FACULTY OF BIOSCIENCE ENGINEERING

Research group “Sustainable Systems Engineering (STEN)”

DUURZAME VOEDING OP ONS BORD:

“HOE KUNNEN WE DIT METEN EN VERBETEREN?”

Dr. Lieselot Boone

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Colruyt launches Eco-Score to show environmental impact of foodstuffs

Friday, 12 March 2021

© Colruyt

Verpakkingen: goed of slecht?

Leestijd: 3 minuten

milieu centraal

Een Nederlander opent dagelijks gemiddeld 7 verpakkingen. Dat zorgt voor een hoop afval: 20 procent van ons afval bestaat uit verpakkingen. Toch kunnen verpakkingen ook goed zijn voor het milieu. Hoe zit dat eigenlijk?

Bram Ameloot (38) brengt de West-Vlaamse 'Spa' op de markt

DELEN

WEST-VLAANDEREN 01 februari, 2022 Door **Karel Cambien**

OOSTKAMP – Met het nieuwe SAVEME komt een gloednieuw watermerk op de markt dat volgens zijn geestelijke vader Bram Ameloot (38) in niets te vergelijken is met de gekende watermerken. De 100 procent recycleerbare en dus duurzame blikjes van SAVEME zijn stuk voor stuk canvassen vol ideeën om van onze wereld een betere plek te maken.

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https://www.milieucentraal.nl/minder-afval/verpakkingen/verpakkingen-goed-of-slecht/
https://www.made-in.be/west-vlaanderen/bram-ameloot-38-brengt-de-west-vlaamse-spa-op-de-markt
https://www.brusselstimes.com/159592/colruyt-launches-eco-score-environmental-impact-foodstuffs-carbon-footprint-water-land-use-climate-air-pollution-smartwithfood/

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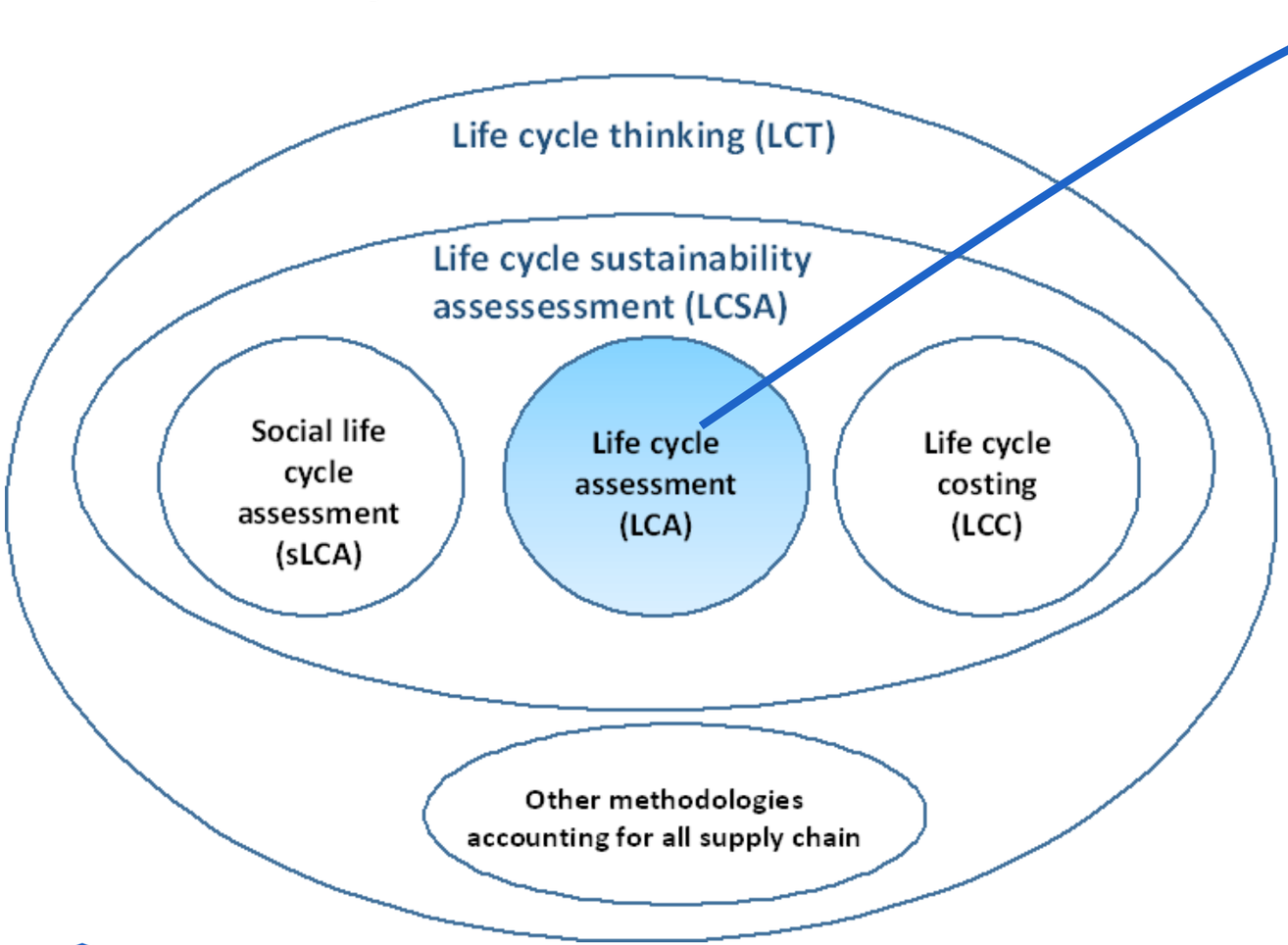
LIFE CYCLE THINKING

Sustainability Assessment Toolbox



LCA is now prominent to quantify environmental sustainability

- Standards
- Handbooks with guidance
- PEF-category rules

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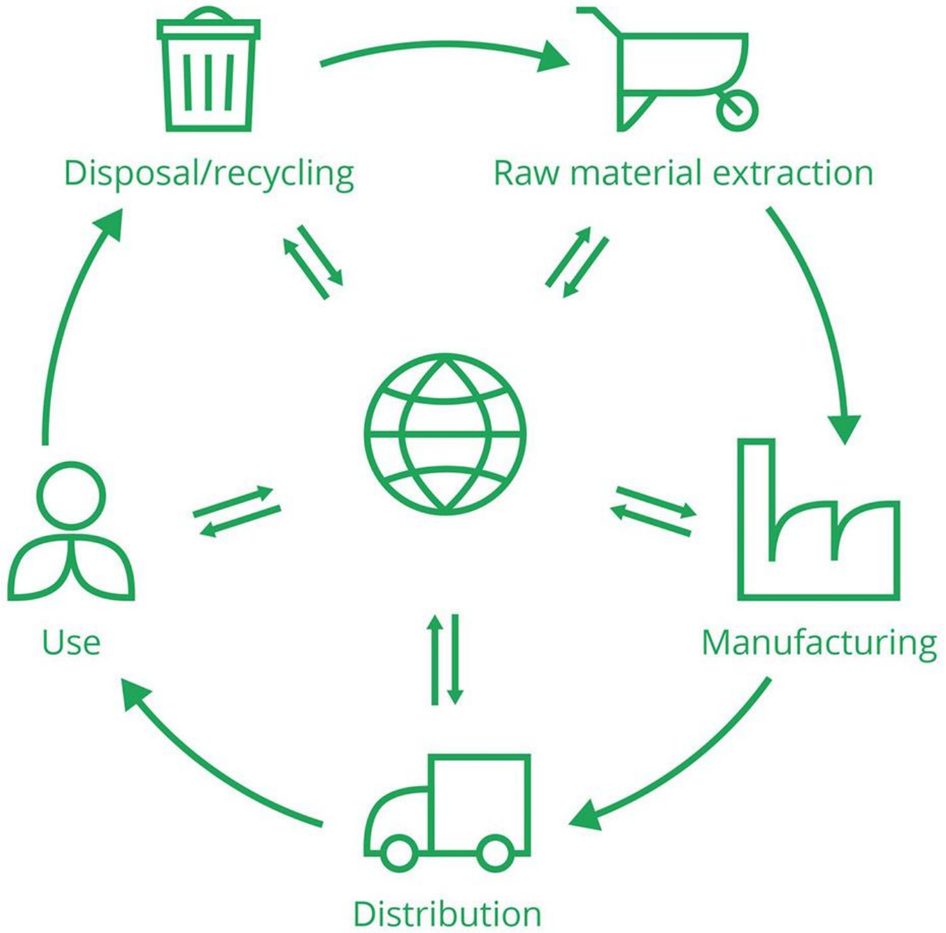
Source: Dewulf et al., 2016

LCA: WHAT?

"the compilation and evaluation of the **inputs, outputs** and the potential **environmenal impacts** of a **product system** (good or service) throughout its **life cycle**, from the extraction of raw material to product disposal"



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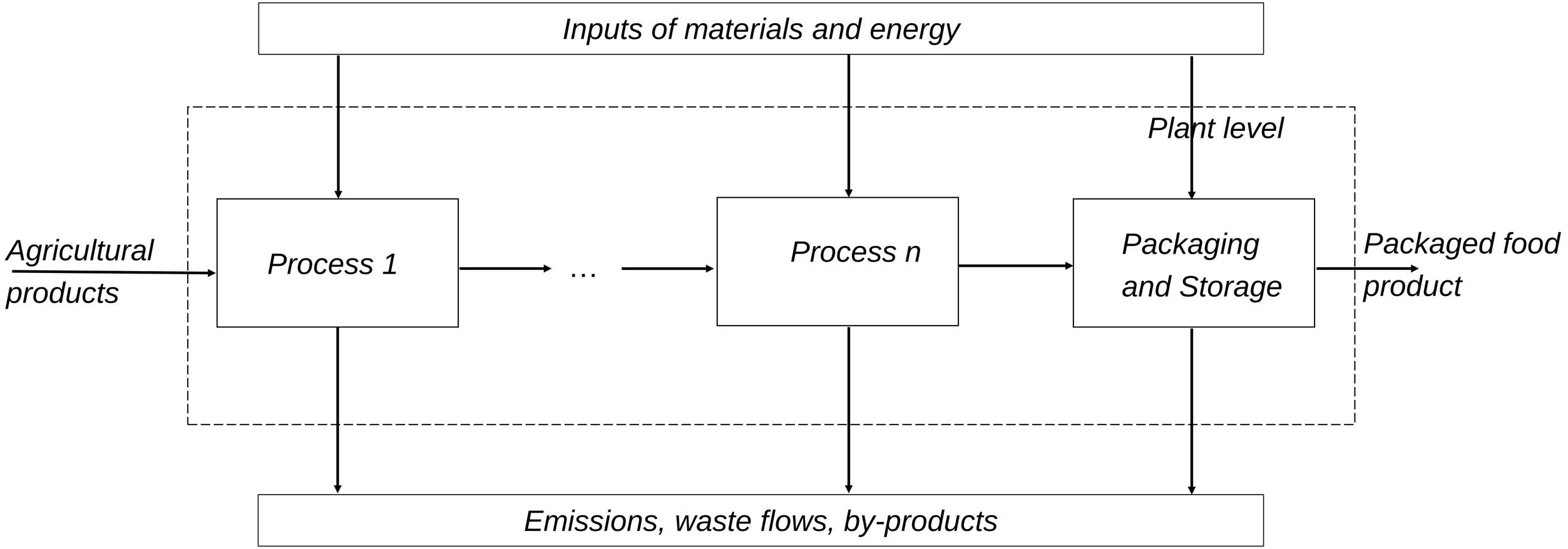
Source: Pré., 2020

LCA STARTS FROM "LIFE CYCLE INVENTORY": INPUT AND OUTPUT FLOWS



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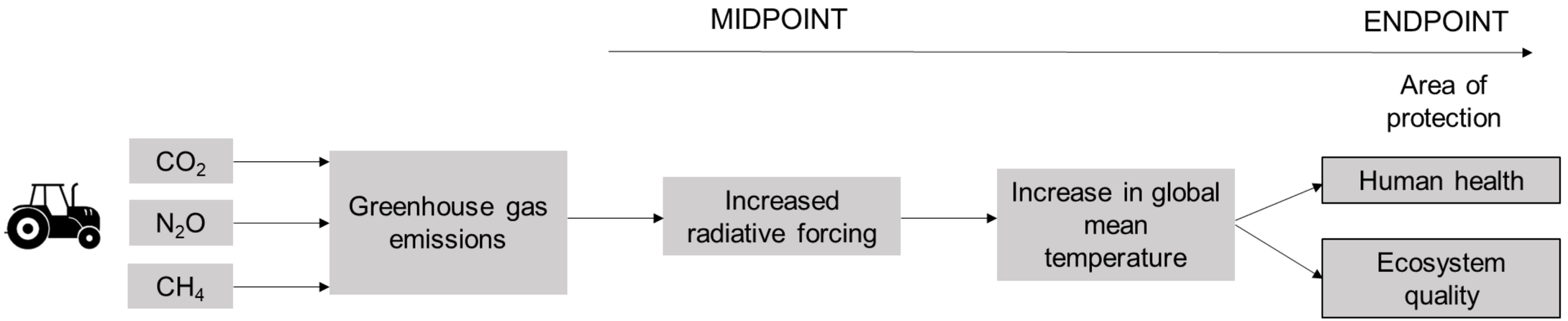
THE INPUT AND OUTPUT FLOWS INDUCE CAUSE-AND-EFFECT CHAINS: "LIFE CYCLE IMPACT ASSESSMENT"

Example: Climate Change



Range of impact categories

- Land use, water use, fossil resource use
- Particulate matter
- Acidification
- Eutrophication
- …

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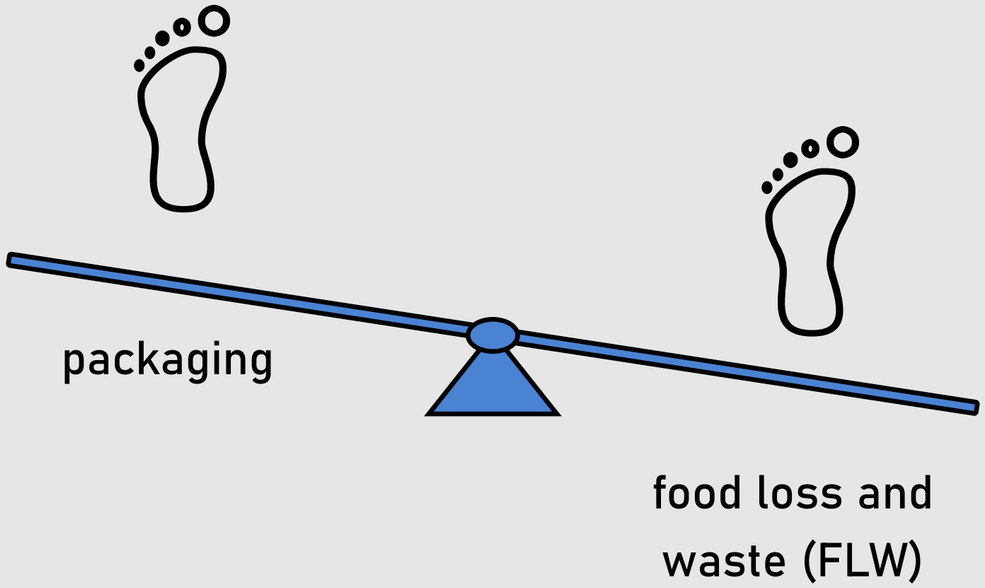
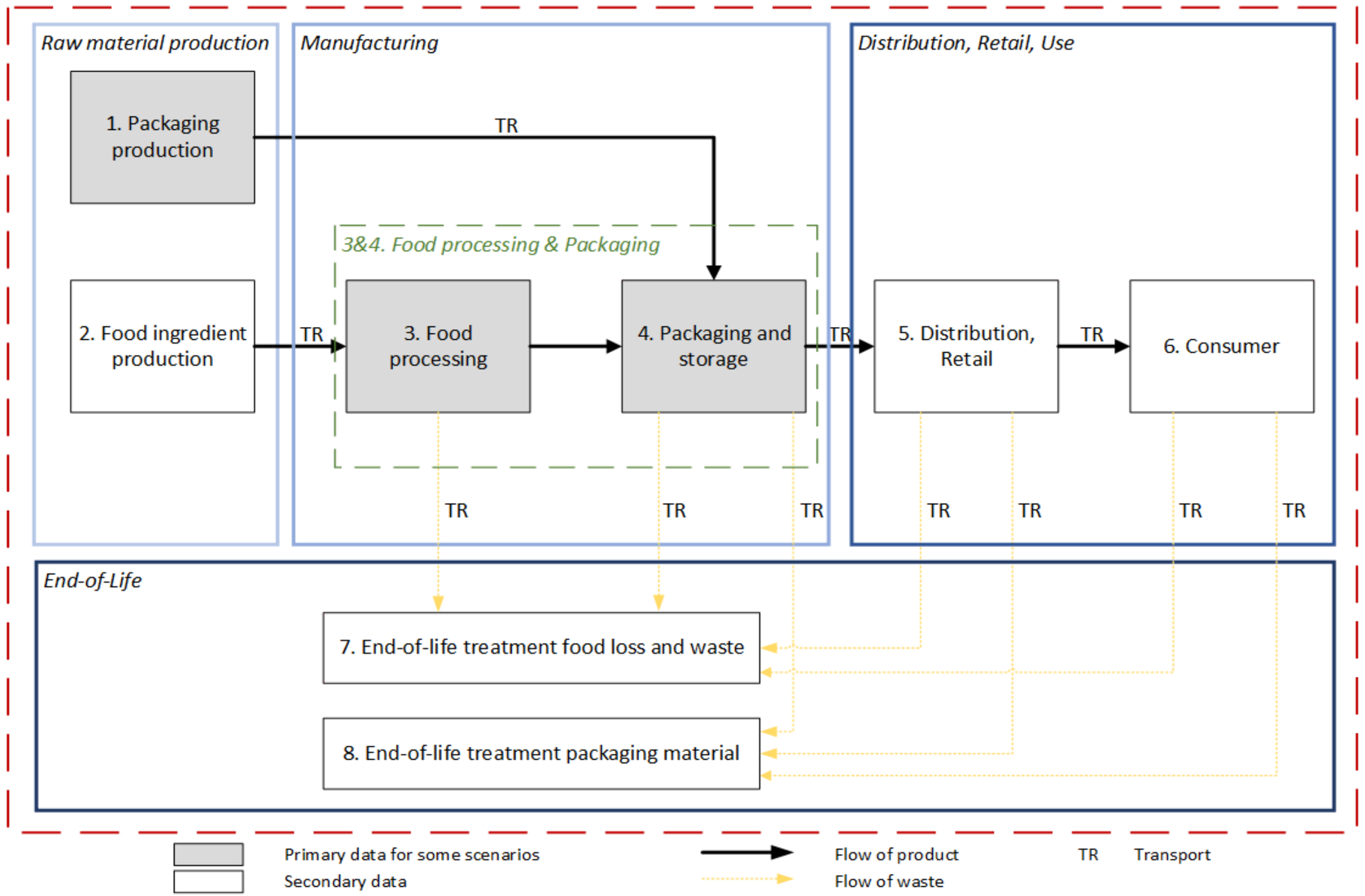
THE ROLE OF FOOD PACKAGING

- ✓ Food safety and quality
- ✓ Information to consumers
- ✓ Preserving food



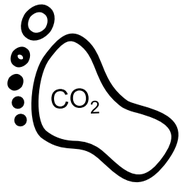
- ? Raw materials
- ? Recyclability
- ? Relationship with food

LIFE CYCLE OF PACKED FOOD PRODUCTS

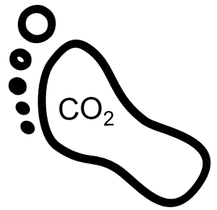


Results are expressed per kg food consumed at home (FU)

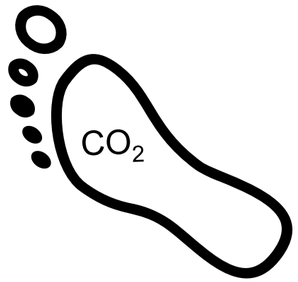
NO LOSSES



CURRENT



-2d shelf life



2 kg CO_2-eq/FU

+8%

13 kg CO_2-eq/FU

+11%

20 kg CO_2-eq/FU

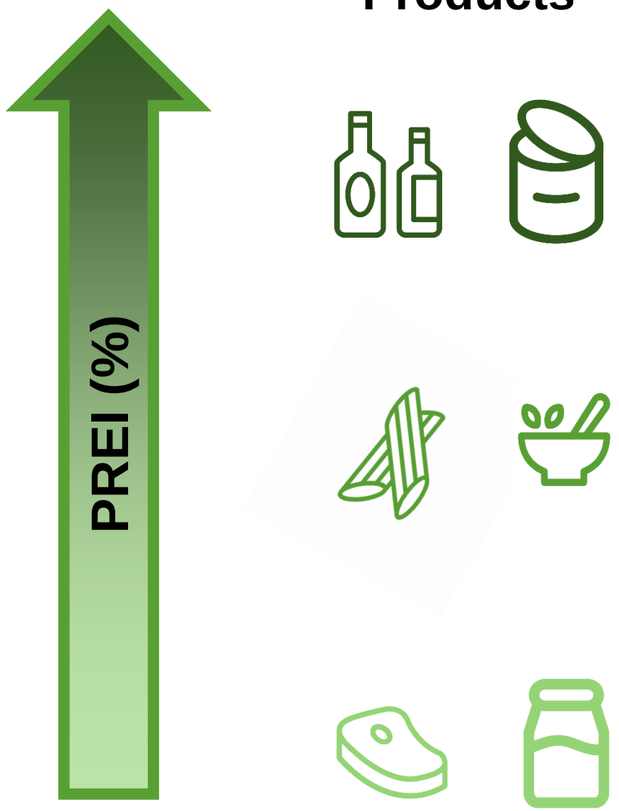
+28%

+36-45%

Boone et al. (2021) Report on the sustainability indicators of bio-, active and intelligent packaging solutions
Boone et al. (2023) Environmental performance of plastic food packaging: Life cycle assessment extended with costs on marine ecosystem services

PACKAGING RELATIVE ENVIRONMENTAL IMPACT (PREI)

$$PREI = \frac{Environmental\ impact\ of\ packaging}{Environmental\ impact\ of\ packed\ food}$$



Products

Environmental Improvement Strategies

→ Packaging reduction

→ Packaging redesign: choice of alternative packaging material/technology

→ Reduce packaging-related FLW

→ Shelf life extension

→ Optimized packaging design

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Licciardello (2017)

THE IMPACT OF PACKAGING VS THE ROLE OF PACKAGING

- The influence of the environmental impact of the **food product**
  - ✓ Consider the packaging relative environmental impact

- The influence of **shelf life**
  - ✓ Short shelf life & high impact of food => prioritize FLW reduction over packaging optimization
  - ✓ Long shelf-life => case dependent! (e.g. cooled storage?)

- The influence of **packaging size**
  - ✓ Less packaging per amount of product, but consider consumer preferences

=> Important to focus on packed food products and relationship between food and packaging

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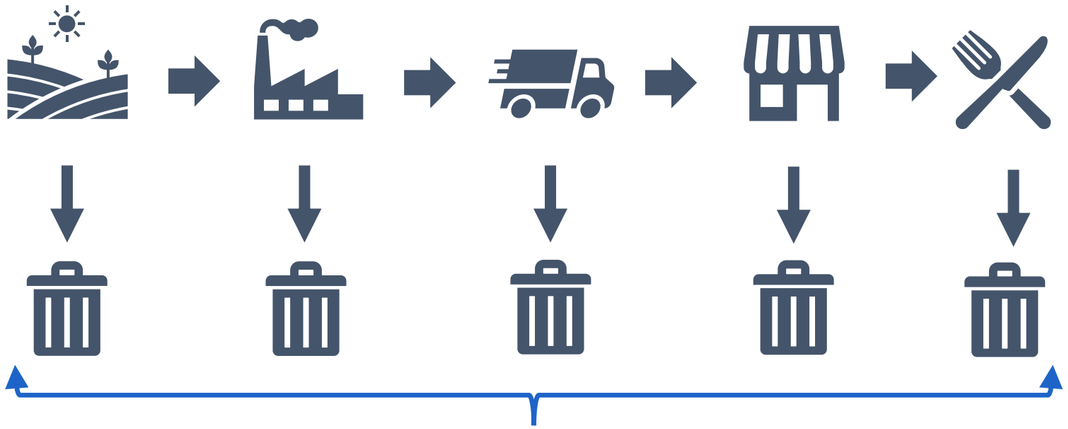
How to make choices? A case study on grapes

fibre-based packaging

plastic based packaging

Environmental impact of 400 g grapes consumed at home



10%

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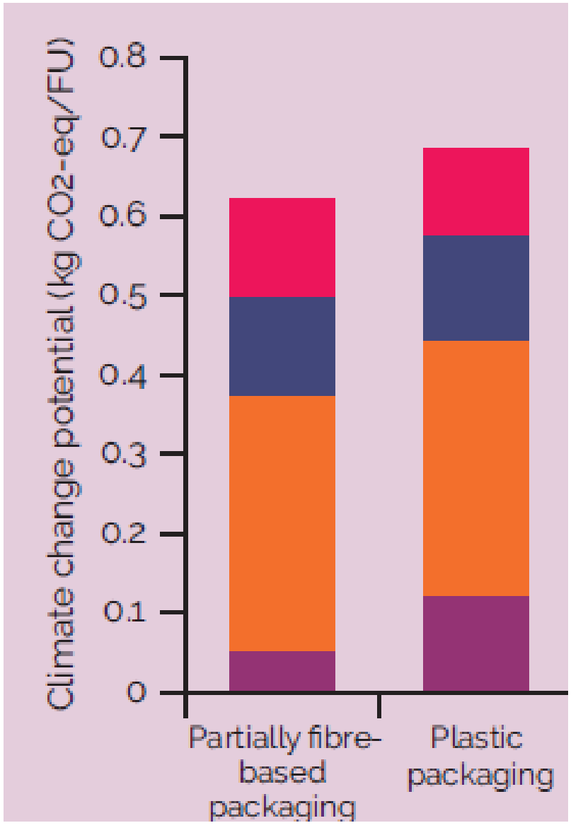
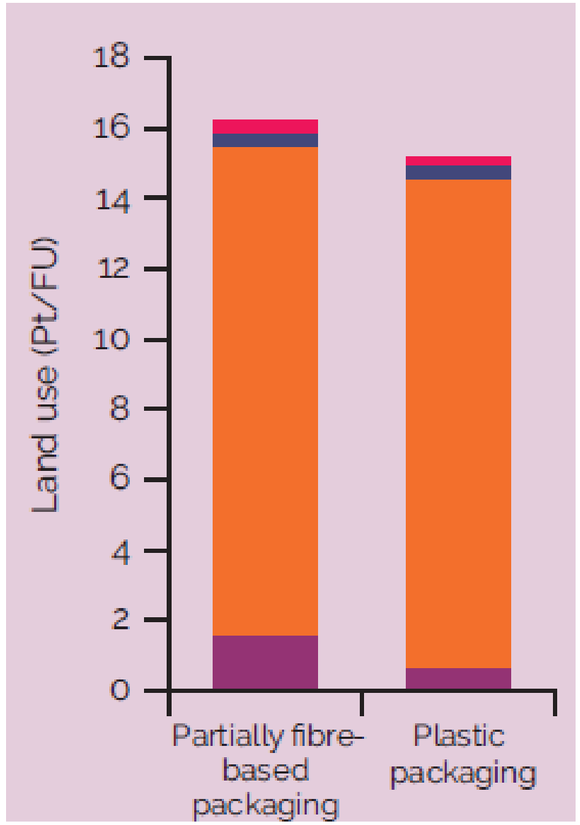
De Ridder et al. (2024) *Food Science and Technology*, Volume 38, Issue 4, December 2024, Pages 48–51, https://doi.org/10.1002/fsat.3804_12.x

INSIGHTS INTO THE PACKAGING CHOICE





- ✓ Food production is main contributing stage, but share of packaging is substantial
- ✓ Not always one clear preference when considering whole environmental profile

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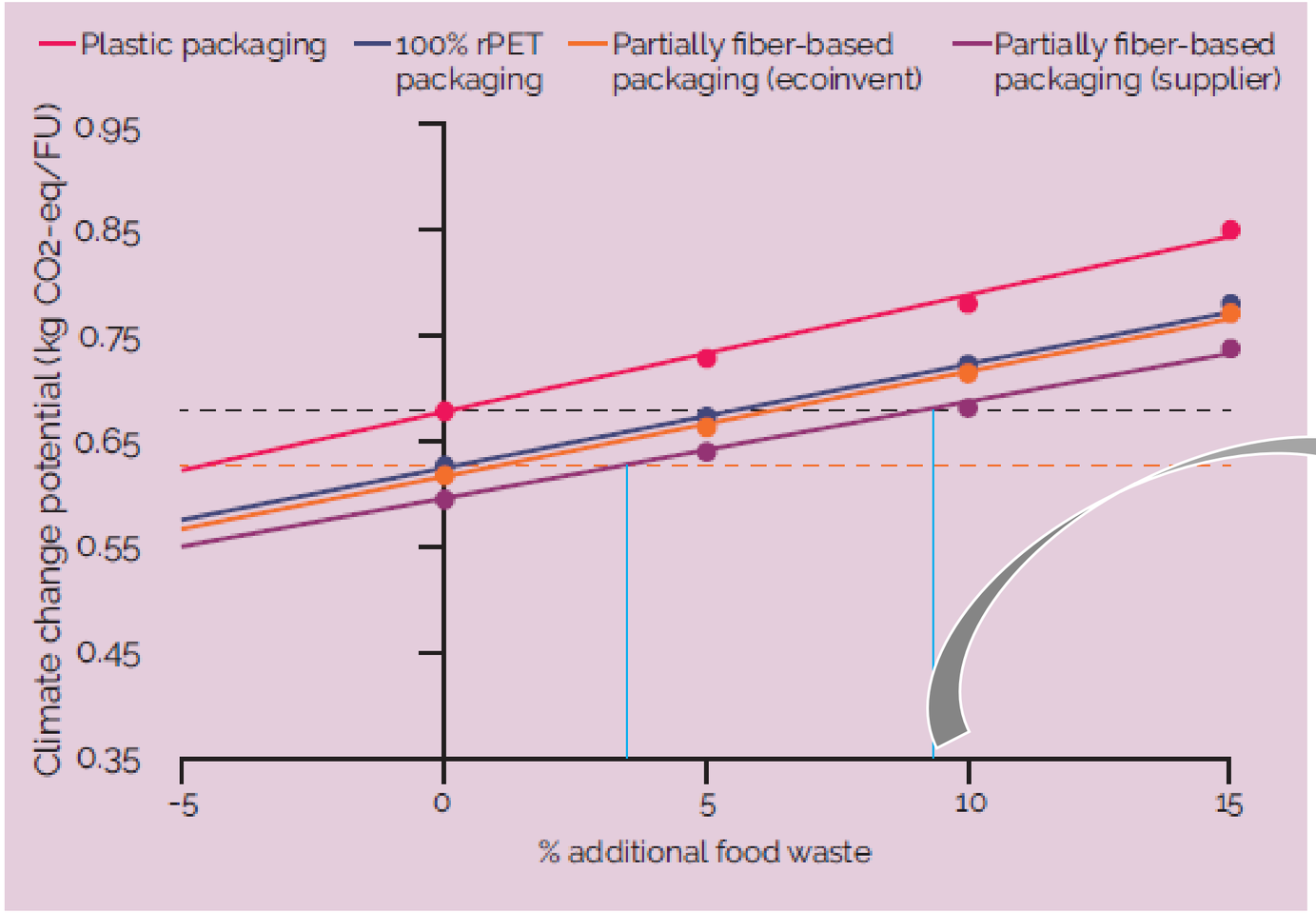
CAN WE DEFINE A THRESHOLD?



Selection of innovative packaging is ok

if

less **than 9%** additional grapes are wasted

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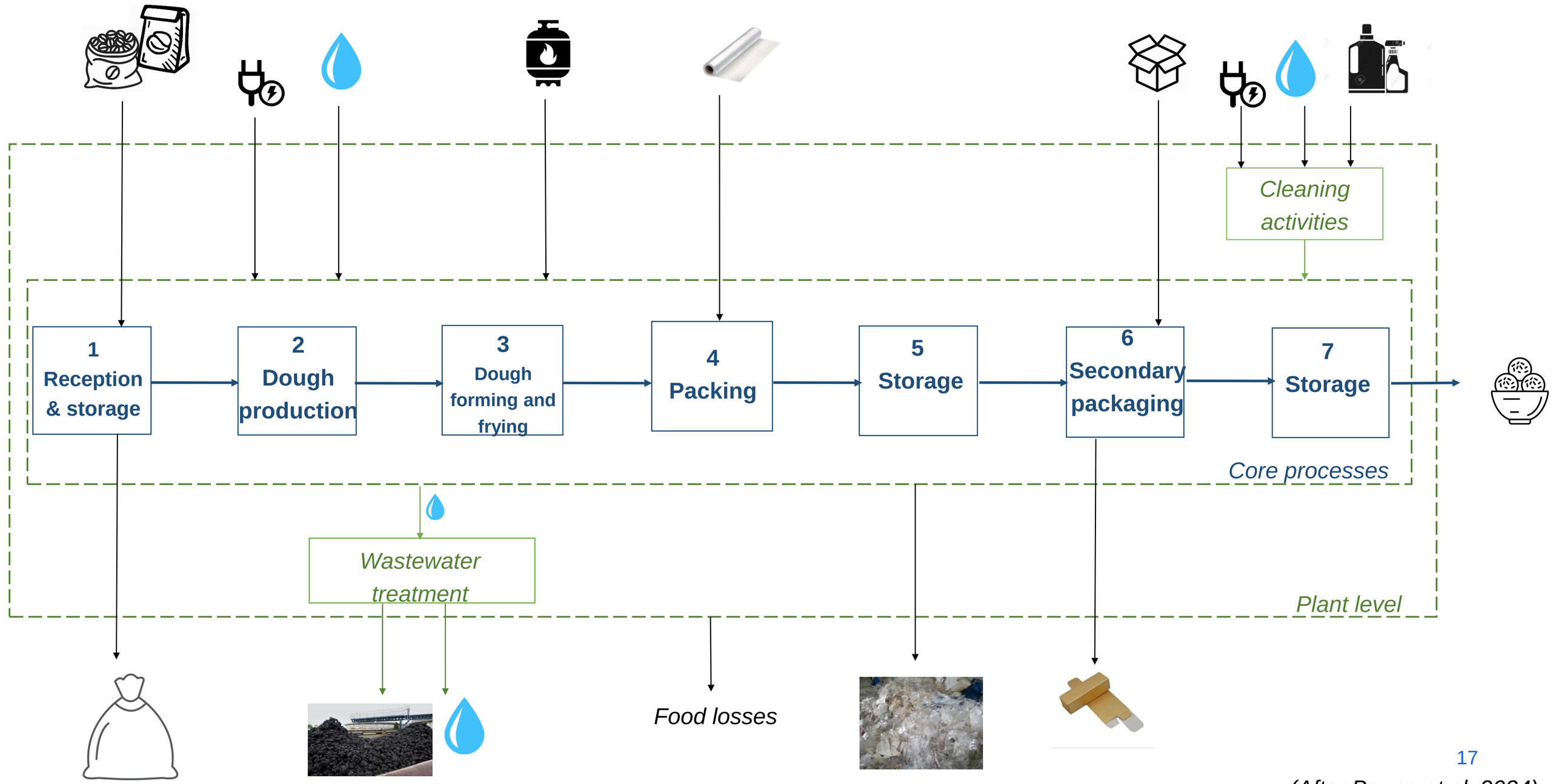
De Ridder et al. (2024) *Food Science and Technology*, Volume 38, Issue 4, December 2024, Pages 48–51, https://doi.org/10.1002/fsat.3804_12.x

THE IMPACT AT PRODUCER

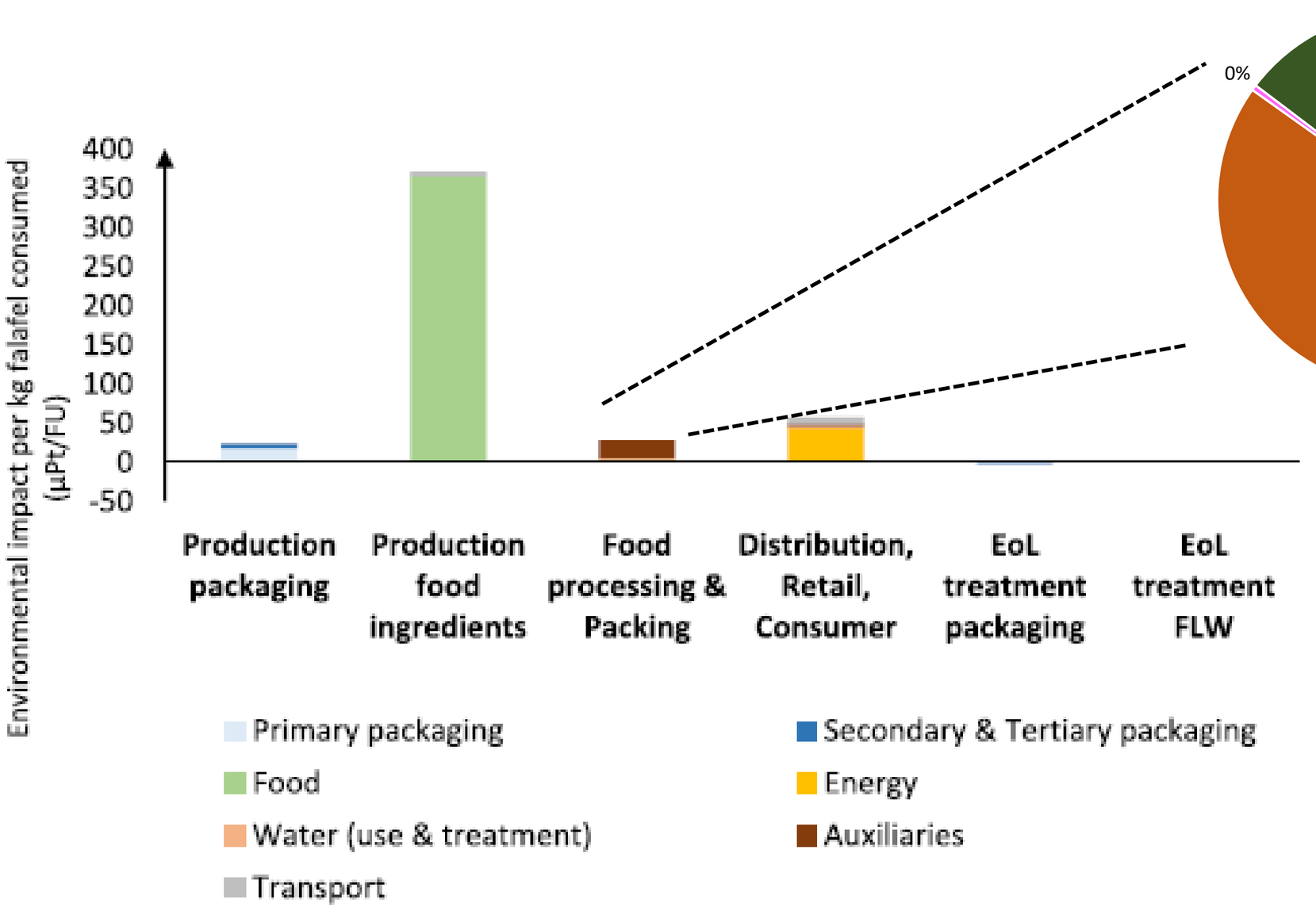
- ✓ Hotspot identification in production processes
- ✓ Comparing two production routes
- ✓ Choices at producer influence also the end-of-life

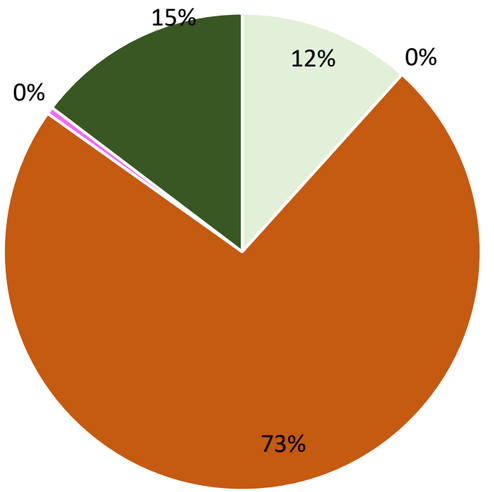
AN LCA AT A FOOD COMPANY: AN EXAMPLE OF FALAFEL

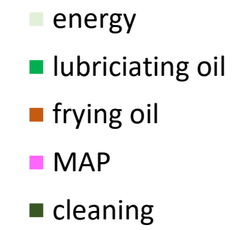


(After Boone et al. 2024)

THE IMPACT OF 1 KG OF FALAFEL CONSUMED AT HOME







=> Important to understand the main contributors within your company

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USING LCA TO EVALUATE ENVIRONMENTAL SUSTAINABILITY OF FOOD PRODUCTS

STRENGTHS

- ✓ Analytical, data-based method
- ✓ Highlights hotspots
- ✓ Avoid burden shifting
- ✓ Supports decision-making

LIMITATIONS

- ➢ Data intensive
- ➢ Provides input for decision making but not the definitive answer (trade-offs)
- ➢ Accounting for changes over time/new technologies can be challenging
- ➢ Not all impacts are covered

Use LCA according to the standards and be transparant

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Sustainable systems engineering group

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Thank you!

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