شركة الصناعات الوطنية
NATIONAL INDUSTRIES COMPANY

Environmental Product Declaration

AAC White Block

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/ AC:2021, manufactured by National Industries Company.

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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

UN CPC Code: 3755
"Prefabricated structural components for building or civil engineering, 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 declarations; and be valid at the time of comparison.

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: Kripanshi Gupta, Intertek Assuris

Approved by: The International EPD® System

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

Yes [x] No

LCA practitioners

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National Industries Company has the sole ownership, liability, and responsibility for this EPD.

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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 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 m^3 (480 kg) AAC White Block. 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 National Industries Company

National Industries Company (NIC) is the leading and one of the most prestigious companies specialized in the manufacture and marketing of building materials and infrastructure products in the State of Kuwait. The company was established in 1960 and is a subsidiary of National Industries group (NIG) which has a portfolio of many industrial and financial companies in the Middle East, Europe and North America.

NIC owns 16 factories and two rock quarries. Its work force consist of 1800 employees in various fields of specialization. The Company achieved a tremendous success in keeping abreast with the urbanization and building movement in the local and regional markets by timely expanding its industrial base in pursuant to a product diversification strategy, being the only domestic company that produces such products as Sandlime, Limestone, Large Diameter Concrete Pipes, High Density Poly Ethylene pipes and Ceramics.

Vision

To develop NIC into the largest industrial conglomeration at the local and GCC levels, with a high and advanced technology, a high overall quality, supported by a local technical experience and excellent skills, offering diversified products and multiple alternatives at competitive prices.

Mission

That the Company becomes a unique model reference in the quality and diversity of its building materials products at the local and regional levels; that it maintains its pioneering spirit and genuine determination to excel, to anticipate its customers ambitions across all its services, satisfy its shareholders and contribute to the welfare and development of its society.

About AAC White Block

Products of White Blocks have become the ideal choice for construction in Kuwait and the neighboring countries since it has started production in 1983. The properties of this product may be characterized in its high insulation quality, easiness and speed in the construction works and cost effectiveness. The product is subjected to regularly tested standards such as DIN 4102, DIN 4165, ASTM-C-518.

Light Insulation Blocks features makes it the most suitable choice for construction. Which are as follows:

Thermal Insulation

Insulation plays an important role in minimizing the costs of heating or air conditioning and it can help in extending the life span of the air conditioning system without the need for other insulation materials, knowing that the thermal insulation is inversely proportional to the density; i.e., whenever the density decreases, the thermal insulation increases. However, if the density becomes more than 500 kg/m^3, the effective thermal insulation does not happen as per the standards of the Ministry of Electricity and Water.

Density: 480 kg/m^3	Thermal Insulation: 0.91 Btu/ft^2.hr.f^0

High Endurance

Undoubtedly, light insulation block is considered to be a very strong material which matches most of the required engineering specifications. It undergoes many continuous control tests to ensure it can withstand the utmost pressure forces so that it can be used with both load bearing walls and non-load bearing walls.

Load Bearing: 30 - 40 kg/cm^2

About AAC White Block

The product investigated in this EPD is National Industries Company's AAC white block product produced at company's production location at West Industrial Region in Kuwait. AAC blocks are made of materials such as portland cement, sand, lime, gypsum etc. The product and packaging compositions are shown in table below along with production flow diagram.

*Product Composition	Weight (%)	Post-consumer material weight - %	Biogenic material kg C/declared unit
Sand	32 - 34	0	0
Water	31 - 33	0	0
Lime	17 - 19	0	0
Portland Cement	14 - 16	0	0
Gypsum	0.5 - 1.5	0	0
Powder	<0.1	0	0

*Wet product composition.

Packaging Composition	Weight, kg	Post-consumer material weight - %	Biogenic material, kg C / declared unit
PET straps	0.161	0	0
EUR-Pallet	0.282	0	0.110

System Boundary

A1 - Raw Material

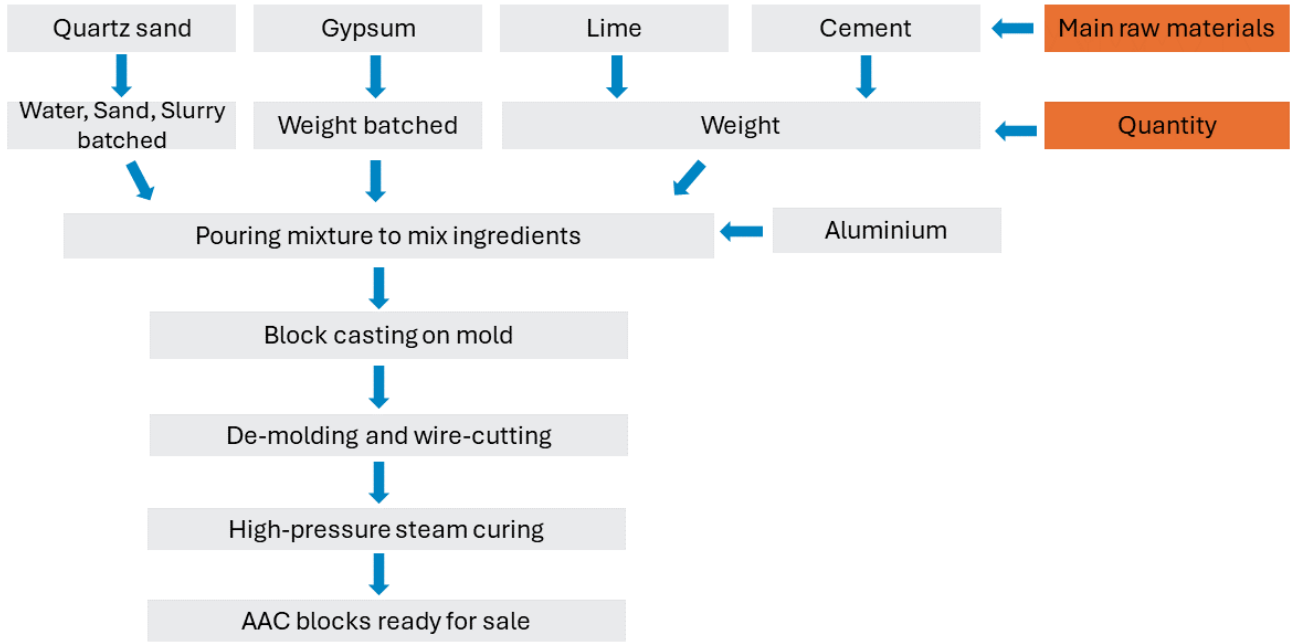
This life cycle module comprises all relevant processes required for the provision of the raw materials and precursors. Main materials used in the product are portland cement, sand, lime, gypsum, etc. Environmental impacts of these materialsare considered in this stage.

A2 - Raw Material Transport

This stage includes all the relevant transport processes of the raw materials and precursors to the production site. Highway transport is the dominant mean of transport at this stage along with sea transportation. Transport routes and distances are supplier-specific and provided by the manufacturer.

A3 - Manufacturing

This life cycle module A3 includes the manufacturing of the declared product at the production site. Including processes are shown in the below production diagram. The following production steps are included: proportioning the raw materials with their quantities, making the slurry mixture and pouring the mixture to mix ingredients with the addition of aluminium powder, casting the mold then de-molding and wire cutting. After wire curing, the product goes high-pressure steam curing. Then, it becomes ready for sale.



System Boundary

A4 - Transport
This stage describes the delivery of final product to the intended markets and customers. Highway transportation is involved at this stage. The transport routes and distances are supplier-specific and provided by the manufacturer.

A5 - Installation
This life cycle module describes the installation of the product in the building. During the installation of AAC white blocks at site, glue mortar is used. According to the manufacturer, there is around 13 kg cement mortar use per 1 m^3 of AAC block application. The impact of mortar use and end-of-life impacts of packaging materials are considered at this stage.

B1 - Use
Due to the CaO content of the cement and lime used in the product, AAC blocks absord CO_2 during their lifetime. Theoretical CO_2 uptake by carbonation process is calculated by considering the CaO content within cement and lime with reference to the Hartmut B. Walther (2018).

C1 - Deconstruction/Demolition
It is assumed that 0.07 MJ energy is needed for the deconstruction/demolition of 1 kg of final product. This is from the JRC technical report called "Model for Life Cycle Assessment (LCA) of buildings" prepared by Dos Santos Gervasio, H. and Dimova, S. in 2018 published by the publication's office of the European Union. According to this assumption, 33.6 MJ, (0.07 MJ * 480 kg) of electricity energy is needed for the deconstruction/ demolition of the product.

C2 - Waste Transport
Due to the lack of information about the transportation of the discarded product to waste processing area, 100 km distance via Euro5 motor is assumed.

C3 - Waste Processsing
This module is considered as zero since this life cycle module does not require any material or energy flows.

C4 - Disposal
Based on the current sector practices in the region, it is assumed that 100% of the AAC white block is landfilled at the end-of-life stage. Thus, this stage is modelled accordingly.

D - Reuse, recovery or recycling potential
Since 100% of the AAC white block is assumed to be landfilled, there is no future benefit or potential attributed to this stage.

LCA Information

Declared Unit
1 m³ autoclaved aerated concrete white block manufactured by National Industries Company.

Conversion factor:
Dry density of 1 m³ of AAC white block considered in this study is 480 kg. Thus a mass conversion factor of 0.002 should be used.

System Boundary
Cradle to gate with options, modules C1–C4, module D and with optional modules (A4, A5 & B1).

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
For all 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.

Period Under Review
The data used for LCA study concerns the year 2023.

Source of Electricity
The electricity data modelled for the production processes is taken from Ecoinvent 3.9.1 dataset that represents medium voltage electricity production in Kuwait. The chosen dataset has GWP-GHG impact of 0.802 kg CO2 eq. / kWh.

Allocations
Energy consumption and raw material transportation were weighted according to 2023 production figures. In addition, hazardous and non-hazardous waste amounts were also allocated from the total waste generation in 2023.

Assumptions
Upstream and downstream road transportation are assumed to be carried out with Euro5 motor vehicles with a size class of 16-32 metric tonnes where distances acquired through Google Maps. In addition, 100 km distance for the waste transport at C2 stage is assumed.

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	X	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	KW	KW	KW	KW	-	-	-	-	-	-	KW	KW	KW	KW	KW
Specific Data Used	*95.4%				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - Products	0%				-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - Sites	0%				-	-	-	-	-	-	-	-	-	-	-	-	-

(X = Module included, ND = Not declared, GLO = Global, KW = Kuwait)

*Transportation and manufacturing-related activities are considered as specific data according to PCR 2019:14 v.1.3.3. In addition, impact of cement use is also considered as specific data since a valid EPD published under IES has been used for environmental impacts of cement.

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. The results of this EPD should not be used without the consideration of Module C.

Core environmental impact indicators (Mandatory)	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
GWP - Fossil	kg CO_2 eq.	1.90E+02	9.23E+00	3.19E+00	-6.66E+01	7.48E+00	9.23E+00	0.00E+00	4.58E+00	0.00E+00
GWP - Biogenic	kg CO_2 eq.	-3.90E-01	2.64E-03	4.80E-01	0.00E+00	1.08E-03	2.64E-03	0.00E+00	2.50E-03	0.00E+00
GWP - Luluc	kg CO_2 eq.	3.52E-02	4.75E-03	1.56E-03	0.00E+00	4.41E-04	4.75E-03	0.00E+00	3.26E-03	0.00E+00
GWP - Total	kg CO_2 eq.	1.90E+02	9.24E+00	3.67E+00	-6.66E+01	7.48E+00	9.24E+00	0.00E+00	4.59E+00	0.00E+00
ODP	kg CFC-11 eq.	1.11E-05	1.38E-07	1.42E-08	0.00E+00	1.54E-07	1.38E-07	0.00E+00	1.42E-07	0.00E+00
AP	mol H+ eq.	8.94E-01	3.27E-02	1.20E-02	0.00E+00	3.61E-02	3.27E-02	0.00E+00	3.16E-02	0.00E+00
EP - Freshwater	kg P eq.	1.20E-02	8.72E-05	5.57E-05	0.00E+00	1.27E-05	8.72E-05	0.00E+00	1.01E-04	0.00E+00
EP - Marine	kg N eq.	1.27E-01	1.06E-02	3.11E-03	0.00E+00	5.75E-03	1.06E-02	0.00E+00	1.07E-02	0.00E+00
EP - Terrestrial	mol N eq.	1.39E+00	1.14E-01	3.45E-02	0.00E+00	6.19E-02	1.14E-01	0.00E+00	1.15E-01	0.00E+00
POCP	kg NMVOC	4.40E-01	4.39E-02	9.89E-03	0.00E+00	2.60E-02	4.39E-02	0.00E+00	4.39E-02	0.00E+00
*ADPE	kg Sb eq.	1.13E-04	2.95E-05	7.61E-06	0.00E+00	8.48E-06	2.95E-05	0.00E+00	7.60E-06	0.00E+00
*ADPF	MJ	1.55E+03	1.30E+02	2.00E+01	0.00E+00	1.03E+02	1.30E+02	0.00E+00	1.26E+02	0.00E+00
*WDP	m^3 depriv.	2.81E+01	5.75E-01	6.91E-01	0.00E+00	3.89E-01	5.75E-01	0.00E+00	5.99E+00	0.00E+00
Additional environmental impact indicators (Mandatory)										
**GWP-GHG	kg CO_2 eq.	1.89E+02	9.25E+00	3.26E+00	-6.66E+01	7.49E+00	9.25E+00	0.00E+00	4.60E+00	0.00E+00
Additional environmental impact indicators (Optional)										
PM	disease inc.	8.65E-06	7.31E-07	1.34E-07	0.00E+00	2.75E-07	7.31E-07	0.00E+00	6.11E-07	0.00E+00
***IR	kBq U-235 eq.	3.19E+00	4.59E-02	2.59E-02	0.00E+00	7.17E-03	4.59E-02	0.00E+00	3.48E-02	0.00E+00
ETP-FW	CTUe	1.82E+03	7.24E+01	8.99E+00	0.00E+00	2.57E+01	7.24E+01	0.00E+00	8.53E+01	0.00E+00
*HTP - C	CTUh	2.38E-07	4.17E-09	1.02E-09	0.00E+00	1.79E-09	4.17E-09	0.00E+00	1.19E-07	0.00E+00
*HTP - NC	CTUh	8.23E-07	9.32E-08	2.33E-08	0.00E+00	2.24E-08	9.32E-08	0.00E+00	4.15E-06	0.00E+00
*SQP	Pt	5.20E+02	7.74E+01	2.64E+01	0.00E+00	3.91E+00	7.74E+01	0.00E+00	4.56E+02	0.00E+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, B1: Use, C1: Demolition, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Future reuse, recycling or energy recovery potentials,

Indicators describing resource use (Mandatory)	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
PERE	MJ	1.37E+01	1.65E+00	6.77E+00	0.00E+00	1.74E-01	1.65E+00	0.00E+00	1.26E+00	0.00E+00
PERM	MJ	3.78E+00	0.00E+00	-3.78E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.75E+01	1.65E+00	2.99E+00	0.00E+00	1.74E-01	1.65E+00	0.00E+00	1.26E+00	0.00E+00
PENRE	MJ	6.11E+02	1.30E+02	4.30E+01	0.00E+00	7.51E+01	1.30E+02	0.00E+00	1.26E+02	0.00E+00
PENRM	MJ	2.30E+01	0.00E+00	-2.30E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	6.34E+02	1.30E+02	2.00E+01	0.00E+00	7.51E+01	1.30E+02	0.00E+00	1.26E+02	0.00E+00
SM	kg	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.84E+00	2.21E-02	4.95E-02	0.00E+00	1.36E-02	2.21E-02	0.00E+00	1.44E-01	0.00E+00
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									
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	4.96E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E+02	0.00E+00
RWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Environmental information describing output flow (Mandatory)	Unit									
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE (Electric)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE (Thermal)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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 CO2 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

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