# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025, EN 15804

TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
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LAFARGE

## ENVIRONMENTAL PRODUCT DECLARATION

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| Owner of the Declaration | **Lafarge Beočinska Fabrika Cementa, d.o.o.** |
| Programme holder | CENIA, Czech Environmental Information Agency, executive function of the NPEZ Agency |
| EPD prepared by | TZÚS Praha, s.p. - branch office Ostrava |
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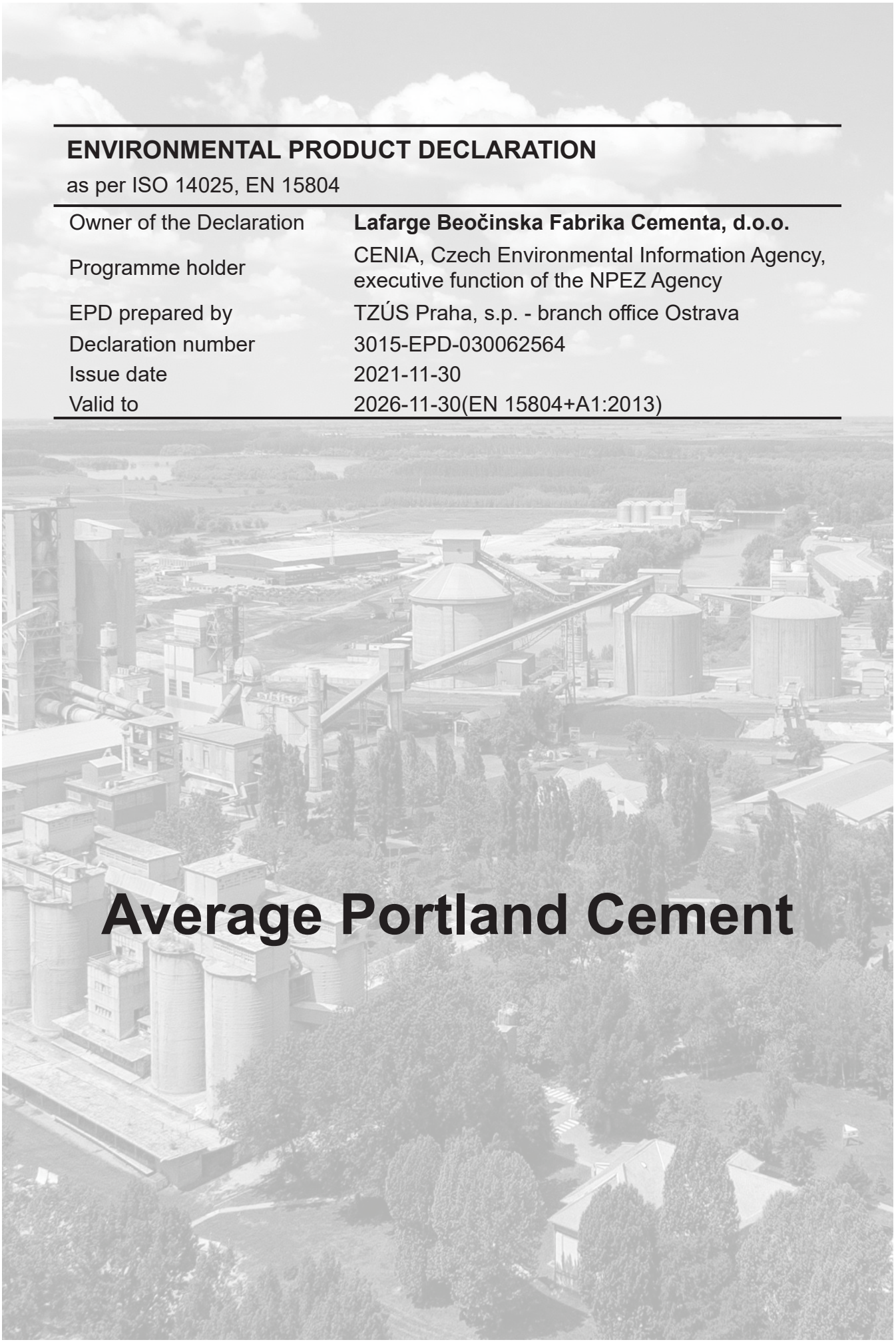

# Average Portland Cement

# 1. General Information Statement

| Lafarge Beočinska Fabrika Cementa, d.o.o. | CEMENT BONDED PARTICLE BOARD |
|---|---|
| **Program:**<br>„National Environmental Labeling Program“ -CZ<br>**Programme holder:**<br>CENIA, Czech Environmental Information Agency, executive function of the NPEZ Agency,<br>Vršovická 1442/65, Praha 10, 100 10, www.cenia.cz | **Owner of the Declaration:**<br>**Lafarge Beočinska Fabrika Cementa, d.o.o.,**<br>Trg BFC 1<br>21300 Beocin<br>Serbia |
| **Declaration number:**<br>3015-EPD-030062564 | **Declared product / Declared unit:**<br>**1tmanufactured products** |
| **This Declaration is based on the Product Category Rules:**<br>EN 15804+A1:2013as basic PCR<br>EN 16908:2017Cement and building lime - Environmental product declarations - Product category rules complementary to EN 15804.<br>**Issue date:** **2021-11-30**<br>**Valid to:** **2026-11-30** (EN 15804+A1:2013 | **Product:**<br>**Average Portland Cement** |

We remind you that this study is only based on facts, circumstances and assumptions which are specified in the report. Should these facts, circumstances or assumptions would be different, our conclusions might be different.

Moreover, the results of the study should be considered in the aggregate with regard to the assumptions made and not taken individually.

This document is consistent with the international standards of construction products: **ISO 21 930:2013** Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services and **EN 15804+A1:2013** Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products and with the life cycle assessment (LCA) standards **EN ISO 14040:2006** Environmental management - Life Cycle Assessment - Principles and Framework and **EN ISO 14044:2006** Environmental management - Life Cycle Assessment- Requirements and guidelines.

A Product Category Rules (PCR) document: **EN 16908:2017** Cement and building lime - Environmental product declarations - Product category rules complementary to EN 15804.

The company has a certified integrated quality management system according to the EN ISO 9001 standard and the environment according to EN ISO 14001.

### 1.1. Product description

#### 1.1.1. Product

Lafarge Beočin cement plant, operating in Serbia since the acquisition in 2002, is a certified supporter of domestic construction industry, the leader in cement and concrete production and the leader of innovations in the building sector.

Lafarge Company is part of the global giant – Holcim Group, operating in more than 60 countries worldwide with over 100.000 employees and over 2.500 facilities, working in Serbia in the Beocin cement plant and several RMX plants across the country.

Product portfolio covers wide range of different cement types designed with the goal to support the sustainable building principles. Apart from bulk and bag cement, Lafarge company is known for different types of high-quality concrete, the standard as well as innovative ones. They are designed based on specific market requirements using state-of-the-art technology.

The LCA study is prepared for the average cement produced in Lafarge Beočin cement plant, and it includes the following types of the cements:

- CEM I 42,5R
- CEM II/A-M (S-L) 42,5R
- CEM II/B-M (V-L) 42,5N
- CEM II/B-M (S-V-L) 42,5N
- CEM II/B-M (S-V) 42,5N – LH
- Multibat MC22,5

In Serbia, Lafarge is implementing a globally defined de-carbonization strategy aimed to reduce $CO_2$ by 40% until the year 2030, with zero emission goal by the year 2050, which is the common goal of all Holcim Group members. The company is focused on reducing fossil fuel usage, promoting sustainable development and transforming our portfolio by increasing the amount of products with minimal emission of harmful gasses.

### 1.1.2. Application

Cement is the most used hydraulic binder in production of different types of mortars and plasters for internal and external use, screeds, load-bearing and non-load-bearing concrete structures (walls, slabs, columns and beams, etc.), for all other concrete types exposed to aggressive and non-aggressive environments, soil stabilization in road construction segment, and many more.

### 1.1.3. Technical data

The composition of cements manufactured by Lafarge Beocin cement plant is in accordance with the following standards:

- EN 197-1:2011 Cement Part 1: Composition, specifications and conformity criteria for common cements
- EN 197-2:2020 Cement – Part 2: Assessment and verification of constancy of performance
- EN 197-5:2021 Cement – Part 5: Portland-composite cement CEM II/C-M and Composite cement CEM VI
- EN 413-1:2011 Masonry cement – Part 1: Composition, specifications and conformity criteria
- CEN/TR 14245:2020 Cement – Guidelines for the application of EN 197-2: Assessment and verification of constancy of performance

EU Regulation No. 305/2011 applies to the product. A declaration of performance (DoP) and CE marking are prepaered for CEM I 42,5R andCEM II/A-M (S-L) 42,5R cement types.Certificate of Performance no. 1020-CPR-040 049061 for CEM II/A-M (S-L) 42,5Rcement and no. 1020-CPR-040 066972 for CEM I 42,5R cement types are obtained by theTechnical and Test Institute for Construction Prague - TZUS, Czech Republic, valid from 15/07/2016, and 22/03/2021, respectively.

Cement does not contain any harmful substances that are listed in the „Candidate List of substances of very high concern for Authorisation“, published in accordance with article 59 (10) of the REACH regulation, and does not meet the criteria for PBT (Persistent, Bio-accumulative and Toxic) or vPvB (very Persistent and very Bio-accumulative) in accordance with Annex XIII of Regulation (EC) No. 1907/2006 of the European Parliament. Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles aredefined by REACH Regulation under Annex XVII Entry 47 – Chromium VI compounds.Product quality is ensured by an effective quality management system according to EN ISO:9001 and ISO:14001, and is in accordance with technical regulations concerning the type of product.

### 1.1.4. Product processing

Cement is one of the most important product in construction industry. Cement production can be shown as technology that uses natural and alternative raw mineral components, and by mixing them, drying, grinding and exposing to very high temperatures, the final product is obtained. In Lafarge Beočin cement plant, main raw materials for clinker production are limestone and marl, with addition of sand, and main raw materials for cement production are clinker, blast granulated slag, fly ash, limestone and gypsum.

The whole production process includes:

- Raw material exploitation
- Raw meal preparation
- Fuel preparation (traditional and alternative fuels)
- Production and storage of cement clinker
- Production and storage of cement
- Packing and shipment

### 1.1.5. Reference Service Life (RSL)

No RSL is declared for cement or building lime as they are intermediate building products. A reference service life could be declared for downstream products such as ready-mix concrete, precast concrete, screed, plasters, masonry mortars or other building products in which cement and/or building lime are used (EN 16908).

## 1.2. LCA: Calculation rules

### 1.2.1. Declared unit

The declared unit is used instead of the functional unit when the precise function of the product or scenarios at the building level is not stated or is unknown. The declared unit shall be applied when an EPD covers one or more life cycle stages as information modules, i.e. in the case of a “cradle to gate” EPD and “cradle to gate with options” EPD and when the EPD is not based on a full “cradle to grave” LCA. The declared unit provides a reference by means of which the material flows of the information module of a construction product are normalised (in a mathematical sense) to produce data, expressed on a common basis. It provides the reference for combining material flows attributed to the construction product and for combining environmental impacts for the selected stages of the construction product’s incomplete life cycle. The declared unit shall relate to the typical applications of products.

**For assessing products “Average Portland Cement” was chosen declared unit 1 t.**
**Conversion factor for 1 kg: 0,001**

## 2. System boundary according to the modular approach

The system boundary with nature is set to include those technical processes that provide the material and energy inputs into the system and the following manufacturing, and transport processes up to the factory gate as well as the processing of any waste arising from those processes.

The boundary of the product system of the product life cycle is only the information module **A1 - A3 "Production phase"** in accordance with the standard EN 15804 + A1: 2013. The project report includes all relevant "cradle to gate" processes.

The boundaries of the system are set to include both those processes that provide material and energy inputs to the system and subsequent production and transportation processes up to the production gateway, as well as the processing of all waste resulting from these processes.
Applied information modules according to EN 15804 + A1 are listed in the following table:

***Tabele2: Applied information modules***

| **Information about product system boundaries - information modules** (**X** = included, **MND** = module not declared) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Product stage** | | | **Construction process stage** | | **Use stage** | | | | | | | **End-of-life stage** | | | | **Benefits and loads beyond the system boundary** |
| Raw materiál supply | transport | Manufacturing | transport to the building site | Construction - Installation proces | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction, demolition | transport to waste processing | Waste processing | Disposal | Reuse, recovery and/or recycling potentialsrecyklace |
| **A1** | **A2** | **A3** | **A4** | **A5** | **B1** | **B2** | **B3** | **B4** | **B5** | **B6** | **B7** | **C1** | **C2** | **C3** | **C4** | **D** |
| **X** | **X** | **X** | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND | MND |

**A1-A3 Product stage:**
- A1 - raw material supply
- A2 - transport to the manufacturer
- A3 - manufacturing,

Environmental impacts are listed in total for modules A1-A3.

### 2.1. Omissions of life cycle stages

Information modules A4 to C4 and module D, which is intended to provide additional information beyond the life cycle, have not been included in the LCA due to the difficult availability of input data and are therefore not declared.
**Benefits and costs beyond the system:** They are not quantified in the study. In other product systems.

### 2.2. Cut-off criteria

The cut-off rules set for this project are the ones recommended by the document EN 15804+A1:2013.
Criteria for the exclusion of inputs and outputs (cut-off rules) in the LCA and information modules and any additional information are intended to support an efficient calculation procedure. They shall not be applied in order to hide data. Any application of the criteria for the exclusion of inputs and outputs shall be documented.
The cut-off criterion used 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
- 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%)
- No simplification of the LCI by additional exclusions of material flows

The following flows are not recorded in the system boundaries:

- 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 supposed to be negligible compared to the production of the building product when compared at these systems lifetime level
- All types of waste not related to the production process were excluded

**2.3. Sources of environmental data**

All operational data concerning product recipes, energy data, diesel consumption and the distribution of annual waste production and emissions according to plant records were taken for the study. For all considered inputs and outputs, transport costs were considered or differences in transport distances were recognized.

Quantifications for the input and output of energy and materials were directly derived from annual **production data of 2020** and detailed in the LCA study.

The basic source of the necessary data from the area of production, purchasing and consumption on the basis of technological data, etc. was the information system and operational data of the company.

The annual report on waste production for 2020 was used to determine the production of waste. The structure of electricity generation in Serbia in 2020 is used for LCIA calculations (data from Ecoinvent).

Used software for data processing and evaluation: SimaPro - version 9.1.1.1, SimaPro Analyst, Ecoinvent database 3.6.

**2.4. Data quality**

The data used to calculate the EPD correspond to the following principles:

**Time period:** Manufacturer's data for 2020 are used for specific data (the requirement to use average data for a period of 1 year is met). Data from the Ecoinvent database version 3.6 are used for generic data.

**Technological aspect:** Data corresponding to the current production of individual types of products and corresponding to the current state of the used production technologies (product recipes, technological procedures) are used. For each product type, all the data needed to calculate the average product of that type are used.

**Aspect of completeness:** Most of the input data is based on consumption balances, which are accurately recorded in the company's information system. The reliability of the source of specific data is given by the uniformity of the company's information system collection methodology. The source of some data, or their allocations, were also qualified technological calculations.

**Geographical aspect:** The generic data used from the Ecoinvent database are used valid for the EU (eg energy mix of electricity generation).

**Consistency aspect:** Uniform aspects are used throughout the report (allocation rules, data age, technological scope, time scope, geographical scope).

**Credibility aspect:** All important data were checked for cross-comparison of mass balances.

**Sensitivity analysis:** The variability of the input data is relatively difficult to estimate. It is given by the situation on the construction products market and the development of orders for individual types of products. For most input-specific data, their size in the previous year was also taken into account and no significant differences were found in relation to the amount of product produced.

As part of the sensitivity analysis to possible input fluctuations, the effect of reducing the number of crushed tires by 50% and replacing them with coal was assessed. The effect of this possible fluctuation is very small.

**Credibility aspect:** All important data were checked for cross-comparison of mass balances.

### 2.5. Allocation

Allocation criteria are based on production weight.

### 2.6. Comparability

Environmental product statements from different programs may not be comparable. Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to EN 15804+A1:2013 and the building context, respectively the product-specific characteristics of performance, are taken into account.

The used background database has to be mentioned.

### 2.7. Product variability

In this EPD, only data concerning one plant (production site) and the average product are given. Data on all inputs and outputs are obtained in aggregate for the total cement production. For this reason, no calculation rules are used to average the data. The included types of cements are listed in chapter 1.1.1.

**The declared unit of 1** t was chosen for the assessment of the average cement.

### 2.8. LCA: Results

The impact assessment calculations are made in full accordance with standard EN 15804+A1:2013. This standard requires parameters describing the environmental impacts, the use of resources, the waste disposal and the others output flows.

The calculation of environmental impacts is realized with the impact characterization factors defined in the CML-IA (database developed by Institute of Environmental Sciences Faculty of Science University of Leiden, Netherlands).

#### 2.8.1. Parameters describing the environmental impacts

***Tabele3: Parameters describing the environmental impacts***

| Parameter | Parameter | A1-A3 |
|---|---|---|
| Abiotic depletion potential (ADP-elements) for non fossil resources | kg Sb equiv. | 2,12E-04 |
| Abiotic depletion potential (ADP-fossil fuels) for fossil resources | MJ, net calorific value | 5,32E+03 |
| Global warming potential (GWP) | kg CO2 equiv. | 6,70E+02 |
| Depletion potential of the stratospheric ozone layer (ODP) | kg CFC 11 equiv. | 4,06E-05 |
| Formation potential of tropospheric ozone (POCP) | kg Ethene equiv | -4,64E-01 |
| Acidification potential of soil and water (AP) | kg SO2 equiv. | 4,81E+00 |
| Eutrophication potential (EP) | kg (PO4)3- equiv. | 1,64E+00 |

*Tabele4: Parameters describing the resource use*

| Parameter | Parameter | A1-A3 |
|---|---|---|
| Use of renewable primary energy excluding renewable primary energy resources used as raw materials | MJ | 1,36E+02 |
| Use of renewable primary energy resources used as raw materials | MJ | 0,00E+00 |
| Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) | MJ | 1,36E+02 |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials | MJ | 1,89E+03 |
| Use of non-renewable primary energy resources used as raw materials | MJ | 0,00E+00 |
| Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) | MJ | 1,89E+03 |
| Use of secondary material | kg | 1,84E+02 |
| Use of renewable secondary fuels | MJ | 0,00E+00 |
| Use of non-renewable secondary fuels | MJ | 1,03E+03 |
| Net use of fresh water | m3 | 9,55E-01 |

*Tabele5: Parameters describing the waste categories*

| Parameter | Parameter | A1-A3 |
|---|---|---|
| Hazardous waste disposed | kg | 0,00E+00 |
| Non-hazardous waste disposed | kg | 1,70E-03 |
| Radioactive waste disposed | kg | 0,00E+00 |

*Tabele6: Parameters describing the others output flows*

| Parameter | Parameter | A1-A3 |
|---|---|---|
| Components for re-use | kg | 0,00E+00 |
| Materials for recycling | kg | 1,26E-01 |
| Materials for energy recovery | kg | 7,25E-01 |
| Exported energy | MJ per energy carrier | 1,79E+01 |

### 2.8.2. LCA: Interpretation

All the obtained results are clearly presented in the LCA study in the appendices of the network graphs for the given product. It is thus possible to assess the impact of the main components of input-output flows on individual types of environmental impacts.

### 3. LCA: Scenarios and additional technical information

Information modules A4 to C4 and module D were not included in the LCA analysis.

### 4. LCA: Additional information

The EPD does not include additional documentation related to the declaration of supplementary information.

### 5. References

ISO 14025:2010 Environmental labels and declarations - Type III environmental declarations - Principles and procedures

EN 15804+A1:2013 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

EN 16908:2017 Cement and building lime - Environmental product declarations - Product category rules complementary to EN 15804

EN ISO 14040:2006 Environmental management - Life Cycle Assessment - Principles and Framework

EN ISO 14044:2006 Environmental management - Life Cycle Assessment – Requirements and guidelines
EN ISO 14063:2010 Environmental management - Environmental communication - Guidelines and examples
EN 15643-1:2010 Sustainability of construction works - Sustainability assessment of buildings Part 1: General framework
EN 15643-2:2011 Sustainability of construction works - Assessment of buildings - Part 2: Framework for the assessment of environmental performance
EN 15942:2011 Sustainability of construction works - Environmental product declarations Communication format business-to-business
TNI CEN/TR 15941:2010 Sustainability of construction works - Environmental product declarations Methodology for selection and use of generic data
ILCD handbook - JRC EU, 2011
Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC
Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/200
SimaPro - LCA software for fact-based sustainability, Pré Consultants, the Netherlands, www.pre-sustainability.com
Ecoinvent Centre, www.Ecoinvent.org
Explanatory documents are available from the “Quality Manager “ of Lafarge Beočinska Fabrika Cementa, d.o.o.

## 6. EPD verification

| 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. 51/2021 | |

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|---|---|---|
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