Version 1.0

ENVIRONMENTAL PRODUCT DECLARATION

ISO 14025 EN 15804

epd-norge.no
The Norwegian EPD Foundation

Declaration owner	Saint-Gobain ISOVER AB
Program holder and publisher	The Norwegian EPD Foundation
Declaration number	NEPD 00244E
Issue date	27.03.2014
Valid to	27.03.2019

ISOVER UNI-skiva 35

General information

Product
ISOVER UNI-skiva 35

Program holder
The Norwegian EPD Foundation
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Declaration number
NEPD 00244E

This declaration is based on Product Category Rules
CEN Standard EN 15804 serve as core PCR
Saint-Gobain Methodological Guide for Construction Products (2012)

Declared unit
1 m² with a thermal resistance of 1.0 °K m² W^{-1}

Functional unit
1 m² with a thermal resistance of 1,0 °K m² W^{-1} with a reference service life of 60 years.

The EPD has been worked out by:

The EPD has been worked by use of EPD tool, Saint-Gobain ISOVER TEAM, version 5.1 by

Hanne Dybro

Company-specific data has been verified by Sanna Lindholm, Saint-Gobain ISOVER AB.

internally ☑

Sanna Lindholm
(Internal verifier)

Approved

Dagfinn Malnes
(Manager EPD-Norway)

Owner of the declaration
Saint-Gobain ISOVER AB
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Manufacturer
Saint-Gobain ISOVER AB

Place of production
Billesholm (Sweden)

Place of usage
Sweden

Management system
SS-EN ISO 9001:2008 ;
SS-EN ISO 14001:2004 ;

Org. No
556048-9931

Issue date
27.03.2014

Valid to
27.03.2019

Comparability
EPD of construction products may not be comparable if they do not comply with EN15804 and seen in a building context.

Year of study
2013

Verification
Independent verification of calculation data and other environmental information and test of the computer program was carried out by Linda Høibye, COWI in accordance with ISO14025, 8.1.3 and 8.1.4

externally ☑

Linda Høibye
(Independent verifier approved by EPD Norway)

Declared unit
1 m² with a thermal resistance of 1,0 °K m² W^{-1}

Key environmental indicators	Unit	Cradle to gate A1 - A3	Transport **
Global warming	kg CO_2 -eqv	0,7	0,05
Energy use	MJ	25	0,6
Dangerous substances	*	-	-
Input recycled material	%	80	-

* The product contains no substances from the REACH Candidate list (of 15.02.2014)

** Transport from production site to central warehouse in Sweden

Product description

Product description and description of use:

This EPD describes the environmental impacts of 1 m² of glass wool.

The production site of Saint-Gobain ISOVER Billesholm (Sweden) uses natural and abundant raw materials (sand), using fusion and fiberising techniques to produce glass wool. The products obtained come in the form of a "glass wool mat" consisting of a soft, airy structure

On Earth, naturally, the best insulator is dry immobile air at 10°C: its thermal conductivity factor, expressed in λ , is 0.025 W/(m.K) (watts per meter Kelvin degree). The thermal conductivity of mineral wool is close to immobile air as its lambda varies from 0.030 W/(m.K) for the most efficient to 0.040 W/(m.K) to the least.

With its entangled structure, glass wool is a porous material that traps the air, making it one of the best insulating materials. The porous and elastic structure of the wool also absorbs noise in the air, knocks and offers acoustic correction inside premises. Glass wool mainly containing incombustible materials does not react to fire.

Glass wool insulation is used in buildings as well as industrial facilities. It ensures a high level of comfort, lowers energy costs, minimizes carbon dioxide (CO2) emissions, prevents heat loss through pitched roofs, walls, floors, pipes and boilers, reduces noise pollution and protects homes and industrial facilities against fire.

Glass wool products last for the average building’s lifetime (which is often set at 60 years as a default), or as long as the insulated building component is part of the building.

Technical data/physical characteristics:

The thermal resistance of the product equals: 1.0 K.m2.W-1

The thermal conductivity of mineral wool is: 0.035 W/(m.K)

Description of the main product components and or materials:

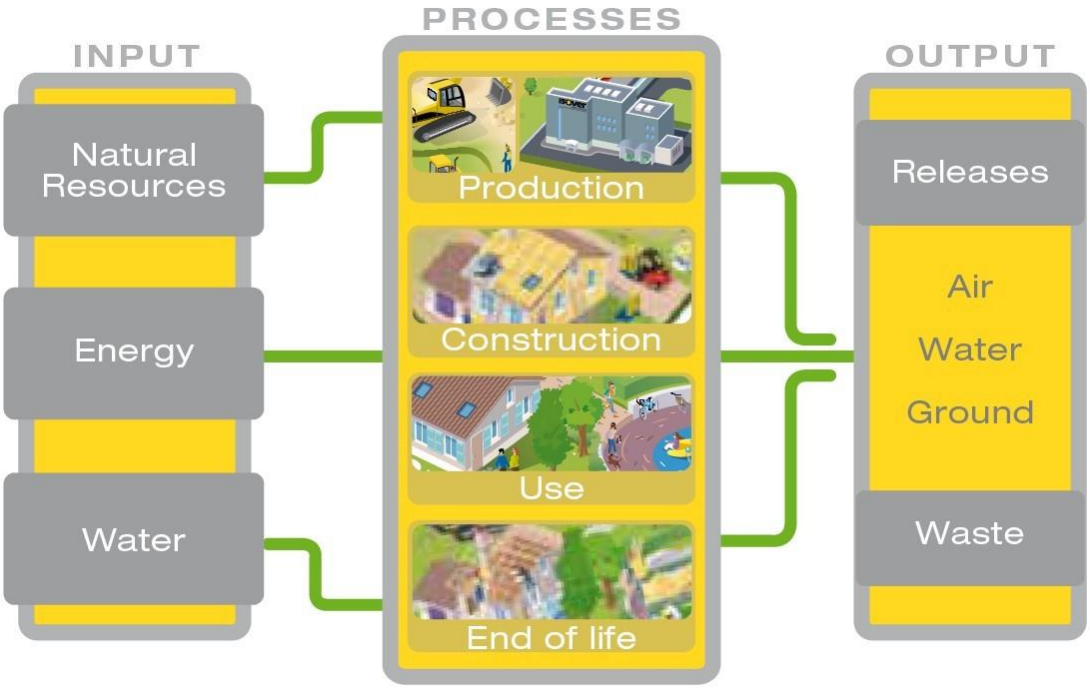
PARAMETER	VALUE
Quantity of wool for 1 m^2 of product	595 g
Product thickness (1 FU)	35 mm
Facing	None
Packaging for the distribution and transportation	Polyethylene: 14 g/m² Wood pallet: 80 g/m²
Tool used for the Installation:	None

LCA calculation information

FUNCTIONAL UNIT	Providing a thermal insulation on 1 m² with a thermal resistance of equals 1 K.m2.W-1.
SYSTEM BOUNDARIES	Cradle to Grave: Mandatory stages = A1-3, A4-5, B1-7, C1-4 and Optional stage = D
REFERENCE SERVICE LIFE (RSL)	60 years
CUT-OFF RULES	The use of cut-off criterion on mass inputs and primary energy at the unit process level (1%) and at the information module level (5%); Flows related to human activities such as employee transport are excluded; The construction of plants, production of machines and transportation systems is excluded since the related flows are estimated to be negligible compared to the production of the building product when compared at these systems lifetime level;
ALLOCATIONS	Allocation criteria are based on mass
ELECTRICITY USED FOR THE MANUFACTORING PROCESS	Sweden electricity mix from ecobilan (reference year 2008)
GREENHOUSE GAS EMISSION FROM ELECTRICITY	0,0116 kg CO2 ekv/MJ

Life cycle stages

Flow diagram of the Life Cycle



Product stage, A1-A3

Description of the stage: The product stage of the glass wool products is subdivided into 3 modules A1, A2 and A3 respectively “Raw material supply”, “transport” and “manufacturing”.

The aggregation of the modules A1, A2 and A3 is a possibility considered by the EN 15 804 standard. This rule is applied in this EPD.

Description of scenarios and additional technical information:

A1, Raw material supply
This module takes into account the extraction and processing of all raw materials and energy which occur upstream to the studied manufacturing process.

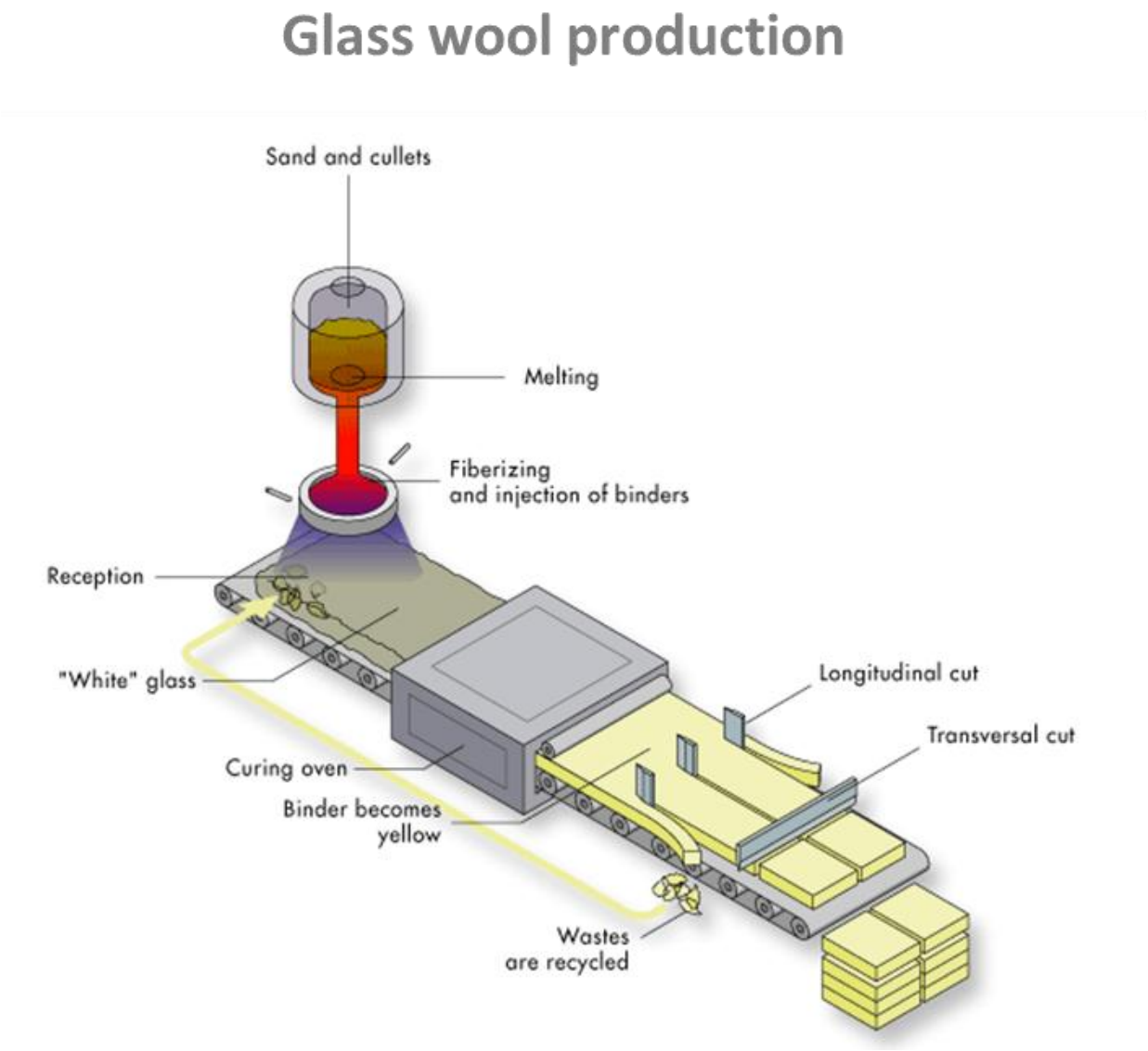
Specifically, the raw material supply covers production binder components and sourcing (quarry) of raw materials for fiber production, e.g. sand and borax for glass wool. Besides these raw materials, recycled materials (glass cullet) are also used as input. The cullets are considered a waste product because cullets are not initially produced for the purpose of glass wool insulation production. The low price of cullets also supports this assumption of cullets being a waste product.

A2, transport to the manufacturer
The raw materials are transported to the manufacturing site. In our case, the modeling include: road or boat transportations (average values) of each raw material.

A3, manufacturing
This module includes manufacturing of products and manufacturing of packaging. Specifically, it covers glass production, binder production, glass wool fabrication (including melting and fiberization see process flow diagram) and packaging.

The production of packaging material is taking into account at this stage.

Manufacturing process flow diagram



Construction process stage, A4-A5

Description of the stage: The construction process is divided into 2 modules: transport to the building site A4 and installation A5.

A4, Transport to the building site: This module includes transport from the production gate to the building site.
Transport is calculated on the basis of a scenario with the parameters described in the following table.

PARAMETER	VALUE
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	Average truck trailer with a 24t payload, diesel consumption 38 liters for 100 km
Distance	500 km
Capacity utilisation (including empty returns)	100 % of the capacity in volume 30 % of empty returns
Bulk density of transported products	17.0 kg/m3
Volume capacity utilisation factor	1 (by default)

A5, Installation in the building: This module includes

- Wastage of products: see following table 5 %. These losses are landfilled (landfill model for glass see chapter end of life),
- Additional production processes to compensate for the loss,
- Processing of packaging wastes: they are 100 % collected and modeled as recovered matter.

PARAMETER	VALUE
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	5 %
Output materials (specified by type) as results of waste processing at the building site e.g. of collection for recycling, for energy recovering, disposal (specified by route)	Packaging wastes are 100 % collected and modeled as recovered matter Glass wool losses are landfilled

Use stage (excluding potential savings), B1-B7

Description of the stage: The use stage is divided into the following modules:

- B1: Use
- B2: Maintenance
- B3: Repair
- B4: Replacement
- B5: Refurbishment
- B6: Operational energy use
- B7: Operational water use

Description of scenarios and additional technical information:

Once installation is complete, no actions or technical operations are required during the use stages until the end of life stage. Therefore glass wool insulation products have no impact (excluding potential energy savings) on this stage.

End-of-life stage C1-C4

Description of the stage:

The stage includes the different modules of end-of-life detailed below.

C1, de-construction, demolition
The de-construction and/or dismantling of insolation products take part of the demolition of the entire building. In our case, the environmental impact is assumed to be very small and can be neglected.

C2, transport to waste processing
The model use for the transportation is applied.

C3, waste processing for reuse, recovery and/or recycling;
Today the product is considered to be landfilled without reuse, recovery or recycling.
C4, disposal;
The glass wool is assumed to be 100% landfilled.

Description of scenarios and additional technical information: See below

End-of-life:

PARAMETER	VALUE/DESCRIPTION
Collection process specified by type	595 g (collected with mixed construction waste)
Recovery system specified by type	No re-use, recycling or energy recovery
Disposal specified by type	595 g are landfilled
Assumptions for scenario development (e.g. transportation)	Average truck trailer with a 24t payload, diesel consumption 38 liters for 100 km 20 km

Reuse/recovery/recycling potential, D

Description of the stage: Packaging wastes from module A5 are reported in this module as recovered matter.

LCA results

LCA model, aggregation of data and environmental impact are calculated from the TEAM™ software 5.1.

Resume of the LCA results detailed on the following tables.

Calculation of environmental impact for each thickness of the product.

ISOVER UNI-skiva 35 is produced in differant thickness. The environmental impact of each thickness can be estimated by multiplying with the factors in table 2.

Table 1. Factors that are used to estimate the environmental impact for each thickness of the product when funktional unit is 1 m² with a thermal resistance equals to 1 K.m2.W-1 . For UNI-skiva 35 it means 35 mm of the product.

Thickness	Factor
45 mm	1.3
70 mm	2
95 mm	2.7
120 mm	3.4
145 mm	4.1
170 mm	4.9
195 mm	5.6
220 mm	6.3

ENVIRONMENTAL IMPACTS

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	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	
Global Warming Potential (GWP) - *kg CO2 equiv/FU*	7.1E-01	4.8E-02	3.8E-02	0	0	0	0	0	0	0	0	2.1E-02	0	0	0
	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.														
Ozone Depletion (ODP) *kg CFC 11 equiv/FU*	4.8E-08	3.3E-08	4.1E-09	0	0	0	0	0	0	0	0	1.4E-08	0	0	0
	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 (AP) *kg SO2 equiv/FU*	3.6E-03	2.9E-04	1.9E-04	0	0	0	0	0	0	0	0	1.2E-04	0	0	0
	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 (EP) *kg (PO4)3- equiv/FU*	5.2E-04	7.0E-05	3.0E-05	0	0	0	0	0	0	0	0	3.0E-05	0	2.3E-06	0
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
Photochemical ozone creation (POPC) *Ethene equiv/FU*	2.3E-04	6.7E-06	1.2E-05	0	0	0	0	0	0	0	0	2.8E-06	0	0	0
	Chemical reactions brought about by the light energy of the sun. 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 ressources (ADP-elements) - *kg Sb equiv/FU*	2.6E-07	9.0E-12	1.3E-08	0	0	0	0	0	0	0	0	3.0E-12	0	0	0
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU*	1.1E+01	5.9E-01	5.7E-01	0	0	0	0	0	0	0	0	2.5E-01	0	0	0
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														

RESOURCE USE

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	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	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - *MJ/FU*	5.3E+00	1.2E-03	2.7E-01	0	0	0	0	0	0	0	0	1.4E-04	0	0	0
Use of renewable primary energy used as raw materials *MJ/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	5.3E+00	1.2E-03	2.7E-01	0	0	0	0	0	0	0	0	1.4E-04	0	0	0
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU*	2.0E+01	6.0E-01	1.0E+00	0	0	0	0	0	0	0	0	2.6E-01	0	0	0
Use of non-renewable primary energy used as raw materials *MJ/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total use of non-renewable primary energy resources (primary energy energy resources used as raw materials) - MJ/FU and primary	2.0E+01	6.0E-01	1.0E+00	0	0	0	0	0	0	0	0	2.6E-01	0	0	0
Use of secondary material *kg/FU*	4.9E-01	0	2.4E-02	0	0	0	0	0	0	0	0	0	0	0	2.1E-02
Use of renewable secondary fuels- *MJ/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Use of non-renewable secondary fuels - *MJ/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Use of net fresh water - *m3/FU*	1.3E-02	5.8E-05	6.8E-04	0	0	0	0	0	0	0	0	2.4E-05	0	0	0

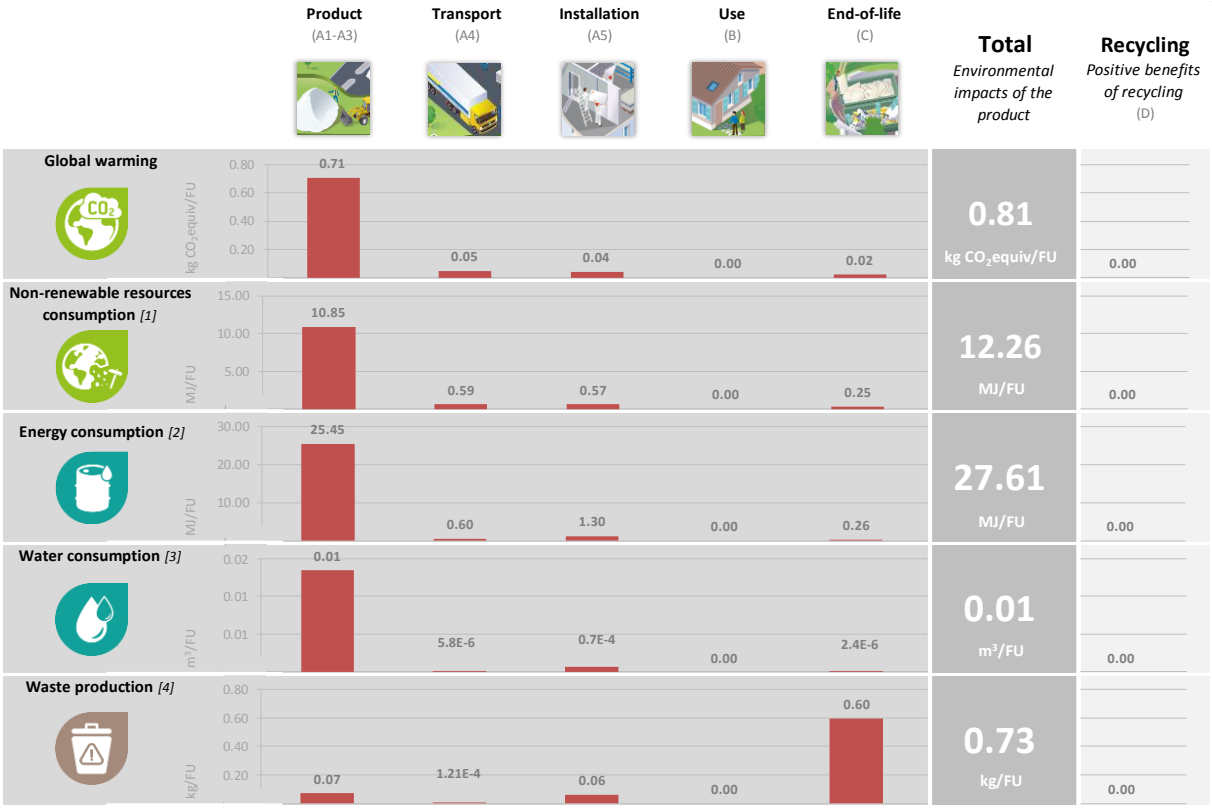
WASTE CATEGORIES

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	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*	4.3E-04	1.4E-05	2.2E-05	0	0	0	0	0	0	0	0	5.9E-06	0	0	0
Non-hazardous waste disposed *kg/FU*	7.4E-02	9.7E-05	6.3E-02	0	0	0	0	0	0	0	0	2.2E-05	0	6.0E-01	0
Radioactive waste disposed *kg/FU*	1.1E-04	9.5E-06	5.9E-06	0	0	0	0	0	0	0	0	4.1E-06	0	0	0

OUTPUT FLOWS

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	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	
Components for re-use *kg/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Materials for recycling *kg/FU*	8.8E-02	4.5E-07	2.6E-02	0	0	0	0	0	0	0	0	1.0E-07	0	0	0
Materials for energy recovery *kg/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exported energy *MJ/FU*	2.2E-02	0	1.1E-03	0	0	0	0	0	0	0	0	0	0	0	0

LCA interpretation



[1] This indicator corresponds to the abiotic depletion potential of fossil resources.
[2] This indicator corresponds to the total use of primary energy.
[3] This indicator corresponds to the use of net fresh water.
[4] This indicator corresponds to the sum of hazardous, non-hazardous and radioactive waste disposed.

Bibliography

Product-Category Rules. PCR Saint-Gobain Meothodological Guide for Construction Products, (2012)

Tool TEAM 5.1 Saint-Gobain ISOVER

Product-Category Rules. NPCR 12 rev. Insulation materials, epd-norge.no, (2012)

Environmental labels and declarations - Type III environmental declarations - Principles and procedures (ISO 14025:2006)

Environmental management - Life cycle assessment - Requirements and guidelines (ISO 14044:2006)

Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products (EN 15804:2012)
Sustainability in building construction - Environmental declaration of building products (ISO 21930:2007)