

ASISTAL
Aluminium Profiles Company

Environmental Product Declaration

IN ACCORDANCE WITH ISO 14025 FOR : ALUMINIUM BILLET

FROM: ASISTAL ALUMINIUM

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
Licensee:	EPD Türkiye
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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.
EPD of multiple products, based on the average results of the product group In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019

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Programme Information

PROGRAMME

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PRODUCT CATEGORY RULES

CEN Standard EN 15804:2012+A2:2019, Product Category Rules (PCR):

PCR 2019:14, version 1.3.4,

UN CPC code: 4153 Semi-finished products of copper, nickel, aluminium, lead, zinc and tin or their alloys

PCR REVIEW

PCR review was conducted by: The Technical Committee of the International EPD System.

See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

EPDs within the same product category but from different 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.

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.

INDEPENDENT THIRD-PARTY VERIFICATION

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

EPD process certification EPD verification Pre-verified tool

Verifier Name: Anni Oviir

Organization: LCA Support

Approved by: The International EPD® System

The procedure for follow-up during EPD validity, as defined in the GPI, involves third-party verifier:

Yes No

Product Information

About The Company

As a global manufacturer, Asistal adds value to people's lives in 40 countries, including the Balkans, Europe, the Middle East, and Central America. We have been serving the aluminum industry since 1994.

Our production facilities span an outdoor area of 52,000 m², with a total indoor area of 32,000 m². Equipped with modern facilities that are consistently updated, our production facilities include the Foundry, Molding Room, Extrusion Press Line, Anodizing Line, Horizontal and Vertical Electrostatic Powder Coating Line, Wood Transfer Line, Assembly Line with Thermal Barrier, Mechanical Process Line, Quality Control and Material Testing Department, and Packaging and Shipping Department.

We serve our customers through branches located in the Marmara, Aegean, and Central Anatolia Regions of Türkiye, as well as in America and Bulgaria internationally. As one of the world's leading companies in the aluminum products and services sector, Asistal aims to contribute to building a better tomorrow.

Focus On High Quality: We recognize our responsibility for overall quality and consistently acknowledge knowledge and success. By providing an efficient, sustainable, safe, and healthy working environment, we prioritize the effective utilization of both internal and external resources.

Focus On Customer: We understand the importance of collaborative success. To achieve this, we offer the most suitable products and services to meet our customers' needs by facilitating communication, thereby supporting the advancement of our business partners.

Focus On Continuous Development: We continuously enhance our facilities through investments and aspire to improve every aspect of our operations daily.

Owner of The EPD

Asistal Aluminium Profiles Company (Aluminium Business)

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LCA Developed By

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Product Information

Product Description

At our aluminum billet casting facility, we utilize state-of-the-art Wagstaff casting lines to produce billets with diameters of 5, 6, 7, 8, and 9 inches. We manufacture standard 6XXX series alloys with optimized parameters to ensure homogeneity and appropriate grain size. Additionally, we cater to the automotive, defense, and aerospace industries with specialized alloys.

Production involves a blend of pure aluminum ingots, recycled scrap, and alloying elements (such as Mg, Si, Ti, Cu, etc.) in specific proportions.

Geographical Scope

The geographical coverage for aluminium billet production is global scale. Primary data have been obtained from the production of aluminium billet in 3 production plants located in Tekirdağ, Türkiye plant of Asistal Aluminium, whereas for secondary data EU and global datasets were used if there are no available Turkish datasets.

UN CPC Code

4153 - Semi-finished products of aluminium or aluminium alloys

Product Application

Aluminum billets, which are essentially semi-finished cylindrical metal bars with a circular cross-section, are widely used across various industries due to the versatile and beneficial properties of aluminum. These billets are a key raw material in the manufacturing of aluminum profiles.



Product Information

LCA Information

Time Representativeness: Data Refer to the Year 2023

Data Base Used: Ecoinvent Database 3.10

LCA Software Used: Simapro 9.6.0.1

Asistal Aluminium Profiles Company (Aluminium Business)

Data Quality

Data collection and quality requirements were conducted in accordance with ISO 14044. Precision, completeness, consistency, and representativeness are important criteria used to assess data quality (geographical, time, technology).

All primary data collected from Asistal Aluminium's facility is an average value for the year 2023 as a measure of data quality. These data were used to create primary datasets in SimaPro. The Ecoinvent version 3.10 database provided secondary data related to life cycle stages. Care was taken to ensure that the Ecoinvent data that has been used is the latest version of the dataset. Utility consumption data, such as energy and water, were obtained through invoices and measuring devices, while waste information was sourced from the waste declaration form. Transportation distances and methods for each input material were determined using purchase invoices and Google Maps. Electricity data were based on Ecoinvent's (version 3.10) dataset for Turkey's electricity production, which has a global warming potential (GWP) of 0.63291 kg CO₂e/kWh for the process. For natural gas, a global dataset was utilized.

LCA Modelling Calculation

The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. According to the PCR, all energy calculations were obtained. There are no co-product allocations within the LCA study underlying this EPD

Methodology

The EN 15804:2012+A2:2019 reference package is based on EF 3.1. Allocation, cut-off, EN15804 system model used.

Declared Unit

The Declared Unit (DU) is 1 kg of Aluminium Billet

Description of the System Boundries

Cradle to gate with options, modules C 1-C4, module D. (A1-A5, C1-C4+D).

Inventory

The inventory for the LCA study is based on the 2023 production figures for aluminium products by Asistal Aluminium production plant in Kirklareli, Turkey. This EPD's system boundary is cradle to gate with options, modules C 1-C4, module D. (A1-A5, C1-C4+D).

Allocations

Different product group models were assigned based on production data, transportation, energy, and any materials utilized in the facility for raw material preparation. When allocating resources, the method chosen is determined by the nature and purpose of the process that requires it.

There is no product allocation in this study.

Cut-off Criteria

Mass: If a flow is less than 1% of the total mass of the model, it can be eliminated if its environmental relevance is not an issue. Then masses that are higher than 1% of the total mass flow are considered as a part of the modeling system and simulated in the model to calculate elementary flows

Energy: All energy flows are considered in the analysis of the LCA model without any cut-off criteria.

Assumptions

Raw materials, transport, production and packaging materials data are collected from the production plant.

REACH and RoHS

Asistal Alüminyum products have REACH, RoHS registration. The products do not contain any REACH and RoHS SVHC substances in amounts greater than 0.1% (1000 ppm).

Product Information

Properties of Aluminium

Physical properties of aluminum in solid state	
Property	Value
State of matter	Solid
Density	2.70 g/cm ³
Density in liquid state	2.375 g/cm ³
Melting point	933.47 K & 660.32 °C
Boiling point	2792 K & 2519 °C
Heat of fusion	10.71 kJ/mol
Heat of evaporation	294 kJ/mol

Other properties of aluminum in solid state	
Property	Value
Electric resistance	26.50 nΩ·m (20°C'de)
Thermal conductance	237 W/(m·K)
Thermal expansion	23.1 μm/(m·K) (25°C'de)
Velocity of sound	5000 m/s (20°C'de)
Mosh hardness	2.75
Velocity of sound	167 MPa
Brinnel hardness	245 MPa

Manufacturing Process



Product Information

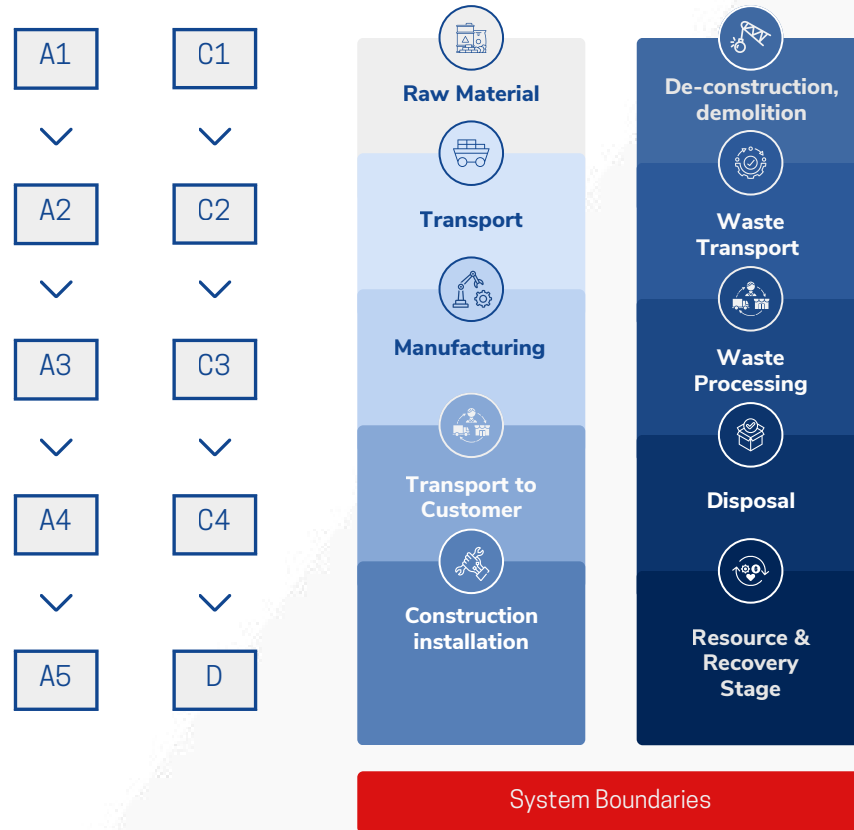
Table 1: Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results)

	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 energy use	De-construction& demolition	Transport	Waste processing	Disposal	Recycling potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Module declared	x	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	TR	TR	TR	GLO	GLO	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data use	>70%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Product Information

The LCA model is studied with the approach of cradle-to-gate with options modules C1-C4, module D (A1-A5 + C1-C4 + D). In the table below, all included and excluded components of the LCA approach of cradle-to-gate can be followed.

System boundaries of primary aluminium production



Included	Excluded
Production of the materials of the product groups (raw materials, additives, and other materials)	Human labor
Transportation of production materials and products from the factory/ to the factory	General consumption of the office items (electronic devices, etc.)
Manufacturing (energy, water, and packaging) in the plant	Construction of capital equipment
Production of used energy, processed water, and packaging	
End-of-life	

Product Information

A1- Raw Material Supply

This module examines the extraction and processing of raw materials, as well as the energy used throughout their manufacturing process

A2- Transport

This module considers the transportation of raw materials to the factory.

A3- Manufacturing

This stage encompasses energy and water usage during the manufacturing process. It also addresses packaging materials and the handling of any waste generated at this stage. The subsequent production processes are as follows:

Casting, Packaging.

A4- Transport to Customer

This stage considers the transportation of aluminium products to the customers.

A4 Scenario Information	Unit
Type of fuel and consumption of the vehicle or the category of vehicle utilized for transportation	Euro6 gross vehicle weight 16-32 metric ton lorry
Distance	Weighted average distance of 71 km of lorry

A5 - Construction Installation

This stage covers the end-of-life impact of the packaging materials included in the analysis, with the assumption that the packaging waste is sent to a landfill.

C1 - De-construction, demolition processes

Most applications assume deconstruction to be a manual process. However, when machinery is used, profiles are often part of a larger structure being demolished. In such cases, the impacts associated with profiles are negligible. Therefore, no inputs were modeled at this stage.

C2 - Transport from collection point to waste processing and disposal site:

In this phase, discarded goods are transported to waste processing or disposal facilities, with trucks assumed to cover a distance of 100 km.

C3 - Shredding and sorting fractions for recycling:

This module provides a comprehensive analysis of the impacts associated with the sorting and preparation processes required for melting.

C4 - Landfill of materials fractions not entering the recycling treatment:

For the aluminum billet product, a 100% recycling approach has been implemented. As semi-finished products, aluminum billets are fully recycled and seamlessly reintegrated into the production process.

D- Resource & Recovery Stage

Based on from the European Aluminium Association ("EAA"), 100% of the aluminium wastes is recycled. Aluminium billets are used as raw material for profile production.

Table 2: End of life scenario table

Material exiting the system boundary	Process at the system boundary	Material/energy recovered /substituted	Related quantity
Aluminium Billet	Recycling	Aluminium	1 kg

Content Declaration

Table 3: Content Declaration of Aluminium Billet

Material	Type	Quantity(%)
Aluminium	Primary	48-52
Aluminium	Scraps from recycling	46.5-50.5
Alloying elements	Primary	min 1.01 & max 1.33

The post-consumer portion of the aluminum scrap used is less than 5%.

Asistal Alüminyum produces and supplies aluminum billets in various sizes and thicknesses, as detailed in the product catalog available on its website. For this assessment, calculations are based on a 1 kg aluminum billet, using average data from Asistal Alüminyum's production processes to accurately reflect the typical environmental impact of the product.

Average production data has been used to calculate the impacts for profiles of various sizes and shapes. The scenarios analyzed in this study are currently implemented and represent one of the most probable alternatives.

Table 4: Content Declaration of Packaging Material of Aluminium Billet

Packaging material	Weight (kg/Mt)	Weight(%)	Biogenic carbon, weight (kg)
Wood packaging	0.0023	92.0	0.00115
Metal packaging	0.0002	8.0	-

1 kg biogenic carbon is equivalent to 44/12 kg of CO₂.

Environmental Performance

Table 5: Environmental Impact Results for 1 kg of Aluminium Billet

Impact Category	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-Fossil	kg CO2 eq	6.50E+00	1.36E-02	5.60E-05	0.00E+00	1.92E-02	1.03E+00	3.08E-02	-2.95E+00
GWP-Biogenic	kg CO2 eq	1.96E-02	2.15E-06	2.20E-08	0.00E+00	3.03E-06	5.96E-03	8.18E-05	-9.35E-03
GWP-Luluc	kg CO2 eq	1.21E-01	5.53E-06	1.49E-07	0.00E+00	7.78E-06	8.73E-04	3.83E-05	-5.86E-02
GWP-Total	kg CO2 eq	6.64E+00	1.36E-02	5.62E-05	0.00E+00	1.92E-02	1.03E+00	3.09E-02	-3.02E+00
OPD	kg CFC -11 eq	5.98E-08	2.02E-10	7.51E-13	0.00E+00	2.84E-10	1.43E-08	5.62E-10	-2.43E-08
AP	mol H+ eq	4.82E-02	3.12E-05	2.91E-07	0.00E+00	4.39E-05	1.05E-02	1.78E-04	-2.28E-02
*EP-Freshwater	kg P eq	2.09E-04	1.26E-07	1.29E-09	0.00E+00	1.78E-07	5.13E-05	5.40E-07	-8.91E-05
EP-Marine	kg N eq	5.97E-03	9.52E-08	0.00E+00	9.91E-06	9.75E-04	7.47E-05	-5.02E-03	0.00E+00
EP-Terrestrial	mol N eq	6.68E-02	7.82E-05	1.04E-06	0.00E+00	1.10E-04	1.22E-02	6.71E-04	-3.09E-02
POCP	kg NMVOC	2.43E-02	4.37E-05	3.37E-07	0.00E+00	6.15E-05	3.87E-03	2.11E-04	-1.12E-02
ADPE	kg Sb eq	1.91E-05	4.44E-08	1.45E-10	0.00E+00	6.26E-08	1.03E-04	7.97E-08	-4.26E-06
ADPF	MJ	6.56E+01	1.91E-01	7.78E-04	0.00E+00	2.69E-01	1.06E+01	5.21E-01	-2.89E+01
WDP	m3 depriv	1.66E+00	8.71E-04	5.73E-06	0.00E+00	1.23E-03	5.69E-01	-1.99E-01	-7.02E-01
PM	disease Inc.	7.48E-07	1.01E-09	4.93E-12	0.00E+00	1.42E-09	6.74E-08	3.22E-09	-3.66E-07
IR	kBq U-235 eq	2.40E-01	6.23E-05	1.24E-06	0.00E+00	8.78E-05	2.61E-02	4.37E-04	-1.17E-01
ETP-FW	CTUe	2.58E+01	5.13E-02	3.38E-04	0.00E+00	7.23E-02	1.43E+01	2.13E+02	-1.08E+01
HTTP-C	CTUh	3.44E-08	7.15E-11	3.43E-13	0.00E+00	1.01E-10	1.30E-08	1.59E-10	-1.63E-08
HTTP-NC	CTUh	5.58E-08	1.20E-10	4.97E-13	0.00E+00	1.69E-10	8.56E-08	4.81E-09	-2.52E-08
SQP	Pt	9.83E+00	1.16E-01	5.05E-04	0.00E+00	1.63E-01	9.12E+00	7.98E-01	-4.36E+00
Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, OPD: 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: Transportation of Product A5: Construction Installation C1:Demolition and Deconstruction , C2: Waste Transport, C3: Waste Processing, C4:Waste Disposal, D: Resource& Recovery Stage								

Environmental Performance

Table 6: GWP-GHG Results for 1 kg of Aluminium Billet

Impact category	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
**GHG-GWP	kg CO2 eq	6.41E+00	1.27E-02	5.22E-05	0.00E+00	1.78E-02	1.05E+00	2.80E-02	-3.76E+00
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transportation of Product A5: Construction Installation C1:Demolition and Deconstruction , C2: Waste Transport, C3: Waste Processing, C4:Waste Disposal, D: Resource& Recovery Stage								
<p>Disclosure: Results from modules A1-A3 should not be used alone. Consider module C results for a complete and reliable interpretation.</p> <p>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. A review has been conducted to assess the impact of the identified issues in ecoinvent database version 3.10 on this project. The evaluation confirms that these issues do not affect the results of this EPD. All data and calculations remain accurate and reliable.</p>									

Table 7: Use of Resources

Impact category	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	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
PERM	MJ	3.08E-02	0.00E+00	-3.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	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
PENRE	MJ	6.39E+01	1.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.70E-01	-5.16E+01
PENRM	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
PENRT	MJ	6.39E+01	1.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.70E-01	-5.16E+01
SM	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
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
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
FW	m3	1.61E+00	6.25E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-02	-1.35E+00
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 nonrenewable 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								
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transportation of Product A5: Construction Installation C1:Demolition and Deconstruction , C2: Waste Transport, C3: Waste Processing, C4:Waste Disposal, D: Resource& Recovery Stage								

Environmental Performance

Table 8: Waste Output & Flows

Impact category	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	3.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	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
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
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
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+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
EE (Electrical)	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
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
Acronyms	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								
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transportation of Product A5: Construction Installation C1: Demolition and Deconstruction, C2: Waste Transport, C3: Waste Processing, C4: Waste Disposal, D: Resource & Recovery Stage								
*Disclaimer 1	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 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.								
*** Disclaimer 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 14020:2000

Environmental Labels and Declaration- General Principles

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)

EN 15804:2012+A2:2019

Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products

GPI General Programme Instructions of the International EPD system Version 4.0

PCR for Construction Products PCR 2019:14, version 1.3.4

The International EPD System

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

www.environdec.com

Ecoinvent Version 3.10

Ecoinvent Centre

www.ecoinvent.org

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