ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025:2006 for:

CORRUGATED CARDBOARD PACKAGING WITH PRINTING (FLEXOGRAPHIC AND DIGITAL) MANUFACTURED FROM RECYCLED FIBER BY

Grupak

Papel y empaque de cartón corrugado

EPD® THE INTERNATIONAL EPD® SYSTEM

LATIN AMERICA EPD®

Programme:	The International EPD® System, www.environdec.com	**Publication date:**	2025-11-17
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01 General information

Product Category Rules (PCR)
PCR 2010:14, Version 3.1.1. Processed paper and paperboard, UN CPC 3214
PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Paola Borla. The review panel may be contacted via the Secretariat www.environdec.com/contact.

Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ Individual EPD verification without a pre-verified LCA/EPD tool **Third-party verifier:** Ruben Carnerero - Approved EPD verifier - r.carnerero@ik-ingenieria.com, IK Ingeniería SL **Observer:** Liher Beltrán - l.beltran@ik-ingenieria.com, IK Ingeniería SL **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

Programme information	
Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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The EPD owner has the sole ownership, liability, and responsibility for the EPD.

"EPDs within the same product category but from different programmes may not be comparable. 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"

02 Information about EPD owner

Owner of the EPD:	Grupak S.A de C.V.
Contact	Jazel Ayala Nuñez Email: jayala@grupak.com.mx Phone: 5625642283
Description of the organisation:	Grupak is a Mexican company that produces 100% recycled paper with FSC certification. The products are fully recyclables and biodegradables.
Address and contact information of the LCA practitioner commissioned by the EPD owner:	Center for Life Cycle Assessment and Sustainable Design Address: Bosques De Bohemia 2 No. 9, Bosques del Lago. Cuautitlán Izcalli. Estado De México. C.P. 54 766, México. Tel: +52 55 26 02 96 94 www.cadis.earth Contact: jpchargoy@cadis.earth

Grupak is one of Mexico's leading manufacturers and suppliers of liner and medium papers. Its objective is to ensure supply security, supported by fully integrated processes that extend from secondary-fibre collection to paper manufacturing and corrugated-packaging production. The company designs its products to enhance customer competitiveness. In a corrugated box, the liner and medium papers serve as the inside and outer of the structure of the corrugated board.

03 Product information

Product name:	Corrugated cardboard packaging with printing (flexographic and digital) manufactured from recycled fiber by Grupak.
Product description:	The Corrugated cardboard packaging with printing (flexographic and digital) produced by Grupak is manufactured with 100% recyclable and recycled materials. With materials regulated under the standards of the Forest Stewardship Council Chain of Custody (FSC CoC) Recycled and Mix.
UN CPC code:	3214.
Name and location of production site(s):	**Cuernavaca** Av. Atlacomulco 117 A; Chapultepec, C.P. 62450; Cuernavaca, Morelos. **Hidalgo** Carretera Federal Pachuca CD. Sahagún tramo Cd. Sahagún Emiliano Zapata Km. 20 Emiliano Zapata, C.P. 43960 Hidalgo. **Toluca** Calle Cuatro Norte 302, Parque Industrial Toluca 2000, C.P. 50200 Toluca de Lerdo, Estado de México.

Figure 1. Corrugated cardboard packaging.

EPD shall not include rating, judgements, or direct comparisons with other products or companies.

“Other products” include previous or alternative versions of the studied product, i.e., the EPD shall not display changes in the environmental performance results of a product over time, or differences with regard to a hypothetical version of the product using, e.g., alternative production processes or input materials. “Other companies” means that the EPD shall not in any way imply that the EPD owner is, for example, “a market leader” or “more sustainable” (or similar) compared to its competitors.

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03 Product information

The printing of the packaging is applied to its outer surfaces. Single wall corrugated cardboard packaging is manufactured with three papers: two outer and inner facings (liners) and a central paper that forms the corrugated medium (flute).

It includes two protective barriers against ink migration. Double-wall corrugated cardboard packaging is manufactured with five papers: two outer and inner facings, one central paper, and two corrugated mediums (flutes), providing four protective barriers against ink migration that prevent contact with the products contained inside.

Types of Corrugated Cardboard Packaging

- Regular Slotted Corrugated Boxes (RSC): These boxes are the most common and economical type of corrugated cardboard boxes, as the entire sheet of cardboard is used in their manufacturing. These boxes have two flaps that meet completely close at the center.
- Overlap Slotted Corrugated Boxes (OSC): These boxes have flaps that overlap with one another, providing greater security and cushioning for the product placed inside. They are commonly used for delicate or heavy products that could deform or break a regular slotted corrugated box.
- Die-Cut Corrugated Boxes: These boxes feature special designs and are self-assembling. Their manufacturing requires a die-cut process. They are highly specialized self-assembling boxes with automatic closures.

Physical Characteristics:	Free from physical contamination such as wood and metallic particles.
Chemical Characteristics:	Heavy metals are less than 100 ppm.
Biological Characteristics:	Fecal Coliforms (Absence) Total Coliforms (< 200 UFC/cm² of surface)
Expected service life:	The useful life is up to three months under proper storage conditions. The shelf life is related to mechanical and physical properties.
Storage Conditions:	Store in a dry environment.
Handling Instructions:	Handle with care, materials are susceptible to damage and mistreatment from strong impacts or friction against surfaces.
Intended Use:	Secondary/tertiary packaging material. Manufactured according to the specifications agreed with our customers and in compliance with our quality standards. It can be used safely for the purposes for which it was manufactured.

Table 1. Technical characteristics.

04 Content declaration

Table 2 presents the content declaration for Corrugated cardboard packaging with printing (flexographic and digital), including the materials and information on their hazardous properties, in accordance with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), issued by the United Nations. Information on the distribution of packaging is also provided.

Recycled material

Corrugated cardboard packaging with printing (flexographic and digital) contain post-consumer carboard, which represents 99.39% of its total composition. The post-consumer carboard indicated in Table 2 has been collected and recovered as input material for a recycling process.

Product content	Weight (kg)	Weight (%)	Environmental / Hazardous Properties (GHS Hazard Codes)1	CAS No.	Biogenic material, mass-% of product	Biogenic material, kg C/product or declared unit
Corrugated board Manufactured from post-consumer material	993.89	99.39	Not present	N/A	45	446
Inks	4.99	0.50	Not present	N/A	0.0	0.0
Adhesive	0.63	0.06	Not present	N/A	0.0	0.0
Others	0.50	<1	Not present	N/A	0.0	0.0
Total	1000	100	–	N/A	45	446

Packaging material Weight (kg)	Weight (kg)	Mass-% (versus the product)	Biogenic material, kg C/product or declared unit
Corrugated board	4.84E+00	<1	<1
Film	4.42E-01	<1	0.0
Strapping	1.35E-01	<1	0.0
Total	5.41E+00	**<1**	**<1**

Table 2. Content Corrugated cardboard packaging with printing (flexographic and digital) manufactured by Grupak and its distribution packaging

[1]Corrugated cardboard packaging with printing (flexographic and digital) is not considered to have hazardous environmental properties according to the Classification of Chemicals based on the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).
[2]1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO_2.

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05 LCA information

Potential environmental impacts were calculated in accordance with PCR 2010:14 V 3.1.1. Processed paper and paperboard. This EPD is in accordance with ISO 14025:2006. Potential environmental impacts were calculated through Life Cycle Assessment (LCA) methodology conformity to ISO 14040:2006 and ISO 14044:2006. An external third-party verification process of the EPD was conducted according to General Programme Instructions from the International EPD® System Version 5.0.1. (General Programme Instructions for The International EPD System, 2025).

5.1. Declared unit

1000 kg of Corrugated cardboard packaging with printing (flexographic and digital), with grammages from 325 g/m^2 to 1200 g/m^2 and a moisture content of 6–8%, manufactured from secondary fiber by the company Grupak at the Toluca, Cuernavaca and Hidalgo plants.

5.2. Reference service life
No applicable

5.3. Time representativeness
Direct data obtained from Grupak is representative for 2023.

5.4 Geographical scope
Global

5.5 Database and LCA software used
Ecoinvent 3.10, implemented in the SimaPro 9.6.0.1 software.

05 LCA information

5.6 System boundary

The system boundary is cradle-to-gate and is divided into three different modules:

- Upstream processes
- Core processes
- Downstream processes

In the EPD, the environmental performance associated with each life cycle phase is reported separately, in accordance with the requirements specified in the reference PCR.

Upstream process:

- Production of inks and other chemicals used in the core processes.
- Production of the raw material (corrugated board) used in the core process.
- Production of packaging used to transport the raw materials of the core processes.
- Production of electricity and fuels used in the core processes. The residual national electricity mix has been chosen for electricity used.

Core process:

- Transportation of raw materials, auxiliary inputs and their packaging.
- Water consumption.
- Water and air emissions.
- Disposal and transport of waste generated during production processes.

Downstream process:

- Disposal of packaging waste (based on scenarios).

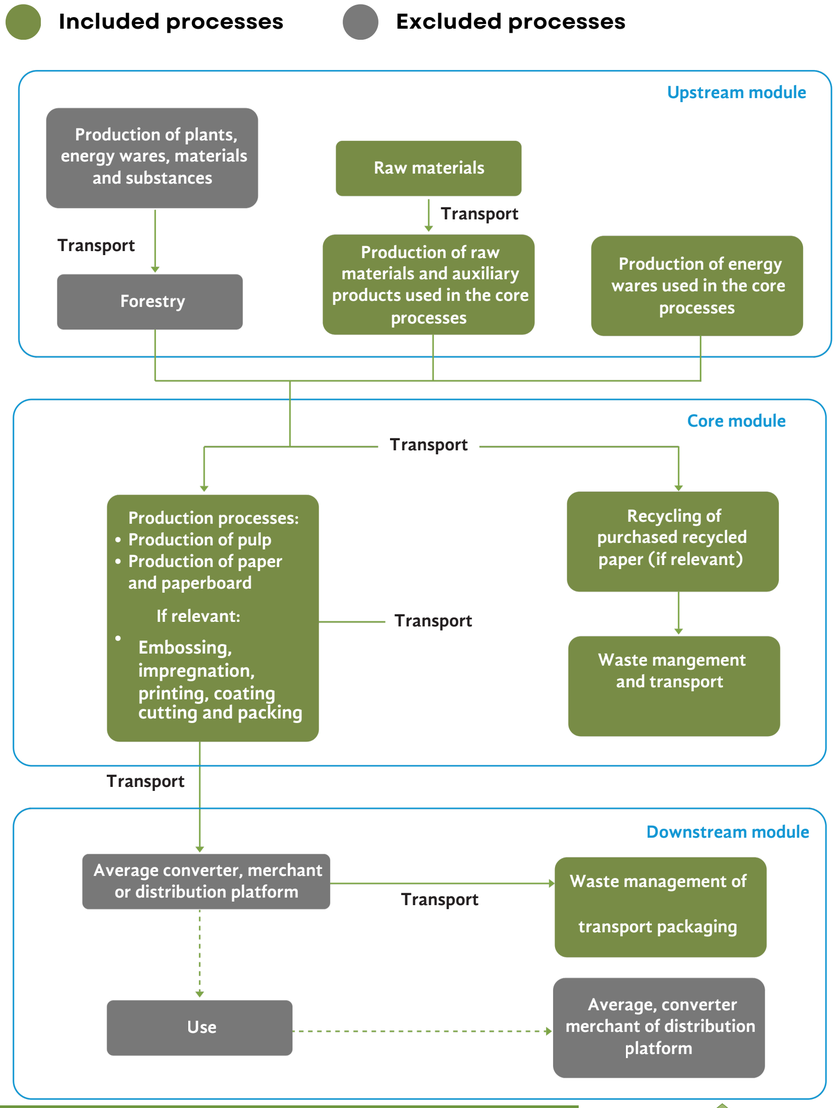

Figure 2. Diagram illustrating the applicable modules, divided into Upstream, Core, and Downstream processes. The processes shown with dashed lines are optional.

05 LCA information

5.7 Excluded Stages

The system includes Upstream processes, Core processes and Downstream processes, with a cradle-to- gate scope, excluding the use and end-of-life phase of the product.

5.8. Description of the manufacturing process

Flexographic

The process begins with the storage of Corrugated cardboard sheets, the reception and inspection of complementary raw materials, as well as the preparation of specific tools for the printing and cutting stages. Subsequently, the operation is divided into two lines:

- FFG Flexographic Line: In this line, corrugated cardboard sheets are fed into the flexographic printing system, where the graphic design is applied using inks. Cutting and gluing operations are then carried out. The process continues with the forming and bonding of the boxes. The produced units undergo quality inspection, followed by strapping. Finally, the products are packaged and transferred to the final storage.

- RDC Flexographic Line (Rotary Die Cutter): In this line, corrugated sheets enter the printing system where the corresponding design is printed. Subsequently, customized die-cutting is performed. The die-cut pieces are temporarily stored before the gluing process. In a later stage, adhesive is applied, and quality inspection of the finished product is performed. The boxes are then strapped, bundled and stored.

Digital

The process begins with the reception and inspection of the corrugated cardboard sheet and other required raw materials. The sheets are fed into the digital printing line, where the design is applied through controlled deposition of inks and varnish. Next, the printed sheets undergo a cutting or die cutting process, depending on the structural design of the packaging. The resulting pieces are temporarily bundled and strapped to maintain order and facilitate handling in the subsequent stages. The cut or die cut units are then assembled by adhesive bonding or stapling, according to the technical specifications of the final product. Finally, the assembled boxes are strapped, stacked and stored.

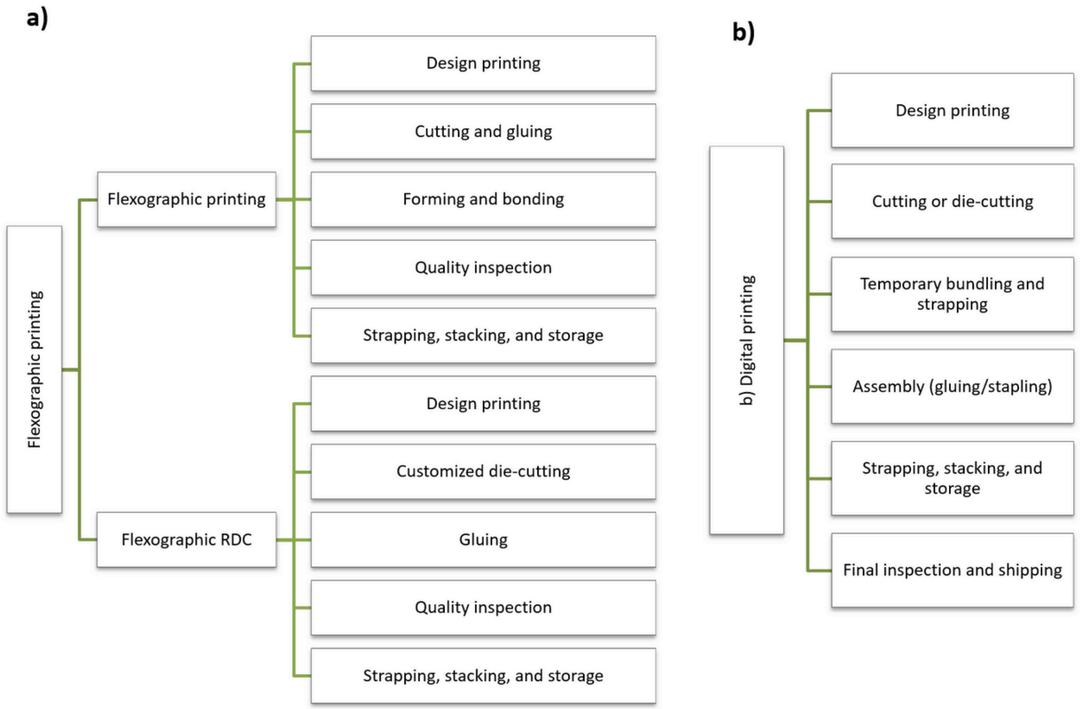

Figure 3. Corrugated cardboard packaging with printing (flexographic and digital) manufacturing process diagram.

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05 LCA information

5.9 Data quality assessment

Data	Source type	Source	Reference year	Data category	Geographical representativeness	Technical representativeness	Precision	Completeness	Consistency	% of contribution to GWP-GHG
Upstream, Core and Downtream processes										
Production of raw materials and auxiliary products	Collected data	Data Grupak	2023	Primary data	Very Good	Very Good	Very Good	Very Good	Very Good	95%
Production of energy wares used in the core processes	Collected data	Data Grupak and Ecoinvent 3.10	2023	Primary data	Very Good	Very Good	Very Good	Very Good	Very Good	3%
				Total						**98%**

Table 3. Summary of data quality for Upstream, Core and Downstream processes.

5.10 Assumption

Table 4 presents the assumptions for the Downstream processes.

Life Cycle Module	Assumptions
Downstream processes	• It is assumed that 35% of plastic used as distribution packaging is recycled in Mexico (ANIPAC, 2022). • It is assumed that 65% of the plastic waste used as distribution packaging is landfilled. • It is assumed that 58% of cardboard used as distribution packaging is recycled in Mexico (National Chamber of the Pulp and Paper Industry, 2021). • It is assumed that 42% of cardboard waste used as distribution packaging is landfilled. • It is assumed that the recycling rate for metal waste is 98% (ALACERO, 2021). • It is assumed that the remaining 2% of metal waste is sent to final disposal in a sanitary landfill. • The transportation distance of waste to the recycling and landfilled site is assumed to be 250.71 km.

Table 4. Assumptions.

5.11 Allocation

No allocation processes were carried out in the present study.

5.12 Cut-off criteria

All flows of fuel, energy, materials and supplies necessary to produce the Corrugated cardboard packaging with printing (flexographic and digital) have been considered; materials that could be used in preventive or corrective maintenance of machinery and equipment were disregarded, as well as the use of uniforms and personal protective equipment or other auxiliary materials, leaving out textiles impregnated with oils or plastics and the final disposal of these as hazardous waste.

5.13 Characterisation methods

- Global Warming Potential, GWP100, EN 15804. Version: EF 3.1, February 2023.
- Acidification potential, AP, accumulated exceedence, EN 15804. Version: February 2023.
- Eutrophication potential (EP) Version 2.0 of the default list of indicators (valid from 2022-03-29).
- Photochemical ozone creation potential (POCP), POCP, LOTOS-EUROS as applied in ReCiPe, EN 15804. Version: February 2023.
- Ozone depletion potential (ODP), EN 15804. Version: February 2023.
- Abiotic depletion potential (ADP) for minerals and metals (non-fossil resources), ADP minerals & metals, EN 15804. Version: February 2023.
- Abiotic depletion potential (ADP) for fossil resources, ADP fossil resources, EN 15804. Version: August 2021.
- Water deprivation potential (WDP), (Available water remaining (AWARE) method), EN 15804.

06 Environmental performance

The Life Cycle Impact Assessment was calculated using the EN 15804+A2 Method V1.02 / EF 3.1 normalization and weighting set (PRé-Sustainability, 2021) and Ecoinvent 3.10, implemented in the SimaPro 9.6.0.1 software.

6.1. LCA results of the product

The results indicate that upstream processes account for the largest contribution to the potential environmental impact, with percentages above 98% in all categories assessed. In second place, core processes show insignificant contributions, with values below 2% in the analyzed categories.Downstream processes record the lowest potential environmental contributions, without reaching significant values in any of the impact categories.

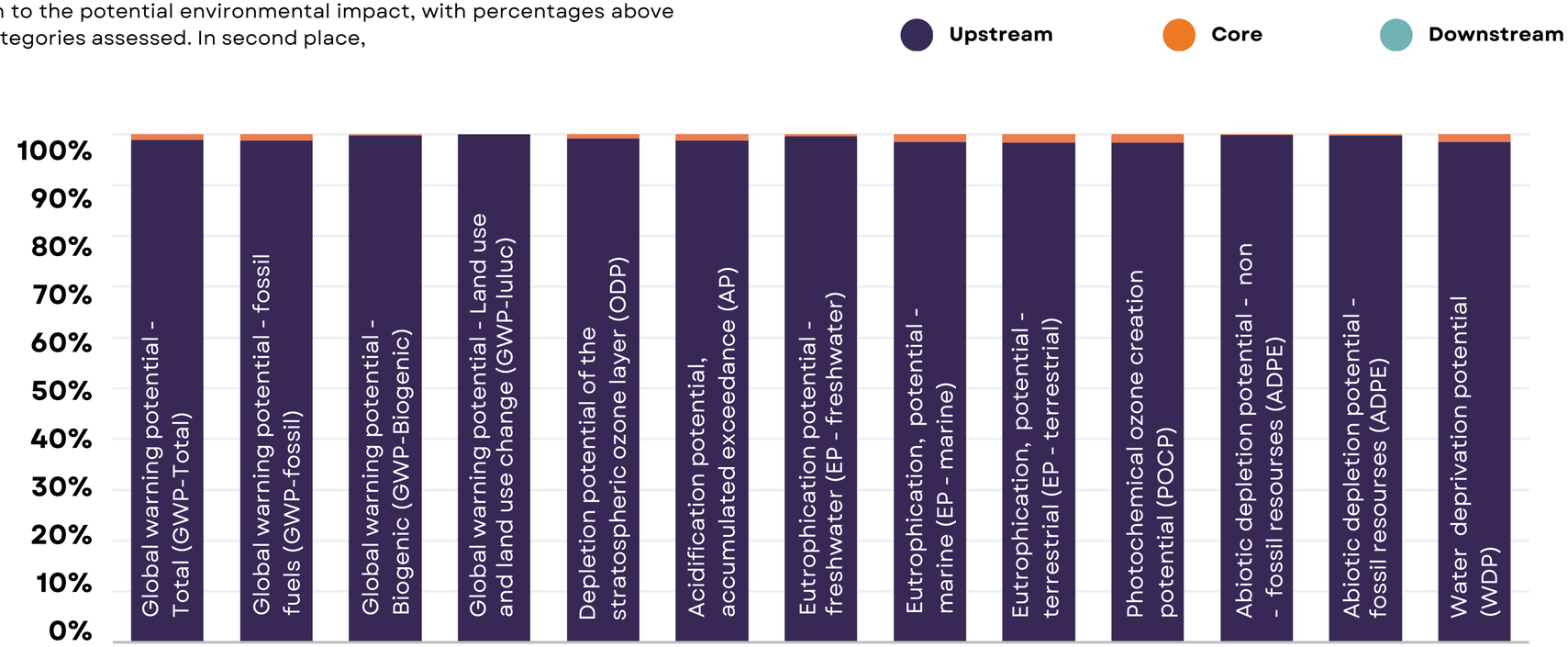

Figure 4. Basic impact categories of corrugated cardboard packaging with printing (flexographic and digital).

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06 Environmental performance

Parameter		Unit	Upstream	Core	Downstream	Total
Global Warming Potential (GWP)	Fossil	kg CO_2 eq.	1.29E+03	1.00E+01	1.88E-01	1.30E+03
	Biogenic	kg CO_2 eq.	8.38E+01	1.94E-01	5.27E-05	8.40E+01
	Land use and land transformation	kg CO_2 eq.	5.76E+00	7.22E-04	7.54E-06	5.76E+00
	Total	kg CO_2 eq.	1.38E+03	1.02E+01	1.88E-01	1.39E+03
Ozone layer Depletion (ODP)		kg $CFC\text{-}_{11}$ eq.	3.02E-05	1.46E-07	1.97E-09	3.03E-05
Acidification potential (AP)		mol H+ eq.	3.64E+00	3.57E-02	5.34E-04	3.68E+00
Eutrophication potential (EP)	Aquatic freshwater	kg P eq.	2.27E-02	9.61E-05	3.68E-07	2.28E-02
	Aquatic marine	kg N eq.	1.25E-01	1.46E-02	2.77E-04	1.27E+00
	Aquatic terrestrial	mol N eq.	1.21E+01	1.57E-01	2.39E-03	1.22E+01
Photochemical oxidant creation potential (POCP)		kg NMVOC eq.	4.50E+00	5.33E-02	7.91E-04	4.55E+00
Abiotic Depletion potential (ADP)*	Metals and minerals	kg Sb eq.	1.58E-03	6.13E-07	9.81E-09	1.58E-03
	Fossil Resources	MJ, net calorific value	1.91E+04	1.33E+02	1.81E+00	1.92E+04
Water deprivation potential (WDP)*		m^3 world eq. deprived	5.31E+02	9.06E+00	-1.10E-01	5.408E+02

Table 5. Basic impact categories result of corrugated cardboard packaging with printing (flexographic and digital).

*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.
The environmental performance results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Global Warming Potential (GWP-GHG)

Table 6 shows the result of the corrugated cardboard packaging with printing (flexographic and digital) evaluated with the IPCC GWP100 method.

Parameter	Unit	Upstream	Core	Downstream	Total
Global Warming Potential (GWP-GHG)[1]	kg CO_2 eq.	1.37E+03	1.02E+01	1.88E-01	1.38E+03

[1]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_2 is set to zero.

Table 6. Global Warming Potential (GWP-GHG) of corrugated cardboard packaging with printing (flexographic and digital).

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06 Environmental performance

Resource use indicators

Parameters describing resource use were evaluated with the Cumulated Energy Demand method version 1.09 (Frischknecht et al. 2007). Net use of fresh water was evaluated with ReCiPe 2016 Midpoint (H) version 1.08 (Huijbregts, et al., 2017). A detailed description of the use of resources is provided in **Table 7** for corrugated cardboard packaging with printing (flexographic and digital).

Parameter		Unit	Upstream	Core	Downstream	Total
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	2.28E+03	4.22E-01	4.70E-03	2.28E+03
	Used as raw materials	MJ, net calorific value	5.35E+01	0.00E+00	0.00E+00	5.35E+01
	TOTAL	MJ, net calorific value	2.23E+03	4.22E-01	4.70E-03	2.23E+03
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	2.09E+04	1.42E+02	1.92E+00	2.10E+04
	Used as raw materials	MJ, net calorific value	4.94E+02	0.00E+00	0.00E+00	4.94E+02
	TOTAL	MJ, net calorific value	2.04E+04	1.42E+02	1.92E+00	2.06E+04
Secondary material		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels (optional)		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water		m3	1.49E+01	2.71E-01	-2.53E-03	1.52E+01

Table 7. Use of resources parameters of 1000 kg of corrugated cardboard packaging with printing (flexographic and digital).

Waste and Output flow indicators

Table 8 and Table 9 present the Waste and the Output flow indicators and energy flows for 1,000 kg of corrugated cardboard packaging with printing (flexographic and digital) manufactured by Grupak, broken down into the Upstream, Core, and Downstream process stages. The environmental information describing these categories was calculated using the EDIP 2003 method (Hauschild and Potting, 2005).

Parameter	Unit	Upstream	Core	Downstream	Total
Hazardous waste disposed *	kg	5.86E-01	2.48E-01	1.23E-05	8.34E-01
Non-hazardous waste disposed*	kg	1.02E+02	4.80E-01	2.73E+00	1.05E+02
Radioactive waste disposed	kg	7.84E-03	5.27E-06	9.46E-08	7.84E-03

*Indirect indicators are not related to Grupak operations but to the generation during the processes of obtaining auxiliary inputs.

Table 8. Indicators describing waste categories of corrugated cardboard packaging with printing (flexographic and digital).

Parameter	Unit	Upstream	Core	Downstream	Total
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	1.01E+02	3.23E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ per energy carrier	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ per energy carrier	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 9. Indicators describing Output flow indicators of corrugated cardboard packaging with printing (flexographic and digital).

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07 Version history

EPD-IES-0026747:001, Original version of the EPD.

EPD-IES-0026747:002, Corrected editorial mistakes.

08 Abbreviations

CADIS	Centre for Life Cycle Assessment and Sustainable Design
CO_2	Carbon dioxide
PCR	Product Category Rules
EPD	Environmental Product Declaration
GWP	Global warming potential
LCA	Life Cycle Assessment

09 Additional environmental information

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Grupak
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10 Contact information

Grupak
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EPD Owner

https://www.grupak.com.mx/es

CENTER FOR
LIFE CYCLE ASSESSMENT
AND SUSTAINABLE DESIGN

LCA Practitioner

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Programme Operator

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11 References

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