WE*R
CREATING THE NEW

8° Seminario Nacional Bandeira Azul, 6-7 Dezembro 2022, Portugal

Ana Espada e Alexia Massa Gallucci

PERSONAL GOAL

I WANT TO MAKE ENVIRONMENTAL-FRIENDLY BEHAVIOUR EASY FOR EVERYONE
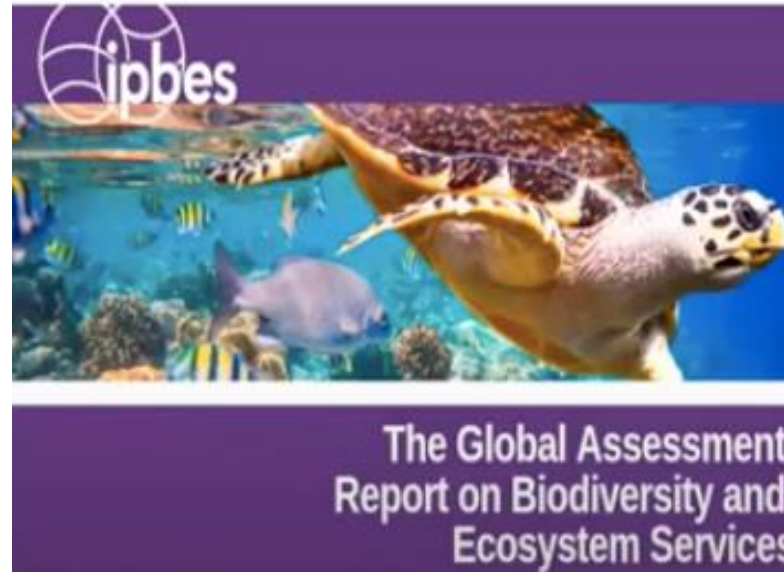
Ana Espada (PhD)
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Today's reality: unprecedented challenges, urgent action

1st GLOBAL WARMING

2nd BIODIVERSITY

3rd RESOURCES

Consensus on global warming

Consensus on biodiversity where we finally recognize the importance on equal footing with climate

(less known) the international resource panel which talks about the fundamentally unsustainable use of resources on this planet

THE MESSAGE IS RATHER CLEAR:

- we need URGENT ACTION
- we are in a PIVOTAL DECADE
- facing IRREVERSIBILITIES
- we are past some TIPPING POINTS

- we will be dealing with this, at least this complete century and beyond

After 5 decades of increasing the impacts on the environment

We have never addressed this issues properly

Expectations/ policy promises

or

OBVIOUS QUESTIONS:

How serious are we about

bending the trend?

How credible and feasible is this?

What type of policies and knowledge do we need to get there?

(European Environment Agency core business)

To explore ways in which we can

REDESIGN OUR SYSTEMS, PRODUCTS AND SERVICES

to allow us to achieve a sustainable living

FOR ALL, WITHIN PLANETARY LIMITS

A major shift in:
- how we produce
- how we distribute
- how we consume

EG.
SAFETY BOOTS FOR FISHERY

Business Model Innovation:

- Digital transformation – building a totally new facility, with fully digital/ robotized production

- Create an online store [from B2B]to B2C]. Become closer to the final user [emotion design]

- Industrial synergies – waste valorisation
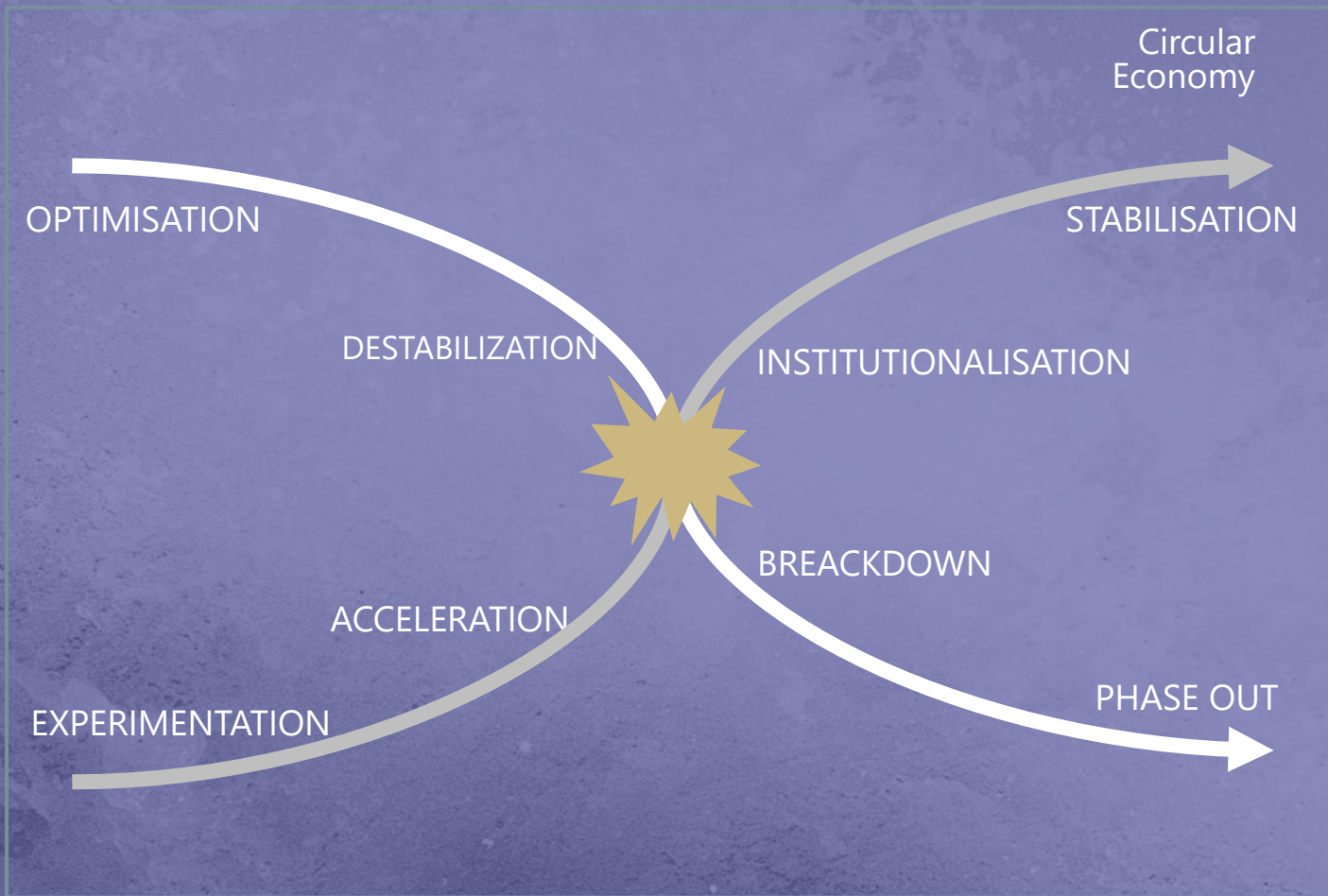
Prepare to track-back cycle - RFID

From silicone-based release agents to water-based Film layer R&D

Reduce the environmental impact - PU sole with a rubber pad for better grip

Insole made with waste from the production – light weight

SYSTEMIC CHANGE IS DISRUPTIVE: THE 'X-CURVE'

Circular Economy

OPTIMISATION

STABILISATION

DESTABILIZATION

INSTITUTIONALISATION

BREECKDOWN

ACCELERATION

PHASE OUT

EXPERIMENTATION

Gray arrow:

New technologies, new business models, new solutions, new types of work...

White arrow:

But there is the line we need to step away, PHASE OUT.

Those are technologies, solutions and economic activities, that we need to phase out if we want to go towards a LOW-CARBON CIRCULAR ECONOMY that is JUST and that RESPECTS the BOUNDARIES OF OUR PLANET.

X curve tool: DRIFT (https://drift.eur.nl/nl/publicaties/staat-van-transitie/) copyright Ana Espada ana@utop.be

WHAT ARE THE CHALLENGES HOLDING BACK PROGRESS?

A LACK OF TOP-DOWN GOVERNANCE

Transforming the way, we produce and consume goods (green deal)

CONTROLLING MARKET POWER

We are living in a moment that made technology powerfully distributive.
Our societies have now fluid values instead of fixed preferences; collaborative and interdependent societies; rather than calculate they approximate; we are dealing with citizens which don't dominate nature, but belong to nature

CREATING PUBLIC VALUE

We need to better understanding the different sources of wealth and ways of citizens participation and empowerment.

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The current economies and their systems of production and consumption are stressing and damaging the Earth's natural systems.

Huge amounts of raw materials and energy are used to create billions of products in order to sustain people's quality of life and consumer habits.

Large volumes of waste are sent into the atmosphere, water, land, ecosystems, which are vital to human existence.

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Source: Ellen MacArthur foundation
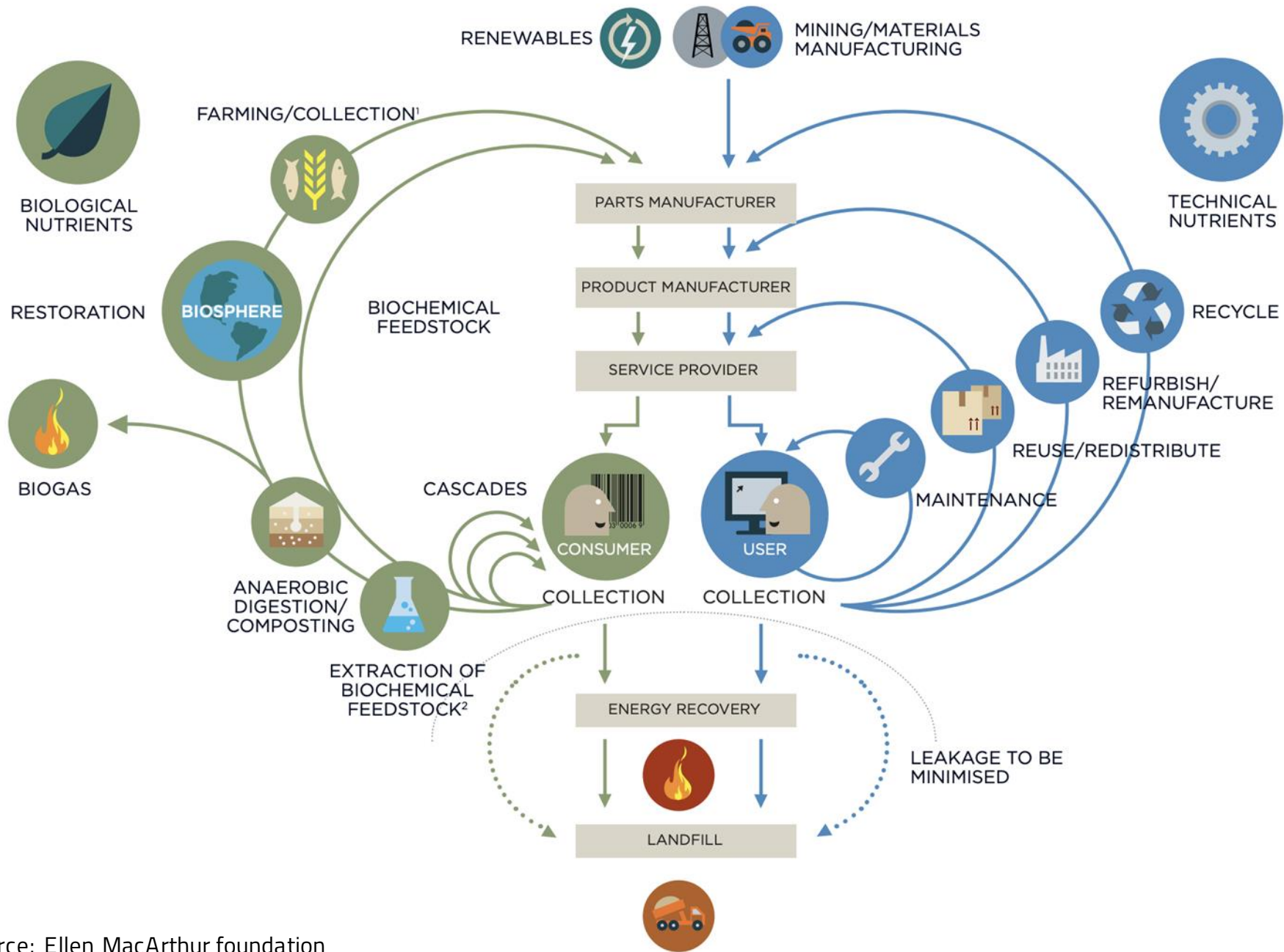
R's

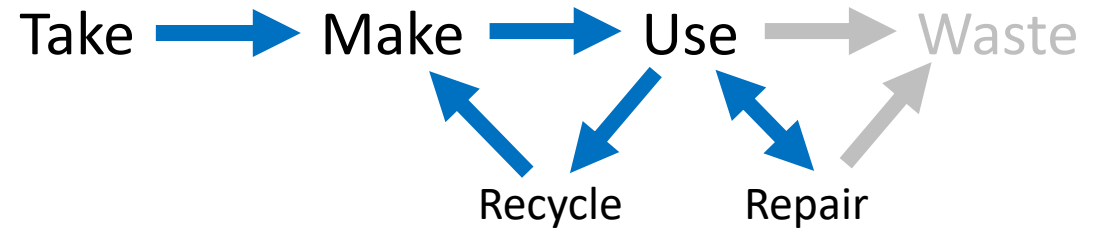| Rot |
|---|
| Recuperate |
| Recycle |
| Reuse |
| Repair |
| Reduce |
| Refuse |
| Rethink! |

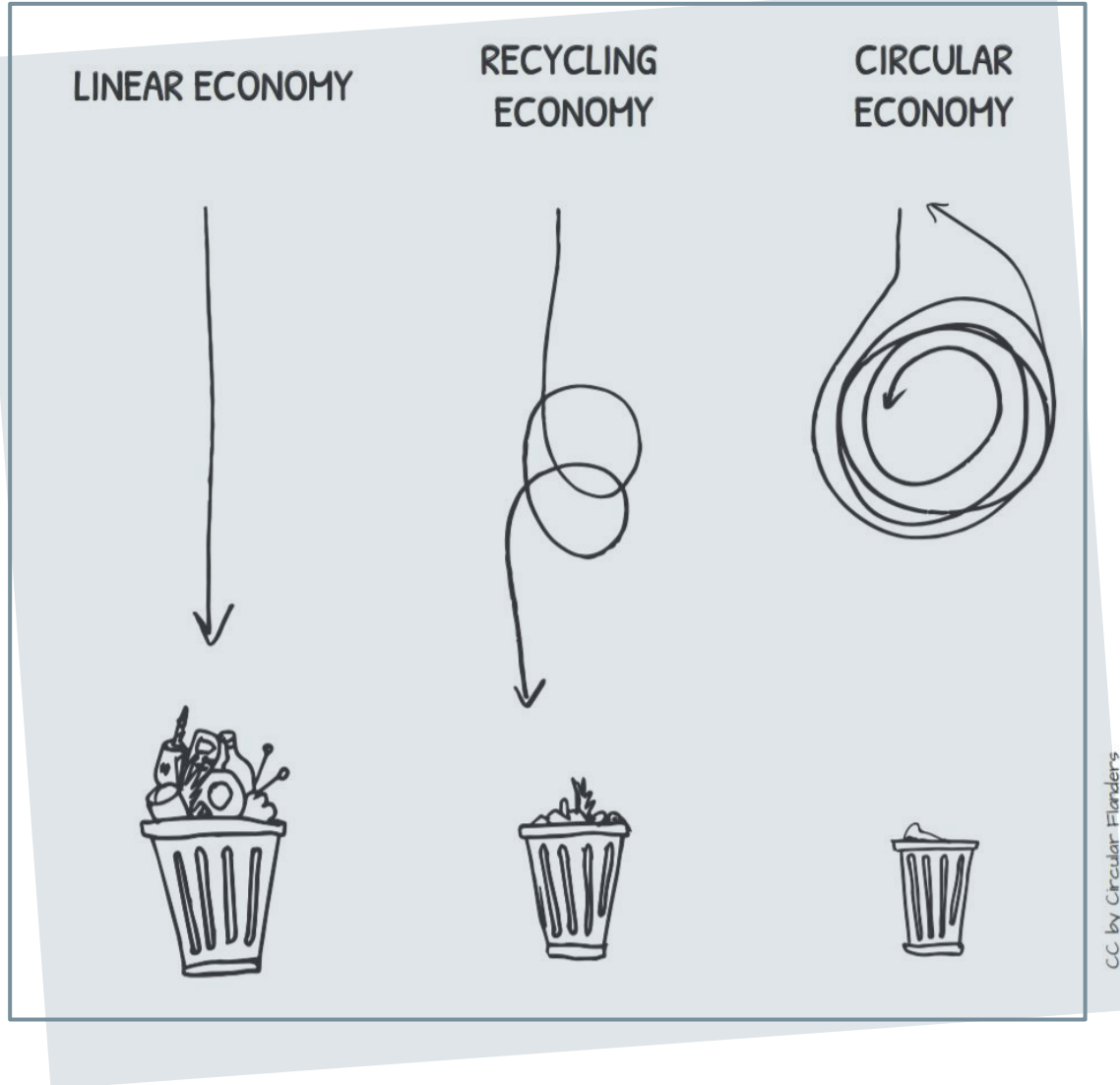# What is a Circular Economy?

LINEAR ECONOMY

Take ➡ Make ➡ Use ➡ Waste

Images Credits: Circular Flanders

What is a Circular Economy?

LINEAR ECONOMY

RECYCLING ECONOMY

Take ➡ Make ➡ Use ➡ Waste

Recycle   Repair

Images Credits: Circular Flanders

What is a Circular Economy?

LINEAR ECONOMY   RECYCLING ECONOMY   CIRCULAR ECONOMY

CC by Circular Flanders

Remanufacture   Reuse

Take → Make → Use → Waste

Recycle   Repair

Images Credits: Circular Flanders

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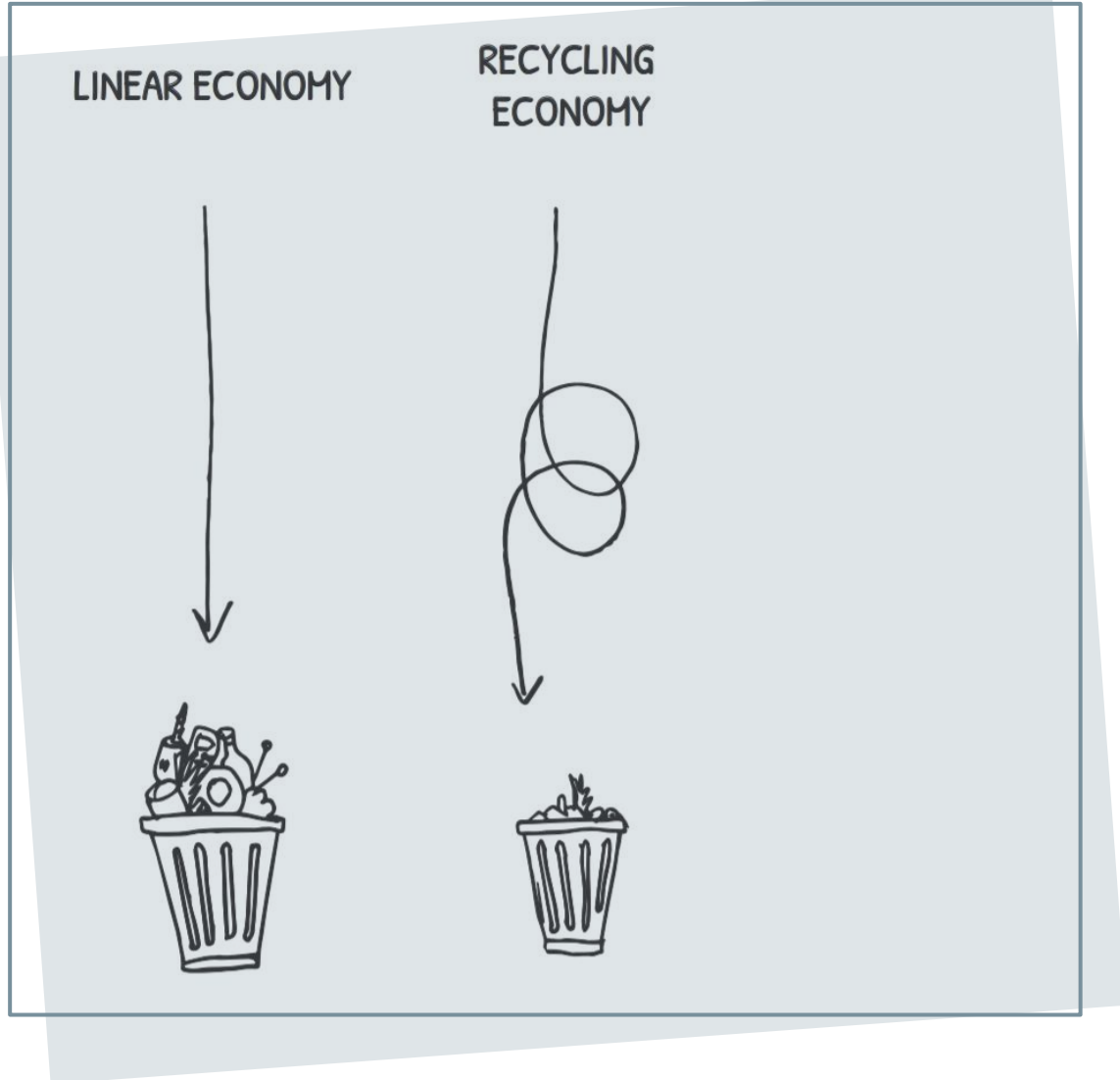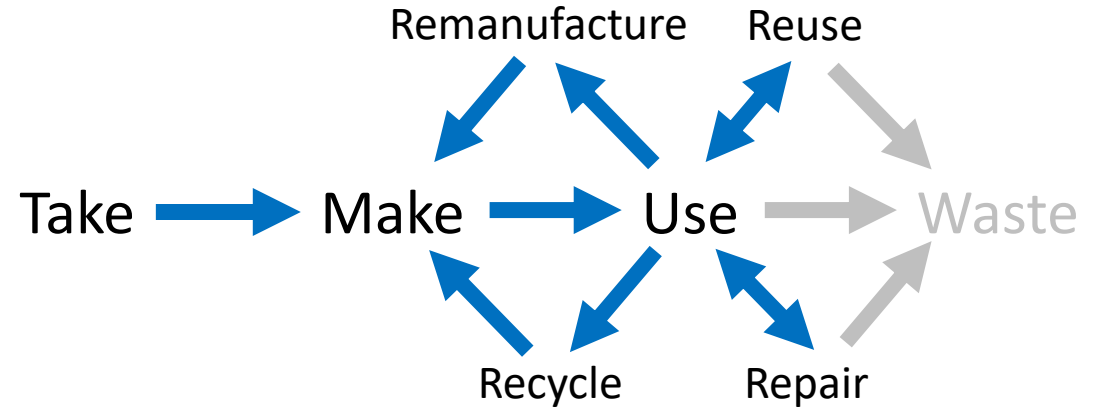
NARROWING THE LOOPS

- Reduces the amount of resources per product or service

- An interesting business model innovation of narrowing loops is, in fact, the combination with other circular strategies, for example, moving from ownership of a car to usage of a car that provides a mobility service.
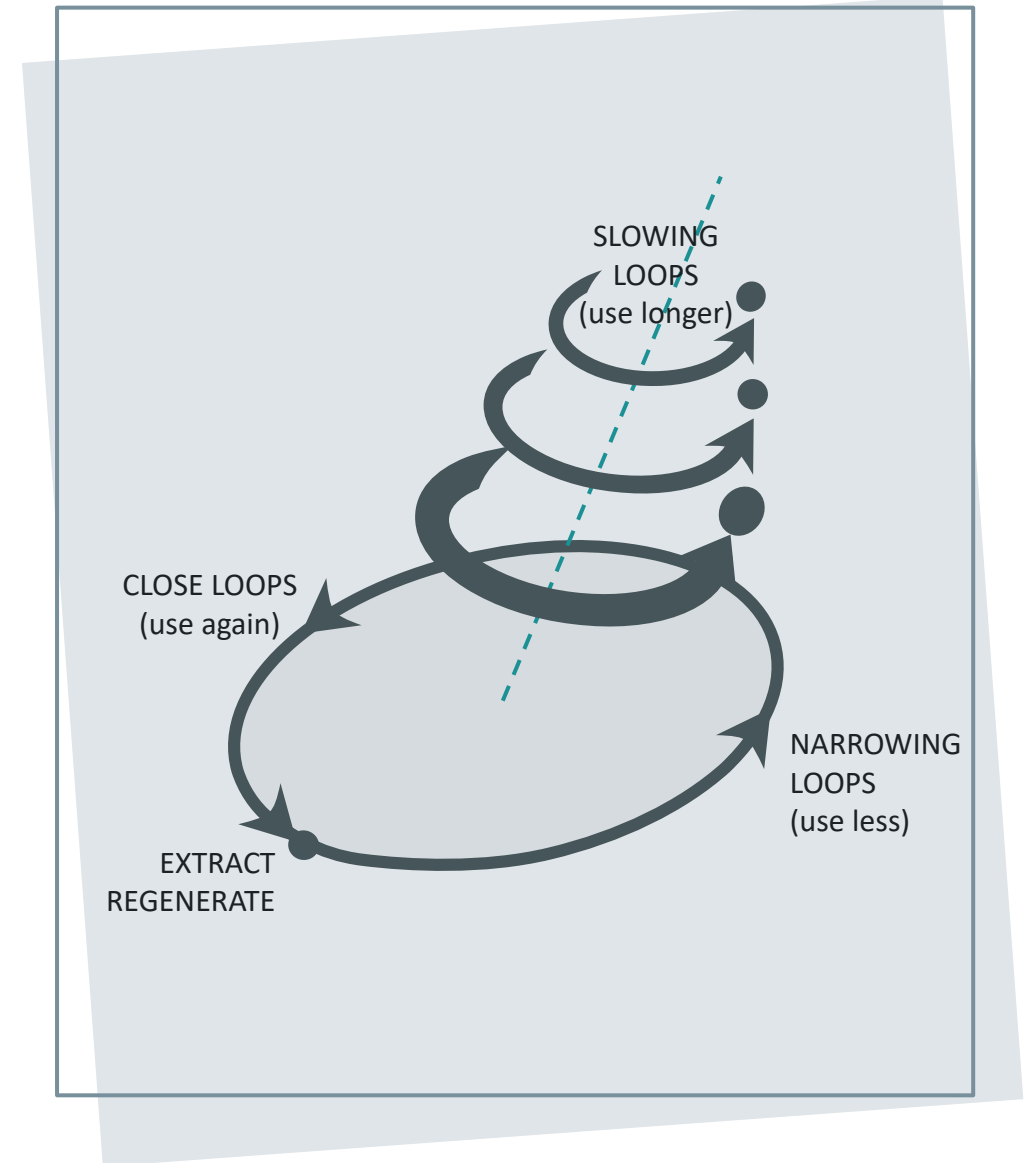

SLOWING LOOPS (use longer)

CLOSE LOOPS (use again)

NARROWING LOOPS (use less)

EXTRACT REGENERATE
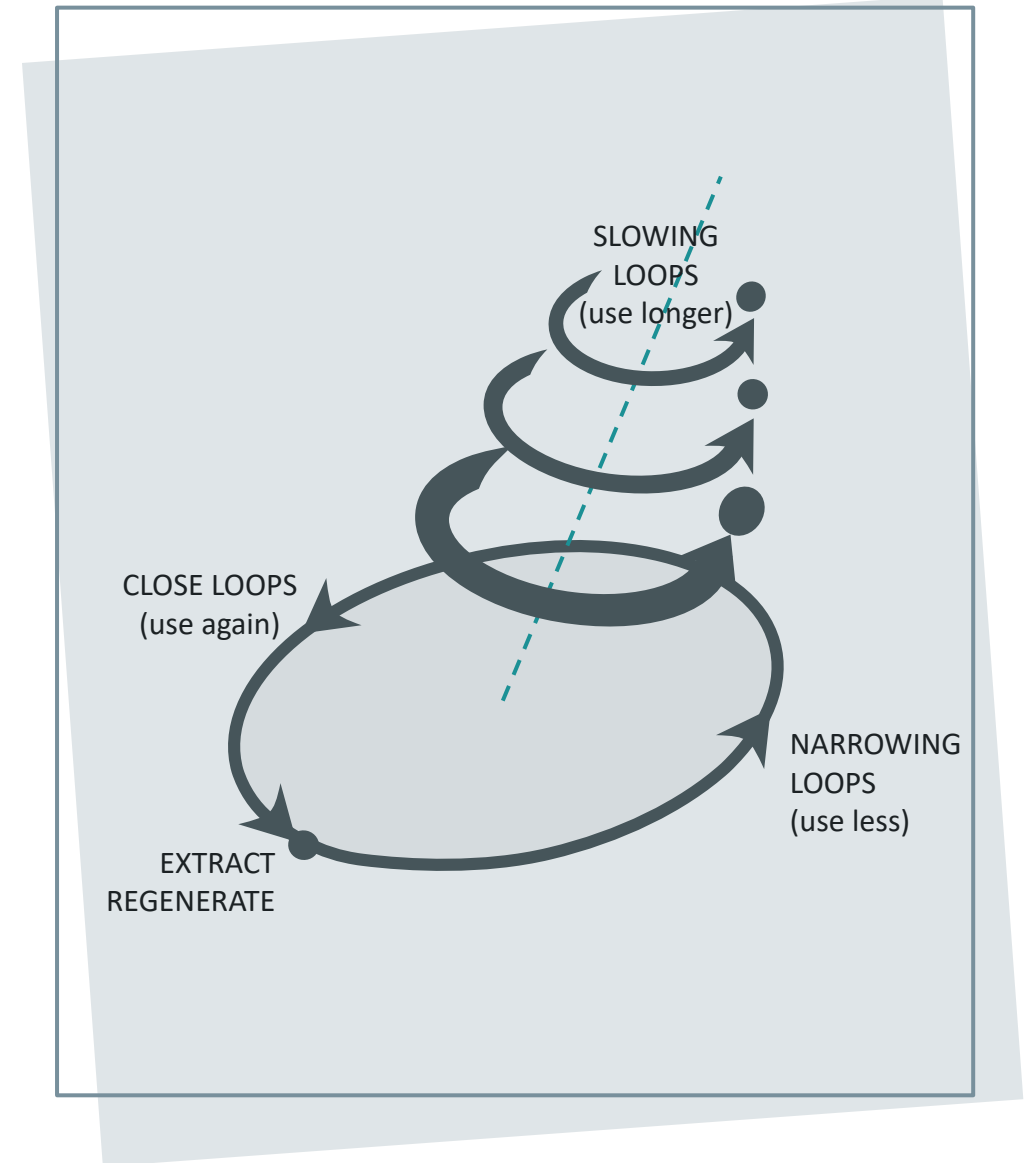
NARROWING LOOPS
Use less

Thinner, lighter and smaller caps

SLOWING DOWN LOOPS

- It slow-down the resources used by intensifying or expanding its use.

- It involves innovation at the business model and value chain levels.


SLOWING
LOOPS
(use longer)

CLOSE LOOPS
(use again)

NARROWING
LOOPS
(use less)

EXTRACT
REGENERATE

SLOWING LOOPS
Use longer

Durable Materials and Technologies

CLOSING DOWN LOOPS

The CLOSING LOOPS strategy **after several cycles** of use is the concept introduced by Braungart and McDonough in **Cradle to Cradle** (2010).

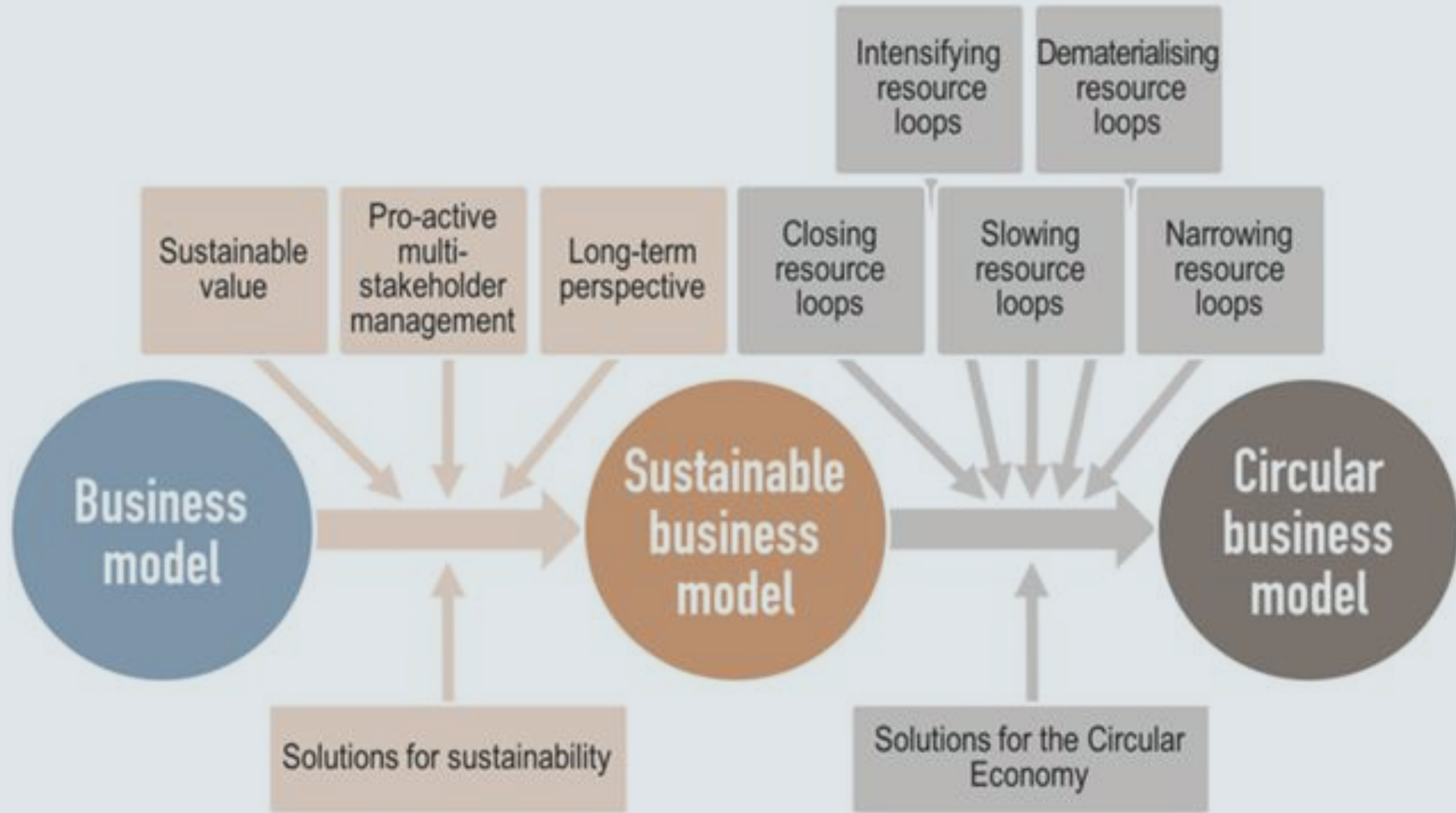Design strategies for **disassembly and reassembly (e.g. modularity)** will be instrumental in closing the loops.
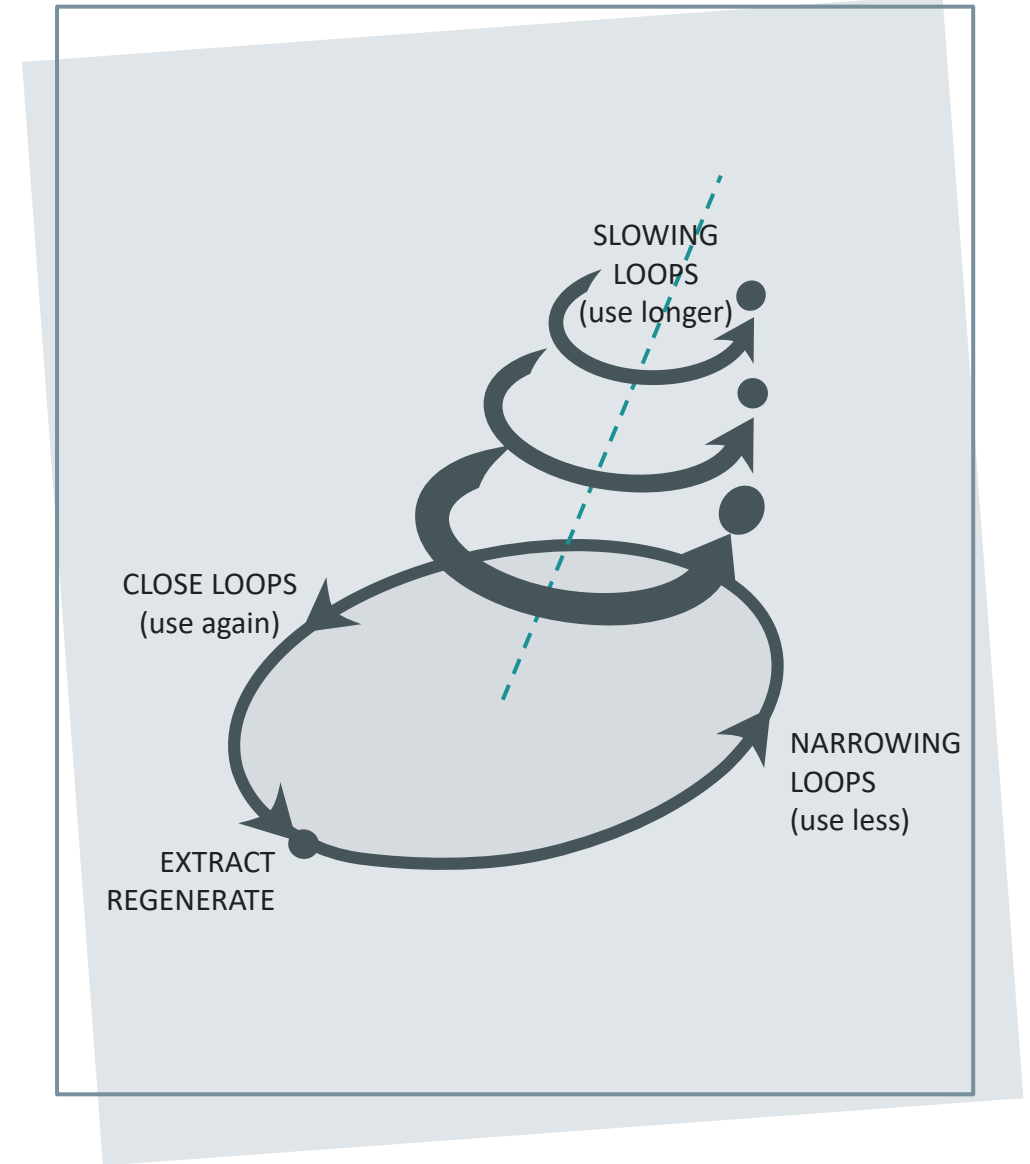
CLOSING LOOPS
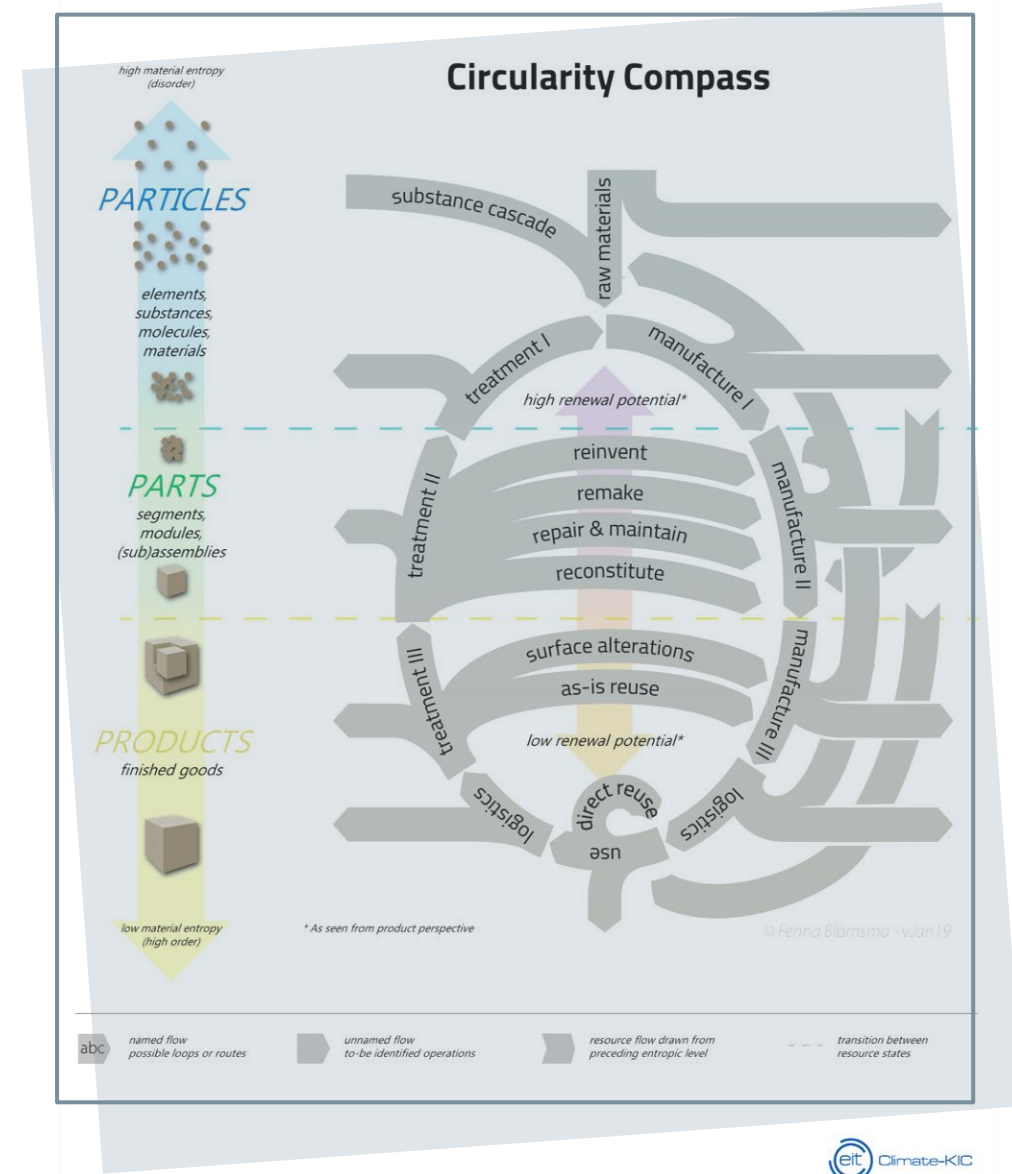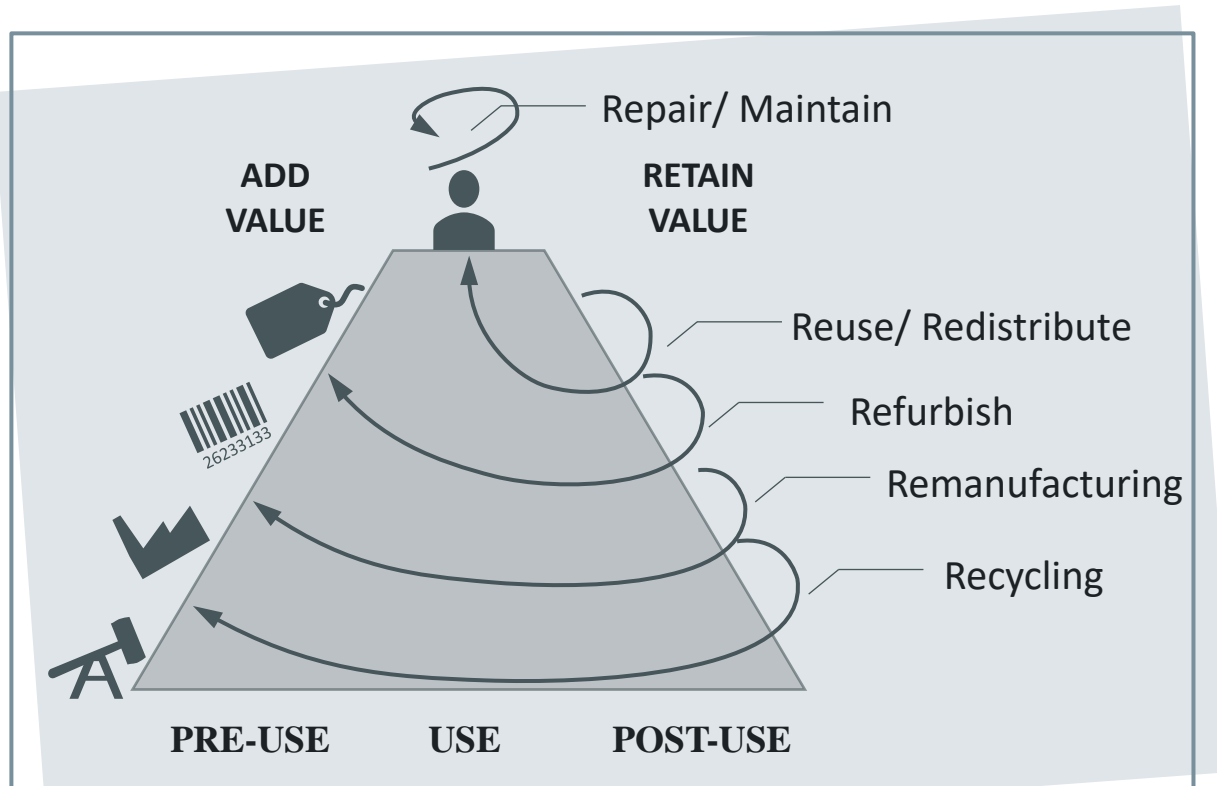**Use again**

Making Socks from Plastic Bottles

In packaging: **use of single-layer materials**, to **simplify the** recycling **process**.

(Geissdoerfer *et al.*, 2018)

BLUE circular
postbranding project

TO INTEGRATE CIRCULAR ECONOMY PRINCIPLES AT AN EARLY STAGE OF THE DESIGN PROCESS
Once product specifications are determined, only minor changes are usually possible

ADD VALUE

RETAIN VALUE

Repair/ Maintain

Reuse/ Redistribute

Refurbish

Remanufacturing

Recycling

26233133

PRE-USE   USE   POST-USE

Circularity Compass

high material entropy
(disorder)

PARTICLES

elements,
substances,
molecules,
materials

substance cascade

raw materials

treatment I

manufacture I

high renewal potential*

reinvent

remake

repair & maintain

reconstitute

treatment II

manufacture II

PARTS

segments,
modules,
(sub)assemblies

treatment III

surface alterations

as-is reuse

low renewal potential*

manufacture III

PRODUCTS

finished goods

logistics

direct reuse

use

logistics

low material entropy
(high order)

* As seen from product perspective

© Fenna Blomsma - vaan19

| abc | named flow possible loops or routes | | unnamed flow to-be identified operations | | resource flow drawn from preceding entropic level | | transition between resource states |

eit Climate-KIC

USER CENTERED DESIGN STRATEGIES

Design for DURABILITY
Products that succeed in meeting the consumer's requirements (functionality, aesthetic…) for long time.

EMOTIONAL Design
Products that strives to create an emotional attachment for the user. User want to keep using longer.

Design for DEMATERIALIZATION
Design that meets the user needs using no material or significatively less materials.

CIRCULAR DESIGN STRATEGIES

MANUFACTURING CENTERED DESIGN STRATEGIES

Design for for REPAIR
Correct faults to prolong product life.

Design for for SHARE
Use, occupy, or enjoy a product jointly with another or others.

Design for for REUSE
Use again or several times the product with the same function.

Design for REMANUFACTURING
Rebuild the product with original specifications, using reused, repaired and new parts.

Design for REFURBISHMENT
Renovation/restyling to prolong the product life.

Design for DISMANTLING
Take a product apart to facilitate reuse/repair/recycling parts.

Design for MATERIAL RECOVERY
Valorization of production waste in the same production.

Design with SECONDARY MATERIAL
Use of materials recycled from unknown companies.

Design with TAKE-BACK MATERIAL
Use in the same product, materials collected from the user

INDUSTRIAL SYNERGIES DESIGN STRATEGIES

Waste-free Design for END-OF-LIFE RECYCLING
Design the products to be transformed in reusable materials for unknown products.

Waste-free Design for WASTE VALORIZATION
Design allowing valorization of industrial waste in packaging, other component or industrial sector.

Waste-free Design for REUSE OF PARTS
Design products which parts can be functional in other products or aftermarket parts.

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Alexia Massa Gallucci e Ana Espada

BLUE ECOTECH

Alexia Massa Gallucci (PhD)
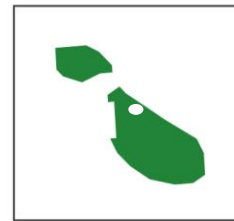linkedin.com/in/alexia-massa-gallucci-5851373a/

Does size matter?

Size does matter...and sometimes position too!

Only 7% of waste is recycled, the remaining goes to the landfill

The smallest
European Union
member state

BLUE ECOTECH

Mission is to protect, conserve and educate about the importance of the natural environment and its resources

- Valorisation of marine waste resources like beach wrack and fish waste
- Marine Conservation
- Habitat Restoration

BLUE ECOTECH

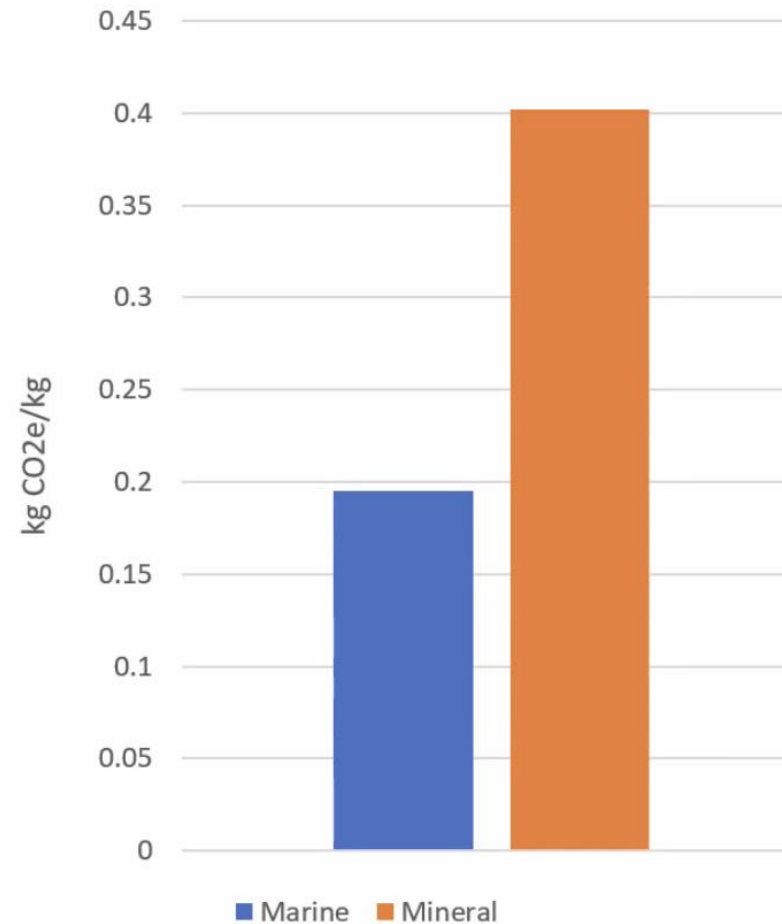The idea:

Blue EcoTech organic fertiliser

- using seagrass beach wrack

- sustainable fertiliser for agriculture

- reduces pollution

- improves soil's health

Value for the Planet

Carbon Footprint

kg CO2e/kg

■ Marine   ■ Mineral

Marine conservation and Fisheries Science

Alexia Massa Gallucci
Founder

Fisheries research and Aquaculture

Karl Cutajar
Founder

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Co-funded by the European Union

BLUE ECOTECH
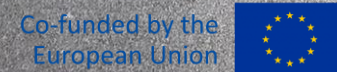
Questions?

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Portugal
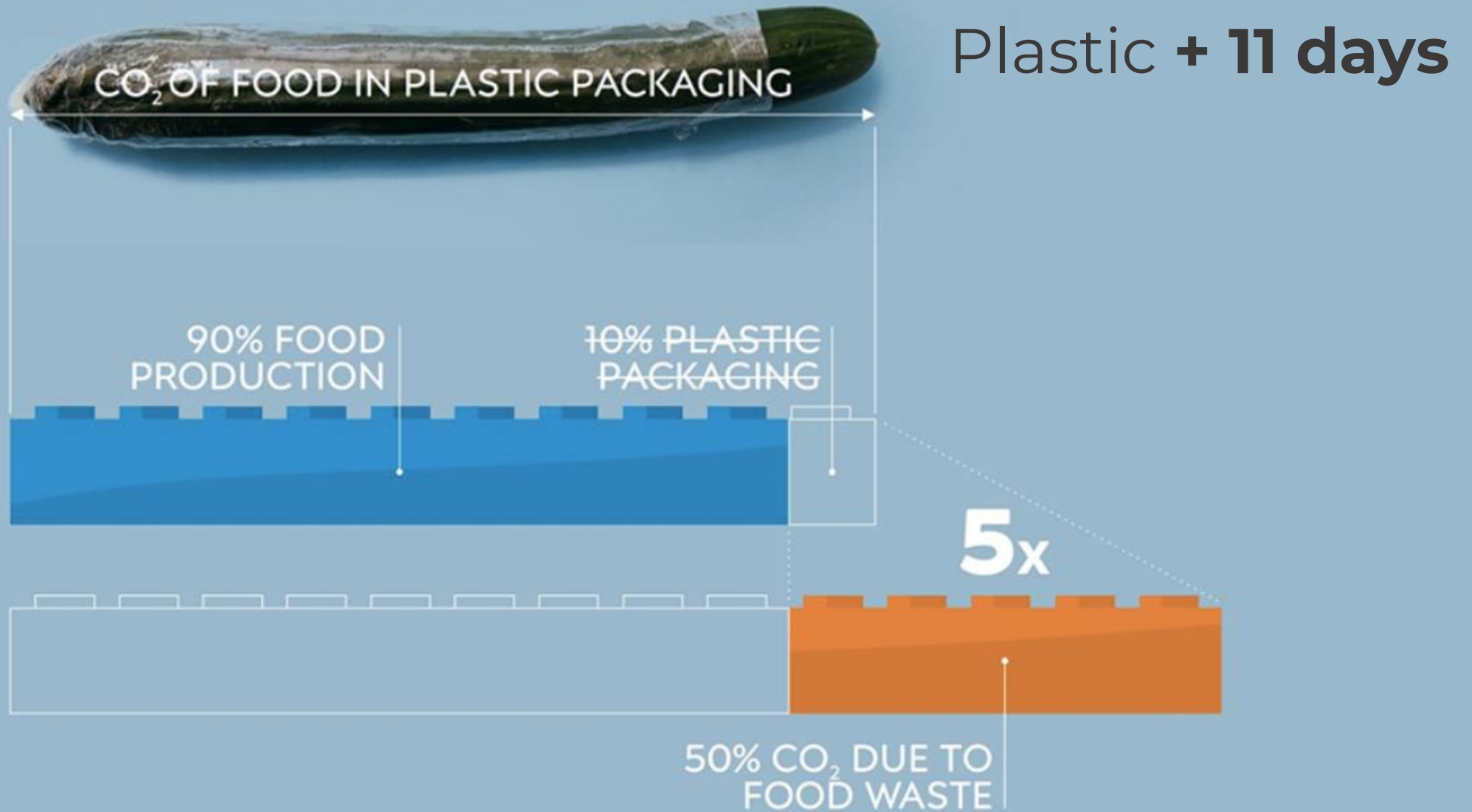07.12.2022

Plastic!!!

- The **anti-plastic sentiment** is distracting us from the net environmental benefits of plastic

Source: Selke, 2018

- **Replacing plastic** with alternative resources has a significant net **negative** environmental impact

Source: Selke, 2018; Chaimin, 2019

Plastic **+ 11 days**

CO₂ OF FOOD IN PLASTIC PACKAGING

90% FOOD PRODUCTION

10% PLASTIC PACKAGING

5x

50% CO₂ DUE TO FOOD WASTE
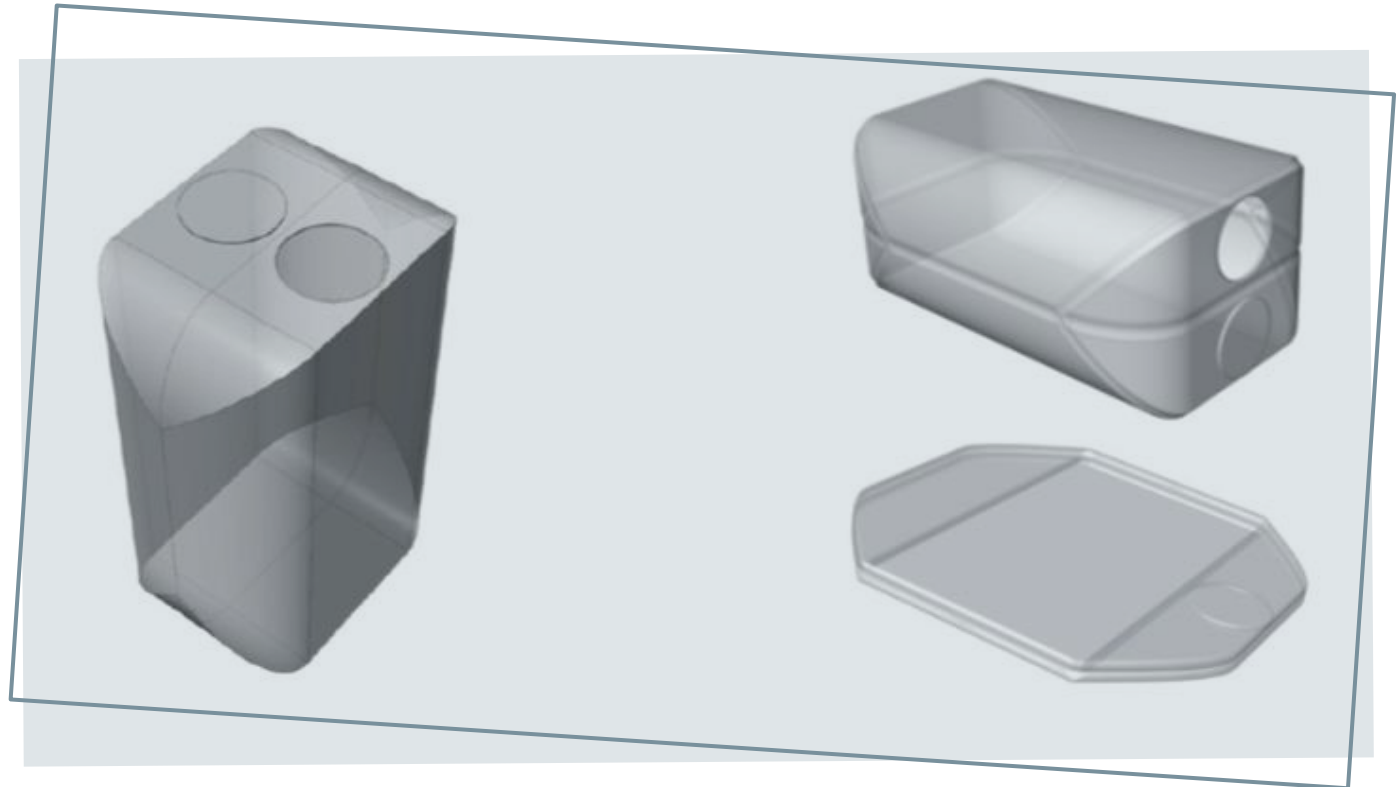
Source: Ragaert, K. 2019

TO INTEGRATE CIRCULAR ECONOMY PRINCIPLES AT AN EARLY STAGE OF THE DESIGN PROCESS
Once product specifications are determined (MATERIALS), only minor changes are possible

5-litre package scenario

22 500g CO_2/Km.
1294€/100Km

900g CO_2/Km
78€/100Km
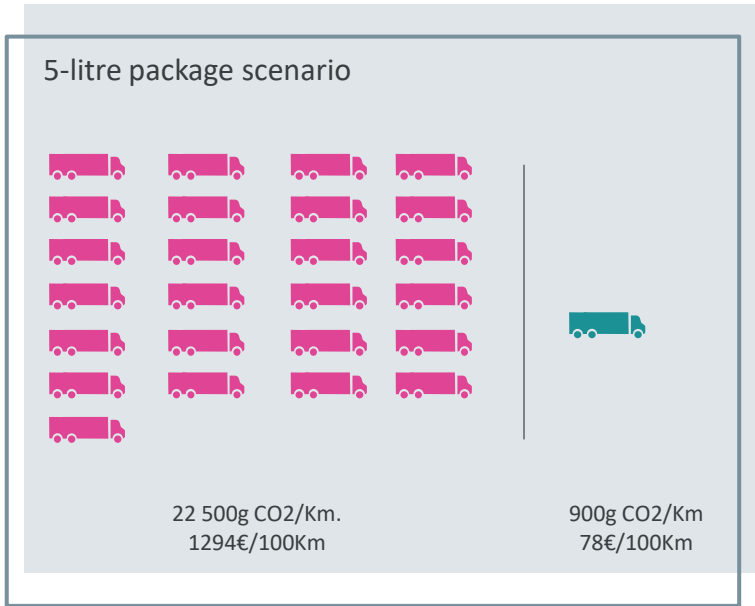
Source (adapted from):
Wisepack, Espada, A.; Rosado, L.; Vargas, L., 2008

HDPE | Blow molding | Household and Personal-care markets

Source: Wisepack, Espada, A.; Rosado, L.; Vargas, L., 2008/ WO Patent No. WO2008020776A1, 2008