Comparative LCA of blister packs and alternatives

Final restitution for CITEO customers - June 2025

SOUHIL Mathieu - LCA & eco-design project manager

SALES Robin - Senior LCA & eco-design consultant

MARQUES Axel - Junior LCA & eco-design consultant

Table of contents

Glossary

- ICP : Industrial and Commercial Packaging
- SU : Sale Unit
- SS : Single Score
- CC : Climate Change
- LCA : Life Cycle Assessment
- EOL : End Of Life
- PEF : Product Environmental Footprint
- PPWR : Packaging and Packaging Waste Regulation
- CFF : Circular Footprint Formula
- SA : Sensitivity analysis
- FU : Functional Unit

Table of contents

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- 3 offices in Nantes, Lyon and Troyes
- Ambassadors throughout France

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which brings together consultants, engineers, doctors, IT specialists in their field

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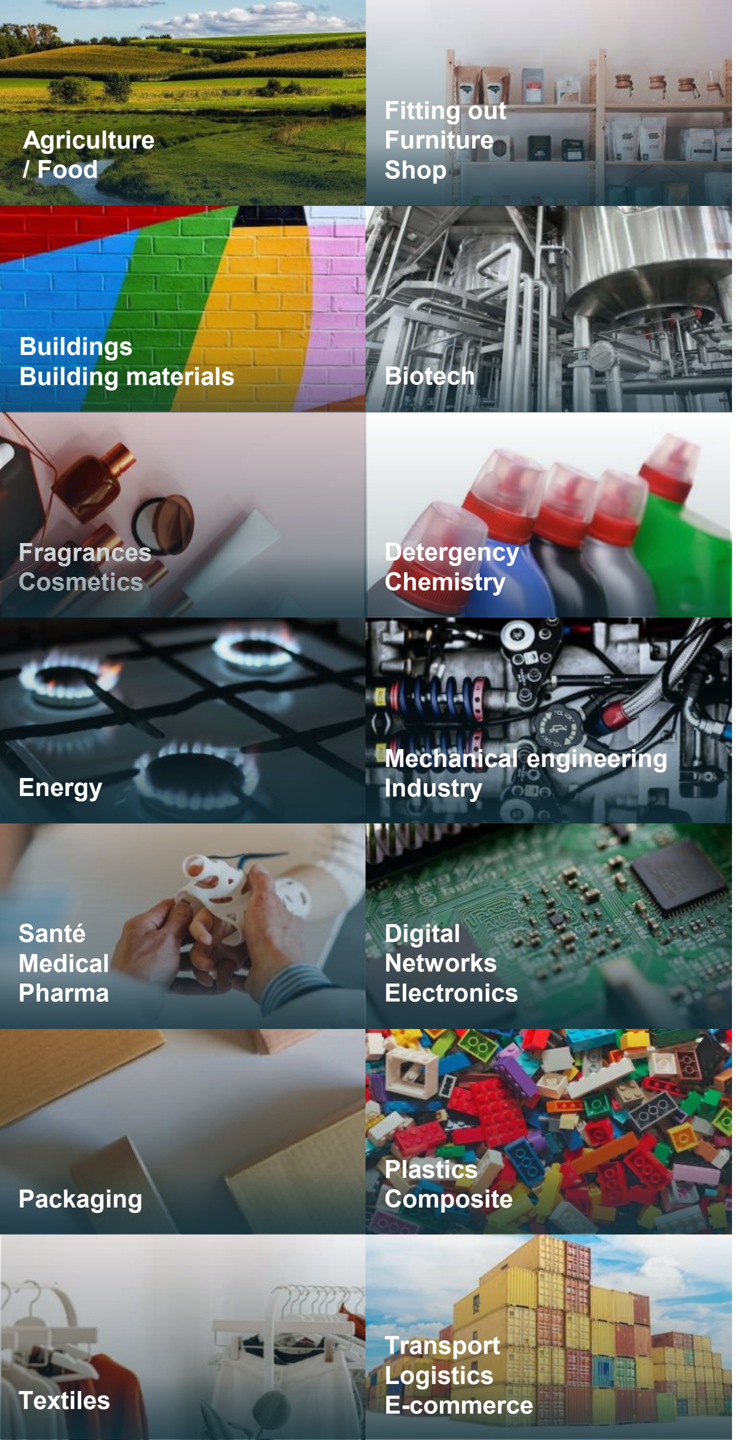
Transferring our skills through our training offering, deploying software tools and supporting our customers... with an entrepreneurial and cooperative culture that we want to share.



Our services

Understanding and assessing your challenges

- LCA: life cycle assessment
- ASCV: social analysis of the life cycle
- BGES: greenhouse gas emissions balance sheet
- ESDS: environmental and health data sheet
- PEP: Product Environmental Profiles

Making the most of your results

- Responsible communication
- Environmental labelling
- CSRD reporting

Supporting your transformation

- Eco-design
- Eco-innovation
- Climate and/or biodiversity strategy
- Social and socio-economic impact
- R&D (EVEA is an accredited accredited research institute)

Integrate tools and deploy

- Training in environmental and social assessment and eco-design (EVEA is a *Qualiopi* accredited training institute)
- Publishing and distribution of software tools

7 centres of expertise with strong interactions

AGRO-RESOURCES & GREEN CHEMISTRY

(agriculture and food, detergents, textiles, bio-based materials, fuels, formulation)

GOODS & SERVICES

(everyday, technical and technological, future, essential)

BUILDING

(building materials and equipment)

EMPREINTE SOCIAL / CLIMATE / BIODIVERSITY

IT & DEVELOPMENT

distri~~bution~~ and development of custom software

TRAINING

for skills transfer (*Qualiopi* accredited)

R&D

applied to the sustainable sustainable development (CIR and CII accredited)

Table of contents

Context and objective of the project

Following legislative changes, in particular the **PPWR,** aimed at improving recyclability and banning non-recyclable packaging placed on the market, CITEO wishes to support its customers by carrying out an environmental study of **alternative packaging that could be candidates for the common PET/cardboard blister packagings**. In fact, there are other alternatives to this "typical" blister pack, alternatives that must be considered **recyclable** under future European regulations.

In order to validate the environmental relevance of this alternative packaging compared to the PET/cardboard blister pack, CITEO wishes to carry out a comparative environmental assessment using the **LCA** method.

CITEO also wishes to **submit this new assessment to a critical review** so that it can communicate the results.

One of the objectives is to **highlight the environmental impact of the alternatives to CITEO's customers and industrials.**

Background to the study

Regulations require all packaging to be recyclable by 2030.

Carton/PET blister packs are likely to be banned in 2030 and need to evolve

CITEO wants to help its customers find recyclable structures with better environmental performance.

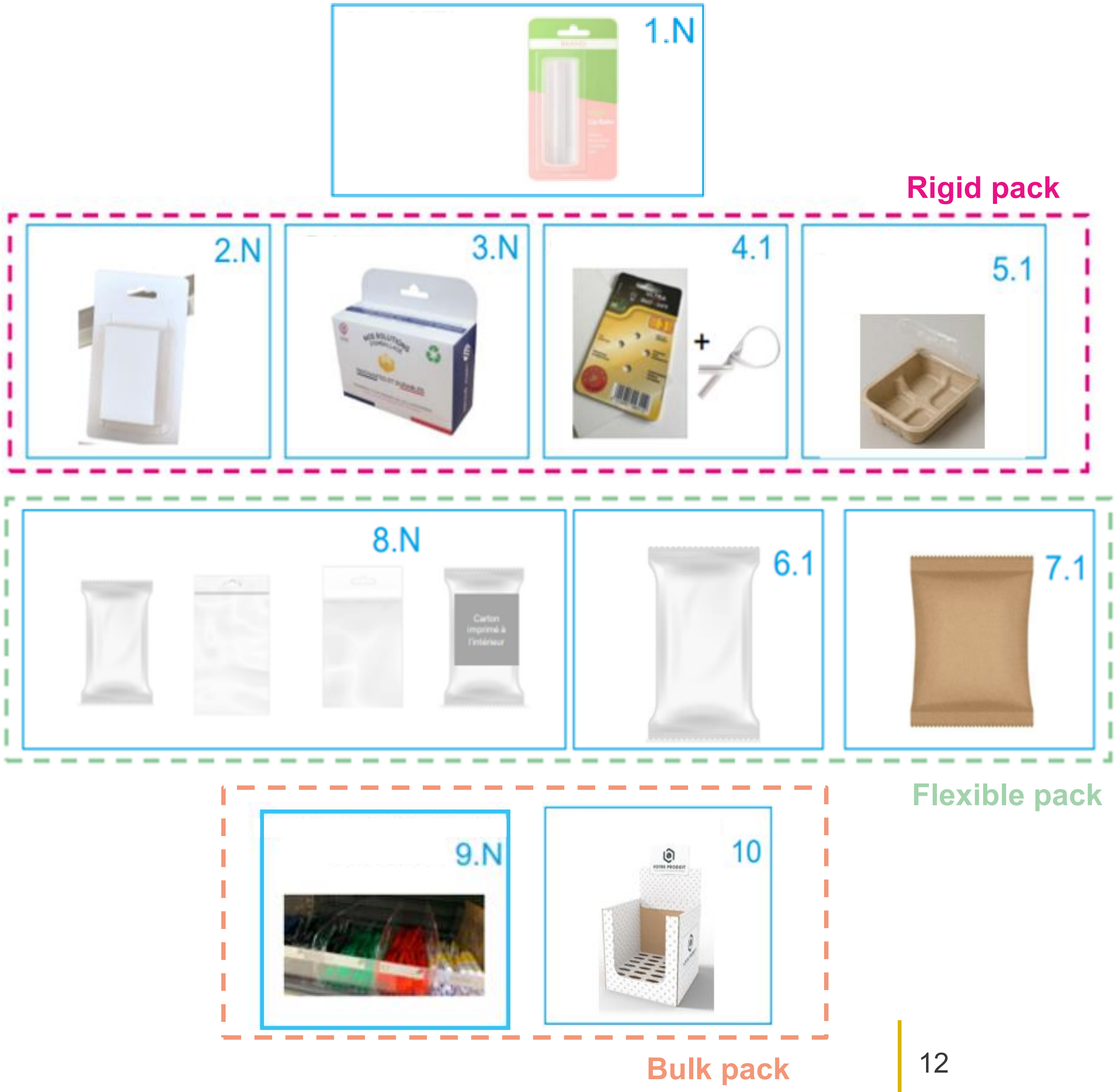
Comparative LCA of different types/families of recyclable packaging in 2030

⚠ *The visuals* are for illustrative purposes only (and not the actual products used in the study).

Aim of the project

Packaging families under study

Scenarios	Identification number	Type of pack	Materials/features
Reference scenario	**1.N**	**PET/cardboard blister**	• PET shell • Flat cardboard base
Alternative scenarios	**2.N**	**Reverse blister pack**	• Flat cardboard shell and base
	3.N	**Cardboard case**	• Folded flat cardboard
	4.1	**Cardboard + strap**	• Flat cardboard base • Nylon tie (clamp)
	5.1	**Moulded cellulose**	• Cellulose shell • PET lid
	7.1	**Opaque flexible paper flowpack**	• Paper • HDPE film • PU glue
	8.1	**PP flexible flowpack**	• PP film • PU glue
	6.1	**Transparent flexible paper flowpack**	• Paper • PP Film • PU glue
	9.N and 10.1	**Bulk (with and without display)**	• Flat cardboard box for transport and display



Purpose of the project
Sensitivity analyses

The parameters to be varied will be studied in sensitivity analyses:

- ♻️ **SA1**: Variation in the incorporated recycled content of certain materials
- 🌏 **SA2**: Asian origin of raw materials
- 🎈 **SA3**: Change in packed volume for carton/PET blisters

3 sensitivity studies

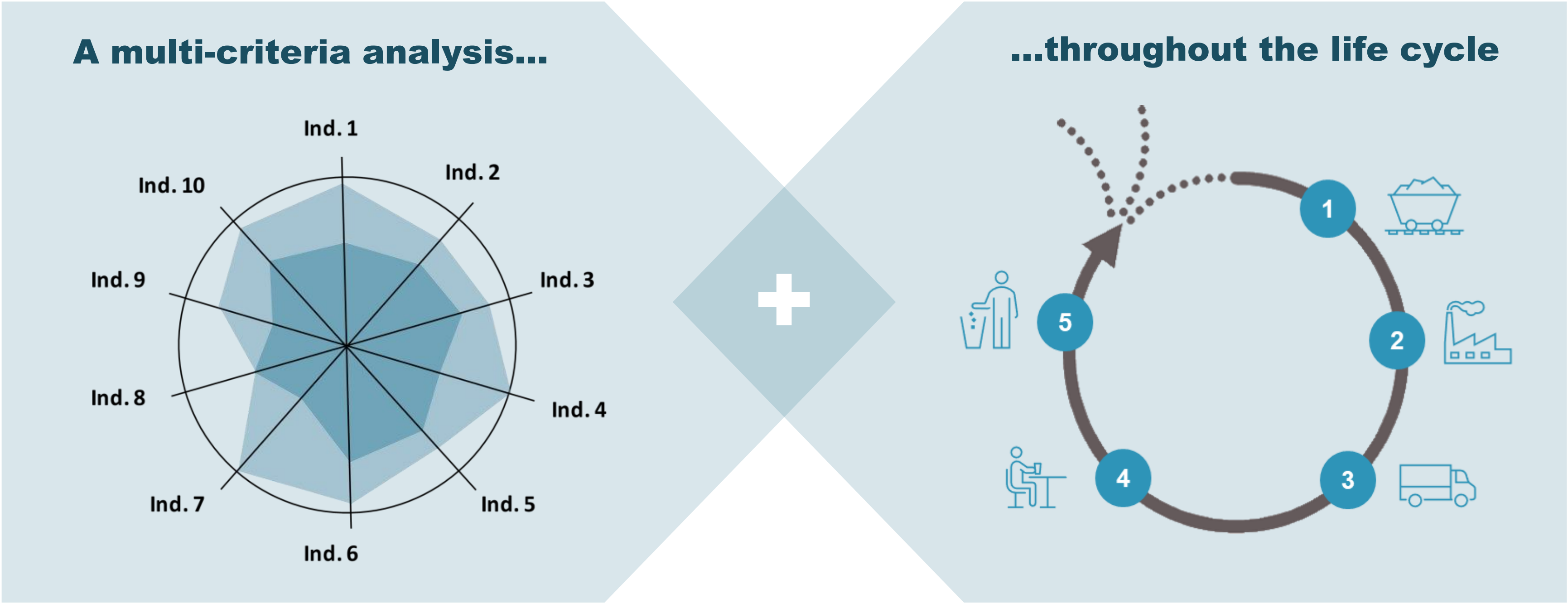
Sensitivity analyses will make it possible to identify the tipping points between certain parameters

Table of contents

Reminders on Life Cycle Assessment

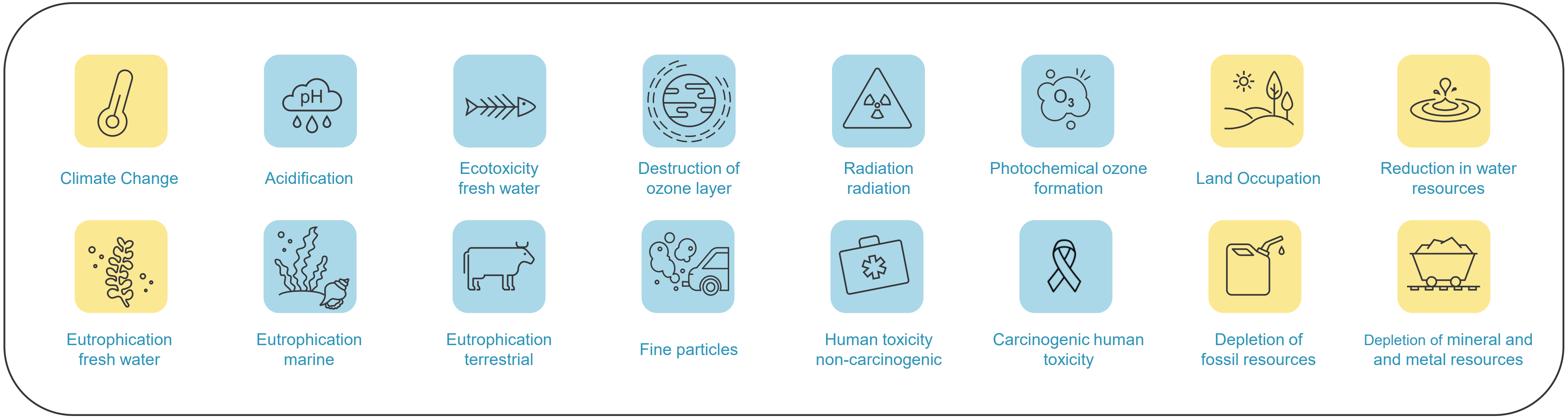
Life Cycle Assessment (LCA) is a standardised method (ISO 14040 and 14044) used to assess the potential environmental impact of a product.

The two main principles of LCA are :



A multi-criteria analysis

The impact of each indicator is calculated using the EF 3.1 method, the calculation method recommended by the PEF (Product Environmental Footprint). 6 indicators have been selected, indicators desired by CITEO as well as by their contribution to the unique PEF score.



Indicators selected for this study

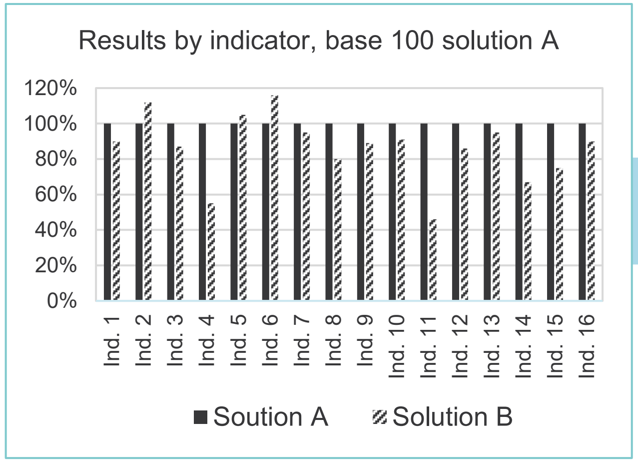
Indicators not selected for this study

The single score

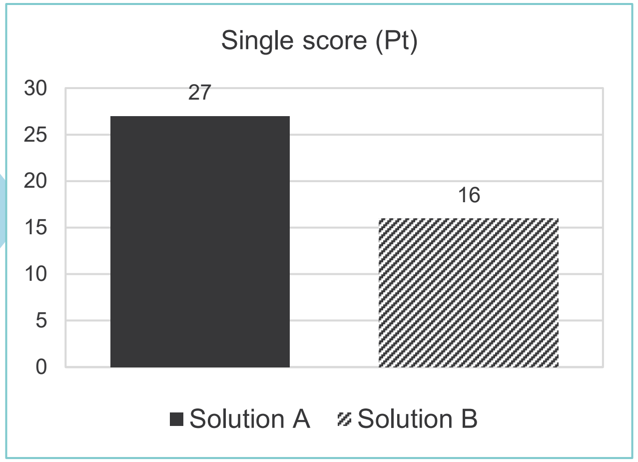
Using a single score makes it easier to compare results and identify transfers of impact.

The Single Score is a score calculated from 16 environmental impact indicators, using standardisation and weighting:

- **Normalization** converts the units of all the indicators (kg CO2 eq, m3 world eq...) to a common unit (Point: Pt) so that 1 Pt is representative of the annual environmental impact of one inhabitant in the world.
- **Weighting** as defined by the PEF method (European Commission), accounts for the robustness of the indicators and the significance of the environmental challenges.



SINGLE SCORE



Here B has a lower single score than A, so B has less impact than A

Point of attention

- A single score gives you a trend but does not allow you to communicate
- The method for calculating the single score (PEF method) is subject to change

Table of contents

Study framework

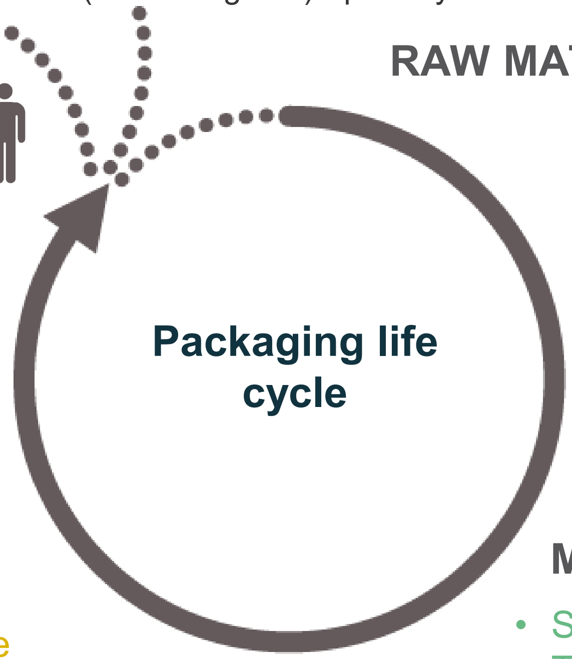
Comparison on the basis of a functional unit

- **27 types of packaging classified into 10 families with the same main function:** package and protect non-food products
- **Functional unit**: Transporting and displaying 1 cm^3 of non-food products in a sales outlet.

Scope of the study

Definition of the life cycle and scope of the study

Scope: From extraction of raw materials to end of life (cradle to grave) - primary / secondary / tertiary packaging



RAW MATERIALS

- Extraction of materials and manufacture of packaging
  - Primary packaging
  - Secondary packaging
  - Tertiary packaging

MANUFACTURING

- Shaping and finishing (% offcuts taken into account)
- Transport to the packaging plant
- Filling of packaging → % waste (not taken into account as there is no difference between packaging)
- ICP of manufacturers of empty packaging

DISTRIBUTION

- Transporting products to points of sale

USE

- Use of the product
- Transport between the point of sale and the consumer's home

END OF LIFE

- End-of-life packaging in France (recycling, incineration, landfill)

Taken into account
Not taken into account

Table of contents

DATA USED AND ASSUMPTIONS

Hybrid data collection procedure and level of data quality

2 sources of information (incoming data)

Collection files completed by CITEO customers

Sample measurement by EVEA (weighing, surface measurement)

Data for modelling

A big thank you to all the CITEO customers who took part in the project!

Scale of robustness of the information collected

The + robust ⟷ The - robust

Collected by EVEA and customer: customer value retained	Collected by EVEA and customer: EVEA value retained	Collected only by EVEA	Collected only by customer

DATA USED AND ASSUMPTIONS

General assumptions relating to the overall project

Hypothesis	Justification
Exclusion of the **manufacture of products** contained in the packaging	Not the primary objective of the study, and the products are very varied, so it's impossible to have a "standard" product.
Recycling of **flexible PP** modelled using a **mechanical** process	Flexible PP should be chemically recycled by 2030, but this data does not yet exist. There are a variety of chemical recycling processes
Exclusion of **ICPs** for the **transport of empty packaging components** and associated **transport**	Going up the entire value chain to collect this logistics data was considered too complex. EVEA considers their impact to be negligible in the context of this study.
Exclusion of the **use phase** (shelf scraps, product breakage, etc.)	This limit may be important if one packaging design leads to greater product loss than another packaging design.
Exclusion of **transport** between the **consumer's home and the point of sale**	Allocation of transport from the individual to the sales site is not at the heart of the issues at stake in this LCA.
Exclusion of specific **sales systems** dedicated to the sale of **bulk products** (shelf bins, dispensers, etc.).	The products are not studied, which makes it difficult to model infrastructures dedicated to bulk sales.

DATA USED AND ASSUMPTIONS

Primary packaging - general assumptions

Data	Hypothesis
Percentage **of recycled material incorporated**	**0% in the base case for all scenarios**. The aim was to compare packaging designs but not the specific choices of each brand.
Percentage of production off-cuts	Collected by the brands **or estimated by EVEA from packaging samples received (surface measurements)**

DATA USED AND ASSUMPTIONS

Primary packaging

1. Example of ICV: PET blister/carton

Product number	Material	Component weight (g)	Percentage drop in production (%)	Manufacturing process	Finishing process	Finishing surface (cm²)	Total mass (g)	Volume (cm3)
1.1	Flat cardboard	3,3	11%	Cardboard cutting	Heat-seal varnish + Offset printing	234	7	95,3
	PET	3,7	6%	Thermoformed	-	-		
1.2	Flat cardboard	3,9	1%	Cardboard cutting	Heat-seal varnish + Offset printing	236	5,9	50
	PET	2	6%	Thermoformed	-	-		
1.3	Flat cardboard	3,1	3%	Cardboard cutting	Heat-seal varnish + Offset printing	180	4,41	25,05
	PET	1,31	6%	Thermoforming	-	-		
1.4	Flat cardboard	8,5	1%	Cardboard cutting	Heat-seal varnish + Offset printing	674	18,8	168,64
	PET	10,3	6%	Thermoforming	-	-		
1.5	Flat cardboard	8,5	1%	Cardboard cutting	Heat-seal varnish + Offset printing	674	22,97	352
	PET	14,47	6%	Thermoforming	-	-		

* Modelling data for the other families can be found in the appendices.

DATA USED AND ASSUMPTIONS

Secondary packaging (ICP) - For all products

The exact quantity of each ICP varies according to mass, the shape of the primary packaging and the layout of the pallet *(which is not detailed in this presentation)*.

However, the quantity of film and the weight of the pallet are always the same. It is assumed that the pallet is reused an average of 25 times.

Material	Unit weight (g)	Comment
Corrugated cardboard *	Varies according to product	For all primary packaging
LDPE film	300	
Pallet - Wood	25000	

** Some products have plastic II packaging (PET trays) or paper inserts in addition to corrugated cardboard.*

DATA USED AND ASSUMPTIONS
Logistical data

Sourcing	Hypothesis
Raw materials → Processing plants components	Included in **ecoinvent** data
Components → Primary pack manufacturing plants	Included in **ecoinvent** data
Industrial & commercial packaging → Primary packaging plants	Included in **ecoinvent** data
Packaging plant → Points of sale	Truck transport 32T EURO 6 - RER - **500km**
End-of-life waste management logistics (collection, sorting, recycling, incineration, etc.)	**Average truck** transport to end-of-life sites (ADEME data)

DATA USED AND ASSUMPTIONS

End-of-life packaging I, II, III - FRANCE

Effective recycling rate (in %)	Flat cardboard	Corrugated cardboard	Pallet wood	PP flexible	LDPE	PET	Adhesive Coating Finish
France 2030	**85**	**85**	**30**	**55**	**55**	**55**	**0**

Residual landfill and incineration rates (%)	Incineration	Landfill
France 2030	**71**	**29**

Source 2030: [ADEME AND CITEO 2023]

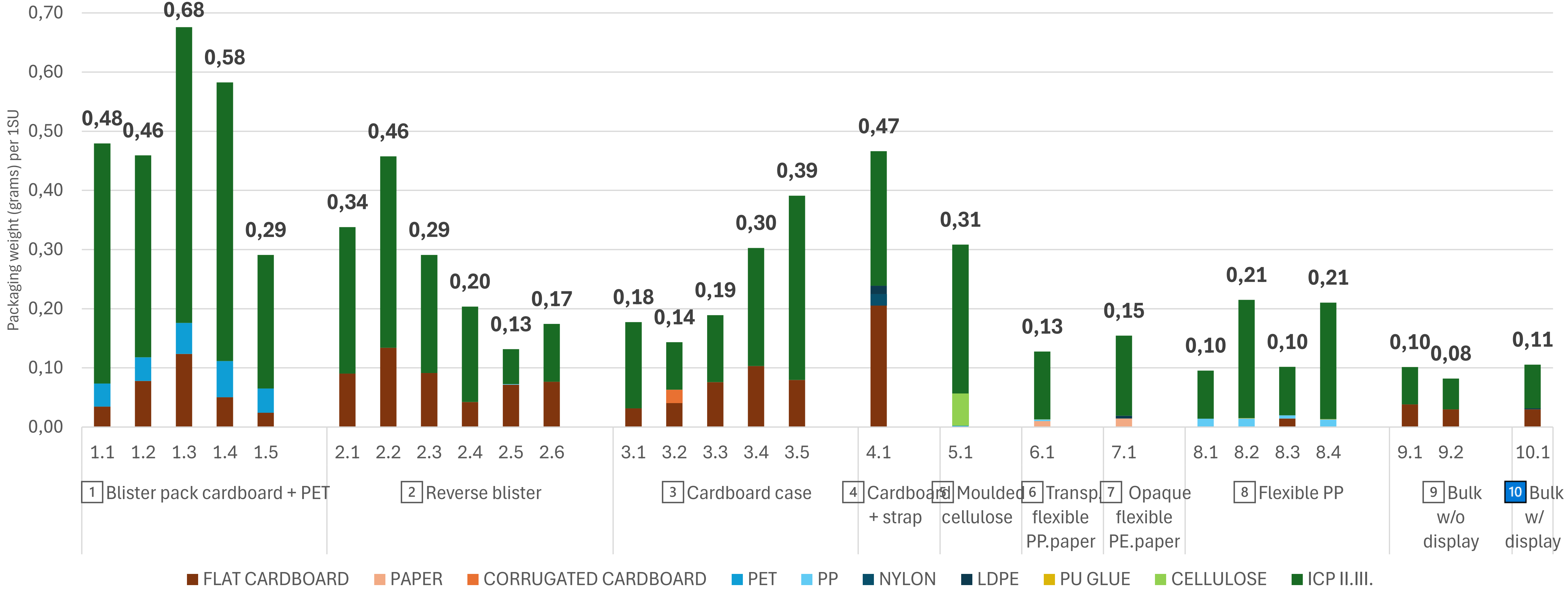
End-of-life is modelled using the methodology recommended by the European Commission CFF (Circular Footprint Formula)

The end-of-life assumptions are based on a prospective situation (2030) for recycling the various materials.
In LCA modelling**, not all packaging components are considered recyclable!**
For example, no component of packaging 1.1 is recyclable because the mass of cardboard is less than 70% of the total mass of the packaging. Table 13, page 59, of the ISO report validated by critical review, details all the elements/components that are recyclable or not.

Table of contents

Table of contents

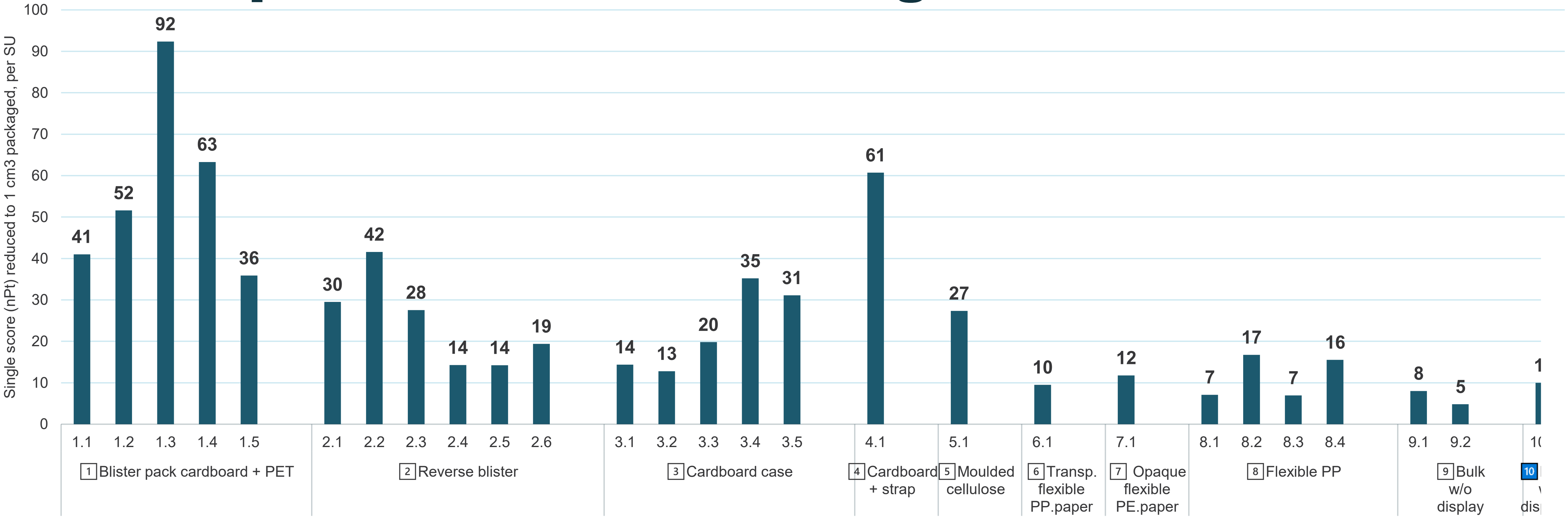
0. Pack weights (per SU = Sale Unit*)



- If we focus on the mass per **1cm³ packed**, some clear trends can be observed
- The 1 family of **cardboard/PET blisters** has the **highest ratio**, followed by 2 **blister inverted cardboard**, then 3 **cardboard cases** (with at least 5 samples).
- The 8 **flexible PP** and 9 & 10 **bulk** families seem to have the **best ratio g/cm³**
- For the other families, the limited number of samples makes it difficult to identify any trends.

* Sale Unit (SU) refers to the basic packaging of a product intended for sale directly to the end consumer. It represents the smallest unit that can be purchased individually.

1.1 Comparative LCA - PEF single score



↘ Based on the **single score** (SS), the alternatives studied have **less impact** than the 1 **blister pack** references.

🔍 In detail, we observe that:

- the **flexible** packaging categories 6 (**transparent paper**), 7 (**opaque paper**), 8 (**PP**) and **bulk** 9 & 10 have a much **lower impact** than the **benchmark**,
- The individual packaging categories based on cardboard 2 (**reverse blister**), 3 (**cardboard case**), and 5 (**moulded cellulose**) are **better than the reference** overall, but **some designs generate limited environmental gains** (2.1, 2.2, 3.4 and 3.5) because of their **low packed volume**.
- The impact of the 4 **cardboard + strap** category is comparable or even greater than that of the benchmark. It is difficult to conclude whether this packaging is irrelevant, since it is represented only by one design and does not protect a defined volume (packaged volume = product volume → underestimated).

1.2 Raking of the 27 packaging types

Legend: from most to least impacting, depending on the FU

		1 Blister Cardboard + PET					2 Reverse blister						3 Cardboard case					4 Cardboard +strap	5 Moulded cellulose	6 Transp. flexible PP.paper	7 Opaque flexible PE.paper	8 Flexible PP				9 Bulk w/o display		10 Bulk w/ display
Category of damage	**Unit**	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**	**2.6**	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**	**4.1**	**5.1**	**6.1**	**7.1**	**8.1**	**8.2**	**8.3**	**8.4**	**9.1**	**9.2**	**10.1**
Single score	µPt																											
Climate change	kg CO2 eq																											
Depletion of the ozone layer	kg CFC11 eq																											
Ionising radiation	kBq U-235 eq																											
Photochemical ozone formation	kg NMVOC eq																											
Fine particles	disease inc.																											
Human toxicity. non-carcinogenic	CTUh																											
Human toxicity. cancer	CTUh																											
Acidification	mol H+ eq																											
Eutrophication. freshwater	kg P eq																											
Marine eutrophication	kg N eq																											
Terrestrial eutrophication	mol N eq																											
Ecotoxicity. freshwater	CTUe																											
Land use	Pt																											
Use of water	m3 depriv.																											
Use of fossil. resources	MJ																											
Use of resources. minerals and metals	kg Sb eq																											

Indicators selected (detailed on the following slides)

- There are **no notable pollution shifting** identified on the various indicators and for the 27 packages studied.
  → The **hierarchy of impacts** presented for the single score and for climate change remains valid, on the whole, for the 16 indicators.
- The best solutions for the majority of indicators remain the 6 to 10 categories, followed by the 2, 3 & 5 and 4 categories.

1.3 Indicators contributing to the single score

The impact of each indicator is calculated using the EF 3.1 method, the calculation method recommended by the PEF (Product Environmental Footprint). 6 indicators have been selected, based on CITEO's wishes and their contribution to the single score.

Impact indicators	Unit	Description
Climate change	**g CO_2 eq.**	Human activities, in particular the use of fossil fuels, have led to an exceptional increase in the concentration of greenhouse gases, resulting in global warming.
Land use	**Point**	Measures the extent and type of land use by human activities, including urbanisation, agriculture, forestry, etc.
Reduction in water resources	**m3 depriv.**	Assess the pressure on freshwater resources, quantifying demand in relation to availability and taking into account the needs of ecosystems.
Eutrophication of fresh water	**kg P eq.**	Measures the amount of nutrients (phosphorus) from wastewater discharges that accelerate the growth of algae and other plants in the water.
Depletion of non-renewable fossil resources	**MJ**	Accounts for the extraction and consumption of fossil fuels (oil, gas, coal), whose stocks are limited and do not renew themselves on a human scale.
Depletion of non-renewable metallic and inorganic resources	**kg Sb eq.**	This is followed by the extraction and use of ores and non-organic raw materials (iron, copper, sand, etc.), which are also in finite supply and can become scarce.

Which stages of the life cycle have the greatest impact on the environment?

1.3 Indicators contributing to the single score

The impact of each indicator is calculated using the EF 3.1 method, the calculation method recommended by the PEF (Product Environmental Footprint). 6 indicators have been selected, based on CITEO's wishes and their contribution to the single score.

Impact indicators	Unit	Description
Climate change	g CO_2 eq.	Human activities, in particular the use of fossil fuels, have led to an exceptional increase in the concentration of greenhouse gases, resulting in global warming.
Land us[illegible]	[illegible]	[illegible] agriculture, forestry, etc.
Reduction in water resources	m3 depriv.	[illegible]
Eutrophication of fresh water	kg [illegible]	[illegible] discharges that accelerate the growth of algae and other plants in the water.
Depletion of [illegible] fossil resources	[illegible]	[illegible]
Depletion of non-renewable metallic and inorganic resources	kg Sb eq.	This is followed by the extraction and use of ores and non-organic raw materials (iron, copper, sand, etc.), which are also in finite supply and can become scarce.

Climate change is the only indicator studied in this presentation, which is intended to raise awareness and popularise the subject.

For more information on the other indicators, please refer to the ISO LCA report validated by Critical Review.

For information: there is no significant impact on the other indicators or on the Single Score.

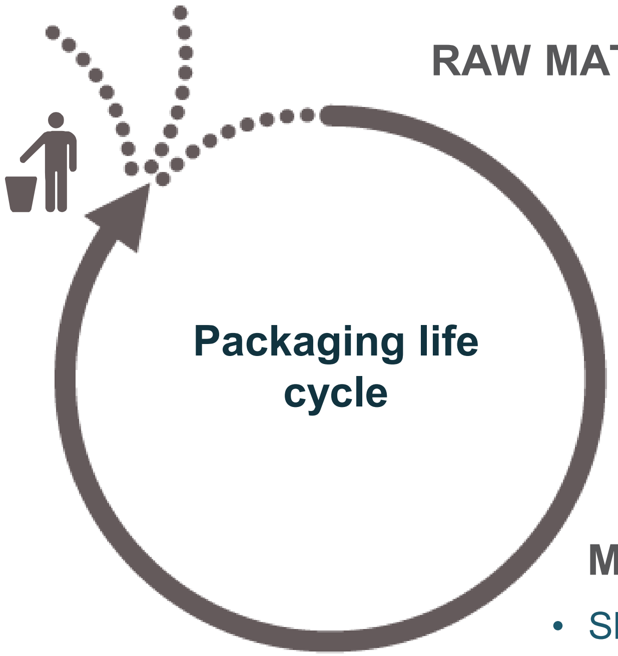
Which stages of the life cycle have the greatest impact on the environment?

Definition of the life cycle

The 6 phases of the life cycle

Scope of stages selected

- Primary packaging raw material
- Transformation processes and production scrap
- Finishes and decorations
- Industrial and commercial packaging (II/III) + their EOLs
- Distribution transport
- End of life (EOL) of primary packaging



RAW MATERIALS

- Extraction of materials and manufacture of packaging
  - Primary packaging
  - Secondary packaging
  - Tertiary packaging

MANUFACTURING

- Shaping and finishing (high scrap rate)
- Transport to the packaging plant

DISTRIBUTION

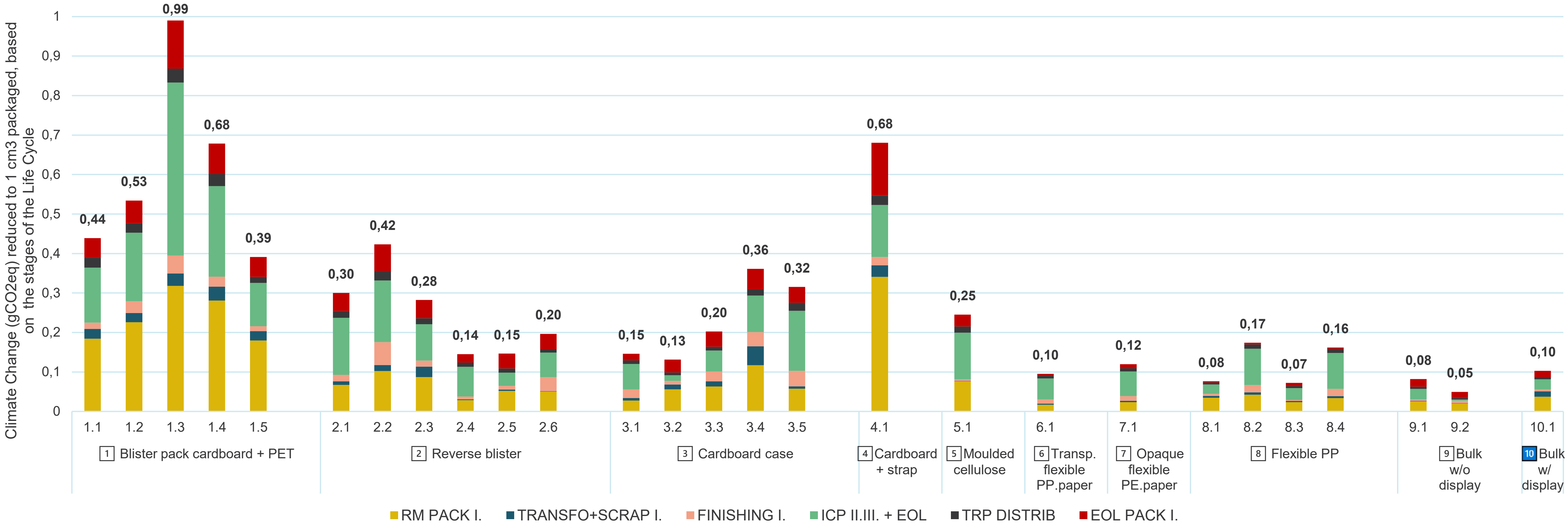
- Transporting products to points of sale

USE

END OF LIFE

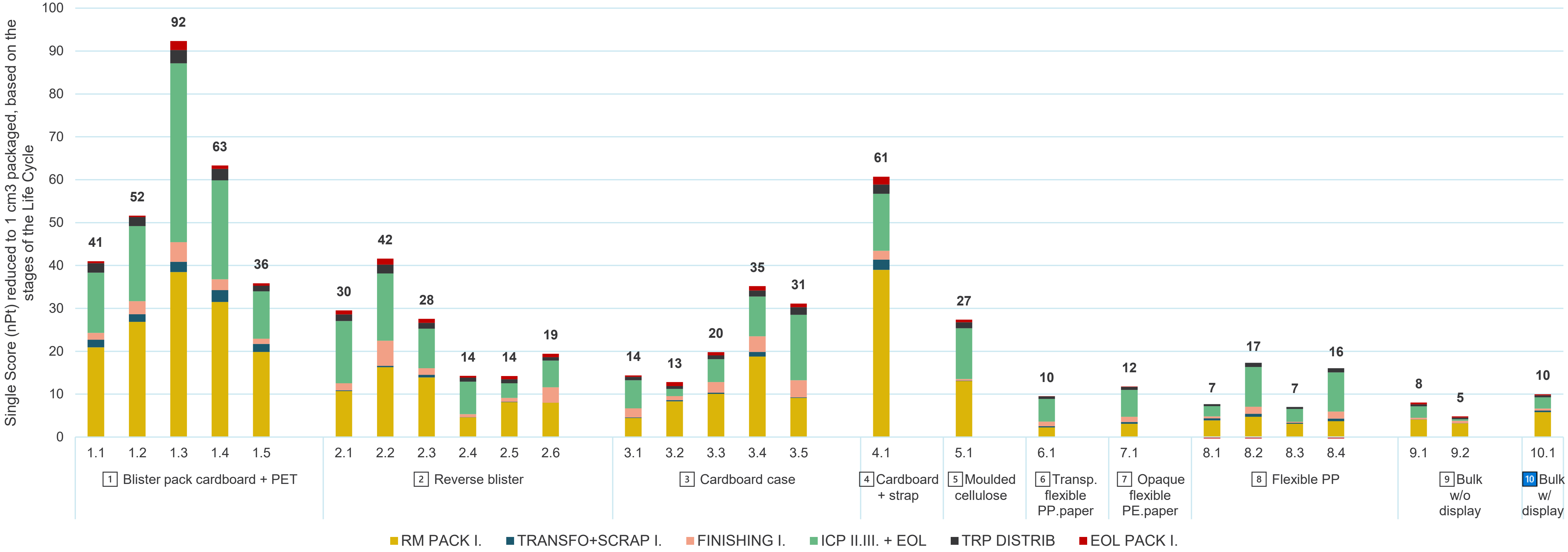
- End-of-life packaging in France (recycling, incineration, landfill)

2.1 Contribution of the LC (Life Cycle) stages, Climate Change



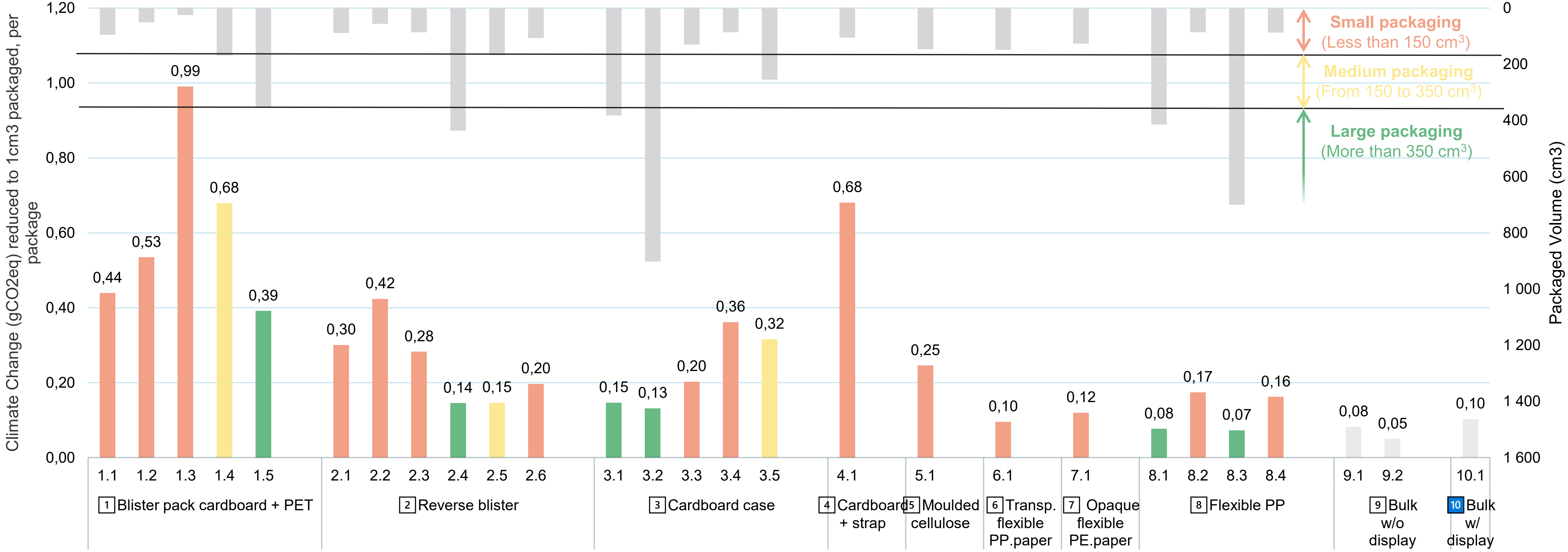
- For all the scenarios studied, **the stages that contribute most to the impact** of climate change are **raw materials** and **ICPs**. For **flexible** packaging (6 to 8) and for some **classic blister**, **reverse blister** and **cardboard case** designs, **the ICPs** are the components that contribute most to the system's impact. These components should not be neglected in the eco-design of new alternatives.
- The **finishing/decorating** stage has a significant impact on climate change, particularly for individual cardboard-based solutions (**blister packs** 1 2 , cardboard case 3).
- Contrary to the single score, the **end-of-life** stage is a major contributor to **carton-based** packaging.
- **The raw materials processing** and **transport** stages make a small contribution to the impact of the Group's activities.

2.2 Contribution of the Life Cycle stages, Single Score



- For all the scenarios studied, **the stages that contribute most to** the **Single Score impact** are **raw materials** and **ICPs**. For **flexible** packaging (6 à 8) and for certain **blister**, **reverse blister** and **case** designs, **the ICPs** are the components that contribute most to the system's impact. These components should not be neglected in the eco-design of new alternatives.
- The **finishing/decoration** stage has a significant impact on the single score, particularly for solutions based on cardboard (blisters 1 & 2, cases 3).
- **The transformation of raw materials**, **transport** and **end-of-life** stages make a small contribution to the impact of our products on the environment.

3. Comparative LCA by volume class, Climate Change

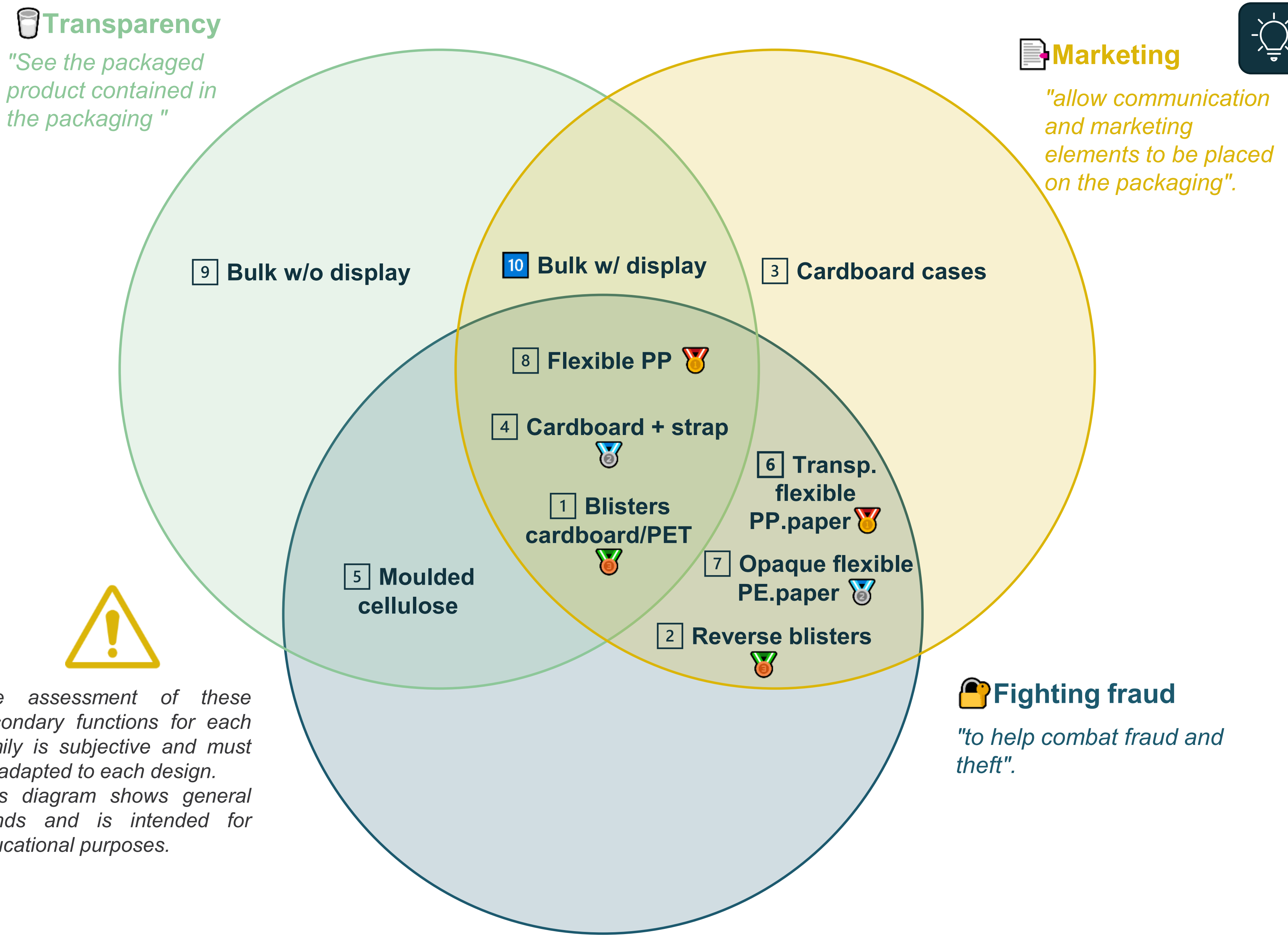


- By classifying packaging according to the size of the volume packed, the interpretations do not change. For example, for a similar volume (170 cm³), the alternatives 2 and 3 generate impacts 2 to 7 times lower than 1.
- Focusing on only one category, the impact on climate change is directly linked to the volume packed.

  → The greater the volume, the lower the impact for a given category.
- **CAUTION**: Packing a larger quantity of a product could lead users to consume more than they need.

  → Impact shifting

4. Taking secondary functions into account, Venn diagram



The assessment of these secondary functions for each family is subjective and must be adapted to each design. This diagram shows general trends and is intended for educational purposes.

- The Flexible PP, cardboard + strap and cardboard/PET blister families fulfil **the 3 secondary functions**. The 8. Flexible PP has the best overall environmental performance.
- The and families (Flexible transparent and opaque paper) as well as the reverse blister family fulfil the "**marketing"** and "**anti-fraud**" functions. The and families have the least impact in this category.
- Moulded cellulose packaging has difficulty fulfilling its "**marketing**" function
- The bulk categories 9 and 10 are not effective in "**fighting fraud**".

Intermediate synthesis

Overall impact :

🔜 **Alternatives** have less overall impact than the reference blister pack
✅ **No significant impact shiffting**: The hierarchy of impacts remains valid for 16 indicators.

Hierarchy of alternatives:

✔️ **Best performers**: **Flexible** packaging (6 to 8) and **bulk** (9 - 10).
〰️ **Contrasting results**: **Individual cardboard** packaging (2 - 3 - 5) is better overall, but some designs offer limited gains.
⚠️ **Similar or better impact**: Cardboard + strap (4), low representativeness → **Promising solution to be explored further**.
🎈 At **equivalent volume**, this hierarchy remains true
🥈 Only the alternatives 8 (flexible PP) and 4 (cardboard + strap) fulfil the 3 defined secondary functions

Analysis by life cycle stage:

🧃 **Raw materials**: Main contributor to impact for all packaging types.
📦 **ICP**: Key factor for **flexible** (6 - 8) and some **blister**, **reverse blister** and **cardboard ase** designs.
🖌️ **Finish/Decoration**: Significant impact, especially for **individual cardboard** solution (blisters 1 2, cases 3).
🚚 🏭 **Transport and transformation of materials**: Low contribution to overall impact.
💀 **End of life**: Significant contribution for **CC cardboard** packaging, but low for the Single Score.

Would the conclusions be the same if certain parameters were to change?

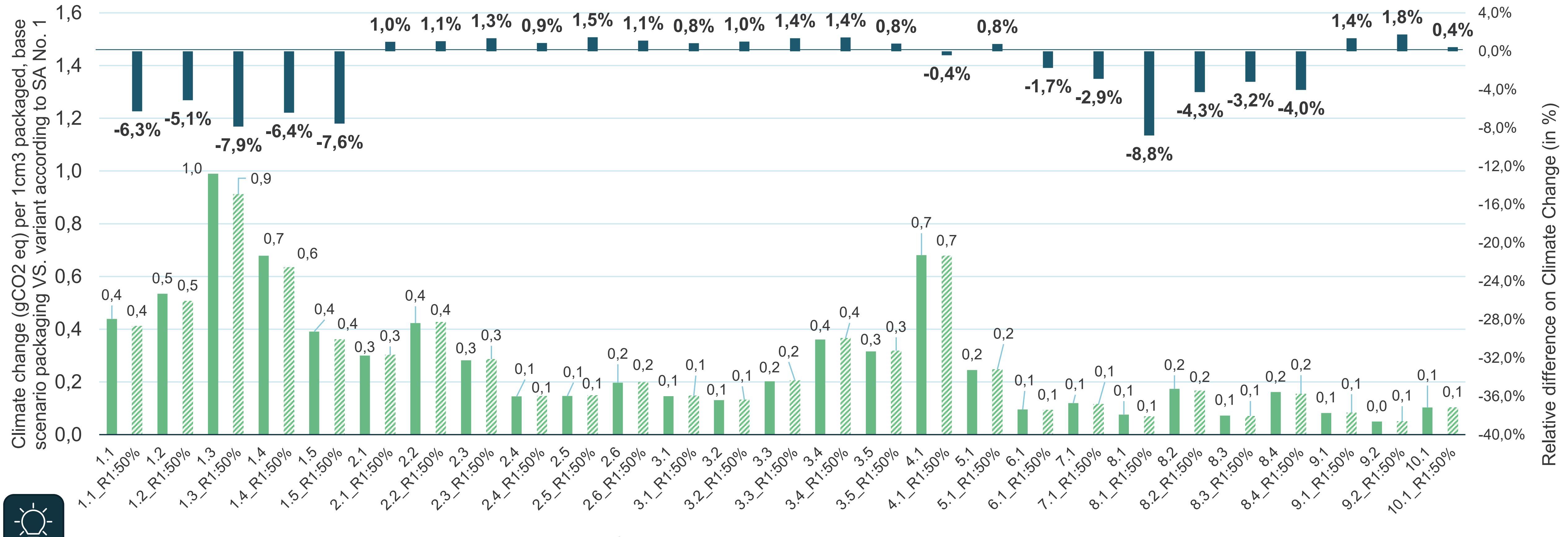
5. Sensitivity analysis

The parameters to be varied will be studied in sensitivity analyses:

- ♻️ **SA1**: Variation in the **incorporated recycled** content of certain materials
- 🌏 **SA2**: **Asian** origin of raw materials
- 🎈 **SA3**: Change in **packed volume** for carton/PET blisters

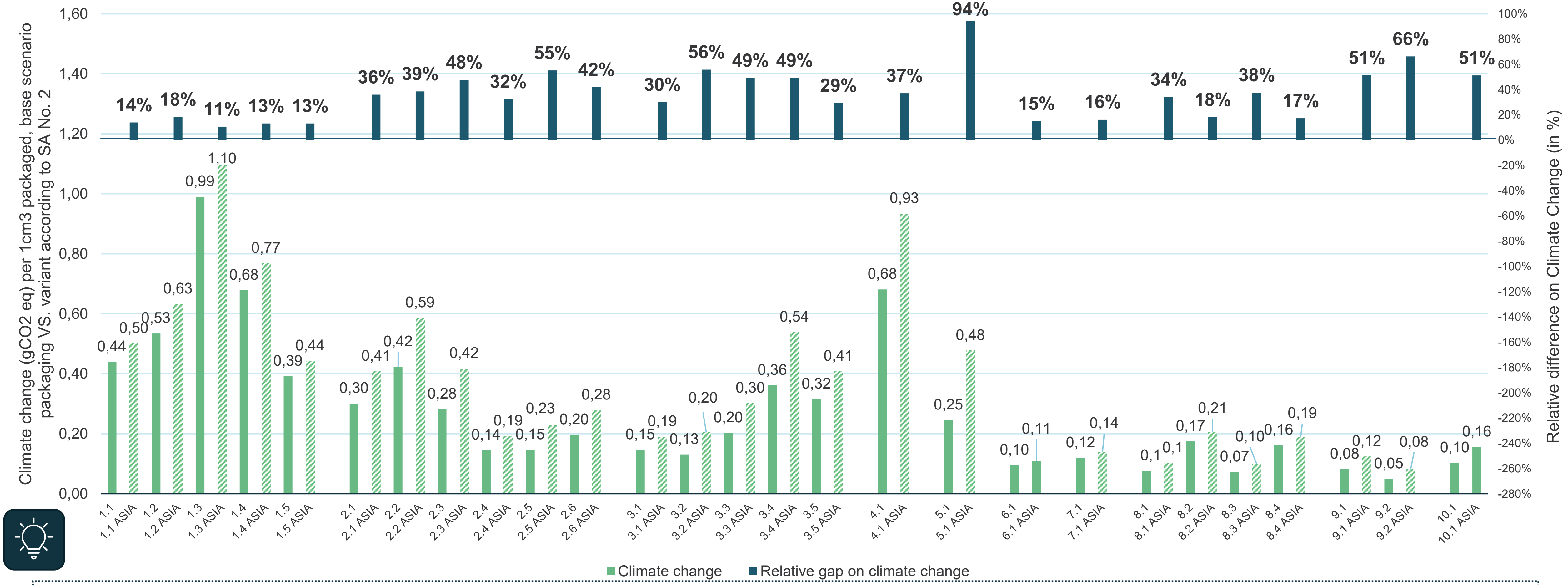
3 sensitivity studies

5. SA1: Variation in the rate of incorporated recycled material



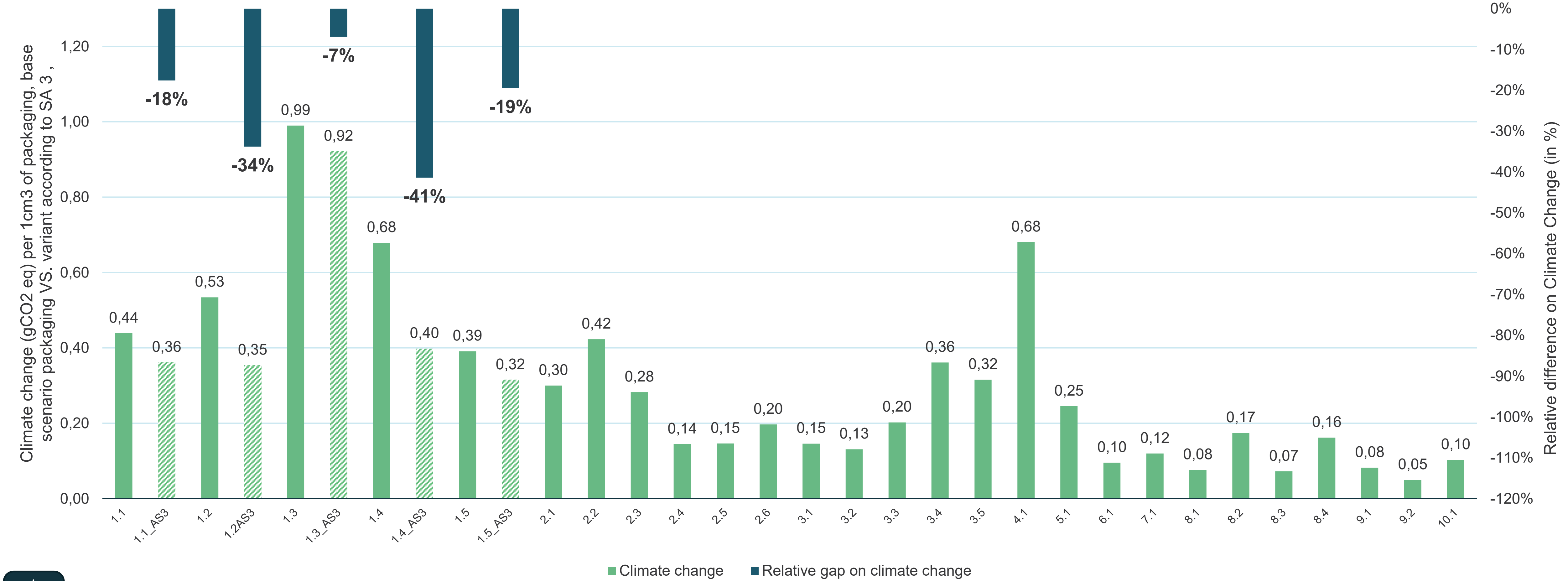
- Incorporating **50% recycled material** reduces the impact of **climate change** by **0 to 9%** over the entire life cycle.
- Categories that **benefit most from** the integration of recycled materials are those that use **plastic** (**classic blister** and **flexible pack**).
- Packaging categories that mainly use **cardboard** have less interest in integrating recycled content because of the **co-production of a biosourced material** (black liquor) in the virgin cardboard manufacturing process and its energy recovery (substitution → impact avoided). And the CFF's **A factor**, set at 0.2 for cardboard, which reduces the benefits of incorporating recycled materials (A=0.5 for plastics).

5. SA2: Asian sourcing of raw materials



- **Modelling:** based on the Chinese energy mix (when electricity is used as an input), otherwise average Asian market raw materials.
  → Transport added (ship + truck).
- **Sourcing in Asia** is decisive for the environmental impact of all packaging → This will **increase the impact** of climate change **by 11% to 94%**.
- Favouring **European sourcing** is therefore a key factor in the design of alternatives to blister packs.
  → Depends on the energy mix of the country of production.

5. SA3: Variation in packaged volume for carton/PET blisters.



- Increasing the volume packed does not change the conclusions of the study.

  → Even if this results in a **7 to 41% reduction in the impact** on climate change, **flexible packaging** (6-8) and **bulk packaging** (9-10) still perform better. However, **individual cardboard packaging** (2-3-5) is no longer necessarily better than the benchmark.
- This SA is based on a theoretical maximum volume = not necessarily realistic

Table of contents

Conclusions

Overview

Key findings

Limits of the study

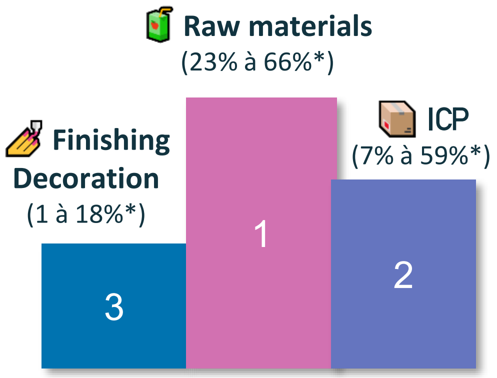
Conclusion

Overview

The environmental impact of the **different scenarios studied** depends on the following categories (in order of importance):

- **Raw materials**
- **ICP**
- **Finish/Decoration**

Life cycle categories in order of importance :



*Category share of the single score

Performance of the different scenarios on the single score by life cycle stage

	1 Blister pack (reference)	2 Reverse blister	3 Cardboard case	4 cardboard + strap	5 Moulded cellulose	6 to 8 flexible	9 & 10 Bulk
Raw materials	6th	4th	🥉	7th	5th	🥇	🥈
ICP	6th	4th	7th	5th	🥇	🥉	🥈
Finishing/Decoration	7th	6th	5th	🥉	🥇	4th	🥈
GLOBAL	6th	4th	🥉	** 7th	5th	🥈	🥇

→ The **least impacting scenarios** are those that have the **least impact** on the most **contributing** categories (raw materials and ICP).

**1 single sample analysed (not necessarily the best designed or optimised). Further analysis required

Key findings

- 🔜 Overall, the **alternatives** are all less impactful than the reference blister pack, basing on the functional unit defined
- 🧃 **Raw materials**
  - Main contributor to impact for all types of packaging
  - Favouring European sourcing is a key factor in controlling impact (SA2)
  - Incorporating 50% recycled material allows a maximum 10% reduction in impact (SA1)
- 📦 **ICP**
  - Major contributor to environmental impact
  - 🔑 eco-design key (palletisation optimisation, mass reduction, recycling, etc.)
- **Analysis by secondary functions** enables further analysis and identification of alternatives adapted to the packaging needs of each product

Limits of the study

- Heterogeneity in data **collection**
  - Samples,
  - Technical data sheets
  - Representativeness

Table of contents

Next steps

LCA
→ The ISO report will be published on the blisters AAP website in the second half of June: [Call for projects] Disposal of non-recyclable cardboard/plastic blister packs | CITEO (early July in English)

→ The presentation will be available in a few days. The presentation will be translated into English on 23th of June.

→ **EVEA recommendations:** Read the report, particularly the last section (conclusions and recommendations). Carrying out LCAs on a case-by-case basis will help to reinforce the conclusions when planning to replace blister packaging.

Call for projects "Disposal of non-recyclable cardboard/plastic blisters".

Application deadline: **4 June 2025**
Closing date for applications: **10 July 2025** at 11.59pm
Announcement to individual winners **before the end of July**

Table of contents

Q&A

Ask us your questions!

DATA USED AND ASSUMPTIONS

Primary packaging

2. Inverted blister pack

<table>
<tr><th>Product number</th><th>Material</th><th>Component weight (g)</th><th>Percentage drop in production (%)</th><th>Manufacturing process</th><th>Finishing process</th><th>Finishing surface (cm²)</th><th>Total mass (g)</th><th>Volume (cm3)</th></tr>
<tr><td>2.1</td><td>Flat cardboard</td><td>8</td><td>15%</td><td>Cardboard cutting</td><td>Offset printing</td><td>229,94</td><td>8</td><td>88,7</td></tr>
<tr><td>2.2</td><td>Flat cardboard</td><td>7,5</td><td>17%</td><td>Cardboard cutting</td><td>Offset printing</td><td>512</td><td>8,5</td><td>56</td></tr>
<tr><td>2.3</td><td>Flat cardboard</td><td>7,8</td><td>34%</td><td>Cardboard cutting</td><td>Offset printing</td><td>206</td><td>7,8</td><td>85,4</td></tr>
<tr><td>2.4</td><td>Flat cardboard</td><td>18,4</td><td>6,5%</td><td>Cardboard cutting</td><td>Offset printing</td><td>494</td><td>18,4</td><td>436,6</td></tr>
<tr><td rowspan="2">2.5</td><td>Flat cardboard</td><td>12</td><td>7,2%</td><td>Cardboard cutting</td><td>Offset printing</td><td>241,67</td><td rowspan="2">12,14</td><td rowspan="2">167,4</td></tr>
<tr><td>PP</td><td>0,14</td><td>20%</td><td>Extrusion</td><td>NA</td><td>NA</td></tr>
<tr><td>2.6</td><td>Flat cardboard</td><td>8,12</td><td>3%</td><td>Cardboard cutting</td><td>Offset printing</td><td>298</td><td>8,12</td><td>106,1</td></tr>
</table>

DATA USED AND ASSUMPTIONS

Primary packaging

3. Case

Product number	Material	Component weight (g)	Percentage drop in production (%)	Manufacturing process	Finishing process	Finishing surface (cm²)	Total mass (g)	Volume (cm3)
3.1	Flat cardboard	12,05	26%	Cardboard cutting	Offset printing	636	12,05	382,5
3.2	Flat cardboard	36,8	34%	Cardboard cutting	Offset printing + Matt PP lamination	661	56,9	902,7
	Corrugated cardboard	20,1	2%	Cardboard cutting	-	-		
3.3	Flat cardboard	9,86	24%	Cardboard cutting	Offset printing	506	9,86	130
3.4	Flat cardboard	8,8	45%	Cardboard cutting	Offset printing	245	8,8	85,4
3.5	Flat cardboard	20,3	12%	Cardboard cutting	Offset printing	793	20,3	255

DATA USED AND ASSUMPTIONS

Primary packaging

4. à 7. Cardboard / Moulded Cellulose / Flexible paper and/or PP flowpack

Product number	Material	Component weight (g)	Percentage drop in production (%)	Manufacturing process	Finishing process	Finishing surface (cm²)	Total mass (g)	Volume (cm3)
4.1	Flat cardboard	21,7	5%	Cardboard cutting	Offset printing	340	25,2	105,5
	Nylon	2	5%	Injection	-	-		
	LDPE (Bubble bag)	1,5	5%	Extrusion	-	-		
5.1	Cellulose	8	1%	Thermoforming/moulding cellulose	-	-	8,32	146,48
	PET lid	0,32	2,4%	Film extrusion	Flexo printing	96		
6.1	Paper	1,5	1%	Extrusion Film (PP) + Lamination (paper + PP) + Flowpackage	Offset printing	240	1,96	149
	PP	0,4			Gloss varnish	240		
	Pu glue	0,06			-	-		
7.1	Paper	1,8	1,%	Flowpackage	Offset printing	240	2,4	126
	LDPE film	0,6	2,4%	Film extrusion	-	-		

DATA USED AND ASSUMPTIONS

Primary packaging

8. Flexible PP

Product number	Material	Component weight (g)	Percentage drop in production (%)	Manufacturing process	Finishing process	Finishing surface (cm²)	Total mass (g)	Volume (cm3)
8.1	PP	5,37	1%	Extrusion of PP film + flowpackage (1 side)	Flexo printing	315	5,81	414,12
	Paper	0,44	18%	-	-			
8.2	PP	1,24	to be determined	PP extrusion + flowpackage (2 sides)	Flexo, digital or offset printing	240	1,3	85,4
	PU glue	0,06	to be determined	-				
8.3	PP	3,8	0%	PP extrusion + flowpackage (2 sides)	-	-	13,8	700
	Flat cardboard	10	6%	Cardboard cutting	Offset printing	306		
8.4	PP	1,1	1%	PP extrusion + flowpackage (2 sides)	Flexo, digital or offset printing	240	1,16	86,6
	Pu glue	0,06	to be determined	-	Water-based varnish	-		

DATA USED AND ASSUMPTIONS

Primary packaging

9. and 10.1 Bulk

<table>
<tr><th>Product number</th><th>Material</th><th>Component weight (g)</th><th>Percentage drop in production (%)</th><th>Manufacturing process</th><th>Finishing process</th><th>Finishing surface (cm²)</th><th>Total mass (g)</th><th>Volume (cm3)</th></tr>
<tr><td>9.1</td><td>Flat cardboard</td><td>43</td><td>5,00%</td><td>Cardboard cutting</td><td>Offset printing</td><td>700</td><td>43,0</td><td>1120</td></tr>
<tr><td>9.2</td><td>Flat cardboard</td><td>15</td><td>5%</td><td>Cardboard cutting</td><td>Offset printing</td><td>466,7</td><td>15</td><td>499,983</td></tr>
<tr><td rowspan="3">10.1</td><td>Flat cardboard</td><td>40,68</td><td>43,50%</td><td>Cardboard cutting</td><td>Offset printing</td><td>1076,4</td><td rowspan="3">43,1</td><td rowspan="3">1365</td></tr>
<tr><td>Paper</td><td>0,14</td><td>5%</td><td>Paper cutting</td><td>Offset printing</td><td>17,28</td></tr>
<tr><td>LDPE</td><td>2,30</td><td>2%</td><td>Extrusion</td><td>-</td><td>-</td></tr>
</table>