LIFE CYCLE ANALYSIS OF A SKATEBOARD DECK

Results & recommandations

AGENDA

01. Context and scope of the study

02. First results

03. Additional/sensitivity analysis

04. Appendix: Life Cycle Assessment (LCA)

01. CONTEXT AND SCOPE OF THE STUDY

CONTEXT

LCA applied to a deck consists in quantifying the environmental impacts of all the activities linked to it:

LCA makes it possible to analyse the impacts for the deck and to carry out sensitivity analyses of the results according to various parameters (choice of modules in the available LCA databases, variations in energy consumption, etc.).

Note: the modelling of the systems studied was carried out using the GaBi tool and database developed by the company Sphera as well as the IDEMAT and EcoInvent database.

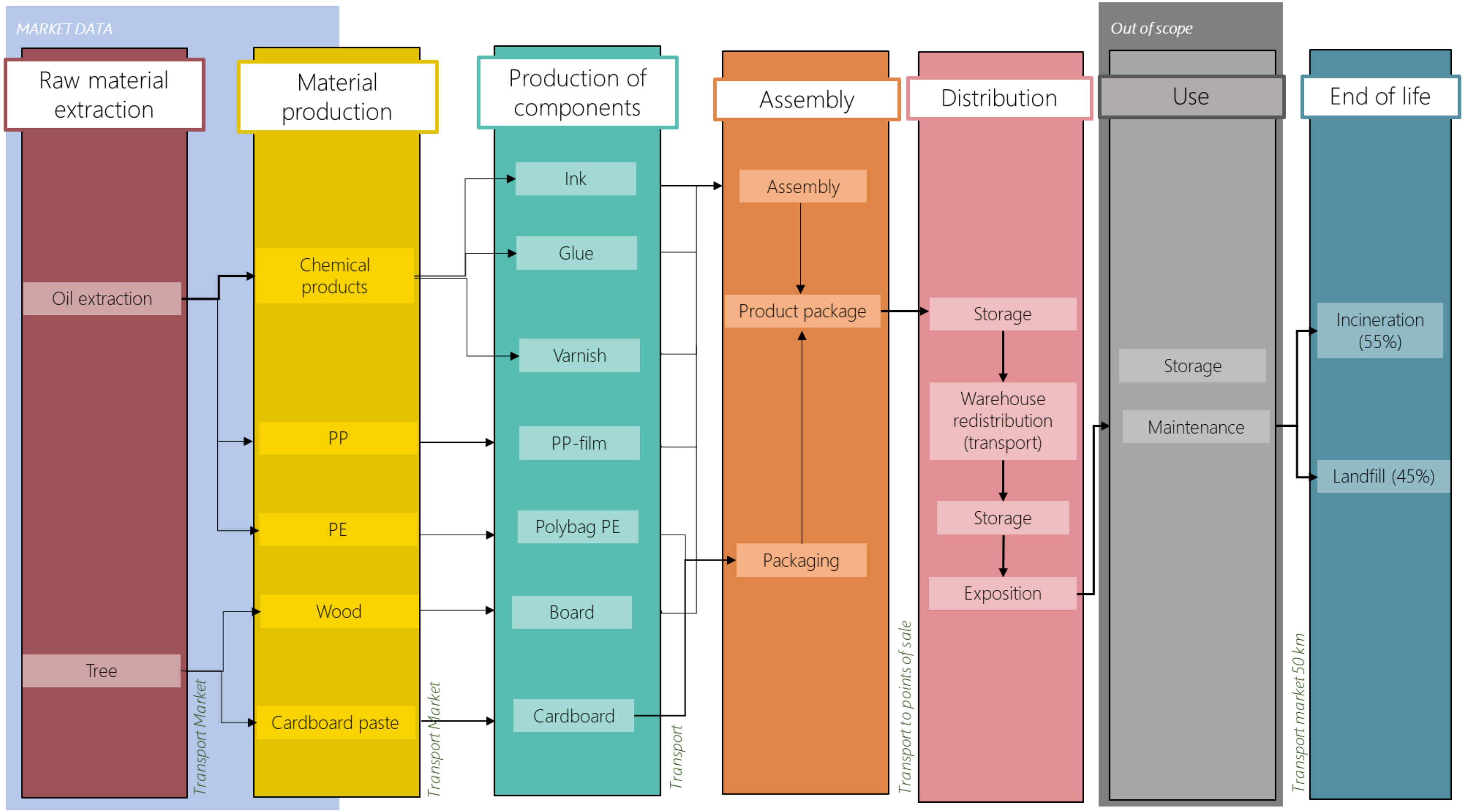
FUNCTIONAL UNIT AND REFERENCE FLOW

In order to carry out an LCA and to facilitate the comparison between two different deck models, a common reference is used to express the environmental balance over the life cycle of the systems studied. This unit, which represents a quantification of the function of a product, is the functional unit.

The reference flow is the quantity of the product under analysis and of the consumables used by this product that are necessary to cover the needs of the functional unit.

FU : « Enables a user to stand while skateboarding for a period of 1 to 6 months »
Reference flow: : 1 deck

BOUNDARY OF THE SYSTEM STUDIED



STATUS OF THE MODELLING

Some items were excluded from the study:

- Plastic film pallet for transport
- Transport pallet

We had to make assumptions about other elements, either due to lack of primary data or lack of information:

- Assumption on the reduction of the impact of an FSC maple wood compared to the same one in non FSC (average developed with available data)
- Wood glue waste: industrial waste
- Printing process: "rotogravure" module, which includes the dyeing process and ink production
- End of life transport: 50 km
- End of life: 45% landfill and 55% incineration

02. FIRST RESULTS

LIFE CYCLE STAGE ANALYSIS

	EF 3.0 Climate Change - total [kg CO_2 eq.]	EF 3.0 Acidification [Mole of H+ eq.]	EF 3.0 Eutrophication, freshwater [kg P eq.]	EF 3.0 Resource use, fossils [MJ]	EF 3.0 Resource use, mineral and metals [kg Sb eq.]	EF 3.0 Land Use [Pt]
Material/Components	1,46	0,0077	0,00015	4,44E+01	1,48E-05	32,3
Procurement	0,18	0,0028	0,00000014	2,35E+00	9,07E-09	0,184
Manufacturing	0,03	0,0001	6,46E-08	-0,01	1,64E-06	0,0989
Packaging	0,27	0,0006	0,00000278	8,39E+00	1,98E-07	5,52E+00
Distribution	0,47	0,0007	0,00000166	6,10E+00	4,71E-08	2,58E+00
Transport End of Life	0,01	0,0000	0,00000002	0,09	6,88E-10	3,78E-02
End of life	0,69	0,0004	0,000015	0,90	5,73E-09	0,143
TOTAL	**3,12**	**0,0124**	**0,000172**	**62,22**	**0,000017**	**40,8637**
Standardisation (Person equivalent in Europe over 1 year)	0,00039	0,00022	0,00011	0,0010	0,00026	0,000009
Standardisation (Equivalent day for one person in Europe)	0,14	0,08	0,04	0,35	0,096	0,0034

20 km **Equivalent km driven with a Euro 5 diesel vehicle**

AIR COOP

IMPACT CATEGORY

CLIMATE CHANGE [KG CO2 EQ]

All inputs and outputs that result in the emission of greenhouse gases. The main contributions are the **burning of fossil fuels such as coal, oil and natural gas**.

ACIDIFICATION [MOL H+ EQ]

Acidification has contributed to the decline of coniferous forests and increased fish mortality. Acidification results from emissions to air, water and land, the **main sources of which are combustion processes related to electricity generation, heat production and transport.**

EUTROPHICATION, FRESHWATER [KG P EQ.]

Aquatic eutrophication of freshwater is the result of the presence of excessive amounts of substances containing nitrogen (N) and phosphorus (P) in water. Due to these excessive concentrations, algae grow too quickly in aquatic ecosystems. The oxygen available in the water can then become too low for fish to survive, which affects these ecosystems as a whole.

IMPACT CATEGORY

RESOURCE USE FOSSIL [MJ]

The Earth contains a finite amount of non-renewable resources, some of which are sources of energy such as coal, oil or gas.

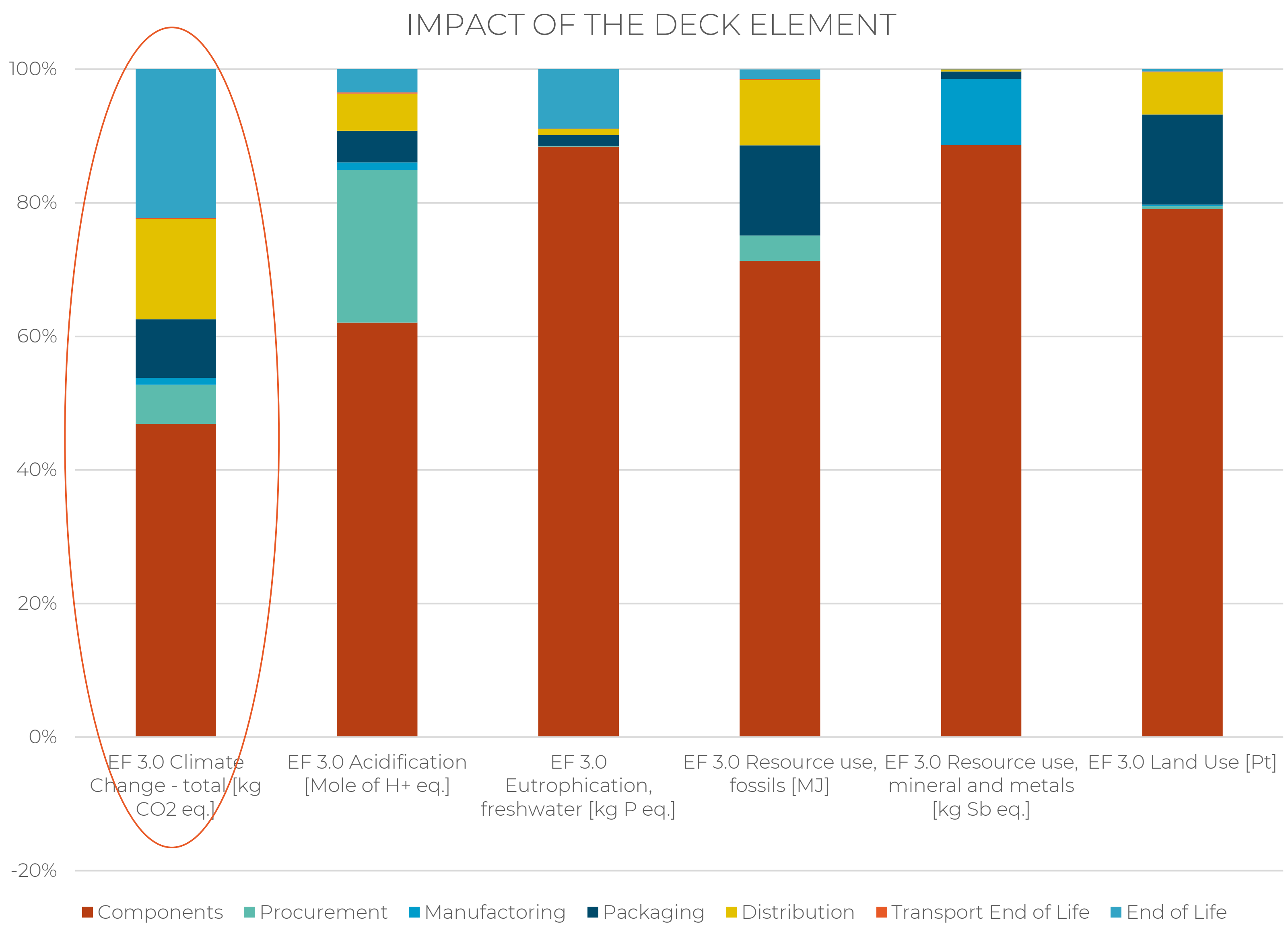
RESOURCE USE, MINERAL AND METALS [KG SB EQ]

The Earth contains a finite amount of non-renewable resources such as metals and minerals. The basic idea behind this impact category is that extracting a high concentration of resources today will force future generations to extract low concentration or low value resources.

LAND USE[Pt]

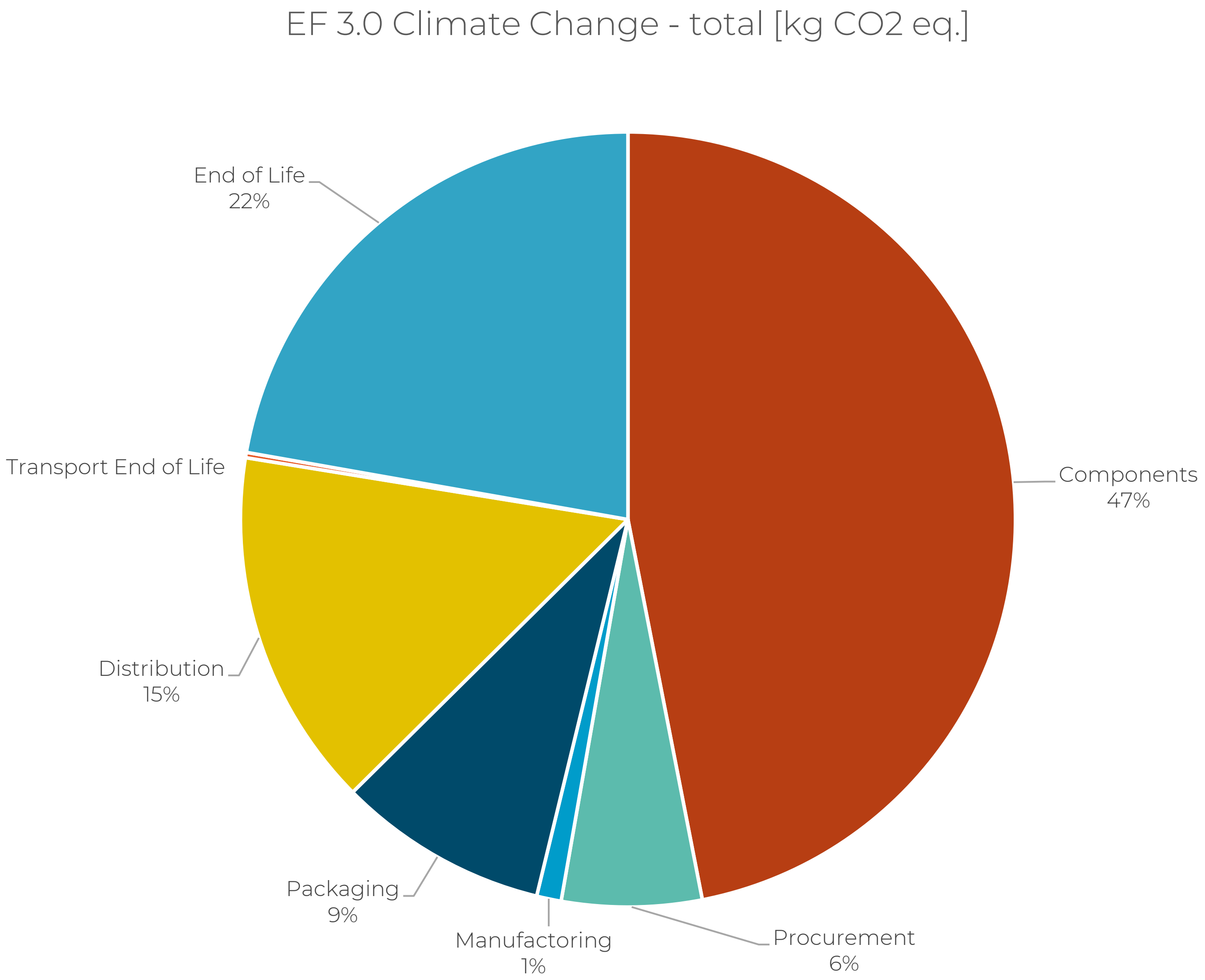
Land is a finite resource, divided between "natural" (forests), productive (agriculture) and urban environments. Land use and habitats determine biodiversity to a large extent. This category therefore reflects the impact of an activity on land degradation, with reference to the "natural state".

LIFE CYCLE STAGE ANALYSIS



- The **components** of the deck (wood, glue, varnish etc.) have the greatest impact on all environmental indicators.
- **The end of life** also has a significant impact on global warming.

FOCUS ON CLIMATE CHANGE

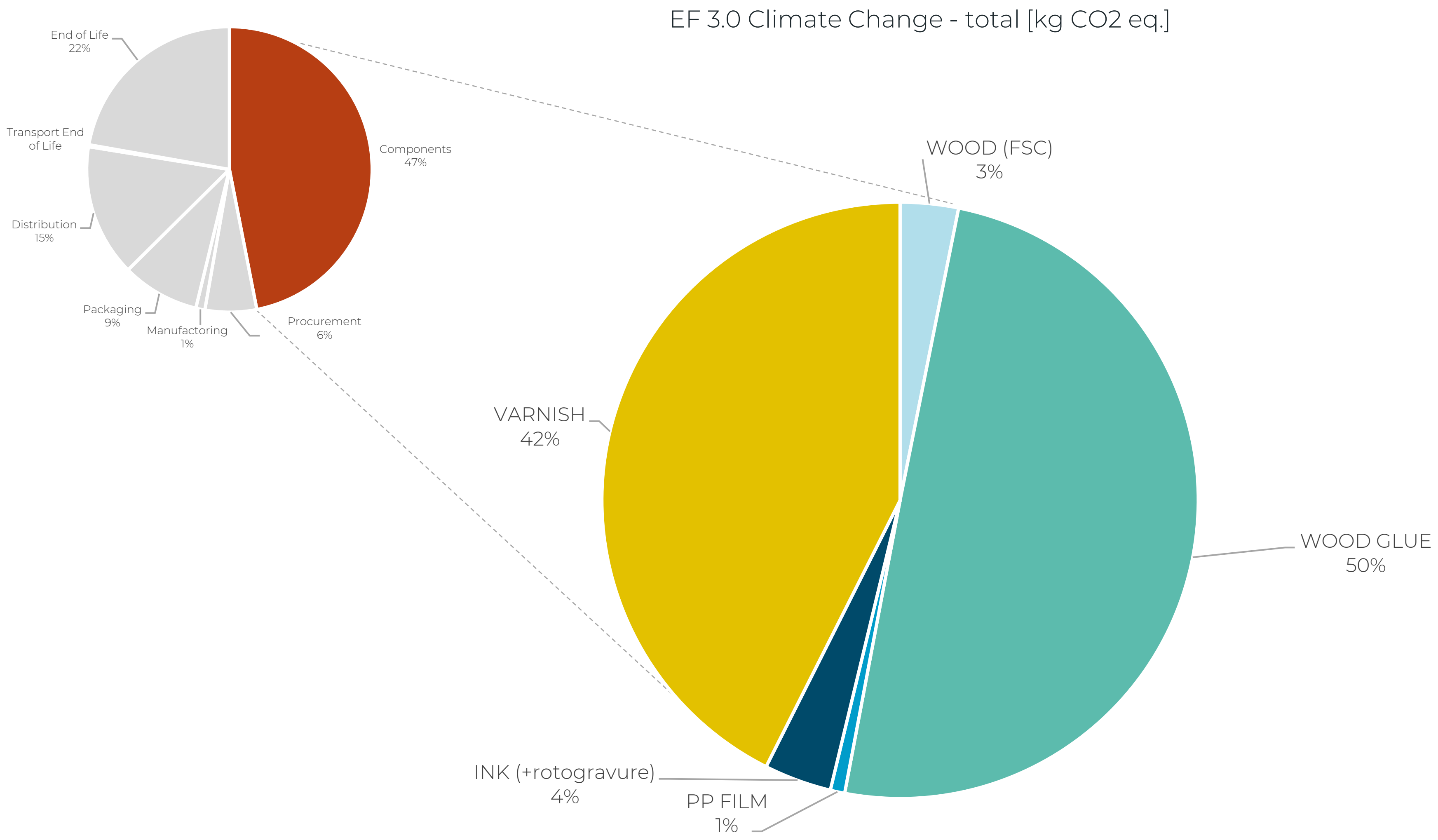


The **deck components** (wood, glue, varnish etc.) and their **shaping** and **supply** account for 53% of the global warming impact.

The **manufacture** (at HCL) of the deck alone accounts for only 1% of the global warming impact (energy and waste from gluing, pressing, printing etc.). This impact is low thanks to the installation of solar panels

Packaging accounts for 9% of the global warming impact, **distribution** 15% and **end of life** 22%.

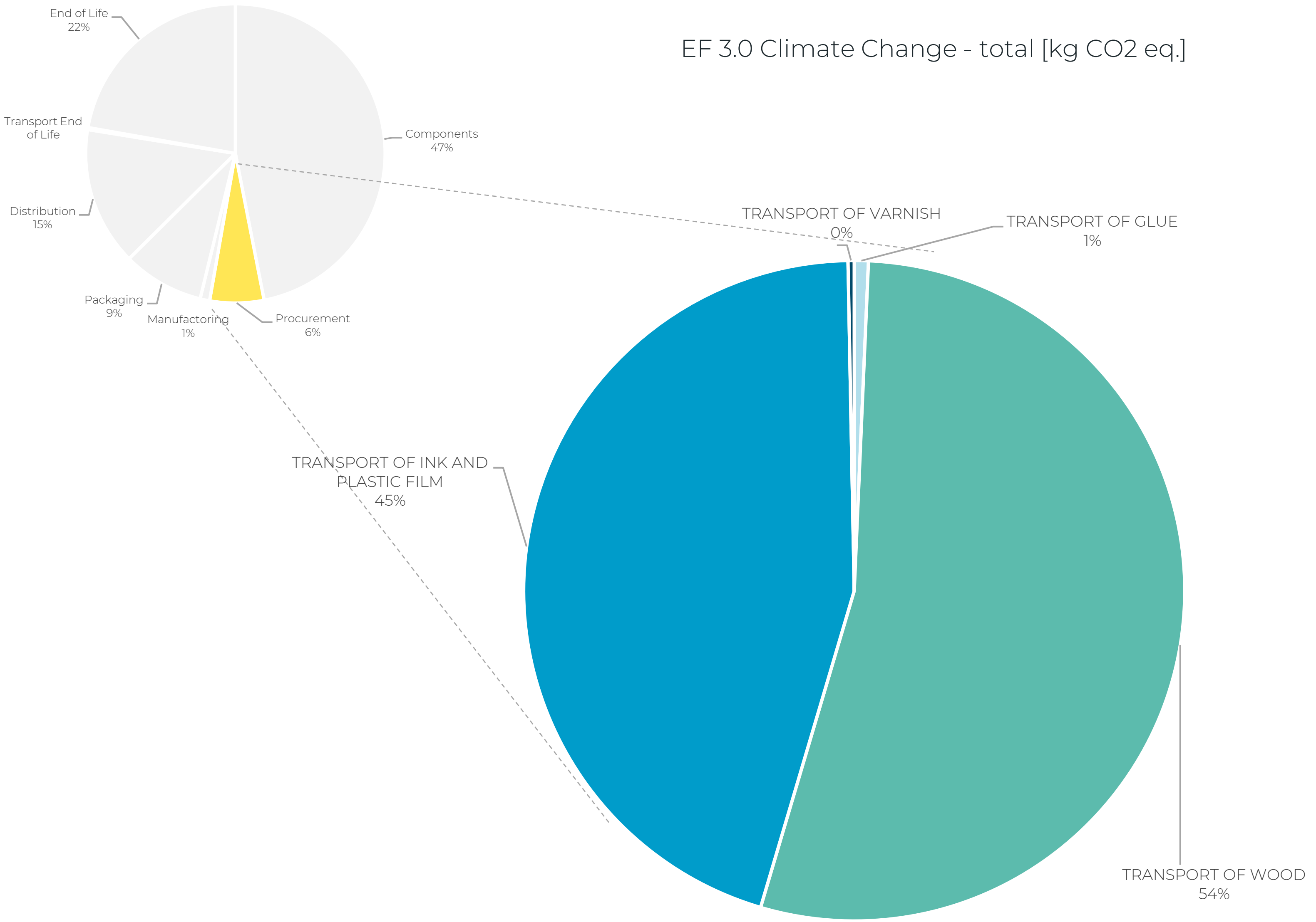
COMPONENTS (47%)



On global warming, **glue** represents **50%** of the impact of the components and **varnish 42%.**

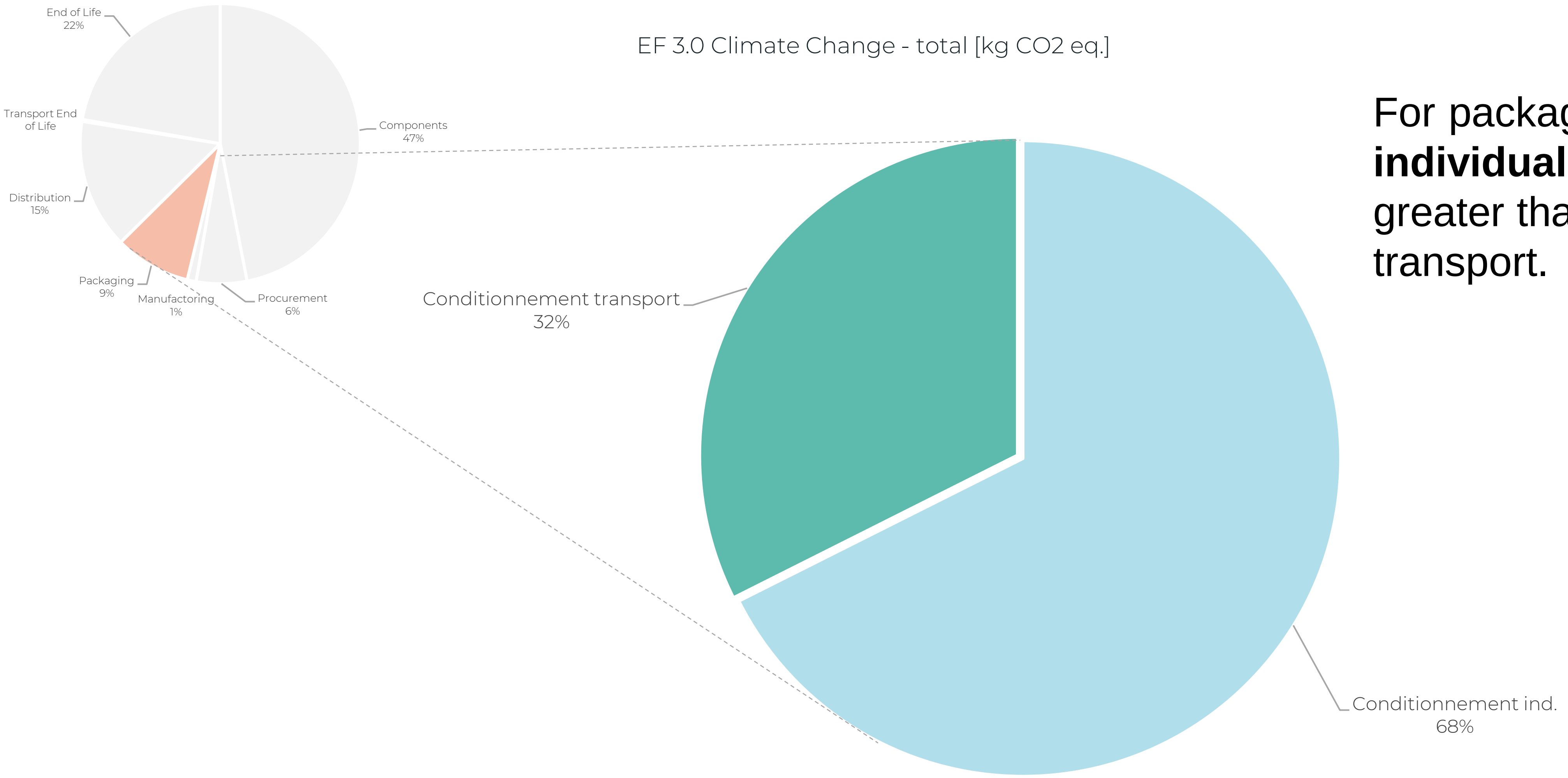
Please note that due to the databases available to date, in this graph the ink also takes into account the printing process.

PROCUREMENT (6%)



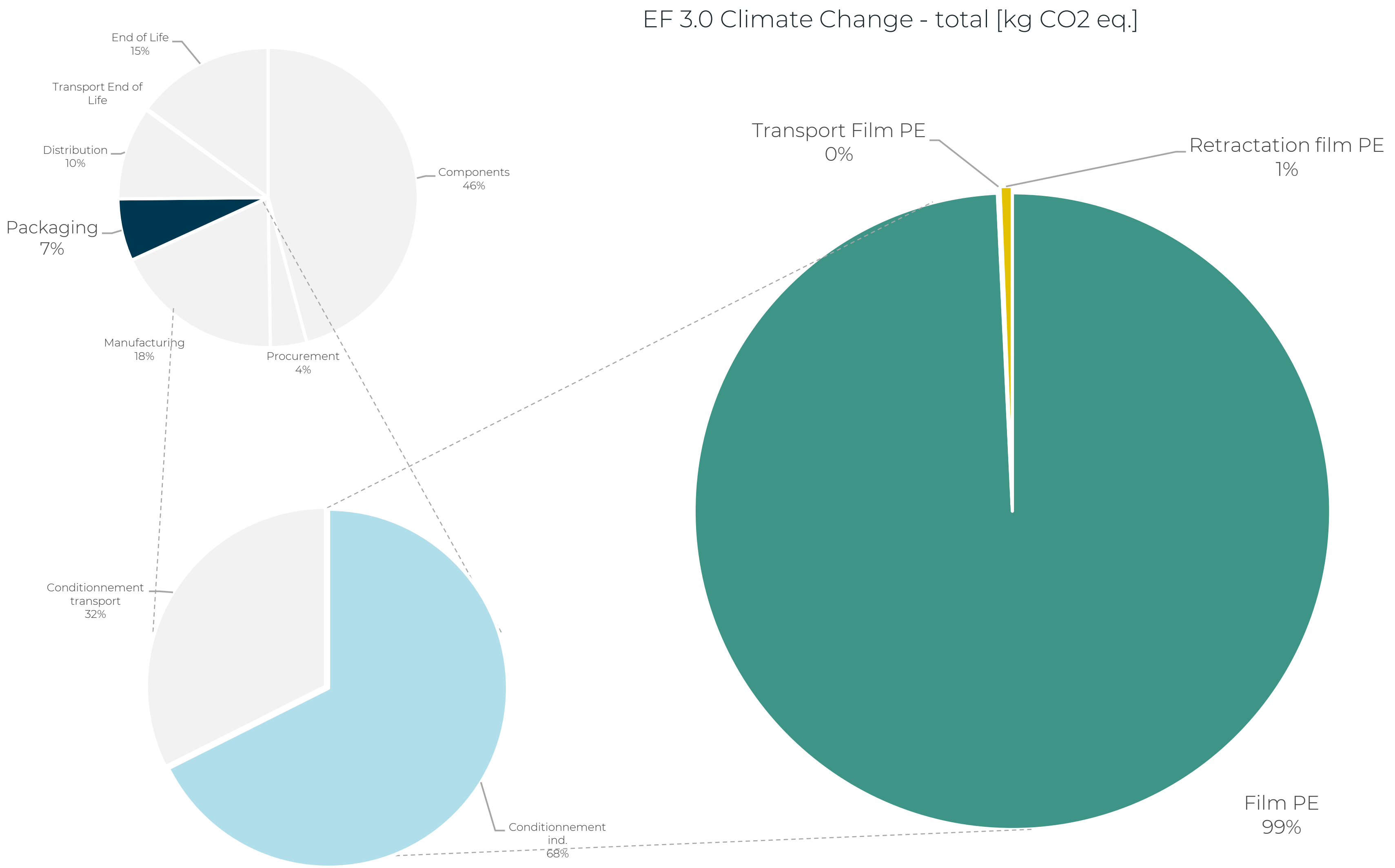
In terms of global warming, the **supply of wood** is the most impactful with 54%. Next come the **transport of ink and plastic films** with 45%. This impact is mainly caused by the use of aircraft.

PACKAGING (7%)



For packaging, the impact of **individual packaging** is greater than that required for transport.

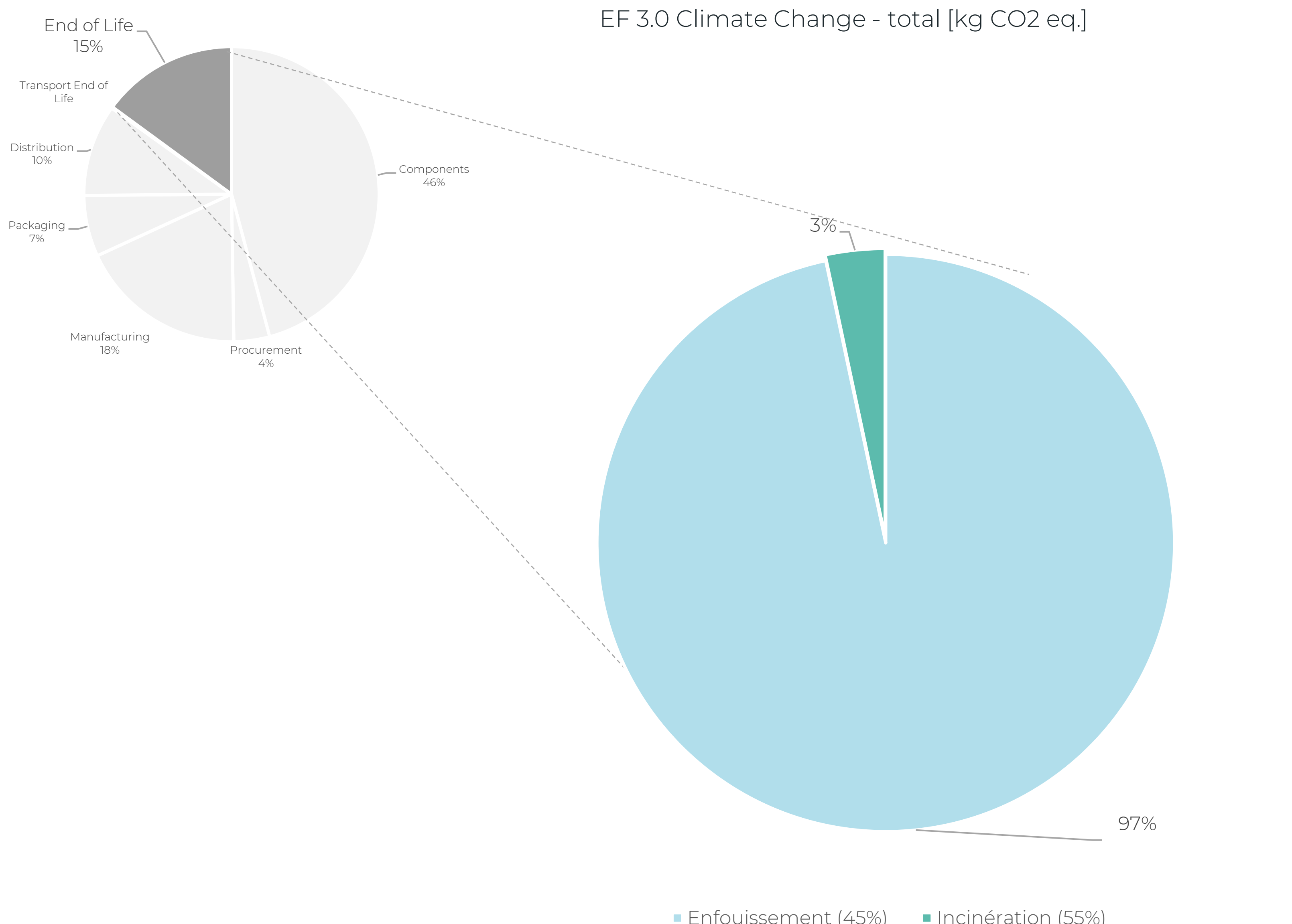
PACKAGING (7%) – INDIVIDUAL (68%)



Focusing on **individual packaging** we note that the greatest impact is due to the **PE film.**

The energy required for shrinkage is low thanks to the use of solar panels.

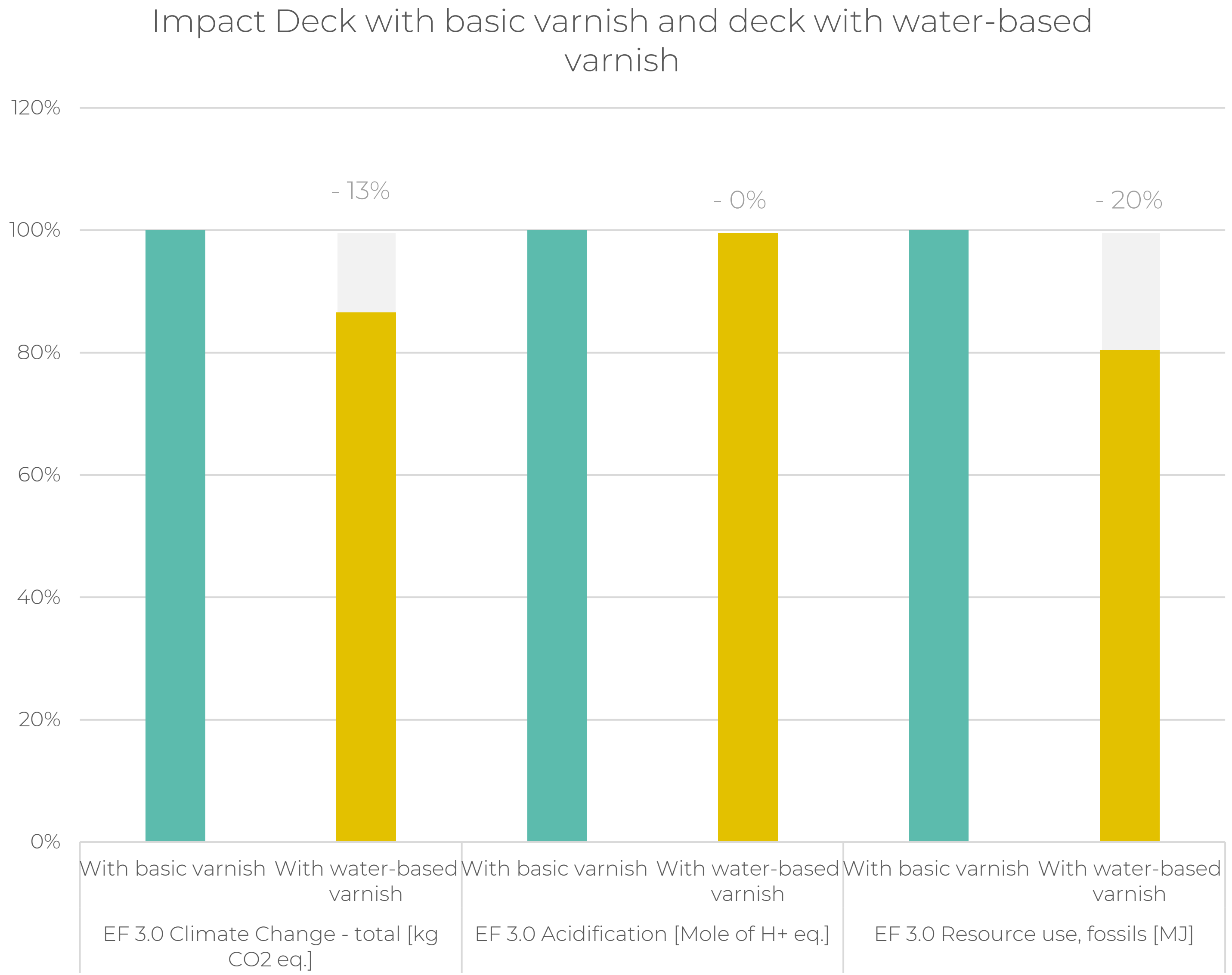
END OF LIFE (15%)



Regarding end-of-life, **landfill** has the biggest impact, mainly on global warming (97% for landfill versus 3% for incineration).

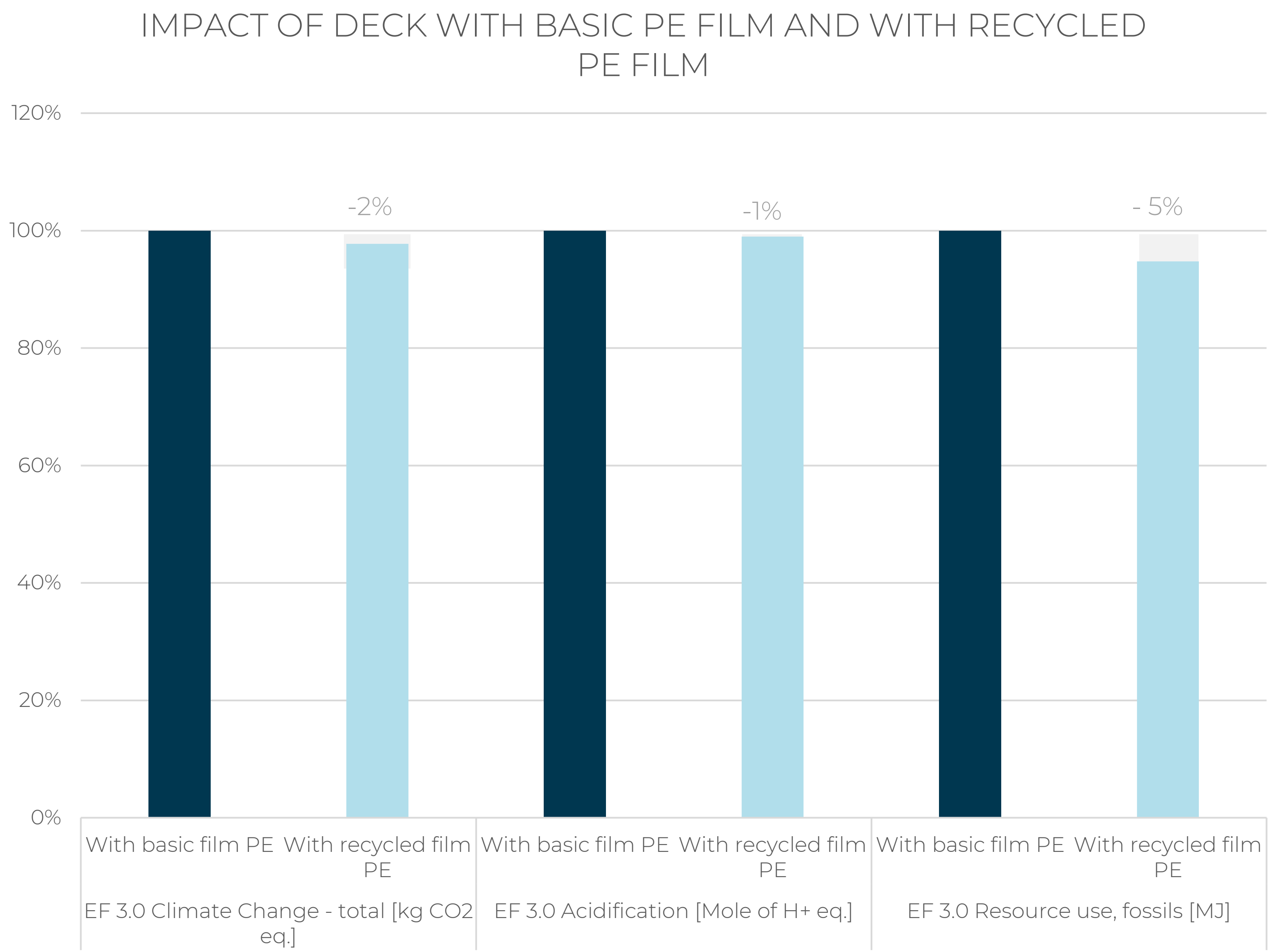
03. ADDITIONAL SENSITIVITY ANALYSIS

COMPARISON OF BASIC VARNISH VS WATER-BASED VARNISH



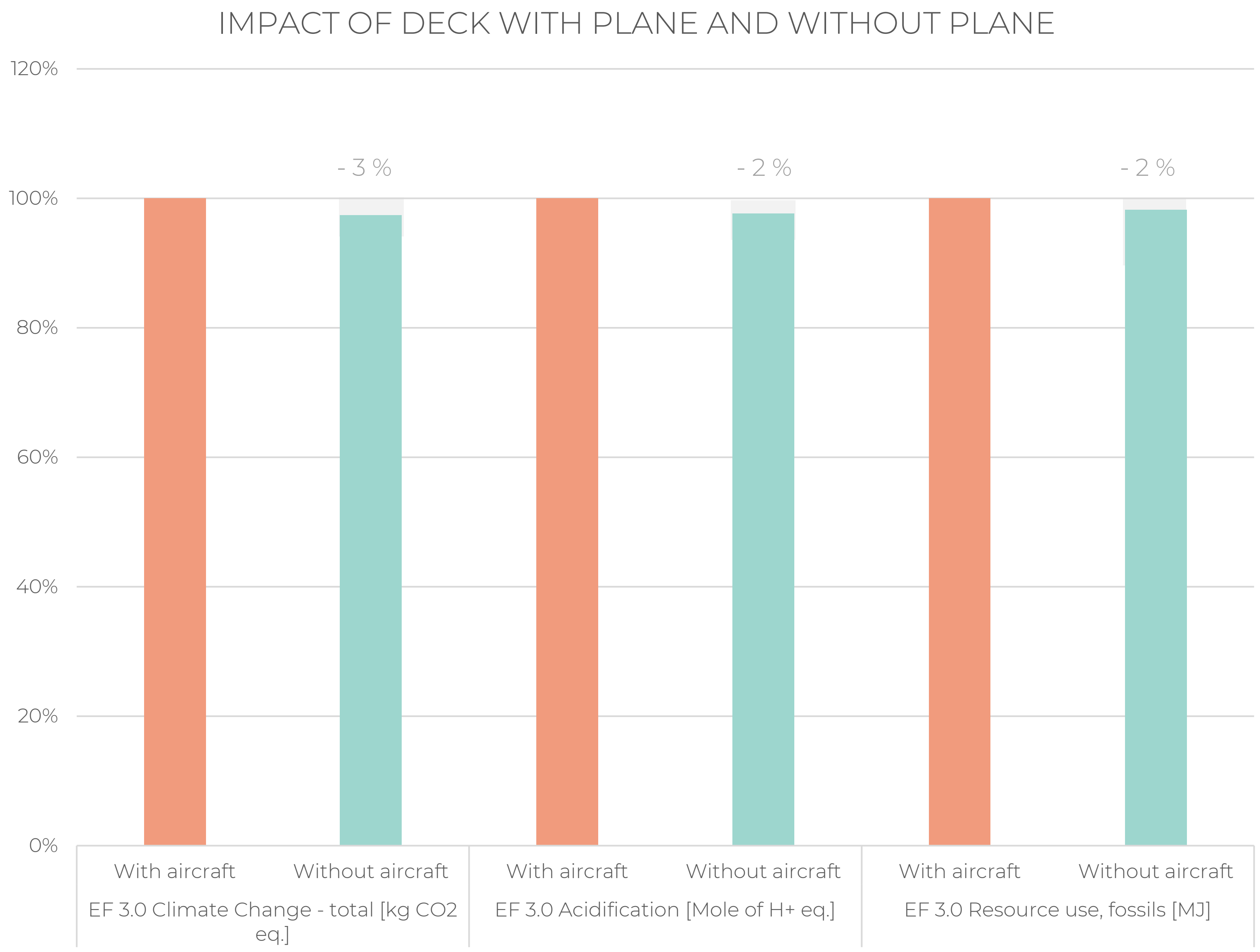
The **varnish** is one of the most impactful components of the board.
If we replace the varnish currently used with water-based varnish, we can **reduce the impact of the board on global warming by 13%** and the impact of **the use of fossil resources by 20 %.**

COMPARISON OF PE FILM BASIC AND PE FILM RECYCLED



The **PE film** used for individual packaging has a considerable impact on the environment.
If we replace the one currently used with a recycled PE film, the impact of the board on **global warming** is reduced by **2%**, on **acidification** by **1%** and on the **use of fossil resources** by **5%**.

COMPARISON WITH PLANE AND WITHOUT PLANE



Supply accounts for **6%** of the deck's impacts on global warming. 45% of that 6% is caused by airplane. If we change the use of airplane to container ship, we can **reduce** the deck's **global warming impact by 3%, 2 % on acidification and 2% on use of fossil resources.**

OUR RECOMMANDATIONS

Because HLC uses solar panels and recycles its waste, the manufacturing of the board does not have a high impact. So we have to focus on the materials used if we want to reduce the environmental impact of the board.

That's why to reduce significantly the impact of a skateboard deck on Climate (and other impact), we recommend to investigate these solutions (by order of importance) :

1. Using a more environmentally **responsible glue and varnish** with similar quality and durability (bio-based)

2. **Replace PE film by a more responsible alternative**, or zero packaging or reuse of the printing waste (e.g. plastic film) to protect the decks during transport and avoid single use PE film

3. Stop using air transport for PE film

AIR COOP

04. Appendix: Life Cycle Assessment (LCA)

LCA: PRESENTATION OF THE METHOD

According to ADEME, life cycle assessment is the most advanced tool for the global and multi-criteria evaluation of environmental impacts. This standardised method makes it possible to measure the quantifiable effects of goods or services on the environment (ISO 14040 and 14044)

- A "life cycle" approach: taking into account all stages of a product's life cycle, from "cradle to grave

- A "multi-criteria" approach: analysis of input (materials and energy) and output (waste, emissions to air, water and soil). The collection of information on flows is an important step in LCA: Life Cycle Inventory (LCI). Indicators of potential environmental impacts are then used to analyse and communicate the impacts.

ACV: THE STEPS OF THE ANALYSIS

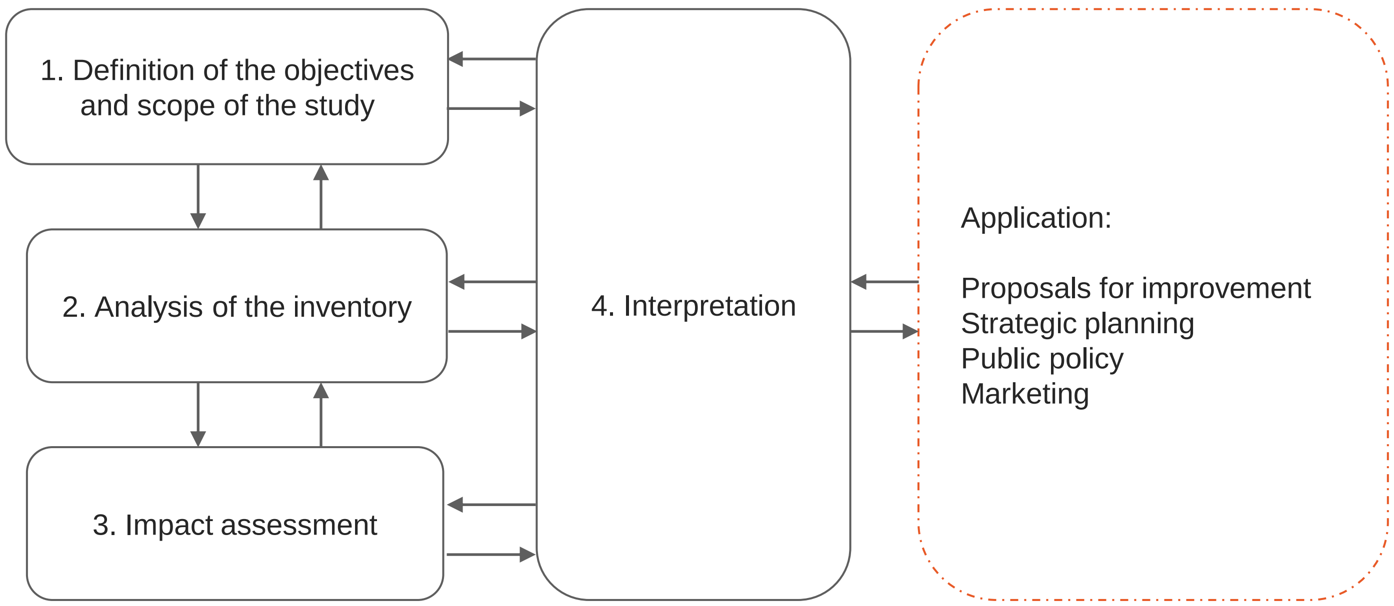
According to ISO 14040 and 14044, the life cycle assessment methodology is based on four distinct and interdependent stages (iterative approach)

1. Definition of the objectives and scope of the study: this stage defines the Functional Unit (a common unit of measurement of the service provided by the product), the boundaries of the system studied and the limits of the study

2. Life cycle inventory (LCI): analytical accounting of flows

3. Assessment of impacts according to a characterisation method and indicators

4. Interpretation of the results obtained according to the objectives set (iterative stage with the previous ones)



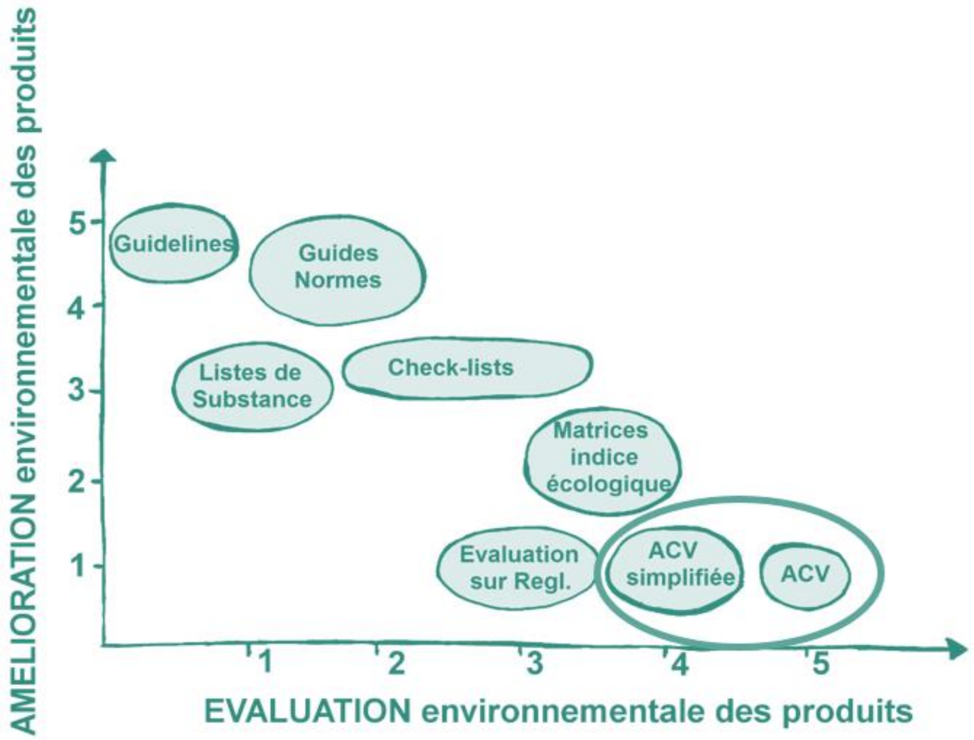
THE LIMITS OF A LCA

According to ISO 14040 and 14044, the life cycle assessment methodology is based on four distinct and interdependent stages (iterative approach)

- LCA is a tool that allows for numerous analysis possibilities. However, it is only an analysis tool, and conducting an LCA does not in itself constitute an eco-design project; it is a step that is carried out upstream

- LCA is not always the most appropriate technique for all situations: it is important to define the objective of the study upstream (step 1 according to the standard)

- The LCA of a product can lead to sometimes complex conclusions: it is important to know how to explain the results of the analysis (beware of greenwashing!)



WHY CARRY OUT AN ACV?

Life cycle assessment is a decision-making tool whose objective is to present a global view of the impacts generated by one or more products.

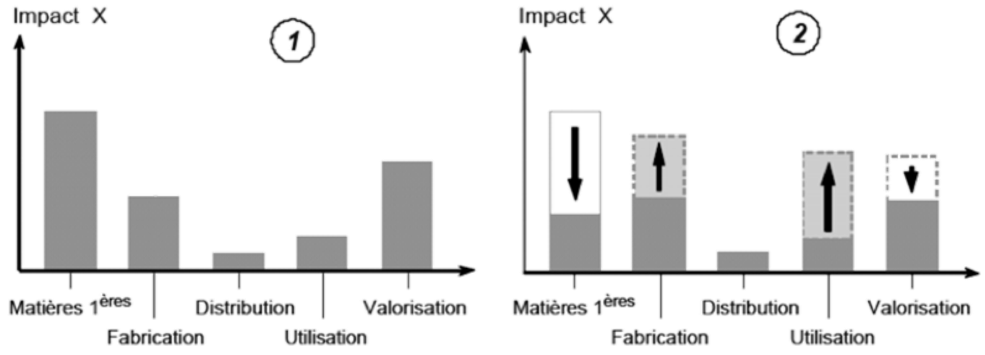
LCA can be used in many cases:

- Identification of environmental issues
- Development of eco-designed products
- Comparison between products (benchmarking) with the same function -> critical review needed (by independent experts)
- Communication, making environmental performance credible
- Strengthen the state of knowledge

The strength of an LCA lies in the fact that it allows :

- **Compare environmental impacts**: taking into account several indicators and all stages of a life cycle, thus reflecting the complexity of environmental impacts.

- **Avoid the risk of impact transfer** by assessing several types of environmental impacts and all stages of the life cycle. In this way, the potential transfer of impacts from one life cycle stage to another, or from one impact category to another, is assessed.



COOPÉRATIVE
D'ENTREPRENEUR·E·S
DU CHANGEMENT

Alice KORTHALS

Consultante en éco-conception
et ACV
Tél. +33 (0)7 66 36 94 87
ak@air.coop

BUILDING A RESPONSIBLE FUTURE - TOGETHER

COOPÉRATIVE D'ENTREPRENEUR·E·S DU CHANGEMENT