acreditat pentru
CERTIFICARE

SR EN ISO/CEI 17065:2013
CERTIFICAT DE ACREDITARE
PR 008

AEROQ

Organism acreditat pentru Certificarea Conformităţii Produselor
SR EN ISO/CEI 17065:2013
Accredited Body for Product Conformity Certification
SR EN ISO/CEI 17065:2013

CERTIFICAT DE CONFORMITATE
CERTIFICATE OF CONFORMITY
nr.: 282

PRODUSUL: Product	**1. Familia de betoane** (conform anexa) **2. Familia de betoane rutiere** (conform anexa) 1. Domeniu de utilizare: fabricarea structurilor turnate in situ, structurilor prefabricate, elementelor de structură prefabricate pentru clădiri şi structuri de geniu civil, constructii de drumuri 2. Domeniu de utilizare: executarea imbracamintilor rutiere din beton de ciment in cofraje fixe si glisante
fabricat de/ manufactured by **cu sediul în/** located at	**HOLCIM (ROMANIA) S.A.** **Bucuresti, Sector 1, Calea Floreasca, nr. 169A, Corp B, etaj 7**
in fabrica / in factory **cu sediul în/** located at	**Statiile de betoane: (conform anexa)** **PIPERA; CHITILA; CLINCENI; PANTELIMON; CRAIOVA; PLOIESTI; CLUJ NAPOCA; TIMIŞOARA; SATU MARE; ORADEA; SIBIU; TG. MURES; BRASOV ; PROGRESU**
si controlul productiei îndeplineşte cerinţele din: and production control fulfils the requirements of	**SR EN 206+A1:2017;** **CP 012/1-2007; NE 014-2002**

Schema de certificare a produsului / Product certification scheme:
2 (similar schema 4 din SR EN ISO/CEI 17067/ like scheme 4 of SR EN ISO/CEI 17067)
"Selectia (planificare si pregatire, specificare a cerintelor); **determinarea caracteristicilor** (incercari, verificarea proiectului, evaluarea serviciilor sau a proceselor, verificari); **analiza** (examinarea dovezilor de conformitate obtinute in faza de determinare); **decizia** (acordarea, mentinerea, extinderea, restrangerea, suspendarea, retragerea certificarii); **atestarea, licentierea** (emiterea certificatului, acordarea dreptului de utilizare a certificatului si a marcii de conformitate). Supraveghere anuala prin incercarea sau evaluarea esantioanelor din fabrica si/sau de pe piata; evaluarea productiei, a livrarii de servicii sau a functionarii procesului"
"Selection (planning and preparation, specification of requirements); **determining the characteristics** (tests, project verification, evaluation of services or processes, verifications); **analyze** (examination of the evidences of conformity obtained in the determination phase); **decision** (granting, maintaining, extending, restricting, suspending or withdrawing the certification), **certification, licensing** (issuing the certificate, granting the right to use the certificate and the conformity mark). Annual surveillance by testing or evaluating samples from the factory and/or on the market; assessment of the production, service delivery or process operation"
Referinţe/ References: **Raport de audit** / Audit report nr.: **3300/25.11.2020**

Data recertificarii	**Data expirării**	**Data certificarii initiale**
Renewing certification date	Expiry date	Initial certification date
03.12.2020	**02.12.2023**	**21.12.2006**

Valabilitatea certificatului este condiţionată de efectuarea auditurilor de supraveghere anuale, confirmată prin rapoartele de audit şi de reevaluarea completă odată cu recertificarea acestuia înainte de expirarea perioadei de valabilitate (3 ani).
Certificate Validity is conditioned by the annual surveillance audits, confirmed by audit reports and by product recertification with its complete reassessment before the expiry of validity period (3 years).
Certificatul poate fi retras sau suspendat dacă nu se respectă cerintele de certificare a conformităţii produselor.
The Certificate may be withdrawn or suspended, if are not adhered to requirements for conformity certification.
Certificatul rămane valabil dacă nu sunt modificate semnificativ: documentele de referinţă, metodele de evaluare a condiţiilor de fabricaţie si caracteristicile esenţiale declarate.
This certificate remains valid if the reference documents, methods for assessing the manufacturing conditions and the essential characteristics declared are not significantly changed.

DIRECTOR GENERAL,
GENERAL MANAGER

ing.
Constantin AVRAM

AEROQ S.A. ROMANIA Societatea Comercială BUCUREŞTI

AEROQ S.A. – Strada Feleacu, nr. 14 B, Sector 1, Bucureşti, România

AEROQ

Marca de conformitate acordata

AEROQ

LICENŢĂ

pentru
UTILIZAREA CERTIFICATULUI nr. 282
şi a
MĂRCII DE CONFORMITATE AEROQ

Emisă de:	AEROQ S.A.
pentru:	HOLCIM (ROMANIA) S.A.
cu sediul în:	Bucuresti, Sector 1, Calea Floreasca, nr. 169A, Corp B, etaj 7
contract nr:	C 10_023/2016

Produse pentru care se acordă dreptul de utilizare a certificatelor şi a mărcii de conformitate	Cod, tip, serie sau alte elemente de identificare a produselor	Standard(e) sau alt(e) document(e) normativ(e)	Reguli specifice pentru certificarea conformităţii produselor
Familia de betoane (conform anexa)		SR EN 206+A1:2017 CP 012/1-2007	RS-H 31–001 Editia 10 / 15.01.2020
Familia de betoane rutiere (conform anexa)		NE 014:2002	RS-H-31-001A Ed. 6 / 15.01.2020

Licenţa este valabilă numai dacă este insoţită de certificate de conformitate în vigoare emise de AEROQ, fiind condiţionata si de efectuarea auditurilor de supraveghere anuale, confirmată prin rapoartele de audit şi de reevaluarea completă odată cu recertificarea acestuia înainte de expirarea perioadei de valabilitate (3 ani).

Certificatul rămane valabil dacă nu sunt modificate semnificativ: documentele de referinţă, metodele de evaluare a condiţiilor de fabricaţie si caracteristicile esenţiale declarate.

DIRECTOR GENERAL

ing. Constantin AVRAM

AEROQ S.A. ROMANIA Societatea Comercială BUCUREŞTI

Data: 03.12.2020

ANEXA la CERTIFICATUL DE CONFORMITATE nr. 282, reemis in 03.12.2020

Statia de betoane PIPERA Bucuresti, sector 2, Soseaua Pipera 52	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45; C40/50; C45/55; C50/60; C60/75	Familia de betoane rutiere: BcR 3,5; BcR 4; BcR 4,5; BcR 5
Statia de betoane CHITILA Bucuresti, sector 1, Soseaua Chitilei, nr.423	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45; C40/50; C45/55; C50/60; C60/75	Familia de betoane rutiere: BcR 3,5; BcR 4; BcR 4,5; BcR 5
Statia de betoane CLINCENI Comuna Clinceni, str. Industriilor, nr.6, jud.ILFOV	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45; C40/50; C45/55; C50/60; C60/75	Familia de betoane rutiere: BcR 3,5; BcR 4; BcR 4,5; BcR 5
Statia de betoane PANTELIMON Pantelimon, Soseaua de Centura nr. 8, jud Ilfov	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45; C40/50; C45/55; C50/60; C60/75	Familia de betoane rutiere: BcR 3,5; BcR 4; BcR 4,5; BcR 5
Statia de betoane CRAIOVA Craiova, Strada Raului, nr. 401, Jud. Dolj	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45; C40/50	Familia de betoane rutiere: BcR 3,5; BcR 4; BcR 4,5; BcR 5
Statia de betoane PLOIESTI Jud. Prahova, Ploieşti, Şoseaua Centura de Est, nr. 48 A	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45; C40/50.	Familia de betoane rutiere: BcR 3,5; BcR 4; BcR 4,5
Statia de betoane CLUJ NAPOCA Cluj Napoca, str. Beiusului, nr. 11, jud. Cluj	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45; C40/50; C45/55	Familia de betoane rutiere: BcR 3,5; BcR 4; BcR 4,5; BcR 5
Statia de betoane TIMISOARA Timisoara, Calea Mosnitei, nr. 17, Jud Timis	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45; C40/50	Familia de betoane rutiere: BcR 3,5; BcR 4; BcR 4,5
Statia de betoane SATU MARE Satu Mare, Drumul Careiului 146, jud. Satu Mare	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45.	Familia de betoane rutiere: BcR 4; BcR 4,5; BcR 5
Statia de betoane ORADEA Oradea, Soseaua Borsului, nr.14C, jud Bihor	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45; C40/50	Familia de betoane rutiere: BcR 3,5; BcR 4; BcR 4,5; BcR 5
Statia de betoane SIBIU Sibiu, Strada Turda, nr. 12, Judeţul Sibiu,	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45	Familia de betoane rutiere: BcR 3,5; BcR 4; BcR 4,5; BcR 5
Statia de betoane Targu Mures Targu Mures, str. Baneasa nr. 8, jud Mures	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45; C40/50	Familia de betoane rutiere: BcR 4; BcR 4,5; BcR 5
Statia de betoane BRAŞOV Judeţul Braşov, Braşov, Strada Zizinului, nr. 121	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45; C40/50; C45/55; C50/60	Familia de betoane rutiere: BcR 3,5; BcR 4; BcR 4,5; BcR 5
Statia de betoane Progresu Bucuresti,Str.Drumul Bercenarului, nr.8, Sector 4	Familia de betoane: C8/10; C12/15; C16/20; C20/25; C25/30; C30/37; C35/45; *C40/50*	Familia de betoane rutiere: BcR 3,5; BcR 4; BcR 4,5

DIRECTOR GENERAL,
ing.
Constantin AVRAM

AEROQ S.A. ROMANIA Societatea Comercială BUCUREŞTI

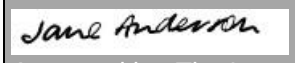
EPD Average Aggregate – Holcim Romania

ISO 14020; ISO 14025; ISO 14040; ISO 14044; EN 15804; ISO 21930; UN CPC 15320

Edition 1; Revision 1: June 2020

1. Programme information

Programme Operator:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
Declaration Holder	Holcim Romania 169 A Calea Floreasca Street Building B Floor 7, District 1, RO 014459, Bucharest, Romania Phone: +4021 231 77 14/15 Contact person: Mihaela Odangiu Email: Mihaela.Odangiu@lafargeholcim.com Company identification information: Trade Register No: J40/399/2002 VAT number: RO 12253732 Subscribed and paid-in capital: LEI 205,268,057
LCA Consultant	Intertek Health, Environmental & Regulatory Services 33 Cavendish Square London W1G 0PS www.intertek.com Contact person: Kim Allbury Email: kim.allbury@intertek.com
EPD Registration number	S-P-00528
Publication Date	2014-05-16
Version Date	2020-06-03
Valid Until	2025-06-04

Product group classification: UN CPC 15320 Pebbles, gravel, broken or crushed stone, macadam, granules, chippings and powder of stone.
Product category rules (PCR): *CEN Standard EN 15804 served as the core PCR. PCR 2012:01 Construction Products and Construction Services Version 2.3 2028-11-15*
PCR review was conducted by: *The Technical Committee of the International EPD System. Chair: Massimo Marino. Contact via info@environdec.com*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: *Jane Anderson, ConstructionLCA Ltd*    Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

2. Company Information

This cradle-to gate environmental product declaration is for 1000 kg of average aggregate production from the locations fully owned and operated by Holcim in Romania, as follows:

Stancesti Aggregate Plant
Targsoru Vechi Village,
Targsoru Vechi Perish,
107590, Prahova County,
Romania

Corbii Mari Aggregate Plant
Corbii Mari Village,
Corbii Mari Perish,
Dambovita County,
Romania

Gligoresti Aggregate Plant
Gligoresti Village,
Luna Perish ,
407360, Cluj County,
Romania

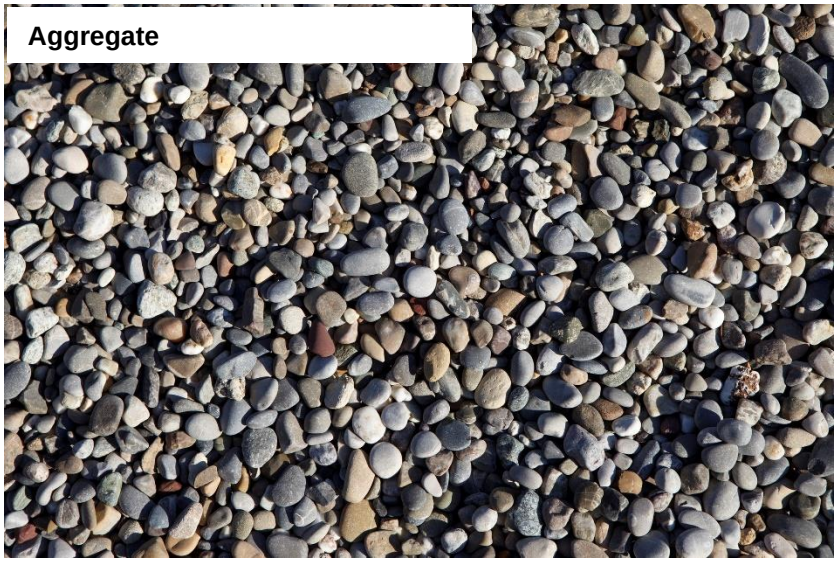
Holcim Romania is the study commissioner and EPD owner. In order to respect the principles of sustainable development, the company implemented, maintained and continuously improves an effective integrated management system, in accordance with the applicable reference standards: SR EN ISO 9001:2015, SR EN ISO 14001:2015, SR ISO 45001:2018; BES 6001:2016. Our aim is to make a positive contribution to the built environment now and for future generations, thus we commit to spearhead the transition towards low-carbon construction and be the leader in promoting a circular economy, from alternative fuels to recycling

Sustainable development
We, Holcim Romania are committed to health and safety as our overarching value, thus we conduct our business with a goal of zero harm to people. We provide high quality products and services, through our manufacturing excellence strategy. We strive to minimize our impact on the environment and in particular on the limited natural resources. We ensure that all constituent materials used within our products are responsibly sourced and used in the most appropriate and sustainable manner.

Further information regarding Holcim Romania and its sustainability strategy can be accessed from www.holcim.ro/en/sustainable-development.

3. Product Information

This EPD provides information concerning all types of aggregates produced by Holcim in Romania as detailed in Table 1.



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 a construction material.

Aggregates addressed in this EPD are produced by Holcim Romania according to Harmonised 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 EN 13139:2003/C91:2009 “Aggregates for mortar”

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

Aggregates are classified under the following UN CPC group and class/subclass: UN CPC 15320 Pebbles, gravel, broken or crushed stone, macadam, granules, chippings and powder of stone.

The geographical scope of this EPD is European.

Plant	Material Description	Material Size / Type	Application
Stancesti	Aggregates (natural, sorted)	0-4mm 4-8mm 8-16mm	Concrete, roads and civil engineering construction (SR EN 12620+A1:2018, Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas (SR EN 13043:2003/AC:2004) Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction (SR EN 13242+A1:2008)
	Aggregates (natural, crushed)	4-8mm 8-16mm 16-22.4mm 16-31.5mm	Concrete, roads and civil engineering construction (SR EN 12620+A1:2018, Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas (SR EN 13043:2003/AC:2004) Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction (SR EN 13242+A1:2008)
Gligoresti	Aggregates (natural, sorted)	0-4mm 4-8mm 8-16mm 16-22.4mm 16-31.5mm	Concrete, roads and civil engineering construction (SR EN 12620+A1:2018) Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas (SR EN 13043:2003/AC:2004)
	Aggregates (natural, sorted)	0-4mm 4-8mm 8-16mm 16-22.4mm 16-31.5mm 0-63mm 16-80mm	Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction (SR EN 13242+A1:2008)
	Aggregates (natural, sorted)	0-1mm 0-4mm	Aggregates for mortar (SR EN 13139:2003/C91:2009)

Plant	Material Description	Material Size / Type	Application
	Aggregates (natural, crushed)	0-63mm	Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction (SR EN 13242+A1:2008)
Corbii Mari	Aggregates (natural, sorted)	0-4mm 4-8mm 8-16mm 16-22.4mm 16-31.5mm 0-63mm	Concrete, roads and civil engineering construction (SR EN 12620+A1:2018) Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas (SR EN 13043:2003/AC:2004)
	Aggregates (natural, sorted)	0-4mm 4-8mm 8-16mm 16-22.4mm 16-31.5mm 0-63mm	Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction (SR EN 13242+A1:2008)
	Aggregates (natural, sorted)	0-1mm 0-4mm	Aggregates for mortar (SR EN 13139:2003/C91:2009)

Table 1: Product Identification and Usage

3.1 Technical Specification of Product

Aggregate properties vary by material type, grain size and regularity / shape, as reflected in the Technical Standards. The density of produced aggregates is > 1200 kg/m^3. All products are CE marked and have a declared performance in accordance with limits values stipulated in the EN harmonized product standards:

- SR EN 12620+A1:2008 Aggregates for concrete
- SR EN 13043:2003/AC:2004 Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas
- SR EN 13242+A1:2008 Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction
- SR EN 13139:2003/C91:2009 Aggregates for mortar.

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

3.2 Content Declaration

The composition of the average product modelled in this project is obtained from the total raw material usages supplied by the sites. No substances that are listed in the 'Candidate List of Substances of very high concern for authorisation' are contained in the average aggregate.

Material	Percentage
Aggregates 0-4 (sand)	36%
Aggregates 4-8 (gravel)	18%
Aggregates 8-16 (gravel)	33%
Aggregates 16-22.5 (gravel)	12%
Other aggregates	2%

Table 2: Average aggregate composition

3.3 Manufacturing Process

Aggregate are extracted from the ground in quarries with machinery powered by diesel fuel. The quarried material is transported by truck (max. 2 km) to the processing area which also use diesel fuel.

The above-mentioned material is then transported via conveyer (that are using electricity) to the processing plant where it is crushed, washed and screening takes place to produce various graded aggregates for sale. For the processing, only electric energy is used. Groundwater and surface water are used for the washing, no mains water is used.

Waste generated during the production process (e.g. excavated soil, etc.) is reused within the aggregate production plants as backfill. No waste from the production process is sent to landfill. Aggregates are delivered in bulk. In all aggregate plants settling tanks are used for wastewater treatment. No chemicals are used.

The main steps in aggregate production are illustrated in the Figure 1.

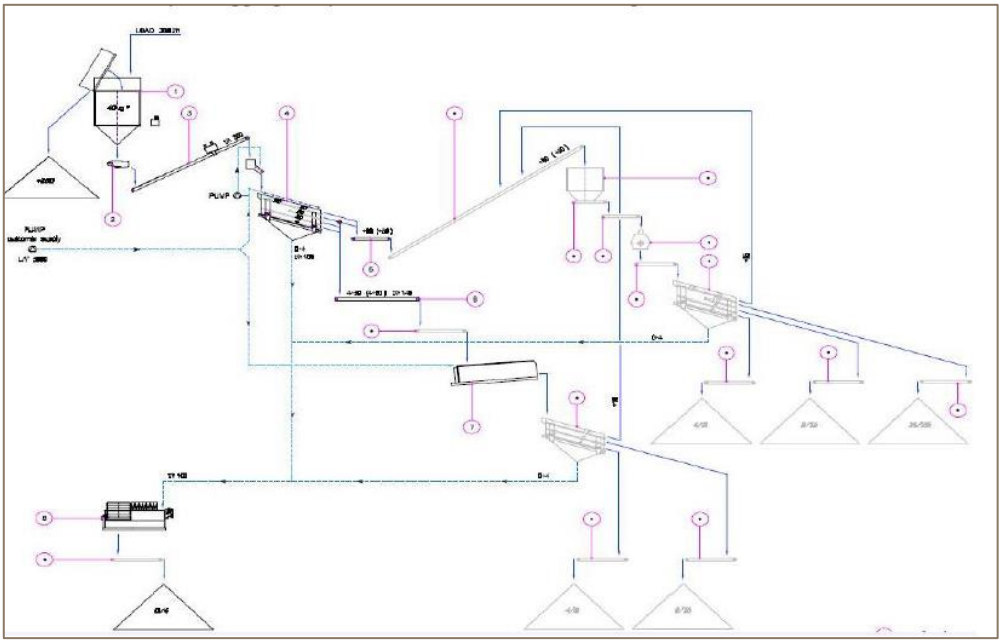


Figure 1: Aggregate process flow

3.4 Additional information

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, water and waste management, he emission of noise, dust, energy consumption, etc.

4. LCA Information

4.1 Goal of Study

The goal of this study was to generate an environmental profile of average aggregates produced and delivered from the locations fully owned and operated by Holcim Romania, to better understand the associated lifecycle environmental impacts and to allow a Type III EPD to be generated and made public via the International EPD System.

4.2 Declared Unit

The declared unit of the EPD is 1000 kg of aggregates produced and delivered from the locations fully owned and operated by Holcim Romania. This EPD is established for the weighted average product of theses manufacturing plants. The average is based on the mass of aggregate produced at each plant.

4.3 System Boundary

System boundaries determine the unit processes to be included in the LCA study and which data as “input” and/or “output” to/from the system can be omitted.

This EPD covers the cradle to gate stage (A1 to A3), because other life cycle stages are dependent on particular scenarios and are better developed for specific building or construction works.

System boundaries are according to the modular approach and the cradle to gate stage is divided into the upstream (A1) and core (A2 and A3) phases, as outlined in Figure 2. Life cycle stage that are not covered by the EPD are indicated as MND (Module Not Declared).

Upstream	Core		Downstream												Other environmental information
Product Stage			Construction process stage		Use Stage							End of Life stage			Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Construction	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Demolition	Transport	Waste processing	Disposal	Future reuse, recycling or energy recovery potential
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

Figure 2: Modules included in the aggregate LCA: A1 (Raw material supply), A2 (Transport), A3 (Manufacturing)

4.4 Data sources and quality

The geographical system boundary of the LCA is Romania. All processes (including energy mix) are valid for the production sites in Romania. The three aggregate plants account for 100% of total aggregate produced by Holcim in Romania.

All material flows of the processes are based on company and site-specific data gathered for one year of operation, for the period 1st January 2018 – 31st December 2018.

Modelling of the life cycle of Holcim Romania aggregate was performed using SimaPro8 LCA software from PRé. All relevant background LCI datasets are taken from the ecoinvent database v3.4 (cut-off) released in 2017.

The foreground data has been collected on site and validated based on mass balances. 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 Allocation

The foreground data has been collected on site and validated based on mass balances. The All allocation is performed according to the basic rules from EN15804:2012+A1:2013. 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 quantity of aggregates produced (sorted / crushed).

All data is included based on measured data for each plant. To ensure high representativeness for calculation of the aggregates this specific data has been weighted based on the production mass of each plant, as follows:

Plant	Percentage
Stancesti	40%
Gligoresti	37%
Corbii Mari	23%

Table 4 Holcim Romania - Aggregate Production (Percentage / Plant) 2018

4.6 Cut-off Criteria and assumptions

The cut-off criteria adopted is as stated in EN 15804:2012+A1:2013. Where there is insufficient data or data gaps for a unit process, the cut-off criteria is 1% of the total mass of input of that process. The total of neglected input flows per module is a maximum of 5% of energy usage and mass. The exception is if they have any of the following, in which case they have to be included:

- Significant effects of or energy use in their extraction, use or disposal
- Are classed as hazardous waste

Site specific data collected from the three manufacturing sites was used. The inventory process in this LCA includes all data related to raw materials used within the production process.

In addition to the above, during the LCA a number of assumptions were made, which have been documented below for transparency:

- No packaging of the final product has been included as aaggregates are delivered in bulk.
- For each plant, total site production data for all aggregates produced at the plants has been modelled for mass of total aggregates produced – no distinction has been made between sorted and crushed aggregates. The resulting data is for an average aggregate produced from the sites.
- No mains water is used for the washing of the aggregates, only surface and groundwater.

- The materials re-used on site as backfill are reported as inert waste against the non-hazardous waste reporting parameter.

4.7 Comparability

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

5. Environmental Performance

The environmental impacts are declared and reported using the parameters and units shown in the Tables below. Baseline characterisation factors are taken from CML – IA version 4.1 (dated October 2012).

The impact categories presented in the following table refer to 1000 kg of average aggregate produced from the locations fully owned and operated by Holcim in Romania.

Parameter	Unit	A1-A3
Parameters describing environmental impacts		
Global Warming Potential (GWP)	Kg CO_2 equiv.	1.83
Ozone Depletion Potential (ODP)	Kg CFC 11	2.11E-07
Acidification Potential for Soil and Water (AP)	kg SO_2 equiv.	0.0127
Eutrophication Potential (EP)	kg $(PO_4)^3$-equiv.	0.00681
Formation potential of tropospheric Ozone (POCP)	kg C_2H^4 equiv.	3.91E-04
Abiotic Depletion Potential (ADPE)	kg Sb equiv.	7.87E-07
Abiotic Depletion Potential (ADPF)	MJ, net calorific	23.2
Parameters describing resource use, primary energy		
Use of renewable primary energy excluding renewable primary energy used as raw materials (PERE)	MJ	3.24
Use of renewable primary energy resources used as raw materials (PERM)	MJ	0
Total use of renewable primary energy resources (PERT)	MJ	3.24
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (PENRE)	MJ	30.2
Use of non-renewable primary energy resources used as raw materials (PENRM)	MJ	0
Total use of non-renewable primary energy resources (PENRT)	MJ	30.2

Parameters describing resource use, secondary materials and fuels, use of water		
Use of secondary material (SM)	kg	0
Use of renewable secondary fuels (RSF)	MJ	0
Use of non-renewable secondary fuels (NRSF)	MJ	0
Net use of fresh water (FW)	m^3	2.26
Other environmental information describing waste categories		
Hazardous waste disposed (HWD)	kg	2.97E-04
Non-hazardous waste disposed (NHWD)	kg	92
Radioactive waste disposed (RWD)	kg	2.76E-04
Other environmental Information describing output flows		
Components for re-use (CRU)	kg	0
Materials for recycling (MRF)	kg	0.0166
Materials for energy recovery (MER)	kg	0
Exported Energy (EE)	MJ per energy carrier	0

NOTE: The LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Reading tip:
2.11E-07 = 2.11 x 1^{-7} = 0,000000211

6. Range of Results

This EPD provides the results for the average (representative) product. The total output of production from each aggregate plant has been modelled and then combined on a mass weighted average of production to calculate the results for the average product.

The difference in results for the average aggregate produced at each site compared to the representative (average) product is higher than 10% for the some of the environmental impact indicator categories. The differences in indicator results for GWP, AP, EP, POCP, ADPE and ADPF are slightly more.

7. Interpretation

The following table provides an identification of the most significant contributors to parameters describing environmental impacts.

Parameter	Most significant contributor
Global Warming Potential (GWP)	Dominated by the supply and use of fossil fuels (diesel) and the indirect emission from electricity production used in processing.
Ozone Depletion Potential (ODP)	Dominated by the supply and use of fossil fuels (diesel) and the indirect emission from electricity production used in processing.
Acidification Potential for Soil and Water (AP)	Dominated by diesel combustion in quarrying and emissions from electricity production used in processing.
Eutrophication Potential (EP)	Dominated by indirect emissions from electricity production used in processing.
Formation potential of tropospheric Ozone (POCP)	Dominated by nitrous oxide and sulphur dioxide emissions from diesel combustion in quarrying and indirect emissions from electricity production used in processing.
Abiotic Depletion Potential (ADPE)	The contribution is dominated by the supply chain of electricity.
Abiotic Depletion Potential (ADPF)	Dominated by diesel combustion in quarrying and emissions from electricity production used in processing.
Hazardous waste disposed (HWD)	Generated from electricity production in Romania.
Non-hazardous waste disposed (NHWD)	Generated from electricity production in Romania.
Radioactive waste disposed (RWD)	Generated from electricity production in Romania.

Concluding, the supply and use of fossil fuels (diesel) for the extraction of raw materials and the indirect emission from electricity production used in the processing of the aggregates dominate most parameters describing environmental impacts.

8. Differences Versus Previous Versions

The table below reports the differences in indicator results compared to the previously published version of this EPD.

Environmental Indicator	Previous Version (2012 production data)	Current version (2018 production data)	Percentage Change (%)
Global Warming Potential (GWP)	3.1	1.83	-41
Ozone Depletion Potential (ODP)	5.04E-10	2.11E-07	41765
Acidification Potential for Soil and Water (AP)	0.0433	0.0127	-71
Eutrophication Potential (EP)	0.00367	0.00681	86
Formation potential of tropospheric Ozone (POCP)	0.0066	3.91E-04	-94
Abiotic Depletion Potential (ADPE)	2.11E-07	7.87E-07	273
Abiotic Depletion Potential (ADPF)	39.9	23.2	-42

The main reason for the change in indicator results is updated production data and to a lesser extent differences in generic datasets.

9. 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 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, Circular Economy and of Environmental Stewardship as a standard business practice in our operations. Moreover, we encourage the adoption of the responsible sourcing practices throughout our supply chain.

In this sense, we measure, monitor, assess and continuously improve our environmental performance. 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.

Nevertheless, we develop and launch innovative products and solutions with enhanced environmental or social performance.

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

10. References

Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products, BS EN 15804:2012+A1:2013. BSI Standards Limited.

PCR 2012:01 Construction products and construction services version 2.3, The International EPD System.

Life-cycle assessment software and database:

- SimaPro8 LCA software from PRé.
- ECOINVENT database v3.4 - released in 2017, contains life cycle inventory datasets
- CML-IA database version 4.1 – released in 2012, The **C**entrum voor Milieuwetenschappen **L**eiden **I**mpact **A**ssessment (CML-IA), contains characterisation factors for life cycle impact assessment (LCIA)

ISO 14020:2000 Environmental labels and declarations — General principles

ISO 14025:2006 Environmental labels and declarations — Type III environmental declarations — Principles and procedures

ISO 14044:2006+A1:2018. Environmental management – life cycle assessment – requirements and guidelines, International Organisation for Standardisation (ISO), Geneva.

ISO 14040:2008. Environmental management – Life cycle assessment – principles and framework, International Organisation for Standardisation (ISO), Geneva.

ISO 21930:2017 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services

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 EN 13139:2003/C91:2009 Aggregates for mortar

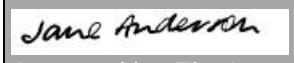
EPD Grey Cements – Holcim Romania

ISO 14020; ISO 14025; ISO 14040; ISO 14044; EN 15804; EN 16908; ISO 21930:

Edition 1; Revision 1: June 2020

1. Programme information

Programme Operator:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
Declaration Holder	Holcim Romania 169 A Calea Floreasca Street Building B Floor 7, District 1, RO 014459, Bucharest, Romania Phone: +4021 231 77 14/15 Contact person: Mihaela Odangiu Email: Mihaela.Odangiu@lafargeholcim.com Company identification information: Trade Register No: J40/399/2002 VAT number: RO 12253732 Subscribed and paid-in capital: LEI 205,268,057
LCA Consultant	Intertek Health, Environmental & Regulatory Services 33 Cavendish Square London W1G 0PS www.intertek.com Contact person: Kim Allbury Email: kim.allbury@intertek.com
EPD Registration number	S-P-00527
Publication Date	2014-05-16
Version Date	2020-06-03
Valid Until	2025-06-04

Product group classification: UN CPC 3744 CEMENT
Product category rules (PCR): *CEN Standard EN 15804 served as the core PCR. PCR 2012:01 Construction Products and Construction Services Version 2.3 2028-11-15, Sub-PCR-H Cement and building limes 2018-11-22*
PCR review was conducted by: *The Technical Committee of the International EPD System. Chair: Massimo Marino. Contact via info@environdec.com*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: *Jane Anderson, ConstructionLCA Ltd*    Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

2. Company Information

This cradle-to gate environmental product declaration is for 1000 kg of average grey cement production from the locations fully owned and operated by Holcim in Romania, as follows:

Alesd Cement Plant
Street Viitorului, No.2, Postal code 417022
Chistag Village, Bihor County, Romania

Campulung Cement Plant
Postal code 117805 Valea Mare Pravat
Village, Arges County, Romania

Holcim Romania is the study commissioner and EPD owner. In order to respect the principles of sustainable development, the company implemented, maintained and continuously improves an effective integrated management system, in accordance with the applicable reference standards: SR EN ISO 9001:2015, SR EN ISO 14001:2015, SR ISO 45001:2018; BES 6001:2016. Our aim is to make a positive contribution to the built environment now and for future generations, thus we commit to spearhead the transition towards low-carbon construction and be the leader in promoting a circular economy, from alternative fuels to recycling

Sustainable development
We, Holcim Romania are committed to health and safety as our overarching value, thus we conduct our business with a goal of zero harm to people. We provide high quality products and services, through our manufacturing excellence strategy. We strive to minimize our impact on the environment and in particular on the limited natural resources. We ensure that all constituent materials used within our products are responsibly sourced and used in the most appropriate and sustainable manner.

Further information regarding Holcim Romania and its sustainability strategy can be accessed from www.holcim.ro/en/sustainable-development.

3. Product Information

This EPD provides information concerning all types of grey cements (Portland cements, Portland-composite cements, Portland-limestone cements and Masonry cement) produced by Holcim in Romania as detailed in Table 1.

Cement is a hydraulic binder which sets after a few hours when mixed with water, and then hardens in a few days into a solid, strong construction material. Therefore, it is used for the production of concrete, mortars, grouts, etc. Cement is classified under the following UN CPC group and class/subclass: UN CPC 3744 CEMENT.

The geographical scope of this EPD is European.

Cement type (product standard)	Significant characteristic	Recommended use	
		Application domain	Market segment
1. Portland cement with high initial strength type **CEM I 52.5R** (SR EN 197-1:2011)	high early strength	reinforced or pre-stressed concrete elements, casted in situ or precast; AAC; sprayed concrete; injections	RMX (special technologies), precast elements and AAC (gasbeton)
2. Portland cement with high initial strength type **CEM I 42.5R** (SR EN 197-1:2011)	very good strengths; short setting time.	reinforced or pre-stressed concrete elements, casted in situ or precast ; infrastructure works (concrete pavements). Adhesives and dry mortars	RMX (especially for concrete pavements), precast concrete products, dry mortars and adhesives
3. Portland-limestone Cement with high initial strength, type **CEM II/A-LL 42,5 R** (SR EN 197-1:2011)	good strengths; significant fineness (improving workability)	Reinforced concrete	RMX – civil and industrial buildings
4. Portland-composite cement with high initial strength, type **CEM II/B-M(S-LL) 42,5 R**	resistance to aggressive environments	reinforced concrete	lower evolution of strength and good final strength; significant

Cement type (product standard)	Significant characteristic	Recommended use	
		Application domain	Market segment
(SR EN 197-1:2011)			fineness (improving workability)
5. Portland-composite cement with high initial strength, type **CEM II/B-M(S-V- LL) 42,5 R** (SR EN 197-1:2011)	resistance to aggressive environments	reinforced concrete	lower evolution of strength and good final strength; significant fineness (improving workability)
6 . Portland-composite cement with ordinary initial strength and low hydration heat, type **CEM II/B-M(S-V) 42,5 N-LH**, (SR EN 197-1:2011)	low hydration heat	reinforced concrete	resistance to aggressive environments
7. Portland-composite cement with ordinary initial strength and low hydration heat, type **CEM II/B-M(S-LL) 42,5 N L-H** (SR EN 197-1:2011)	low hydration heat	massive construction	RMX - civil and industrial buildings; work of arts
8. Portland-composite cement with high initial strength, type **CEM II/ B-M(S-LL) 32,5 R** (SR EN 197-1:2011)	lower evolution of strength and good final strength; significant fineness (improving workability)	reinforced concrete	lower evolution of strength and good final strength; significant fineness (improving workability)
9. Portland-composite cement with high initial strength, type **CEM II/B-M(S-V) 32,5 R** (SR EN 197-1:2011)	low hydration heat	massive construction	RMX - civil and industrial buildings; work of arts
10. Portland-composite cement with high initial strength, type **CEM II/B-LL 32,5 R** (SR EN 197-1:2011)	lower evolution of strength and good final strength; significant fineness (improving workability)	reinforced concrete	lower evolution of strength and good final strength; significant fineness (improving workability)
11. Masonry cement type **MC 12,5**, trade name TENCO (SR EN 413-1:2011)	water retaining; air content (ensuring good workability and adhesion)	masonry and plastering/rendering works; usual screeds	Individual users; local works

Table 1: Product Identification and Usage

3.1 Technical Specification of Product

The basic mechanical, physical and chemical requirements of the grey cements are as specified in EN 197-1:2011 and are shown in Table 2a and Table 2b.

Strength class	Compressive strength MPa				Initial setting time	Sound-ness (expan-sion)
	Early strength		Standard strength			
	2 days	7 days	28 days		min	mm
32,5 L[a]	-	≥ 12,0	≥ 32,5	≤ 52,5	≥ 75	≤ 10
32,5 N	-	≥ 16,0				
32,5 R	≥ 10,0	-				
42,5 L[a]	-	≥16,0	≥ 42,5	≤ 62,5	≥ 60	
42,5 N	≥ 10,0	-				
42,5 R	≥ 20,0	-				
52,5 L[a]	≥ 10,0	-	≥ 52,5	-	≥ 45	
52,5 N	≥ 20,0	-				
52,5 R	≥ 30,0	-				
a Strength class only defined for CEM III cements.						

Table 2a: Mechanical and physical requirements given as characteristic values

1	2	3	4	5
Property	Test reference	Cement type	Strength class	Requirements[a]
Loss on ignition	EN 196-2	CEM I CEM III	All	≤ 5,0 %
Insoluble residue	EN 196-2 [b]	CEM I CEM III	All	≤ 5,0 %
Sulfate content (as SO_3)	EN 196-2	CEM I CEM II[c] CEM IV CEM V	32,5 N 32,5 R 42,5 N	≤ 3,5 %
			42,5 R 52,5 N 52,5 R	≤ 4,0 %
		CEM III[d]	All	
Chloride content	EN 196-2	all [e]	All	≤ 0,10 %[f]
Pozzolanicity	EN 196-5	CEM IV	All	Satisfies the test

[a] Requirements are given as percentage by mass of the final cement.

[b] Determination of residue insoluble in hydrochloric acid and sodium carbonate.

[c] Cement types CEM II/B-T and CEM II/B-M with a T content > 20 % may contain up to 4,5 % sulfate (as SO_3) for all strength classes.

[d] Cement type CEM III/C may contain up to 4,5 % sulfate.

[e] Cement type CEM III may contain more than 0,10 % chloride but in that case the maximum chloride content shall be stated on the packaging and/or the delivery note.

[f] For pre-stressing applications cements may be produced according to a lower requirement. If so, the value of 0,10 % shall be replaced by this lower value which shall be stated in the delivery note.

Table 2b: Chemical requirements given as characteristic values

3.2 Content Declaration

The composition of grey cements manufactured by Holcim Romania is in accordance with cement standard SR EN 197-1:2011 (see Table 3a), and SR EN 413-1:2011 (see Table 3b).

Table 3a: Cement composition as stipulated in SR EN 197-1:2011

Main types	Notation of the 27 products (types of common cement)		Composition (percentage by mass[a])										
			Main constituents										Minor additional constituents
			Clinker	Blast-furnace slag	Silica fume	Pozzolana		Fly ash		Burnt shale	Limestone		
						natural	natural calcined	siliceous	calca-reous				
			K	S	D[b]	P	Q	V	W	T	L	LL	
CEM I	Portland cement	CEM I	95-100	–	–	–	–	–	–	–	–	–	0-5
CEM II	Portland-slag cement	CEM II/A-S	80-94	6-20	–	–	–	–	–	–	–	–	0-5
		CEM II/B-S	65-79	21-35	–	–	–	–	–	–	–	–	0-5
	Portland-silica fume cement	CEM II/A-D	90-94	–	6-10	–	–	–	–	–	–	–	0-5
	Portland-pozzolana cement	CEM II/A-P	80-94	–	–	6-20	–	–	–	–	–	–	0-5
		CEM II/B-P	65-79	–	–	21-35	–	–	–	–	–	–	0-5
		CEM II/A-Q	80-94	–	–	–	6-20	–	–	–	–	–	0-5
		CEM II/B-Q	65-79	–	–	–	21-35	–	–	–	–	–	0-5
	Portland-fly ash cement	CEM II/A-V	80-94	–	–	–	–	6-20	–	–	–	–	0-5
		CEM II/B-V	65-79	–	–	–	–	21-35	–	–	–	–	0-5
		CEM II/A-W	80-94	–	–	–	–	–	6-20	–	–	–	0-5
		CEM II/B-W	65-79	–	–	–	–	–	21-35	–	–	–	0-5
	Portland-burnt shale cement	CEM II/A-T	80-94	–	–	–	–	–	–	6-20	–	–	0-5
		CEM II/B-T	65-79	–	–	–	–	–	–	21-35	–	–	0-5
	Portland-limestone cement	CEM II/A-L	80-94	–	–	–	–	–	–	–	6-20	–	0-5
		CEM II/B-L	65-79	–	–	–	–	–	–	–	21-35	–	0-5
		CEM II/A-LL	80-94	–	–	–	–	–	–	–	–	6-20	0-5
		CEM II/B-LL	65-79	–	–	–	–	–	–	–	–	21-35	0-5
	Portland-composite cement[c]	CEM II/A-M	80-88	‹---------- 12-20 ----------›									0-5
		CEM II/B-M	65-79	‹---------- 21-35 ----------›									
CEM III	Blast furnace cement	CEM III/A	35-64	36-65	–	–	–	–	–	–	–	–	0-5
		CEM III/B	20-34	66-80	–	–	–	–	–	–	–	–	0-5
		CEM III/C	5-19	81-95	–	–	–	–	–	–	–	–	0-5
CEM IV	Pozzolanic cement[c]	CEM IV/A	65-89	–	‹---------- 11-35 ----------›					–	–	–	0-5
		CEM IV/B	45-64	–	‹---------- 36-55 ----------›					–	–	–	0-5
CEM V	Composite cement[c]	CEM V/A	40-64	18-30	–	‹------- 18-30 -------›			–	–	–	–	0-5
		CEM V/B	20-38	31-49	–	‹------- 31-49 -------›			–	–	–	–	0-5

a The values in the table refer to the sum of the main and minor additional constituents.

b The proportion of silica fume is limited to 10 %.

c In Portland-composite cements CEM II/A-M and CEM II/B-M, in pozzolanic cements CEM IV/A and CEM IV/B and in composite cements CEM V/A and CEM V/B the main constituents other than clinker shall be declared by designation of the cement (for examples, see Clause 8).

Type of masonry cement	Material	Percentage
MC 12.5	Portland cement clinker	≥40
	Natural crushed limestone	≤60
	Additives	≤1

Table 3b: Cement composition as stipulated in SR EN 413-1:2011

Cement does not meet the criteria for PBT (Persistent, Bio-accumulative and Toxic) or vPvV (very Persistent and very Bio-accumulative) in accordance with Annex XIII of Regulation (EC) No. 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). Furthermore, cement is a mixture and it is exempted from REACH registration.

3.3 Manufacturing Process

The main steps in the cement manufacturing process are as follows, and illustrated in Figure 1:

- Quarrying and raw material preparation
- Clinker production
- Cement grinding and distribution

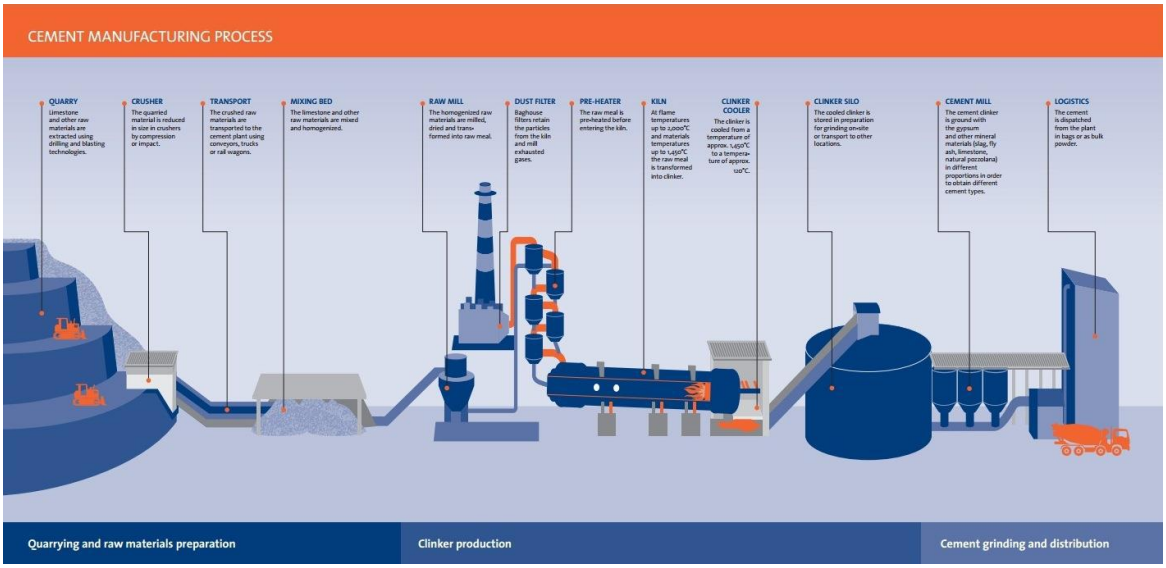


Figure 1: Cement process flow

3.3.1 Quarrying

Natural raw materials used for the clinker manufacture are calcareous materials like limestone or marl, and argillaceous materials like clay. These materials are extracted using drilling and blasting techniques.

3.3.2 Crusher

The quarried material is then reduced in size by compression and / or impact in various mechanical crushers.

3.3.3 Conveyor

Raw material is then transported from the quarry to the plant using conveyors.

3.3.4 Mixing bed

The crushed limestone and clay is homogenized by stacking and reclaiming in a long layered stockpile. This material is then ready for milling and drying in the kiln.

3.3.5 Raw Mill

The raw materials are milled and dried in a vertical roller mill in Campulung Plant and in a horizontal ball mill in the Alesd Plant. In the case of the vertical roller mill, heavy rollers are held over a rotating table, and in the horizontal ball mill, balls are rolled over until the coarse material is milled fine enough to be carried by air to a homogenizing silo.

3.3.6 Preheater

Cyclone preheaters enable the raw material of cement production to be preheated before entry into the kiln. This increases the energy efficiency of the kiln as the material is about 20-40% calcined at the point of entry into the kiln. Additionally, calciners are integrated in both plants kiln systems, further increasing the efficiency of the process.

3.3.7 Kiln

The kiln is designed to maximise the efficiency of heat transfer from fuel burning to the raw material. In the preheater tower the raw materials are heated rapidly to a temperature of about 1000°C, where the limestone forms burnt lime. In the rotating kiln, the temperature reaches up to 2000°C. At this high temperature, minerals fuse together to form predominantly calcium silicate crystals – cement clinker.

3.3.8 Cement mill

Finish milling is done in ball mills and consist of grinding together of cement clinker, with around 5% of natural or synthetic gypsum. Other cementitious materials such as slag and fly ash are also incorporated in the final cement powder. Cement is either packaged in paper bags and delivered on pallets or delivered in bulk.

3.4 Additional information

More information about cement's environmental stewardship and occupational health and safety aspects are detailed within the SDS made publicly available on Holcim Romania portal https://www.holcim.ro/ro/produse-si-servicii/produse. All SDS have been developed by Holcim Romania in compliance with the requirements of Commission Regulation (EU) No 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

4. LCA Information

4.1 Goal of Study

The goal of this study was to generate an environmental profile of average grey cement produced and delivered from the locations fully owned and operated by Holcim Romania, to better understand the associated lifecycle environmental impacts and to allow a Type III EPD to be generated and made public via the International EPD System.

4.2 Declared Unit

The declared unit of the EPD is 1000 kg of grey cement produced and delivered from the locations fully owned and operated by Holcim Romania. This EPD is established for the weighted average product of theses manufacturing plants. The average is based on the mass of cement produced at each plant.

4.3 System Boundary

System boundaries determine the unit processes to be included in the LCA study and which data as “input” and/or “output” to/from the system can be omitted.

This EPD covers the cradle to gate stage (A1 to A3), because other life cycle stages are dependent on particular scenarios and are better developed for specific building or construction works.

System boundaries are according to the modular approach and the cradle to gate stage is divided into the upstream (A1) and core (A2 and A3) phases, as outlined in Figure 2. Life cycle stage that are not covered by the EPD are indicated as MND (Module Not Declared).

Upstream	Core		Downstream												Other environmental information
Product Stage			Construction process stage		Use Stage							End of Life stage			Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Construction	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Demolition	Transport	Waste processing	Disposal	Future reuse, recycling or energy recovery potential
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

Figure 2: Modules included in the grey cement LCA: A1 (Raw material supply), A2 (Transport), A3 (Manufacturing)

4.4 Data sources and quality

The geographical system boundary of the LCA is Romania. All processes (including energy mix) are valid for the production sites in Romania. The two cement plants account for 100% of total grey cement produced by Holcim in Romania.

All material flows of the processes are based on company and site-specific data gathered for one year of operation, for the period 1st January 2018 – 31st December 2018.

Modelling of the life cycle of Holcim Romania grey cement was performed using SimaPro8 LCA software from PRé.

All relevant background LCI datasets are taken from the ecoinvent database v3.4 (cut-off) released in 2017.

The foreground data has been collected on site and validated based on mass balances. 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 Allocation

The foreground data has been collected on site and validated based on mass balances. The All allocation is performed according to the basic rules from EN15804:2012+A1:2013. 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 cement produced.

All data is included based on measured data for each plant. To ensure high representativeness for calculation of the grey cement this specific data has been weighted based on the production mass of each plant, as follows:

Plant	Percentage
Campulung	52%
Alesd	48%

Table 4 Holcim Romania - Grey Cement Production (Percentage / Plant) 2018

4.6 Cut-off Criteria and assumptions

The cut-off criteria adopted is as stated in EN 15804:2012+A1:2013. Where there is insufficient data or data gaps for a unit process, the cut-off criteria is 1% of the total mass of input of that process. The total of neglected input flows per module is a maximum of 5% of energy usage and mass. The exception is if they have any of the following, in which case they have to be included:

- Significant effects of or energy use in their extraction, use or disposal
- Are classed as hazardous waste

The production of the materials that have been excluded from the product system under study are listed in Table 5. These materials are either waste derived or excluded due to their low economic value. While the production of these materials are excluded the material masses are part of the calculation and they are considered as secondary materials.

Material	Considered as
Alternative Raw Material (slag / fly ash)	Secondary Material
Pyrite ash	Secondary Material
By-bass dust	Secondary Material
Fly ash / acidic fly ash (ARSN)	Secondary Material
Granulated blast furnace slag	Secondary Material

Table 5: Secondary materials excluded from the product system

The clinker production process uses non-renewable secondary fuels (Table 6). According to the PCR, secondary fuels are modelled to enter the studied system free of environmental loads. They are displayed as a resource use and all emissions occurring during the production process are allocated to the produced products.

Fuel	Considered as
Used tires	Partially Non-Renewable Secondary fuel (27% biomass content)
Rubber	Partially Non-Renewable Secondary fuel (27% biomass content)
Sawdust / paper	Renewable Secondary fuel
Mixed industrial waste (including sorted household waste)	Partially Non-Renewable Secondary fuel (44% biomass content)
Petroleum sludge	Non-Renewable Secondary fuel
Other recovered fuel	Non-Renewable Secondary fuel

Table 6: Secondary fuels excluded from the product system

In addition to the above, during the LCA a number of assumptions were made, which have been documented below for transparency:

- No waste is produced during the clinker production process.
- There is a difference between the mass of the raw meal consumed and the clinker produced which is due to the water (remaining humidity of raw materials) that evaporates and mainly CO_2 that is released from decarbonation.

4.7 Comparability

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

5. Environmental Performance

The environmental impacts are declared and reported using the parameters and units shown in the Tables below. Baseline characterisation factors are taken from CML – IA version 4.1 (dated October 2012).

The impact categories presented in the following table refer to 1000 kg of average cement produced from the locations fully owned and operated by Holcim in Romania.

Parameter	Unit	A1-A3
Parameters describing environmental impacts		
Global Warming Potential (GWP)	Kg CO2 equiv.	504
Ozone Depletion Potential (ODP)	Kg CFC 11	7.69E-06
Acidification Potential for Soil and Water (AP)	kg SO2 equiv.	0.368
Eutrophication Potential (EP)	kg (PO4)3-equiv.	0.303
Formation potential of tropospheric Ozone (POCP)	kg C2H4 equiv.	0.0404
Abiotic Depletion Potential (ADPE)	kg Sb equiv.	5.38E-05
Abiotic Depletion Potential (ADPF)	MJ, net calorific	1194
Parameters describing resource use, primary energy		
Use of renewable primary energy excluding renewable primary energy used as raw materials (PERE)	MJ	216
Use of renewable primary energy resources used as raw materials (PERM)	MJ	32.5
Total use of renewable primary energy resources (PERT)	MJ	248
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (PENRE)	MJ	1712
Use of non-renewable primary energy resources used as raw materials (PENRM)	MJ	0
Total use of non-renewable primary energy resources (PENRT)	MJ	1712

Reading tip:
7,69E-06 = 7,69 x 1^{-6} = 0,00000769

Parameters describing resource use, secondary materials and fuels, use of water		
Use of secondary material (SM)	kg	85.6
Use of renewable secondary fuels (RSF)	MJ	0.349
Use of non-renewable secondary fuels (NRSF)	MJ	0.503
Net use of fresh water (FW)	m^3	1.26
Other environmental information describing waste categories		
Hazardous waste disposed (HWD)	kg	0.0138
Non-hazardous waste disposed (NHWD)	kg	8.943
Radioactive waste disposed (RWD)	kg	0.0128
Other environmental Information describing output flows		
Components for re-use (CRU)	kg	0
Materials for recycling (MRF)	kg	0.347
Materials for energy recovery (MER)	kg	0
Exported Energy (EE)	MJ per energy carrier	0

NOTE: The LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

6. Range of Results

The EPD provides the results for the average (representative) product. Each individual cement type (from both sites) has been modelled and then combined on a mass weighted average of production to calculate the results for the average product.

The difference in results for the average cement product produced at each site compared to the representative (average) product is lower than 10% for the majority of the environmental impact indicator categories. The differences in indicator results for ODP and POCP are slightly more.

7. Interpretation

The following table provides an identification of the most significant contributors to parameters describing environmental impacts.

Parameter	Most significant contributor
Global Warming Potential (GWP)	The use of clinker in the cement is the main cause for overall global warming potential. Emissions in the kiln result from both decarbonation of limestone as well as burning of fuel.
Ozone Depletion Potential (ODP)	Dominated by the use of petcoke in the clinker production and by indirect emission from electricity production.
Acidification Potential for Soil and Water (AP)	Dominated by the indirect emissions from electricity production, both used during the cement plant and during the clinker production process.
Eutrophication Potential (EP)	Dominated by the indirect emissions from electricity production, both used during the cement plant and during the clinker production process.
Formation potential of tropospheric Ozone (POCP)	Dominated by emissions from the kiln as well as from fuel production for the burning of clinker.
Abiotic Depletion Potential (ADPE)	Highest contribution from the quarry of minerals (gypsum / limestone) and from the use of electricity.
Abiotic Depletion Potential (ADPF)	Dominated by the use of fossil fuels in the clinker production (petcoke and bituminous coal) and indirect emissions from electricity production.
Hazardous waste disposed (HWD)	Generated from electricity production in Romania.
Non-hazardous waste disposed (NHWD)	Generated from electricity production in Romania.
Radioactive waste disposed (RWD)	Generated from electricity production in Romania.

Concluding, the use of energy is the most significant contributor to environmental impacts associated with cement production. Energy is used as electricity and fuel, by far dominated by the kiln. Also contributing is the energy demand related to the excavation of raw materials. The contribution to global warming (carbon emissions) is dominated by the decarbonation of limestone – a process necessary to produce cement.

8. Differences Versus Previous Versions

The table below reports the differences in indicator results compared to the previously published version of this EPD.

Environmental Indicator	Previous Version (2012 production data)	Current version (2018 production data)	Percentage Change (%)
Global Warming Potential (GWP)	706	504	-29
Ozone Depletion Potential (ODP)	1.88E-08	7.69E-06	40804
Acidification Potential for Soil and Water (AP)	1.68	0.368	-78
Eutrophication Potential (EP)	0.155	0.303	95
Formation potential of tropospheric Ozone (POCP)	0.0915	0.0404	-56
Abiotic Depletion Potential (ADPE)	2.09E-03	5.38E-05	-97
Abiotic Depletion Potential (ADPF)	3400	1194	-65

The main reason for the change in indicator results is updated production data and to a lesser extent differences in generic datasets.

9. 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 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, Circular Economy and of Environmental Stewardship as a standard business practice in our operations. Moreover, we encourage the adoption of the responsible sourcing practices throughout our supply chain.

In this sense, we measure, monitor, assess and continuously improve our environmental performance. 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.

Nevertheless, we develop and launch innovative products and solutions with enhanced environmental or social performance.

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

10. References

Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products, BS EN 15804:2012+A1:2013. BSI Standards Limited.

PCR 2012:01 Construction products and construction services version 2.3, The International EPD System.

Sub-PCR to PCR 2012:01 (v2.3) PCR 2012:01- sub-PCR-H, Cement and Building Lime (EN 16908:2017), The International EPD System.

Life-cycle assessment software and database:

- SimaPro8 LCA software from PRé.
- ECOINVENT database v3.4 - released in 2017, contains life cycle inventory datasets
- CML-IA database version 4.1 – released in 2012, The **C**entrum voor **M**ilieuwetenschappen **L**eiden **I**mpact **A**ssessment (CML-IA), contains characterisation factors for life cycle impact assessment (LCIA)

ISO 14020:2000 Environmental labels and declarations — General principles

ISO 14044:2006+A1:2018. Environmental management – life cycle assessment – requirements and guidelines, International Organisation for Standardisation (ISO), Geneva.

ISO 14040:2008. Environmental management – Life cycle assessment – principles and framework, International Organisation for Standardisation (ISO), Geneva.

EN16908:2017 Cement and building lime – Environmental product declarations – Product category rules complementary to EN 15804. BSI Standards Limited

ISO 21930:2017 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services

SR EN 197-1:2011 “Cement. Composition, specifications and conformity criteria for common cements.” Romanian version of European Standard EN 197-1:2011, published by National Standardization Body – ASRO

SR EN 413-1:2011. Masonry cement. Composition, specifications and conformity criteria. Romanian version of European Standard EN 413-1:2011, published by National Standardization Body – ASRO

Commission Regulation (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

acreditat pentru
CERTIFICARE

SR EN ISO/CEI 17021-1:2015
CERTIFICAT DE ACREDITARE
SM 003

AEROQ

Organism Acreditat pentru Certificarea Sistemelor de Management – SR EN ISO/CEI 17021-1

Membru Asociat la Organizaţia Europeană pentru Calitate - EOQ

CERTIFICAT

nr.: **849 M**

Se certifică: **Sistemul de Management de Mediu**

al

HOLCIM (România) S.A.

România, Bucureşti, Calea Floreasca, Nr. 169A, Clădirea B, Etaj 7, Sector 1

Puncte de lucru – conf. Anexă

Care este conform cu :

SR EN ISO 14001:2015, EN ISO 14001:2015

Domeniu: – **Producţia pe bază de resurse naturale şi alternative, dezvoltarea şi livrarea de ciment, lianţi hidraulici speciali, filer, betoane, şape, mortare şi agregate.**

Referinţe: Certificat de acreditare **RENAR** nr. **SM 003/30.01.2017**
Raport audit nr. **3436/26.10.2018**

Data recertificării:	Data expirării:	Data certificării iniţiale:
29.11.2018	**28.11.2021**	**Certificat nr. 01104031957/22.12.2003**

Valabilitatea certificatului este condiţionată de efectuarea auditurilor de supraveghere anuale, confirmată prin rapoartele de audit şi de reevaluarea completă a SM odată cu recertificarea acestuia înainte de expirarea perioadei de valabilitate (3 ani). Acest certificat poate fi suspendat sau retras, dacă prin auditurile de supraveghere se constată că nu se menţin condiţiile în baza cărora a fost emis.

Director General,
Ing. Constantin AVRAM

AEROQ S.A. ROMANIA Societatea Comercială BUCUREŞTI

Anexa la Certificatul nr. 849M/29.11.2018 emis pentru S.C. HOLCIM (România) S.A.

Puncte de lucru:

I. CIMENT

Fabrica de ciment Câmpulung	Valea Mare Pravăţ, Jud. Argeş.
Fabrica de ciment Aleşd	Aştileu, Sat Chiştag, Str. Viitorului, Nr. 2, Jud. Bihor.
Staţia de măcinare, concasare şi terminal ciment Turda	Turda, Str. Ştefan cel Mare, Nr. 4, Jud. Cluj.
Terminal ciment Progresul	Bucureşti, Drumul Bercenarului, Nr. 8, Sector 4.
Staţia de lianţi hidraulici Piteşti	Piteşti, Depozitelor, Nr. 10, Jud. Argeş

II. STAŢII DE BETOANE

Staţia de betoane Chitila	Bucureşti, Şos. Chitilei, nr. 423, Sector 1
Staţia de betoane Pantelimon	Pantelimon, Şos .de Centură, nr.8, Jud. Ilfov
Staţia de betoane Pipera	Bucureşti, Şos. Pipera, nr. 52, Sector 2
Staţia de betoane Progresu	Bucureşti, Drumul Bercenarului, Nr. 8, Sector 4.
Staţia de betoane Clinceni	Clinceni, Str. Industriiilor, nr.6, Jud. Ilfov
Staţia de betoane Braşov	Braşov, Str. Zizinului, Nr. 121, Jud. Braşov
Staţia de betoane Craiova	Craiova, Str. Râului, Nr. 401, Jud. Dolj
Staţia de betoane Ploieşti	Ploieşti, Şos. Centura de Est, Nr. 48A, Jud. Prahova
Staţia de betoane Sibiu	Sibiu, Str. Turda, Nr. 12, Jud. Sibiu
Staţie de betoane Timişoara	Timişoara, Calea Moşniţei, Nr.17, Jud. Timiş
Staţia de betoane Satu Mare	Satu Mare, Drumul Careiului, Nr. 146, Jud. Satu Mare
Staţia de betoane Oradea	Oradea, Str. Borşului, Nr. 14/C, Jud. Bihor
Staţia de betoane Cluj	Cluj Napoca, Str. Beiuşului, Nr. 11, Jud. Cluj
Staţia de betoane Târgu Mureş	Târgu Mureş, Str. Băneasa, Nr. 8, Jud. Mureş

III. STAŢII DE AGREGATE

Staţia de producere agregate Stănceşti	Com. Târguşoru Vechi, Sat Târguşoru Vechi, Jud. Prahova
Staţia de producere agregate Gligoreşti	Com. Luna, Sat Gligoreşti, Jud. Cluj
Staţia de producere agregate Corbii Mari	Corbii Mari, Jud. Dâmboviţa

Data: 29.11.2018

Director General,
ing. Constantin AVRAM

AEROQ S.A. ROMANIA BUCUREŞTI Societatea Comercială

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CERTIFICARE

SR EN ISO/CEI 17021-1:2015
CERTIFICAT DE ACREDITARE
SM 003

AEROQ

Organism acreditat pentru Certificarea Sistemelor de Management – SR EN ISO/CEI 17021-1

Membru Asociat la Organizaţia Europeană pentru Calitate - EOQ

CERTIFICAT

nr.: 597 S

Se certifică

Sistemul de Management al Sănătăţii şi Securităţii în Muncă al

HOLCIM (România) S.A.

România, Bucureşti, Calea Floreasca, Nr. 169A, Clădirea B, Etaj 7, Sector 1

Puncte de lucru – conf. Anexă

Care este conform cu :

SR ISO 45001:2018 / ISO 45001:2018

Domeniu: **Producţia pe bază de resurse naturale şi alternative, dezvoltarea şi livrarea de ciment, lianţi hidraulici speciali, filer, betoane, şape, mortare şi agregate.**

Referinţe: Certificat de acreditare **RENAR** nr. **SM 003/30.01.2017**
Raport audit din **29.11.2019**

Data *reemiterii:*	Data expirării:	Data certificării iniţiale:
17.02.2020	**28.11.2021**	**Certificat nr. 01113030067/18.12.2003**

Valabilitatea certificatului este condiţionată de efectuarea auditurilor de supraveghere anuale, confirmată prin rapoartele de audit şi de reevaluarea completă a SM odată cu recertificarea acestuia înainte de expirarea perioadei de valabilitate (3 ani). Acest certificat poate fi suspendat sau retras, dacă prin auditurile de supraveghere se constată că nu se menţin condiţiile în baza cărora a fost emis.

Director General,
Ing. Constantin AVRAM

AEROQ S.A. ROMANIA Societatea Comercială BUCUREŞTI

Anexa la Certificatul nr. 597S/17.02.2020 emis pentru S.C. HOLCIM (România) S.A.

Puncte de lucru:

I. CIMENT

Fabrica de ciment Câmpulung	Valea Mare Pravăţ, Jud. Argeş.
Fabrica de ciment Aleşd	Aştileu, Sat Chiştag, Str. Viitorului, Nr. 2, Jud. Bihor.
Staţia de măcinare, concasare şi terminal ciment Turda	Turda, Str. Ştefan cel Mare, Nr. 4, Jud. Cluj.
Terminal ciment Progresul	Bucureşti, Drumul Bercenarului, Nr. 8, Sector 4.
Staţia de lianţi hidraulici Piteşti	Piteşti, Depozitelor, Nr. 10, Jud. Argeş

II. STAŢII DE BETOANE

Staţia de betoane Chitila	Bucureşti, Şos. Chitilei, nr. 423, Sector 1
Staţia de betoane Pantelimon	Pantelimon, Şos .de Centură, nr.8, Jud. Ilfov
Staţia de betoane Pipera	Bucureşti, Şos. Pipera, nr. 52, Sector 2
Staţia de betoane Progresu	Bucureşti, Drumul Bercenarului, Nr. 8, Sector 4.
Staţia de betoane Clinceni	Clinceni, Str. Industriiilor, nr.6, Jud. Ilfov
Staţia de betoane Braşov	Braşov, Str. Zizinului, Nr. 121, Jud. Braşov
Staţia de betoane Craiova	Craiova, Str. Râului, Nr. 401, Jud. Dolj
Staţia de betoane Ploieşti	Ploieşti, Şos. Centura de Est, Nr. 48A, Jud. Prahova
Staţia de betoane Sibiu	Sibiu, Str. Turda, Nr. 12, Jud. Sibiu
Staţie de betoane Timişoara	Timişoara, Calea Moşniţei, Nr.17, Jud. Timiş
Staţia de betoane Satu Mare	Satu Mare, Drumul Careiului, Nr. 146, Jud. Satu Mare
Staţia de betoane Oradea	Oradea, Str. Borşului, Nr. 14/C, Jud. Bihor
Staţia de betoane Cluj	Cluj Napoca, Str. Beiuşului, Nr. 11, Jud. Cluj
Staţia de betoane Târgu Mureş	Târgu Mureş, Str. Băneasa, Nr. 8, Jud. Mureş

III. STAŢII DE AGREGATE

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Staţia de producere agregate Gligoreşti	Com. Luna, Sat Gligoreşti, Jud. Cluj
Staţia de producere agregate Corbii Mari	Corbii Mari, Jud. Dâmboviţa

Data: 17.02.2020

Director General,

ing. Constantin AVRAM

AEROQ S.A. ROMANIA Societatea Comercială BUCUREŞTI

acreditat pentru CERTIFICARE

SR EN ISO/CEI 17021-1:2015
CERTIFICAT DE ACREDITARE
SM 003

AEROQ

Organism Acreditat pentru Certificarea Sistemelor de Management – SR EN ISO/CEI 17021-1

Membru Asociat la Organizaţia Europeană pentru Calitate - EOQ

CERTIFICAT

nr.: **2400**

Se certifică **Sistemul de Management al Calităţii**

al

HOLCIM (România) S.A.

România, Bucureşti, Calea Floreasca, Nr. 169A, Clădirea B, Etaj 7, Sector 1

Puncte de lucru – conf. Anexă

Care este conform cu :

SR EN ISO 9001:2015, EN ISO 9001:2015

Domeniu: **Producţia pe bază de resurse naturale şi alternative, dezvoltarea şi livrarea de ciment, lianţi hidraulici speciali, filer, betoane, şape, mortare şi agregate.**

Precizări suplimentare privind aplicabilitatea cerinţelor ISO 9001:2015 şi domeniul conţinut în acest certificat se pot obţine prin consultarea organizaţiei.

Referinţe: Certificat de acreditare **RENAR** nr. **SM 003/30.01.2017**
Raport audit nr. **3436/26.10.2018**

Data recertificării:	Data expirării:	Data certificării iniţiale:
29.11.2018	**28.11.2021**	**Certificat nr. 7510020049/14.01.2004**

Valabilitatea certificatului este condiţionată de efectuarea auditurilor de supraveghere anuale, confirmată prin rapoartele de audit şi de reevaluarea completă a SM odată cu recertificarea acestuia înainte de expirarea perioadei de valabilitate (3 ani). Acest certificat poate fi suspendat sau retras, dacă prin auditurile de supraveghere se constată că nu se menţin condiţiile în baza cărora a fost emis.

Director General,

Ing. Constantin AVRAM

AEROQ S.A. ROMANIA BUCUREŞTI Societatea Comercială

Anexa la Certificatul nr. 2400/29.11.2018 emis pentru S.C. HOLCIM (România) S.A.

Puncte de lucru:

I. CIMENT

Fabrica de ciment Câmpulung	Valea Mare Pravăţ, Jud. Argeş.
Fabrica de ciment Aleşd	Aştileu, Sat Chiştag, Str. Viitorului, Nr. 2, Jud. Bihor.
Staţia de măcinare, concasare şi terminal ciment Turda	Turda, Str. Ştefan cel Mare, Nr. 4, Jud. Cluj.
Terminal ciment Progresul	Bucureşti, Drumul Bercenarului, Nr. 8, Sector 4.
Staţia de lianţi hidraulici Piteşti	Piteşti, Depozitelor, Nr. 10, Jud. Argeş

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Staţia de betoane Progresu	Bucureşti, Drumul Bercenarului, Nr. 8, Sector 4.
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Staţia de betoane Braşov	Braşov, Str. Zizinului, Nr. 121, Jud. Braşov
Staţia de betoane Craiova	Craiova, Str. Râului, Nr. 401, Jud. Dolj
Staţia de betoane Ploieşti	Ploieşti, Şos. Centura de Est, Nr. 48A, Jud. Prahova
Staţia de betoane Sibiu	Sibiu, Str. Turda, Nr. 12, Jud. Sibiu
Staţie de betoane Timişoara	Timişoara, Calea Moşniţei, Nr.17, Jud. Timiş
Staţia de betoane Satu Mare	Satu Mare, Drumul Careiului, Nr. 146, Jud. Satu Mare
Staţia de betoane Oradea	Oradea, Str. Borşului, Nr. 14/C, Jud. Bihor
Staţia de betoane Cluj	Cluj Napoca, Str. Beiuşului, Nr. 11, Jud. Cluj
Staţia de betoane Târgu Mureş	Târgu Mureş, Str. Băneasa, Nr. 8, Jud. Mureş

III. STAŢII DE AGREGATE

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Staţia de producere agregate Gligoreşti	Com. Luna, Sat Gligoreşti, Jud. Cluj
Staţia de producere agregate Corbii Mari	Corbii Mari, Jud. Dâmboviţa

Data: 29.11.2018

Director General,
ing. Constantin AVRAM

AEROQ S.A. ROMANIA BUCUREŞTI Societatea Comercială

AEROQ

Organism de certificare produse notificat de Comisia Europeană

Număr de identificare 1840

acreditat pentru CERTIFICARE

RENAR

SR EN ISO/CEI 17065:2013

CERTIFICAT DE ACREDITARE 001/8 OC

CERTIFICAT DE CONSTANȚĂ A PERFORMANȚEI

nr.: 1840-CPR-97/555/EC/0223-08

In conformitate cu Regulamentul (UE) nr.305/2011 al Parlamentului European şi al Consiliului din 9 martie 2011 (Regulamentul Produselor pentru Constructii-CPR), acest certificat se aplică pentru:

Ciment portland cu calcar EN 197-1 - CEM II/A-LL 42,5 R

Domeniu de utilizare: Prepararea betonului, mortarului, pastei şi altor amestecuri pentru construcţii şi pentru fabricarea produselor pentru construcţii

Fabricat de:	**HOLCIM (ROMANIA) SA**
cu sediul în:	Bucuresti, sector 1, Calea Floreasca, nr. 169 A, Corp B, Etaj 7
In fabrica:	**Punct de lucru CIMENT CAMPULUNG**
cu sediul în:	**Valea Mare Pravat, jud. Arges**

Acest certificat atestă că sunt îndeplinite toate clauzele privind evaluarea şi verificarea constanţei performanţei şi performanţele specificate în anexa ZA a standardului:

SR EN 197-1:2011

Organismul de certificare notificat **AEROQ** a evaluat performanta produselor pe baza testarilor, inclusiv esantionarea, a efectuat inspecţia iniţială a fabricii şi a controlului producţiei în fabrică, supraveghează şi evaluează continuu controlul producţiei în fabrică ,efectueaza incercari prin sondaj a unor esantioane prelevate inaintea introducerii produsului pe piata şi confirmă că produsele îndeplinesc cerinţele prescrise în standard prin aplicarea sistemului **1+.**

Data reemiterii	Data primei ediţii (conform CPD)
29.09.2014	**06.10.2008**

Acest certificat rămâne valabil dacă nu sunt modificate cerinţele privind metodele de încercare şi/sau controlul producţiei în fabrică din standardul armonizat, utilizate la evaluarea performanţei caracteristicilor declarate şi nu se modifică în mod semnificativ produsul şi condiţiile de producţie din fabrică, modificări care ar putea conduce şi la schimbarea declaraţiei de performanţă.

Valabilitatea certificatului este condiţionată de efectuarea anuală a supravegherii şi a evaluării continue a controlului producţiei în fabrică, confirmată prin rapoartele rezultate.

Menţinerea valabilităţii certificatului poate fi verificată pe adresa www.aeroq.ro.

Acest certificat poate fi suspendat sau retras, dacă se constată că nu se menţin condiţiile în baza cărora a fost emis.

Director General

ing. Constantin AVRAM

AEROQ S.A. ROMANIA Societatea Comercială BUCUREŞTI

Certificate of Approval

Certificate Number: RS0020 Issue: 06

Holcim (Romania) S.A.

having complied with the requirements of:

BES 6001: Issue 3.1
Framework Standard for Responsible Sourcing

has achieved a performance rating of: **Very Good**

and is authorised to use the BRE Global Certification Mark on the following product(s) and associated stationery and publications.

Head Office Address

Holcim (Romania) S.A.
169 A Calea Floreasca St
Building B, Floor 7, Dist. 1
BUCHAREST
ROMANIA
RO 014459

Production Site(s)

See appendix for details

Signed for BRE Global Ltd	Cris Francis Director BRE Global	22 June 2020 Date of this Issue
2 June 2014 Date of First Issue		21 December 2020 Expiry Date

BRE Global Ltd., Garston, Watford WD25 9XX.
T: +44 (0)333 321 8811 F: +44 (0)1923 664603 E: Enquiries@breglobal.com

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Appendix to Certificate No: RS0020

Issue: 06

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Building B, Floor 7, Dist. 1
BUCHAREST
ROMANIA
RO 014459

See table below for details

Product	Description	Site
Ready Mixed Concrete: C8/10;C12/15;C16/20; C20/25;C25/30; C30/37;C35/45;C40/50; C50/60;C60/75;BcR 3,5;BcR 4;BcR 4,5	Ready Mixed Concrete manufactured in automated batching plants, according to SR: EN 206-1:2002 (Concrete - Part 1: Specification, performance, production and Conformity)	Chitila, RO - 013407
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25;C25/30;C30/37; C35/45;C40/50; C45/55;C50/60;C60/75;BcR 3,5;BcR 4;BcR 4,5; BcR 5		Pipera RO - 020112
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25;C25/30;C30/37; C35/45;C40/50; C50/60;C60/75;BcR 3,5;BcR 4;BcR 4,5		Clinceni, RO - 077060
Ready Mixed Concrete: C8/10;C12/15;C16/20; C20/25; C25/30;C30/37;C35/45;C40/50; C45/55;C50/60; C60/75;BcR 3,5;BcR 4;BcR 4,5		Pantelimon, RO - 417022
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25; C25/30;C30/37; C35/45;C40/C50; BcR 3,5; BcR 4; BcR 4,5: BcR5.		Craiova, RO - 200636

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Issue: 06

Holcim (Romania) S.A.

Product	Description	Site
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25;C25/30;C30/37; C35/45;C40/50; BcR 3,5; BcR 4; BcR 4,5	Ready Mixed Concrete manufactured in automated batching plants, according to SR: EN 206-1:2002 (Concrete - Part 1: Specification, performance, production and Conformity)	Ploieşti, RO -100120
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25;C25/30;C30/37; C35/45;C40/50; C45/55;BcR 3.5;BcR 4;BcR 4.5; BcR 5		Cluj Napoca, RO - 400394
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25;C25/30;C30/37; C35/45;C40/C50;BcR 3.5; BcR 4;BcR 5		Timişoara, RO - 300547
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25; C25/30;C30/37; C35/45;C40/50; BcR 3,5; BcR 4; BcR 4,5; BcR 5.		Oradea, RO - 410605
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25; C25/30;C30/37; C35/45;BcR 3,5; BcR 4;BcR 4,5;BcR 5		Sibiu, RO - 550052
Ready Mixed Concrete: C8/10;C12/15;C16/20; C20/25; C25/30;C30/37; C35/45;C40/50; BcR 4;BcR 4,5;BcR 5		Târgu Mureş, RO - 540199
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25; C25/30;C30/37; C35/45;C40/50; C45/55;C 50/60;BcR 3,5; BcR 4; BcR 4,5; BcR 5		Braşov, RO - 500407
Ready Mixed Concrete: C8/10;C12/15;C16/20; C20/25; C25/30;C30/37; C35/45; BcR 4;BcR 4;5;BcR 5		Satu Mare, RO - 440187

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Appendix to Certificate No: RS0020

Issue: 06

Holcim (Romania) S.A.

Scoring Table

Section	Score					
	1	2	3	4	5	Additional Credit
3.2.1 Responsible sourcing policy	C					
3.2.2 Legal compliance	C					
3.2.3 Quality management system	C					
3.2.4 Supplier management system	C					
3.3.1 Material traceability through supply chain	C					
3.3.2 EMS in the supply chain	C					
3.3.3 H&SMS in the supply chain	C					
3.4.1 Greenhouse gas emissions	C					
3.4.2 Energy management						
3.4.3 Resource use	C					
3.4.4 Waste prevention and management	C					
3.4.5 Water abstraction	C					
3.4.6 Life Cycle Assessment (LCA)	C					
3.4.7 Ecotoxicity						
3.4.8 Transport impacts	C					
3.4.9 Employment and skills	C					
3.4.10 Local community engagement	C					
3.4.11 Business ethics						

Key	C	Compulsory
		Points scored
		Maximum score available per clause

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See table below for details

Product	Description	Site
Ready Mixed Concrete: C8/10;C12/15;C16/20; C20/25;C25/30; C30/37;C35/45;C40/50; C50/60;C60/75;BcR 3,5;BcR 4;BcR 4,5	Ready Mixed Concrete manufactured in automated batching plants, according to SR: EN 206-1:2002 (Concrete - Part 1: Specification, performance, production and Conformity)	Chitila, RO - 013407
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Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25;C25/30;C30/37; C35/45;C40/50; C50/60;C60/75;BcR 3,5;BcR 4;BcR 4,5		Clinceni, RO - 077060
Ready Mixed Concrete: C8/10;C12/15;C16/20; C20/25; C25/30;C30/37;C35/45;C40/50; C45/55;C50/60; C60/75;BcR 3,5;BcR 4;BcR 4,5		Pantelimon, RO - 417022
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25; C25/30;C30/37; C35/45;C40/C50; BcR 3,5; BcR 4; BcR 4,5: BcR5.		Craiova, RO - 200636

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Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25;C25/30;C30/37; C35/45;C40/50; C45/55;BcR 3.5;BcR 4;BcR 4.5; BcR 5		Cluj Napoca, RO - 400394
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25;C25/30;C30/37; C35/45;C40/C50;BcR 3.5; BcR 4;BcR 5		Timişoara, RO - 300547
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25; C25/30;C30/37; C35/45;C40/50; BcR 3,5; BcR 4; BcR 4,5; BcR 5.		Oradea, RO - 410605
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25; C25/30;C30/37; C35/45;BcR 3,5; BcR 4;BcR 4,5;BcR 5		Sibiu, RO - 550052
Ready Mixed Concrete: C8/10;C12/15;C16/20; C20/25; C25/30;C30/37; C35/45;C40/50; BcR 4;BcR 4,5;BcR 5		Târgu Mureş, RO - 540199
Ready Mixed Concrete: C8/10;C12/15;C16/20;C20/25; C25/30;C30/37; C35/45;C40/50; C45/55;C 50/60;BcR 3,5; BcR 4; BcR 4,5; BcR 5		Braşov, RO - 500407
Ready Mixed Concrete: C8/10;C12/15;C16/20; C20/25; C25/30;C30/37; C35/45; BcR 4;BcR 4;5;BcR 5		Satu Mare, RO - 440187

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3.4.9 Employment and skills	C					
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EPD Ready-mix concrete – Holcim Romania

ISO 14020; ISO 14025; ISO 14040; ISO 14044; EN 15804; EN 16757; ISO 21930

Edition 1; Revision 1: June 2020

1. Programme information

Programme Operator:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
Declaration Holder	Holcim Romania 169 A Calea Floreasca Street Building B Floor 7, District 1, RO 014459, Bucharest, Romania Phone: +4021 231 77 14/15 Contact person: Mihaela Odangiu Email: Mihaela.Odangiu@lafargeholcim.com Company identification information: Trade Register No: J40/399/2002 VAT number: RO 12253732 Subscribed and paid-in capital: LEI 205,268,057
LCA Consultant	Intertek Health, Environmental & Regulatory Services 33 Cavendish Square London W1G 0PS www.intertek.com Contact person: Kim Allbury Email: kim.allbury@intertek.com
EPD Registration number	S-P-00526
Publication Date	2014-05-16
Version Date	2020-06-03
Valid Until	2025-06-04

Product group classification: UN CPC 375 Concrete
Product category rules (PCR): *CEN Standard EN 15804 served as the core PCR. PCR 2012:01 Construction Products and Construction Services Version 2.3 2028-11-15*
PCR review was conducted by: *The Technical Committee of the International EPD System. Chair: Massimo Marino. Contact via info@environdec.com*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: *Jane Anderson, ConstructionLCA Ltd*    Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

2. Company Information

This cradle-to gate environmental product declaration is for 1m^3 of average ready-mix concrete production from the locations fully owned and operated by Holcim in Romania, as follows:

- RMX Chitila - Bucureşti, Şos. Chitilei, Nr. 423, Sector 1
- RMX Pipera - Bucureşti, Şos. Pipera, Nr. 52, Sector 2
- RMX Clinceni - Clinceni, Strada Industriilor, Nr. 6, Jud. Ilfov
- RMX Pantelimon - Pantelimon, Sos. de Centura nr.8, Jud. Ilfov
- RMX Craiova - Craiova, Str. Râului, Nr. 401, Jud. Dolj
- RMX Ploiesti - Ploieşti, Şos. Centura de Est, Nr. 48A, Jud. Prahova
- RMX Cluj - Cluj Napoca, Str. Beiuşului, Nr. 11, Jud. Cluj
- RMX Timisoara - Timişoara, Calea Moşniţei, Nr. 17, Jud. Timiş
- RMX Oradea - Oradea, Şos. Borşului, Nr. 14/C, Jud. Bihor
- RMX Sibiu - Sibiu, Str. Turda, Nr. 12, Jud. Sibiu
- RMX Tg. Mures - Târgu Mureş, Str. Băneasa, Nr. 8, Jud. Mureş
- RMX Brasov - Braşov, Str. Zizinului, Nr. 121, Jud. Braşov
- RMX Satu Mare - Satu Mare, Drumul Careiului, Nr. 146, Jud. Satu Mare

Holcim Romania is the study commissioner and EPD owner. In order to respect the principles of sustainable development, the company implemented, maintained and continuously improves an effective integrated management system, in accordance with the applicable reference standards: SR EN ISO 9001:2015, SR EN ISO 14001:2015, SR ISO 45001:2018; BES 6001:2016. Our aim is to make a positive contribution to the built environment now and for future generations, thus we commit to spearhead the transition towards low-carbon construction and be the leader in promoting a circular economy, from alternative fuels to recycling

Sustainable development
We, Holcim Romania are committed to health and safety as our overarching value, thus we conduct our business with a goal of zero harm to people. We provide high quality products and services, through our manufacturing excellence strategy. We strive to minimize our impact on the environment and in particular on the limited natural resources. We ensure that all constituent materials used within our products are responsibly sourced and used in the most appropriate and sustainable manner.

Further information regarding Holcim Romania and its sustainability strategy can be accessed from www.holcim.ro/en/sustainable-development.

3. Product Information

Concrete is a composite material obtained through the homogenization of cement, aggregates, water and additives. The commercial applications of ready-mix concrete cover a wide range of applications including; foundation, flooring, car parking, access roads, terracing, frames, stairs, lift shafts, as well as major infrastructure works and hydro-technical constructions. Ready-mix concrete is classified under the following UN CPC group 375 concrete.

Concrete

The ready-mix concrete addressed in this EPD, as described in Table 1, is manufactured in the locations fully owner and operated by Holcim in Romania, according to the following standards and norms:

- European Norm: EN206-1:2000 Concrete – Part 1: Specification, performance, production and conformity, transposed into Romanian Standard SR EN 206-1:2002/A1:2005/A2:2005/C91:2008
- Romanian Standard SR 13510:2006/C91:2008: Concrete Part 1: Specification, performance, production and conformity. National document for the application of SR EN 206-1
- CP 012/12007: Code of practice for the production of concrete

- NE 014:02: Normative for the execution of cement concrete pavements in fixed and in sliding formwork systems

The geographical scope of this EPD is European.

Plant	Standards / Norms	Read-mix concrete type	
		Regular ready-mixed concrete	Road ready-mixed concrete
RMX Chitila	SR EN 206+A1:2017; CP 012/1-2007; NE 014:02	C8/10;C12/15;C16/20;C20/25; C25/30;C30/37;C35/45; C40/50;C45/55; C50/60; C60/75	BcR 3,5;BcR 4; BcR 4,5; BcR 5
RMX Pipera		C8/10;C12/15;C16/20;C20/25; C25/30;C30/37;C35/45; C40/50;C45/55;C50/60; C60/75	BcR 3,5;BcR 4; BcR 4,5; BcR 5
RMX Clinceni		C8/10;C12/15;C16/20;C20/25; C25/30;C30/37;C35/45; C40/50;C45/55; C50/60; C60/75	BcR 3,5;BcR 4; BcR 4,5; BcR 5
RMX Pantelimon		C8/10;C12/15;C16/20;C20/25; C25/30;C30/37;C35/45; C40/50;C45/55;C50/60; C60/75	BcR 3,5;BcR 4; BcR 4,5; BcR 5
RMX Craiova		C8/10;C12/15;C16/20;C20/25; C25/30;C30/37;C35/45; C40/50	BcR 3,5;BcR 4; BcR 4,5; BcR 5
RMX Ploiesti		C8/10;C12/15;C16/20; C20/25;C25/30;C30/37; C35/45; C40/50	BcR 3,5;BcR 4; BcR 4,5
RMX Cluj		C8/10;C12/15;C16/20;C20/25; C25/30;C30/37;C35/45; C40/50;C45/55	BcR3.5;BcR4; BcR4.5; BcR5
RMX Timisoara		C8/10;C12/15;C16/20;C20/25; C25/30;C30/37; C35/45; C40/50	BcR3.5; BcR4; BcR 4,5
RMX Oradea		C8/10;C12/15;C16/20;C20/25; C25/30;C30/37;C35/45;C40/50	BcR 3,5; BcR 4 ; BcR 4,5;BcR 5
RMX Sibiu		C8/10;C12/15;C16/20;C20/25; C25/30;C30/37;C35/45	BcR 3,5; BcR 4 ; BcR 4,5;BcR 5

Plant	Standards / Norms	Read-mix concrete type	
		Regular ready-mixed concrete	Road ready-mixed concrete
RMX Tg. Mures		C8/10;C12/15;C16/20;C20/25; C25/30;C30/37;C35/45;C40/50	BcR 4;BcR 4,5; BcR5
RMX Brasov		C8/10;C12/15;C16/20;C20/25; C25/30;C30/37;C35/45;C40/50; C45/55; C 50/60	BcR3,5;BcR 4; BcR 4,5;BcR 5
RMX Satu Mare		C8/10;C12/15;C16/20;C20/25; C25/30;C30/37;C35/45	BcR4; BcR4.5; BcR5

Table 1: Product Identification and Usage

3.1 Technical Specification of Product

Holcim are EN 206 complaint (compression strengths and exposure classes), so technical characteristics are given by the European Standard transposed into Romanian legislative norms (included in Table 1 above). The different compressive strengths of concrete combined with exposure classes represent different categories of usage. The functional characteristic are linked with commercial applications of the ready-mix concrete, that covers a wide range: from foundation, flooring, car parking, access roads, terracing, frames, stairs, lift shafts, to major infrastructure works, hydro-technical constructions, etc.

Product specific technical and functional characteristics are available via the Holcim web-site.

3.2 Content Declaration

The composition of the average product modelled in this project is obtained from the total raw material usages supplied by the sites. No substances that are listed in the 'Candidate List of Substances of very high concern for authorisation' are contained in the average aggregate.

The density of the resulting average ready-mix concrete is 2,329 kg/m^3.

Material	Percentage
Aggregates	77.5%
Cement	14.9%
Water	7.5%
Additives	0.1%

Table 2: Average ready-mix composition

3.3 Manufacturing Process

The main steps in ready-mix concrete production are as follows, and illustrated in Figure 1:

- Raw material supply and storage
- Raw material preparation
- Mixing

The main steps in aggregate production are illustrated in the Figure 1.

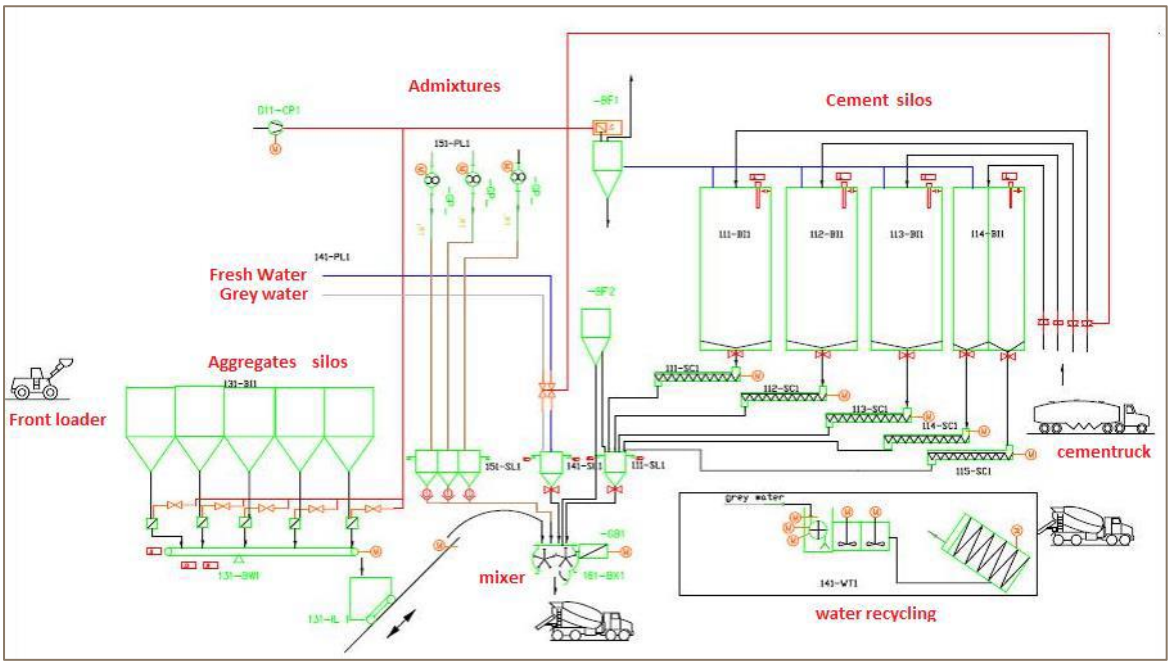

Figure 1: Ready-mix concrete process flow

3.3.1 Raw material supply, storage and preparation

Raw materials are supplied from, received and stored in dedicated storage facilities. All aggregates and cement are supplied by Holcim sites in Romania. The process flow of production of Holcim cement and aggregates is communicated in the accompanying LCA reports for average aggregates and average grey cement. Aggregates are transferred from storage facilities towards bunkers by a front loader.

3.3.2 Mixing

Concrete batches are mixed according to batching recipe with the concrete constitutions having been weighted by size and types according to the recipe via the weighting hoppers. The ingredients are blended in a mechanical mixer. Energy for the concrete production is supplied by diesel fuel and electricity. The water recycling system from the Holcim plants allows separation of water and aggregates (resulting from the return of fresh concrete and from the washing of ready-mix trucks) for further reutilization within the production process.

3.4 Additional information

The production of ready-mix concrete is subject to Romanian and European legislation, which addressed all relevant environmental aspects like dust emissions, noise, energy consumption, water and waste management, etc.

More information about ready-mixed concrete environmental stewardship and occupational health and safety aspects are detailed within the SDS (Safety Data Sheet) made publicly available on Holcim Romania portal: https://www.holcim.ro/ro/produse-si-servicii/produse. The SDS has been developed by Holcim Romania in compliance with the requirements of Commission Regulation (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

4. LCA Information

4.1 Goal of Study

The goal of this study was to generate an environmental profile of average ready-mix concrete produced and delivered from the locations fully owned and operated by Holcim Romania, to better understand the associated lifecycle environmental impacts and to allow a Type III EPD to be generated and made public via the International EPD System.

4.2 Declared Unit

The declared unit of the EPD is 1m^3 of average ready-mix concrete produced and delivered from the locations fully owned and operated by Holcim Romania. This EPD is established for the weighted average product of theses manufacturing plants. The average is based on the volume of ready-mix concrete produced at each plant.

4.3 System Boundary

System boundaries determine the unit processes to be included in the LCA study and which data as “input” and/or “output” to/from the system can be omitted.

This EPD covers the cradle to gate stage (A1 to A3), because other life cycle stages are dependent on particular scenarios and are better developed for specific building or construction works.

System boundaries are according to the modular approach and the cradle to gate stage is divided into the upstream (A1) and core (A2 and A3) phases, as outlined in Figure 2. Life cycle stage that are not covered by the EPD are indicated as MND (Module Not Declared).

Upstream	Core		Downstream												Other environmental information
Product Stage			Construction process stage		Use Stage							End of Life stage			Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Construction	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Demolition	Transport	Waste processing	Disposal	Future reuse, recycling or energy recovery potential
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

Figure 2: Modules included in the ready-mix concrete LCA: A1 (Raw material supply), A2 (Transport), A3 (Manufacturing)

4.4 Data sources and quality

The geographical system boundary of the LCA is Romania. All processes (including energy mix) are valid for the production sites in Romania. The thirteen ready-mix concrete plants account for 100% of total ready-mix concrete produced by Holcim in Romania.

All material flows of the processes are based on company and site-specific data gathered for one year of operation, for the period 1st January 2018 – 31st December 2018.

Modelling of the life cycle of Holcim Romania ready-mix concrete was performed using SimaPro8 LCA software from PRé. All relevant background LCI datasets are taken from the ecoinvent database v3.4 (cut-off) released in 2017.

All aggregates and cement are supplied by Holcim sites in Romania and the following manufacturer specific EPD have been used for these two raw materials;

- EPD Average Aggregates – Holcim Romania: S-P-00528
- EPD Grey Cements – Holcim Romania: S-P-000527

The foreground data has been collected on site and validated based on mass balances. 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 Allocation

The foreground data has been collected on site and validated based on mass balances. The All allocation is performed according to the basic rules from EN15804:2012+A1:2013. 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 ready-mix concrete produced.

All data is included based on measured data for each plant. To ensure high representativeness for calculation of the ready-mix concrete this specific data has been weighted based on the production volume of each plant, as follows:

Plant	Percentage
Brasov	7.7%
Chitila	13.1%
Clinceni	8%
Pantelimon	10.2%
Pipera	15.8%
Craiova	4.1%
Ploiesti	3.6%
Sibiu	9.1%
Timisoara	11.6%
Tg Mures	3.1%
Satu Mare	3.8%
Cluj	5.4%
Oradea	4.8%
Total production	100%

Table 3 Holcim Romania - Ready-mix Concrete Production (Percentage / Plant) 2018

4.6 Cut-off Criteria and assumptions

The cut-off criteria adopted is as stated in EN 15804:2012+A1:2013. Where there is insufficient data or data gaps for a unit process, the cut-off criteria is 1% of the total mass of input of that process. The total of neglected input flows per module is a maximum of 5% of energy usage and mass. The exception is if they have any of the following, in which case they have to be included:

- Significant effects of or energy use in their extraction, use or disposal
- Are classed as hazardous waste

For the foreground process of ready-mix concrete production, no cut-off has been necessary. All raw materials and associated transport to the plant, process energy and water use are included.

In addition to the above, during the LCA a number of assumptions were made, which have been documented below for transparency:

- For each plant, total site production data for all concrete types produced at the plants has been modelled for mass of total concrete produced – no distinction has been made between the different types of concrete in terms of energy usage. The resulting data is for an average concrete produced from the sites.
- No packaging is associated with the final product, the concrete is delivered in bulk.
- A proxy has been used for the admixture, which is less then 0.1% by mass of the concrete.
- No production waste is associated with the ready-mix production.

4.7 Comparability

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

5. Environmental Performance

The environmental impacts are declared and reported using the parameters and units shown in the Tables below. Baseline characterisation factors are taken from CML – IA version 4.1 (dated October 2012).

The impact categories presented in the following table refer to 1m^3 of average ready-mix concrete produced from the locations fully owned and operated by Holcim in Romania.

Parameter	Unit	A1-A3
Parameters describing environmental impacts		
Global Warming Potential (GWP)	Kg CO2 equiv.	201
Ozone Depletion Potential (ODP)	Kg CFC 11	5.94E-06
Acidification Potential for Soil and Water (AP)	kg SO2 equiv.	0.223
Eutrophication Potential (EP)	kg (PO4)3-equiv.	0.141
Formation potential of tropospheric Ozone (POCP)	kg C2H4 equiv.	0.0210
Abiotic Depletion Potential (ADPE)	kg Sb equiv.	5.47E-05
Abiotic Depletion Potential (ADPF)	MJ, net calorific	811
Parameters describing resource use, primary energy		
Use of renewable primary energy excluding renewable primary energy used as raw materials (PERE)	MJ	104.1
Use of renewable primary energy resources used as raw materials (PERM)	MJ	0
Total use of renewable primary energy resources (PERT)	MJ	104.1
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (PENRE)	MJ	1029
Use of non-renewable primary energy resources used as raw materials (PENRM)	MJ	0
Total use of non-renewable primary energy resources (PENRT)	MJ	1029

Reading tip:
5.94E-06= 5.94 x 1^{-6} = 0,00000594

Parameters describing resource use, secondary materials and fuels, use of water		
Use of secondary material (SM)	kg	30.4
Use of renewable secondary fuels (RSF)	MJ	0.124
Use of non-renewable secondary fuels (NRSF)	MJ	0.179
Net use of fresh water (FW)	m^3	4.99
Other environmental information describing waste categories		
Hazardous waste disposed (HWD)	kg	0.00732
Non-hazardous waste disposed (NHWD)	kg	190
Radioactive waste disposed (RWD)	kg	0.006725
Other environmental Information describing output flows		
Components for re-use (CRU)	kg	0
Materials for recycling (MRF)	kg	0.154
Materials for energy recovery (MER)	kg	0
Exported Energy (EE)	MJ per energy carrier	0

NOTE: The LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

6. Range of Results

This EPD provides the results for the average (representative) product. The production of all concrete has been modelled from the thirteen sites and then combined on a volume weighted average of production to calculate the results for the average product.

For the majority of sites, the difference in indicator results for the average concrete product produced at each site compared to the representative (average) product is within 10% for the environmental impact indicator categories. A small number of sites have a difference in indicator results of slightly higher than 10% for the environmental impact indicator categories.

7. Interpretation

The following table provides an identification of the most significant contributors to parameters describing environmental impacts.

Parameter	Most significant contributor
Global Warming Potential (GWP)	Dominated by the supply of raw materials, primarily the cement.
Ozone Depletion Potential (ODP)	Dominated by the supply of raw materials, namely cement, and the use of fossil fuels (diesel) for transportation.
Acidification Potential for Soil and Water (AP)	Dominated by the supply of raw materials, namely cement, and the use of fossil fuels (diesel) for transportation.
Eutrophication Potential (EP)	Dominated by the supply of raw materials, primarily the cement and to a lesser extent aggregates and the and the use of fossil fuels (diesel) for transportation.
Formation potential of tropospheric Ozone (POCP)	Dominated by the supply of raw materials, namely cement and to a lesser extent admixture, and the use of fossil fuels (diesel) for transportation.
Abiotic Depletion Potential (ADPE)	Dominated by the supply of raw materials and transportation of materials.
Abiotic Depletion Potential (ADPF)	Dominated by the use of fossil fuels for the production of the raw materials and transportation of materials.
Hazardous waste disposed (HWD)	Generated from electricity production in Romania.
Non-hazardous waste disposed (NHWD)	Generated from electricity production in Romania.
Radioactive waste disposed (RWD)	Generated from electricity production in Romania.

Concluding, a significant contribution to the overall environmental impacts comes from the production of cement. Further details regarding the environmental impact of this raw material can be accessed from the Holcim EPD for cement. Another contribution is related to the production of aggregates. Further details regarding the environmental impact of this raw material can be accessed from the Holcim EPD for Aggregates. The transportation of raw materials for ready-mix production though the use of diesel fuel and electricity necessary for the manufacturing stage are also contributors to the environmental impact.

8. Differences Versus Previous Versions

The table below reports the differences in indicator results compared to the previously published version of this EPD.

Environmental Indicator	Previous Version (2012 production data)	Current version (2018 production data)	Percentage Change (%)
Global Warming Potential (GWP)	271	201	-26
Ozone Depletion Potential (ODP)	8.36E-09	5.94E-06	70953
Acidification Potential for Soil and Water (AP)	0.781	0.223	-71
Eutrophication Potential (EP)	0.0782	0.141	80
Formation potential of tropospheric Ozone (POCP)	0.0566	0.021	-63
Abiotic Depletion Potential (ADPE)	7.60E-04	5.47E-05	-93
Abiotic Depletion Potential (ADPF)	1440	811	-44

The main reason for the change in indicator results is updated production data and to a lesser extent differences in generic datasets.

9. 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 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, Circular Economy and of Environmental Stewardship as a standard business practice in our operations. Moreover, we encourage the adoption of the responsible sourcing practices throughout our supply chain.

In this sense, we measure, monitor, assess and continuously improve our environmental performance. 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.

Nevertheless, we develop and launch innovative products and solutions with enhanced environmental or social performance.

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

10. References

Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products, BS EN 15804:2012+A1:2013. BSI Standards Limited.

PCR 2012:01 Construction products and construction services version 2.3, The International EPD System.

Sub-PCR to PCR 2012:01 (v2.3) PCR 2012:01- sub-PCR-G, Concrete and Concrete Elements (EN 16757:2017), The International EPD System.

Life-cycle assessment software and database:

- SimaPro8 LCA software from PRé.
- ECOINVENT database v3.4 - released in 2017, contains life cycle inventory datasets
- CML-IA database version 4.1 – released in 2012, The **C**entrum voor **M**ilieuwetenschappen **L**eiden **I**mpact **A**ssessment (CML-IA), contains characterisation factors for life cycle impact assessment (LCIA)

ISO 14020:2000 Environmental labels and declarations — General principles

ISO 14025:2006 Environmental labels and declarations — Type III environmental declarations — Principles and procedures

ISO 14044:2006+A1:2018. Environmental management – life cycle assessment – requirements and guidelines, International Organisation for Standardisation (ISO), Geneva.

ISO 14040:2008. Environmental management – Life cycle assessment – principles and framework, International Organisation for Standardisation (ISO), Geneva.

ISO 21930:2017 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services

EN 16757:2017 Sustainability of construction works – Environmental product declarations – Product Category Rules for concrete and concrete elements. BSI Standards Limited.

European Norm: EN 206-12000 Concrete – Part 1: Specification, performance, production and conformity, transposed into Romanian Standard SR EN 206-1:2002/A1:2005/A2:2005/C91:2008.

Romanian Standard SR 13510:2006/C91:2008; Concrete – Part 1: Specification, performance, production and conformity. National document for the application of SR EN 206-1.

CP 012/1-2007: Code of practice for the production of concrete.

NE 014:2002: Romanian Normative for production of concrete for roads

Commission Regulation (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)