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# Let’s make it real: mineral wool insulation as use-case

## We use Knauf Insulation’s EPD to illustrate the different steps of an LCA


ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025, ISO 21930 and EN 15804+A2 for:

PTN, TP

From

KNAUFINSULATION

| | |
|---|---|
| Program: | The International EPD® System www.environdec.com |
| Programme operator: | EPD International AB |
| EPD registration number: | S-P-05553 |
| Publication date: | 2022-11-17 |
| Validity date: | 2027-11-17 |

EPD®

**Mineral wool** is an insulation product manufactured from a **mix of stone & silica**

The materials are first **heated to a high temperature** until molten

The molten stone is then spun and formed into a **fibrous mat**, which is then **compressed** into finished insulation slabs


https://www.youtube.com/watch?v=1kCMiZNIW1Y

**EPD (Environmental Product Declaration)** is a standardized **document** describing an LCA study, that follows given reporting **guidelines**

- An EPD is **defined by ISO 14025**, which sets out the principles and procedures for developing **Type III environmental declarations**
- An EPD follows the **methodology based on ISO 14040**, using the appropriate **Product Category Rules (PCRs),** to ensure **consistency** and **comparability**
- The EPD is delivered as a document or report following a **series of third-party verification reviews before registration and publication**

Source: EPD number S-P-05553 (Knauf Insulation), International EPD® System. This EPD follows the EN 15804+A2 standard (EU guideline for the construction sector).

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# Goal and scope definition for Knauf Rock Mineral Wool PTN

## What are the intended application & audience? What do I include in my study? Which data is needed?

| | Decision items | Knauf Rock Mineral Wool PTN |
|---|---|---|
| Goal | Goal and audience | **Inform** the **stakeholders** in Belgium about the product's environmental impacts through an EPD |
| Scope | Function | **Insulate** a building |
| | Functional unit | **1 m²** of **uncoated** slab (R-value of 1.14 m² K/W) |
| | Product system & boundaries | Cradle to grave: Raw materials → Manufacturing → Transport → Installation → Usage → End-of-life → Recycling |
| Data | Temporal & geographic scope | Year **2018**<br>Single plant in **Slovakia** |
| | Data quality requirements | >90% **specific** data, <10% **generic** data |
| Calculation & reporting | Environmental impact assessment method | **EN15084+A2** impact assessment method |
| | Type & format of the report | **EPD document** following the EN15084+A2 guidelines |
| | Critical review considerations | **Reviewed** by an independent third-party |

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# Instructions for the life-cycle inventory

**Assignment**

- Using the production flowchart and the corresponding data points, model the life-cycle inventory of the mineral wool insulation slab
- Calculate all the intermediate flow quantities for each process and scale them to the functional unit

**Method**

- Select one process in the flowchart from where we take the functional unit as a reference, then calculate backward and forward the quantities of each raw material, input and outputs needed
- Use a pen a paper! Rounding up is done to 1 decimal

**Functional unit**

**1 m²** of **uncoated** slab
(R-value of 1.14 m² K/W)

**Scope**

**Cradle-to-gate**
(from extraction of raw materials to construction site)

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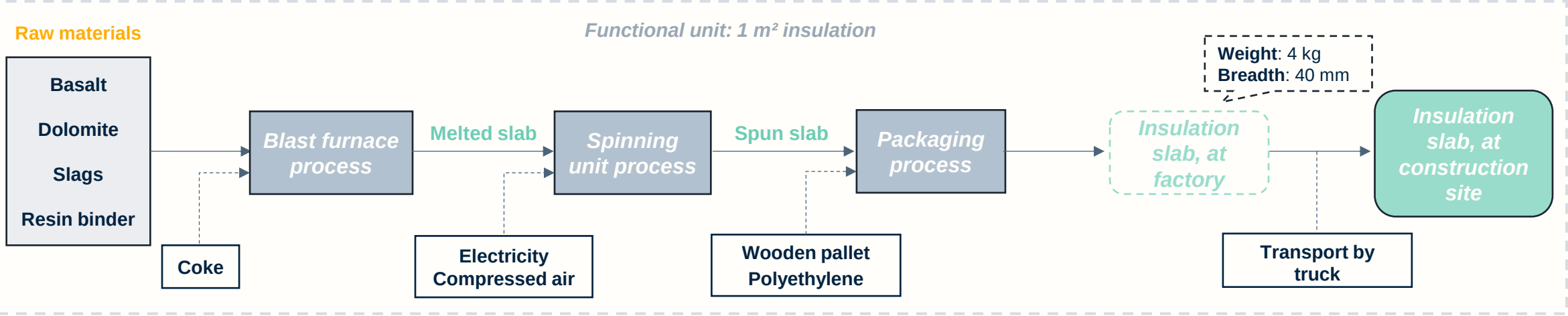
# The production stage (1/2)

## Production process of Rock Mineral Wool PTN, TP and transport to construction site

### Simplified production process




### Data inputs

| Raw material | Relative weight / FU | Ecoinvent database |
|---|---|---|
| Basalt | 55% | "Market for basalt \| basalt \| GLO" |
| Dolomite | 15% | "Market for dolomite \| dolomite \| Cutoff, U- RER" |
| Slags | 25% | "Market for blast furnace slag \| … \| GLO" |
| Resin binder | 5% | "Market for polyester-complexed starch biopolymer \| GLO" |

**How many kg of coke needed to fuel the process of 1 kg of melted slab?**

$$C + O_2 \rightarrow CO_2 + energy$$

- C (= coke): 12 g/mol
- $O_2$: 16 g/mol
- Caloric value of coke: 28,6 MJ/kg (ecoinvent source for CO2)

"On average, we burn **96 kilograms of coke** and use **5,76 m³ of compressed air** (600 kPa) in **one day**"

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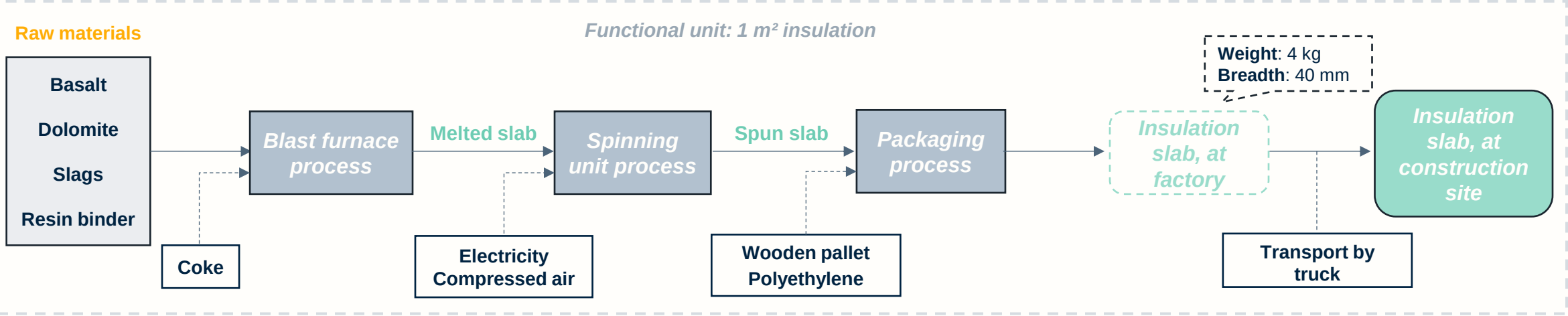
# The production stage (2/2)

## Production process of Rock Mineral Wool PTN, TP and transport to construction site

### Simplified production process




### Data inputs

| Electricity consumption |
|---|
| "We spin 12 m² per hour, and our total electricity consumption/day (+/- 8 hours) is 192 kWh." |
| **Hint:** the plant uses medium voltage |

| Packaging material |
|---|
| Polyethylene film: 0,030 kg/m² (2 layers) |
| Wooden pallet: EUR – flat pallet<br>→ Assume: 0,85 m x 1,2 m<br>→ Weight of the pallet is 5 kg<br>→ Max height of piling is 70 cm |

| Transportation parameter | Value |
|---|---|
| Average transport distance | 600 km |
| Type of vehicle | EURO 6 Truck (28 – 32 t) |
| Truck payload capacity | 22 tonnes |
| Number of pallets in truck | 20-25 units |