

## Powder Coated Aluminium Profile

# Environmental Product Declaration

**Programme**

The International EPD® System

**Geographical Scope**

Global

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**Programme Operator**

EPD Turkey

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# General Information

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## Programme Information

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### Information about verification and reference PCR:

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

### Product category rules (PCR)

Product Category Rules (PCR): <PCR 2019:14 Construction products (EN 15804:2012+A2.2019/AC:2021) Version 1.3 and UN CPC code(s) and 41532, Bars, rods and profiles, of aluminium

### PCR review was conducted by

The Technical Committee of the International EPD® System. See [www.environdec.com/TC](http://www.environdec.com/TC) 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](http://www.environdec.com/contact).

Independent verification of the declaration and data, according to ISO 14025:2021:

EPD process verification       EPD verification

**Third party verifier**

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**Approved by**

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

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

Yes       No

**LCA Study & EPD Design Conducted by**

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*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.*





# Product Information

## Product Name

### Powder Coated Aluminium Profile

The production process in the rolled aluminium profile facility begins with the supply of cylindrical aluminium billets. Once these aluminium billets arrive at the facility, they are first weighed, and then they are stacked within the raw material entry unit. Subsequently, these billets undergo a preparation phase tailored to meet customer requirements. Then, the prepared billets are conveyed to the loading machine and subsequently dispatched to the extrusion unit.

The production of aluminium profiles relies on the extrusion process, which consumes electricity, natural gas, and water. Our extrusion lines are utilized to manufacture aluminium profiles for a wide range of industries and applications.

The process starts with the heated billets sourced from the raw material input unit, reaching temperatures between 440-450°C in the billet furnace. The billets, heated in the furnace, are then precisely cut to meet the specific order requirements while being adhered to the mold with controlled pressure. The mold aids in shaping and producing the profile. The profiles emerging from the press are allowed to cool on designated benches, with any profiles exceeding 500°C being cooled using fans.

Once adequately cooled, the profiles undergo stretching in a dedicated machine, followed by flattening and transfer to the saw for precise cutting according to the customer's specified length. Subsequently, the profiles are subjected to hardening within a thermal (artificial aging) oven. Quality checks are performed to verify the hardness of the profiles upon exiting the thermal furnace, after which they are dispatched to the powder coating unit according to customer demand.



Powder coating is another part of the process, involving a dry finishing technique where an electric charge causes dry powder to adhere to the metal's surface. Aluminium profiles are painted in the spray paint booth in the colour specified by the customer. After dyeing, the dyed products are transferred to the oven and dried at the predetermined temperature. The coated metal is baked in a curing oven to achieve a smooth, durable finish. After quality control, the profiles are shipped to the packaging and shipping unit.

Powder coating is known for creating a tough finish that surpasses conventional paint in terms of durability, making it highly resistant to wear and tear, regardless of its application. This coating exhibits exceptional resistance to chipping, fading, scratching, and general wear and tear, making it particularly well-suited for metal parts exposed to sunlight and various environmental factors.

## Intended Use of Product

We produce special or standard aluminium extrusion profiles for many different sectors. The most common applications of our aluminium are automotive, food processing, construction industries. It is used for structural glazing, glass houses, green buildings, structural buildings, partitions, doors, and windows.

# Technical Specifications

## Product-related Certifications: Powder Coated Aluminium Profile Technical Specifications

**UN CPC Code:** 41532, Bars, rods and profiles, of aluminium

Product	Standards	Description
<b>Powder-Coated Aluminium Profile</b>	QUALICOAT	Specifications for a quality label for liquid and powder coatings on aluminium for architectural applications
	TS 545	Preparation of Standard Solutions for Volumetric Analysis
	TS EN 12152	Curtain walling - Air permeability - Performance requirements and classification
	TS EN 12154	Curtain walling - Watertightness - Performance requirements and classification
	TS EN 13116	Curtain walling - Resistance to wind load - Performance requirements
	TS EN 15088	Aluminium and aluminium alloys - Structural products for construction works - Technical conditions for inspection and delivery



# LCA Information

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## Declared Unit

The declared unit is a 1 kg of Powder Coated Aluminium Profile

## Reference Service Life

Not applicable

## Time Representativeness

The production data in this LCA study represents the period of 1st January 2022 and 31st December 2022.

## Database(s) and LCA software used

SimaPro v9.4.0.2 LCA software and Ecoinvent 3.7.0.1

## Description of System Boundaries

### Cradle to gate with modules

C1–C4 and module D (A1–A3 + C + D)

## Cut-off Rules

The cut-off criteria adopted is as stated in “EN 15804:2012+A2:2019”. Life Cycle Inventory data was incorporated for at least 99% of the total inflows to the three life cycle stages have been included, and a 1% cut-off rule was implemented concerning energy, mass, and environmental significance. Where there is insufficient data or data gaps for a unit process, the cut-off criterion stands at 1% of the overall input for a unit process.

## Data Quality and Data Collection

ISO 14044 standard was applied in terms of data collection and quality requirements. Data regarding all input and output flows were provided by Astaş Alüminyum.

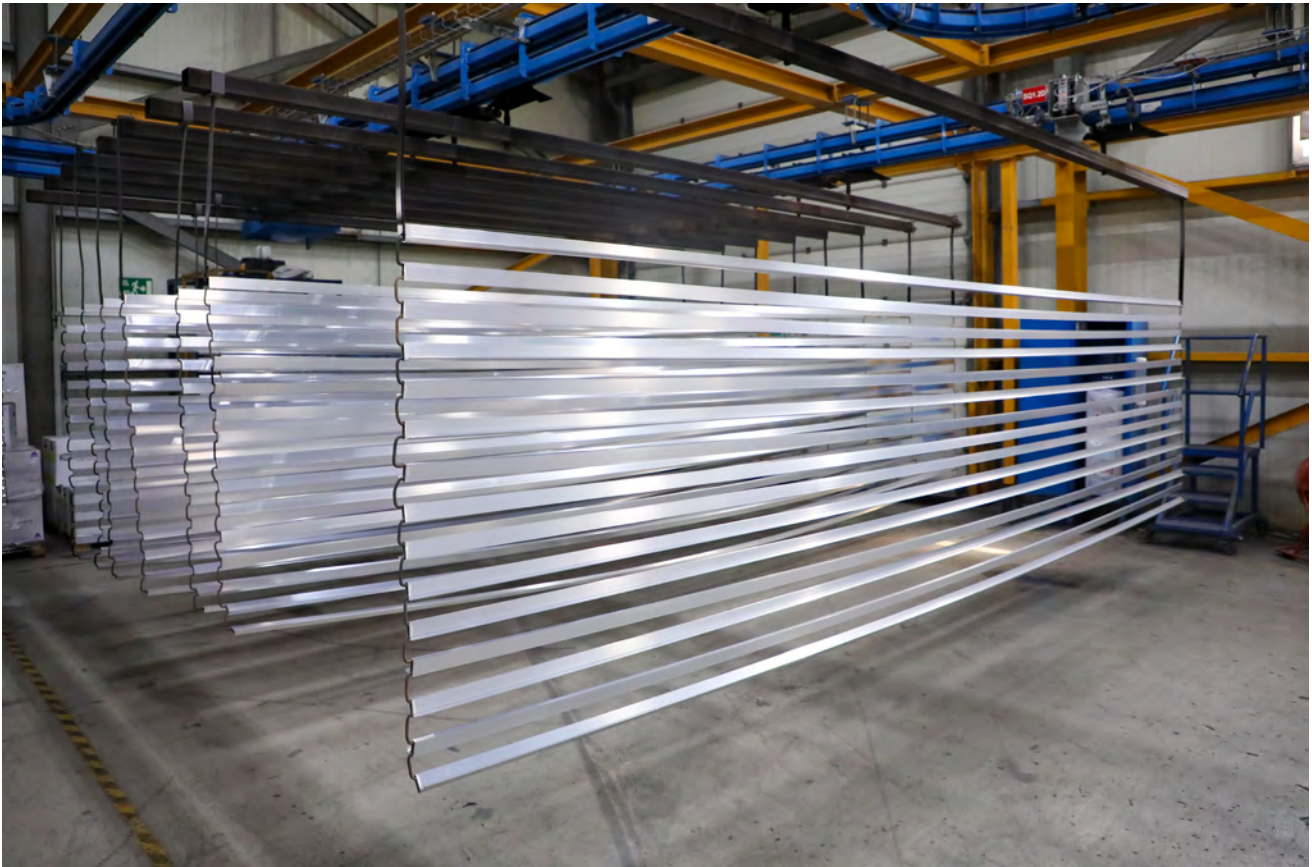
According to EN 15804:2012+A2:2019/AC:2021, specific data for the A3 module (Processes over which the manufacturer has influence) was used and collected from the production facility. Specific data include actual product weights, amounts of raw materials used, product content, energy consumption, transportation figures, water consumption and waste amounts. Background data for these stages are taken from Ecoinvent v.3.7.0.1.

## Allocation

Allocation rules have been performed in accordance with the requirements of ISO 14044:2006.

The methodology for the allocation of mentioned data was mass allocation on the produced amount of products. For extruded profiles, natural gas, electricity and water consumptions, wastes and packaging products are allocated based on the mass of the final products.



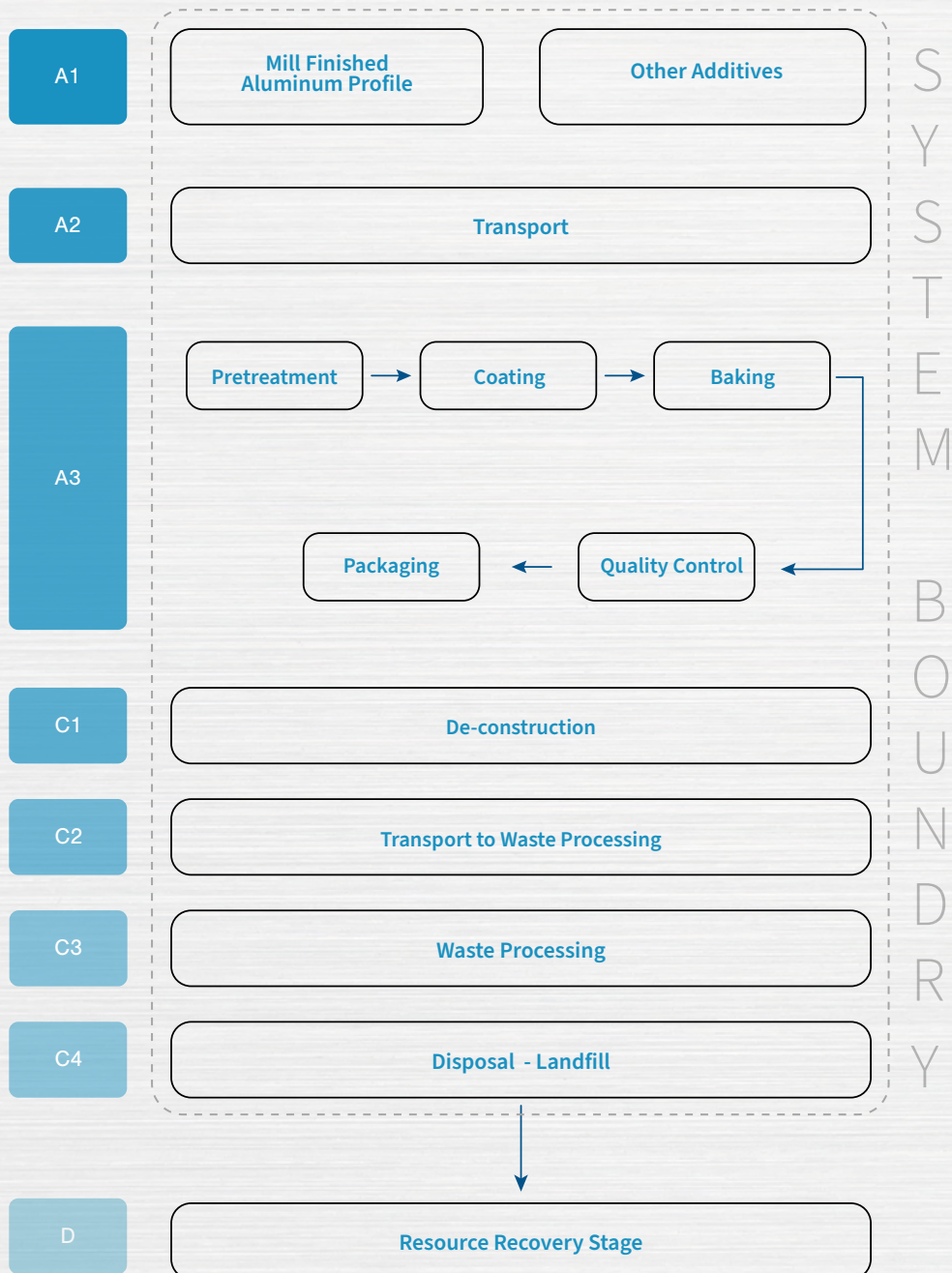


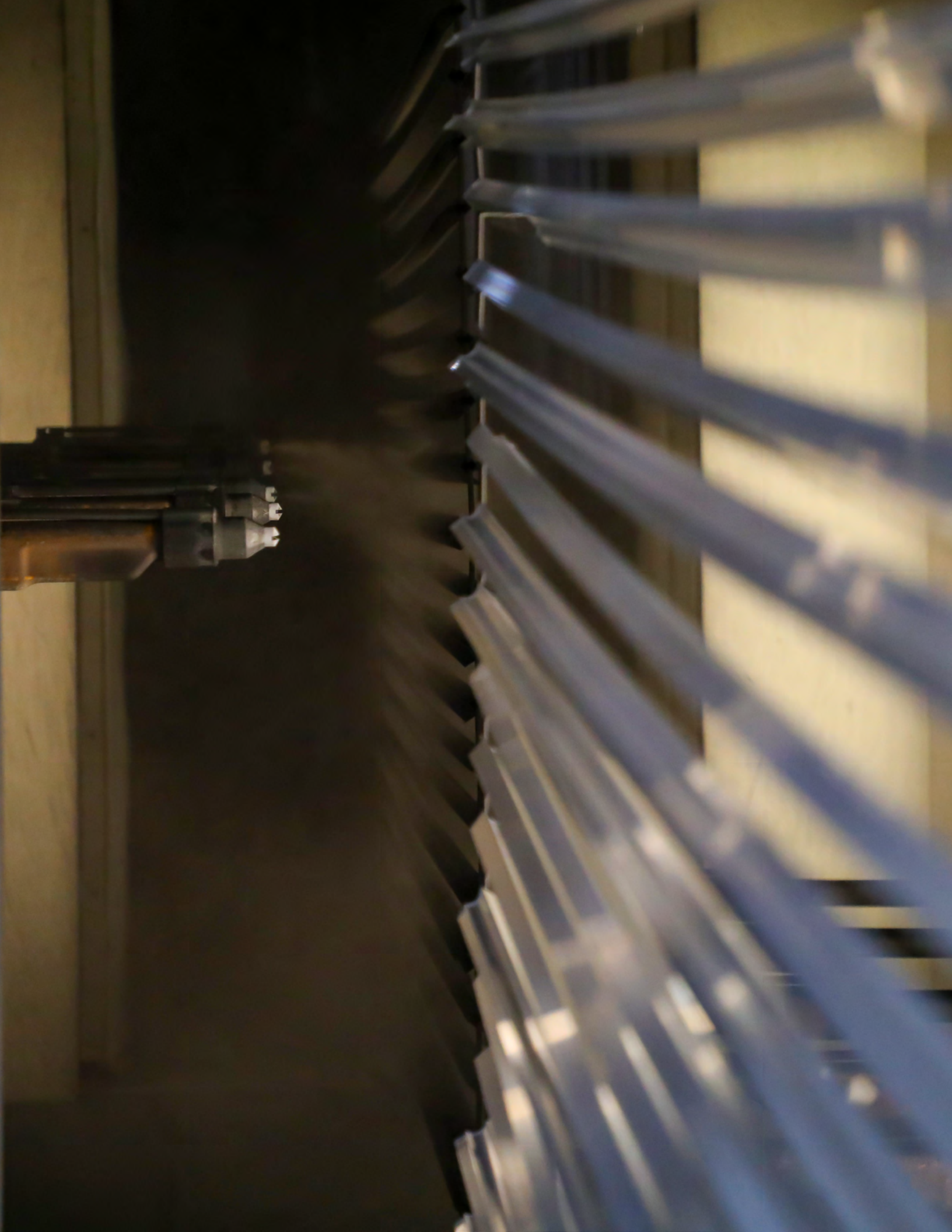
**Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation**

	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	Recycling Potential
<b>MODULES</b>	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
<b>Module declared</b>	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
<b>Geography</b>	GLO	GLO	TR	-	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
<b>Specific data used</b>	>99%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Variation-products</b>	Not Relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Variation-sites</b>	Not Relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

# System Diagram

## Powder Coated Aluminium Profile





# Description of Declared Modules

## A1-A3 - Cradle to gate

The aggregation of the modules A1, A2 and A3 is allowed according to EN 15804:2012+A2.2019/AC:2021. This rule is applied in this EPD and denoted by A1-3. This module includes the extraction and processing of raw materials before production stage, transport to production sites, processing of raw materials at the facility and packaging of the final product.

Module A1 represents the extraction and processing of raw materials.

Module A2 covers transportation of the raw materials from supplier to factory gate. The transportation methods taken into account are sea transport and road transport.

Module A3 includes energy and water consumption during the manufacturing process. Additionally, packaging materials are covered in this module. The processing of any waste arising from this stage is also included.

## C1 - De-construction

Demolition of the powder coated aluminium profile from base construction was assumed to be done manually. Given the scenario that is assumed, environmental impact of de-construction process is not considered under the scope of this study.

## C2 - Transport to waste processing

It has been assumed that the transportation to the sorting facility covers an average distance of 200 km.

## C3 - Waste processing for reuse, recovery and/or recycling

This module includes the energy consumption required for the sorting of powder coated aluminium profile in the recycling process.

## C4 - Final disposal

For the end-of-life scenario, 99% of the product will be collected and sorted during de-construction. It is anticipated that 1% of the product will be lost during de-construction, while the remaining 99% will make its way to the sorting/recycling facility.

According to the EU Aluminum programme, for windows, doors and curtain walling, the collection rate of aluminum is 99%, shredding efficiency is 95% and scrap recycled through the refining process: 96.5%. As a result, the overall aluminum recycling rate is:  $99\% * 95\% * 96.5\% = 91\%$ .

## D - Reuse, recovery or recycling

Module D includes the environmental aspects of recycled scrap generated at the end-of-life minus that used Module A1, which stands for the extraction and processing during the production stage.

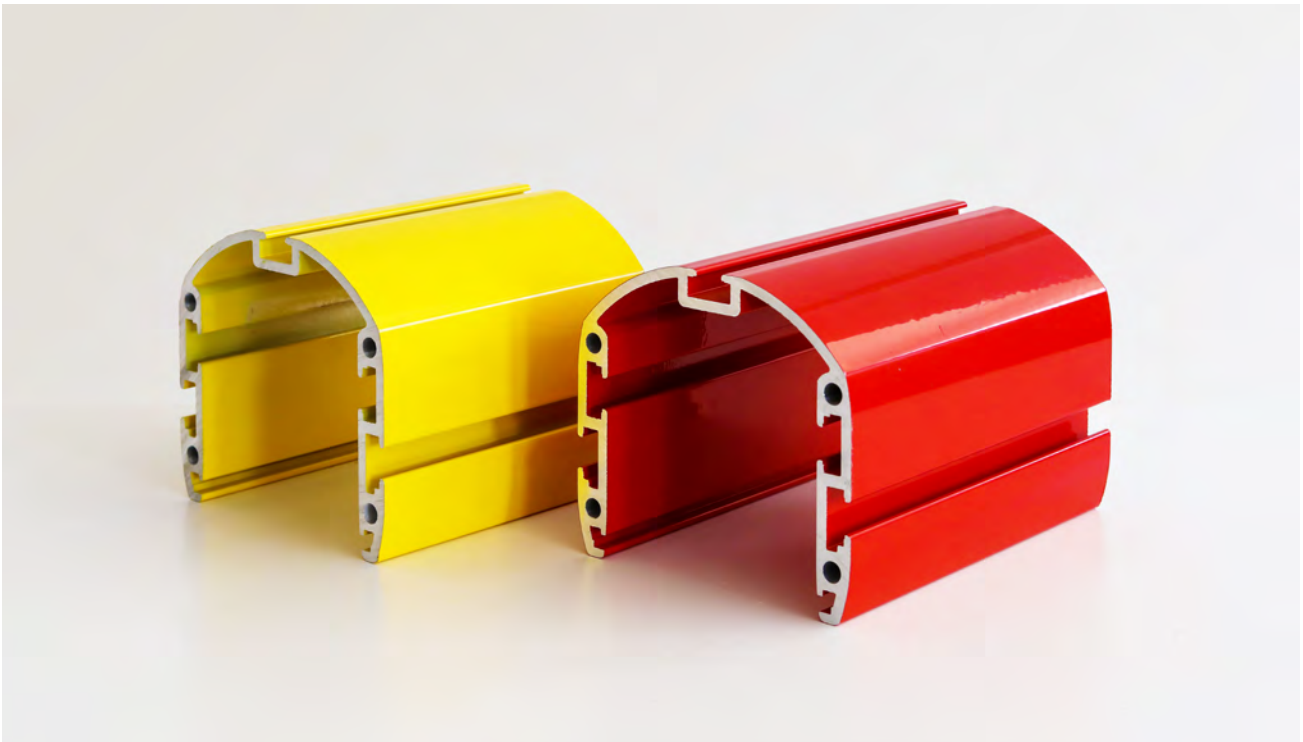
Powder coated aluminium profile inputs to the production stage are subtracted from the construction to be recycled at end-of life in order to obtain the powder coated aluminium profile from the product system. This remaining net powder coated aluminium profile is then sent to recycling.



# Content Declaration

## Content Declaration of 1 kg Powder Coated Aluminium Profile

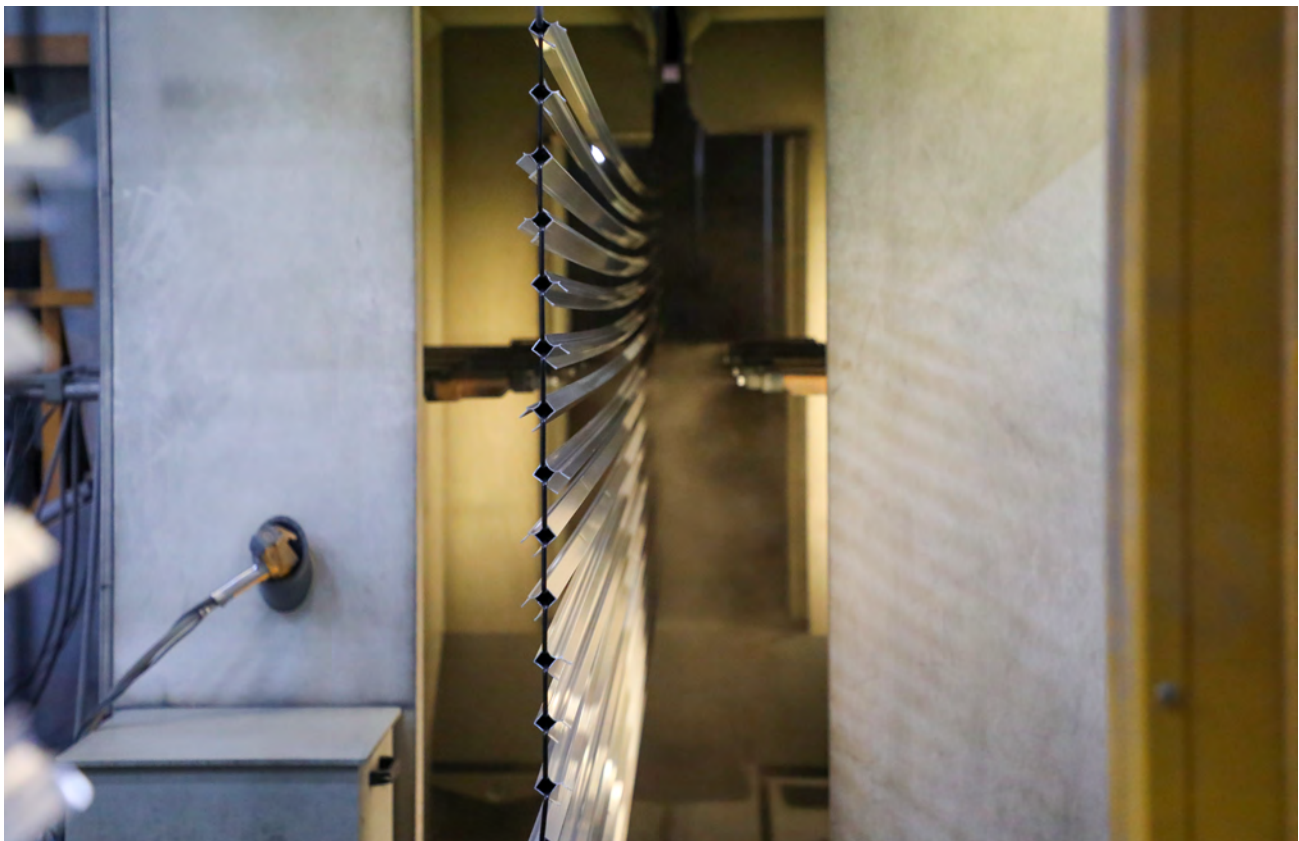
Product	Primary aluminium, %	Pre-consumer recycled materials, %	Additives, %	Renewable material weight, %	Biogenic carbon weight, %
<b>Powder Coated Aluminium Profile</b>	60-70	20-30	10-20	0	0-5



# Packaging Materials

## Content Declaration of Packaging Material, for 1 kg of Powder Coated Aluminium Profile

Powder Coated Aluminium Profile	Weight, %	Biogenic carbon, %
Wood	5-10	0-5
Packaging Tape	0-5	0-5
Nylon	0-5	0
Cardboard & Paper	0-5	0-5



# Environmental Performance

## Mandatory Impact Category Indicators According to EN 15804

Results per Functional or Declared Unit							
Indicator	Unit	A1-A3	C1	C2	C3	C4	D
<b>GWP-fossil</b>	kg CO <sub>2</sub> eq.	9.60	0	0.032	0.057	0.004	-5.44
<b>GWP-biogenic</b>	kg CO <sub>2</sub> eq.	-0.173	0	0	1.73E-01	9.80E-05	-0.006
<b>GWP-luluc</b>	kg CO <sub>2</sub> eq.	0.182	0	1.10E-05	4.98E-05	3.43E-06	-0.113
<b>GWP-total</b>	kg CO <sub>2</sub> eq.	9.61	0	0.032	0.230	0.004	-5.56
<b>ODP</b>	kg CFC 11 eq.	7.89E-07	0	7.32E-09	6.62E-09	4.00E-10	-3.99E-07
<b>AP</b>	mol H+ eq.	0.068	0	8.96E-05	2.04E-04	2.39E-05	-0.044
<b>EP-freshwater</b>	kg P eq.	0.003	0	2.20E-06	2.36E-05	1.10E-06	-0.002
<b>EP-marine</b>	kg N eq.	0.010	0	1.87E-05	3.34E-05	5.97E-06	-0.006
<b>EP-terrestrial</b>	mol N eq.	0.102	0	2.03E-04	3.16E-04	6.41E-05	-0.058
<b>POCP</b>	kg NMVOC eq.	0.032	0	7.77E-05	9.46E-05	1.90E-05	-0.019
<b>ADP-minerals&amp;metals*</b>	kg Sb eq.	6.05E-05	0	1.18E-07	6.51E-08	8.08E-09	-1.12E-05
<b>ADP-fossil*</b>	MJ	98.8	0	0.488	1.02	0.051	-52.5
<b>WDP*</b>	m <sup>3</sup>	3.45	0	0.001	0.006	0.001	-1.41
<b>Acronyms</b>	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.

# Environmental Performance

## Additional Mandatory and Voluntary Impact Category Indicators

Results per Functional or Declared Unit							
Indicator	Unit	A1-A3	C1	C2	C3	C4	D
<b>GWP-GHG<sup>1</sup></b>	kg CO <sub>2</sub> eq.	9.51	0	0.032	0.056	0.003	-5.53
Results according to EN 15804:2012+A2.2019/AC:2021 for 1 kg of Powder Coated Aluminium Profile							
<b>PM</b>	[disease inc.]	7.89E-07	0	2.03E-09	8.52E-10	3.42E-10	-5.35E-07
<b>IRP</b>	[kBq U235 eq]	0.797	0	0.003	0.014	3.00E-04	-0.594
<b>ETP-fw</b>	[CTUe]	286	0	0.375	0.328	57.3	-161
<b>HT-C</b>	[CTUh]	2.16E-08	0	1.33E-11	1.13E-11	3.44E-12	-1.62E-08
<b>HT-nc</b>	[CTUh]	3.26E-07	0	3.67E-10	2.61E-10	8.67E-11	-2.29E-07
<b>SQP</b>	[pt]	37.4	0	0.341	0.086	0.066	-9.48
<b>Acronyms</b>	GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology; PM = Potential incidence of disease due to PM emissions; IRP = Potential Human exposure efficiency relative to U235; ETP-fw = Potential Comparative Toxic Unit for ecosystems; HT-C = Potential Comparative Toxic Unit for humans; HT-nc = Potential Comparative Toxic Unit for humans; SQP = Potential soil quality index (SQP)						

<sup>1</sup>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 CO<sub>2</sub> is set to zero.

\* Disclaimers shall be added, if required by EN 15804.

\* Disclaimer 2: 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 3: The results of this environmental impact



# Use of Resources

Results per Functional or Declared Unit							
Indicator	Unit	A1-A3	C1	C2	C3	C4	D
<b>PERE</b>	MJ	50.9	0	0.007	0.079	0.003	-39.6
<b>PERM</b>	MJ	0	0	0	0	0	0
<b>PERT</b>	MJ	50.9	0	0.007	0.079	0.003	-39.6
<b>PENRE</b>	MJ	105	0	0.518	1.10	0.055	-55.4
<b>PENRM</b>	MJ	0	0	0	0	0	0
<b>PENRT</b>	MJ	105	0	0.518	1.10	0.055	-55.4
<b>SM</b>	kg	0.336	0	0	0	0	0
<b>RSF</b>	MJ	0	0	0	0	0	0
<b>NRSF</b>	MJ	0	0	0	0	0	0
<b>FW</b>	m3	0.454	0	4.45E-04	0.005	1.72E-04	-0.247
<b>Acronyms</b>	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 Production

Results per Functional or Declared Unit							
Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	0	0	0	0	0	0
Non-hazardous waste disposed	kg	0.013	0	0	0	0	0
Radioactive waste disposed	kg	0	0	0	0	0	0



# Output Flows

Results per Functional or Declared Unit							
Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	0
Material for recycling	kg	0	0	0	0	0	0
Materials for energy recovery	kg	0.067	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0



# References



**ISO 14040 2021 Environmental management** - Life cycle assessment - Principles and framework

**ISO 14044 2021 Environmental management** - Life cycle assessment - Requirements and guidelines

**ISO 14025 2006 Environmental labels and declarations** - Type III environmental declarations - Principles and procedures

**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

**The International EPD® System** [www.environdec.com](http://www.environdec.com)

**The International EPD® System** The General Programme Instructions v4

**The International EPD® System** PCR 2019:14 Construction products v1.2.5 (EN 15804:2012+A2.2019/AC:2021)

**Ecoinvent 3.7** [www.ecoinvent.org](http://www.ecoinvent.org)

**SimaPro LCA Software** [www.simapro.com](http://www.simapro.com)

# Contact

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## Third Party Verifier

**Sunil Kumar**

**SimaPro partners for India & Sri Lanka, SIPL Pvt Ltdy**



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## LCA Study & EPD Design Conducted By

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