

TYPE III · ISO 14025:2006

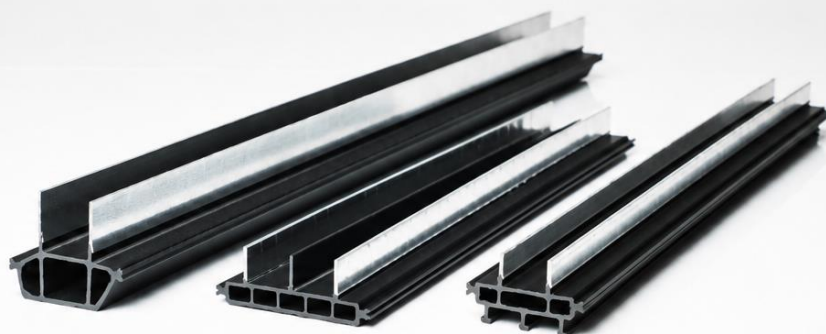
Environmental Product Declaration

in accordance with ISO 14025:2006 and EN 15804:2012+A2:2019

ALFA THERM

Extruded thermal break profile · PPE/PA alloy reinforced with glass fibre (PPE/PA GF20)

Production site: Tecnologica S.r.l. — Pietracuta di San Leo (RN), Italy



alfa THERM

EPD OWNER

Alfa Solare S.p.A.

Average-product EPD. The declared results are the 2025 mass-weighted average of the ALFA THERM range (virgin and recycled grades, accessories aggregated). Cradle-to-gate with modules C1–C4 and module D.

Programme operator

EPDItaly

Publisher	EPDItaly
Declaration number	EPDALFATHERM_2025_rev.0.0
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General information

EPD OWNER	
Company name	Alfa Solare S.p.A.
Legal seat	Via Guardia di Rocca, 6 - 47891 Serravalle (Repubblica San Marino)
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PROGRAM OPERATOR	
Program Operator	EPDItaly — operated by ICMQ S.p.A., Via Gaetano De Castillia 10, 20124 Milano, Italy · www.epditaly.it
Publisher	EPDItaly
PRODUCT	
Product name	ALFA THERM
Production site	Tecnologica S.r.l. — Pietracuta di San Leo (RN), Italy
Description	Extruded thermal break profile in PPE/PA alloy + 20% glass fibre (average product)
Field of application	Thermal barrier in metal (aluminium) window and door profiles
Type of EPD	Product (average); Cradle-to-gate with modules C1–C4 and module D
Product standard · CPC	EN 14024 · UN CPC 36390
Geographical scope	Production: Italy · Market & end-of-life: Global
VERIFICATION & VALIDATION	
PCR	CORE PCR ICMQ 001, Rev. 4 (10/11/2025)
EPDItaly Regulation	Regolamento EPDItaly, Rev. 7.1 (05/09/2025)
Project Report (LCA)	Studio del Ciclo di Vita a supporto delle Dichiarazioni Ambientali di Prodotto (EPD). Profili in materiale termoplastico estruso a taglio termico ALFA MID, ALFA THERM, ALFA PRO e ALFA ASA v0.2 of 24/07/2026
Independent verification	Independent verification of the declaration and data, according to UNI EN ISO 14025:2010 ☐ Internal ☒ External
Third-party verifier	TÜV Italia srl – Via Fulvio Testi 280/6 20126 Milano (MI) – Italia (Accredited by Accredia, N.00077)
Comparability	EPDs from different programmes or not compliant with EN 15804 may not be comparable; comparison must consider the product's use in the building over the full life cycle.
Responsibility	The EPD Owner is responsible for the information and supporting evidence; EPDItaly assumes no liability for the data and results provided by the EPD Owner.
LCA CONSULTANT	
LCA consultant	Bluegreen Ecoinnovations S.r.l. SB alessandro.marson@bluegreen.eco · www.bluegreen.eco

Company profile

Alfa Solare S.p.A. (Republic of San Marino) is the EPD Owner and a long-standing manufacturer of thermal break profiles for the window and door industry (Window Division). Through more than thirty years of activity it offers an extensive range of extruded thermoplastic profiles available as standard and custom (special) profiles, in bars or coils and in a range of colours.

The ALFA THERM profiles covered by this declaration are physically manufactured by Tecnologica S.r.l. at its plant in Pietracuta di San Leo (RN), Italy, under a third-party (conto terzi) arrangement (EPDItaly “Case A”): Alfa Solare is the legal entity responsible for the declaration, while Tecnologica is the production site.

Scope and type of EPD

This is an average product EPD. The declared modules are A1–A3 (aggregated), C1–C4 and module D; modules A4, A5 and B1–B7 are not declared (Table 1). The declared results represent the 2025 mass-weighted average of the ALFA THERM grades, with accessories aggregated, produced at a single site (Tecnologica S.r.l.). The environmental indicators of the individual grades are not declared separately; the representativeness of the average is described in the Product section, and its variability is reported under “Variability of the average product”.

Declared and non-declared modules

Life-cycle stage	Module	Status
Raw material supply	A1	X
Transport to manufacturer	A2	X
Manufacturing	A3	X
Transport to customer	A4	ND
Installation	A5	ND
Use stage	B1–B7	ND
De-construction / demolition	C1	X
Transport to waste processing	C2	X
Waste processing for recovery	C3	X
Disposal	C4	X
Benefits and loads beyond the boundary	D	X

Table 1 — Declared and non-declared modules (X = declared; ND = not declared).

Product system & system boundary

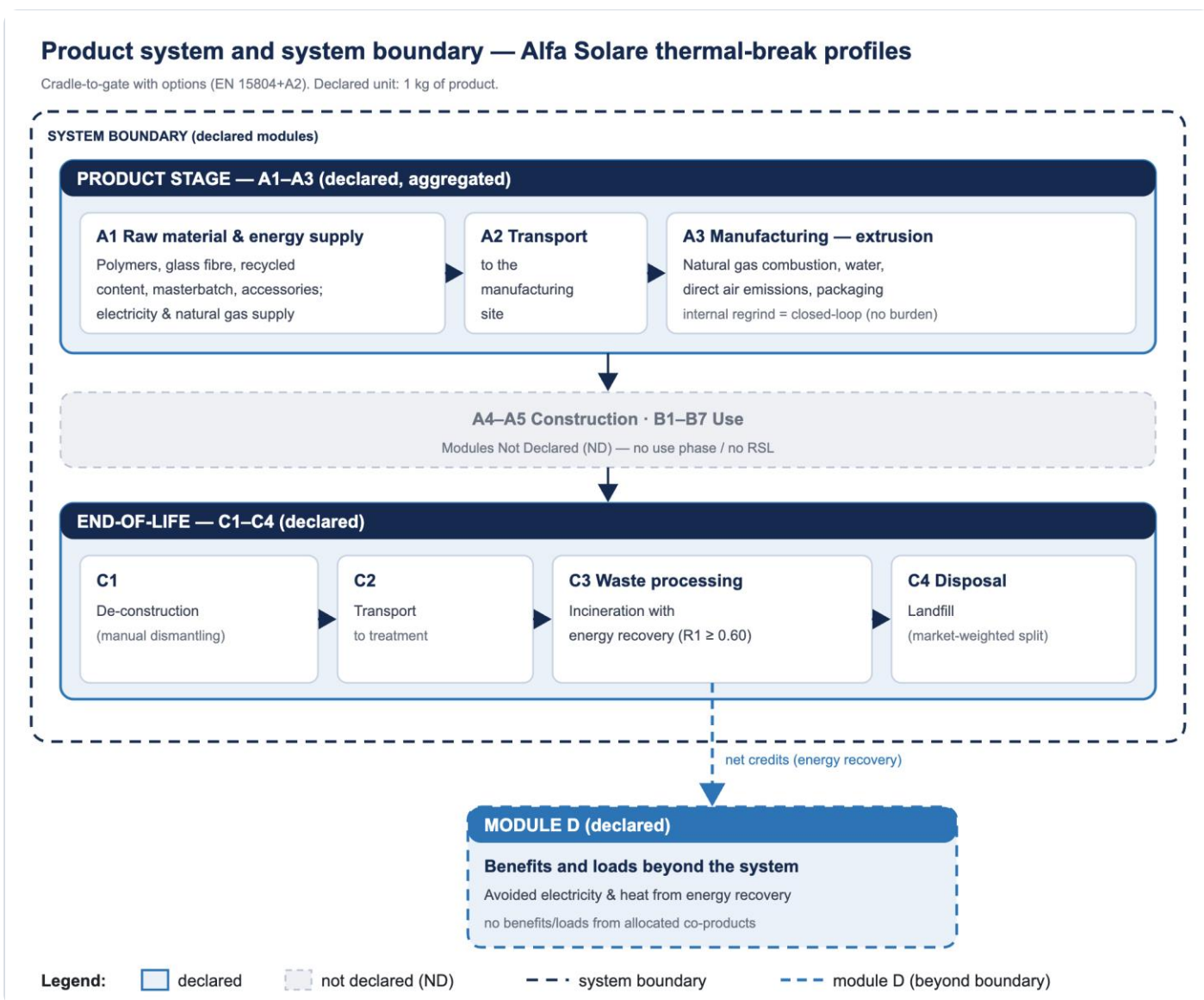


Figure 1 — Product system and system boundary.

Basis of the LCA calculation

Declared unit	1 kg of product (average product, reference year 2025)
Database / system model	ecoinvent v3.12 — cut-off by classification
LCIA method / indicators	Environmental Footprint (EF) v3.1 + EN 15804+A2
LCA software	Activity Browser (Brightway)
Allocation	Physical, by extruded mass
Secondary (recycled) inputs	EoL allocation approach: Cut-off; internal regrind modelled closed-loop in A3
Electricity	Italian residual mix, no Guarantees of Origin. GWP-total 0.621 kg CO ₂ e/kWh
Cut-off	< 1% per flow, < 5% total

Table 2 — Basis of the LCA calculation.

Product

ALFA THERM is an extruded thermal break profile inserted into aluminium window and door frames to interrupt the thermal bridge between the inner and outer shells and reduce heat transfer. The polymer matrix is a PPE/PA alloy (modified polyphenylene ether blended with polyamide) reinforced with 20% glass fibre (PPE/PA GF20), including virgin and recycled grades; accessories (tying cord, film) account for about 1% of the mass. The product is C2C Certified® Material Health Silver (certificate number 7250 issued 14/08/2024 – expiration date 10/04/2027). The profiles are produced by extrusion and supplied in bars or coils, in black only. As a component incorporated into the window/door system, no use stage is declared (B1–B7 = ND) and no Reference Service Life is declared. Packaging (cardboard, plastic film, wooden pallet) is allocated by extruded mass.

Technical data

Property	Value	Standard
Composition	PPE/PA + 20 ±3% GF	—
Density	1.18±0.05 g/cm³	ISO 1183
Colour	black	—
Melting temp. (DSC)	> 250 °C	ISO 3146
HDT (1.8 MPa)	≈ 195 °C	ISO 75-2
Thermal cond. λ	0.25 W/(m·K)	EN ISO 10077-2
Lin. therm exp. (23–85 °C)	≈ 4.0×10 ⁻⁵ K ⁻¹	ISO 11359-2
Reaction to fire	Class E	EN 13501-1:2019
Flammability	HB	UL 94
Tensile strength (dry)	> 90 N/mm²	ISO 527-4
Tensile modulus (dry)	> 5500 N/mm²	ISO 527-4
Hardness	80 ± 3 ShD	ISO 868

Composition

PPE/PA alloy	≈ 80%
Glass fibre	≈ 20%
Accessories	< 1%

Table 3 — Product composition (share of declared unit mass).

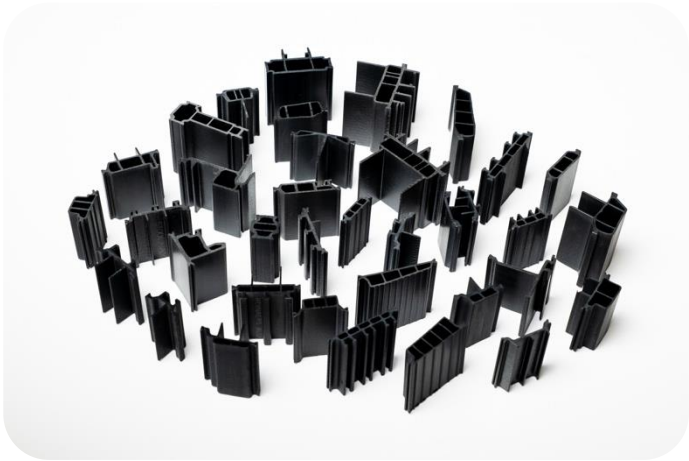


The image shows a cross-section of a complete window or door unit, which is not covered by the EPD. The insulating profile, which is covered by the EPD, is highlighted in red.

Representativeness of the average

The declared average was determined as the 2025 mass-weighted average of the ALFA THERM grades produced, combining configurations with and without accessories (tying cord, PA film, Aluminum film). The EPD is representative of the ALFA THERM standard and special profiles of the Alfa Solare Window Division; production is concentrated at one site (Tecnologica S.r.l.) and the brand is Alfa Solare. This EPD covers the entire ALFA THERM family (all standard and special profile geometries). The complete list of the product codes manufactured in the reference year is reported in the LCA Report.

Table 4 — Technical data



Environmental performance

Results are given per declared unit (1 kg). Mandatory core and additional indicators carry the disclaimers of EN 15804+A2 §7.2.3.3 (Table 5): they are potential values and relative statements that do not predict impacts on endpoints, thresholds or risks (§8.2). Result tables contain no blank cells; 0.00E+00 denotes a value calculated as zero or below the reporting limit.

TABLE 5 — CORE ENVIRONMENTAL IMPACT INDICATORS (PER 1 KG)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	6,70E+00	0,00E+00	1,91E-02	9,60E-01	5,28E-02	-4,03E-01
GWP-fossil	kg CO ₂ eq	6,65E+00	0,00E+00	1,90E-02	9,60E-01	5,28E-02	-3,97E-01
GWP-biogenic	kg CO ₂ eq	5,14E-02	0,00E+00	1,21E-05	7,05E-05	2,60E-05	-5,52E-03
GWP-luluc	kg CO ₂ eq	2,56E-03	0,00E+00	6,14E-06	7,97E-06	3,81E-06	-4,82E-04
ODP	kg CFC-11 eq	1,68E-07	0,00E+00	4,30E-10	3,35E-10	1,69E-10	-1,31E-08
AP	mol H ⁺ eq	2,53E-02	0,00E+00	5,97E-05	2,32E-04	4,49E-05	-1,01E-03
EP-freshwater	kg P eq	1,42E-03	0,00E+00	1,32E-06	3,35E-06	6,71E-07	-1,63E-04
EP-marine	kg N eq	7,48E-03	0,00E+00	2,08E-05	1,32E-04	1,18E-03	-2,23E-04
EP-terrestrial	mol N eq	5,47E-02	0,00E+00	2,26E-04	1,13E-03	1,87E-04	-2,05E-03
POCP	kg NMVOC eq	2,22E-02	0,00E+00	9,45E-05	2,81E-04	7,70E-05	-7,68E-04
ADP-min&met ¹	kg Sb eq	7,55E-05	0,00E+00	6,63E-08	7,22E-08	1,22E-08	-3,04E-07
ADP-fossil ¹	MJ	1,24E+02	0,00E+00	2,69E-01	1,90E-01	1,40E-01	-7,42E+00
WDP ¹	m ³ depriv.	3,83E+00	0,00E+00	1,40E-03	6,75E-02	6,12E-03	-1,01E-01

¹Indicator to be used with care: high uncertainty / limited experience (EN 15804+A2).

Core environmental impact indicators. **GWP-total**, Global Warming Potential total; **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 the freshwater end compartment; **EP-marine**, eutrophication potential, fraction of nutrients reaching the marine end compartment; **EP-terrestrial**, eutrophication potential (accumulated exceedance); **POCP**, formation potential of tropospheric ozone (photochemical ozone formation); **ADP-min&met**, abiotic depletion potential for non-fossil resources (minerals and metals); **ADP-fossil**, abiotic depletion potential for fossil resources; **WDP**, water (user) deprivation potential (deprivation-weighted water consumption).

TABLE 6 — ADDITIONAL IMPACT INDICATORS (PER 1 KG)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PM ²	disease inc.	2,47E-07	0,00E+00	1,52E-09	1,23E-09	1,02E-09	-3,74E-09
IRP ^{2,3}	kBq U235 eq	5,53E-01	0,00E+00	3,07E-04	3,09E-04	1,13E-04	-9,67E-02
ETP-fw ²	CTUe	1,63E+01	0,00E+00	3,98E-02	2,01E+00	1,93E+00	-5,59E-01
HTP-c ²	CTUh	1,11E-09	0,00E+00	3,11E-12	8,67E-11	3,47E-12	-5,44E-11
HTP-nc ²	CTUh	5,32E-08	0,00E+00	1,63E-10	3,04E-09	6,15E-10	-1,39E-09
SQP ²	-	1,24E+01	0,00E+00	1,60E-01	5,54E-02	3,30E-01	-5,92E-01

²Use with care (high uncertainty / limited experience). ³IRP covers low-dose ionising radiation from the nuclear fuel cycle; excludes accidents, occupational exposure and radioactive-waste disposal.

Additional environmental impact indicators. **PM**, potential incidence of disease due to particulate matter emissions; **IRP**, ionising radiation, human health (potential human exposure relative to U235); **ETP-fw**, ecotoxicity, freshwater (comparative toxic unit for ecosystems); **HTP-c**, human toxicity, cancer effects (comparative toxic unit for humans); **HTP-nc**, human toxicity, non-cancer effects (comparative toxic unit for humans); **SQP**, land use related impacts / soil quality index.

Use of resources · waste & output flows

TABLE 7 — USE OF RESOURCES (PER 1 KG)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	4,35E+00	0,00E+00	4,42E-03	7,94E-03	1,92E-03	-8,65E-01
PERM	MJ	4,44E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	4,79E+00	0,00E+00	4,42E-03	7,94E-03	1,92E-03	-8,65E-01
PENRE	MJ	9,65E+01	0,00E+00	2,69E-01	1,90E-01	1,40E-01	-7,42E+00
PENRM	MJ	2,79E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,24E+02	0,00E+00	2,69E-01	1,90E-01	1,40E-01	-7,42E+00
SM	kg	3,21E-02	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
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	1,17E-01	0,00E+00	3,18E-05	1,14E-03	-2,12E-03	-2,34E-03

PERE / PERM / PERT renewable primary energy: used as energy / used as material / total · **PENRE / PENRM / PENRT** non-renewable primary energy: as energy / as material / total · **SM** secondary material · **RSF / NRSF** renewable / non-renewable secondary fuels · **FW** net use of fresh water.

TABLE 8 — WASTE CATEGORIES AND OUTPUT FLOWS (PER 1 KG)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
HWD	kg	6,85E-01	0,00E+00	1,64E-03	1,71E-02	7,11E-04	-1,80E-02
NHWD	kg	8,59E+00	0,00E+00	2,16E-02	4,75E-01	1,52E+00	-8,28E-01
RWD	kg	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
MFR	kg	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
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	1,73E+00	0,00E+00	0,00E+00
EET	MJ	0,00E+00	0,00E+00	0,00E+00	4,28E+00	0,00E+00	0,00E+00

HWD / NHWD / RWD hazardous / non-hazardous / radioactive waste disposed · **CRU** components for re-use · **MFR** materials for recycling · **MER** materials for energy recovery · **EEE / EET** exported electrical / thermal energy.

Variability of the average product

The declared product is an average covering ALFA THERM with and without accessories (tying cord, PA film, aluminium film). In accordance with the EPDItaly Regulation Rev. 7.1 §4.3, the variability of the core impact indicators (A1–A3) across the configurations included in the average has been assessed against the $\pm 10\%$ threshold. Table 9 reports the maximum range relative to the base profile; the worst case corresponds to the configuration with aluminium film.

TABLE 9 — VARIABILITY OF THE CORE INDICATORS ACROSS THE AVERAGE (A1–A3)

Core indicator	Range (max)	> 10%
GWP-total	11.4%	yes
GWP-fossil	11.5%	yes
GWP-biogenic	-1.2%	–
GWP-luluc	66.3%	yes
ODP	2.8%	–
AP	19.9%	yes
EP-freshwater	19.8%	yes
EP-marine	10.9%	yes
EP-terrestrial	15.5%	yes
POCP	11.3%	yes
ADP-min&met	3.3%	–
ADP-fossil	6.1%	–
WDP	5.1%	–

The following core impact categories show a variability greater than 10% among the products included in the average: GWP-total, GWP-fossil, GWP-luluc, AP, EP-freshwater, EP-marine, EP-terrestrial and POCP. The variability is driven mainly by the optional aluminium-film accessory; the declared values are the mass-weighted average representative of 2025 production.

Calculation rules and scenarios

The declared unit is 1 kg of product. Allocation is physical, by extruded mass; cut-off thresholds are 1% per flow and 5% in total (EN 15804+A2 §6.3.6 / CORE PCR §5.5). Secondary materials are modelled with the cut-off (polluter-pays) approach; market-balance and book-and-claim approaches are not used.

Module A1–A3 covers raw-material and energy supply, gas combustion, extrusion, water, direct air emissions and packaging.

End-of-life scenario (by destination market): for European market: 57.3% to disposal (controlled landfill, **C4**; no credit) and 42.7% to incineration with energy recovery (**C3**, D10+R1; fossil-CO₂ load reported in C3); for Extra-Europe market 100% to disposal (controlled landfill, **C4**; no credit). Transport to end-of-life (**C2**) is 100 km by 16–32 t lorry; incineration qualifies as recovery (R1 $\approx 0.82 \geq 0.60$, Directive 2008/98/EC). **Module D** reports net credits from avoided EU-average electricity and heat (plant efficiencies 15% electrical / 37.1% thermal).

Biogenic carbon

The product polymers are of fossil origin (no biogenic carbon). The cellulosic packaging carries biogenic carbon; because module A5 is not declared, the biogenic-CO₂ uptake in A3 is balanced by an equal release reported within the declared A1–A3 results (ECO Platform LCA Calculation Rules v2.0 §2.11). The net GWP-biogenic of the packaging within A1–A3 is therefore nil.

Biogenic carbon in the product	0.00E+00 kg C
Biogenic carbon in the accompanying packaging	1.24E-02 kg C
As % of packaging mass	37.5% (> 5%; balanced in A1–A3)

Table 10 — Biogenic carbon content at the gate (A1–A3), per 1 kg.

Data quality

Data quality is assessed per EN 15941:2024 and EN 15804+A2 Annex E, Table E.2 (PEF, 1 = Very good ... 5 = Very poor). Primary site data (2025) are very good and the ecoinvent v3.12 background is good; geographical representativeness ranges from very good (IT) to fair (GLO/RoW), technological representativeness is good for native datasets and fair for the constructed datasets. No relevant data are poor or very poor; one relevant fair dataset exceeds 30% on a core indicator (the constructed PPE/PA GF20 dataset, which dominates the A1–A3 result). No misleading or exaggerated claims are made.

References

Standards	UNI EN ISO 14025:2010 · EN 15804:2012+A2:2019 · EN 15941:2024 · EN 14024.
Programme	Regolamento EPDItaly Rev. 7.1 (05/09/2025) and Annexes; CORE PCR ICMQ 001 Rev. 4 and Technical Guideline; ECO Platform LCA Calculation Rules v2.0 (2024)