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Environmental Product Declaration

EN ISO 14025:2010

EN 15804:2012+A2:2020

CARTON WALL

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Alier

ALIER S.A.

The holder of this Declaration is responsible for its contents and for keeping the records and the documentation that supports data and statements included during the validity period.

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AENOR is a founding member of ECO Platform, the European Association of Environmental Product Declaration Verification Programmes.

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Independent verification of the declaration and data in accordance with EN ISO 14025:2010 ☐ Internal ☒ External
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1. General Information

1.1. The Organisation

ALIER, S.A. has been a leading company in sustainable manufacturing since 1948, specialising in the production of recycled paper from 100% recovered paper, with a high capacity for recycling paper that is difficult to treat, such as moisture-resistant, laminated, liquid packaging, plastic-coated, etc.

In particular, ALIER, S.A. specifically manufactures paper for the production of gypsum boards. Its properties include high moisture content, resistance between layers, as well as porosity and breaking load in both directions.

The organisation has a Quality Management System and an Environmental Management System in accordance with the requirements of UNE-EN ISO 9001: 2015 and UNE-EN ISO 14001: 2015 standards, respectively. In addition, it has been granted with the PEFC and FSC forest products chain-of-custody compliance certificate.

The company is also certified as an ECOEMBES S.A. approved recoverer/recycler for paper-cardboard and beverage/food cardboard from selective collection.

At present ALIER, S.A. has implemented an Energy Management System based on the UNE-EN ISO 50001: 2018 standard.

1.2. Scope of the Declaration.

This environmental product declaration describes environmental information relating to the life cycle from cradle to gate with modules C1-C4 and D (A1-A3, C and D) of ALIER's Carton Wall paper (ivory and grey) in the different grades and weights manufactured for use in the construction sector.

The specific data of the products' production process included in this LCA study come from ALIER's facilities in Roselló and correspond to the production data for 2021, which is considered representative.

The product for which the EPD is drawn up serves to provide mechanical and structural strength for Plaster Board Liner (PBL).

The present review is issued to include chapter 4.8 for the calculation of biogenic carbon and the review of related data. A new point 6.4 for the reduction of CO2 emissions as a result of Alier's manufacturing processes is also included.

1.3. Life Cycle and Compliance.

This EPD has been developed and verified in accordance with UNE-EN ISO 14025 :2010 and UNE-EN 15804: 2012+A2:2020.

Information on product category rules	
Descriptive title	Sustainability in construction. Environmental product declarations. Basic product category rules for construction products.
Reg. code and version	UNE-EN 15804:2012 + A2:2020
Date of issue	2020-03
Compliance	UNE-EN 15804:2012 + A2:2020
Programme Manager	AENOR Internacional S.A.U.

This EPD includes the life cycle stages listed in table 1-1. This is a cradle-to-gate EPD with modules C1-C4 and D (A1-A3, C, D).

This EPD may not be comparable with those developed in other Programmes or under different reference documents.

Likewise, the EPDs may not be comparable if the source of the data is different (e.g. databases), not all relevant information modules are included or not based on the same scenarios.

Table 1-1. Limits of the system. Information modules considered

Product stage	A1	Supply of raw materials	X
	A2	Transport to factory	X
	A3	Manufacture	X
Construction	A4	Transport to construction works	MNE
	A5	Installation/construction	MNE
Use stage	B1	Use	MNE
	B2	Maintenance	MNE
	B3	Repair	MNE
	B4	Substitution	MNE
	B5	Rehabilitation	MNE
	B6	In-service energy use	MNE
	B7	In-service water use	MNE
End of life	C1	Deconstruction/demolition	MNR
	C2	Transport	X
	C3	Waste treatment	X
	C4	Disposal	X
	D	Potential for re-use, recovery and/or recycling	X
X = Module included in the LCA; MNR = Module not relevant; MNE = Module not evaluated			

The comparison of construction products must be made on the same function, applying the same functional unit and at the level of the building (or architectural or engineering work), that is, including the behaviour of the product throughout its life cycle, as well as the specifications of section 6.7.2 of the UNE-EN ISO 14025 standard.

1.4. Differences from previous versions of this DAP.

This DAP is an update to the version published on 2023-03-10

2. The Product

2.1. Product Identification.

This EPD includes the manufacture of Carton Wall at ALIER facilities located in Roselló (Lleida, Spain).

CPC code: 3215

Product Description

It is a 100% recycled multi-ply paper with a profile and warping correction system to produce Plaster Board Liner (PBL). Its high porosity allows for rapid drying of the board during production. The high quality of ALIER paper gives the PBL board the mechanical and structural strength required by our clients.

This product is mainly divided into two families: Carton Wall Grey and Carton Wall Ivory, available in different weights and colours.

2.2. Product Composition.

The composition declared by the manufacturer for 1 tonne of product is: 94% fully recovered paper and board, in accordance with standard UNE-EN 643: 2014 (European list of standard grades of recovered paper and board) and 6% additives.

The manufacturer declares that none of the components of the final product is included in the "Candidate list of substances of very high concern for authorisation" (SVHC) of the REACH regulation in a percentage higher than 0.1% of the weight of the product.

2.3. Product Performance.

IVORY CARTON WALL (CWY):

- Ivory CW, green ivory CW, Pink ivory CW, yellow ivory CW, sky ivory CW:

PAPER QUALITY WY/WR/WV/WN/WA/SK									
TECHNICAL CHARACTERISTICS									
UNE/EN/ISO – 536	**GRAMS**	**g/m²**	**160**	**170**	**180**	**190**	**200**	**210**	**+/- 3%**
UNE/EN/ISO - 287	Moisture	%	10.0	10.0	10.0	10.0	10.0	10.0	+/- 1.0%
UNE/EN/ISO – 1924/2	Dry Tensile strenght MD	Kgf	19.0	20.0	21.5	21.5	22.5	22.5	-10%
UNE/EN/ISO – 1924/2	Dry Tensile strenght CD	Kgf	6.4	6.5	7.5	7.5	8.5	8.5	-10%
UNE/EN/ISO – 535	Cobb 60 T	g/m²	25	25	25	25	25	25	MAX 30/MIN 20
UNE/EN/ISO – 535	Cobb 60 B	g/m²	25	25	25	25	25	25	MAX 30/MIN 20
UNE/ISO 5636-5	Gurley (air resistance)	S	70	70	70	70	70	70	MAX 90/MIN 40
ISO 2470-1	Whiteness	%	52	52	52	52	52	52	MIN 48
ISO 16260	Plybond	J/m²	270	270	270	270	270	270	MAX 325/MIN 220
ITO4.08-40	Saturation	Min	<30	<30	<30	<30	<30	<30	MAX 30

- High Performance Ivory Carton Wall (ivory, pink ivory and green ivory):

PAPER QUALITY HWY/HWR/HWV									
TECHNICAL CHARACTERISTICS									
UNE/EN/ISO – 536	**GRAMS**	**g/m²**	**120**	**140**	**150**	**160**	**170**	**180**	**+/- 3%**
UNE/EN/ISO - 287	Moisture	%	9.0	10.5	10.5	10.5	10.5	10.5	+/- 1.0%
UNE/EN/ISO – 1924/2	Dry Tensile strenght MD	Kgf	18.0	20.0	20.5	21.5	22.5	23.0	-10%
UNE/EN/ISO – 1924/2	Dry Tensile strenght CD	Kgf	5.7	6.5	7.0	7.2	7.7	8.0	-10%
UNE/EN/ISO – 535	Cobb 60 T	g/m²	25	25	25	25	25	25	MAX 30/MIN 20
UNE/EN/ISO – 535	Cobb 60 B	g/m²	25	25	25	25	25	25	MAX 35/MIN 20
UNE/ISO 5636-5	Gurley (air resistance)	S	60	60	60	60	60	60	MAX 90/MIN 40
ISO 2470-1	Whiteness	%	52	52	52	52	52	52	MIN 48
ISO 16260	Plybond	J/m²	270	290	270	270	270	270	MAX 450/MIN 220
ITO4.08-40	Saturation	Min	<30	<30	<30	<30	<30	<30	MAX 30

- High Bond Ivory Carton Wall:

PAPER QUALITY BWY				
TECHNICAL CHARACTERISTICS				
UNE/EN/ISO – 536	**GRAMS**	**g/m²**	**190**	**+/- 3%**
UNE/EN/ISO - 287	Moisture	%	10.0	+/- 1.0%
UNE/EN/ISO – 1924/2	Dry Tensile strenght MD	Kgf	21.5	-10%
UNE/EN/ISO – 1924/2	Dry Tensile strenght CD	Kgf	7.5	-10%
UNE/EN/ISO – 535	Cobb 60 T	g/m²	25	MAX 30/MIN 20
UNE/EN/ISO – 535	Cobb 60 B	g/m²	25	MAX 35/MIN 20
UNE/ISO 5636-5	Gurley (air resistance)	S	70	MAX 90/MIN 40
ISO 2470-1	Whiteness	%	52	MIN 48
ISO 16260	Plybond	J/m²	270	MAX 325/MIN 220
ITO4.08-40	Saturation	Min	<30	MAX 30

- Antifungal Ivory Carton Wall (ivory, pink ivory and green ivory):

PAPER QUALITY FWY/FWR/FWV									
TECHNICAL CHARACTERISTICS									
UNE/EN/ISO – 536	**GRAMS**	**g/m²**	**160**	**170**	**180**	**190**	**200**	**210**	**+/- 3%**
UNE/EN/ISO - 287	Moisture	%	10.0	10.0	10.0	10.0	10.0	10.0	+/- 1.0%
UNE/EN/ISO – 1924/2	Dry Tensile strenght MD	Kgf	19.0	20.0	21.5	21.5	22.5	22.5	-10%
UNE/EN/ISO – 1924/2	Dry Tensile strenght CD	Kgf	6.4	6.5	7.5	7.5	8.5	8.5	-10%
UNE/EN/ISO – 535	Cobb 60 T	g/m²	25	25	25	25	25	25	MAX 30/MIN 20
UNE/EN/ISO – 535	Cobb 60 B	g/m²	25	25	25	25	25	25	MAX 35/MIN 20
UNE/ISO 5636-5	Gurley (air resistance)	S	70	70	70	70	70	70	MAX 90/MIN 40
ISO 2470-1	Whiteness	%	52	52	52	52	52	52	MIN 48
ISO 16260	Plybond	J/m²	270	270	270	270	270	270	MAX 325/MIN 220
ITO4.08-40	Saturation	Min	<30	<30	<30	<30	<30	<30	MAX 30

- White Top Liner Ivory Carton Wall:

PAPER QUALITY WTL					
TECHNICAL CHARACTERISTICS					
UNE/EN/ISO – 536	**GRAMS**	**g/m²**	**170**	**200**	**+/- 3%**
UNE/EN/ISO - 287	Moisture	%	10.0	10.0	+/- 1.0%
UNE/EN/ISO – 1924/2	Dry Tensile strenght MD	Kgf	20.0	22.5	-10%
UNE/EN/ISO – 1924/2	Dry Tensile strenght CD	Kgf	6.5	8.5	-10%
UNE/EN/ISO – 535	Cobb 60 T	g/m²	25	25	MAX 30/MIN 20
UNE/EN/ISO – 535	Cobb 60 B	g/m²	25	25	MAX 35/MIN 20
UNE/ISO 5636-5	Gurley (air resistance)	S	70	70	MAX 90/MIN 40
ISO 2470-1	Whiteness	%	73	73	MIN 70
ISO 16260	Plybond	J/m²	270	270	MAX 325/MIN 220
ITO4.08-40	Saturation	Min	<30	<30	MAX 30

- White Plus Ivory Carton Wall:

PAPER QUALITY WP				
TECHNICAL CHARACTERISTICS				
UNE/EN/ISO – 536	**GRAMS**	**g/m²**	**200**	**+/- 3%**
UNE/EN/ISO - 287	Moisture	%	10.0	+/- 1.0%
UNE/EN/ISO – 1924/2	Dry Tensile strenght MD	Kgf	22.5	-10%
UNE/EN/ISO – 1924/2	Dry Tensile strenght CD	Kgf	8.5	-10%
UNE/EN/ISO – 535	Cobb 60 T	g/m²	25	MAX 30/MIN 20
UNE/EN/ISO – 535	Cobb 60 B	g/m²	25	MAX 35/MIN 20
UNE/ISO 5636-5	Gurley (air resistance)	S	70	MAX 90/MIN 40
ISO 2470-1	Whiteness	%	62	MIN 56
ISO 16260	Plybond	J/m²	270	MAX 325/MIN 220
ITO4.08-40	Saturation	Min	<30	MAX 30

GREY CARTON WALL (HP):

- Grey Carton Wall, grey green Carton Wall, grey pink Carton Wall:

PAPER QUALITY HP/HR/HV										
TECHNICAL CHARACTERISTICS										
UNE/EN/ISO – 536	GRAMS	g/m²	140	150	160	170	180	190	200	+/- 3%
UNE/EN/ISO - 287	Moisture	%	9.5	9.5	9.5	9.5	9.5	9.5	9.5	+/- 1.0%
UNE/EN/ISO – 1924/2	Dry Tensile strenght MD	Kgf	15.5	16.0	17.5	17.5	17.5	18.5	19.1	-10%
UNE/EN/ISO – 1924/2	Dry Tensile strenght CD	Kgf	6.0	6.5	7.0	7.0	7.0	7.5	7.9	-10%
UNE/EN/ISO – 535	Cobb 60 T	g/m²	25	25	25	25	25	25	25	MAX 30/MIN 20
UNE/EN/ISO – 535	Cobb 60 B	g/m²	30	30	30	30	30	30	30	MAX 35/MIN 20
UNE/ISO 5636-5	Gurley (air resistance)	S	55	55	55	55	55	55	55	MAX 70/MIN 40
ISO 16260	Whiteness	J/m²	270	270	270	270	270	270	270	MAX 325/MIN 220
ITO4.08-40	Plybond	Min	<30	<30	<30	<30	<30	<30	<30	MAX 30

- High Performance Grey Carton Wall (grey, grey pink and grey green):

PAPER QUALITY HHP/HHR/HHV											
TECHNICAL CHARACTERISTICS											
UNE/EN/ISO – 536	GRAMS	g/m²	120	125	130	135	140	150	160	170	+/- 3%
UNE/EN/ISO - 287	Moisture	%	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	+/- 1.0%
UNE/EN/ISO – 1924/2	Dry Tensile strenght MD	Kgf	16.1	16.4	16.8	17.1	17.5	18.0	18.5	19.5	-10%
UNE/EN/ISO – 1924/2	Dry Tensile strenght CD	Kgf	6.8	7.0	7.2	7.3	7.5	7.8	8.0	8.5	-10%
UNE/EN/ISO – 535	Cobb 60 T	g/m²	25	25	25	25	25	25	25	25	MAX 30/MIN 20
UNE/EN/ISO – 535	Cobb 60 B	g/m²	30	30	30	30	30	30	30	30	MAX 35/MIN 20
UNE/ISO 5636-5	Gurley (air resistance)	S	50	50	50	50	50	50	50	50	MAX 70/MIN 40
ISO 16260	Whiteness	J/m²	270	270	270	270	270	270	270	270	MAX 450/MIN 220
ITO4.08-40	Plybond	Min	<30	<30	<30	<30	<30	<30	<30	<30	MAX 30

- High Bond Grey Carton Wall:

PAPER QUALITY BHP							
TECHNICAL CHARACTERISTICS							
UNE/EN/ISO – 536	**GRAMS**	**g/m²**	**150**	**160**	**170**	**180**	**+/- 3%**
UNE/EN/ISO - 287	Moisture	%	9.5	9.5	9.5	9.5	+/- 1.0%
UNE/EN/ISO – 1924/2	Dry Tensile strenght MD	Kgf	16.0	17.5	17.5	17.5	-10%
UNE/EN/ISO – 1924/2	Dry Tensile strenght CD	Kgf	6.5	7.0	7.0	7.0	-10%
UNE/EN/ISO – 535	Cobb 60 T	g/m²	25	25	25	25	MAX 30/MIN 20
UNE/EN/ISO – 535	Cobb 60 B	g/m²	30	30	30	30	MAX 35/MIN 20
UNE/ISO 5636-5	Gurley (air resistance)	S	55	55	55	55	MAX 70/MIN 40
ISO 16260	Whiteness	J/m²	270	270	270	270	MAX 325/MIN 220
ITO4.08-40	Plybond	Min	<30	<30	<30	<30	MAX 30

3. LCA Information

3.1. Life Cycle Analysis.

The Life Cycle Assessment Report for the ALIER S.A. Carton Wall EPD was carried out by the company Abaleo S.L. using the Ecoinvent 3.8 database and the SimaPro 9.4.0.2 software, which was the most up-to-date version available at the time the LCA was carried out.

In order to carry out the study, data was taken from the ALIER plant located in Roselló, Lleida (Spain).

The LCA study follows the recommendations and requirements of the international standards ISO 14040:2006, ISO 14044:2006 and the European Standard UNE-EN 15804:2012+A2:2020 as the reference CPR.

3.2. Scope of the study.

The scope of this LCA covers the cradle-to-gate Carton Wall production with modules C1-C4 and D (A1-A3, C, D) for use in the construction sector.

The following phases of the product life cycle were studied:

Product stage.

- A1, production of the raw materials that are part of the final product.
- A2, transport of raw materials to ALIER's facilities.
- A3, production of Carton Wall at the Roselló plant, including energy consumption; production of auxiliary materials and their transport to the factory; and transport and management of waste generated.

End of life stage.

- C1, deconstruction.
- C2, transport of the disassembled materials to the waste treatment or final disposal site.
- C3, treatment of waste for re-use, recovery and/or recycling.
- C4, waste disposal, including physical pre-treatment and management at the disposal site and the associated energy and water use.

Benefits and loads beyond the system.

- D, potential for re-use, recovery and/or recycling, expressed as net benefits and loads.

This LCA does not include:

- All equipment with a service life of more than 3 years.
- The construction of plant buildings, nor other capital assets.
- Business trips; nor staff trip to or from work; and
- Research and development activities.

This LCA does not consider the CO2 absorption associated with carbonation that occurs during the product's life cycle.

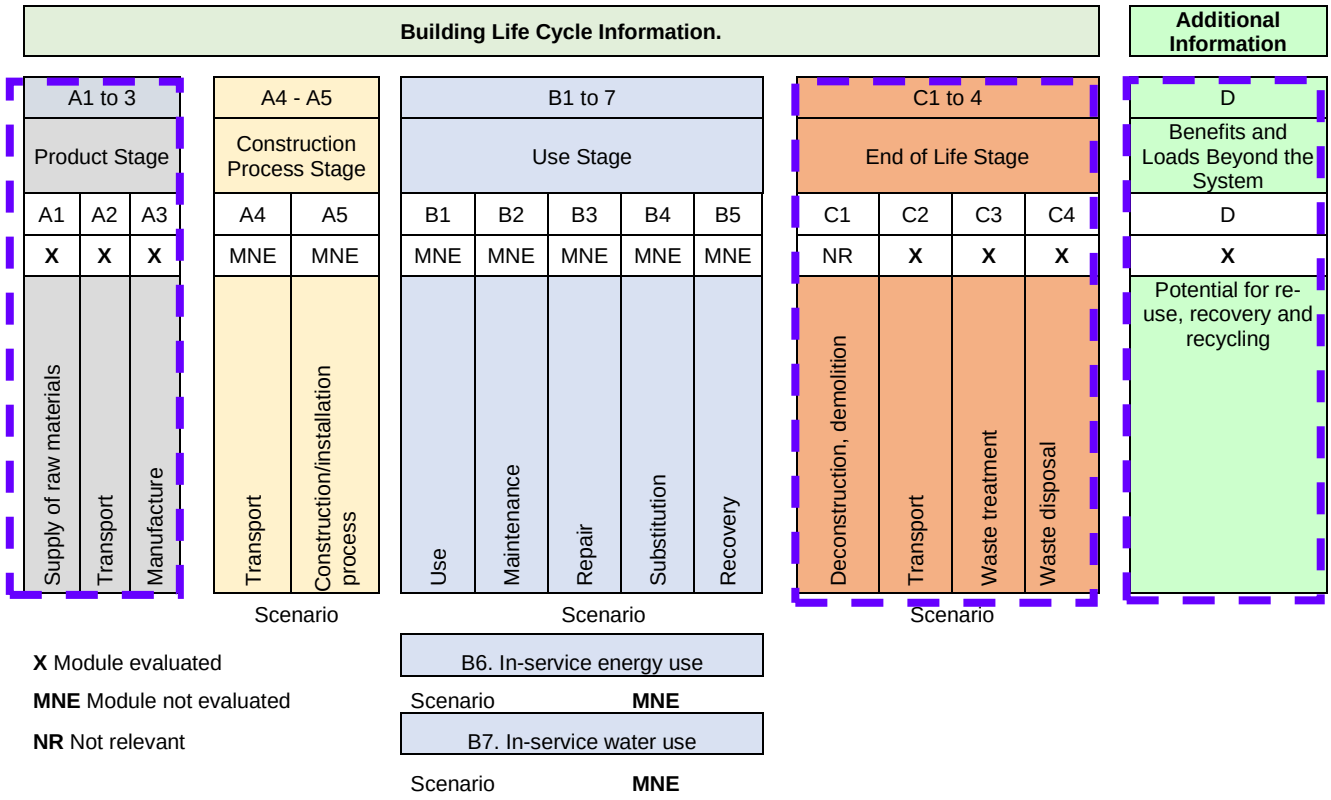


Figure 1. Stages and information modules for building assessment. Building life cycle.

3.3. Declared Unit.

The declared unit is one tonne of product, including the relevant part of the packaging.

3.4. Reference Service Life (RSL).

Carton Wall Reference Service Life (RSL): not specified as it is a cradle-to-gate EPD with modules C and D. Assembly processes and/or installation are outside the scope of this EPD.

3.5. Allocation Criteria.

In accordance with the criterion of the reference standard:

- Where possible, the product system was extended to avoid allocating the environmental impacts of multi-output unit processes.
- Where allocation could not be avoided, the system's inputs and outputs were allocated by mass. This allocation criterion was applied for electricity, oil, gas and packaging consumption, and waste.

It was not necessary to apply financial allocation criteria.

3.6. Cut-Off Criteria.

The gross weight/volume of all materials used in the manufacturing process was included in the LCA. Consequently, the criterion of including at least 99% of the total weight of the products used for the declared functional unit was fulfilled.

3.7. Representativeness, Quality and Selection of Data.

In order to model the manufacturing process of ALIER's Carton Wall, production data corresponding to the year 2021, which is a period with representative production data, were used for the plant located in Roselló (Lleida, Spain). From this factory we obtained data on: consumption of materials and energy; transport; and waste generation.

Where necessary, the Ecoinvent 3.8 database (November 2021), which was the latest version available at the time of the LCA, was used. SimaPro 9.4.0.2 software was used for the inventory data, for modelling the LCA and for

calculating the environmental impact categories required by the reference standard, which was the most up-to-date version available at the time of the study.

The following criteria were applied to select the most representative processes:

- Data representing the technological development applied in the manufacturing processes. In case no information was available, a data representing an average technology was chosen.
- Geographic data as close as possible and, where appropriate, regionalised means.
- Data as up to date as possible.

To assess the quality of the primary data of ALIER's Carton Wall production, the semi-quantitative data quality assessment criteria proposed by the European Union in its Guide to the Environmental Footprint of Products and Organisations were applied. The results obtained were as follows:

- Very good integrity. Score 1.
- Reasonable methodological appropriateness and coherence. Score 3.
- Very good temporal representativeness. Score 1.
- Good technological representativeness. Score 2.
- Very good geographical representativeness. Score 1.
- Low data uncertainty. Score 2.

In accordance with the above data, the Data Quality Rating (DQR) has the following value: 9/6= 1.5, which indicates that the quality of the data is excellent.

To better understand the data quality assessment carried out, please note that the score for each of the criteria ranges from 1 to 5 (the lower the score, the higher the quality) and that the following table is applied to obtain the final score:

Overall Data Quality Rating (DQR)	Overall Level of Data Quality
≤ 1.6	Excellent
1.6 to 2.0	Very good
2.0 to 3.0	Good
3 to 4.0	Reasonable
> 4	Insufficient

4. System boundaries, scenarios, and additional technical information.

4.1. Module A1 – Production of Raw Materials.

This module includes the production processes of raw materials, in which the following is considered:

- Extraction of resources and raw materials.
- Transport of raw materials to processing/production centres.
- Fuel and energy consumption during the production of raw materials.
- Consumption of other resources (such as water) during the production of raw materials.
- The generation of waste and emissions to air and discharges to water and soil during the production of raw materials.

4.2. Module A2 - Transport of Raw Materials to the Factory.

The transport of all raw materials from the production sites (suppliers) to ALIER's facilities was considered, distinguishing in each case the mode of transport used: lorries and ships. The transport distances of the raw materials were provided by ALIER, which knows the location of the plant and its suppliers' facilities.

4.3. Module A3 - Manufacture.

This module includes:

- The Carton Wall manufacture process.
- The production of ancillary materials and their transport to the plant.
- The manufacture of packaging and its transport from the suppliers to the plant.

The transport distances of the waste were provided by ALIER, which knows the location of the plant and its waste managers' facilities.

4.4. Module C1 – Deconstruction/Demolition.

The LCA considered that the deconstruction module (C1) was not relevant for the quantitative analysis. The consumption of material and energy for the deconstruction and extraction of the Carton Wall was not relevant in the context of the building or civil works of which it forms part.

4.5. Module C2: Transport to the Waste Treatment/Recovery Plant.

It is considered that the waste deriving from the Carton Wall is transported an average of 50km to the closest waste management plant in 16-32 tonne EURO5 lorries.

4.6. Module C3 – Waste Treatment, and Module C4 – Waste Disposal.

At the end of its service life, the Carton Wall is all sent to landfill. The end-of-life scenario for the product is:

Table 4-1 Module C Parameters

Parameter	Value (per declared unit)
Demolition	It is considered that during the deconstruction and dismantling of the Carton Wall the consumption of materials and energy is not relevant in the context of the building or civil works of which they form part.
Collection process, specified by type	0 kg collected separately 1.000 kg collected with mixed construction waste.
Recovery system, specified by type	0 kg for re-use 0 kg of board for recycling 0 kg for energy recovery
Disposal, specified by type	1.000 kg of product or material for final disposal in landfill.
Assumptions made to develop scenarios (transport)	Transport of waste in 16-32 tonne EURO5 lorries: Average distance of 50 km from the works to the waste management plants.

4.7. Module D – Benefits Beyond the System.

In the absence of any end-of-life recovery system for the product in question, there are no benefits beyond the system.

4.8. Biogenic carbon content in the Carton Wall.

Annex C.2.4 of the UNE EN 15804+A2 standard indicates that "the removal of CO2 in biomass from all sources except native forests is considered, such as carbon transfer, sequestered by active biomass, from nature to the declared product system, as biogenic GWP. This parameter also groups the GWP from the transfer of any biogenic carbon from previous product systems into the studied product system."

ALIER uses used paper and cardboard as secondary raw material for the manufacture of cardboard for construction products. To determine the biogenic carbon content in the Carton Wall, the provisions of the UNE EN 16485. Sawn wood and round wood. Environmental Product Declarations. Category rule for wood products and wood derivatives for use in construction standard are adopted as a reference.

In the case of ALIER, used paper and cardboard reach the end of waste status when ALIER begins to process it to introduce it into its manufacturing process. The biogenic carbon content of wood entering the product system as wood from secondary sources is considered an inherent property of the material.

To produce 1 ton of cardboard, ALIER needs 1,230.88 kg of used paper and cardboard, so the amount of biogenic carbon contained in the 1,230.88 kg needed to produce 1 ton of Carton wall is as follows:

1,230.88 kg of cardboard * 0.5 kg C/ kg of wood * 44/12 kgCO2e/kg C = 2,255.15 kg CO2e fixed in the paper and cardboard from the wood needed to produce the Carton Wall.

Of the total CO_2e fixed:

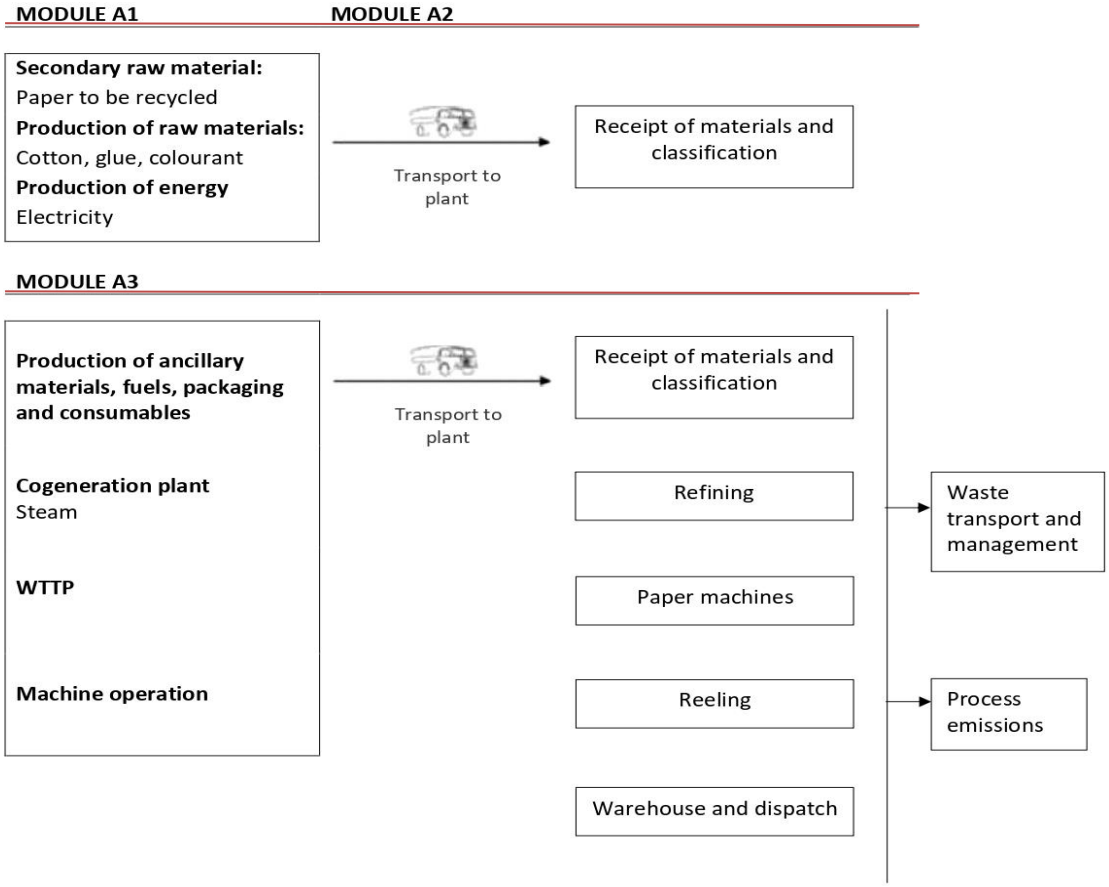
- The biogenic CO_2 fixed in the amount corresponding to the management in landfill or incineration of used paper and cardboard waste that is not transformed into Carton Wall is emitted in A3, that is:

  1,230.88 kg of cardboard * 0.23 * 0.5 kg C/ kg of wood * 44/12 kgCO_2e/kg C = 421.82 kg CO_2e fixed in the paper and cardboard from the wood needed to produce the Carton Wall, which become production waste.

- All the biogenic carbon contained in 1 ton of Carton Wall is emitted in C3 and C4, that is:

  1,000 kg of cardboard * 0.5 kg C/ kg of wood * 44/12 kgCO_2e/kg C = 1,833.33 kg CO_2e fixed in the wood necessary to produce the Carton Wall.

In short, in the entire life cycle of the Carton Wall, the biogenic carbon fixed in the wood, which is the raw material that was used to produce the used paper and cardboard, which is the secondary raw material that Alier uses, turns out to be neutral.



MODULE C1 to C4

- C2, transport of the discounted materials to the waste treatment or disposal site.
- C3, waste treatment for re-use, recovery and/or recycling.
- C4, waste disposal, including physical pre-treatment and management at the disposal site and associated energy and water use.

MODULE D

5. LCA and LCI Environmental Parameter Declaration.

The different environmental parameters obtained from the Life Cycle Assessment (LCA) for the production of 1 tonne of Carton Wall are presented below.

The estimated impact results are relative and do not indicate the final value of the impact categories, nor do they refer to threshold values, safety margins or risks.

5.1. Environmental Impacts.

Table 5-1 Parameters describing the environmental impacts defined in the UNE-EN 15804 Standard for the production of 1 tonne of ALIER's Carton Wall.

Parameter	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	-1,98E+03	1,78E+01	9,21E+02	-1,04E+03	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	7,47E+00	1,83E+03	2,59E+00	0
GWP-fossil	2,40E+02	1,78E+01	5,09E+02	7,67E+02	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	7,46E+00	0	2,59E+00	0
GWP-biogenic	-2,25E+03	1,16E-03	4,12E+02	-1,84E+03	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	4,87E-04	1,83E+03	7,03E-04	0
GWP-luluc	3,69E+01	3,49E-04	2,46E-01	3,72E+01	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	1,46E-04	0	1,64E-04	0
ODP	9,13E-06	3,85E-07	6,56E-05	7,51E-05	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	1,61E-07	0	4,12E-08	0
AP	1,54E+00	4,50E-02	3,99E-01	1,98E+00	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	9,39E-03	0	2,43E-02	0
EP-freshwater	1,13E-02	1,40E-05	2,91E-02	4,04E-02	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	5,87E-06	0	3,08E-06	0
EP-marine	4,20E-01	1,74E-02	3,28E-01	7,66E-01	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	2,33E-03	0	1,14E-02	0
EP-terrestrial	3,31E+00	1,84E-01	1,17E+00	4,67E+00	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	2,27E-02	0	1,24E-01	0
POCP	8,53E-01	7,30E-02	9,12E-01	1,84E+00	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	1,76E-02	0	3,66E-02	0
ADP-minerals&metals [2]	9,23E-04	6,16E-07	2,59E-05	9,49E-04	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	2,58E-07	0	1,08E-07	0
ADP-fossil [2]	2,87E+03	2,36E+02	7,06E+03	1,02E+04	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	9,87E+01	0	3,40E+01	0
WDP [2]	2,31E+02	2,15E-01	1,14E+02	3,45E+02	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	9,01E-02	0	4,38E-02	0

GWP - total (kg CO2 eq.): Global warming potential; **GWP - fossil (kg CO2 eq.)**: Global warming potential of fossil fuels; **GWP - biogenic (kg CO2 eq.)**: Biogenic global warming potential; **GWP - luluc (kg CO2 eq.)**: Global warming potential of soil use and soil-use change; **ODP (kg CFC-11 eq)**: Stratospheric ozone depletion potential; **AP (mol H+ eq)**: Acidification potential, cumulative surplus; **EP-freshwater (kg PO4 eq)**: Eutrophication potential, fraction of nutrients reaching the final freshwater compartment; **EP-marine (kg N eq)**: Eutrophication potential, fraction of nutrients reaching the final marine water compartment; **EP-terrestrial (mol N eq)**: Eutrophication potential, cumulative surplus; **POCP (kg NMVOC eq)**: Tropospheric ozone formation potential; **ADP-minerals&metals (kg Sb eq)**: Abiotic depletion potential for non-fossil resources; **APD-fossil (MJ, v.c.n)**: Abiotic depletion potential for fossil resources; **WDP (m3 eq)**: Water deprivation potential (user), weighted water deprivation consumption.

Table 5-2 Parameters describing the additional environmental impacts defined in the UNE-EN 15804 Standard for the production of 1 tonne of ALIER's Carton Wall.

Parameter	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	1,05E-05	1,18E-06	2,87E-06	1,45E-05	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	4,50E-07	0	6,99E-07	0
IRP [1]	6,04E+01	3,77E-02	1,57E+00	6,20E+01	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	1,58E-02	0	5,82E-03	0
ETP-fw [2]	3,48E+03	1,05E+02	1,35E+03	4,93E+03	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	4,41E+01	0	1,63E+01	0
HTP-c [2]	1,07E-07	1,23E-09	1,83E-08	1,26E-07	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	4,75E-10	0	1,52E-10	0
HTP-nc [2]	2,89E-06	1,26E-07	6,32E-07	3,65E-06	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	5,31E-08	0	4,01E-09	0
SQP [2]	2,93E+03	4,51E-01	3,44E+02	3,27E+03	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	1,89E-01	0	4,23E+01	0

PM (Disease incidence): Particulate matter emissions resulting in potential for diseases; **IRP (kBq U235 eq)**: Efficiency of exposure of human potential related to U235; **ETP-fw (CTUe)**: Comparative ecosystem toxic unit potential - freshwater; **HTP-c (CTUh)**: Comparative ecosystem toxic unit potential - carcinogenic effects; **HTP-nc (CTUh)**: Comparative ecosystem toxic unit potential – non-carcinogenic effects; **SQP (Pt)**: Soil quality potential index.

Note 1. This impact category deals mainly with the potential impacts of low doses of ionising radiation on human health from the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents and occupational exposure due to the disposal of radioactive waste in underground facilities. The ionising radiation potential of soil, due to radon or some building materials is not measured in this parameter either.
Note 2. The results of this environmental impact indicator should be used carefully as the results are highly uncertain and experience with this parameter is limited.

5.2. Use of Resources.

Table 5-3 Parameters describing the use of resources for the production of 1 tonne of ALIER's Carton Wall.

Parameter	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	1,92E+03	6,23E-01	1,13E+02	2,04E+03	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	2,61E-01	0	9,23E-01	0
PERM	2,06E+04	0	9,09E+01	2,07E+04	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	0	0	0	0
PERT	2,25E+04	6,23E-01	2,04E+02	2,27E+04	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	2,61E-01	0	9,23E-01	0
PENRE	5,65E+03	237,11522	7135,0258	1,30E+04	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	9,93E+01	0	3,41E+01	0
PENRM	0	0	4,22E+01	4,22E+01	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	0	0	0	0
PENRT	5,65E+03	2,37E+02	7,18E+03	1,31E+04	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	9,93E+01	0	3,41E+01	0
SM	1,23E+03	0	0	1,23E+03	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	0	0	0	0
RSF	0	0	0	0	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	0	0	0	0
NRSF	0	0	0	0	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	0	0	0	0
FW	5,00E+00	9,96E-03	1,98E+00	6,98E+00	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	4,17E-03	0	1,95E-03	0

PERE (MJ, v.c.n.): Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM (MJ, v.c.n.):** Use of renewable primary energy as raw materials; **PERT (MJ, v.c.n.):** Total use of renewable energy; **PENRE (MJ, v.c.n.):** Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials; **PENRM (MJ, v.c.n.):** Use of non-renewable primary energy as raw materials; **PENRT (MJ, v.c.n.):** Total use of non-renewable energy; **SM (kg)**: Use of secondary materials; **RSF (MJ, v.c.n.):** Use of renewable secondary fuels; **NRSF (MJ, v.c.n.):** Use of non-renewable secondary fuels; **FW (m^3)**: Net use of flowing water resources.

5.3. Waste Category.

Table 5-4 Parameters describing the waste categories for the production of 1 tonne of ALIER's Carton Wall.

Parameter	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	1,05E-02	1,57E-03	3,30E-02	4,51E-02	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	6,55E-04	0	2,27E-04	0
NHWD	1,74E+01	1,17E-02	2,26E+02	2,43E+02	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	4,90E-03	0	9,99E+02	0
RWD	3,84E-02	2,03E-05	1,14E-03	3,96E-02	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	8,51E-06	0	2,64E-06	0

HWD (kg): Hazardous waste disposed; **NHWD (kg)**: Non-hazardous waste disposed; **RWD (kg)**: Radioactive waste disposed.

5.4. Outflows.

Table 5-5 Parameters describing the outflows for the production of 1 tonne of ALIER's Carton Wall.

Parameter	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
CRU	0	0	0	0	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	0	0	0	0
MFR	0	0	5,35E+02	5,35E+02	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	0	0	0	0
MER	0	0	7,89E+00	7,89E+00	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	0	0	0	0
EE	0	0	0	0	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNE	MNR	0	0	0	0

CRU (kg): Components for re-use; **MFR (kg)**: Materials for recycling; **MER (kg)**: Materials for energy recovery; **EE (MJ)**: Exported energy

5.5. Information on Biogenic Carbon Content.

Table 5-6 Information describing the biogenic carbon content in the ALIER Carton Wall factory door**.**

Element	Biogenic Carbon Content	Units	Result per Functional Unit
ALIER's Carton Wall	Product biogenic carbon content - KgC	Kg C	5,00E+02
	Packaging biogenic carbon content - KgC	Kg C	2,69E-00

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

6. Additional Environmental Information.

6.1. Indoor Air Emissions.

The manufacturer declares that the Carton Wall generates no indoor air emissions during its service life.

6.2. Discharge to Land and Water.

The manufacturer declares that the Carton Wall generates no discharge to soil or water during its service life.

6.3. ALIER's Carbon Footprint.

As part of its commitment to the fight against climate change, ALIER has calculated its carbon footprint for 2020 and 2021 in accordance with the requirements of the UNE-EN ISO 14064-1: 2019 standard.

Within the objectives of decarbonisation, in the coming years ALIER will implement different projects to reduce its GHG emissions (installation of a biomass plant, installation of solar panels, etc.).

The company also plans to be registered in the Spanish Ministry for the Ecological Transition and Demographic Challenge's Carbon Footprint Register.

6.4. Reduction of CO_2 emissions as a result of Alier's manufacturing processes.

For its manufacturing process, ALIER uses paper and cardboard waste with a high percentage of unsuitable materials, which, after appropriate recycling operations, it converts into its secondary raw material. It is a type of waste that is not used by other industries, and which, if it is not used by ALIER, would become waste managed in landfills or incinerated.

Thanks to the secondary raw material obtained after recycling paper and cardboard waste, which remains contained in the Carton Wall, ALIER's manufacturing processes allow reducing Greenhouse Gas emissions from landfills and waste incineration by between 600.76 $kgCO_2e$ and 17.77 $kgCO_2e$, respectively (according to waste treatment applied) per ton of Carton Wall manufactured.

6.5. Other Environmental Matters.

ALIER has an R&D&I department focused on the development of new sustainable products and the search for solutions to recover and minimise waste resulting from its processes.

In terms of water, a project is being carried out to reduce water consumption and to be able to re-use it.

References

[1] Standard UNE-EN 15804:2012+A2:2020. Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.

[2] General Rules of the GlobalEPD Programme, 2nd Revision. AENOR. February 2016.

[3] Standard UNE-EN ISO 14025:2010. Environmental labels and declarations. Type III environmental declarations. Principles and procedures. (ISO 14025:2006).

[4] Standard UNE-EN ISO 14040:2006/A1:2021. Environmental management. Life cycle assessment. Principles and framework. Amendment 1. (ISO 14040:2006/Amd 1:2020).

[5] Standard UNE-EN ISO 14044:2006/A1:2021. Environmental management. Life cycle assessment. Requirements and guidelines. Amendment 2. (ISO 14044:2006/Amd 2:2020).

[6] Life Cycle Assessment Report for ALIER S.A.'s Carton Wall EPD, drafted by Abaleo S.L. February 2023. Version 2.

[7] Ecoinvent 3.8 database (November 2021).

[8] Environmental impact assessment methodologies applied through SimaPro 9.4.0.2

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