

# ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

Owner of the declaration:  
Program operator:  
Publisher:  
Declaration number:  
Registration number:  
ECO Platform reference number:  
Issue date:  
Valid to:

Saint-Gobain Sweden AB, ISOVER  
The Norwegian EPD Foundation  
The Norwegian EPD Foundation  
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## CLIMPIPE Section Alu2

Saint-Gobain Sweden AB, ISOVER



## General information

### Product

CLIMPIPE Section Alu2

### Program operator

The Norwegian EPD Foundation  
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### Declaration number

00000000000000000000

### ECO Platform reference number

### This declaration is based on Product Category Rules

CEN Standard EN 15804 serve as core PCR  
The Product Category Rules, NPCR 12 rev.:Insulation materials, epd-norge.no, (2012) is used in addition to the core PCR.

### Statement of liability

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

### Declared unit

1 linear meter with a thermal resistance of  $1,0 \text{ K m}^2 \text{ W}^{-1}$ , a thickness of 33 mm and inner diameter of 15 mm.

### Functional unit

1 linear meter with a thermal resistance of  $1,0 \text{ K m}^2 \text{ W}^{-1}$  a thickness of 33 mm and inner diameter of 15 mm with a reference service life of 60 years.

### Verification

Independent verification of calculation data and other environmental information and test of the computer program was carried out by Martin Erlandsson in accordance with ISO14025, 8.1.3 and 8.1.4 + EN 15804

Externally



IVL Swedish Environmental Research Institute  
(Independent verifier approved by EPD Norway)

### Owner of the declaration

Saint-Gobain Sweden AB, ISOVER  
Contact person: Per FERM  
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e-mail: [Per.ferm@saint-gobain.com](mailto:Per.ferm@saint-gobain.com)

### Manufacturer

Saint-Gobain Sweden AB, ISOVER

### Place of production

Billesholm, Sweden

### Management system

SS-EN ISO 9001:2008  
SS-EN ISO 14001:2004

### Org. No

556241-2592

### Issue date

01/01/2018

### Valid to

01/01/2019

### Year of study

2018

### Comparability

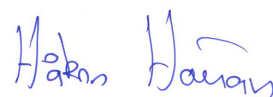
EPD of construction products may not be comparable if they do not comply with EN15804 and seen in a building context.

### The EPD has been worked out by

The EPD has been worked by the use of EPD tool, GaBi, version 8.7 by Saint-Gobain LCA central team and by Sanna Lindholm.

Company-specific data has been verified by Patricia Jimenez Diaz, Saint-Gobain central LCA team.

Approved



Håkon Hauan  
Managing Director of EPD-Norway

## Product description

### Product description and description of use:

This EPD describes the potential environmental impacts of 1 lineal meter of glass wool insulation, CLIMPIPE Section Alu2, with a thermal resistance equal to  $1 \text{ K}\cdot\text{m}^2\cdot\text{W}^{-1}$ , a thickness of 33 mm and inner diameter of 15 mm. 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.

The Climpipe Section Alu 2 product is an ISOVER preformed glass wool pipe insulation, a pipe section with a complete cylinder shape and with a longitudinal opening. Faced on its outer surface with an aluminum foil, reinforced with glass mesh and polyethylene hot melt glue, which acts as a vapor barrier. An aluminium tape is covering the longitudinal opening.

ISOVER glass wool products for technical insulation are CE-marked according to the EN 13172 (2011) "Thermal Insulation Products – Evaluation of Conformity" and EN 14303 "Thermal insulation products for building equipment and industrial installations. Factory made mineral wool (MW) products. Specification".

The production site of Saint-Gobain Sweden AB, ISOVER in Billesholm, uses a small amount of natural and abundant raw materials (sand, soda, limestone, feldspar) and high share of recycled glass cullets (more than 50% post-consumer recycled content of the glass). This material is converted by using fusion and fiberizing techniques to produce glass wool. The products obtained come in the form of a glass wool pipe section.

On Earth, naturally, the best insulator is dry immobile air at  $10^\circ\text{C}$ : its thermal conductivity factor, expressed in  $\lambda$ , is  $0.025 \text{ W}/(\text{m}\cdot\text{K})$  (watts per meter Kelvin degree). The thermal conductivity of mineral wool at  $10^\circ\text{C}$  is close to immobile air as its  $\lambda$  varies from  $0.030 \text{ W}/(\text{m}\cdot\text{K})$  for the most efficient to  $0.040 \text{ W}/(\text{m}\cdot\text{K})$ . For technical insulation the thermal conductivity is declared for different temperatures.

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 and offers acoustic correction inside premises. Glass wool mainly containing incombustible materials and does not react to fire.

Glass wool insulation is used in buildings as well as industrial facilities. It ensures a high level of comfort, minimizes carbon dioxide ( $\text{CO}_2$ ) emissions by preventing heat losses through roofs, walls, floors, pipes and boilers. It reduces noise and protects homes and industrial facilities against fire.

Correctly installed glass wool products and solutions do not require maintenance and last throughout the lifetime of the building (which is set at 60 years as a default value in the model), or as long as the insulated building component is a part of the building.

**Technical data/physical characteristics (for a thickness of 33 mm and inner diameter of 15 mm):**

Thermal resistance of the Product: 1 K.m<sup>2</sup>.W<sup>-1</sup> (UNE EN 12667)

The thermal conductivity of the Glass wool is: 0.0033 W/(m.K) at 10° (EN 14303)

Reaction to fire: A2L-s1, d0 (EN 13501-1)

**Description of the main product components and or materials:**

**Main components**

Glass wool 90-95% (REACH registration number 01-2119472313-44-0041)  
 Binder 0-10%

**Description of the main components and/or materials for 1 linear meter of product with a thermal resistance of 1 K.m<sup>2</sup>.W<sup>-1</sup> a thickness of 33 mm and inner diameter of 15 mm for the calculation of the EPD®:**

PARAMETER	VALUE (per functional unit)
Quantity of wool for 1 linear meter of product	0.619 Kg
Thickness of wool	33 mm
Inner diameter	15 mm
Surfacing	Aluminium foil and aluminium tape: 30 g/linear meter
Packaging for the transportation and distribution	Cardboard: 41 g/linear meter Stretch film: 0.3 g/linear meter Label paper: 0.1 g/linear meter Wood pallet: 51 g/linear meter
Product used for the Installation	None

## LCA calculation information

<b>FUNCTIONAL UNIT</b>	Providing a thermal insulation on 1 linear meter with a thermal resistance of equals 1 K.m <sup>2</sup> .W <sup>-1</sup> , a thickness of 33 mm and inner diameter of 15 mm
<b>SYSTEM BOUNDARIES</b>	Cradle to Grave. Mandatory stages: A1-3, A4-5, B1- 7, C1-4
<b>REFERENCE SERVICE LIFE(RSL)</b>	60 years
<b>CUT-OFFRULES</b>	See detailed explanation page 9
<b>ALLOCATIONS</b>	See detailed explanation page 9
<b>ELECTRICITY USED FOR THE MANUFACTURING PROCESS</b>	Renewable electricity mix (reference year 2018)
<b>GEOGRAPHICAL COVERAGE AND TIME PERIOD</b>	Sweden 2018

## Cut-off criteria

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The cut-off criterion used in Saint-Gobain EPD will be the mass criterion with the following details:

- Taking into account all input and output flows in a unit process i.e. taking into account the value of all flows in the unit process and the corresponding LCI whenever available
- No simplification of the LCI by additional exclusions of material flows

Data collected at the manufacturing site was used. The inventory process in this LCA includes all data related to raw material, packaging material and consumable items, and the associated transport to the manufacturing site. Process energy and water use, direct production waste and emissions to air and water are included. Scenarios have been developed to account for downstream processes such as demolition and waste treatment in accordance with the requirements of EN 15804:2012+A1:2013

All inputs and outputs to the manufacturing plants have been included and made transparent. All assumptions regarding the materials and water balances have also been included.

All hazardous and toxic materials and substances are considered in the inventory even though they are below the cut off criteria

There are excluded processes in the inventory:

- Flows related to human activities such as employee transport and administration activity.

## Allocation

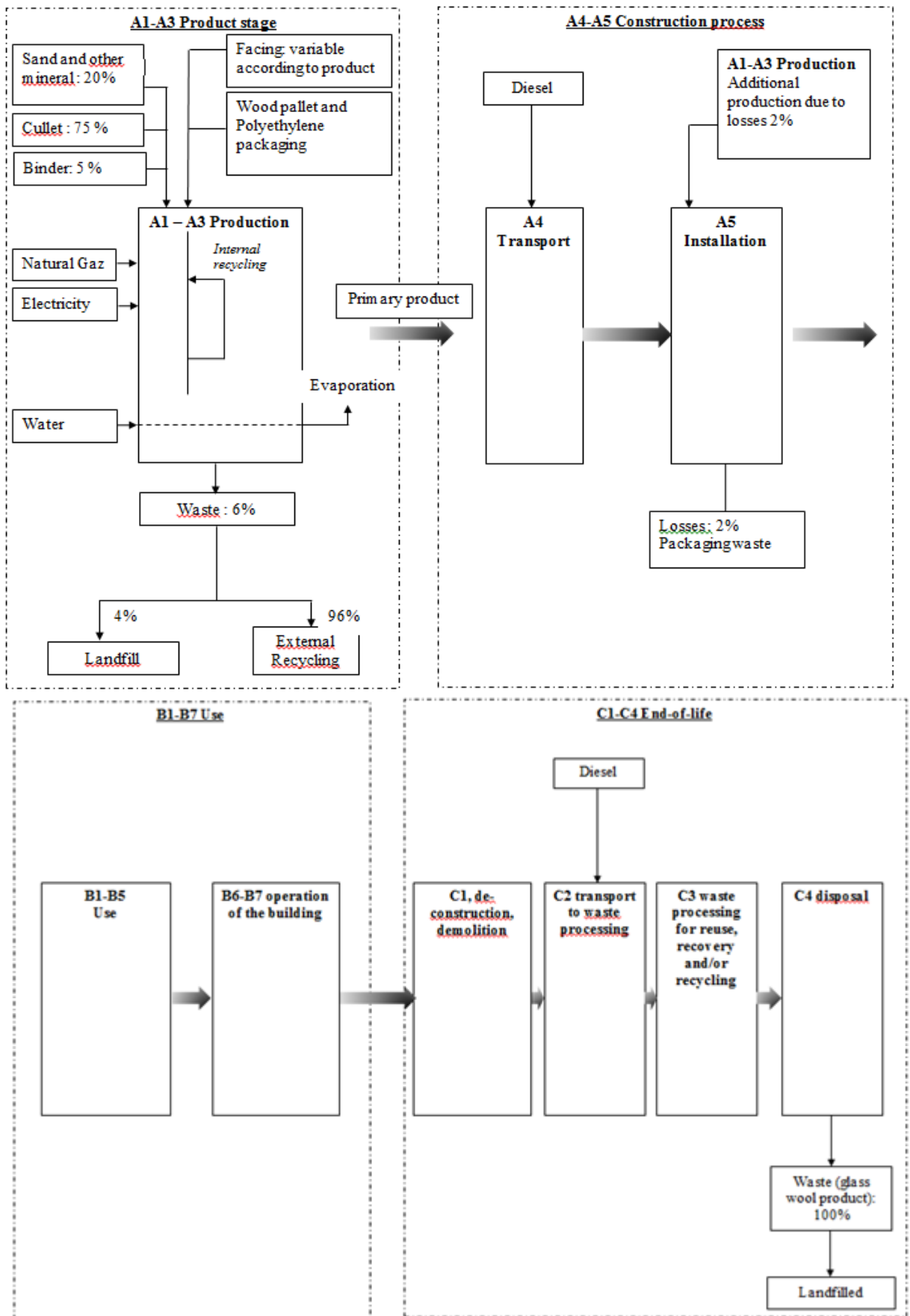
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Allocation criteria are based on mass.

The allocation of all the air emissions, wastes and energy usage are based on mass (kg). The reason we can use a mass basis is because we use the exact same manufacturing process shown for every product. We only produce glass mineral wool in the Billesholm site using the same process and therefore all the factors can be allocated by a mass basis. The amount of binder varies for different products and is accounted for as well as if different surface layers are used.

A mass balance was conducted for the 2018 production year to ensure that we have not excluded any materials, emissions and hence potential environmental impacts. Regarding the mass balance, all the raw materials and corresponding production goods and wastes generated were taken into account.

Flow diagram of the Life Cycle



System boundaries (X=included, MND=module not declared)																
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	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	X	X	X	X	X	X	X	X	X	X	X	MND

### Product stage, A1-A3

#### Description of the stage:

The product stage of the mineral 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.

#### **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 of binder components and sourcing (quarry) of raw materials for fiber production, e.g. sand and borax for glass wool. Besides these raw materials, recycled material/glass cullet is also used as input.

About cullet: The main raw material for the production of glass insulation material is cullets or/and sand. Only specific cleaning activities and transport is included for the cullets – and thus not the impacts from the full life cycle of glass. The reason is that cullets are considered a waste product and not initially produced for the purpose of glass wool insulation production. The only activities included are:

- Magnetic separation of metallic piece
- Separation of other piece-crushing of glass (<20 mm)
- Separation of bottle cap crushing (<2 mm) sieving
- Transport

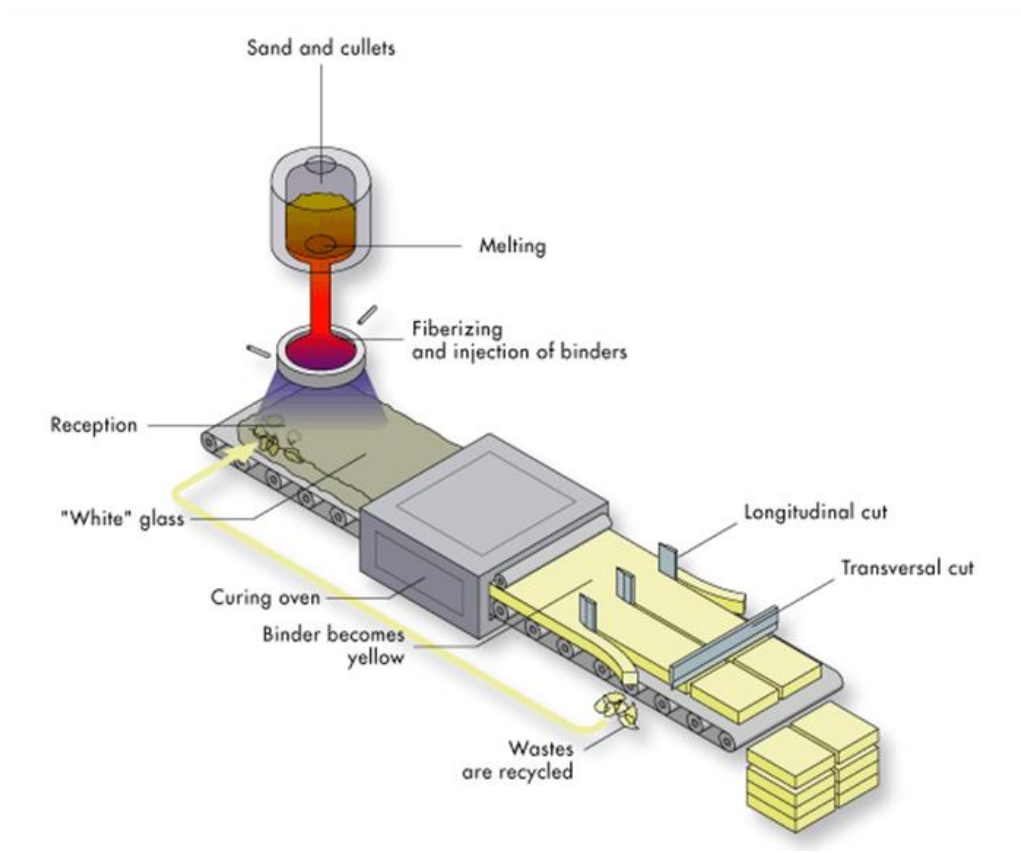
#### **A2, transport to the manufacturer**

The raw materials are transported to the manufacturing site. In our case, the modeling includes: road and boat transportations (specific values) of each raw material.

#### **A3, manufacturing**

This module covers glass wool fabrication, including melting and fiberization (see process flow diagram). In addition, the production of packaging material is taking into account at this stage.

## Glass wool production



### Construction process stage, A4-A5

#### Description of the stage:

The construction process is divided into 2 modules: A4, transport to the building site and A5, installation in the building.

#### Description of scenarios and additional technical information:

##### *A4, Transport to the building site:*

- This module includes transport from the production gate to the building site. (Representative as average for the Swedish market).
- Transport is calculated on the basis of a scenario with the parameters described in the following table.

PARAMETER	VALUE (per functional unit)
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	Average truck trailer with a 27t payload, diesel consumption 38 liters for 100 km
Distance	450 km
Capacity utilisation (including empty returns)	77 % of the capacity in volume (40% capacity utilization including 39 % of empty returns in mass)
Bulk density of transported products	75 kg/m <sup>3</sup>
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 (per functional unit)
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	5 %
Distance	25 km to landfill by truck
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 insulation products take part of the demolition of the entire building and is assumed to be made manually. In our case, the environmental impact is assumed to be very small and can be neglected.

**C2, transport to waste processing**

Transport is included and calculated on the basis of a scenario with the parameters described in the End-of-life table.

**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 (per functional unit)
Collection process specified by type	The entire insulation product (wool and surfacing) is collected with mixed construction waste 0.68 kg of glass wool (collected with mixed construction waste)
Recovery system specified by type	No re-use, recycling or energy recovery
Disposal specified by type	The entire insulation product (wool and surfacing) is landfilled 0.68 kg of glass wool are landfilled
Assumptions for scenario development (e.g. transportation)	Average truck trailer with a 27t payload, diesel consumption 38 liters for 100 km  25 km (default distance from the building site to landfill).

### Reuse/recovery/recycling potential, D

Description of the stage: Module D is not included in the EPD.








## LCA results

LCA model, aggregation of data and potential environmental impact are calculated from the GaBi software 8.7 and CML impact method has been used, together with thinkstep 8.7 (2018) and ecoinvent V3.1 (2014) databases to obtain the inventory of generic data. Biogenic carbon is not reported in the context of GWP.









Raw materials and energy consumption, as well as transport distances have been taken directly from the manufacturing plant of Saint-Gobain Sweden A, ISOVER in Billesholm (Production data according 2018).

Resume of the LCA results detailed on the following tables.




## 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	8,91E-01	2,77E-02	4,89E-02	0	0	0	0	0	0	0	0	3,14E-03	0	4,18E-02	MND
	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	8,31E-08	4,23E-18	4,15E-09	0	0	0	0	0	0	0	0	3,42E-15	0	6,78E-17	MND
	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	5,44E-03	1,18E-04	2,84E-04	0	0	0	0	0	0	0	0	1,28E-05	0	6,98E-05	MND
	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	1,68E-03	2,89E-05	8,91E-05	0	0	0	0	0	0	0	0	3,09E-06	0	5,00E-05	MND
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
 Photochemical ozone creation (POPC) kg Ethene equiv/FU	5,33E-04	4,31E-06	2,78E-05	0	0	0	0	0	0	0	0	4,77E-07	0	1,47E-05	MND
	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 resources (ADP-elements) - kg Sb equiv/FU	5,97E-05	3,67E-10	2,98E-06	0	0	0	0	0	0	0	0	4,27E-11	0	4,03E-09	MND
 Abiotic depletion potential for fossil resources (ADP-fossil fuels) - MJ/FU	1,31E+01	3,85E-01	6,91E-01	0	0	0	0	0	0	0	0	4,37E-02	0	1,91E-01	MND
	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	1,39E+01	8,8E-03	7,0E-01	0	0	0	0	0	0	0	0	1,2E-03	0	2,1E-02	MND
 Use of renewable primary energy used as raw materials MJ/FU	1,58E+00	0	7,9E-02	0	0	0	0	0	0	0	0	0	0	0	MND
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) MJ/FU	1,71E+01	8,8E-03	7,8E-01	0	0	0	0	0	0	0	0	1,2E-03	0	2,1E-02	MND
 Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	1,41E+01	3,9E-01	7,4E-01	0	0	0	0	0	0	0	0	4,4E-02	0	2,0E-01	MND
 Use of non-renewable primary energy used as raw materials MJ/FU	8,15E-01	0	4,1E-02	0	0	0	0	0	0	0	0	0	0	0	MND
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - MJ/FU	1,49E+01	3,9E-01	7,8E-01	0	0	0	0	0	0	0	0	4,4E-02	0	2,0E-01	MND
 Use of secondary material kg/FU	3,74E-01	0	1,9E-02	0	0	0	0	0	0	0	0	0	0	0	MND
 Use of renewable secondary fuels- MJ/FU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MND
 Use of non-renewable secondary fuels - MJ/FU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MND
 Use of net fresh water - m3/FU	1,79E-02	3,0E-06	9,0E-04	0	0	0	0	0	0	0	0	3,7E-07	0	3,9E-05	MND

## 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 <i>kg/FU</i>	3,08E-08	1,38E-09	1,79E-09	0	0	0	0	0	0	0	0	1,57E-10	0	2,54E-09	MND
 Non-hazardous waste disposed <i>kg/FU</i>	6,44E-02	4,68E-06	4,15E-02	0	0	0	0	0	0	0	0	5,94E-07	0	6,73E-01	MND
 Radioactive waste disposed <i>kg/FU</i>	2,10E-04	4,50E-07	1,07E-05	0	0	0	0	0	0	0	0	5,12E-08	0	2,62E-06	MND

## 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 <i>kg/FU</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MND
 Materials for recycling <i>kg/FU</i>	1,12E-02	0	9,41E-02	0	0	0	0	0	0	0	0	0	0	0	MND
 Materials for energy recovery <i>kg/FU</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MND
 Exported energy <i>MJ/FU</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MND

# 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.

## Global Warming Potential (Climate Change) (GWP)

When analyzing the above figure for GWP, it can clearly be seen that the majority of contribution to this environmental impact is from the production modules (A1 – A3). This is primarily because the sources of greenhouse gas emissions are predominant in this part of the life cycle. CO<sub>2</sub> is generated upstream from the production of electricity and is also released on site by the combustion of natural gas. We can see that other sections of the life cycle also contribute to the GWP; however, the production modules contribute to over 80% of the contribution. Combustion of fuel in transport vehicles will generate the second highest percentage of greenhouse gas emissions together the waste during the installation stage.

Global warming potential does not account for emission and uptake of biogenic CO<sub>2</sub>.

## Non-renewable resources consumptions

We can see that the consumption of non – renewable resources is once more found to have the highest value in the production modules. This is because a large quantity of natural gas is consumed within the factory, and non – renewable fuels such as natural gas and coal are used to generate the large amount of electricity we use. The contribution to this impact from the other modules is very small and primarily due to the non – renewable resources consumed during transportation.

## Energy Consumptions

As we can see, modules A1 – A3 have the highest contribution to total energy consumption. Energy in the form of electricity and natural gas is consumed in a vast quantity during the manufacture of glass mineral wool so we would expect the production modules to contribute the most to this impact category.

## Water Consumption

As we don't use water in any of the other modules (A4 – A5, B1 – B7, C1 – C4), we can see that there is no contribution to water consumption. For the production phase, water is used within the manufacturing facility and therefore we see the highest contribution here. However, we recycle a lot of the water on site so the contribution is still relatively low.

## Waste Production

Waste production does not follow the same trend as the above environmental impacts. The largest contributor is the end of life module. This is because the entire product is sent to landfill once it reaches the end of life state. However, there is still an impact associated with the production module since we do generate waste on site. The following small impact associated with installation is due to the loss rate of product during implementation.

# Additional information

## Influence of particular thicknesses

This EPD® includes the range of thicknesses between 20 and 120 mm and an inner diameter from 15 to 273 mm, using a multiplication factor in order to obtain the environmental performance of every thickness and inner diameter. In order to calculate the multiplication factors, a reference unit has been selected value of  $R = 1 \text{ m}^2 \cdot \text{K} / \text{W}$  for 33mm (thickness) and 15mm (inner diameter).

The conversion factors in the table below gives an exact GWP value based on the specific material combination in the current pipe insulation. In order to obtain the environmental performance associated with every specific thickness, the results expressed in this EPD® must be multiplied by its corresponding multiplication factor. The variation for other indicator than GWP is at most.15%.

		Mineral wool thickness (mm)								
		20	30	33	40	50	60	80	100	120
Diameter (mm)	15	0,64	0,91	1,00	1,21	1,54	1,89			
	18	0,67	0,95		1,25	1,58	1,93			
	22	0,72	1,00		1,30	1,63	1,98			
	28	0,79	1,07		1,38	1,71	2,07	2,85		
	35	0,87	1,16		1,47	1,80	2,17	2,96		
	42	0,95	1,24		1,56	1,90	2,26	3,07	3,96	
	48	1,02	1,31		1,63	1,98	2,35	3,16	4,06	
	54	1,09	1,39		1,71	2,06	2,43	3,25	4,16	5,17
	60	1,16	1,46		1,79	2,14	2,52	3,34	4,26	5,28
	64		1,51		1,84	2,19	2,57	3,40	4,32	5,35
	70		1,58		1,92	2,27	2,65	3,49	4,42	5,45
	76		1,65		1,99	2,35	2,74	3,58	4,52	5,56
	89		1,81		2,16	2,53	2,92	3,78	4,73	5,79
	108		2,04		2,40	2,78	3,19	4,07	5,05	6,12
	114		2,12		2,48	2,86	3,27	4,16	5,14	6,23
	140		2,43		2,81	3,21	3,63	4,55	5,57	6,68
168		2,77		3,17	3,58	4,02	4,98	6,03	7,18	
219		3,39		3,82	4,26	4,74	5,75	6,86	8,07	
273		4,05		4,51	4,99	5,49	6,57	7,75		

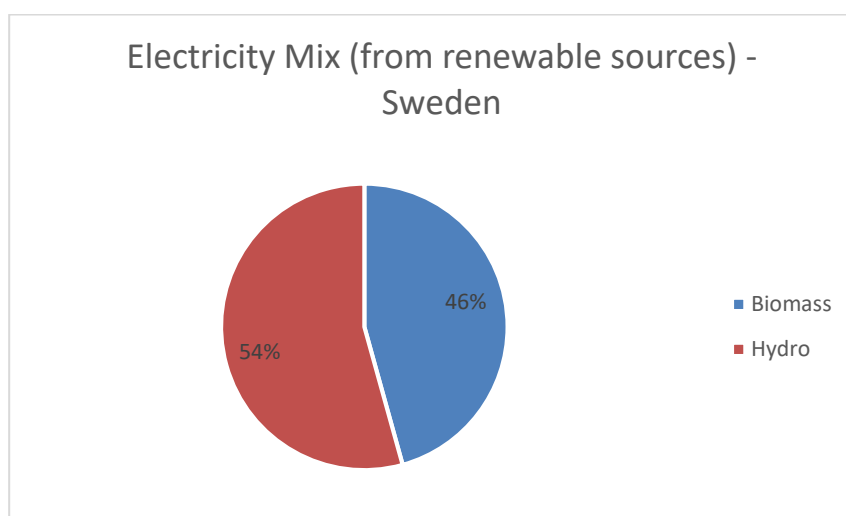


## Additional Norwegian requirements

### *Greenhouse gas emissions from the use of electricity in the manufacturing phase*

The LCA calculation has been made taking into account the fact that during the manufacturing process it is used 100% renewable electricity. This 100% renewable electricity bought is evidenced by Guarantee of Origin certificates (GOs) from LOS, valid for the period chosen in the calculation (2018).

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of average production in Sweden
Geographical representativeness description	Split of energy sources in Sweden - Hydro: 54% - Biomass: 46%
Reference year	2018
Type of data set	Cradle to gate from Thinkstep
Source	Gabi database from International Energy Agency -2013 Guarantee of Origin certificates (GOs) - 2018



The dataset used to model the renewable electricity mix used for these calculations come from thinkstep database.

DATA SOURCE	AMOUNT	UNIT
thinkstep (2018)	0.05	kg CO <sub>2</sub> eq /KWh

### *Dangerous substances*

The product contains no substances given by the REACH Candidate list (of 15.01.2018) or the Norwegian priority list. (REACH registration number 01-2119472313-44-0039)

### *Indoor environment*




No test performed

### *Carbon footprint*

Carbon footprint has not been worked out for the product

# Bibliography

- 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)
- Ecoinvent database V3.1 (2014)
- Gabi database (2018)
- SS-EN 13172:2012 Thermal Insulation Products – Evaluation of conformity
- SS- EN 14303 “Thermal insulation products for building equipment and industrial installations. Factory made mineral wool (MW) products. Specification
- LCA report, Information for the Environmental Product Declaration of Isover product. Saint-Gobain Sweden AB Isover, April 2019

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