducted therefore accepting data gaps. In all cases, it is assumed that the cut-off criteria of EN 15804 are met.

INFORMATION ON EXCLUDED PROCESSES

Following processes were excluded for the inventory:

- The effects of capital goods and infrastructural processes have been excluded.
- Flows related to human activities such as employee transport and administration activity.

INFORMATION ON BIOGENIC CARBON MODELLING

Loose-fill cellulose insulation products are mainly made from old newspapers, with high biogenic carbon content. As long as the product is in use this carbon is stored in the product. For loose-fill and sprayed cellulose insulation products, the amount is assessed based on the following formula and is provided in the overall LCA results:

$$\text{CO}_2 \text{ content kg in air} = (\text{paper content}) \times 0,9 \text{ (factor } 10\% > 0\% \text{ moisture content)} \times 0,46 \text{ (IPCC, 2006) (carbon content)} \times 3,67 \\ (\text{mol ratio CO}_2 - \text{C}) \text{ presented in kg CO}_2 / \text{kg Cellulose materials.}$$

For EN 15804+A2 include following table:

Biogenic carbon content (kg C / FU)	
Biogenic carbon content in product (at the gate)	3.73E-1
Biogenic carbon content in accompanying packaging (at the gate)	1.67E-2

INFORMATION ON CARBON OFFSETTING

Carbon offsetting is not allowed in the EN 15804 and hence not taken into account in the calculations.

ADDITIONAL OR DEVIATING CHARACTERISATION FACTORS

The characterization factors from EC-JRC were applied. No additional or deviating characterisation factors were used.

DESCRIPTION OF THE VARIABILITY

The thickness for which a linearity can be assumed for the environmental impact is from 10 to 45 cm.

DATA

SPECIFICITY

The data used for the LCA is gathered from ISOPROC production facility. The data about the process and products are based upon frequent contact with the company to guarantee that this EPD is based on the most up-to-date production data.

PERIOD OF DATA COLLECTION

The data was collected and updated in 2019.

INFORMATION ON DATA COLLECTION

No adaptations of the data were found necessary.

DATABASE USED FOR BACKGROUND DATA

Eco-invent version 3.6 was used.

ENERGY MIX

The company specific energy mix is considered for the manufacturing partly generated by solar panels onsite.

The Belgium energy mix is used for the installation of the product in the building.

To declare the benefits beyond the system boundaries (module D), the Belgian energy mix was used.

PRODUCTION SITES

ISOPROC – PCIM Plant – Rue de Gorimont 8, 5590 Achène Belgium.

SYSTEM BOUNDARIES

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒

X = included in the EPD

MND = module not declared

POTENTIAL ENVIRONMENTAL IMPACTS PER 1KG OF AVERAGE INSULATION PRODUCT

The results of the LCIA are calculated by merging the results at the product level using the market shares. The results are provided for **1kg of the average insulation product**. The average installed density for the assessed product is 43 kg/m3.

	Production			Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction/ demolition	C2 Transport	C3 Waste processing	C4 Disposal	
 GWP total (kg CO2 equiv/FU)	-1,36E+00	5,45E-02	2,62E-02	1,89E-02	3,43E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,00E-03	2,17E-02	1,39E+00	0,00E+00	-2,16E-01
 GWP fossil (kg CO2 equiv/FU)	1,74E-02	5,45E-02	3,50E-02	1,89E-02	1,16E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,00E-03	2,17E-02	2,03E-02	0,00E+00	-2,27E-01
 GWP biogenic (kg CO2 equiv/FU)	-1,37E+00	2,44E-05	-1,02E-02	-2,61E-06	2,27E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,11E-06	1,16E-05	1,37E+00	0,00E+00	1,14E-02
 GWP luluc (kg CO2 equiv/FU)	7,21E-05	2,11E-05	1,36E-03	0,00E+00	2,52E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,15E-07	7,57E-06	6,55E-06	0,00E+00	-2,17E-04
 ODP (kg CFC 11 equiv/FU)	-1,37E-09	1,22E-08	3,72E-09	2,90E-11	-2,26E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,64E-10	4,92E-09	3,15E-09	0,00E+00	-3,80E-08
 AP (mol H+ equiv/FU)	6,21E-04	3,51E-04	1,70E-04	1,20E-04	2,96E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,19E-05	8,85E-05	2,48E-04	0,00E+00	-3,50E-04
 EP - freshwater (kg P equiv/FU)	3,35E-06	4,10E-07	1,01E-06	7,10E-09	5,47E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,46E-08	1,70E-07	3,54E-07	0,00E+00	-2,23E-06
 EP - marine (kg N equiv/FU)	5,26E-05	9,45E-05	2,78E-05	5,62E-05	7,24E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,85E-05	2,63E-05	9,98E-05	0,00E+00	-8,41E-05
 EP - terrestrial (mol N equiv/FU)	3,14E-04	1,05E-03	4,77E-04	6,16E-04	7,89E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,03E-04	2,91E-04	1,09E-03	0,00E+00	-9,77E-04
 POCP (kg NMVOC equiv/FU)	2,96E-06	3,04E-04	1,09E-04	1,54E-04	1,81E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,57E-05	8,90E-05	2,79E-04	0,00E+00	-2,90E-04

	ADP Elements (kg Sb equiv/FU)	1,21E-06	1,38E-06	5,91E-07	7,45E-10	7,79E-08	0,00E+00	6,14E-09	5,86E-07	1,95E-07	0,00E+00	-4,09E-07						
	ADP fossil fuels (MJ/FU)	4,84E-01	8,10E-01	1,06E+00	2,64E-01	-4,06E-02	0,00E+00	5,51E-02	3,27E-01	2,29E-01	0,00E+00	-5,79E+00						
	WDP (m³ water eq deprived /FU)	5,17E-02	2,18E-03	3,93E-02	7,19E-05	1,54E-03	0,00E+00	7,38E-05	9,09E-04	6,21E-03	0,00E+00	-4,47E-02						

GWP = Global Warming Potential (Climate Change); ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels;

RESOURCE USE PER 1KG OF AVERAGE INSULATION PRODUCT

	Production			Construction process		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Decommission / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
PERE	1,76E-01	1,10E-02	6,94E-01	2,99E-04	8,82E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,98E-04	4,61E-03	-1,21E+01	0,00E+00	-4,68E-01
PERM	1,21E+01	0,00E+00	2,86E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	1,23E+01	1,10E-02	6,95E-01	2,99E-04	8,82E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,98E-04	4,61E-03	-1,21E+01	0,00E+00	-4,68E-01
PENRE	6,36E-01	8,16E-01	1,13E+00	2,64E-01	-2,08E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,48E-02	3,29E-01	2,55E-01	0,00E+00	-6,35E+00
PENRM	0,00E+00	0,00E+00	2,51E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	6,36E-01	8,16E-01	1,38E+00	2,64E-01	-2,08E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,48E-02	3,29E-01	2,55E-01	0,00E+00	-6,35E+00

SM	9,00E-01	0,00E+00	0,00E+00																
RSF	0,00E+00	0,00E+00																	
NRSF	0,00E+00	0,00E+00																	
FW	1,43E-03	5,95E-05	6,21E-04	1,67E-06	4,12E-05	0,00E+00	1,97E-06	2,50E-05	5,45E-04	0,00E+00	-1,13E-03								

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 = Net use of freshwater

WASTE CATEGORIES & OUTPUT FLOWS PER 1KG OF AVERAGE INSULATION PRODUCT

	Production			Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Hazardous waste disposed kg/FU	1,44E-03	5,35E-04	1,13E-03	2,32E-08	4,49E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,47E-05	2,10E-04	2,23E-01	0,00E+00	-1,58E-03
Non-hazardous waste disposed kg/FU	1,30E-02	3,96E-02	1,17E-02	0,00E+00	1,57E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,14E-04	1,72E-02	8,84E-03	0,00E+00	-2,09E-02
Radioactive waste disposed kg/FU	1,79E-06	5,53E-06	5,66E-06	7,11E-06	-1,18E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,82E-07	2,23E-06	9,75E-07	0,00E+00	6,92E-06
Components for re-use kg/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,80E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Materials for recycling kg/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,16E-03	0,00E+00													
Materials for energy recovery kg/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,70E-03	0,00E+00	1,00E+00	0,00E+00	0,00E+00										
Exported energy heat MJ/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,02E-02	0,00E+00	2,43E+00	0,00E+00	0,00E+00										
Exported energy electricity MJ/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,51E-02	0,00E+00	1,21E+00	0,00E+00	0,00E+00										

IMPACT CATEGORIES ADDITIONAL TO EN 15804 PER 1KG OF AVERAGE INSULATION PRODUCT

		Production			Construction process		Use stage							End-of-life stage				D Reuse, recovery, recycling
		A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
	PM (disease incidence)	5,80E-09	3,59E-09	1,54E-09	9,75E-10	3,46E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,11E-09	1,51E-09	2,58E-09	0,00E+00	-1,83E-09
	IRHH (kg U235 eq/FU)	3,35E-03	3,53E-03	6,40E-03	4,61E-05	-4,65E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,36E-04	1,43E-03	7,47E-04	0,00E+00	-4,12E-02
	ETF (CTUe/FU)	1,87E+00	6,39E-01	5,18E-01	1,27E-02	6,31E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,32E-02	2,62E-01	9,54E-01	0,00E+00	-1,31E+00
	HTCE (CTUh/FU)	2,64E-11	1,98E-11	2,68E-11	3,33E-13	2,54E-12	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,16E-12	7,35E-12	7,63E-11	0,00E+00	-3,56E-11

	HTnCE (CTUh/FU)	1,06E-09	6,85E-10	4,62E-10	8,10E-12	5,19E-11	0,00E+00	2,85E-11	2,85E-10	8,98E-10	0,00E+00	-7,02E-10							
	Land Use Related impacts (dimensionless)	4,49E-01	5,23E-01	2,02E+00	0,00E+00	3,28E-02	0,00E+00	7,03E-03	2,25E-01	1,71E-01	0,00E+00	-1,91E+00							

HTCE = Human Toxicity – cancer effects; HTnCE = Human Toxicity – non cancer effects; ETF = Ecotoxicity – freshwater; PM = Particulate Matter; IRHH = Ionizing Radiation – human health effects;

POTENTIAL ENVIRONMENTAL IMPACTS IN OPEN BLOWING APPLICATION

The results of the LCIA are calculated for each application by merging the results at the product level using the market shares. The Life Cycle Impact assessment results and the results for additional indicators are provided below for 1m² of insulated open blowing attics with an R value equal to 7 m².K/W (thickness of 266 mm). The average installed density used for the calculation is 30 kg/m³ in open blowing applications.

	Production			Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
	GWP total (kg CO ₂ equiv/FU)	-1,08E+01	4,35E-01	2,09E-01	1,51E-01	2,74E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,19E-02	1,73E-01	1,11E+01	0,00E+00	-1,72E+00
	GWP fossil (kg CO ₂ equiv/FU)	1,38E-01	4,35E-01	2,80E-01	1,51E-01	9,24E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,19E-02	1,73E-01	1,62E-01	0,00E+00	-1,81E+00
	GWP biogenic (kg CO ₂ equiv/FU)	-1,10E+01	1,95E-04	-8,13E-02	-2,08E-05	1,81E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,88E-06	9,23E-05	1,09E+01	0,00E+00	9,13E-02
	GWP luluc (kg CO ₂ equiv/FU)	5,75E-04	1,69E-04	1,08E-02	0,00E+00	2,01E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,52E-06	6,04E-05	5,23E-05	0,00E+00	-1,73E-03
	ODP (kg CFC 11 equiv/FU)	-1,10E-08	9,76E-08	2,97E-08	2,32E-10	-1,80E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,90E-09	3,93E-08	2,52E-08	0,00E+00	-3,03E-07

	AP (mol H+ equiv/FU)	4,96E-03	2,80E-03	1,36E-03	9,57E-04	2,37E-04	0,00E+00	3,34E-04	7,07E-04	1,98E-03	0,00E+00	-2,80E-03						
	EP - freshwater (kg P equiv/FU)	2,67E-05	3,27E-06	8,06E-06	5,67E-08	4,37E-07	0,00E+00	1,16E-07	1,36E-06	2,83E-06	0,00E+00	-1,78E-05						
	EP - marine (kg N equiv/FU)	4,20E-04	7,54E-04	2,22E-04	4,48E-04	5,78E-05	0,00E+00	1,47E-04	2,10E-04	7,96E-04	0,00E+00	-6,71E-04						
	EP - terrestrial (mol N equiv/FU)	2,51E-03	8,37E-03	3,81E-03	4,92E-03	6,30E-04	0,00E+00	1,62E-03	2,32E-03	8,71E-03	0,00E+00	-7,80E-03						
	POCP (kg NMVOC equiv/FU)	2,36E-05	2,42E-03	8,68E-04	1,23E-03	1,45E-04	0,00E+00	4,45E-04	7,10E-04	2,23E-03	0,00E+00	-2,32E-03						
	ADP Elements (kg Sb equiv/FU)	9,66E-06	1,10E-05	4,72E-06	5,95E-09	6,22E-07	0,00E+00	4,90E-08	4,68E-06	1,56E-06	0,00E+00	-3,27E-06						
	ADP fossil fuels (MJ/FU)	3,86E+00	6,46E+00	8,42E+00	2,11E+00	-3,24E-01	0,00E+00	4,39E-01	2,61E+00	1,83E+00	0,00E+00	-4,62E+01						
	WDP (m³ water eq deprived /FU)	4,12E-01	1,74E-02	3,14E-01	5,74E-04	1,23E-02	0,00E+00	5,89E-04	7,26E-03	4,96E-02	0,00E+00	-3,57E-01						

GWP = Global Warming Potential (Climate Change); ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels;

RESOURCE USE IN OPEN BLOWING APPLICATION

	Production			Construction process		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
PERE	1,41E+00	8,76E-02	5,54E+00	2,38E-03	7,04E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,38E-03	3,68E-02	-9,68E+01	0,00E+00	-3,73E+00
PERM	9,69E+01	0,00E+00	2,28E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

PERT	9,83E+01	8,76E-02	5,54E+00	2,38E-03	7,04E-02	0,00E+00	2,38E-03	3,68E-02	-9,68E+01	0,00E+00	-3,73E+00							
PENRE	5,07E+00	6,51E+00	8,99E+00	2,11E+00	-1,66E+00	0,00E+00	4,37E-01	2,63E+00	2,03E+00	0,00E+00	-5,07E+01							
PENRM	0,00E+00	0,00E+00	2,01E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	5,07E+00	6,51E+00	1,10E+01	2,11E+00	-1,66E+00	0,00E+00	4,37E-01	2,63E+00	2,03E+00	0,00E+00	-5,07E+01							
SM	7,18E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	1,14E-02	4,75E-04	4,95E-03	1,34E-05	3,28E-04	0,00E+00	1,57E-05	1,99E-04	4,35E-03	0,00E+00	-8,99E-03							

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 = Net use of freshwater

WASTE CATEGORIES & OUTPUT FLOWS IN OPEN BLOWING APPLICATION

	Production			Construction process stage		Use stage							End-of-life stage			D Reuse, recovery, recycling	
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	

Hazardous waste disposed kg/FU	1,15E-02	4,27E-03	9,03E-03	1,85E-07	3,59E-02	0,00E+00	1,57E-05	1,99E-04	4,35E-03	0,00E+00	-8,99E-03							
Non-hazardous waste disposed kg/FU	1,04E-01	3,16E-01	9,34E-02	0,00E+00	1,26E-02	0,00E+00	2,77E-04	1,68E-03	1,78E+00	0,00E+00	-1,26E-02							
Radioactive waste disposed kg/FU	1,43E-05	4,41E-05	4,52E-05	5,67E-05	-9,39E-06	0,00E+00	1,71E-03	1,37E-01	7,05E-02	0,00E+00	-1,67E-01							
Components for re-use kg/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,03E-05	0,00E+00	3,05E-06	1,78E-05	7,78E-06	0,00E+00	5,53E-05							
Materials for recycling kg/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,73E-02	0,00E+00												
Materials for energy recovery kg/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,96E-02	0,00E+00	7,98E+00	0,00E+00	0,00E+00									
Exported energy heat MJ/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,41E-01	0,00E+00	1,94E+01	0,00E+00	0,00E+00									
Exported energy electricity MJ/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,20E-01	0,00E+00	9,69E+00	0,00E+00	0,00E+00									

IMPACT CATEGORIES ADDITIONAL TO EN 15804 IN OPEN BLOWING APPLICATION

	Production			Construction process		Use stage							End-of-life stage			D Reuse, recovery, recycling
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal

	PM	4,63E-08	2,86E-08	1,23E-08	7,78E-09	2,76E-09	0,00E+00	8,84E-09	1,20E-08	2,06E-08	0,00E+00	-1,46E-08						
	IRHH	2,67E-02	2,82E-02	5,11E-02	3,68E-04	-3,71E-03	0,00E+00	1,88E-03	1,14E-02	5,96E-03	0,00E+00	-3,29E-01						
	ETF	1,49E+01	5,10E+00	4,13E+00	1,02E-01	5,03E-01	0,00E+00	2,65E-01	2,09E+00	7,61E+00	0,00E+00	-1,04E+01						
	HTCE	2,10E-10	1,58E-10	2,14E-10	2,65E-12	2,02E-11	0,00E+00	9,26E-12	5,87E-11	6,09E-10	0,00E+00	-2,84E-10						
	HTnCE	8,48E-09	5,46E-09	3,69E-09	6,47E-11	4,14E-10	0,00E+00	2,27E-10	2,28E-09	7,16E-09	0,00E+00	-5,60E-09						
	<i>Land Use Related impacts (dimensionless)</i>	3,58E+00	4,17E+00	1,61E+01	0,00E+00	2,62E-01	0,00E+00	5,61E-02	1,80E+00	1,36E+00	0,00E+00	-1,53E+01						

HTCE = Human Toxicity – cancer effects; HTnCE = Human Toxicity – non cancer effects; ETF = Ecotoxicity – freshwater; PM = Particulate Matter; IRHH = Ionizing Radiation – human health effects;

POTENTIAL ENVIRONMENTAL IMPACTS IN A PITCHED ROOF APPLICATION

The results of the LCIA are calculated for each application by merging the results at the product level using the market shares. The Life Cycle Impact assessment results and the results for additional indicators are provided for **1m² of the insulated roof with an R value equal to 7 m².K/W** (thickness of 266 mm). The average installed density used for the calculation is 48 kg/m³ in roof application.

	Production			Construction process stage		Use stage							End-of-life stage			D Reuse, recovery, recycling	
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction/ demolition	C2 Transport	C3 Waste processing	C4 Disposal	
	GWP total (kg CO ₂ equiv/FU)	-1,73E+01	6,96E-01	3,35E-01	2,42E-01	4,38E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,11E-02	2,77E-01	1,77E+01	0,00E+00	-2,76E+00
	GWP fossil (kg CO ₂ equiv/FU)	2,22E-01	6,95E-01	4,47E-01	2,42E-01	1,48E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,11E-02	2,77E-01	2,59E-01	0,00E+00	-2,90E+00
	GWP biogenic (kg CO ₂ equiv/FU)	-1,75E+01	3,12E-04	-1,30E-01	-3,33E-05	2,90E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,42E-05	1,48E-04	1,75E+01	0,00E+00	1,46E-01
	GWP luluc (kg CO ₂ equiv/FU)	9,20E-04	2,70E-04	1,74E-02	0,00E+00	3,22E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,03E-06	9,67E-05	8,37E-05	0,00E+00	-2,77E-03
	ODP (kg CFC 11 equiv/FU)	-1,75E-08	1,56E-07	4,76E-08	3,71E-10	-2,89E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,10E-08	6,29E-08	4,03E-08	0,00E+00	-4,86E-07
	AP (mol H+ equiv/FU)	7,93E-03	4,48E-03	2,17E-03	1,53E-03	3,79E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,34E-04	1,13E-03	3,17E-03	0,00E+00	-4,47E-03
	EP - freshwater (kg P equiv/FU)	4,28E-05	5,24E-06	1,29E-05	9,07E-08	6,99E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,86E-07	2,17E-06	4,52E-06	0,00E+00	-2,85E-05
	EP - marine (kg N equiv/FU)	6,72E-04	1,21E-03	3,55E-04	7,18E-04	9,25E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,36E-04	3,35E-04	1,27E-03	0,00E+00	-1,07E-03
	EP - terrestrial (mol N equiv/FU)	4,02E-03	1,34E-02	6,09E-03	7,87E-03	1,01E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,59E-03	3,71E-03	1,39E-02	0,00E+00	-1,25E-02

 POCP (kg NMVOC equiv/FU)	3,78E-05	3,88E-03	1,39E-03	1,97E-03	2,31E-04	0,00E+00	7,12E-04	1,14E-03	3,56E-03	0,00E+00	-3,71E-03						
 ADP Elements (kg Sb equiv/FU)	1,55E-05	1,76E-05	7,55E-06	9,52E-09	9,95E-07	0,00E+00	7,84E-08	7,49E-06	2,49E-06	0,00E+00	-5,23E-06						
 ADP fossil fuels (MJ/FU)	6,18E+00	1,03E+01	1,35E+01	3,37E+00	-5,18E-01	0,00E+00	7,03E-01	4,17E+00	2,93E+00	0,00E+00	-7,40E+01						
 WDP (m³ water eq deprived /FU)	6,60E-01	2,78E-02	5,02E-01	9,18E-04	1,97E-02	0,00E+00	9,42E-04	1,16E-02	7,94E-02	0,00E+00	-5,71E-01						

GWP = Global Warming Potential (Climate Change); ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels;

RESOURCE USE IN PITCHED ROOF APPLICATION

	Production			Construction process		Use stage							End-of-life stage				D Reuse, recycling
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
PERE	2,25E+00	1,40E-01	8,87E+00	3,82E-03	1,13E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,80E-03	5,89E-02	-1,55E+02	0,00E+00	-5,97E+00
PERM	1,55E+02	0,00E+00	3,65E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	1,57E+02	1,40E-01	8,87E+00	3,82E-03	1,13E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,80E-03	5,89E-02	-1,55E+02	0,00E+00	-5,97E+00
PENRE	8,12E+00	1,04E+01	1,44E+01	3,37E+00	-2,66E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,00E-01	4,21E+00	3,25E+00	0,00E+00	-8,11E+01
PENRM	0,00E+00	0,00E+00	3,21E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

PENRT	8,12E+00	1,04E+01	1,76E+01	3,37E+00	-2,66E+00	0,00E+00	7,00E-01	4,21E+00	3,25E+00	0,00E+00	-8,11E+01						
SM	1,15E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
RSF	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
NRSF	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
FW	1,82E-02	7,60E-04	7,93E-03	2,14E-05	5,26E-04	0,00E+00	2,52E-05	3,19E-04	6,95E-03	0,00E+00							
																	-1,44E-02

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 = Net use of freshwater

WASTE CATEGORIES & OUTPUT FLOWS IN PITCHED ROOFS APPLICATION

	Production			Construction process stage		Use stage							End-of-life stage			D Reuse, recovery, recycling	
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Hazardous waste disposed kg/FU	1,84E-02	6,83E-03	1,45E-02	2,97E-07	5,74E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,44E-04	2,68E-03	2,85E+00	0,00E+00	-2,02E-02
Non-hazardous waste disposed kg/FU	1,67E-01	5,05E-01	1,49E-01	0,00E+00	2,01E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,73E-03	2,19E-01	1,13E-01	0,00E+00	-2,67E-01
Radioactive waste disposed kg/FU	2,29E-05	7,06E-05	7,23E-05	9,08E-05	-1,50E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,88E-06	2,85E-05	1,25E-05	0,00E+00	8,84E-05

Components for re-use kg/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,85E-05	0,00E+00													
Materials for recycling kg/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,76E-02	0,00E+00													
Materials for energy recovery kg/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,73E-02	0,00E+00	1,28E+01	0,00E+00	0,00E+00	0,00E+00									
Exported energy heat MJ/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,85E-01	0,00E+00	3,10E+01	0,00E+00	0,00E+00	0,00E+00									
Exported energy electricity MJ/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,93E-01	0,00E+00	1,55E+01	0,00E+00	0,00E+00	0,00E+00									

IMPACT CATEGORIES ADDITIONAL TO EN 15804 IN PITCHED ROOFS APPLICATION

		Production			Construction process		Use stage							End-of-life stage				D Reuse, recovery, recycling
		A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
	PM	7,41E-08	4,58E-08	1,96E-08	1,24E-08	4,42E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,41E-08	1,93E-08	3,29E-08	0,00E+00	-2,34E-08
	IRHH	4,28E-02	4,51E-02	8,17E-02	5,89E-04	-5,93E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,01E-03	1,82E-02	9,53E-03	0,00E+00	-5,26E-01
	ETF	2,39E+01	8,16E+00	6,62E+00	1,63E-01	8,06E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,24E-01	3,34E+00	1,22E+01	0,00E+00	-1,67E+01

	HTCE	3,37E-10	2,53E-10	3,42E-10	4,25E-12	3,24E-11	0,00E+00	1,48E-11	9,39E-11	9,74E-10	0,00E+00	-4,55E-10						
	HTnCE	1,36E-08	8,74E-09	5,90E-09	1,03E-10	6,63E-10	0,00E+00	3,64E-10	3,64E-09	1,15E-08	0,00E+00	-8,96E-09						
	<i>Land Use Related impacts (dimensionless)</i>	5,74E+00	6,67E+00	2,58E+01	0,00E+00	4,19E-01	0,00E+00	8,98E-02	2,88E+00	2,18E+00	0,00E+00	-2,44E+01						

HTCE = Human Toxicity – cancer effects; HTnCE = Human Toxicity – non cancer effects; ETF = Ecotoxicity – freshwater; PM = Particulate Matter; IRHH = Ionizing Radiation – human health effects;

POTENTIAL ENVIRONMENTAL IMPACTS IN WALL APPLICATION

The results of the LCIA are calculated for each application by merging the results at the product level using the market shares. The Life Cycle Impact assessment results and the results for additional indicators are provided for **1m² of the insulated wall with an R value equal to 3.5 m²·K/W** (thickness of 133 mm). The average installed density used for the calculation is 50 kg/m³ in wall application.

	Production			Construction process stage		Use stage							End-of-life stage			D Reuse, recovery, recycling	
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction/ demolition	C2 Transport	C3 Waste processing	C4 Disposal	
	GWP total (kg CO ₂ equiv/FU)	-9,01E+00	3,62E-01	1,74E-01	1,26E-01	2,28E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,66E-02	1,44E-01	9,23E+00	0,00E+00	-1,44E+00
	GWP fossil (kg CO ₂ equiv/FU)	1,15E-01	3,62E-01	2,33E-01	1,26E-01	7,70E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,66E-02	1,44E-01	1,35E-01	0,00E+00	-1,51E+00
	GWP biogenic (kg CO ₂ equiv/FU)	-9,13E+00	1,62E-04	-6,78E-02	-1,74E-05	1,51E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,40E-06	7,69E-05	9,09E+00	0,00E+00	7,61E-02
	GWP luluc (kg CO ₂ equiv/FU)	4,79E-04	1,41E-04	9,04E-03	0,00E+00	1,68E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,10E-06	5,04E-05	4,36E-05	0,00E+00	-1,44E-03
	ODP (kg CFC 11 equiv/FU)	-9,13E-09	8,14E-08	2,48E-08	1,93E-10	-1,50E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,75E-09	3,27E-08	2,10E-08	0,00E+00	-2,53E-07
	AP (mol H+ equiv/FU)	4,13E-03	2,33E-03	1,13E-03	7,97E-04	1,97E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,78E-04	5,89E-04	1,65E-03	0,00E+00	-2,33E-03
	EP - freshwater (kg P equiv/FU)	2,23E-05	2,73E-06	6,71E-06	4,72E-08	3,64E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,69E-08	1,13E-06	2,35E-06	0,00E+00	-1,48E-05
	EP - marine (kg N equiv/FU)	3,50E-04	6,29E-04	1,85E-04	3,74E-04	4,81E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,23E-04	1,75E-04	6,64E-04	0,00E+00	-5,59E-04
	EP - terrestrial (mol N equiv/FU)	2,09E-03	6,97E-03	3,17E-03	4,10E-03	5,25E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,35E-03	1,93E-03	7,25E-03	0,00E+00	-6,50E-03

	POCP (kg NMVOC equiv/FU)	1,97E-05	2,02E-03	7,24E-04	1,02E-03	1,21E-04	0,00E+00	3,71E-04	5,92E-04	1,86E-03	0,00E+00	-1,93E-03						
	ADP Elements (kg Sb equiv/FU)	8,05E-06	9,17E-06	3,93E-06	4,96E-09	5,18E-07	0,00E+00	4,08E-08	3,90E-06	1,30E-06	0,00E+00	-2,72E-06						
	ADP fossil fuels (MJ/FU)	3,22E+00	5,38E+00	7,02E+00	1,76E+00	-2,70E-01	0,00E+00	3,66E-01	2,17E+00	1,52E+00	0,00E+00	-3,85E+01						
	WDP (m³ water eq deprived /FU)	3,44E-01	1,45E-02	2,61E-01	4,78E-04	1,02E-02	0,00E+00	4,91E-04	6,05E-03	4,13E-02	0,00E+00	-2,98E-01						

GWP = Global Warming Potential (Climate Change); ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels;

RESOURCE USE IN WALL APPLICATION

	Production			Construction process		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
PERE	1,17E+00	7,30E-02	4,62E+00	1,99E-03	5,86E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,98E-03	3,07E-02	-8,07E+01	0,00E+00	-3,11E+00
PERM	8,07E+01	0,00E+00	1,90E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	8,19E+01	7,30E-02	4,62E+00	1,99E-03	5,86E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,98E-03	3,07E-02	-8,07E+01	0,00E+00	-3,11E+00
PENRE	4,23E+00	5,42E+00	7,49E+00	1,76E+00	-1,38E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,64E-01	2,19E+00	1,69E+00	0,00E+00	-4,22E+01
PENRM	0,00E+00	0,00E+00	1,67E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	4,23E+00	5,42E+00	9,17E+00	1,76E+00	-1,38E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,64E-01	2,19E+00	1,69E+00	0,00E+00	-4,22E+01

SM	5,99E+00	0,00E+00	0,00E+00																
RSF	0,00E+00	0,00E+00																	
NRSF	0,00E+00	0,00E+00																	
FW	9,48E-03	3,96E-04	4,13E-03	1,11E-05	2,74E-04	0,00E+00	1,31E-05	1,66E-04	3,62E-03	0,00E+00	-7,49E-03								

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 = Net use of freshwater

WASTE CATEGORIES & OUTPUT FLOWS IN WALLS APPLICATION

	Production			Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Hazardous waste disposed kg/FU	9,60E-03	3,56E-03	7,53E-03	1,54E-07	2,99E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,31E-04	1,40E-03	1,48E+00	0,00E+00	-1,05E-02
Non-hazardous waste disposed kg/FU	8,67E-02	2,63E-01	7,78E-02	0,00E+00	1,05E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,42E-03	1,14E-01	5,88E-02	0,00E+00	-1,39E-01
Radioactive waste disposed kg/FU	1,19E-05	3,68E-05	3,77E-05	4,73E-05	-7,82E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,54E-06	1,48E-05	6,49E-06	0,00E+00	4,60E-05
Components for re-use kg/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,53E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Materials for recycling kg/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,44E-02	0,00E+00													
Materials for energy recovery kg/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,46E-02	0,00E+00	6,65E+00	0,00E+00	0,00E+00										
Exported energy heat MJ/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,01E-01	0,00E+00	1,61E+01	0,00E+00	0,00E+00										
Exported energy electricity MJ/FU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,00E-01	0,00E+00	8,07E+00	0,00E+00	0,00E+00	0,00E+00									

IMPACT CATEGORIES ADDITIONAL TO EN 15804 IN WALLS APPLICATION

		Production			Construction process		Use stage							End-of-life stage				D Reuse, recovery, recycling
		A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
	PM	3,86E-08	2,39E-08	1,02E-08	6,48E-09	2,30E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,36E-09	1,00E-08	1,72E-08	0,00E+00	-1,22E-08
	IRHH	2,23E-02	2,35E-02	4,25E-02	3,07E-04	-3,09E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,57E-03	9,50E-03	4,96E-03	0,00E+00	-2,74E-01
	ETF	1,24E+01	4,25E+00	3,45E+00	8,47E-02	4,19E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,21E-01	1,74E+00	6,34E+00	0,00E+00	-8,70E+00
	HTCE	1,75E-10	1,32E-10	1,78E-10	2,21E-12	1,69E-11	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,72E-12	4,89E-11	5,07E-10	0,00E+00	-2,37E-10

	HTnCE	7,06E-09	4,55E-09	3,07E-09	5,39E-11	3,45E-10	0,00E+00	1,90E-10	1,90E-09	5,97E-09	0,00E+00	-4,67E-09						
	<i>Land Use Related impacts (dimensionless)</i>	2,99E+00	3,48E+00	1,35E+01	0,00E+00	2,18E-01	0,00E+00	4,67E-02	1,50E+00	1,14E+00	0,00E+00	-1,27E+01						

HTCE = Human Toxicity – cancer effects; HTnCE = Human Toxicity – non cancer effects; ETF = Ecotoxicity – freshwater; PM = Particulate Matter; IRHH = Ionizing Radiation – human health effects; WRD = Water Resource Depletion: LUO – SOM = Land Use Occupation – SOM; LUO – B, all: Land Use Occupation – biodiversity ALL; LUO – B, u: Land Use Occupation – biodiversity Urban; LUO – B, a: Land Use Occupation – biodiversity agricultural; LUO – B, f: Land Use Occupation – biodiversity forest; LUT – SOM = Land Use Transformation – SOM; LUT – B all = Land Use Transformation – Biodiversity ALL; LUT – B, u = Land Use Transformation – Biodiversity Urban; LUT – B, a = Land Use Transformation – Biodiversity agricultural; LUT – B, f = Land Use Transformation – Biodiversity forest; LUT – B, tr r = Land Use Transformation – Biodiversity transition rainforest

	 Global Warming Potential	<p>The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.</p> <p>It is split up in 4:</p> <ul style="list-style-type: none"> - Global Warming Potential total (GWP-total) which is the sum of GWP-fossil, GWP-biogenic and GWP-luluc - Global Warming Potential fossil fuels (GWP-fossil) : The global warming potential related to greenhouse gas (GHG) emissions to any media originating from the oxidation and/or reduction of fossil fuels by means of their transformation or degradation (e.g. combustion, digestion, landfilling, etc). - Global Warming Potential biogenic (GWP-biogenic) : The global warming potential related to carbon emissions to air (CO₂, CO and CH₄) originating from the oxidation and/or reduction of aboveground biomass by means of its transformation or degradation (e.g. combustion, digestion, composting, landfilling) and CO₂ uptake from the atmosphere through photosynthesis during biomass growth – i.e. corresponding to the carbon content of products, biofuels or above ground plant residues such as litter and dead wood.¹ - Global Warming Potential land use and land use change (GWP-luluc): The global warming potential related to carbon uptakes and emissions (CO₂, CO and CH₄) originating from carbon stock changes caused by land use change and land use. This sub-category includes biogenic carbon exchanges from deforestation, road construction or other soil activities (including soil carbon emissions).
 Ozone Depletion		Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules.
 Acidification potential		Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.
 Eutrophication potential		<p>The potential to cause over-fertilization of water and soil, which can result in increased growth of biomass and following adverse effects.</p> <p>It is split up in 3:</p> <ul style="list-style-type: none"> - Eutrophication potential – freshwater: The potential to cause over-fertilization of freshwater, which can result in increased growth of biomass and following adverse effects. - Eutrophication potential – marine: The potential to cause over-fertilization of marine water, which can result in increased growth of biomass and following adverse effects. - Eutrophication potential – terrestrial: The potential to cause over-fertilization of soil, which can result in increased growth of biomass and following adverse effects.
 Photochemical ozone creation		Chemical reactions brought about by the light energy of the sun creating photochemical smog. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.
 Abiotic depletion potential for non-fossil resources		<p>Consumption of non-renewable resources, thereby lowering their availability for future generations. Expressed in comparison to Antimonium (Sb).</p> <p>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 experience with the indicator.</p>
 Abiotic depletion potential for fossil resources		<p>Measure for the depletion of fossil fuels such as oil, natural gas, and coal. The stock of the fossil fuels is formed by the total amount of fossil fuels, expressed in Megajoules (MJ).</p> <p>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 experience with the indicator.</p>
 Ecotoxicity for aquatic fresh water		<p>The impacts of chemical substances on ecosystems (freshwater).</p> <p>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 experience with the indicator.</p>
 Human toxicity (carcinogenic effects)		The impacts of chemical substances on human health via three parts of the environment: air, soil and water.

¹ Carbon exchanges from native forests shall be modelled under GWP - luluc (including connected soil emissions, derived products or residues), while their CO₂ uptake is excluded.

		<p><i>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.</i></p>
	Human toxicity (non-carcinogenic effects)	<p><i>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.</i></p>
	Particulate matter	<p><i>Accounts for the adverse health effects on human health caused by emissions of Particulate Matter (PM) and its precursors (NOx, SOx, NH3)</i></p>
	Resource depletion (water)	<p><i>Accounts for water use related to local scarcity of water as freshwater is a scarce resource in some regions, while in others it is not.</i></p> <p><i>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.</i></p>
	Ionizing radiation - human health effects	<p><i>This impact category deals mainly with the eventual impact on human health of low dose ionizing radiation 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.</i></p>
	Land use related impacts	<p><i>The indicator is the “soil quality index” which is the result of an aggregation of following four aspects:</i></p> <ul style="list-style-type: none">- Biotic production- Erosion resistance- Mechanical filtration- Groundwater <p><i>The aggregation is done based on a JRC model. The four aspects are quantified through the LANCA model for land use.</i></p> <p><i>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.</i></p>

DETAILS OF THE UNDERLYING SCENARIOS USED TO CALCULATE THE IMPACTS

A1 – A3 RAW MATERIAL SUPPLY

The module A1 includes raw material extraction and processing, processing of secondary material input (e.g. recycling processes), and additives.

recycling, for energy recovery, disposal (specified by route)			
Direct emissions to ambient air, soil and water	-		
Distance	100 km to incineration	50 km to landfilling	30 km to sorting plant

A2 – TRANSPORT TO THE MANUFACTURER

The recycled newspaper and additives are transported to the cellulose insulation production plant. Transportation distances from the raw material manufacturer to the factory gate are given by the manufacturer.

A3 – MANUFACTURING

The impurities are separated, and the paper is shredded. Paper still containing tiny amounts of impurities is recycled into the process. When milling the shredded paper, fire retardants are added. The packaging for cellulose insulation is also included in this module.

A4 – TRANSPORT TO THE BUILDING SITE

Fuel type and consumption of vehicle or vehicle type used for transport	Truck 16-32 tons 75% to clients	Truck 16-32 tons 25% to sellers
Distance	169 km	178 km
Capacity utilisation (including empty returns)	72,3% (workload * (1-empty return/2))	72,3% (workload * (1-empty return/2))
Bulk density of transported products	30 kg/m³ (average)	30 kg/m³ (average)
Volume capacity utilisation factor	63% (16t of 27t max load)	63% (16t of 27t max load)

- 75% directly to the construction site over 169 km average with “Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, S”
- 25% directly to sellers over 178 km average with “Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, S”

A5 – INSTALLATION IN THE BUILDING

At the construction site, packaging materials are released. Also 2% material losses have been considered.

Ancillary materials for installation (specified by material);	-		
Water use	-		
Other resource use	-		
Quantitative description of energy type (regional mix) and consumption during the installation process	Electricity, low voltage {BE} – Belgian mix	0,00094 kg/m²	
Waste materials on the building site before waste processing, generated by the product's installation (specified by type)	0,0056 kg/m² PE film bags	0,0094 kg/m² pallets	0,00056 kg/m² PE film
Output materials (specified by type) as result of waste processing at the building site e.g. of collection for	-		

B – USE STAGE (EXCLUDING POTENTIAL SAVINGS)

If installed correctly according to the manufacturers' and suppliers' guidelines, loose-fill cellulose insulation products need no further maintenance, repair, replacement or refurbishment during the full life span of the product. If the product is applied following the installation instructions the life span of 60 years is applicable.

C: END OF LIFE

The dismantling is very easy: the cellulose material may be sucked with a hose to the truck at the road and may be reused or recycled if appropriate. This process is a fast reverse process of installing. 100% of incineration with energy recovery in Belgium.

Module C2 – Transport to waste processing					
Type of vehicle (truck/boat/etc.)	Fuel consumption (litres/km)	Distance (km)	Capacity utilisation (%)	Density of products (kg/m³)	Assumptions
Transport, freight, lorry 16-32 metric ton, EURO5 {RER} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, S		30 km to sorting plant	42,5% (workload* (1-empty return/2))	30 kg/m³	Empty return 100%
Transport, freight, lorry 16-32 metric ton, EURO5 {RER} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, S		100 km to incineration	42,5% (workload* (1-empty return/2))	30 kg/m³	Empty return 100%

End-of-life modules – C3 and C4		
Parameter	Unit	Value
Wastes collected separately	kg	
Wastes collected as mixed construction waste	kg	
Waste for re-use	kg	
Waste for recycling	kg	
Waste for energy recovery for 1 kg of product	kg	1
Waste for final disposal	kg	

D: BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The energy recovery from incineration of cellulose insulation material is considered as benefits beyond system boundary, calculated in module D. For incineration with energy recovery, heating value of 12,14 MJ was applied. Credits are assigned for power and heat outputs using the Belgian grid mix and thermal energy from natural gas. The latter represents cleanest fossil fuel

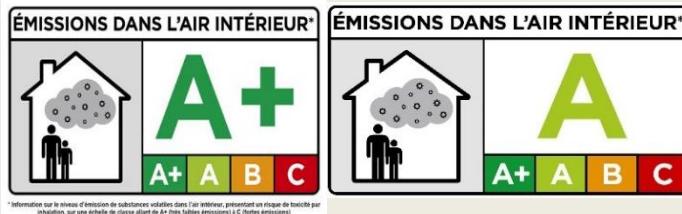
and therefore results in a conservative estimate of avoided burdens. For regional efficiencies and heat-to-power output ratios 20% is considered for avoided heat from natural gas and 10% is considered for the electricity production.

There are no benefits or loads of allocated co-products in module D.

ADDITIONAL INFORMATION ON RELEASE OF DANGEROUS SUBSTANCES TO INDOOR AIR, SOIL AND WATER DURING THE USE STAGE

INDOOR AIR

The VOC emission test, as part of mandatory environmental labeling, was carried out according to NF ISO EN 16000-3, NF ISO EN 16000-6, NF ISO EN 16000-9 and NF ISO EN 16000-11. The loose-fill cellulose insulation is rated as A+ for roof-floor and A for other applications.



The loose-fill cellulose insulation products are not a favorable environment for fungal growth. They are not in contact with the indoor air in these applications.

SOIL AND WATER

Not applicable as this product is not in contact with drinking water, runoff water, seepage water, and surface water.

DEMONSTRATION OF VERIFICATION

EN 15804+A2 serves as the core PCR	
Independent verification of the environmental declaration and data according to standard EN ISO 14025:2010	
Internal <input type="checkbox"/>	External <input checked="" type="checkbox"/>
<p>Third party verifier: Evert Vermaut Jan Olieslagerslaan 35 1800 Vilvoorde evermaut@vincotte.be</p>	

BIBLIOGRAPHY

- ISO 1ISO 14040:2006: Environmental Management-Life Cycle Assessment-Principles and framework.
- ISO 14044:2006: Environmental Management-Life Cycle Assessment-Requirements and guidelines.
- ISO 14025:2006: Environmental labels and Declarations-Type III Environmental Declarations-Principles and procedures.
- NBN EN 15804+A1:2014
- NBN/DTD B 08-001 (BE-PCR)
- CEN-TC88, 2017, EN16783
- ISOPROC Environmental Product Declaration Background Report Loose Fill Cellulose Insulation, June 2019, Loos-en-Gohelle, by WeLOOP.

General information

Owner of the EPD,
Responsible for the data, LCA and information

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EPD program
Program operator
Publisher of this EPD

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Federal Public Service of Health / DG Environment
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Contact programma operator

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Based on following PCR documents

EN 15804+A2:2019
NBN/DTD B 08-001 and its complement
EN 16783
Federal Public Service of Health and Environment &
PCR Review committee

PCR review conducted by

Author(s) of the LCA and EPD

Dr. Naeem ADIBI
Clément BOLLE
WeLOOP - info@weloop.org

Identification of the project report

ISOPROC-Environmental Product Declaration
Background Report Loose Fill Cellulose Insulation-
Version V4-February 2021-WeLOOP

Verification

External independent verification of the declaration and data
according to EN ISO 14025 and relevant PCR documents

Name of the third party verifier
Date of verification

Evert Vermaut
Vinçotte
25.02.2021

www.b-epd.be

www.environmentalproductdeclarations.eu

Comparing EPDs is not possible unless they are conform to the same PCR and taking into account the building context.
The program operator cannot be held responsible for the information supplied by the owner of the EPD nor LCA practitioner.



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Building calculator of the
regiona authorities

www.totem-building.be



Federal Public Service of Health,
Food Chain Safety and
Environment

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