



LCA: Life Cycle Assessment, Action, Accountability

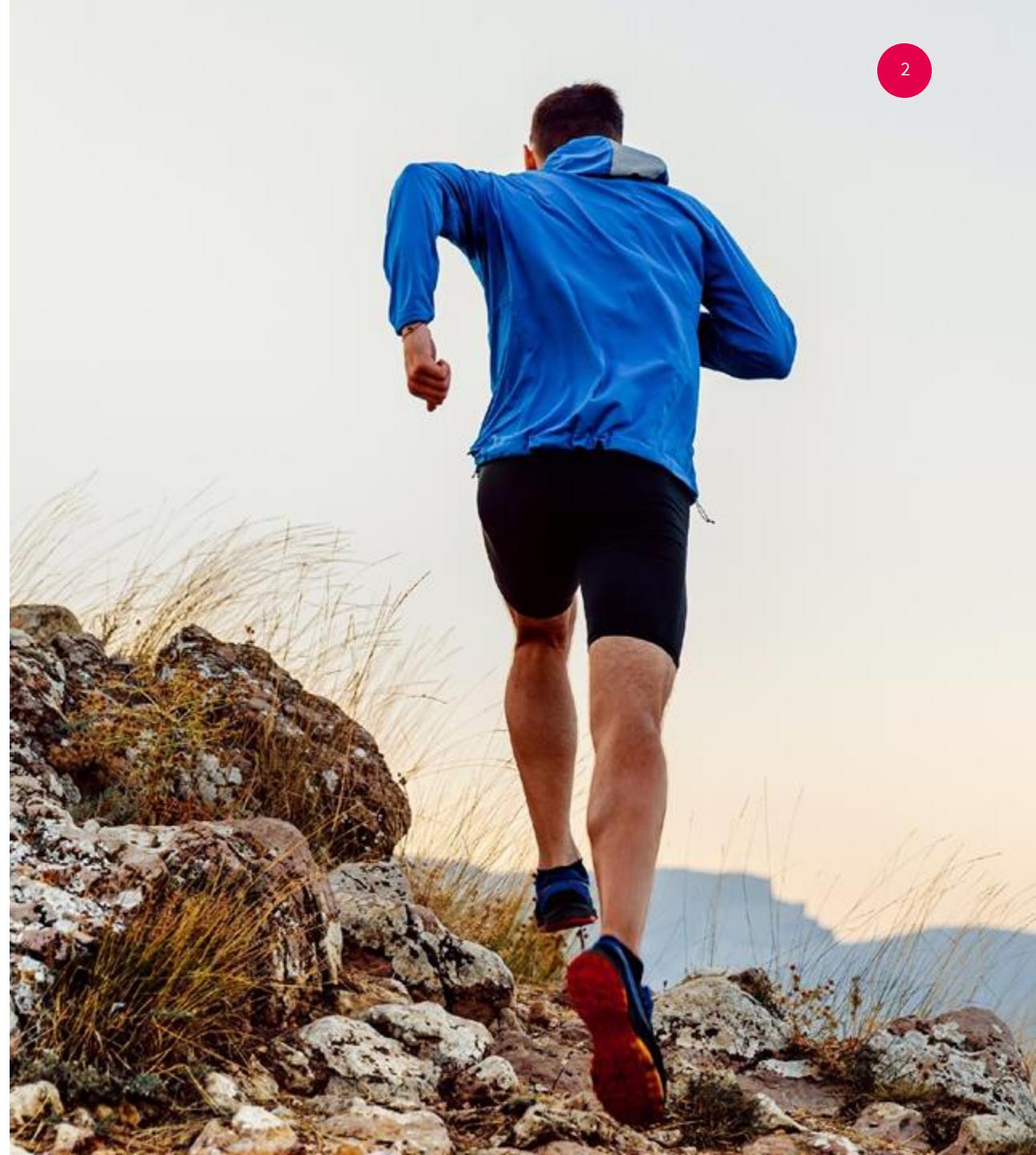
From measurement to management: Use of the LCA framework in the context of biobased solutions

Stefan Frehland, Senior Sustainability Consultant - Quantis

26/06/2023

Agenda

- 01 Introduction & Context
- 02 What is Life Cycle Assessment, why is important and how can it be used
- 03 The LCA framework: how to approach it right
- 04 Biobased solutions in context
- 05 Key takeaways



Speakers



Stefan Frehland

Quantis

Senior Sustainability Consultant

[Link](#)

The background of the slide is a photograph of a person in a blue kayak on a body of water, holding a paddle. A large, semi-transparent white circle is overlaid on the image, centered behind the text. The text is white and positioned in the lower-left quadrant of the image.

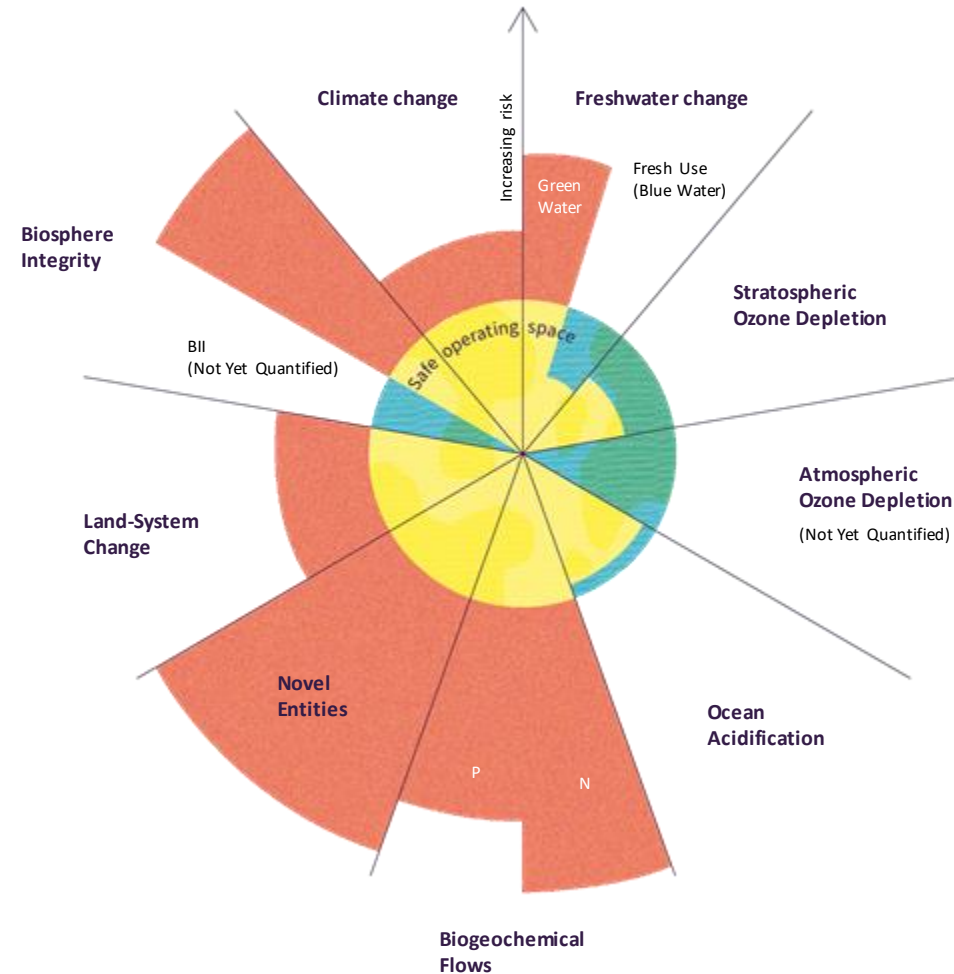
Environmental sustainability consultancy
that works with brands across the globe to
drive sustainable transformation and
align business with planetary boundaries

Aligning business with planetary boundaries

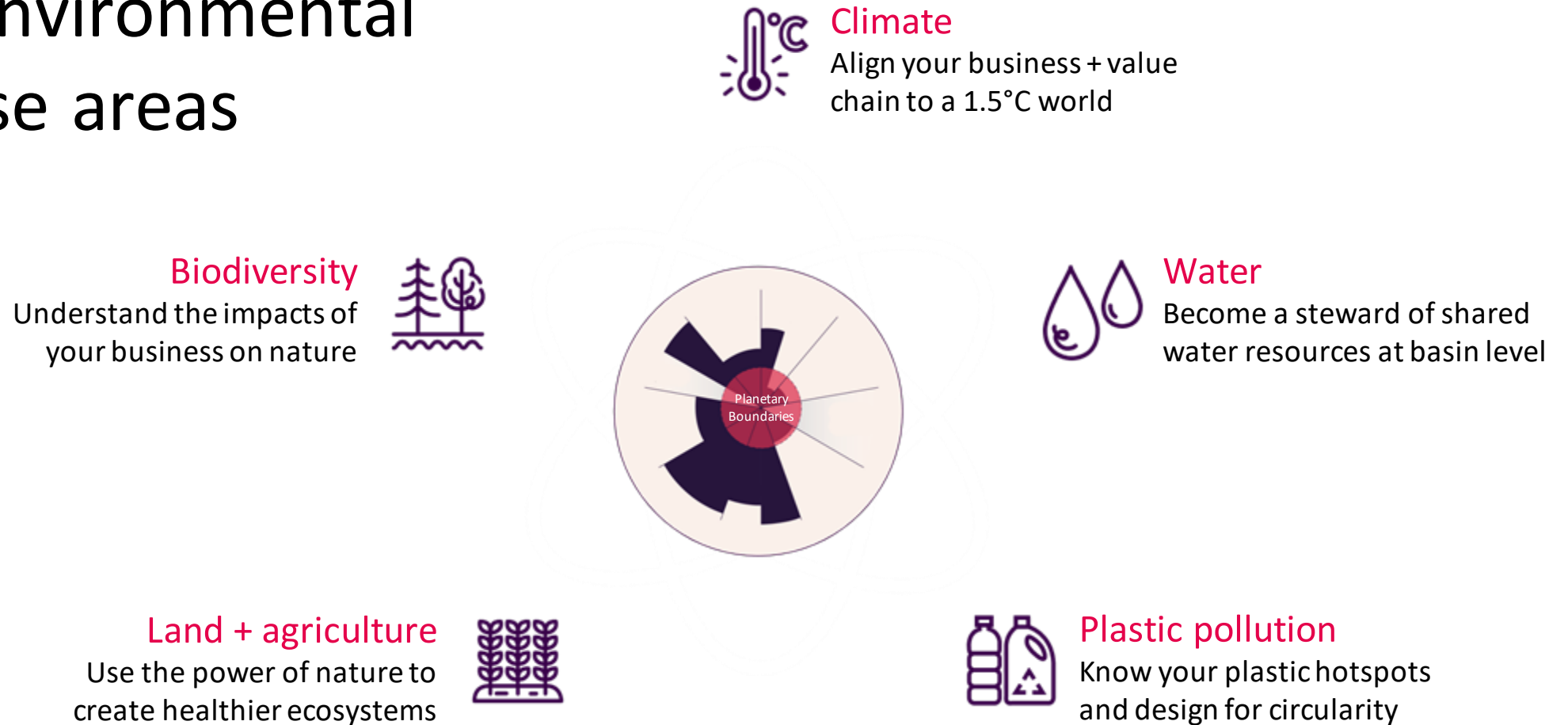
Scientific models such as the Planetary Boundaries define the operating spaces within which we must stay to maintain life as we know it on our planet.

We have already crossed the line on many boundaries.

Biodiversity, climate, land + agriculture, water and plastic pollution: Our 5 environmental expertise areas work with clients to measure your contributions and own limits, set reduction goals and chart a roadmap to get business in-line with the planet's limits:



Our 5 environmental expertise areas



Our Team



Our dynamic and visionary team of smart, passionate individuals — from engineers and environmental scientists to business strategists and communications experts — are committed to building a future that works for people, planet and business.

250+

Sustainability
champions

5000+

Client projects

15+

Years of experience



We guide you through a three-phased Sustainability Transformation Journey



Assess

Gather the best available data, metrics & insights

Identify opportunities for improvement



Plan

Define your ambition and strategic framework to guide the transformation

Set the goals and outline the roadmaps for actions



Transform

Put the transformation plan into action

Engage with stakeholders and activate across the supply chain and portfolio

A photograph of a person kayaking on a calm lake during sunset. The sun is low on the left side of the frame, creating a bright, warm glow and reflecting on the water. In the foreground, the back of a person's head and shoulders are visible, holding a black paddle. In the middle ground, another person in a white kayak is paddling away from the viewer. The background shows a distant shoreline with trees under a clear sky.

01

Introduction & Context



1

LCA >> Life Cycle Assessment

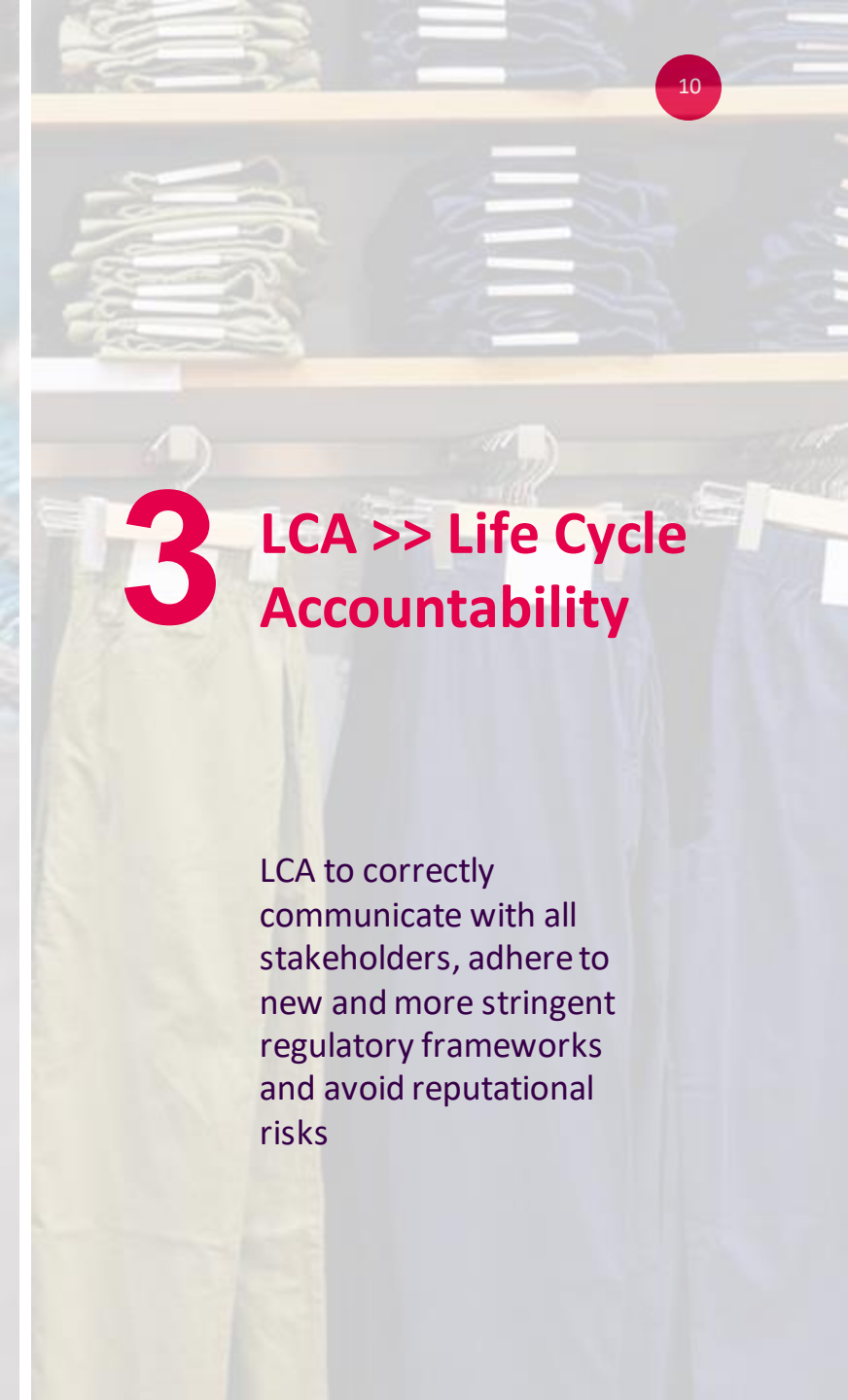
LCA is the science-based tool that will help you measure product footprint and environmental hotspots across different categories



2

LCA >> Life Cycle Actions

LCA metrics are the ones to guide your environmental actions, enabling the Brand to focus on priorities, when it comes to environmental sustainability



3

LCA >> Life Cycle Accountability

LCA to correctly communicate with all stakeholders, adhere to new and more stringent regulatory frameworks and avoid reputational risks



01

What is LCA, why is important and how can it be used



Eco-design is defined as the integration of environmental perspective into products' and services' design and development.



LCA - Life Cycle Assessment, Action, Accountability

LCA is the compass that guides you through your sustainability transformation process



A photograph of a person kayaking on a calm lake at sunset. The sun is low on the left side of the frame, creating a bright, warm glow and reflecting on the water. In the foreground, the back of a person's head and shoulders are visible, holding a black paddle. In the middle ground, another person in a yellow life vest is kayaking away from the viewer. The background shows a distant shoreline with trees under a clear sky.

03

LCA in Action: how to approach it right

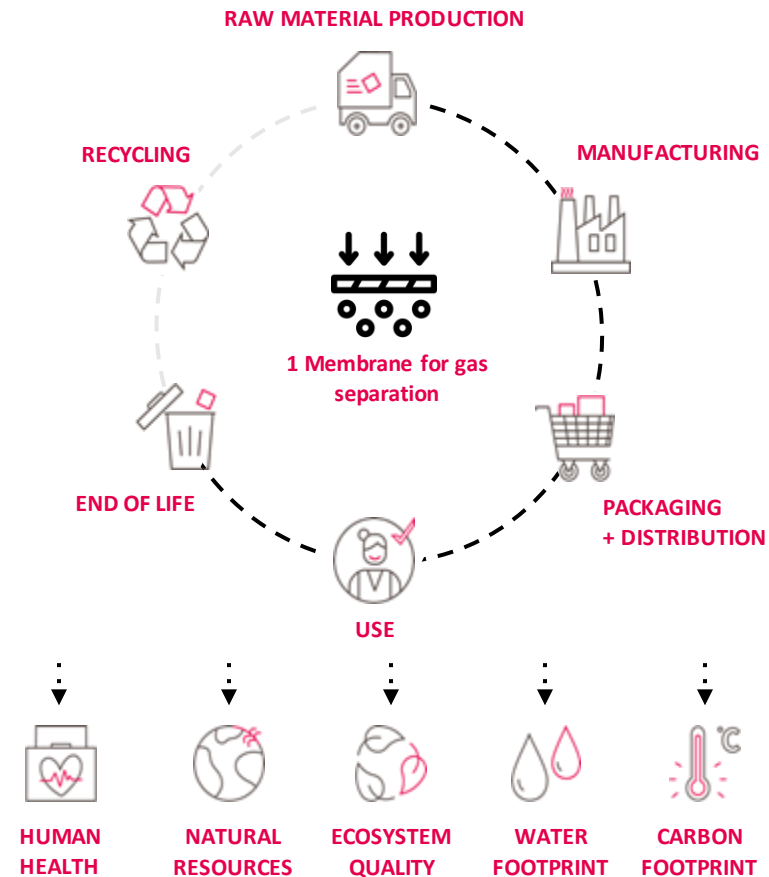
THE LCA APPROACH

Life Cycle Assessment is recognized as the leading methodology for environmental impact evaluation. The main strengths of this tool are the following:

Metrics-based approach, allowing impact evaluations and/or comparisons to be made on a quantified and credible scientific basis.

Life-cycle oriented, allowing users to consider various product stages, to highlight potential 'burden shifting', or unintended consequences.

Multi-criteria: we are aligned with the PEF guidance, and cover a multiplicity of indicators in the assessment (including water use, ecotoxicity, ozone depletion, etc.)



LCA IS A GOOD DECISION MAKING TOOL



Identify environmental issues along the **value chain (hotspots)**



Identify **improvement** possibilities and production **optimization**



Compare alternatives



Set **goals** and measure **progress**



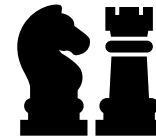
Benchmark performance



Manage **risk**



Communicate



The LCA framework you need to know

Get the right picture:

- Define your **system**, **data requirements** and **assumptions** to fill potential gaps

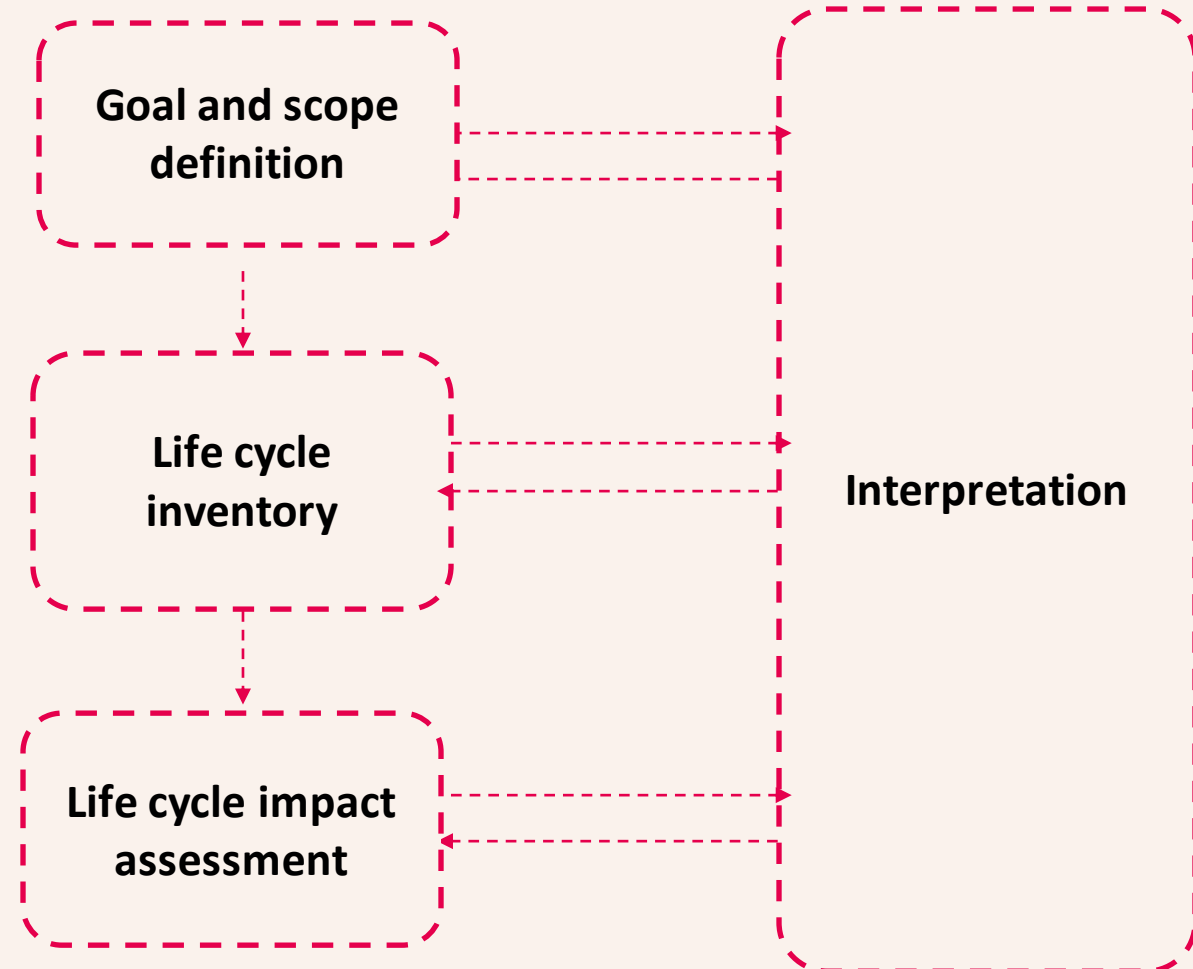
Select the right tools and databases

- To complement available and collected primary data, background databases can fill the gaps (secondary data)

Consider the right impact indicators for your context:

- Select the impact indicators for the assessment based on your context
- Avoid **tradeoffs** by using a multi-indicator approach

ISO NORMS 14 040 + 14 044 (2006) FOR LCA





*“All the really important mistakes
are made on the first day.”*

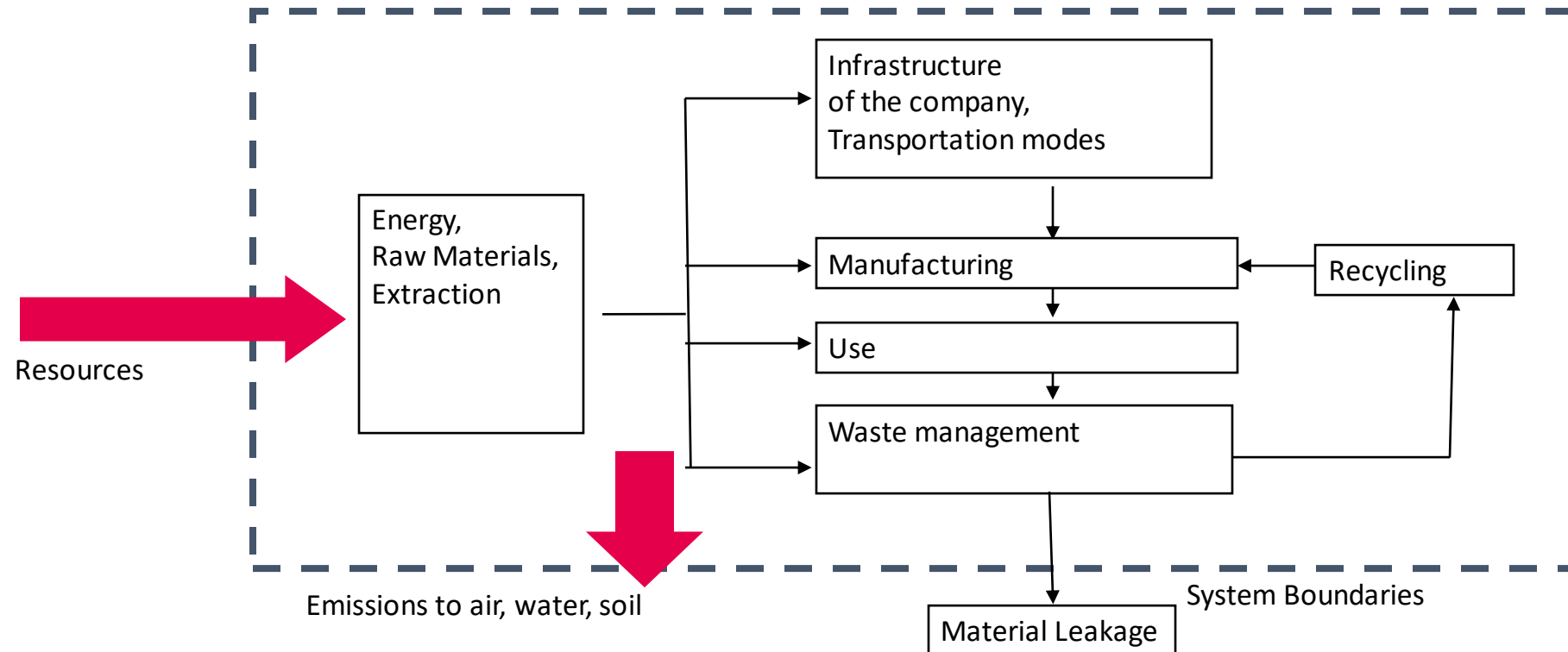
GOAL AND SCOPE

The scope includes the following items:

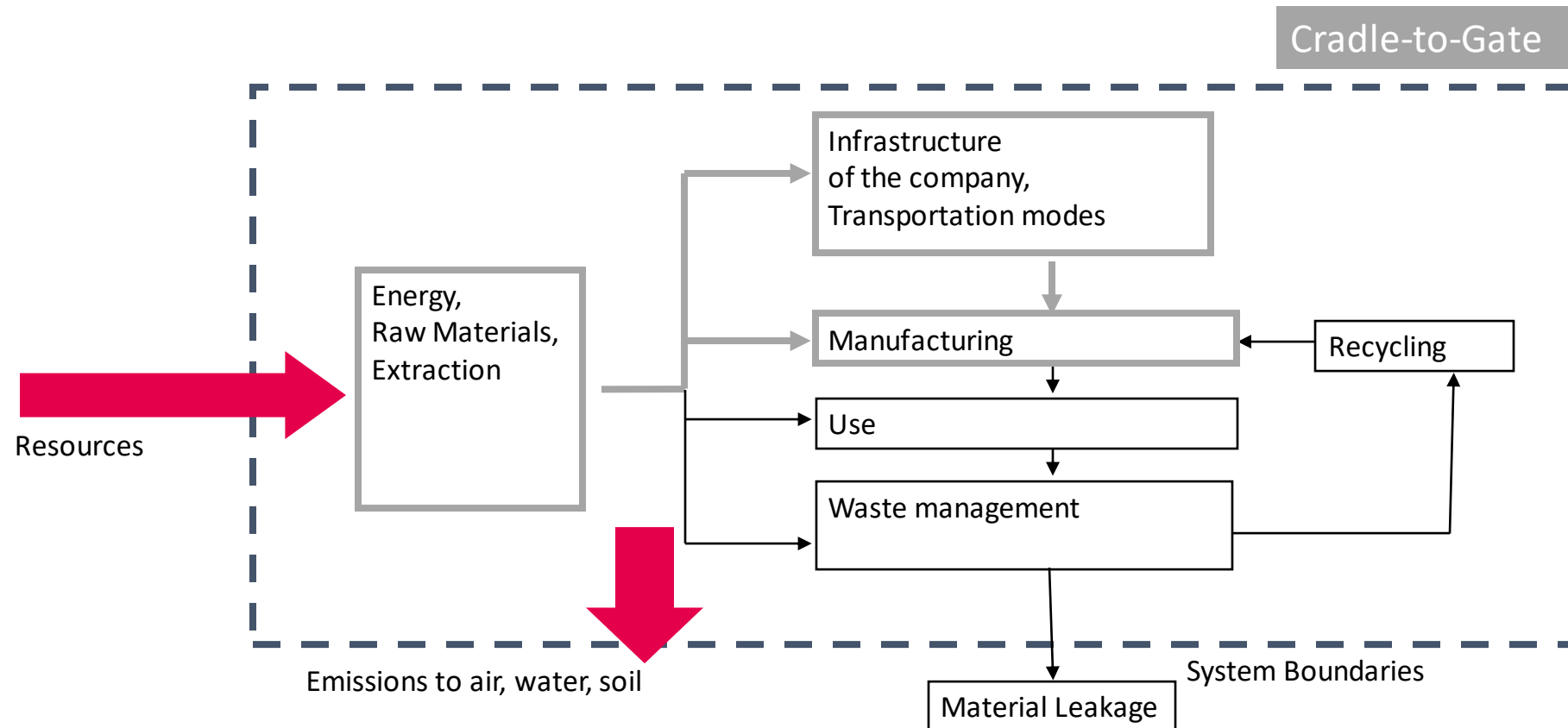
- **Product system** to be studied
- **Functions** of the product system or, in the case of comparative studies, the systems
- **Functional Unit (FU)** and **reference flow**
- System **boundaries**
- **Allocation** procedures
- **Impact categories** selected and methodology of impact assessment
- Data requirements; **assumptions; limitations**
- Initial data quality requirements
- **Type of critical review, if any**
- Type and format of the report required for the study



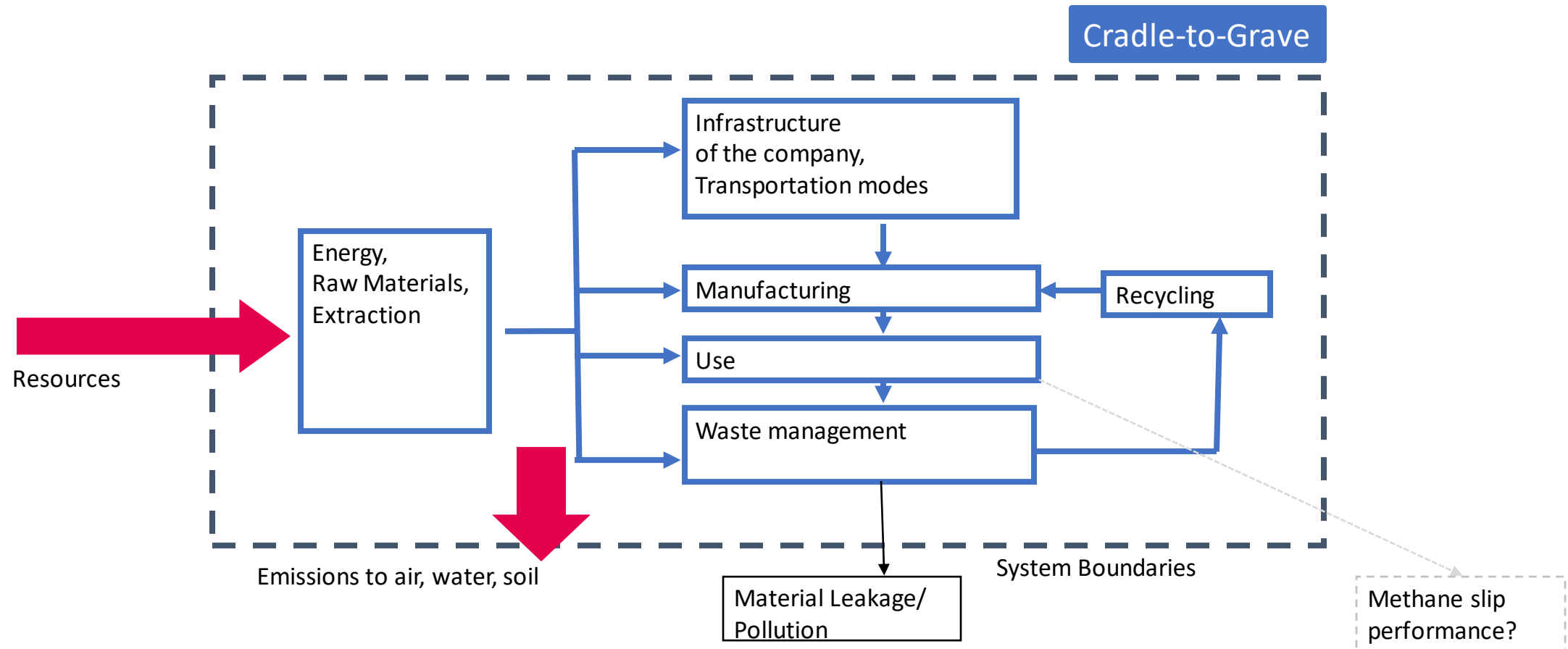
SYSTEM BOUNDARIES



SYSTEM BOUNDARIES



SYSTEM BOUNDARIES

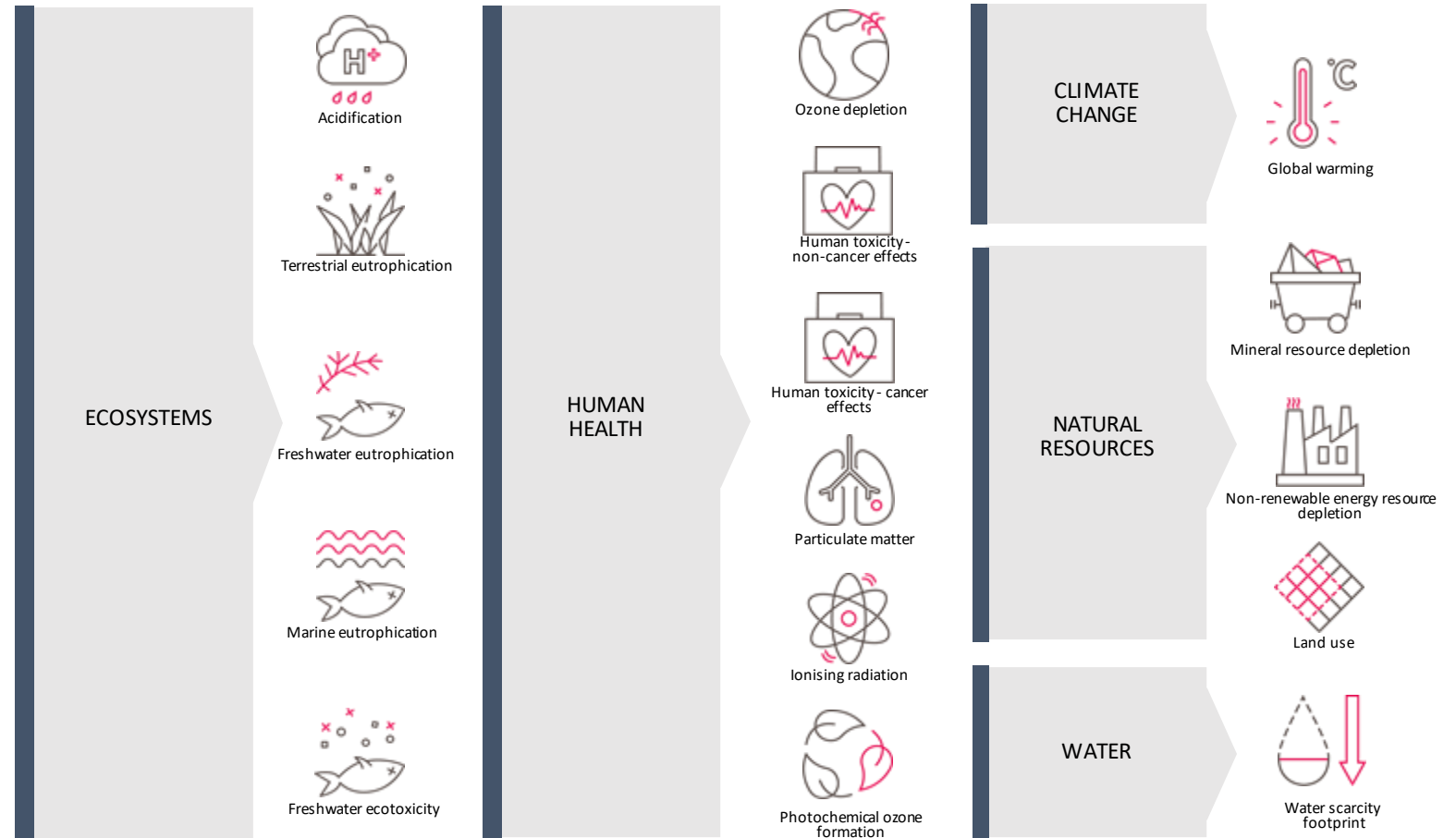


- Cradle-to-Cradle: Regenerative design, turning waste into product (=no more waste)
- Gate-to-Gate: Gate-to-gate is a partial LCA looking at only one value-added process in the entire production chain

IMPACT ASSESSMENT, ENVIRONMENTAL FOOTPRINT (EF) METHOD

Choice of LCIA method depends on

- Type of indicator desired; mid-point, end-point, single score...
- Single score helps to see if a big contributor is missing
- Subject of the project; characterization factors of an indicator.
- EF3.1 LCIA method is recommended if the sector of interest is covered by the methodology



Keep in mind...

- LCA evaluates **potential impacts** and produces relative results
- LCA provides a **hot spot view** but depending on the context, it needs to be **complemented** by other **additional insights**
- LCA is **not risk assessment**
- There is **uncertainty** associated with data and results

LCA - Assessment, action, accountability



LCA is not a **treasure map** ...



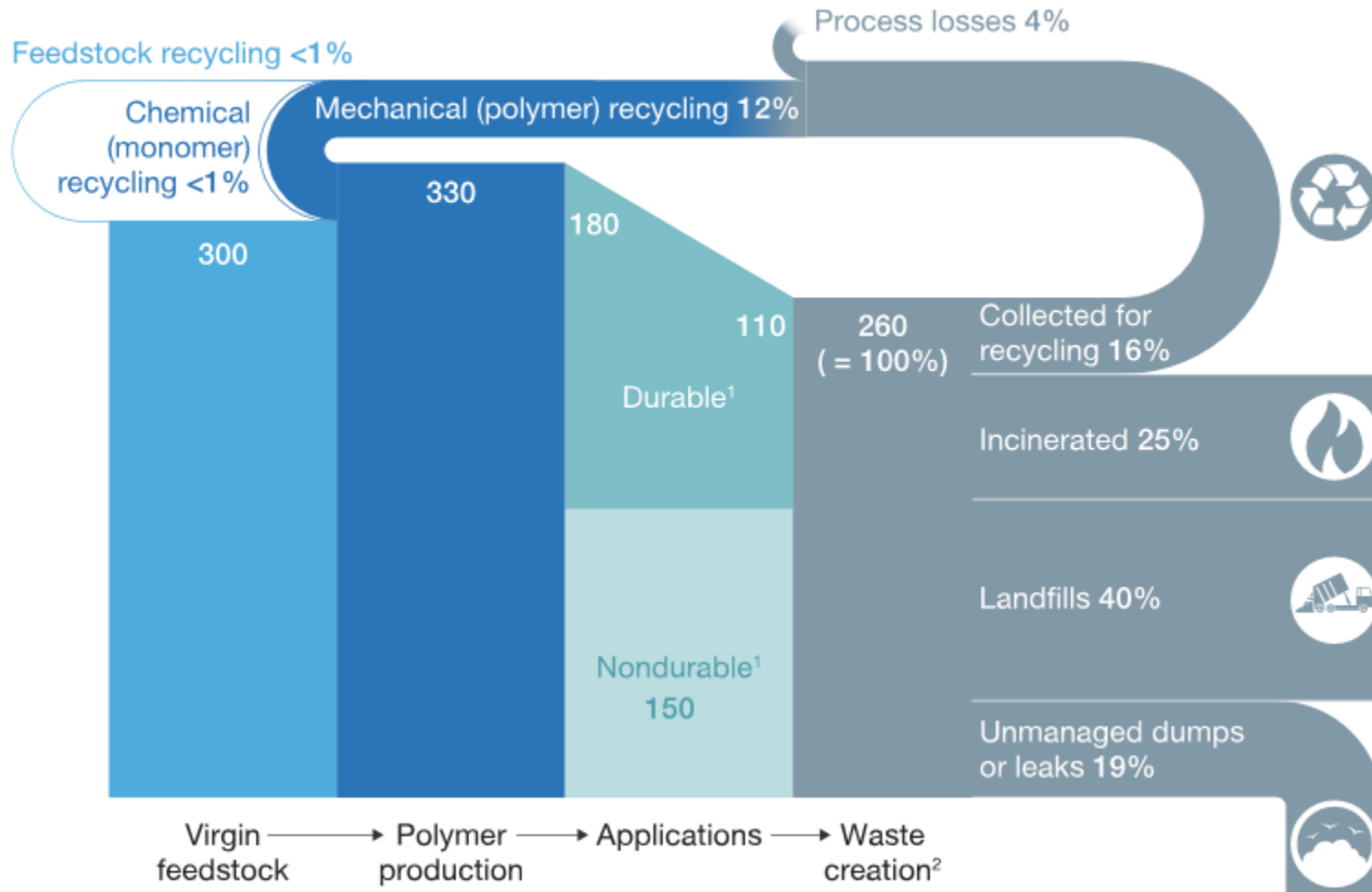
it is our **compass** to sustainability

A photograph of a person kayaking on a calm lake during sunset. The sun is low on the left side of the frame, creating a bright, warm glow and reflecting on the water. In the foreground, the back of a person's head and shoulders are visible, holding a black paddle. In the middle ground, another person in a yellow life vest is kayaking away from the viewer. The background shows a distant shoreline with trees under a clear sky.

04

Biobased solutions in context

PLASTICS: FROM A LINEAR MODEL



MAIN CONCERNS:

- Contribution to climate change
- Plastic leakage and pollution

PLASTICS: A NEW PARADIGM

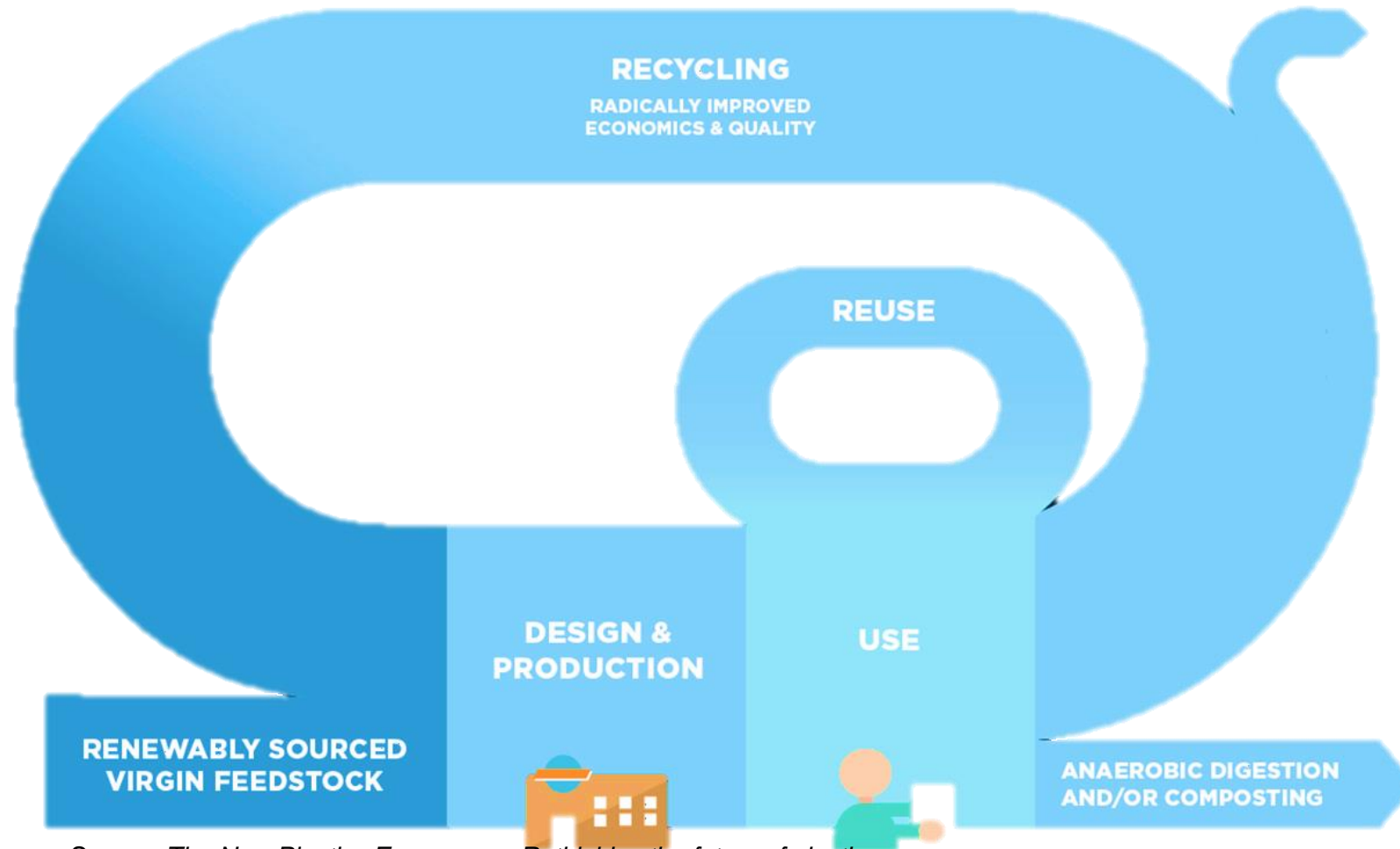


- Plastic is not the problem. The problem is the way we use use & dispose plastic
- We need to rethink the future of plastics

SPECIFIC ACTIONS

- Create an effective after-use economy
- Reduce the plastic leakage into the environment
- **Decouple plastic from fossil feedstocks**
- **Biobased plastic as a source to “close the loop”**

PLASTICS: TO A CIRCULAR MODEL



Source: *The New Plastics Economy — Rethinking the future of plastics*

Solutions



RECYCLED
“Re-circulating” the
feedstock



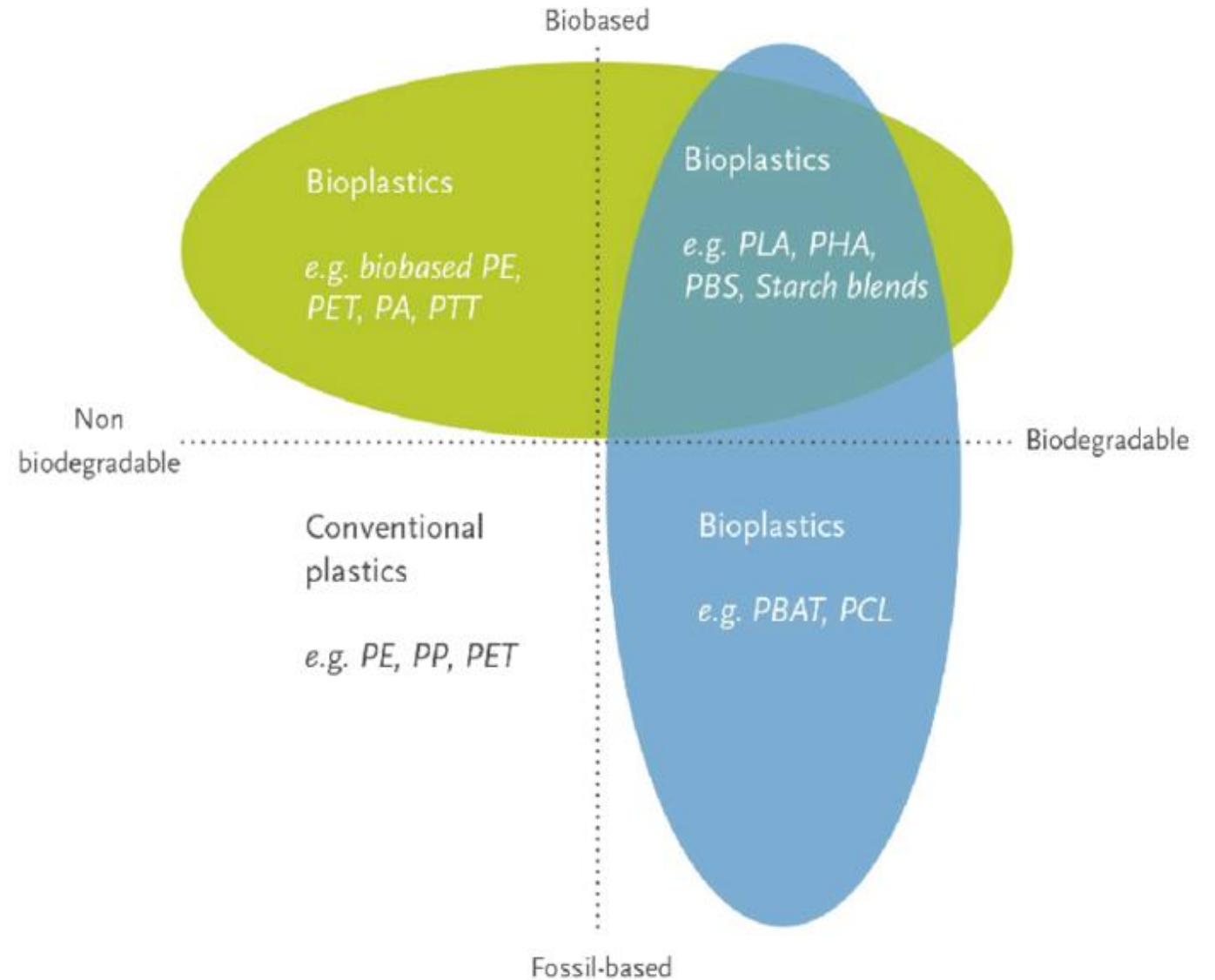
BIOBASED
Renewable feedstocks



BIODEGRADABLE/COMPOSTABLE
Degrade in «natural»
environment



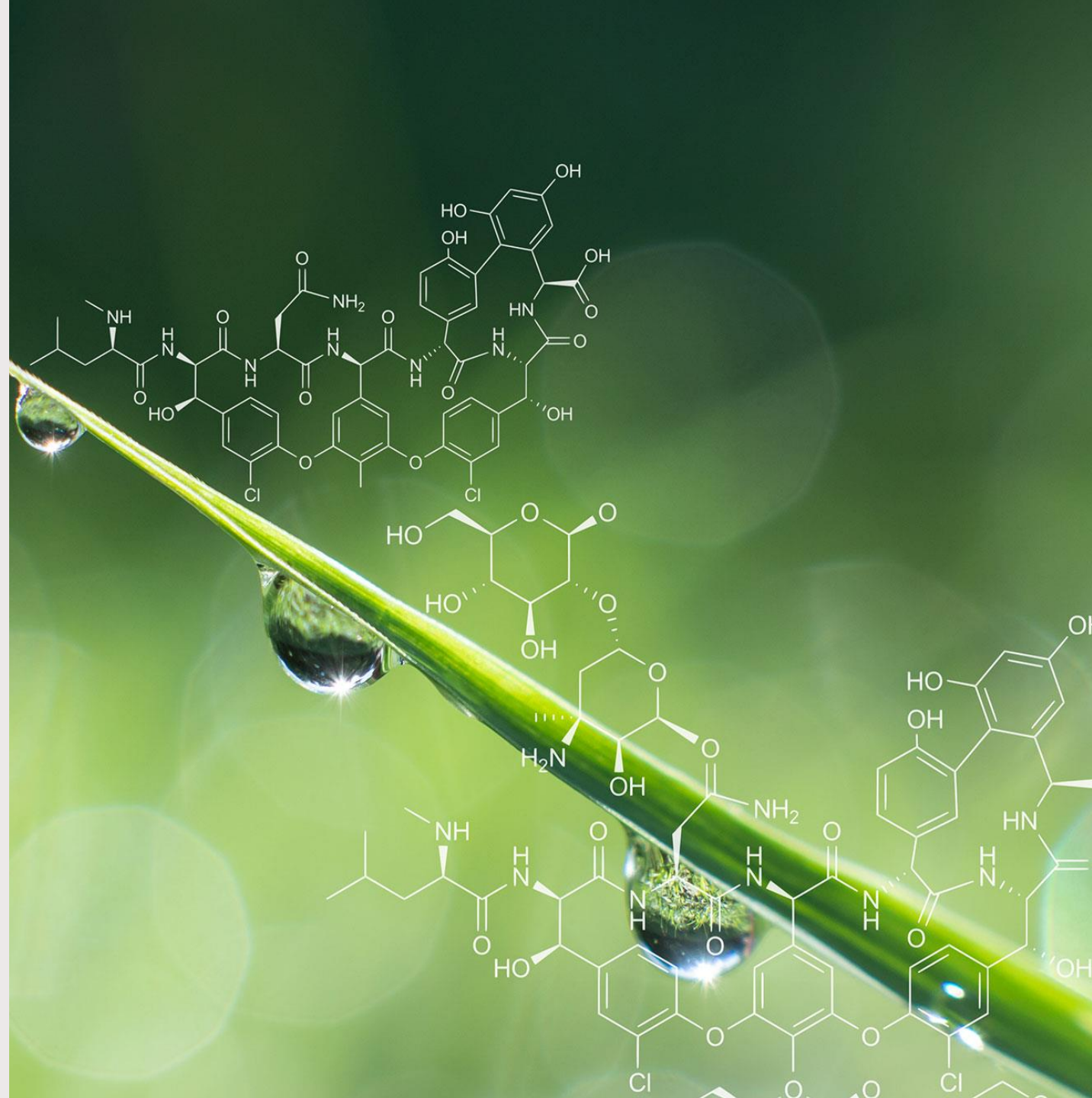
BIOBASED ≠ BIODEGRADABLE



COMPOSTABLE



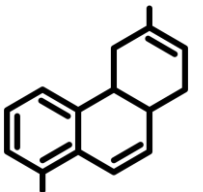
DROP-IN VS INNOVATIVE



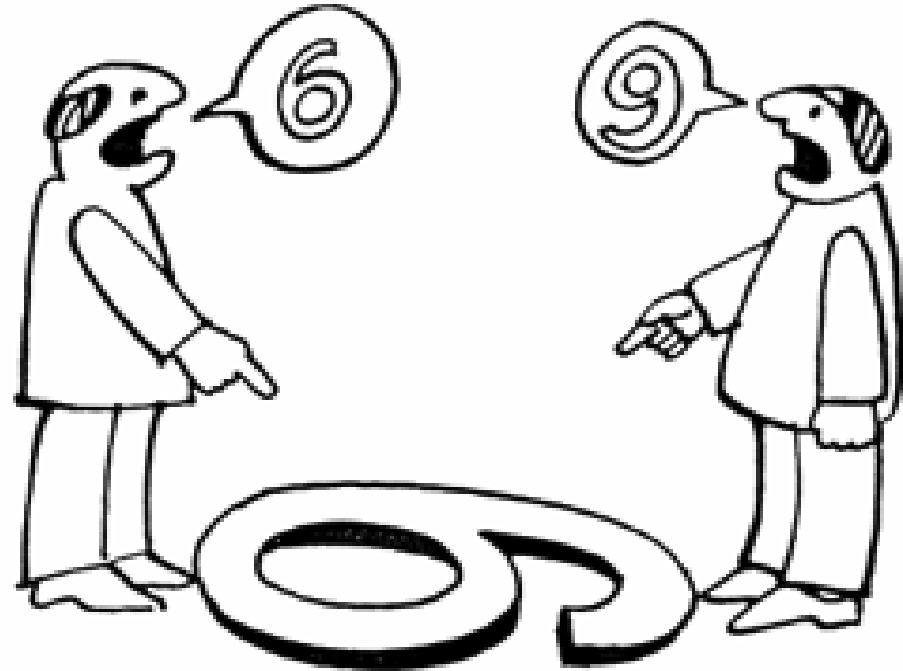
BIOBASED FEEDSTOCKS



BIOREFINERY



BIODEBASED PLASTICS: YES OR NO?

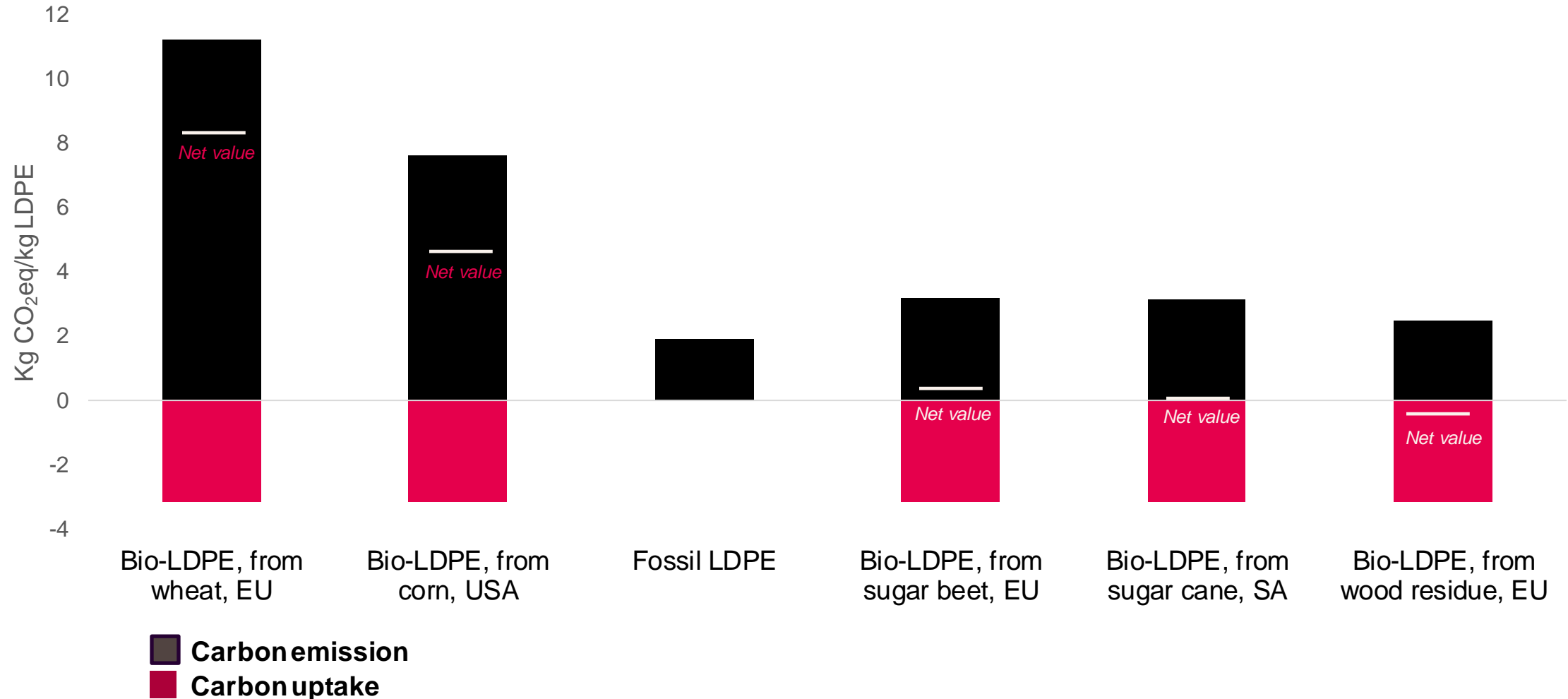


Feedstock plays a key role



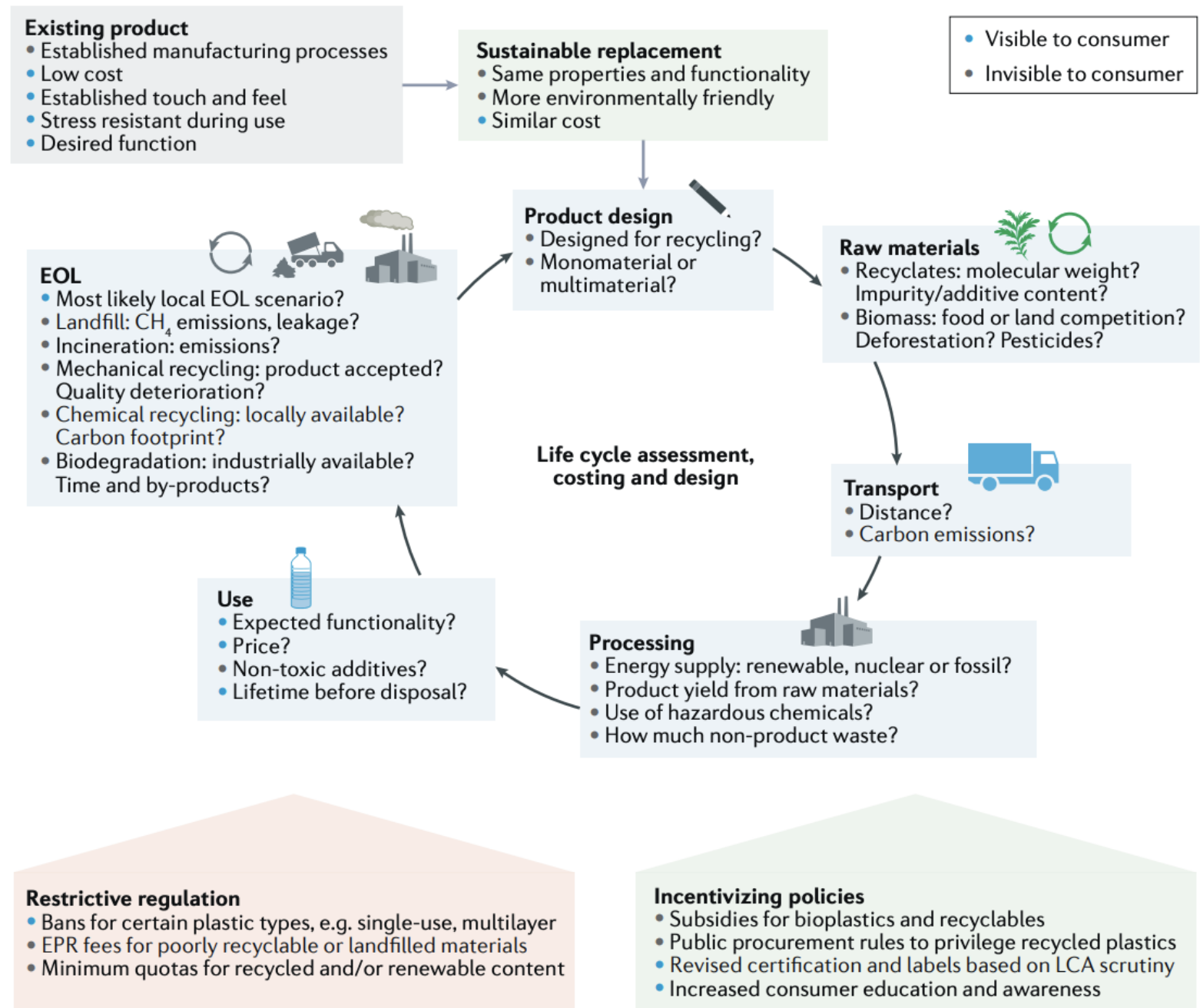
**CLIMATE
CHANGE**
kg CO₂-eq / kg LDPE

Cradle-to-gate analysis



Implementation Framework –

Switching to biobased materials



source: Rosenboom, Jan-Georg, Robert Langer, and Giovanni Traverso. "Bioplastics for a circular economy." *Nature Reviews Materials* 7.2 (2022): 117-137.



Key takeaways

What are the 3 key things about LCA to walk away with?

1 LCA is your sustainability compass.

It's not about the number itself. LCAs can show you the right way forward in your sustainability journey .

2 Strive for progress over perfection.

Sustainability is a journey and an extremely complicated matter. Be aware about what you don't know, focus on transforming the hotspots of your value chain and let LCAs monitor your actions.

3 Go beyond the carbon tunnel vision.

By adopting a multi-indicator approach, LCAs can thoroughly show the impact of your business on the environment, pointing you towards the right decisions and stopping you from just shifting the burden.

What are the 3 key things about biobased solutions to walk away with?

1 Biobased does not necessarily mean more sustainable

Biobased products can clearly be an improvement over petroleum products with respect to climate change; however, not all bio-based resources generate the same environmental outcome (e.g. 1st vs. 2nd gen feedstock).

2 Understand & capture ecosystem trade-offs

One metric ton (t) of biobased polymers can save, relative to conventional alternative, 55 ± 34 gigajoules of primary energy and 3 ± 1 t carbon dioxide equivalents of greenhouse gases. However, biobased materials may increase eutrophication by 5 ± 7 kilograms (kg) phosphate equivalents/t and stratospheric ozone depletion by 1.9 ± 1.8 kg nitrous oxide equivalents/t.

3 Define an implementation framework

Transitioning to sustainable plastic replacements requires companies to balance functionality, cost, and environmental considerations, while complying with regulations and certification rules.



Quantis

Thank you

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