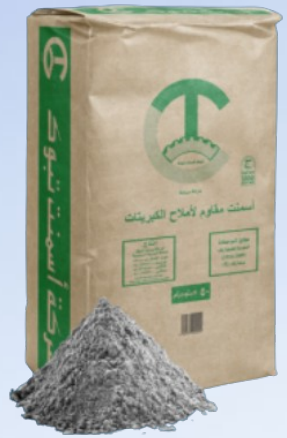
Environmental Product Declaration

Sulphate Resisting Cement



Manufactured by **Tabuk Cement Company** *in accordance with ISO 14025 and EN 15804:2012+A2:2019/AC:2021*

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ECO PLATFORM EPD VERIFIED

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.

Programme Information

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

Product Category Rules (PCR):

PCR 2019:14 Construction products, version 1.3.3, Construction EN 15804:2012+A2:2019/AC:2021 Sustainability of Construction Works and c-PCR-003 Concrete and concrete elements (EN 16757) (2023-01-02).

Division 375 “Articles of concrete, cemet and plaster”

- Class 3756, Other articles of cement, concrete or artificial stone

PCR review was conducted by: The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile

EPDs within the same product category but registered in different EPD programmes 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

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: Vijay Thakur, Intertek Assuris

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes x No

Tabuk Cement Company has the sole ownership, liability, and responsibility for this EPD.

The International EPD® System

EPD International AB
Box 210 60 SE-100 31
Stockholm, Sweden
www.environdec.com

How to Read This EPD?

An Environmental Product Declaration (EPD) is an ISO Type III Environmental Declaration based on ISO 14025 standard. An EPD transparently reports the environmental performance of products or services from a lifecycle perspective. The preparation of an EPD includes different stages, from acquiring raw materials to the end of life of the final product/service. EPDs are based on international standards and consider the entire value chain. Additionally, EPD is a third-party verified document. This EPD includes several sections described below.

1. General and Program Information

The first part of an EPD has information about the name of the manufacturer and product/service and other general information such as the validity and expiration dates of the document, the name of the program operator, geographical scope, etc. The second page states the standards followed and gives information about the program operator, third-party verifier, etc. The followed Product Category Rule (PCR) is indicated on the second page.

2. Company and Product/Service Information

Information about the company and the investigated product is given in this section. It summarizes the characteristics of the product provided by the manufacturer. It also includes information about the product such as product composition and packaging.

3. LCA Information

LCA information is one of the most important parts of the EPD as it describes the functional/declared unit, time representativeness of the study, database(s) and LCA software, along with system boundaries.

The table presented in this part has columns for each stage in the life cycle. The considered stages are marked 'X' whereas the ones that are not considered are labeled as 'NR'. Not all EPDs consider the full life cycle assessment for a product's entire life stages. The 'System Boundary' page is also the place where one can find detailed information about the stages and the assumptions made.

4. LCA Results

The results of the Life Cycle Assessment analysis are presented in table format. The first column in each table indicates the name of the impact category and their measurement units are presented in the second column. These tables show an amount at each life cycle stage to see the impact of different indicators on different stages. Each impact can be understood as what is released through the production of the declared unit of the material—in this case, 1 tonnes of Sulphate Resisting Cement. The benefits of reuse/recycling of the declared product is reflected in this section.

The first impact in the table is global warming potential (GWP), which shows how much CO_2 is released at each stage. Other impacts include eutrophication potential, acidification potential, ozone layer depletion, land use related impacts, etc. The second table provides results for resource use and the third table is about the waste produced during the production. The fourth and final table shows the results for the GWP-GHG indicator, which is almost equivalent to the GWP-Total indicator mentioned previously. The only difference is that this indicator excludes the biogenic carbon content by following a certain methodology.

About Tabuk Cement Company

Tabuk Cement Company was established in accordance with the decision of his excellency the minister of electricity No. 514 of 03/12/1404 AH and amended resolution No. 227 on 10/02/1415 AH, Licensing the establishment of industrial facility in the name of Saudi joint stock company Cement Tabuk and the decision of his excellency the minister of commerce to license the establishment of the company issued with No. 247 on 14/02/1415 AH corresponding to 20/07/1994, By which the establishment of Tabuk cement company was announced (Saudi Arabian joint stock company). The company is administered pursuant to what is specified in its status. It is a Saudi Arabian joint stock company accredited to financial market and subject to the specified rules and regulations of the Saudi Arabian '' Trade.''

Tabuk cement Management and plant is located within the borders of Neom district and 27 km north of Duba Governorate and 220 km from Tabuk city. The construction of the plant began on 29/12/1994 and the opening and commencement of production began on Thursday 25/01/1419AH. Corresponding to 21/05/1998 and Commercial sales of cement began on 01/10/1998 with the honor His Royal highness Price Sultan bin Abdulaziz the Second aviation and Inspector General and His Royal Highness Prince Fahad bin Sultan bin Abdulaziz, Emir of Tabuk District, Honorary President of Tabuk Cement.

Company vision

To lead the local and regional cement industry through being the idol of quality and efficiency, committing to be the perfect choice for our client employees, shareholders, and investors

Company Mission

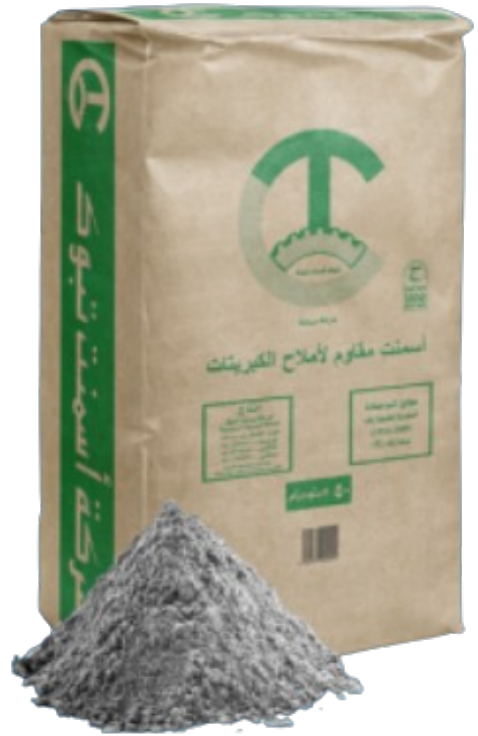
To support the local and regional market with cement products in accordance with international standards and reinforce sustainable development by encouraging construction work on the buildings.

About The Product

Sulphate Resistant Cement (SRC)

The product investigated in this EPD is Tabuk Cement Company's sulphate resistant cement manufactured at company's production facility in Tabuk, Kingdom of Saudi Arabia. Sulphate Resistant Cement is a type of cement differs from other types due to its low content of tri-calcium aluminate which responsible for the interaction with sulphates in the soil or water, which prevents the expansion of concrete and occurrence of cracks in areas where soil contains a high percentage of sulphates.

Description	Units	Technical spec
Finess (Amount retained when wet-screened on a 45 mic (Mesh no.325) sieve %	%	4.418
Air content of slag mortar max	%	N.A
Sulphide sulphur (S)	%	2.065
Total Alkalis (Na_2O+0.658 K_2O)	%	0.935
Slag Activity Index	Grade	N.A
Cement Blaine	m^2/kg	3545
Initial setting not less than	minutes	134
Final setting not more than	minutes	234
Autoclave Expansion max	%	0.08
Compressive strengh		
3 Days not less than	mpa	22
7 Days not less than	mpa	27
28 Days not less than	mpa	37



About The Product

Standards

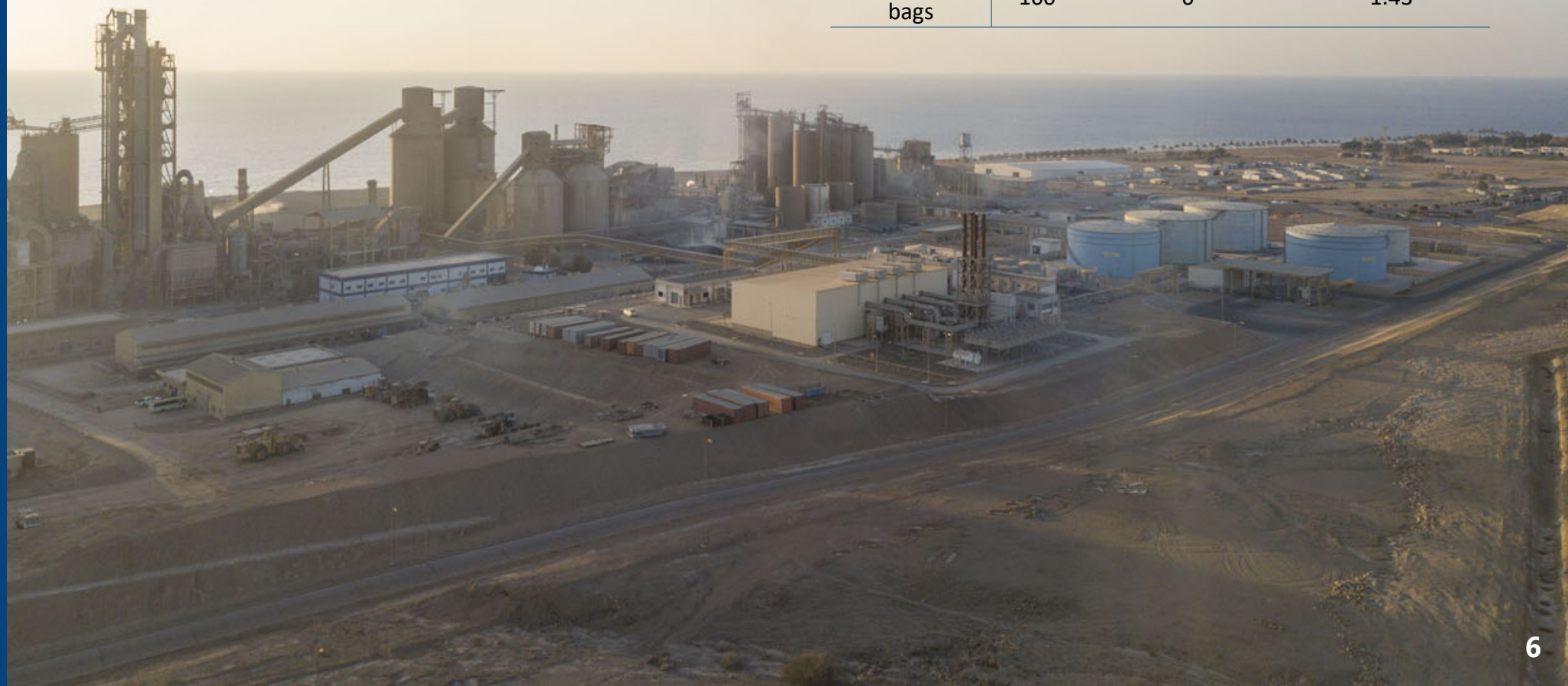
- Conforming to Saudi Gulf Standard: SASO/GSO 1914:2009, Type -V
- Conforming to American Standard: ASTM C150
- Conforming to European Standard: EN197-1:2011 CEM I, SR 5, 42.5R

Application/Usage areas

- Foundations and bases
- Chemical factories
- Infrastructure and basements
- Sewage and water treatment plants
- Block and bricks manufacturing
- Suitable for underground work wherever sulphate are present in soil and ground water

Product Composition	Weight (%)	Post-consumer material weight- %	Biogenic material kg C / kg
Limestone	90.0	0	0
Schist	4.40	0	0
Iron oxide	3.0	0	0
Gypsum	1.9	0	0
Other	<0.1	0	0

Packaging Composition	Weight (%)	Post-consumer material weight- %	Biogenic material kg C/ declared unit
50 kg cement bags	100	0	1.43



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System Boundaries

A1 - Raw Material Supply

This stage includes raw materials extraction and pre-treatment processes before production. Main materials used in the production of ordinary portland cement is limestone, schist, iron oxide, sand, and gypsum. In addition, pre-use impacts of fuels, such as heavy fuel oil and diesel are included at this stage.

A2 - Raw Material Transport

This stage includes transportation related impacts of needed materials for the production of OPC. Highway transportation are heavily involved at this stage. Transport routes and distances are supplier-specific and provided by the manufacturer.

A3 - Manufacturing

This stage includes production-related environmental impacts of the investigated product. Production starts with raw material crushing where most of the cement raw materials are crushed into small sizes through crushing mills. After crushing, during the pre-homogenization stage, homogenizing of cement raw materials and fuel occur through some applications. In the next step, materials are further grounded by raw mills to create the desired fineness and appropiate chemical composition. At the next step, clinker is produced at kilns. After calcination, additional materials such as gypsum are added to the clinker to meet the requirements of different properties. Then, the product is packed and becomes ready for selling. All energy-related inputs during these processes are supplied by the manufacturer.

A4 - Final product shipment

This stage is relevant for the delivery of final product (OPC) to the intended markets and customers. Highway and seaway transportation are involved in this stage. The transport routes and distances are supplier-specific and provided by the manufacturer.

A5 - Installation

This stage includes end-of-life impact of packaging material used in the product.

LCA Information

Declared Unit
1000 kg of Ordinary Portland Cement produced by Tabuk Cement Company.

System Boundary
Cradle to gate with optional modules (A4 & A5). End-of-life and benefit modules are omitted following the conditions described in section 2.2.2 of the relevant PCR.

Cut-Off Rules
1% cut-off is applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

REACH Regulation
No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

Background Data / Specific Data
For LCA modelling and calculation, ecoinvent database (v3.9.1) and SimaPro (v9.5) LCA software were used. Characterization factors of EN 15804 reference package based on EF 3.1 are utilized. Impact of infrastructure and capital goods are excluded from the analysis.

Biogenic Carbon Content
The product does not contain biogenic carbon.

Period Under Review
The data used for LCA study concerns the period between January to December of 2022.

Allocations
Energy consumptions were weighted according to the production figures in relavent period. In addition, hazardous and non-hazardous waste amounts were also allocated from the total waste generation in the considered time interval.

Energy source and emission level for electricity
The electricity source used for modelling at manufacturing (A3) stage is taken from Ecoinvent 3.9.1 dataset which represents the medium voltage impact for the Kingdom of Saudi Arabia. The used dataset has carbon impact of 1.06 kg CO_2 eq. /kWh with the reference year 2020.

Assumptions
Upstream and downstream road transportation are assumed to be carried out with Euro5 motor vehicles with a size class of > 32 metric tonnes where distances acquired through Google Maps. The packaging content is assumed to be landfilled.

LCA Information

	Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits and Loads
	Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction / Demolition	Transport	Waste Processing	Disposal	Future reuse, recycling or energy recovery potentials
Module	**A1**	**A2**	**A3**	**A4**	**A5**	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared	**X**	**X**	**X**	**X**	**X**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	**GLO**	**GLO**	**SA**	**GLO**	**GLO**	-	-	-	-	-	-	-	-	-	-	-	-
Specific Data Used	*81.7%				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - Products	0%				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - Sites	0%				-	-	-	-	-	-	-	-	-	-	-	-	-

(X = Module included, ND = Not declared)

*Direct emissions (calcination + combustion) during the clinker manufacturing and upstream & downstream transportation are considered as specific data.

LCA RESULTS

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.

Core environmental impact indicators (Mandatory)	Unit	A1-A3	A4	A5
GWP - Fossil	kg CO_2 eq.	1.03E+03	2.33E+01	8.87E-02
GWP - Biogenic	kg CO_2 eq.	-4.33E+00	7.00E-03	5.38E+00
GWP - Luluc	kg CO_2 eq.	5.50E-02	1.15E-02	1.12E-04
GWP - Total	kg CO_2 eq.	1.03E+03	2.33E+01	5.47E+00
ODP	kg CFC-11 eq.	6.35E-06	3.65E-07	1.28E-09
AP	mol H+ eq.	2.78E+00	8.43E-02	8.34E-04
EP - Freshwater	kg P eq.	1.31E-03	1.90E-03	4.82E-06
EP - Marine	kg N eq.	7.62E-01	2.80E-02	7.29E-03
EP - Terrestrial	mol N eq.	8.58E+00	2.97E-01	2.08E-03
POCP	kg NMVOC	2.63E+00	1.20E-01	2.15E-03
***ADPE**	kg Sb eq.	2.88E-04	6.29E-05	2.94E-07
***ADPF**	MJ	5.78E+03	3.39E+02	1.43E+00
***WDP**	m^3 depriv.	3.27E+01	1.73E+00	4.56E-02
Additional environmental impact indicators (Mandatory)				
****GWP-GHG**	kg CO_2 eq.	1.03E+03	2.34E+01	4.28E+00
Additional environmental impact indicators (Optional)				
PM	disease inc.	1.62E-05	2.34E-06	8.81E-09
*****IR**	kBq U-235 eq.	8.27E-01	3.12E-01	2.54E-03
***ETP-FW**	CTUe	2.66E+03	1.83E+02	1.33E+01
***HTP - C**	CTUh	1.68E-07	1.01E-08	6.67E-11
***HTP - NC**	CTUh	5.10E-06	2.47E-07	9.39E-09
***SQP**	Pt	1.43E+03	3.43E+02	2.18E+00
Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.				
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transport, A5: Installation			

Indicators describing resource use (Mandatory)	Unit	A1-A3	A4	A5
PERE	MJ	1.47E+02	4.30E+00	6.48E+01
PERM	MJ	6.48E+01	0.00E+00	-6.48E+01
PERT	MJ	2.12E+02	4.30E+00	8.54E-02
PENRE	MJ	5.78E+03	3.39E+02	1.43E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	5.78E+03	3.39E+02	1.43E+00
SM	kg	0.00E+00	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	2.49E+00	6.93E-02	1.18E-03
Acronyms	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding 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, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water.			

Environmental information describing waste categories (Mandatory)	Unit	A1-A3	A4	A5
HWD	kg	1.75E-02	0.00E+00	0.00E+00
NHWD	kg	5.76E-04	0.00E+00	3.60E+00
RWD	kg	0.00E+00	0.00E+00	0.00E+00

Environmental information describing Output flow (Mandatory)	Unit	A1-A3	A4	A5
CRU	kg	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00
EE (Electric)	MJ	0.00E+00	0.00E+00	0.00E+00
EE (Thermal)	MJ	0.00E+00	0.00E+00	0.00E+00
Acronmys	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy thermal.			
*Disclamer 1	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.			
**Disclamer 2	GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology. The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. The GWP-GHG indicator is identical to GWP-total except that the characterisation factor (CF) for biogenic CO_2 is set to zero.			
***Disclamer 3	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.			

References

ISO 9001:2015/ Quality Management Systems

ISO 50001:2018/ Energy Management Systems

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

ISO 14020:2000/ Environmental Labels and Declarations — General principles

EN 15804:2012+A2:2019/AC:2021 Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products

ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

ISO 14040/44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)

PCR for Construction Products and Construction Services/ Prepared by IVL Swedish Environmental Research Institute, Swedish environmental Protection Agency, SP Trä, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limträ AB, SSAB, The International EPD System, 2019:14 Version 1.3.3.

The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

Ecoinvent / Ecoinvent Centre, www.ecoinvent.org

SimaPro/ SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

www.tcc-sa.com/en/

Contact Information

Programme & Programme operator	The International EPD® System www.environdec.com EPD® THE INTERNATIONAL EPD® SYSTEM	EPD International AB Box 210 60 SE-100 31 Stockholm, Sweden www.environdec.com info@environdec.com
Declaration owner	Duba North, PO Box 122 · Tabuk 71911 Saudi Arabia **Tabuk Cement Company**	Contact person: Mohamed Alraghi Phone: 00966562009942 E-mail: malrajhi@tcc-sa.com www.tcc-sa.com/en/
LCA practitioner & EPD Design	metsims Sustainability Consulting 4 Clear Water Place Oxford OX2 7NL, UK 0 800 722 0185 www.metsims.com info@metims.com	SEEDS GROWING SEEDS FOR A GREENER BUILT ENVIRONMENT SEEDS Company Fahad Al Salem Street Al Watiya Tower, Floor 8, Offie 4. Qibla, Kuwait City / Kuwait Tel: +96556676499 www.seedsco.co info@seedsco.co