# EPD

ENVIRONMENTAL PRODUCT DECLARATION
In accordance with EN 15804 and ISO 14025

## Isover R

TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p. Akreditovaný ZÚS Certifikační orgán č. 3015

| | |
|---|---|
| **Manufacturer:** | Saint-Gobain Construction Products CZ, division ISOVER, Smrčkova 2485/4, 180 00 Praha 8, Česká republika |
| **Manufacturer represented:** | Častolovice, Masarykova 197, 517 50, Czech Republic |
| **About company:** | International company, enterprising in 64 countries, part of Saint-Gobain group, more than 190 000 employees. Subject of enterprise of Isover division is to produce and sell thermal insulation from mineral wool, expanded and extruded polystyrene, their accessories and providing technical support for marketed solutions. |
| **EPD Programme:** | The International EPD® System |
| **Registration no:** | 3015-EPD-030058641 |
| **Generic PCR review conducted by:** | Environdec, EPD International Ltd., Box 210 60, SE-100 31 Stockholm, Sweden |
| **Other used standards:** | Saint-Gobain Methodological Guide for Construction Products 2012 |
| **Information for the Environmental Product Declaration based on:** | General report on isover LCA Castolovice, Paris, France: Isover, 2015 |
| **EPD range:** | „From cradle to gate with option“ (details later in EPD) |
| **Date of publication:** | 9th may 2019 |
| **EPD validity:** | 9th may 2024 |
| **Complier EPD:** | Ing. arch. Josef Hoffmann, Division ISOVER, Saint-Gobain Construction Products CZ a.s. |
| **Verifier EPD:** | Technický a zkušební ústav stavební Praha, s.p. – pobočka Plzeň |

**Tab. 1 – Information about verifier**

| **CEN standard EN 15804+A1 serves as the core PCR** | |
|---|---|
| Independent verification of the declaration and data, according to EN ISO 14025:2010:<br>☐ Internal ☒ External | |
| **Third party verifier:**<br>Technický a zkušební ústav stavební Praha, s.p.<br>Prosecká 811/76a, Praha 9, 190 00<br>Czech Republic<br>Certification Body for EPD, accredited by CAI - Czech Accreditation Institute, under No. 440/2018 | TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p. Akreditovaný ZÚS Certifikační orgán č. 3015 |

This EPD describes the environmental impacts of 1 $m^2$ of mineral wool product. EPD was created from complete data included all thicknesses of the product. Each thickness influents environmental impacts specifically, their individual impacts were taken into account by the real production and sale rate. Thickness proportions are listed thereinafter.

Production process of this mineral wool uses natural and abundant raw materials (volcanic rock), blast-furnace slag, recycled contend (briquettes), fusion and fiberising techniques to produce stone wool. The products obtained come in the form of a "mineral wool mat" consisting of a soft, airy structure. It is made of hydrophilic mineral wool, so it has special parameters unlike to standard mineral wool. (see Manufacturing process flow diagram on page 6).

Isover R slabs are designed for thermal, acoustic and fire insulation of the flat warm decks. The slabs are entirely used as an underlayer to another spreading thermal insulative course, e.g. Isover S. Slabs are to be laid on vapour barrier, supporting construction or gravity flow system. The gravity flow system is possible to create from Isover SD gravity flow slabs or as well as from Isover DK double gravity flow wedge blocks in gravity flow up to 15%. Whole structure is recommended to complete with Isover AK attic wedge blocks which helps to better change the horizontál direction of the water-proofing into the perpendicular direction.

**Fig. 1 – Example of use Isover R**

**Tab. 2 – Product parameters for EPD calculation**

| Parameter | Value |
|---|---|
| **Thermal resistance (140 mm) (EN 12162)** | 2.70 $K \cdot m^2 \cdot W^{-1}$ |
| **Thermal conductivity coefficient $\lambda_D$ (EN 12667)** | 0.037 $W \cdot m^{-1} \cdot K^{-1}$ |
| **Water vapour transmission (EN 12086)** | 1 [-] |
| **Compressive strength (EN 826)** | 30 kPa |
| **Tensile strength (EN 1607)** | 1 kPa |
| **Reaction to fire class (EN 13 501-1)** | A1 |

*More info:* ***http://www.isover.cz/en/declaration-of-performance***

**Tab. 3 – Technical data / physical characterictics**

| Parameter | Value |
|---|---|
| **Thickness of product** | 100 mm (from range 60–160 mm) |
| **Density** | 110 kg/m$^3$ (100-142 kg/m$^3$) |
| **Recycled briquette content** | 26–32 % |
| **Surfacing** | – |
| **Packaging for the distribution and transportation** | Polyethylene: 44 g/m$^2$ • Wood pallet: 481 g/m$^2$ |
| **Quantity by transport (truck)** | 10296 kg |
| **Product used for the Installation** | – |
| **Implementation loss rate** | 5 % |

**Tab. 4 – Chemical and hazard information**

| Substance | C.A.S. number(2) | Amount weight (%) | Classification and labelling (Regulation (CE) n°1272/2008) | Classification and labelling (European directive 67/548/EEC)(4) |
|---|---|---|---|---|
| Stone wool (1)<br>Terpolymerbinder | | over 95 %<br>5% | Not classified (3)<br>Not classified (3) | Not classified<br>Not classified |

(1): Man-made vitreous (silicate) fibres with random orientation with alkaline oxide and alkali earth oxide (Na2O+K2O+CaO+MgO+BaO) content greater than 18% by weight and fulfilling one of the nota Q conditions
(2): C.A.S. : Chemical Abstract Service
(3): Non classified H351 "suspected of causing cancer". Stone fibres are not classified carcinogenic according to the note Q of the Directive 97/69/EEC and the regulation n° 1272/2008 (page 335 of the JOCE L353 of December 31, 2008)
(4): Where substances are classified in accordance with Regulation (EC) No 1272/2008 during the period from its entry into force until 1 December 2010, that classification may be added in the safety data sheet together with the classification in accordance with Directive 67/548/EEC. From 1 December 2010 until 1 June 2015, the safety data sheets for substances shall contain the classification

*More info:* ***http://www.isover.cz/en/safety-documents***

**Most important hazards:** There is no warning notice with this product.

During the life cycle of the product any hazardous substance listed in the "Candidate List of Substances of Very High Concern (SVHC) for authorization" has been used in a percentage higher than 0,1% of the weight of the product.

**Tab. 5 – LCA calculation information**

| | |
|---|---|
| **Functional unit** | Providing a thermal insulation on 1 $m^2$ with a thermal resistance of 2.70 $K \cdot m^2 \cdot W^{-1}$ |
| **System boundaries** | "From cradle to gate with options" |
| **Reference service life (RSL)** | 50 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%);<br>Flows related to human activities such as employee transport are excluded;<br>The construction of plants, production of machines and transportation systems is excluded since the related flows are supposed to be negligible compared to the production of the building product when compared at these systems lifetime level;<br>Product parts, that are neglectable for its small influence, are for example Paper Labels, used for labeling insulation parcels and pallets. |
| **Allocations** | Allocation criteria are based on mass |
| **Geographical coverage** | Častolovice (Czech Republic) |
| **Time period** | 2017 |
| **Comparable** | According to EN 15804, EPD of construction products may not be comparable if they do not comply with this standard. According to ISO 21930, EPD might not be comparable if they are from different programmes. |

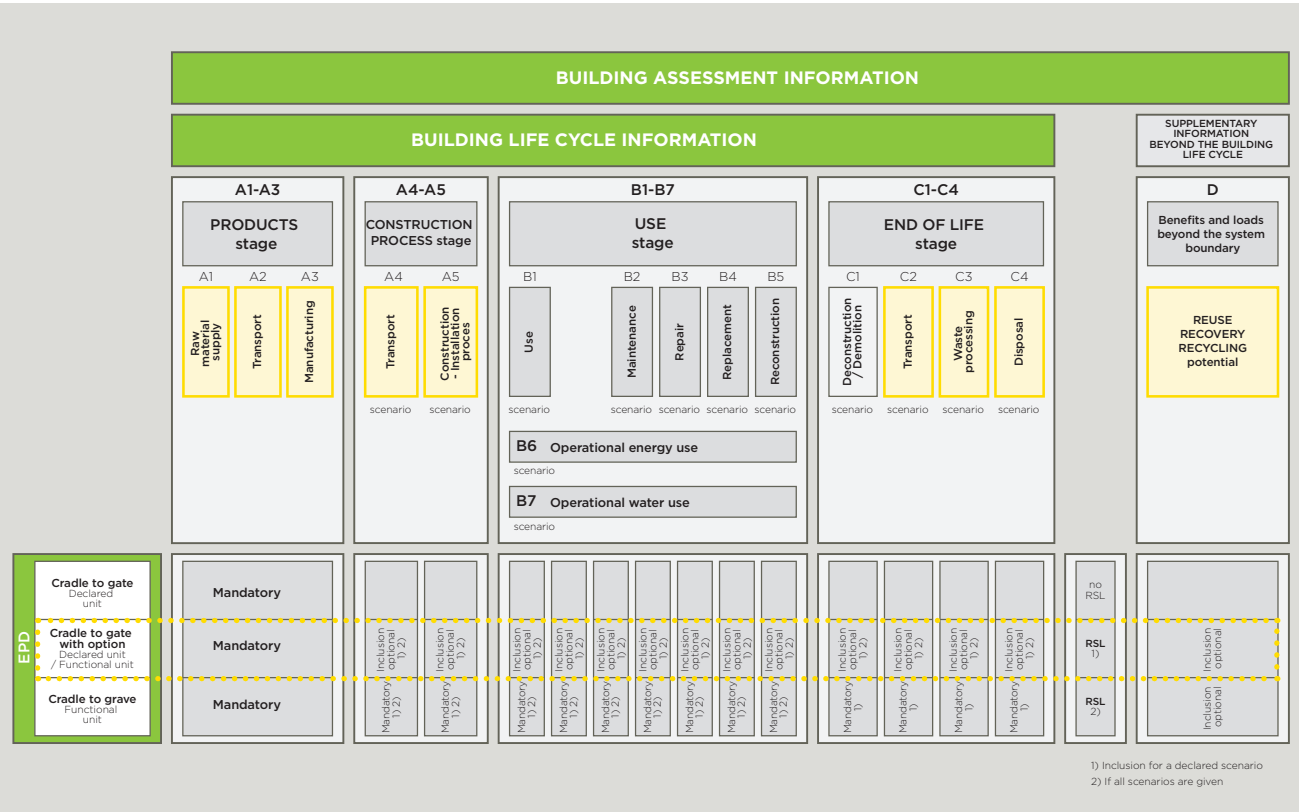



**Fig. 2 – Life cycle phases counted (EN 15804 + A1); the effect of the product in stage B1-B7 will be counted at the level of building construction**

## PRODUCT STAGE, A1-A3

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.

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. basalt and slag for stone wool. Besides these raw materials, recycled materials (briquettes) are also used as input. See detailed info at the end of this EPD.

### A2, transport to the manufacturer

The raw materials are transported to the manufacturing site. In our case, the modelling include: road transportations (average values) of each raw material.

### A3, manufacturing

This module includes process taking place on the manufacturing site. Specifically, it covers stone wool fabrication including melting and fiberization see process flow diagram and packaging. The production of packaging material is taking into account at this stage.


**Fig. 3 – Manufacturing process schema**

## 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 32 liters for 100 km |
| **Distance** | 160 km |
| **Capacity utilisation (including empty returns)** | 100 % of the capacity in volume<br>30 % of empty returns |
| **Bulk density of transported products** | 110 kg/m$^3$ (100-142 kg/m$^3$) |
| **Volume capacity utilisation factor** | 1 (by default) |

### A5, Installation in the building

No additional accessory was taken into account for the implementation phase insulation product.

| 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<br>Stone 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 mineral 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;

The product is considered to be landfilled without reuse, recovery or recycling.

### C4, disposal;

The stone wool is assumed to be 100% landfilled.

**Tab. 6 – Calculation scenario - phases C2, C3, C4**

| Parameter | Value |
|---|---|
| **Collection process specified by type** | 11 kg (collected with mixed construction waste) |
| Recovery system specified by type | No re-use, recycling or energy recovery |
| Disposal specified by type | 11 kg are landfilled |
| **Assumptions for scenario development (e.g. transportation)** | Average truck trailer with a 24 t payload, diesel consumption 32 liters for 100 km |

## Reuse/recovery/recycling potential, D*

Description of the stage: Packaging wastes from module A5 are reported in this module as recovered matter for information.
*see Environmental positive contribution at the end of EPD

LCA model, aggregation of data and environmental impact are calculated from the TEAM™ software 5.2.
Resume of the LCA results detailed on the following tabs.

**Tab. 7 - Environmental impacts of other thicknesses can be recounted by the design factor (on the material density and thickness base): except for A5**

| Thickness (mm) | 30 | 40 | 50 | 60 | 80 | 100 | 120 | 140 | 160 |
|---|---|---|---|---|---|---|---|---|---|
| Faktor | 0.34 | 0.47 | 0.59 | 0.65 | 0.80 | 1.00 | 1.15 | 1.34 | 1.53 |

**Tab. 8 – Environmental impacts**

| Parameters | Unit | Product stage | Construction process stage | | Use stage | End-of-life stage | | | | Reuse, recovery, recycling |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A1-A3 | A4 | A5 | B1-B7 | C1 | C2 | C3 | C4 | D |
| Global Warming Potential (GWP)[1] | kg $CO_2$ equiv /FU | 1,27E+01 | 1,83E-01 | 6,49E-01 | 0 | 0 | 2,84E-02 | 0 | 5,88E-02 | MND |
| Ozone Depletion (ODP)[2] | kg CFC 11 equiv /FU | 6,56E-07 | 3,34E-08 | 3,57E-08 | 0 | 0 | 5,17E-09 | 0 | 1,97E-08 | MND |
| Acidification potential (AP)[3] | kg $SO_2$ equiv /FU | 9,12E-02 | 6,12E-04 | 4,62E-03 | 0 | 0 | 9,47E-05 | 0 | 4,42E-04 | MND |
| Eutrophication potential (EP)[4] | kg $PO_4^{3-}$ equiv /FU | 8,09E-03 | 1,35E-04 | 4,17E-04 | 0 | 0 | 2,09E-05 | 0 | 9,40E-05 | MND |
| Photochemical ozone creation (POPC)[5] | kg $C_2H_4$ equiv /FU | 1,25E-02 | 1,75E-04 | 6,44E-04 | 0 | 0 | 2,72E-05 | 0 | 1,24E-04 | MND |
| Abiotic depletion potential for non-fossil ressources (ADP-elements)[6] | kg Sb equiv /FU | 2,06E-07 | 7,23E-09 | 1,08E-08 | 0 | 0 | 1,12E-09 | 0 | 2,99E-09 | MND |
| Abiotic depletion potential for fossil ressources (ADP-fossil fuels)[6] | MJ /FU | 1,13E+02 | 2,76E+00 | 5,89E+00 | 0 | 0 | 4,28E-01 | 0 | 1,68E+00 | MND |

MND = „module not declared“
The effect of the product in the phase B1-B7 will be count in to the level of the building structure.

1 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.

2 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.

3 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.

4 Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.

5 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.

6 Consumption of non-renewable resources, thereby lowering their availability for future generations.

**Tab. 9 – Resource use**

| Parameters | Product stage | Construction process stage | | Use stage | End-of-life stage | | | | Reuse, recovery, recycling |
|---|---|---|---|---|---|---|---|---|---|
| | A1-A3 | A4 | A5 | B1-B7 | C1 | C2 | C3 | C4 | D |
| Use of renewable primary energy excluding renewable primary energy resources used as raw materials - MJ/FU | 1,34E+01 | 3,41E-02 | 8,10E+00 | 0 | 0 | 5,28E-03 | 0 | 4,31E-02 | MND |
| Use of renewable primary energy used as raw materials MJ/FU | 9,24E+00 | 0 | 9,24E+00 | 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 | 2,27E+01 | 3,41E-02 | 1,14E+00 | 0 | 0 | 5,28E-03 | 0 | 4,31E-02 | MND |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU | 1,13E+02 | 2,75E+00 | 5,89E+00 | 0 | 0 | 4,25E-01 | 0 | 1,67E+00 | MND |
| Use of non-renewable primary energy used as raw materials MJ/FU | 7,30E+00 | 0 | 3,65E-01 | 0 | 0 | 0 | 0 | 0 | MND |
| Total use of non-renewable primary energy resources (primary energy energy resources used as raw materials) - MJ/FU and primary | 1,20E+02 | 2,75E+00 | 6,26E+00 | 0 | 0 | 4,25E-01 | 0 | 1,67E+00 | MND |
| Use of secondary material kg/FU | 6,43E+00 | 0 | 3,21E-01 | 0 | 0 | 0 | 0 | 0 | MND |
| Use of renewable secondary fuels - MJ/FU | 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 | MND |
| Use of net fresh water - $m^3$/FU | 3,80E-02 | 5,31E-04 | 2,02E-03 | 0 | 0 | 8,21E-05 | 0 | 1,83E-03 | MND |

**Tab. 10 – Waste categories**

| Parameters | Unit | Product stage | Construction process stage | | Use stage | End-of-life stage | | | | Reuse, recovery, recycling |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A1-A3 | A4 | A5 | B1-B7 | C1 | C2 | C3 | C4 | D |
| Hazardous waste disposed | kg /FU | 1,43E-01 | 1,80E-03 | 7,28E-03 | 0 | 0 | 2,78E-04 | 0 | 8,60E-04 | MND |
| Non-hazardous waste disposed | kg /FU | 2,39E+00 | 1,44E-01 | 6,78E-01 | 0 | 0 | 2,23E-02 | 0 | 1,10E+01 | MND |
| Radioactive waste disposed | kg /FU | 1,56E-04 | 1,88E-05 | 9,45E-06 | 0 | 0 | 2,91E-06 | 0 | 1,11E-05 | MND |

MND = „module not declared“

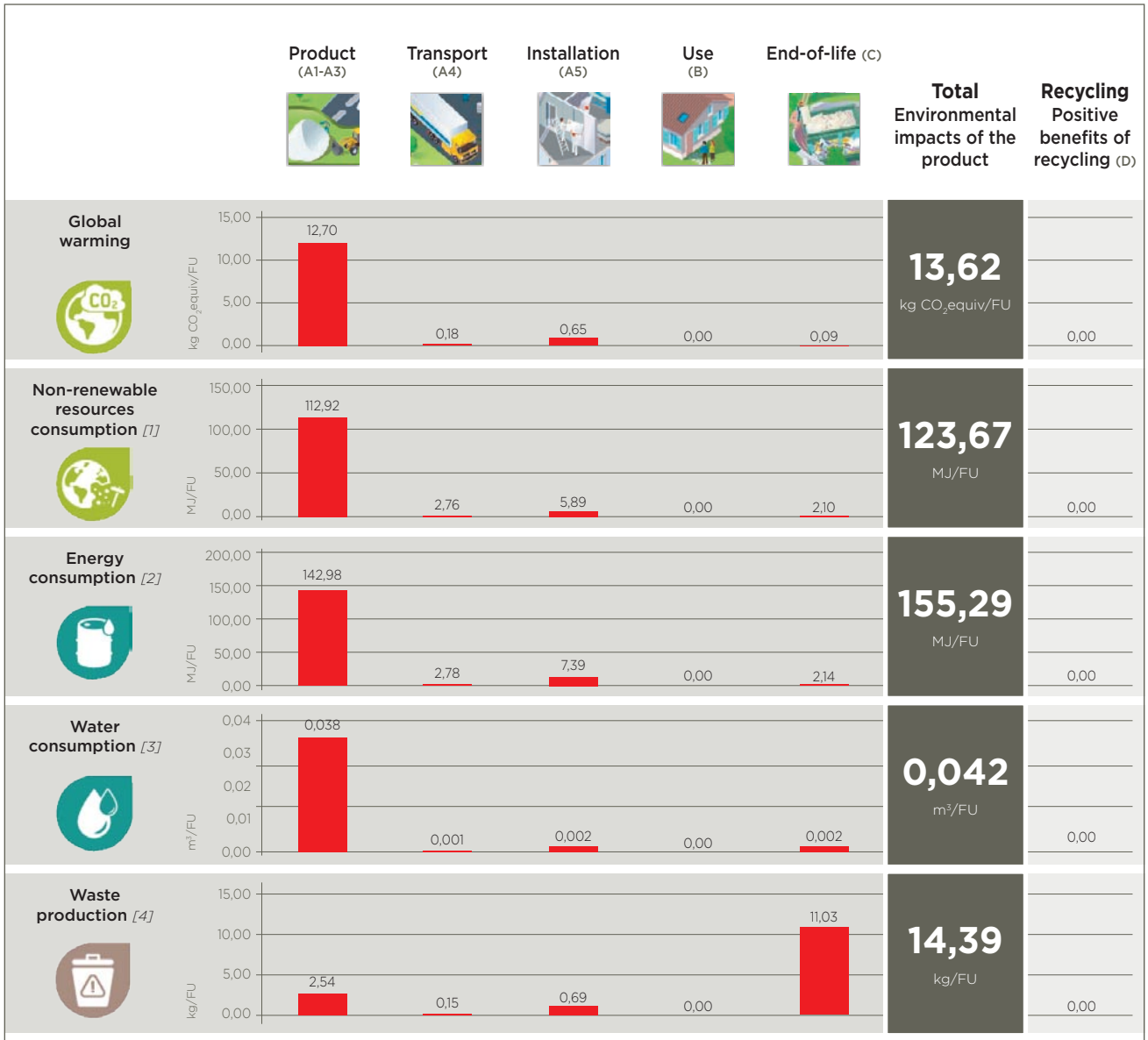
The effect of the product in the phase B1-B7 will be count in to the level of the building structure.

**Tab. 11 – Other output flows**

| Parameters | Unit | Product stage | Construction process stage | | Use stage | End-of-life stage | | | | Reuse, recovery, recycling |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A1–A3 | A4 | A5 | B1–B7 | C1 | C2 | C3 | C4 | D |
| Components for re-use | kg /FU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | MND |
| Materials for recycling | kg /FU | 2,43E-01 | 0 | 5,63E-01 | 0 | 0 | 0 | 0 | 0 | MND |
| Materials for energy recovery | kg /FU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | MND |
| Exported energy | MJ /FU | 1,05E-05 | 0 | 5,25E-07 | 0 | 0 | 0 | 0 | 0 | MND |

MND = „module not declared“

The effect of the product in the phase B1-B7 will be count in to the level of the building structure.




*[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.*

**Fig. 4 – The interpretation of results LCA according to SG PCR**

**Waste processing for reuse, recovery and/or recycling (not considered in the LCA scenarios of this EPD):**

Factory mineral wool waste can be processed into recycled briquettes for mineral wool production. Only internal recycled products (that never leave factory gate) can be used as a production input and it is mentioned only at part A1 - Raw material supply. Main parts of these briquettes are Milled wet mineral waste, Cement and Bauxit.

Second way how to reuse or recycle old mineral wool waste is to mill it and use it as a blown wool for attic floor insulation or for cavity constructions. This option is now available only for an internal waste recycling (for products, that have never been used in real constructions). That's why this reuse and recycling is not counted also for stages C and D of this EPD.

## ENVIRONMENTAL POLICY OF SAINT-GOBAIN

The vision of Saint-Gobain in environmental policy is to respect the principles of sustainable development, to reduce environmental impact at all stages of the life cycle, while preserving and improving all useful properties of their products.

The Group has two long-term objectives: zero environmental accidents and continuous reduction of environmental impacts (see Table 13). Long-term objectives are met by medium-term and short-term goals. The Group emphasizes in particular the following environmental areas: feedstock, waste, energy, atmospheric emissions, water, biodiversity and environmental accidents.

**Tab. 12 – Long term goals of the group Saint Gobain in the environmental**

| | | |
|---|---|---|
|  | **Non recovered waste (2010–2025)**<br>**Long-therm goal** | -50 %<br>zero non-recovered waste |
|  | **Energy consumption (2010–2025)**<br>**$CO_2$ emissions (2010–2025)** | -15 %<br>-20 % |
|  | **Water discharge (2010–2025)**<br>**Long-therm goal** | -80 %<br>zero industrial water discharge in liquid form |
|  | **Target by 2025** | promote the preservation of natural areas at Company sites as much as possible |
|  | **Target by 2025** | EvE2 / site / year < 0.25<br>(EvE: Environment Event management standard from Saint-Gobain) |

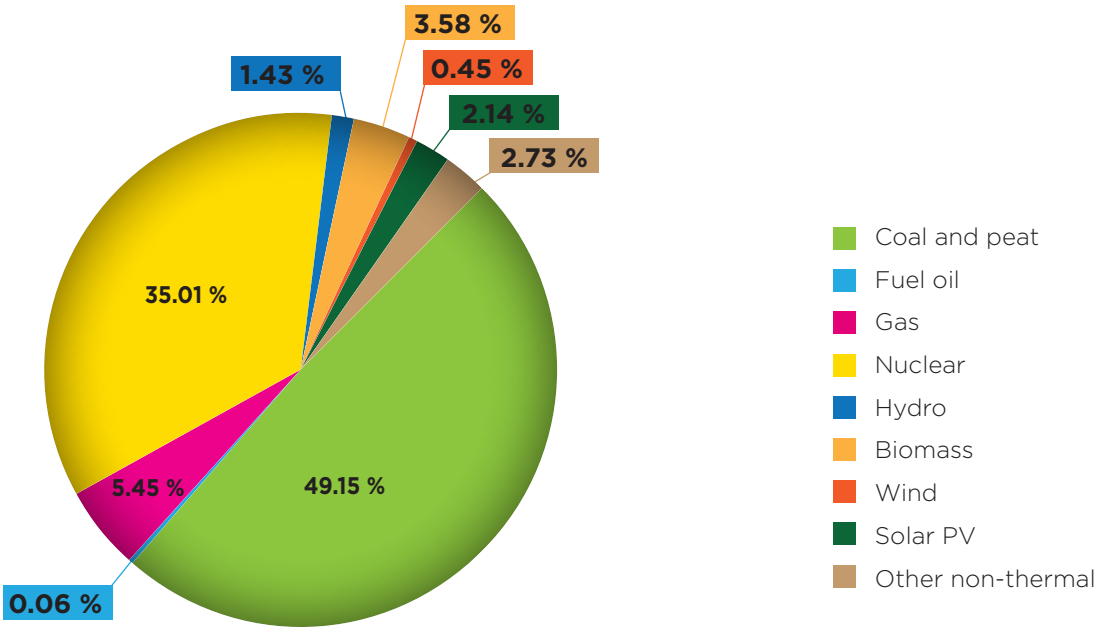
***More informations CSR (Corporate Sustainability Report) on the website www.saint-gobain.com***

Production process follows in addition these international standards:
ČSN EN ISO 9001, ISO 14001,
OHSAS 18001 a ISO 50001

CERTIFIED
ISO 9001 · ISO 14001
OHSAS 18001 · ISO 50001

**The electricity production model considered for the modelling of Saint-Gobain plant is:**
401 Electricity (Czech Republic, 2017)

| Type of information | Description |
|---|---|
| **Location** | Representative of average production in Czech Republic (2017) |
| **Geographical representativeness description** | Split of energy sources in Czech republic<br>– Coal and peat: 49.15%<br>– Fuel oil: 0.06%<br>– Gas: 5.45%<br>– Nuclear: 35.01%<br>– Hydro: 1.43%<br>– Biomass: 3.58%<br>– Wind: 0.45%<br>– Solar PV: 2.14%<br>– Other non-thermal: 2.73% |
| **Reference year** | 2017 |
| **Type of data set** | Cradle to gate |
| **Source** | OTE CZ * |




*National energy mix. OTE CZ [online]. [cit. 2018-08-14]. Available from: http://www.ote-cr.cz/statistika/narodni-energeticky-mix/narodni-energeticky-mix

## REFERENCES

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[2] ČSN ISO 14025. Environmental labels and declarations - Type III environmental declarations - Principles and procedures. Prague: ČESKÝ NORMALIZAČNÍ INSTITUT, 2006
[3] Environdec PCR (International EPD system). Product group : Multiple UN CPC Codes: INSULATION MATERIALS. version 1.0 (2014:13). Sweden.
[4] General report on isover LCA Castolovice. Paris, France: Isover, 2015

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