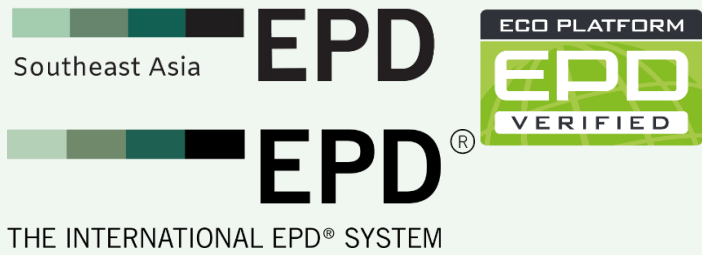


Environmental Product Declaration



In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

EPD of multiple cement products, based on worst-case results: TYPE IL; CEM II 42.5 R; CEM II 52.5 N; Type 5200 PSI; Type 5600 PSI; PCB 50

from

Quang Ninh Construction and Cement Joint Stock Company



Programme:	The International EPD® System / EPD Southeast Asia, https://www.epd-southeastasia.com/ - Hub The International EPD® System, www.environdec.com
Programme operator:	EPD International AB and Hub EPD Southeast Asia
EPD registration number:	EPD-IES-0016084
Publication date:	2024-08-14
Valid until:	2029-08-14

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com



General information

Programme information

Programme:	The International EPD® System and the fully aligned Programme of the hub EPD Southeast Asia
Address:	<p>EPD International AB Box 210 60 SE-100 31 Stockholm Sweden</p> <p>Hub EPD Southeast Asia: Kencana Tower, Level M Business Park Kebon Jeruk Jl Raya Meruya Ilir No. 88 Jakarta Barat 11620 Indonesia</p>
Website:	https://www.epd-southeastasia.com/ and www.environdec.com
E-mail:	admin@epd-southeastasia.com and info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification

Product Category Rules (PCR)

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (PCR):
 PCR 2019:14 v.1.3.3 for construction products
 c-PCR-001 cement and lime, referring to EN 16908:2017+A1:2022 Cement and building lime
UN CPC code(s): 374

PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: No chair appointed.
 The review panel may be contacted via the Secretariat www.environdec.com/contact.

Life Cycle Assessment (LCA)

LCA accountability: SGS INTRON B.V., Mathijs de Vaan

Third-party verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

EPD verification by individual verifier

Third-party verifier: Claudia A. Peña, Director of PINDA LCT SpA

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 registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD:

- Owner of the EPD: Quang Ninh Construction and Cement Joint Stock Company.
- Address: Hop Thanh Area, Phuong Nam Ward, Uong Bi City, Quang Ninh Province, Vietnam.
- Contact: Ms. Luu Thi Phuong Thao.
- E-mail: thao.lp@vawaz.com.vn .
- Phone: (+84) 93456 8591.

Description of the organisation:

Lam Thach cement is a well-known commodity developed by Quang Ninh cement and construction Joint Stock Company. It is critically produced with advanced production line of waterless technology. The facilities are selectively updated according to European standards. The factory's location is adjacent to abundance input materials for cement production including Canxi carbonate or limestone, coal, clay, additives. Economically, it is a notable convenience for transportation not only via road network, but also waterway. This also an inevitable advantage for the people who are interested in doing business with our company.

Lam Thach cement was awarded ISO certificate, and several rewards as a product of premium quality in different national fairs.

Product-related or management system-related certifications:

ISO 9001: 2015, ISO 14001-2015.

Name and location of production site(s):

Lam Thach II Cement Factory.

Address: Hop Thanh area, Phuong Nam ward, Uong Bi city, Quang Ninh province, Vietnam.

Product information

Product description:

Cement is one of the most important building materials used in the construction industry, working as binder that sets, hardens and adheres to other materials to bind them together forming concrete, mortars, grouts and plasters. Cement is a so-called intermediate product with many different final uses. Cement may for example be used in ready-mix concrete, precast concrete, mortar, screed, base treatment for various types of infrastructures, etc.. Each final (concrete, mortar, grout, plaster) product and each application requires a different type of cement with a different composition, resulting in many cement types produced by cement manufacturers.

The cements can be packed in plastic or paper bags or could be transported as bulk using tanker trucks or ships.

Cement is defined in standards published by CEN/TC 51 (EN 197-1) as “a hydraulic binder, i.e. a finely ground inorganic material which, when mixed with water, forms a paste which sets and hardens by means of hydration reactions and processes and which, after hardening, retains its strength and stability even under water”.

UN CPC code: 374.

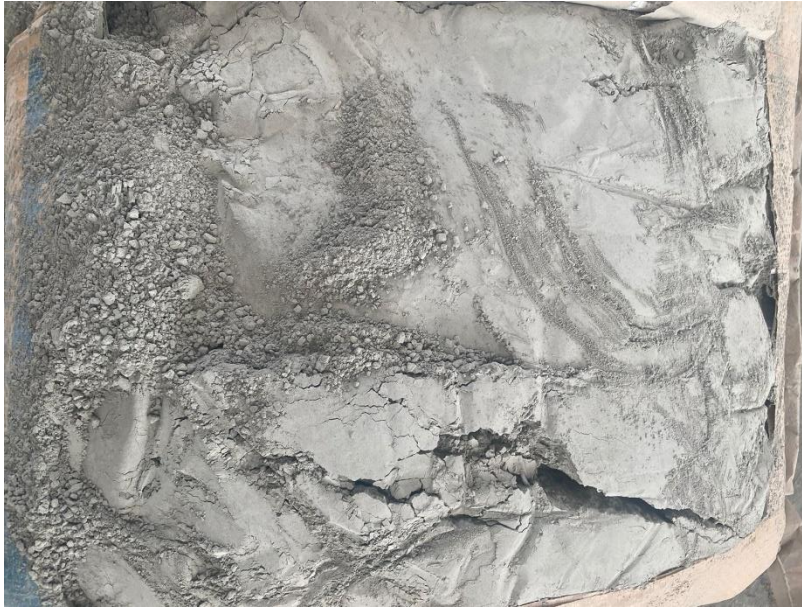
Product name (multiple products) and product identification:

This EPD covers the cement types as mentioned in the Table below. These are cements with different compositions for application in various concrete mixtures, depending on the required performance of the application.

This EPD covers multiple products within a group of cement types. The EPD data is based on the worst-case approach, making it possible to group the cements. LCA-results are reported for the cement type within the group with the worst environmental performance in LCA-results, based on clinker content being the most important contributor to the environmental impact, and based on lowest recycled content: CEM II 52.5 N. The LCA-results also apply to the other products within the group. The variation in GWP-GHG results is <10%.

Technical and functional characteristics are in accordance with the standards mentioned in the Table. The main product components are described in the system diagram in this EPD; the composition for the LCA is further specified in the section ‘Content information’ in this EPD.

Product	Significant characteristic & Recommended use	Technical properties	Product standard
Type 5200 PSI CEM II/A-L 42.5R	<ul style="list-style-type: none"> High residual coefficient of compressive strength, good consistency. Reasonably strength process speed, anti-erosion. Suitable for civil and industrial construction such as: bridge, road, skyscraper, hydro-electric building. 	<ul style="list-style-type: none"> Blaine: <ul style="list-style-type: none"> R009: 1-2 % Blaine: 4100-4200 cm²/g Compressive Strength: <ul style="list-style-type: none"> R3: 27-29 MPa R25: 46-48 MPa Setting time: <ul style="list-style-type: none"> Initial: 120-130 mins Final: 170-180 mins Soundness: 0-3 mm 	TCVN6260:2020 ASTM C150-20 EN 197-1:2011 PNS 63:2019
PCB50 Type 5600 PSI Type IL CEM II 52.5 N	<ul style="list-style-type: none"> High quality cement with outstanding advantages of high early and lately compressive strength. High blaine, no additives, good soundness, low heat of hydration, low alkalinity. Suitable for constructions requiring high technical such as: hydroelectric building, dam, bridge, road, Precast concrete components. 	<ul style="list-style-type: none"> Blaine: <ul style="list-style-type: none"> R009: ≤ 1 % Blaine: 3800-4000 cm²/g Compressive strength: <ul style="list-style-type: none"> R3: 35-37 MPa R25: 58-61 MPa Setting time: <ul style="list-style-type: none"> Initial: 110-120 mins Final: 140-150 mins Soundness: 0-3 mm LOI: ≤ 3% IR: ≤ 0,75% 	TCVN2682:2020 ASTM C150:20 EN 197-1: 2011 PNS 07:2018



Geographical scope: Global.

The products are produced in Vietnam and sold in various countries. The geographical scope of the production (module A1-A3) is Vietnam.

LCA information

Declared unit: 1 000 kg cement types TYPE IL; CEM II 42.5 R; CEM II 52.5 N; Type 5200 PSI; Type 5600 PSI; PCB 50 for use in concrete, mortar, grout, etc..

Reference service life: Not applicable.

Time representativeness: Specific data for the production (module A3) cover the year 2022 (1 January 2022 – 31 December 2022). Background data are not older than 10 years.

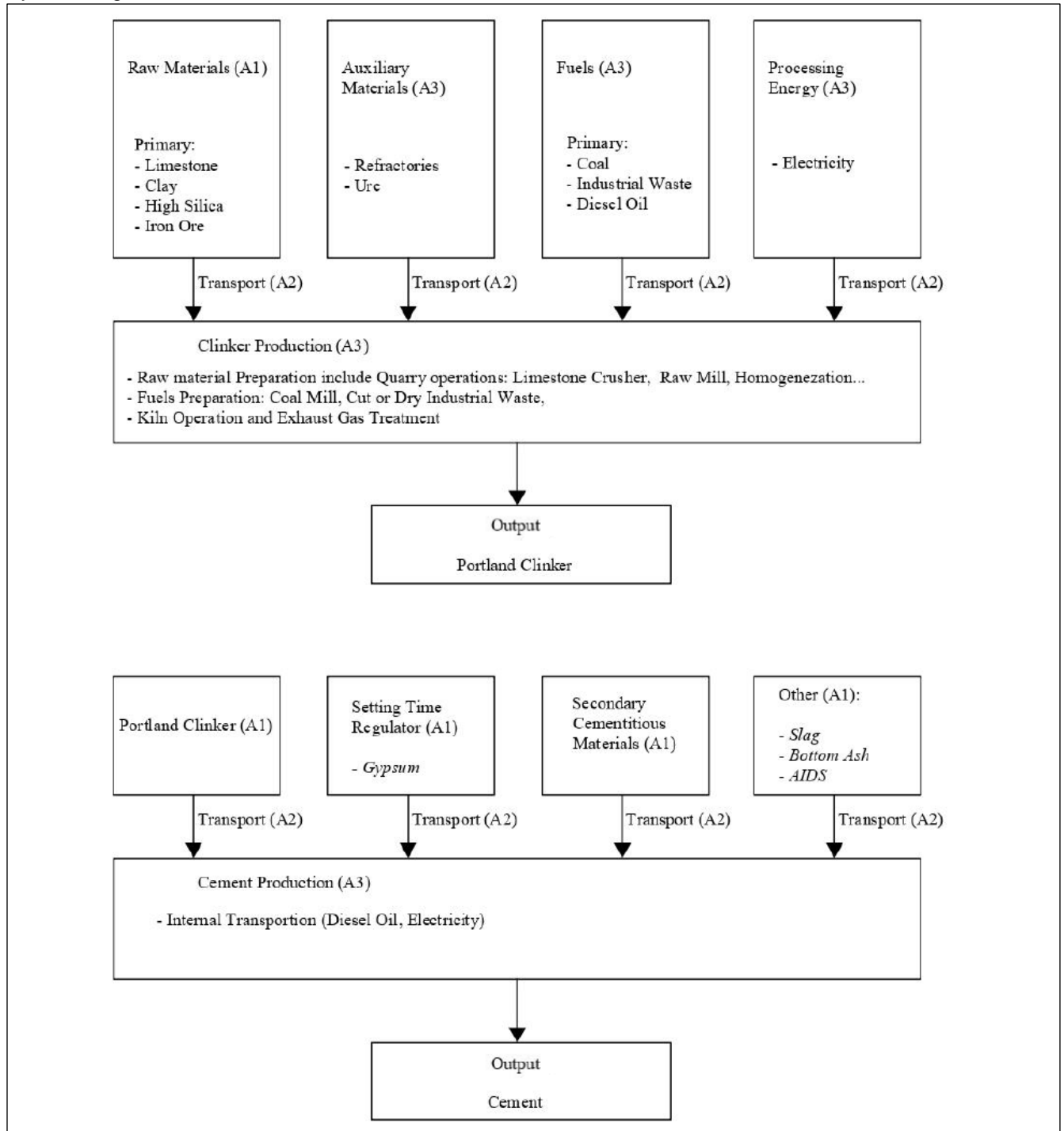
Database(s) and LCA software used: Simapro 9 and ecoinvent 3.8. The EN 15804 reference package based on EF 3.0 has been used.

Description of system boundaries:

d) Cradle to gate (A1–A3). These system boundaries are chosen since cement fulfils the following requirements from EN 15804 and the PCR:

- the product or material is physically integrated with other products during installation so they cannot be physically separated from them at end of life,
- the product or material is no longer identifiable at end of life as a result of a physical or chemical transformation process, and
- the product or material does not contain biogenic carbon.

System diagram:



Description manufacturing process:

Module A1 – Raw material production

The basic ingredient for cement is Portland clinker. The company produces its own clinker. This specific clinker (clinker LTII) production is included in A1. Next to own clinker, a small part is purchased externally. The other cement ingredients are also included in A1. Company data are collected for the clinker LTII. For external clinker, ecoinvent 3.8 data are used.

Module A2 – Transport of raw materials to LT-II

The ingredients are transported to the factory LT-II. Transport data are specific for the production location in Vietnam.

Module A3 - Manufacturing

The cement products are manufactured in one plant in Vietnam. Clinker is ground with other raw materials. All ingredients are dried before use. After grinding and mixing the raw materials to the right fineness, they product is transported to the silos from where the product is placed in means of transport (i.e. bags, bulk cement tanker truck, bulk cement tanker ship).

The purchased electricity used in the manufacturing process accounts for 0.3% of the GWP-GHG results of modules A1-A3. The energy source of this electricity is the Vietnamese national grid mix¹ as included in the ecoinvent 3.8 database, composed of 45% coal, 37% hydro, 17% gas and 1% other power. The climate impact of electricity as kg CO₂-eq/kWh (using the GWP-GHG indicator) used in manufacturing process: 0.562 kg CO₂-eq/kWh for the Vietnamese grid mix.

Ecoinvent processes are calculated including the infrastructure processes and capital goods. Capital goods and other infrastructure are also included in the foreground processes. Ecoinvent processes for landfill are calculated excluding long-term emissions.

Personnel-related impacts, use of offices etc. are excluded.

More information:

More information on QNC can be obtained at qncc.vn.

For more information about the LCA the LCA practitioner can be contacted via nl.intron@sgs.com.

Cut-offs

No cut-offs were applied. The material and energy data are based on full year figures and complete. No data gaps were identified.

Co-products and allocations

The various cement types are produced in one plant. The processing data of the cement plant are based on yearly consumption in 2022. The manufacturer allocated the electricity and water consumption to the various groups, based on actual consumptions for different cement types. Other data (diesel, emissions, production waste, packaging) are allocated on mass basis over all products.

Further allocation procedures for use of secondary raw materials and waste, are in line with EN 15804.

A1-A3 Production cradle-to-gate

The purchased electricity used in the manufacturing process accounts for 0.02% of the GWP-GHG results of modules A1-A3. The energy source of this electricity is the Vietnamese grid mix as included in the ecoinvent 3.8 database composed of 45% coal, 37% hydro, 17% gas and 1% other power. The climate impact GWP-GHG indicator in A1-A3 is 7.96E+02 kg CO₂-eq..

¹ The company doesn't buy a specific mix (option 1 from PCR section 4.8.1). The residual mix of the electricity supplier (option 2) is unknown and there are no ecoinvent data for the residual electricity mix on the Vietnamese market, nor easily accessible public data (option 3). Therefore, option 4 (electricity consumption on the market) is applied and the electricity was not used in processes over which the manufacturer has direct control. This seems justified since electricity is not a main contributor to the results.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	Global	VN	VN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Specific data used	95%	100%	100%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Variation – products	Worst case approach Variation <10%			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Variation – sites	0%			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/ declared unit
Clinker	875 (750-875)	0	0
Limestone	40 (0-200)	0	0
Pozzolan	45 (0-150)	0	0
Gypsum	40 (40-55)	0	0
TOTAL	1 000	0	0
Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/ declared unit
Material 1 packaging paper	1.75	0.18%	8.1E-01
Material 2 packaging plastic	2.29	0.23%	0

The values outside the brackets indicate worst case scenario, the values within the brackets indicate the range. Clinker and lime reflect the highest share in environmental impact. Therefore, the worst-case values from the range are chosen in the composition. To achieve a total weight of 1 000 kg for the declared unit, the content of the other components with less environmental impact (pozzolan and gypsum) are the lowest value of the range. There are no recycled or biogenic components influencing this choice, nor any hazardous substances which could influence the results.

The products do not contain Substances of Very High Concern in amounts greater than 1%. According to REACH regulations the maximum chromate content is 2 ppm. More information and safety instructions may be obtained via Quang Ninh Construction and Cement Joint Stock Company.

Results of the environmental performance indicators

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

NOTE: The worst case (i.e. highest clinker content) product is chosen as the 'representative' product within the group of cements. The decomposition (Bill of Materials) of the worst-case products and production flow diagram are provided in the sections before. Since the clinker content within a group does not vary more than 10% (from the average within the range), the LCA results and the GWP-GHG A1-A3 within the group do not differ more than 10%.

Mandatory impact category indicators according to EN 15804

Results per declared unit 1 000 kg cement				
Indicator	Unit	A1-A3	Optional paper packaging	Optional plastic packaging
GWP-fossil	kg CO ₂ eq.	7.96E+02	1.29E+01	1.84E+01
GWP-biogenic	kg CO ₂ eq.	1.05E+01 ²	-1.02E+00 (A1) / + 1.02E+00 (A5)	-6.71E-02***
GWP-luluc	kg CO ₂ eq.	2.88E-01	1.12E-01	8.38E-02
GWP-total	kg CO ₂ eq.	8.07E+02	1.20E+01	1.84E+01
ODP	kg CFC 11 eq.	9.13E-06	2.49E-06	2.54E-06
AP	mol H ⁺ eq.	2.01E+00	7.54E-02	9.41E-02
EP-freshwater	kg P eq.	6.19E-02	2.87E-04	3.48E-04
EP-marine	kg N eq.	6.31E-01	2.58E-02	2.81E-02
EP-terrestrial	mol N eq.	7.25E+00	2.80E-02	3.06E-01
POCP	kg NMVOC eq.	1.78E+00	7.98E-02	9.85E-02
ADP-minerals&metals* / **	kg Sb eq.	2.72E-04	4.86E-05	7.51E-05
ADP-fossil*	MJ	3.34E+03	1.93E+02	3.63E+02
WDP*	m ³	4.84E-01	1.68E+00	6.04E+00

² GWP-b values stem from generic ecoinvent background processes. There is no biogenic content in the product. The contribution of GWP-b to GWP-tot is just 1.3% and therefore not relevant.

Acronyms

GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

* *Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

** *Disclaimer: The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, non-cancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.*

*** *Small negative value due to various processes inecoinvent. Not corrected because of negligible impact.*

Additional mandatory and voluntary impact category indicators

Results per declared unit 1 000 kg cement

Indicator	Unit	A1-A3	Optional paper packaging	Optional plastic packaging
GWP-GHG ³	kg CO ₂ eq.	7.96E+02	1.29E+01	1.84E+01
PM	disease inc.	7.03E-05	1.15E-06	1.27E-06
IRP*	kBq U-235 eq	5.11E+00	7.57E-01	9.12E-01
ETP-fw** / ***	CTUe	5.14E+03	2.49E+02	2.36E+02
HTP-c** / ***	CTUh	1.27E-07	7.36E-09	8.01E-09
HTP-nc** / ***	CTUh	5.14E-06	1.84E-07	2.13E-07
SQP** / ***	Pt	5.63E+02	5.00E+02	1.76E+02
Acronyms	PM = Particulate matter, IRP = Ionising radiation, ETP-fw = Ecotoxicity, freshwater, HTP-c = Human toxicity, cancer, HTP-nc = Human toxicity, non-cancer, SQP = Land use			

* *Disclaimer: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator*

** *Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator*

*** *Disclaimer: The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, non-cancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.*

³ This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO₂ is set to zero.

Resource use indicators

Results per declared unit 1 000 kg cement

Indicator	Unit	A1-A3	Optional paper packaging	Optional plastic packaging
PERE	MJ	8.85E+01	6.29E+01	1.11E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.85E+01	6.29E+01	1.11E+01
PENRE	MJ	3.70E+03	2.05E+02	3.88E+02
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.70E+03	2.05E+02	3.88E+02
SM	kg	6.50E+01	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00
FW	m ³	1.37E-01	4.81E-02	1.43E-01
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water			

Waste indicators

Results per declared unit 1 000 kg cement

Indicator	Unit	A1-A3	Optional paper packaging	Optional plastic packaging
Hazardous waste disposed	kg	2.68E-03	5.99E-04	4.86E-04
Non-hazardous waste disposed	kg	3.08E+01	1.15E+01	1.20E+01
Radioactive waste disposed	kg	5.48E-03	1.15E-03	1.28E-03

Output flow indicators

Results per declared unit 1 000 kg cement				
Indicator	Unit	A1-A3	Optional paper packaging	Optional plastic packaging
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00

Additional environmental information

Lam Thach cement was awarded ISO certificate, and several rewards as a product of premium quality in different national fairs.

References

Background report SGS INTRON A132871-R20231358-MVa-F630301 SGS Vietnam Limited, 18 April 2024.

Cement and building lime (EN 16908:2017+A1:2022), product group classification: UN CPC 374 c-PCR to PCR 2019:14 C-PCR-001 (TO PCR 2019:14) version: 2022-05-18.

EN 15804+A2:2019/AC:2021, "Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products".

EN 16908:2017+A1:2022. EN 16908:2017+A1:2022 Cement and building lime - Environmental product declarations - Product category rules complementary to EN 15804.

EPD cement Quang Ninh Construction and Cement Joint Stock Company – Lam Thach II Cement Factory, Report SGS INTRON B.V, version 3.

General Programme Instructions of the International EPD® System. Version 4.0.

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ISO 14040:2006, "Environmental management - Environmental management -- Life cycle assessment - Principles and framework".

ISO 14044+A2:2020, "Environmental management - Life cycle assessment - Requirements and guidelines".

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Spatiotemporal Analysis of Carbon Emissions and Carbon Storage Using National Geography Census Data in Wuhan, China.

EPD owner:



qncc.vn

EPD prepared by:



nl.intron@sgs.com
<https://www.sgs.com/en-vn/our-company/about-sgs/sgs-in-vietnam>

Verification by:



Claudia A. Peña
Pinda.lct@gmail.com

Approved by:



The International
EPD® System
Technical Committee,
supported by the
Secretariat

