ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025 and EN 15804:2012 + A2:2019

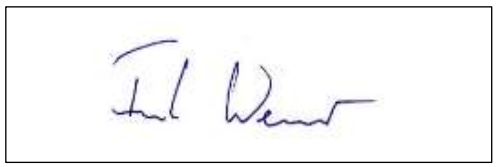
Anodised sheet for composite panels

Owner of the declaration:	
Publisher and Programme holder:	EUROPEAN ALUMINIUM
Declaration number:	EPD-2024-0015
Issue date:	2024-07-26
Valid until	2028-11-19

www.european-aluminium.eu

GENERAL INFORMATION

Owner of the declaration	Almeco Group Via della Liberazione 15 – 20098, San Giuliano Milano (MI), Italy almecogroup.com
Manufacturer	Almeco Group Via della Liberazione 15 – 20098, San Giuliano Milano
Publisher and Programme holder EUROPEAN ALUMINIUM Avenue des Nerviens 85 1040 Etterbeek – Belgium VAT : BE 0480.720.716 info@european-aluminium.eu www.european-aluminium.eu	EUROPEAN ALUMINIUM AISBL Avenue des Nerviens 85 1040 Brussels, Belgium Paul Voss, Director General.
The declaration is based on the Product Category Rules	European Aluminium General Programme Instructions version 3, 23rd of September 2020
Declared Unit	1 m^2 of anodised sheet for composite panels
Scope of the Environmental Product Declaration	This EPD covers 1 m^2 of anodised sheet for composite panels type bxPRO. These EPD results have been calculated from an LCA tool for EPD, based on the LCA for expert database, initially realised by Thinkstep in 2013 and updated by Ecoinnovazione in 2019. Among the product family, one representative product has been selected and corresponding EPD results have been calculated based on specific bill of materials. The results generated by the collective tool can be considered as a good proxy to model anodised sheet for composite panels produced by Almeco group. The EPD may be used in a B2B context within the European Market.
Liability	The owner of the declaration is liable for the underlying manufacturing information and European Aluminium is not liable in this respect.
Disclaimers	This EPD cannot be used as a guarantee of the recycled content of the actual product sold on the market. A specific declaration may be asked from the supplier. The use of this EPD within BIM tools is in principle limited to the products explicitly included in the EPD. The scaling of results to model similar products can only be done if justified and transparently reported in the project report. Any responsibility regarding the misuse of this EPD by third parties is not accepted by the Programme Operator.

Verification	Verifier
EN15804:2012 +A2:2019 serves as core PCR completed by European Aluminium PCR 03/2020 Verification of the EPD by an independent third party in accordance with ISO 14025 ☐ Internally ☒ Externally	

1 PRODUCT

1.1 Product description and applications

This Environmental Product Declaration (EPD) is for business-to-business communication. The product object of the EPD is bxPRO. It is the line of anodized aluminum surfaces made by Almeco that, due to their specific characteristics, are mainly used in exterior architecture and interior design projects. bxPROface ideal for solid facades and cassettes, bxPRObond ideal for ACP (aluminium composite panels), bxPROtek ideal for functional applications such as electronics, bxPROfil ideal for rollforming and standing seam.

The representative product is an anodised sheet for composite panels of 0.5 mm of Aluminium sheet thickness and 8 µm of anodic layer thickness. EPD results have been calculated for 1 representative product, which is detailed in Table 1.

Table 1 Details representative products

ID	Name	Model	Aluminium sheet thickness (mm)	Anodic layer thickness (µm)
1	bxPRO	Anodised sheet for composite panels	0.5	8

1.2 Technical Data

bxPRO is a commercial Almeco product (alloy EN-AW 5005 with anodising quality- temper H14). bxPRO anodised solid aluminium further combines excellent flatness with good deformation properties; is corrosion- UV- and scratch resistant; non-combustible and 100% recyclable.

According to the client requirements, anodised coils and sheets are produced from other anodising qualities made of alloy series EN-AW 1xxx (e.g. 1085), 3xxx, 5xxx (e.g. 5005, 5754) and 6xxx (e.g. 6061) for which the precise composition and microstructure are optimized to satisfy the anodising requirements. On average, these anodised coils and sheets contain at least 95%w of aluminium. The technical data related to these anodised aluminium coil and sheet are publicly available or can be provided by ALMECO S.P.A.

For the most up-to-date values of the technical data, please refer to the product specifications available on the Almeco website (https://www.almecogroup.com/en).

Most relevant standards for applications of aluminium sheet products in buildings are EN 485-2, EN 507, EN 508-2, EN 573-3, EN 1396, EN 13501-1, EN 14782, EN 14783, EN 13964/+A1. Please refer to the latest version of those standards.

1.3 Process description

The anodised sheet is produced using an aluminium sheet that undergoes a further anodization process which increases the resistance to atmospheric corrosion. Other auxiliary materials are used, as for example some acids (sulphuric acid) or alkalis (sodium hydroxide). The aluminium production and the rolling are described in European Aluminium's environmental profile report.

The production phase includes mainly the following steps:

1. Aluminium production and rolling
2. Continuous coil anodising

The main background production processes are reported in Figure 1.

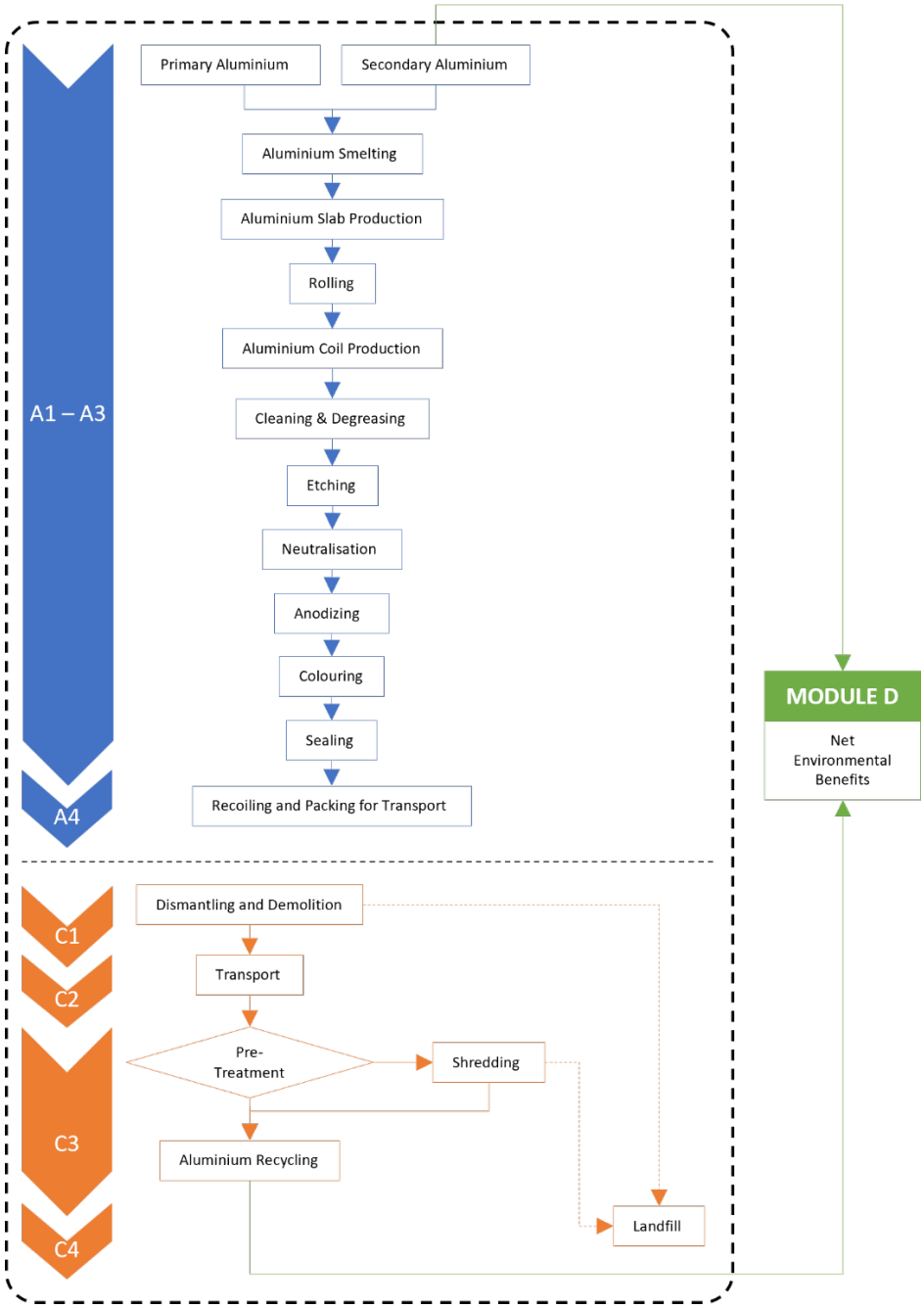


Figure 1 Main production processes and components of the anodised sheet

The upstream aluminium processes have been modelled using European Aluminium LCI datasets for the primary aluminium production, recycling and remelting as described in the European Aluminium Environmental profile report 2018.

At the end-of-life stage, the coil coated aluminium sheets should be specifically dismantled and collected in order to be treated since the aluminium can be efficiently recycled. After having been collected, the coil coated aluminium sheets are treated through shredding and sorting.

1.4 Health and safety aspects during production and installation

Continuous anodising requires the use of acid and alkaline solutions as well as some organometallic salt for colouring purposes. All those processes are very well controlled and workers are not in direct contacts with those solutions or related emissions. Waste solutions are systematically collected and treated. There are no relevant aspects of occupational health and safety during the further processing and installation of the aluminium coil and sheet. Under normal installation, no measurable environmental impacts can be associated to use of anodised aluminium coil. There is no release of any substance from the REACH SVHC list during further processing or during the use phase.

1.5 Reference service life

Since the use phase is not modelled, no specific information can be given about the Reference Service Life. In normal use, aluminium building products are not altered or corroded over time. A regular cleaning (e.g. once a year) of the product suffices to secure a long service life. However, the use of highly alkaline (pH >10) or highly acidic (pH < 4) cleaning solutions should be avoided. In practice, a service life of 50 years can be assumed in normal use for such application.

2 LCA – CALCULATION RULES

2.1 Declared unit & bill of materials

The Bill of Materials of the analysed product is reported in Table 2. The declared unit corresponds to 1 m^2 of coil anodised aluminium sheet.

Table 2 Bill of materials (kg) of the declared unit for the product

Sheet thickness (mm)	Aluminium mass (kg)
0.5	1.35

2.2 System boundary

This EPD is from cradle to gate with modules C1-C4 and module D, as reported in Table 3.

The production stage (modules A1-A3) includes processes that provide materials and energy input for the system, manufacturing, and transport processes up to the factory gate, as well as waste processing. For the end-of-life, the default scenario defined in the General Product Instructions and detailed in 3.2 is applied.

Table 3 Modules declared

Production			Installation		Use stage							End-of-Life				Next product system
Raw material	Transport	Manufacturing	Transport to	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy	Operational water	Deconstruction	Transport	Waste processing	Disposal	Reuse, recovery, recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

Note: ND: Not Declared; X: Module included in the LCA.

Module A4 is declared for a distance of 1 km to give the possibility to adjust the resulting Environmental impacts depending on the specific distance at hand.

2.3 Energy mix

The model uses the European electricity mix (EU-28 Electricity grid mix (2019)). For details about the electricity modelling in the datasets: production of primary aluminium, extrusion, rolling and recycling please refer to the Environmental Profile Report 2018.

2.4 Allocation

The scrap which are produced along the production chain are recycled into the same production chain and are modelled as “closed-loop” within Module A. This recycling loop has been modelled in the LCA for expert model so that the anodised sheet for composite panels is the only product exiting the gate. Hence, the production process does not deliver any co-products.

At the end-of-life stage, the anodised sheet for composite panelss are sent to an end-of-life treatment which is modelled according to the scenario reported in 3.2. The environmental burdens and benefits of recycling and energy recovery are calculated in module D accordingly.

2.5 Assumptions and Cut-off criteria

The aluminium sheets are composed of a mix of 60% primary aluminium and 40% recycled aluminium. Such mix represents the typical sourcing of aluminium in Europe, all markets included. For the primary aluminium, a primary aluminium ingot consumption mix was considered (European production + net fraction of imports into Europe). Alloying elements were not considered, and a pure aluminium sheet has been assumed as a proxy.

2.6 Data quality

Representativeness

Technological: All primary and secondary data were modelled to be specific to the technologies or technology mixes under study. Where technology-specific data were unavailable, proxy data were used. For the aluminium production, extrusion profiles and recycling, the datasets described in the Environmental Profile Report 2018 of European Aluminium have been used and integrated with the EPD profile of the low carbon primary aluminium. The modelling reflects the specific BoM of the analysed products. Technological representativeness is considered as being very good.

Geographical: All primary data were collected specifically to the countries under study. Regarding secondary data, where EU region-specific data were unavailable, DE datasets were used. For the aluminium production, extrusion profiles and recycling, the datasets described in the Environmental Profile Report 2018 of European Aluminium have been used. Geographical representativeness is considered as being good.

Temporal: Primary data refer to the year 2021, and all secondary data come from the LCA for expert version 2021.2, including those on aluminium production, which are the most recent ones as described in the Environmental Profile Report 2018 of European Aluminium.

Completeness

All known operating data was taken into consideration in the analysis. Based on earlier studies conducted by European Aluminium, it can be assumed that the ignored processes or flows contribute to much less than 5% of the impact categories under review.

The process chain is considered sufficiently complete regarding the goal and scope of this study.

Overall, the data quality can be described as good.

2.7 Software and databases

These EPD results have been calculated from an LCA tool for EPD, based on the LCA for expert database. Currently, the EPD software is using the software LCA for expert version 2021.2.

2.8 Comparability

As a general rule, a comparison or evaluation of EPD data may be possible when all of the data to be compared has been drawn up in accordance with EN 15804 and the building context or product-specific characteristics are taken into consideration.

3 LCA – SCENARIOS AND ADDITIONAL INFORMATION

3.1 Scenario for additional modules

Module A4 is taken into consideration in this Declaration, and it has been modelled according to the information reported in Table 4.

Table 4 Module A4 – Transport to the building site

Scenario information	Unit (expressed per DU)
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long-distance truck, boat, etc.	Truck-trailer, Euro 4, 34 - 40t gross weight / 27t payload capacity, diesel driven
Distance	1 km
Capacity utilisation (including empty returns)	61 %
Bulk density of transported products	-
Volume capacity utilisation factor (factor = 1 or <1 or ≥1 for compressed or nested packaged products)	Not applicable

3.2 Scenario for Mod. C1-C4

The default scenario for the end-of-life of the anodised sheet for composite panels, as reported in the General Programme Instructions, is the following:

- collection rate: 99%;
- shredding efficiency: 99%;
- scrap recycled through refining process: 96,5%
- overall aluminium recycling rate: 95%

Table 5 reports the main parameters of the end-of-life scenarios for the main materials and components.

Table 5 Parameters of the end-of-life scenarios for the main materials and components, related to the DU

Processes	Unit (expressed per FU or DU of components, products, or materials and by type of material)	bxPRO- 5 mm of aluminium sheet thickness and 8 µm of anodic layer thickness
Collection process	Kg collected separately	Aluminium sheet: 1.34 kg
Recovery system	Kg for recycling	Aluminium sheet: 1.32 kg
Disposal	Kg to landfill	Aluminium sheet: 0.01 kg

Note to Table 5:

Material collected separately: This amount refers to the waste stream collected separately per material before being subjected to shredding

Material for recycling: This amount refers to the waste stream sent to recycling per material after the shredding and/or sorting process.

Material for final deposition – aluminium: this amount includes the aluminium not collected separately and the shredding losses.

3.3 Scenario Mod. D

Module D includes:

- a transport from the scrap dealers to the recycling plants, considering an average distance of 200 km;
- recycling of Aluminium through refining;
- a net credit for the avoided production of primary aluminium;

The calculation of module D has been implemented in line with the General Programme Instructions of European Aluminium, thus based on the difference between the scrap used at the input and output side. In some cases, this may result in environmental burdens instead of environmental benefits if the product system is a net consumer of valuable secondary material.

3.4 Additional environmental information

In case of fire, aluminium is a non-combustible construction material (European Fire Class A1) in accordance with Commission Decision 96/603/EC (later amended by European Commission Decision 2000/605/EC to follow the new classification system defined in Commission Decision 2000/147/EC, where Class A1 substituted the former Class A), and does therefore not make any contribution to fire.

4 LCA RESULTS – ANODISED SHEET FOR COMPOSITE PANELS bxPRO

4.1 Result of the LCA – Core Environmental impacts indicators

*Table 6 Core Environmental impacts indicators for 1 m² anodised sheet for composite panels **bxPRO***

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP - total	kg CO_2 eq.	1.15E+01	8.33E-05	1.79E-01	1.66E-02	4.29E-02	3.96E-04	-6.40E+00
GWP – fossil	kg CO_2 eq.	1.14E+01	8.31E-05	1.77E-01	1.65E-02	4.25E-02	4.06E-04	-6.39E+00
GWP – biogenic	kg CO_2 eq.	4.94E-02	-3.08E-07	1.91E-03	-6.13E-05	2.64E-04	-1.18E-05	-1.34E-02
GWP - luluc	kg CO_2 eq.	2.62E-03	5.00E-07	2.55E-05	9.95E-05	1.04E-04	1.19E-06	-1.08E-03
ODP	kg CFC 11 eq.	9.29E-11	1.46E-17	3.21E-12	2.91E-15	1.34E-15	1.58E-18	-4.80E-11
AP	mol H^+ eq.	4.91E-02	5.76E-07	3.78E-04	1.15E-04	7.29E-05	2.89E-06	-3.72E-02
EP - freshwater	kg PO_4^{3-} eq.	3.26E-05	1.95E-10	6.52E-07	3.88E-08	1.80E-07	6.82E-10	-2.83E-06
EP - marine	kg N eq.	8.35E-03	2.88E-07	9.16E-05	5.73E-05	2.04E-05	7.51E-07	-5.33E-03
EP - terrestrial	mol N eq.	9.01E-02	3.18E-06	9.59E-04	6.33E-04	2.13E-04	8.25E-06	-5.82E-02
POCP	kg NMVOC eq.	2.45E-02	5.46E-07	2.45E-04	1.09E-04	5.15E-05	2.28E-06	-1.61E-02
ADP-MM (**)	kg Sb eq.	1.01E-05	5.92E-12	2.71E-08	1.18E-09	1.61E-08	3.83E-11	-1.44E-06
ADPF (**)	MJ	1.65E+02	1.13E-03	3.68E+00	2.26E-01	5.38E-01	5.39E-03	-7.84E+01
WDP (**)	m^3	3.16E+00	4.35E-07	3.88E-02	8.66E-05	9.54E-04	4.36E-05	-9.49E-01

Note: GWP – Global Warming Potential; ODP – Ozone Depletion; AP – acidification potential for soil and water; EP – Eutrophication potential; POCP – formation potential of tropospheric ozone; ADP - MM – abiotic depletion potential for non fossil resources; ADPF – Abiotic depletion potential for fossil resources; WDP – Water deprivation potential.

(**) **Disclaimer**: the results of this Environmental impacts indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

4.1.1 Additional Environmental impacts indicators

Table 7 Additional Environmental impacts indicators for 1 m² anodised sheet for composite panels bxPRO

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Particular Matter emissions	Disease incidence	6.29E-07	1.91E-12	3.19E-09	3.81E-10	5.38E-10	3.59E-11	-5.20E-07
Ionising radiation - human health (*)	[kBq U235 eq.]	2.09E+00	1.22E-07	9.70E-02	2.43E-05	4.99E-03	5.94E-06	-8.96E-01
Eco-toxicity (freshwater) (**)	[CTUe]	5.22E+01	8.43E-04	1.63E+00	1.68E-01	2.15E-01	3.07E-03	-2.58E+01
Human toxicity - cancer effects (**)	[CTUh]	2.63E-09	1.68E-14	5.42E-11	3.35E-12	2.97E-11	4.53E-13	-1.61E-09
Human toxicity - non-cancer effects (**)	[CTUh]	7.96E-08	9.07E-13	1.34E-09	1.81E-10	2.44E-10	5.00E-11	-4.64E-08
Land Use related impacts/ Soil quality (**)	dimensionless	2.24E+01	4.03E-04	1.44E+00	8.01E-02	2.66E-01	1.09E-03	-2.27E+00

(*) **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 impacts indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

4.2 Result of the LCA – Resource use

Table 8 Resource use for 1 m² anodised sheet for composite panels bxPRO

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	6.37E+01	7.33E-05	2.19E+00	1.46E-02	2.90E-01	7.26E-04	-3.56E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	6.37E+01	7.33E-05	2.19E+00	1.46E-02	2.90E-01	7.26E-04	-3.56E+01
PENRE	MJ	1.66E+02	1.13E-03	3.68E+00	2.26E-01	5.38E-01	5.39E-03	-7.84E+01
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.66E+02	1.13E-03	3.68E+00	2.26E-01	5.38E-01	5.39E-03	-7.84E+01
SM	kg	5.84E-01	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
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.57E-01	6.68E-08	1.77E-03	1.33E-05	1.57E-04	1.33E-06	-9.01E-02

Note: PERE – 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 resources; SM – Use of secondary materials; RSF – Use of renewable secondary fuels; NRSF – use of non-renewable secondary fuels; FW – use of net fresh water.

4.3 Result of the LCA – Output flows, waste categories

Table 9 Output flows, waste categories for 1 m² anodised sheet for composite panels bxPRO

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
HWD	kg	7.72E-08	3.04E-15	-2.87E-10	6.05E-13	4.18E-10	5.72E-13	-5.53E-08
NHWD	kg	2.27E+00	1.65E-07	2.69E-03	3.29E-05	5.56E-04	2.69E-02	-1.92E+00
RWD	kg	1.19E-02	1.19E-09	5.83E-04	2.36E-07	5.06E-05	5.65E-08	-4.68E-03
CRU	kg	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	1.32E+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
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

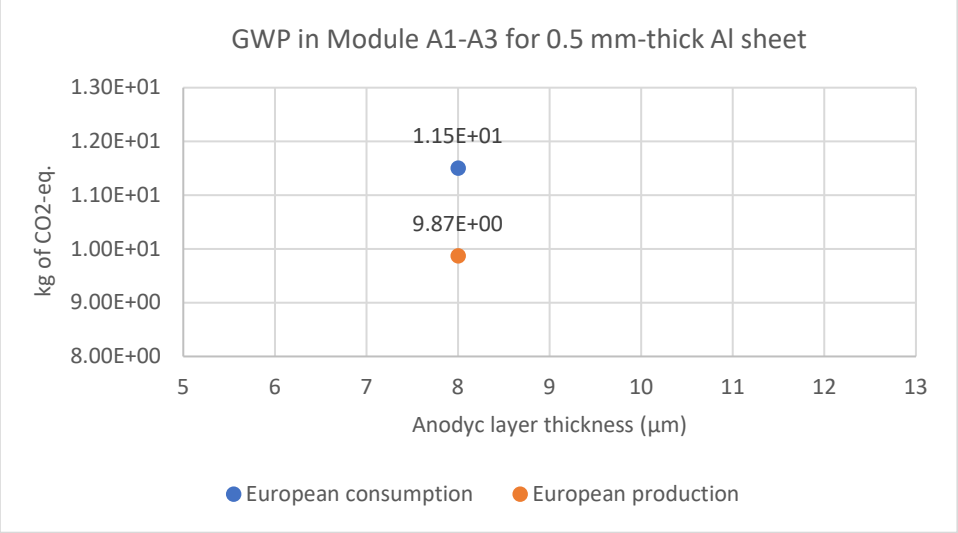
Note: HWD – hazardous waste disposed; NHWD – Non-hazardous waste disposed; RWD – Radioactive waste disposed; CRU – Components for re-use; MFR – Materials for recycling; MER – Materials for energy recovery; EEE – Exported electrical energy; EET – Exported thermal energy

5 LCA – INTERPRETATION

Most of the environmental impacts come from the aluminium coil and sheet manufacturing. Within the manufacturing processes, the primary aluminium production is dominant, especially the alumina production and the electrolysis. The rolling process, which converts ingot into coil, and the subsequent foreground anodising process contribute much less to the LCA results. The LCA modelling and the impact of the primary aluminium production are detailed in European Aluminium's environmental profile report.

The GWP of Module A1-A3 for this sheet thickness with an anodic layer of 8 µm is reported in the next diagram. Comparing the GWP value of European primary aluminium consumption (i.e. European production + net fraction of imports into Europe, as used in the present EPD) with that of European primary aluminium production scenario (i.e. using 100% of primary aluminium produced in Europe), as a sensitivity analysis, the kg of Co2-eq. decreases from 11.5 to 9.87.

Figure 2 Sensitivity analysis: EU consumption GWP against EU production GWP (Module A1-A3)



6 OTHER INFORMATION

The Almeco Group is a world leader in the production of aluminum laminates for architectural, solar, decorative and lighting applications. The most advanced technologies in continuous metal surface treatments guarantee the widest range of solutions and are combined with a service oriented to the highest product customization and supply flexibility.

Almeco Group is founded on the concept of corporate responsibility and includes recognition of the need for positive actions and continuous support and development of the local communities that neighbour our facilities.

Through its Management Systems, certified according to ISO 9001:2015, ISO 14001:2015, Almeco Group actively implements best practices regarding environmental protection through significant investments and measures, by optimizing the production cycle, implementing new procedures that reduce the energy footprint of our plants, and the vigilant prevention of any possibility of environmental pollution

Additional information about Almeco's corporate responsibility and sustainability policy and the products can be found on the Almeco Group website almecogroup.com.

7 REFERENCES

European Aluminium General Programme Instructions version 3, 23rd of September 2020

European Aluminium (2018) ENVIRONMENTAL PROFILE REPORT Life-Cycle inventory data for aluminium production and transformation processes in Europe February 2018

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ISO 14025:2006, Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures.

EN 485-2:2016, Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties

EN 507:2019, Roofing and cladding products from metal sheet -- Specification for fully supported products of aluminum sheet.

EN 508-2:2019 Roofing and cladding products from metal sheet - Specification for self-supporting products of steel, aluminum, or stainless-steel sheet - Part 2: Aluminum.

EN 573-3:2019, Aluminum and aluminum alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products

EN 1396:2015, Aluminium and aluminium alloys - Coil coaproducts.t and strip for general applications - Specifications

EN 13501-1:2018, Fire classification of construction products and building elements -- Classification using data from reaction to fire tests.

EN 14782:2006, Self-supporting metal sheet for roofing, external cladding and internal lining - Product specification and requirements.

EN 14783:2013, Fully supported metal sheet and strip for roofing, external cladding and internal lining - Product specification and requirements.

EN 13964:2004/+A1:2006, Suspended ceilings - Requirements and test methods.

Please refer to the latest version of those standards.