

# EPD of Aggregates

ISO 14020:2000, ISO 14025:2006, ISO 14040:2006, ISO 14044:2006, ISO 21930:2007, EN 15804:2012, UN CPC 375:2013

Romania

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# Environmental Product Declaration (EPD) of Aggregates

## 1. Aim and scope

The current document is developed for providing an environmental product declaration (EPD) for aggregates produced and delivered from the locations fully owned and operated by Holcim in Romania. The aggregates are used in concrete and in other construction applications.

The declaration is established for the weighted average product of these manufacturing plants. The average is based on the extracted production volume of each plant.

As the applications of these aggregates as an intermediate material are numerous, a unique functional unit cannot be defined and therefore this EPD is based on a declared unit = 1000 kg of aggregates.



Figure 1: Stancesti Aggregates Plant

## 2. General information

### 2.1 EPD, LCA, PCR information

EPD Information		
Program operator	The international EPD System	The International EPD System Vasagatan 15-17 SE-111 20 Stockholm Sweden Email: <a href="mailto:info@environdec.com">info@environdec.com</a> Web: <a href="http://www.environdec.com">www.environdec.com</a>
Declaration holder	Holcim Romania	Address: 169 A Calea Floreasca Street Building B, Floor 7, Sector 1, RO 014459, Bucharest, Romania Phone: +4021.231.77.08/09 Fax +4021.231.77.14/15 Contact person: Mihaela Odangiu Email: <a href="mailto:Mihaela.Odangiu@holcim.com">Mihaela.Odangiu@holcim.com</a> Mobile: +40742.358.943 Web: <a href="http://www.holcim.ro">www.holcim.ro</a> Company identification information: Trade Register No: J40/399/2002 Fiscal Registration Code: RO 12253732 Subscribed and paid-in capital: LEI 205,268,05
Product	Aggregates	
Declaration number	S-P-00528	
Date of Issue:	2014-04-01	
Period of Validity:	2019-04-01	
Reference standards:	ISO 14020:2000, ISO 14025:2006	

Reference PCR	Construction products and CPC 54 construction services Version 1.2
Date of issue	2013-03-15
Valid until	2015-01-09
Appointed PCR moderator	Martin Erlandsson, IVL, martin.erlandsson@ivl.se
Independent verification of the EPD	External, according to ISO 14025
Third party verifier	Carl Otto Nevén Independent verifier approved by the International EPD System

Table 1: EPD Information

LCA Information	
Title	Life Cycle Assessment of aggregates of Holcim Romania 1000 kg average aggregates
Date of Issue:	2014-04-01
Preparer:	Ingenieurbüro Trinius GmbH Barmbeker Str. 9A. 22303 Hamburg, Germany Phone: +49 40 2841 788 00 Fax +49 40 2841 788 29 Contact person: Wolfram Trinius Email: <a href="mailto:trinius@trinius.de">trinius@trinius.de</a> Mobile +49 172 425 5657
Reference standards:	ISO 14040:2006, ISO 14044: 2006, EN 15804:2012

Table 2: LCA Information

## 2.2 Reference period of EPD data

The reference period for the data used within this EPD is the year 2012.

## 2.3 Geographical scope of EPD application

The geographical system boundary is Romania. All processes are valid for the production sites in Romania. All inputs coming from outside of Romania are included with their respective geography. Waste treatment processes are included based on average data valid for the European Union (EU-27).

## 2.4 Additional information about EPD

This EPD provides information concerning the production of aggregates only. This information can be used as an input for an assessment of a specific application of aggregates with regard to its entire life cycle.

The production of aggregates is subject to Romanian and European legislation, which address all relevant environmental effects like the excavation of natural raw materials, the rehabilitation of quarries, the recovery of energy and material from wastes and the emission of noise, dust and hazardous substances (NO<sub>x</sub>, SO<sub>2</sub>, heavy metals, etc.).

Aggregates addressed in this EPD are produced by Holcim in Romania according to Harmonized European Standards and according to Romanian Standards, as follows:

- SR EN 12620+A1:2008 “Aggregates for concrete”;
- SR EN 13242+A1:2008 “Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction”
- SR EN 13043:2003/AC:2004 “Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas”
- SR 662:2002 “Road construction works. Natural quarry aggregates. Quality technical requirements”

The Harmonized European Standards mentioned-above address all of the Essential Requirements of the European Construction Products Regulation No. 305/2011 including the Essential Requirement on Hygiene, Health and the Environment.

### 3. Product description and system boundaries

#### 3.1 Product identification and usage

Aggregates are mineral materials excavated from natural quarries, washed, sorted or crushed for distribution. They are used in the production of concrete or directly as construction material.

This EPD covers aggregates produced by Holcim in Romania with care for sustainable development principles:

#### Sustainable development

In order to respect the principles of sustainable development, HOLCIM implements, maintains and continuously improves the integrated management system, in accordance with the applicable reference documentation: SR EN ISO 9001:2008, SR EN ISO 14001:2005, SR OHSAS 18001:2008.

Plant	Material Description	Material Size/ Type	Application
Stancesti	Aggregates (natural, sorted)	0-4 mm	Concrete, roads and civil engineering construction (SR EN 12620+A1:2008, SR 662:2002)
	Aggregates (natural, crushed)	0-25 mm	Road construction works (SR 662:2002)
	Aggregates (natural, sorted)	0-63 mm	Road construction works (SR 662:2002)
	Aggregates (natural, crushed)	0-63 mm	Roads and civil engineering construction (SR EN 13242+A1:2008)
	Aggregates (natural, sorted)	4-8 mm	Concrete, roads and civil engineering construction (SR EN 12620+A1:2008, SR 662:2002)
		8-16 mm	
	Aggregates (natural, crushed)	4-8 mm	Concrete, roads and civil engineering construction. Bituminous mixtures and surface treatments for roads, airfields and other trafficked areas (SR EN 12620+A1:2008, SR 662:2002; SR EN13242+A1:2008, SR EN 13043:2003/AC:2004)
		8-16 mm	
	Aggregates (natural, crushed)	16-22,4 mm	Concrete, roads and civil engineering construction. Bituminous mixtures and surface treatments for roads, airfields and other trafficked areas (SR EN 12620+A1:2008, SR EN 13242+A1:2008, SR EN 13043:2003/AC:2004)
Aggregates (natural, crushed)	16-25 mm	Road construction works (SR 662:2002)	
Gligoresti	Aggregates (natural, sorted)	0-4 mm	Concrete, roads and civil engineering construction (SR EN 12620+A1:2008, SR 662:2002)
		4-8 mm	
		8-16 mm	
	Aggregates (natural, sorted)	16-22,4 mm	Concrete, roads and civil engineering construction (SR EN 12620+A1:2008)
		16-31,5	
	Aggregates (natural, sorted)	0-63 mm	Road construction works (SR 662:2002)
		16-25 mm	
Aggregates (natural, crushed)	0-25 mm		
	0-63 mm		

Table 3: Types of aggregates and their application

### 3.2 Product manufacturing

The main steps in aggregates production are illustrated in the figure below:

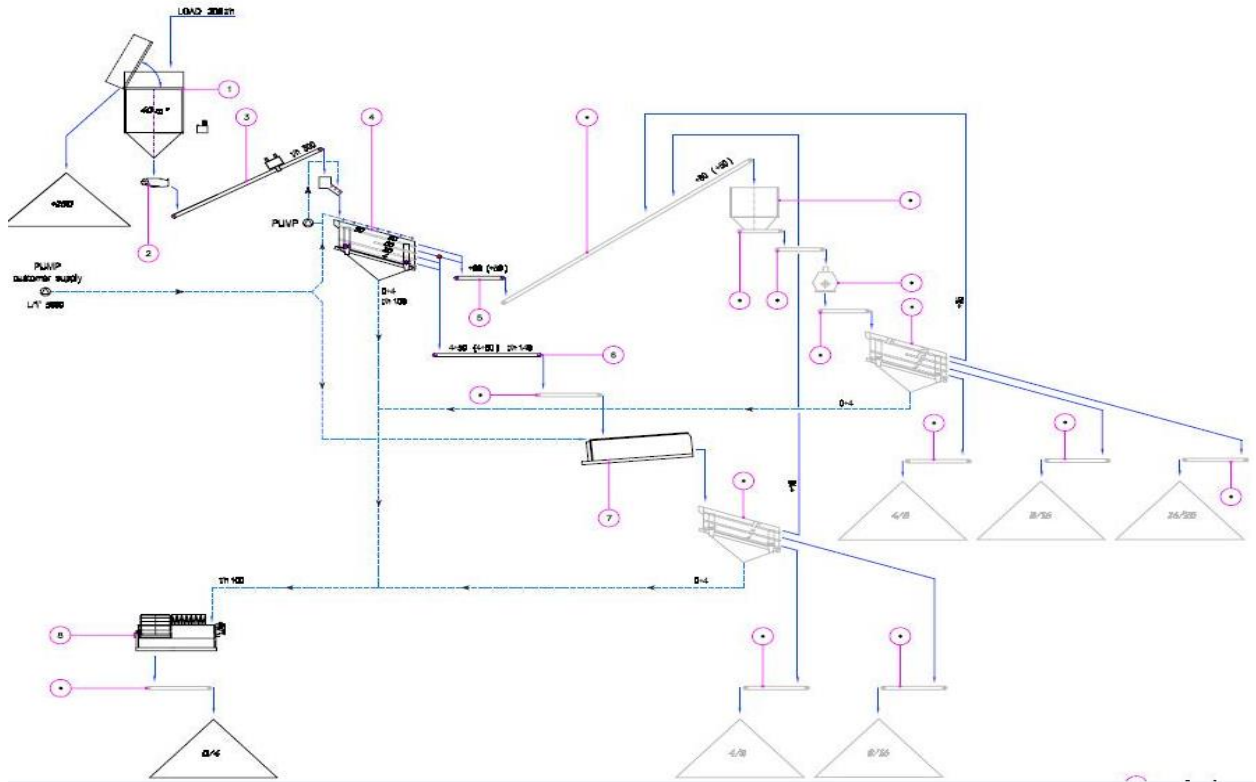


Figure 2: Aggregates manufacturing process

Aggregates are quarried and classified based on the particle size. For the preparation and exploration of aggregates diesel fuel is used. For the processing (classifying, washing) of the aggregates both diesel fuel and electric energy is used.

### 3.3 System boundaries

The technical system boundaries are defined according to the provisions in EN 15804.

Primary raw material is accounted from the quarry, including all processes including transportation to the production facilities.

Material flows and emissions not associated with the production process, such as energy used for personal transportation or wastewater treatment, are not included in this study.

The system boundaries are cradle to gate as shown in the figure below.

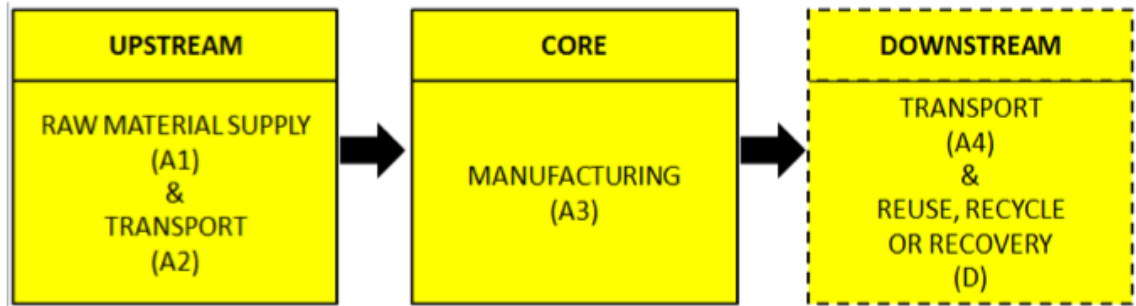


Figure 3: Illustration of the life cycle structure and rough system boundaries

Squares with unbroken edge line indicate processes that shall be included, dashed edge line indicate processes that are option (Figure and explanatory line copied without change from UN CPC 3744 for cement)

This EPD is established for the modules A1, A2 and A3.

## 4. LCA

### 4.1 Information sources and data quality

All core data required for this EPD has been collected from the HOLCIM plants for the year 2012. Company and production specific data is applied in the foreground system of the LCA.

The foreground data has been collected on site and validated based on mass balances. Data collection was performed iteratively to ensure high quality of data.

### 4.2 Estimations and methodology

#### 4.2.1 Allocation Procedures

All allocation is performed according to the basic rules from EN15804. As no co-products are produced, the flow of materials and energy and also the associated release of substances and energy into the environment is therefore related exclusively to the aggregates produced.

All data is included based on measured data for each plant. To ensure high representativeness for calculation of the average aggregates this specific data has been weighted based on the accounted production volume of each plant.

#### 4.2.2 Average aggregates

The inventory data of the different aggregates produced at the Holcim Romania plants is used to calculate the declared average aggregates. The average is determined based on the produced amounts by weight in 2012.

#### 4.2.3 Declared unit

The declared unit for the EPD is 1000kg average aggregates used in construction leaving the factory gate.

#### 4.2.4 Impact Assessment

The impact assessment is carried out applying the established CML method (Guinée et al, 2001). The applied categories and characterization factors within GaBi6 are provided in the CML version published in November 2010. Additionally, selected results from the inventory analysis are displayed (see section 4). The selection of displayed indicators follows the provisions in the PCR (construction products CPC 54 and construction services) document.

### 4.3 Cut-off rules

All materials used within the production process are accounted for. The transportation of diesel fuel from the regional storage to the production site has been excluded. Its contribution to the overall impacts has been judged as very small.

### 4.4 Background data

Background data is included based on generic datasets from the GaBi 6 Database of PE International in the version of 2012 as well as emission data from GEMIS 4.7. The background data is based on reviewed data from life cycle inventories. As all datasets are validated, the data quality for the entire study can be judged as very good.

### 4.5 System boundaries

#### 4.5.1 *Technical system boundaries*

Primary raw material is accounted from the quarry, including all processes including transportation to the production facilities.

Material flows and emissions not associated with the production process, such as energy used for personal transportation or wastewater treatment, are not included in this report.

#### 4.5.2 *Geographical system boundaries*

The geographical system boundary is Romania. All processes are valid for the production sites in Romania. The aggregates plants in Stancesti and Gligoresti are included in the study accounting for 100% of total aggregates produced in the plants fully owned and operated by Holcim in Romania.

#### 4.5.3 *Temporal system boundaries*

All material flows of the processes are based on company and site specific data gathered for the year 2012. All background data originates from the GaBi database version of 2012 with validity until 2016.

### 4.6 Comparability

The EPD is established on the basis of the product category rules (PCR) for construction products EN 15804 in conjunction with the PCR Construction products and CPC 54 construction services Version 1.2 of the International EPD System.

The LCA follows the standards ISO 14040:2006 and ISO 14044: 2006. According to these standards, environmental product declarations do not compare the environmental performance of products in the construction sector. Any comparison of the declared environmental performance of products lies outside the scope of these standards, and is suggested to be feasible only if all compared declarations follow equal standard provisions. Further, any comparative interpretation of the declaration shall reflect the product's application context in a building.

### 4.7 Results

Based on data from all HOLCIM plants in Romania from the year 2012, the following results have been obtained for the average aggregates produced in the Holcim Romania plants. The declared unit is 1000kg of the average aggregates.



Parameter	Unit	A1-A3
Global warming potential	kg CO <sub>2</sub> -eq	3,10E+00
Depletion potential of the stratospheric ozone layer	kg R11-eq	5,04E-10
Acidification potential of land and water	kg SO <sub>2</sub> -eq	4,33E-02
Eutrophication potential	kg PO <sub>4</sub> <sup>3-</sup> -eq	3,67E-03
Formation potential of tropospheric ozone photochemical oxidants	kg ethene-eq	6,64E-03
Abiotic depletion potential for non fossil resources	kg Sb-eq	2,11E-07

Table 4: Summary of life cycle impact analysis for 1000 kg average aggregates

Parameter	Unit	A1-A3
Abiotic depletion potential for fossil resources	MJ	3,99E+01
Renewable primary energy as energy carrier	MJ	0
Renewable primary energy resources as material utilization [MJ]	MJ	0
Total use of renewable primary energy resources	MJ	0
Non renewable primary energy as energy carrier	MJ	3,99E+01
Non renewable primary energy as material utilization	MJ	0
Total use of non renewable primary energy resources	MJ	3,99E+01
Use of secondary material [kg]	kg	0
Use of renewable secondary fuels [MJ]	MJ	0
Use of non renewable secondary fuels [MJ]	MJ	0
Use of net fresh water	m3	1,17E+00

Table 5: Summary of life cycle inventory indicators for 1000 kg average aggregates

**Reading tip:**

- $5,04E-10 = 5,05 \times 10^{-10} = 0,000000000505$
- $3,99E+01 = 3,99 \times 10^1 = 39,9$

## 4.8 Interpretation

The following table provides an identification of the most significant contributors to a selection of the parameters presented above:

Parameter	Most significant contributor
Primary energy demand	dominated by the supply and use of fossil fuels (diesel) and the supply chain of electricity.
Water demand	The water demand is dominated by washing of the aggregates
Waste generation	No significant amounts of waste are being generated
Global warming potential	Dominated by emissions from electricity production and diesel combustion in quarrying and processing.
Acidification potential	Dominated by emissions from electricity production and diesel combustion in quarrying and processing.
Eutrophication potential	Dominated by emissions from diesel combustion in quarrying and processing.
Ozone depletion potential	Dominated by emissions from electricity production
Photochemical ozone creation potential	Dominated by nitrous oxide and sulphur dioxide emissions from diesel combustion in quarrying and processing.
ADP elements	The contribution is dominated by the supply chain of electricity.
ADP fossil	Fossil fuel consumption is dominated by the supply and use of fossil fuels (diesel) and the supply chain of electricity.

Table 6: Most significant contributors to LCA parameters

Concluding, the use of energy is the most significant contributor to environmental performance associated with aggregates. Energy is used as electricity and fuel.

## 5. Other environmental information

Holcim Romania, being aware of its responsibility as cement, concrete and aggregate manufacturer towards the environment, and in particular on the limited natural resources has implemented as part of its integrated management system, an environmental management system. Thus, all the activities that could have a significant impact on the environment are kept under control.

Also, we ensure that the constituent materials used within our products are responsibly sourced and we apply the principles of Sustainable Development and of Environmental Stewardship as a standard business practice in our operations.

In this sense, we measure, monitor, assess and continuously improve our environmental performances. We prevent environmental pollution by implementing in our operations the best available technology and by maintaining and operating our installations in optimum ways. Protecting the environment by preserving non-renewable natural resources, increasing energy efficiency, reducing the environmental emissions, limiting the impact of materials transportation to and from our operations is part of our way in doing business.

Holcim is promoting in Romania the reduction, recycling and recovering of waste and the optimization of water consumption in all processes.

More information regarding our environmental and responsibly sourcing objectives and activities are available on <http://www.holcim.ro/en/sustainable-development.html>

## 6. References

- Council Directive 2008/98/EC on waste, The European Parliament and the Council, November 2008, Official Journal of the European Union, L 312/3, November 2008
- EN 15804: 2012, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- Fritsche U R, Schmidt K 2007: Globales Emissions-Modell Integrierter Systeme (GEMIS), Darmstadt
- GaBi 6 2013: Software und Datenbank zur Ganzheitlichen Bilanzierung. LBP, Universität Stuttgart und PE International, 2012
- GaBi 6 2013: Dokumentation der GaBi-Datensätze der Datenbank zur Ganzheitlichen Bilanzierung. LBP, Universität Stuttgart und PE International, 2012.
- Guinée J B, Gorrée M, Heijungs R, Huppes G, Kleijn R, de Koning A, van Oers L, Sleeswijk A W, Suh S, Udo de Haes H A, de Bruijn H, van Duin R, Huijbregts M A J, Lindeijer E, Roorda A A H, van der Ven B L, Weidema B P. (2001). Life cycle assessment- an operational guide to the ISO standards. Leiden: CML, Leiden University.
- ISO 14020:2000 Environmental labels and declarations – General principles
- ISO 14040: 2006 Environmental management – Life cycle assessment – Principles and framework
- ISO 14044: 2006 Environmental management -- Life cycle assessment -- Requirements and guidelines
- ISO 14025:2011 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
- ISO 21930:2007 Sustainability in building construction – Environmental declaration of building products
- Product Category Rules for Construction products and CPC 54 construction services, PCR 2012:01 version 1.2, The international EPD System



**Holcim Romania**

169 A Calea Floreasca Street Building B, Floor 7, District 1

Bucharest, Postal Code RO 014459

Romania

Mihaela.Odangju@holcim.com

[www.holcim.ro](http://www.holcim.ro)

Phone +4021 231 77 08/09

Fax +4021 231 77 14/15