








INSTITUT FÜR ENERGIE-
UND UMWELTFORSCHUNG
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Comparative Life Cycle Assessment of Tetra Recart[®] packages and alternative packaging systems for shelf stable soup on the European market

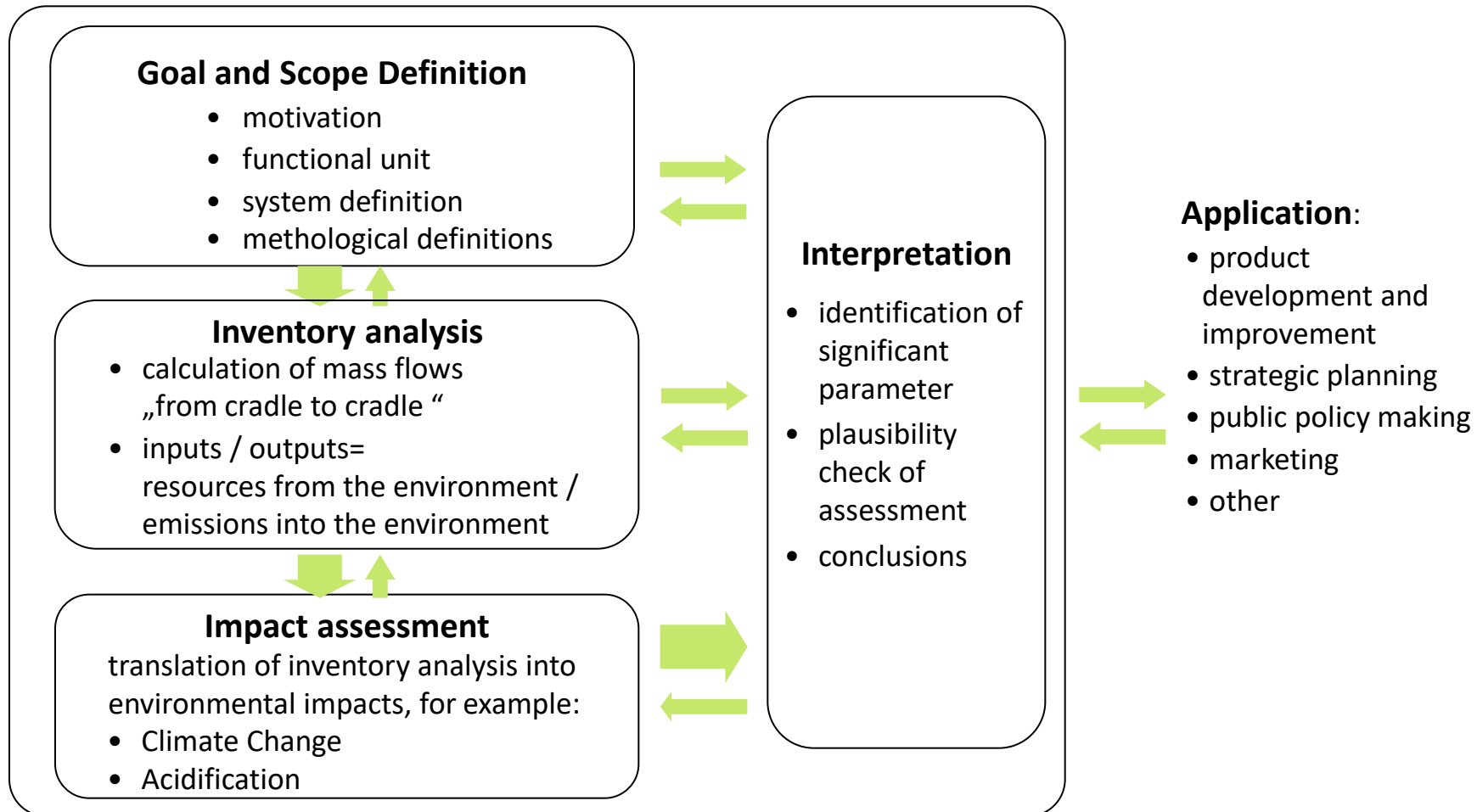
Extended summary, May 2021

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-  Life Cycle Assessment
-  Goal and scope
-  Packaging systems and scenarios
-  Results
-  Overall results

Structure as in (ISO 14040/14044)



Objective

The goal of the study is to conduct an LCA analysing the environmental performance of Tetra Pak's Tetra Recart® carton systems compared to alternative food packaging systems for the segment soup.

Competing packaging systems on the regarded market Europe include:

	Pouch
Europe	Soup

Functional unit and time scope

Functional unit

The function examined in this LCA study is the packaging of shelf stable food for retail. The functional unit for this study is the provision of packaging volume for 1000 L of shelf stable food at the point of sale.

Time scope

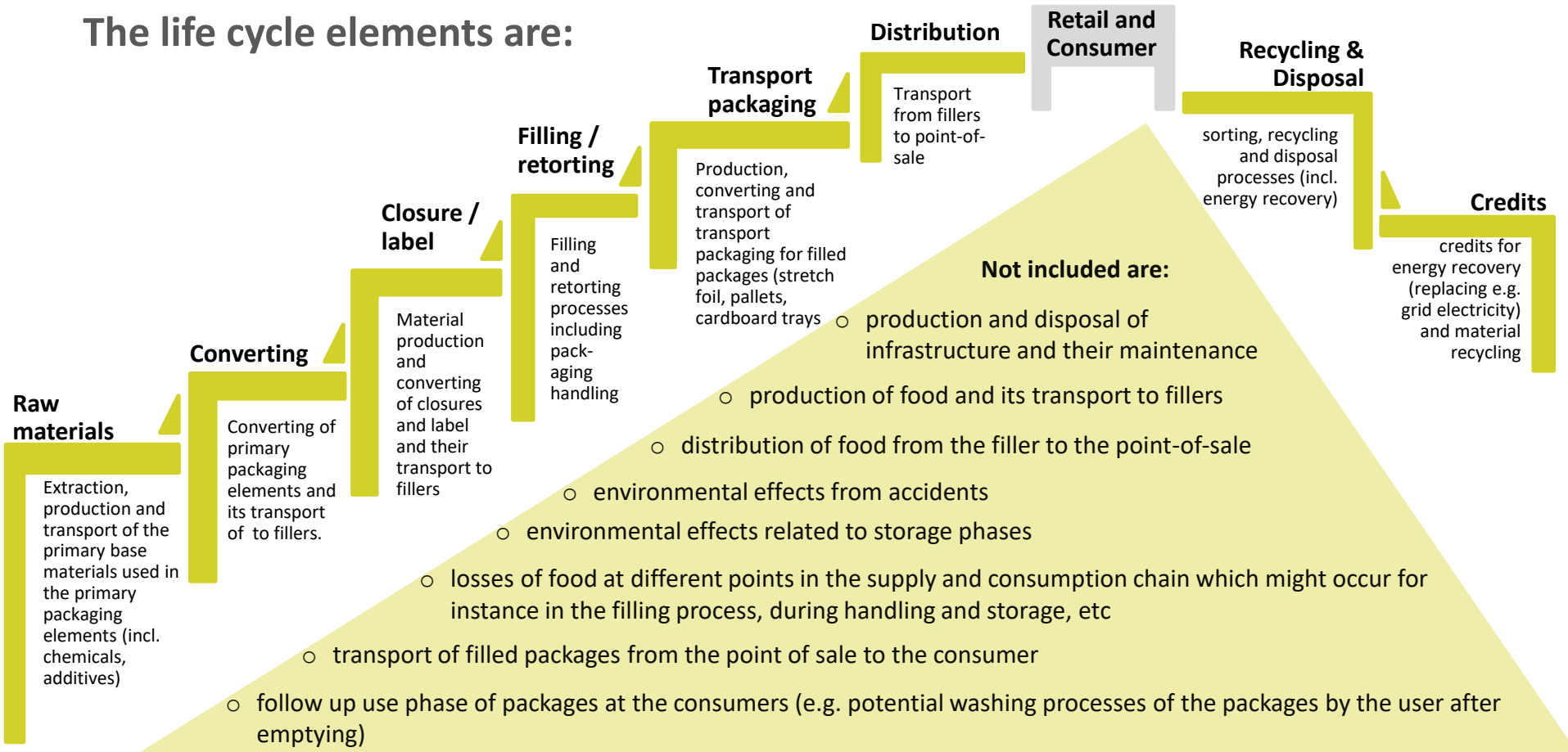
The reference time period for the comparison of packaging systems is 2020. Where no figures are available for these years, the used data is as up-to-date as possible.

System boundaries



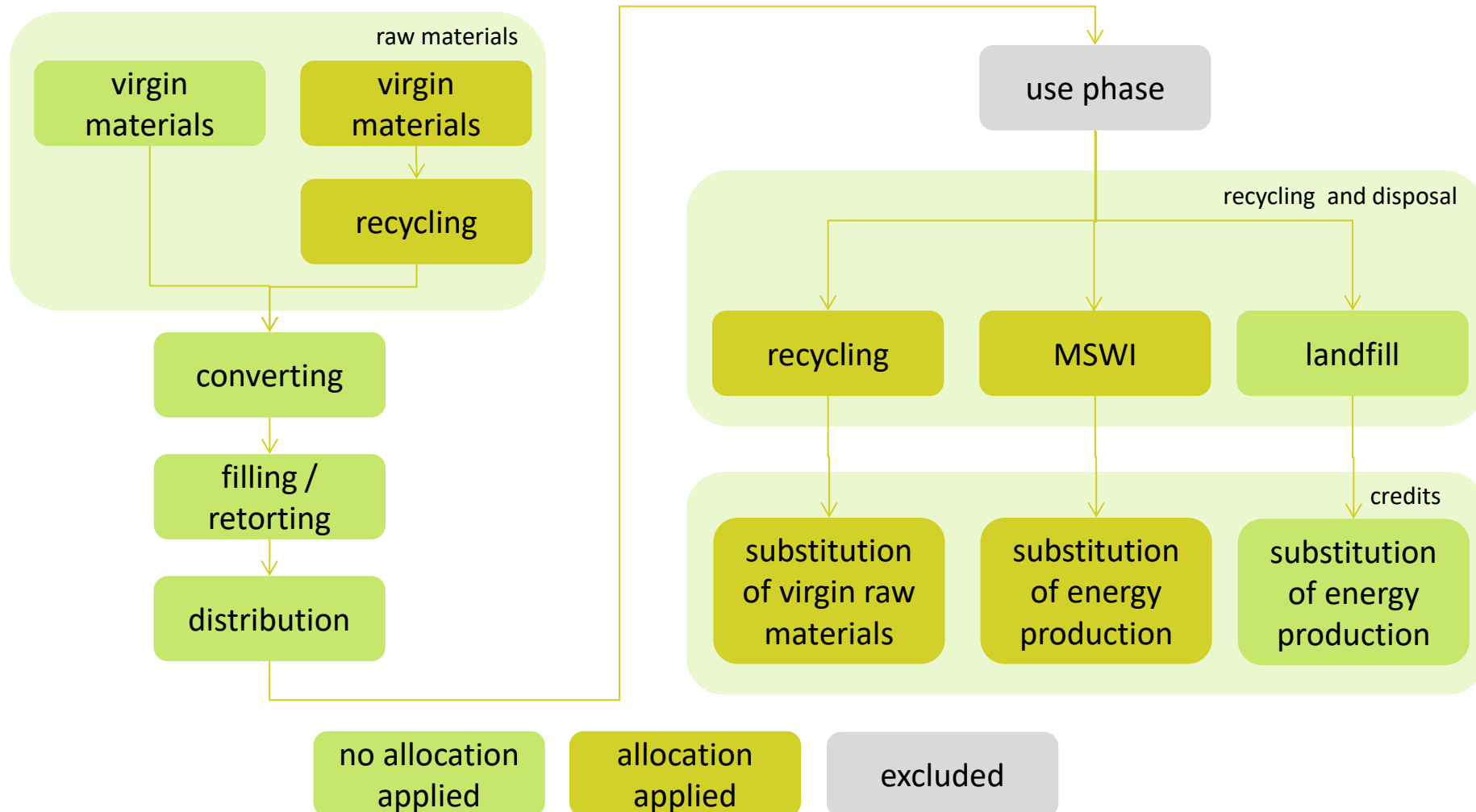
The study is designed as a 'cradle-to-grave' LCA.

The life cycle elements are:



Allocation

processes allocation is applied to

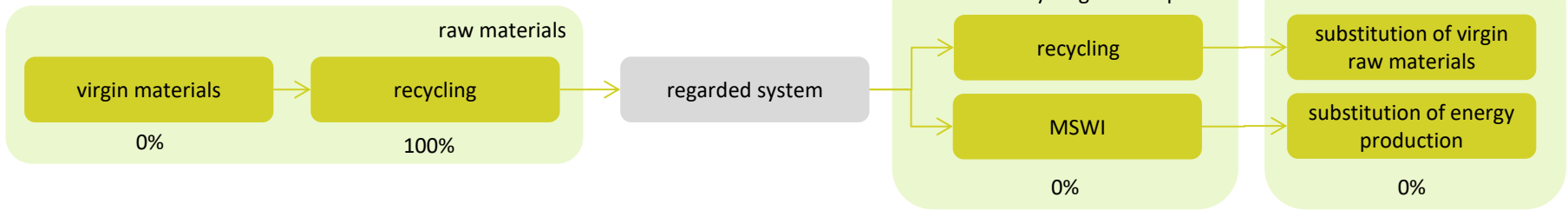


Allocation

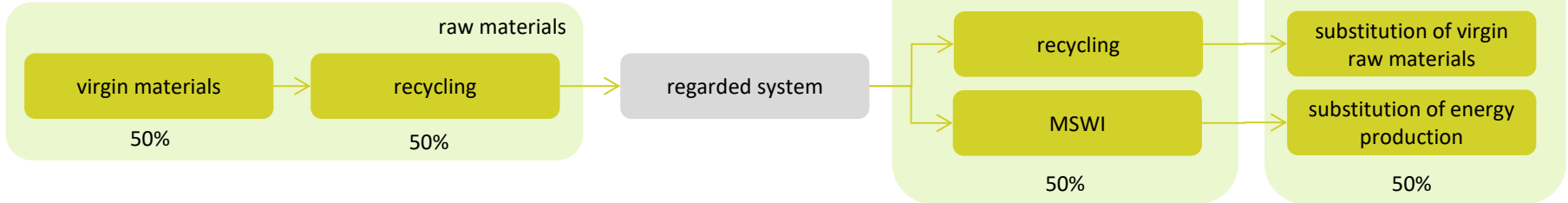
allocation factors for processes for which allocation is applied to



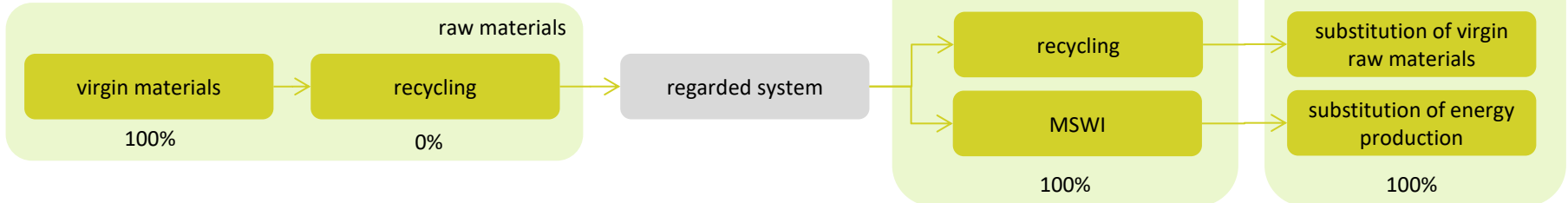
allocation factor 0%:
rewards usage of recycled material



allocation factor 50%:
rewards usage of recycled material and efficient recycling and recovery



allocation factor 100%:
rewards efficient recycling and recovery

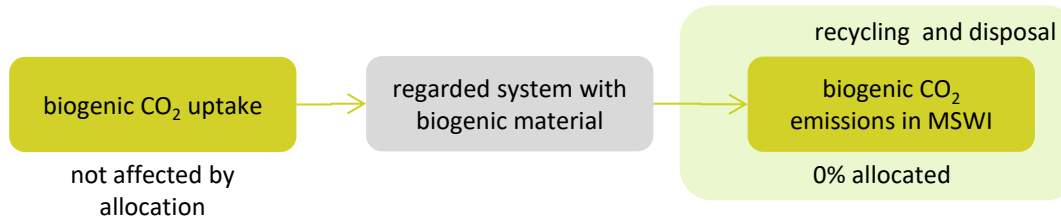


Allocation

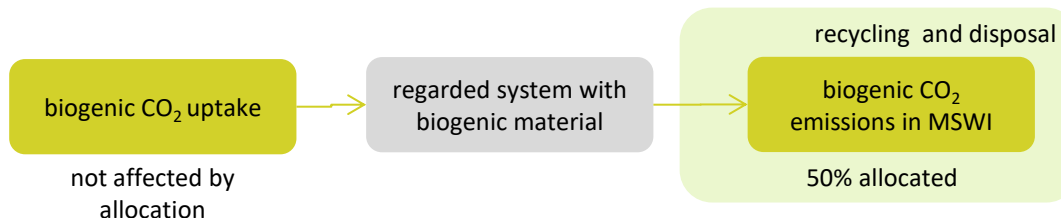
effects on biogenic CO₂



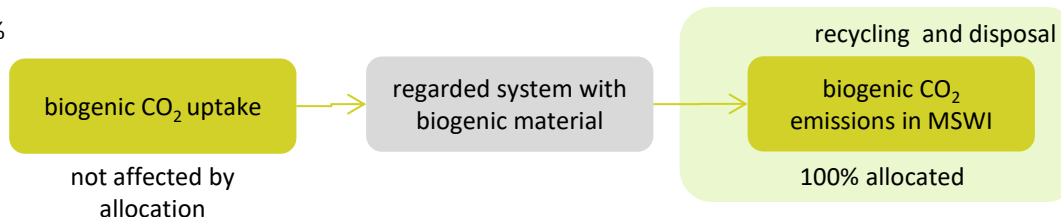
allocation 0%



allocation 50%



allocation 100%



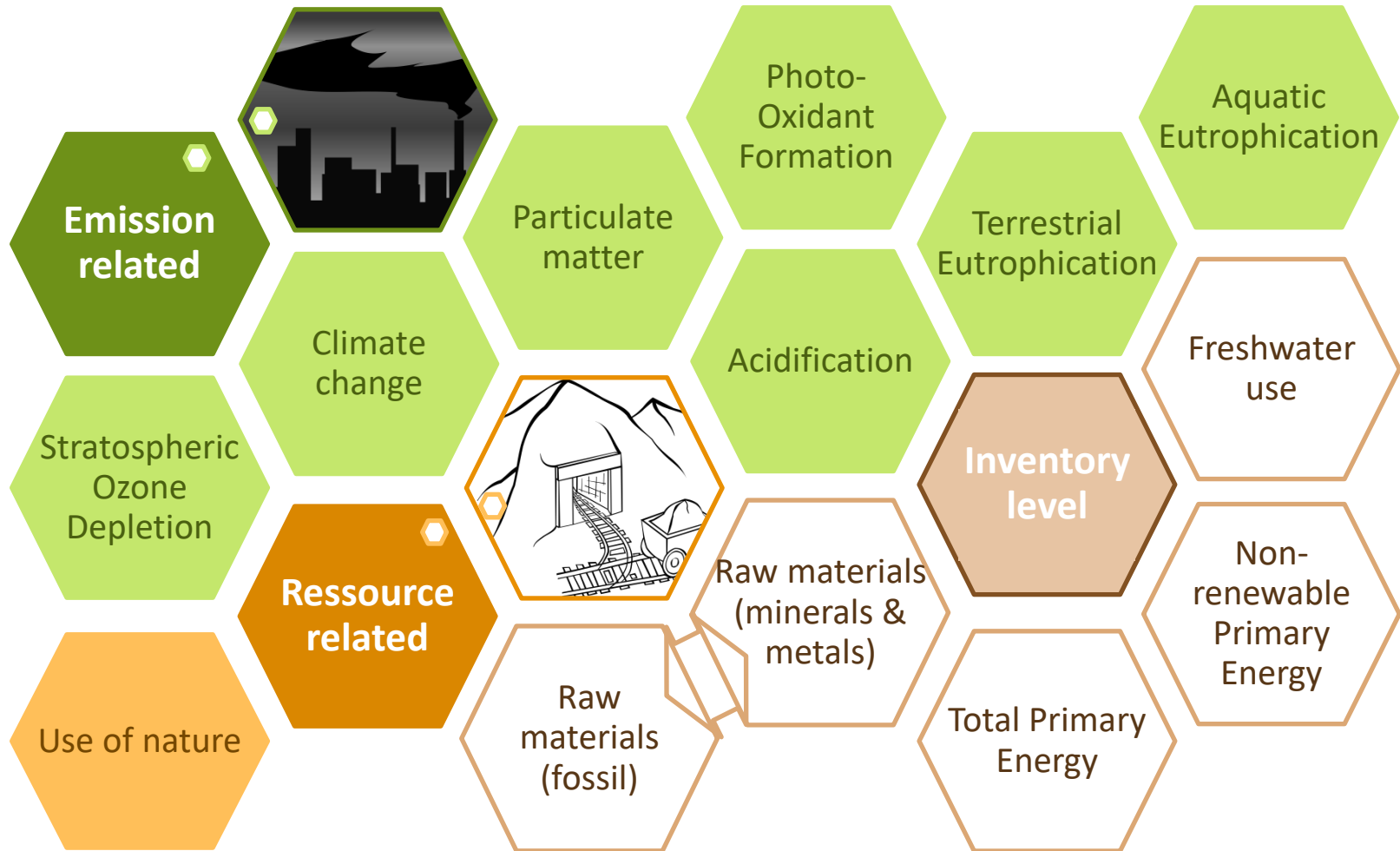
Time and geographic scope

Geographic scope



- The LCA study focuses on the production, distribution and disposal of packaging systems on the European market.
- Regarding alternative packaging systems all life cycle steps are set in the respective market.
- For a certain share of the raw materials, country-specific data is used as well as European averages depending on the availability.
- Locations of life cycle steps regarding Tetra Recart® packaging systems are shown in the following table:

	Europe
materials	
LPB	Sweden
plastics	Europe
aluminium	Europe
converting	Hungary
filling/retorting	Europe
end of life	Europe

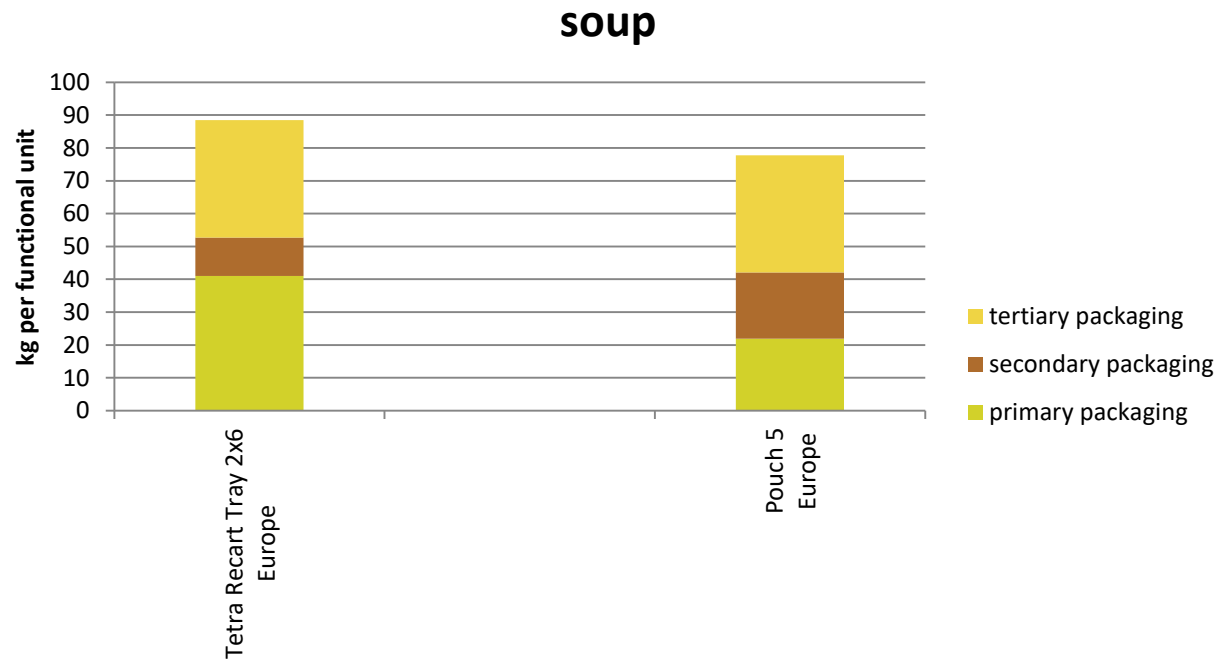
Environmental categories of the LCA study



Selection of packaging systems

Soup			
Carton based packaging systems	Geographic scope	Competing packaging systems	
Tetra Recart Tray 2x6 500 ml 	Europe	Pouch 5 570 ml	

Packaging weights

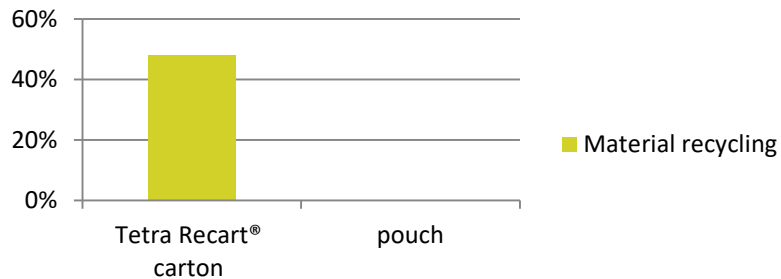


End of life

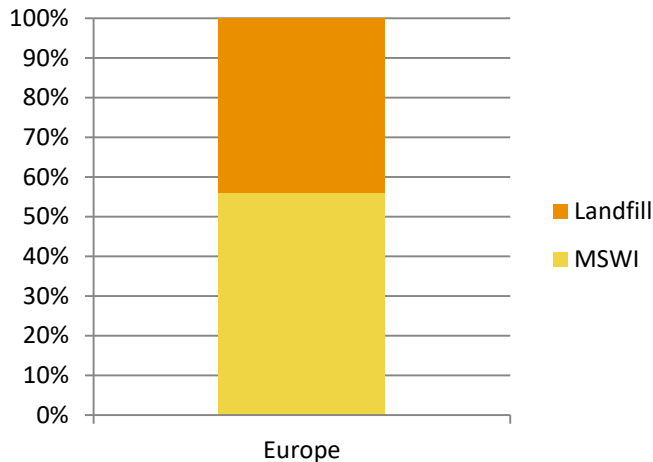
recycling rates; final treatment split



Europe



Final treatment split



- High recycling rates are more beneficial for plastic, glass and metal packaging systems than carton based packaging systems as their substitution of virgin materials leads to higher material credits than the substitution of fibres from carton based packaging systems.
- The final treatment split refers to non-recycled waste flows and the final treatment after the recycled life cycle.
- High shares of landfill leads to high Climate Change impacts for Tetra Recart[®] packaging systems due to methane emissions resulting from the degradation of paper on landfills.

Scenarios

Base scenarios

For each of the studied packaging systems a scenario on the European, US and Japanese market is defined, which is intended to reflect the most realistic situation under the described scope. These scenarios are clustered into groups within the same segment and volume group. Following the ISO standard's recommendation, a variation of the allocation procedure is conducted. Therefore, three scenarios regarding the open-loop allocation are calculated for each packaging system:

- with a system allocation factor of 50 %
- with a system allocation factor of 100 %
- with a system allocation factor of 0 %

Scenarios

Scenario Variants

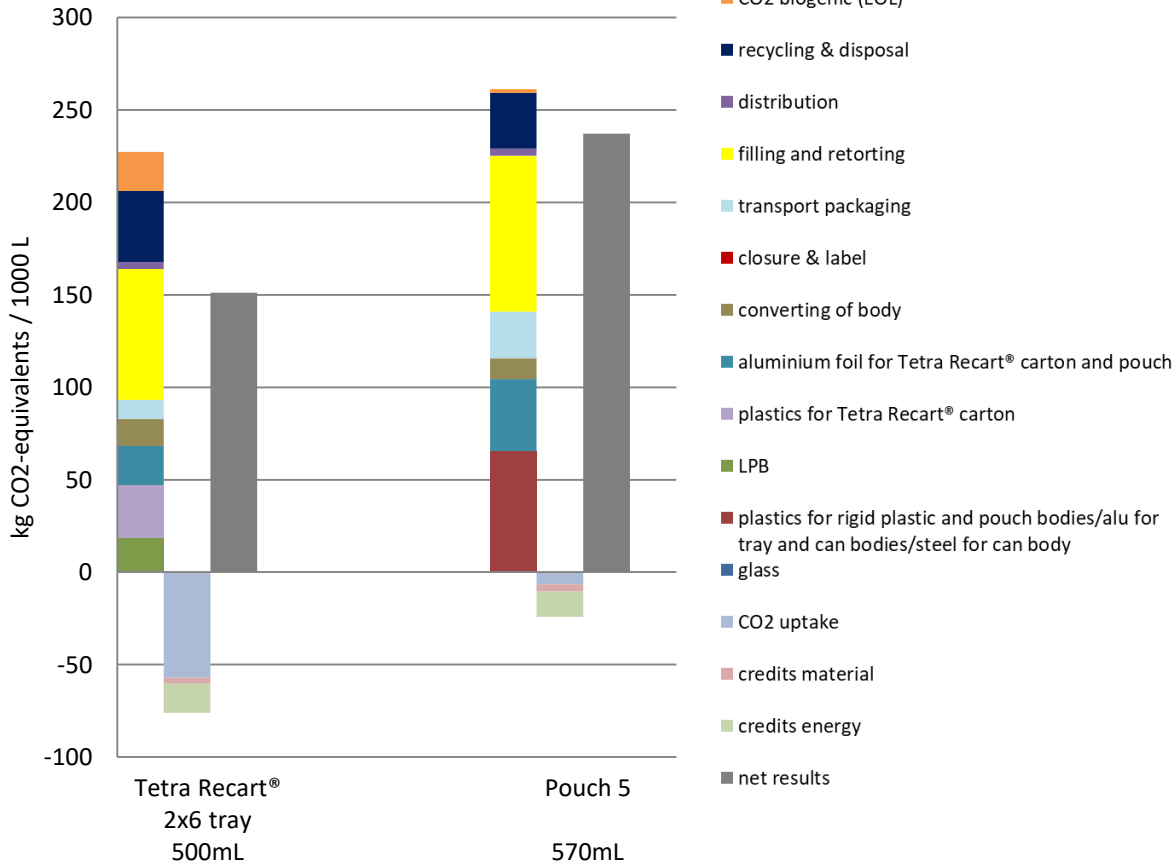
- Scenario variants regarding recycling rate up to 90%
 - flexible multilayer films excluded (pouch)
- Scenario variants regarding recycled content in competing packaging system for the materials
 - main plastics (PET, PE; PP)

Soup Europe

contribution analysis allocation 50% - Climate Change



Climate Change



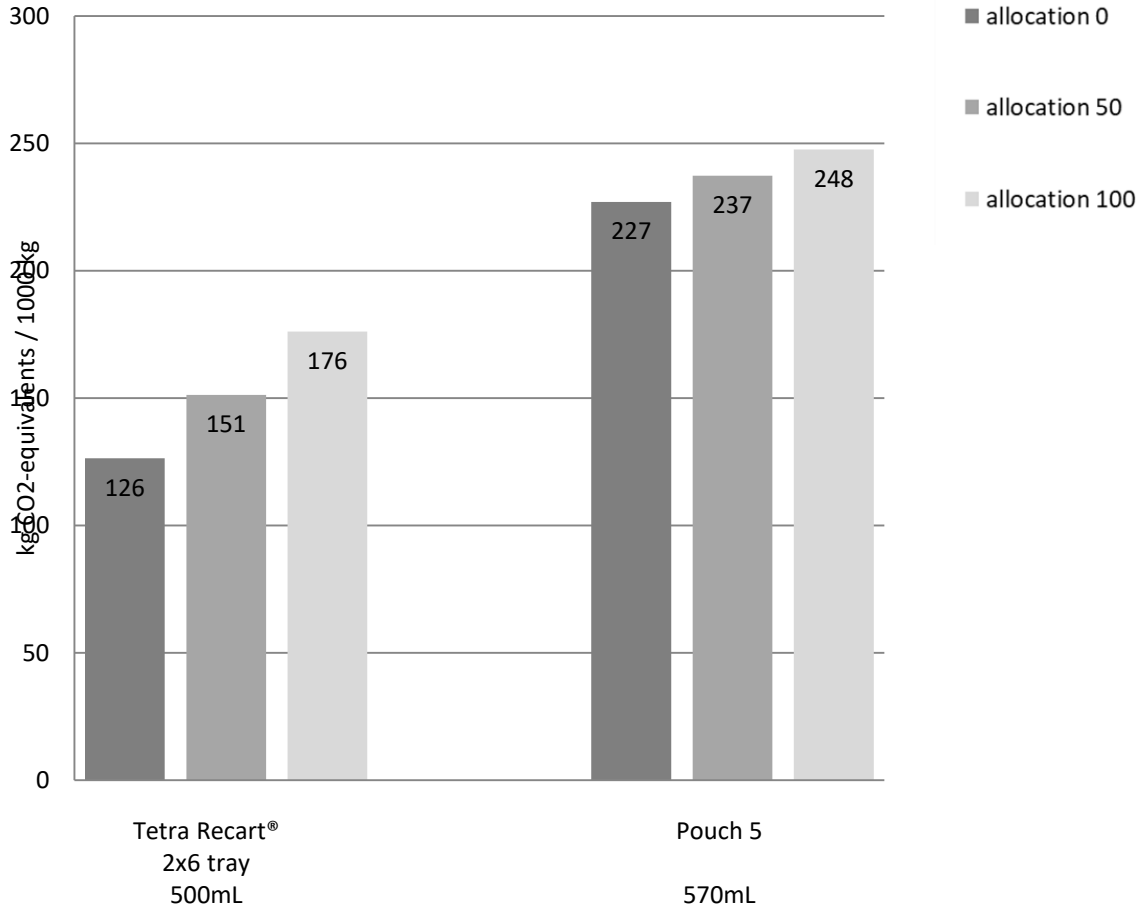
- The following life cycle steps have a share of total Climate Change burdens higher than 20%:
 - Tetra Recart®:
 - filling and retorting: 31%
 - raw materials body (LPB, plastics, aluminium foil): 30%
 - recycling & disposal + CO2 biogenic (EOL): 26%
 - Pouch 5:
 - filling and retorting: 32%
 - raw materials body (plastics, aluminium foil): 40%

Soup Europe

allocation 0%, 50%, 100% - Climate Change



Climate Change



- Regarding Climate Change, with higher allocation factors, net results
 - increase for Tetra Recart® due to the higher allocation of biogenic CO₂ emissions.
 - stay about the same for Pouch 5 as burdens from incineration and resulting energy credits are similar

Soup Europe comparative results



Soup, Europe, Allocation 0	The net results of Tetra Recart® 2x6 tray 500mL are lower (green)/ higher (orange) than those of	
	Pouch 5 570mL	
Climate Change	-44%	
Acidification	-15%	
Photo-Oxidant Formation	-11%	
Ozone Depletion Potential	-58%	
Terrestrial Eutrophication	-14%	
Aquatic Eutrophication	+12%	
Particulate Matter	-13%	
Use of Nature	+640%	

Soup, Europe, Allocation 50	The net results of Tetra Recart® 2x6 tray 500mL are lower (green)/ higher (orange) than those of	
	Pouch 5 570mL	
Climate Change	-36%	
Acidification	-17%	
Photo-Oxidant Formation	-12%	
Ozone Depletion Potential	-58%	
Terrestrial Eutrophication	-15%	
Aquatic Eutrophication	+8%	
Particulate Matter	-15%	
Use of Nature	+542%	

Soup, Europe, Allocation 100	The net results of Tetra Recart® 2x6 tray 500mL are lower (green)/ higher (orange) than those of	
	Pouch 5 570mL	
Climate Change	-29%	
Acidification	-20%	
Photo-Oxidant Formation	-13%	
Ozone Depletion Potential	-59%	
Terrestrial Eutrophication	-16%	
Aquatic Eutrophication	+4%	
Particulate Matter	-17%	
Use of Nature	+442%	

- Main conclusions considering results with all allocation factors:
 - **Tetra Recart® 2x6 tray** shows lower impacts for all impact categories except **‘Aquatic Eutrophication’** and **‘Use of Nature’** than **Pouch 5**.
 - **Tetra Recart® 2x6 tray** shows higher impacts **‘Use of Nature’** than **Pouch 5**.

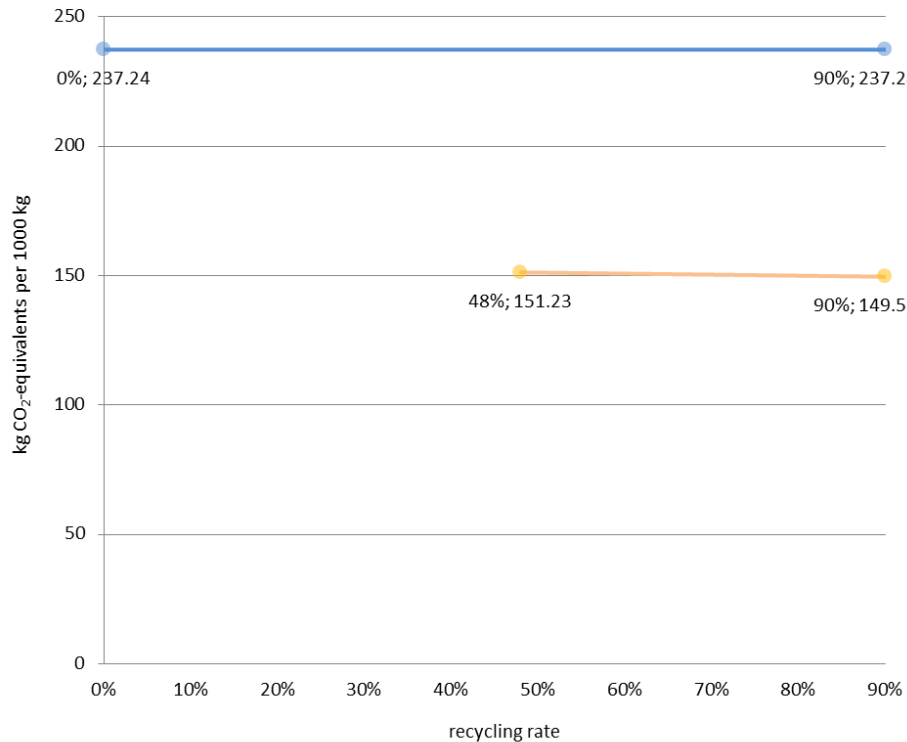
● 19		Tetra Recart® better than alternative packaging system
		Tetra Recart® similar as alternative packaging system
		Tetra Recart® worse than alternative packaging system

Soup Europe

scenario variant – recycling rate



Climate Change



- Scenario variants regarding recycling rate do not change the comparative conclusions in this segment.



- Exemplary graph for 'Climate Change'

— Tetra Recart®
2x6 tray
500mL

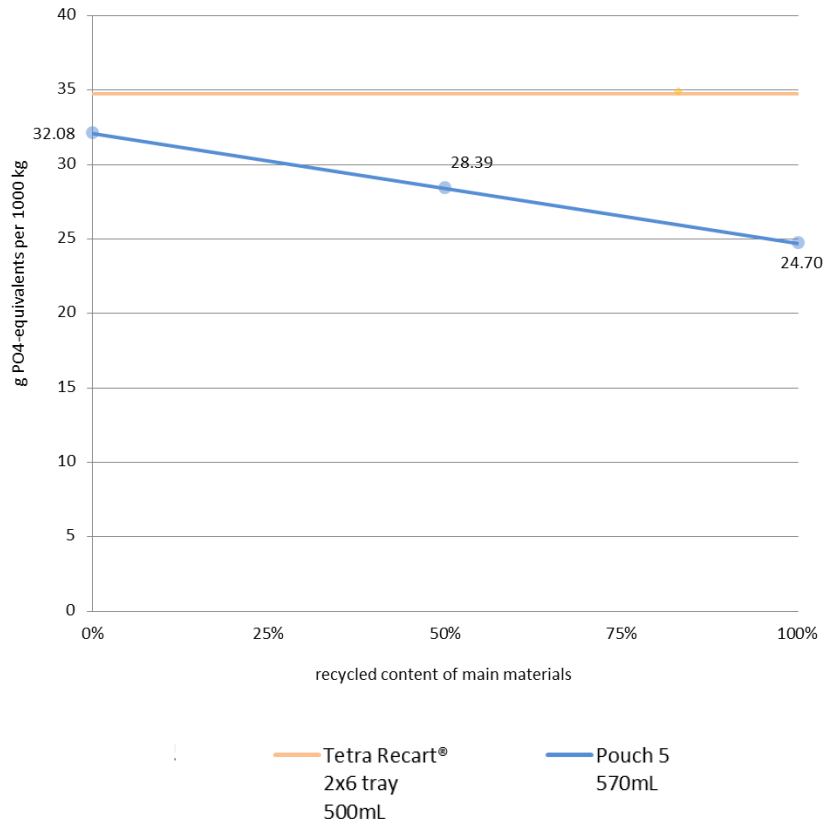
— Pouch 5
570mL

Soup Europe

scenario variant - recycled content



Aquatic Eutrophication



- Scenario variants regarding recycled content change the comparative conclusions in this segment in the following case:
- ‘Aquatic Eutrophication’: The increase of recycled content in the main materials of the pouch leads to higher net results for the Tetra Recart®.






Overall results

Climate Change



		TRC option	Pouch 5 570mL
EUROPE	Allocation: 50% Soup	TRC 2x6 tray 500ml	-36%
	Allocation: 100% Soup	TRC 2x6 tray 500ml	-29%

● 22		Tetra Recart® better than alternative packaging system
		Tetra Recart® similar as alternative packaging system
		Tetra Recart® worse than alternative packaging system

Overall results - all impact categories

- The results of the comparisons of the Tetra Recart® cartons with the competing pouch packaging system show
 - lower impacts for the Tetra Recart® carton in all impact categories except 'Aquatic Eutrophication' and 'Use of Nature'.
 - substantial higher impacts for the Tetra Recart® carton than the compared competing pouch packaging system in case of 'Use of Nature'.
 - 'Use of Nature' covers preservation of biodiversity and ecosystems. The methodology is based on the hemeroby concept (distance to nature) and classifies different land use types based on their occupation impact. That means that forest area receives a lower characterisation factor than agricultural systems. A sustainably managed area, like FSC certified forest, shows the lowest characterisation factor apart from untouched natural land. The highest factor is used for sealed roads or coal mining pits.



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