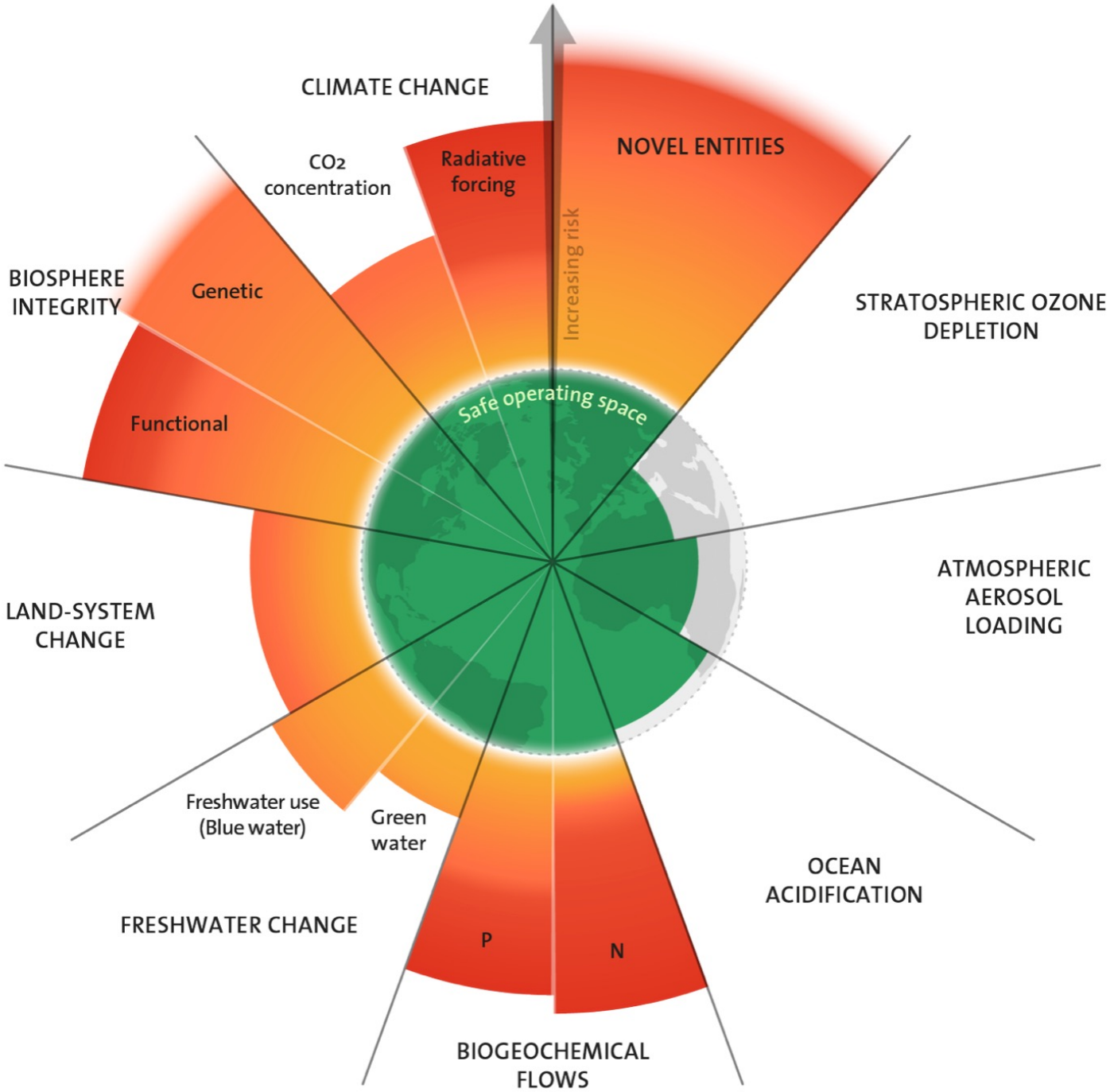
DESIGNING A SUSTAINABLE OPERA PRODUCTION

The Project Butterfly

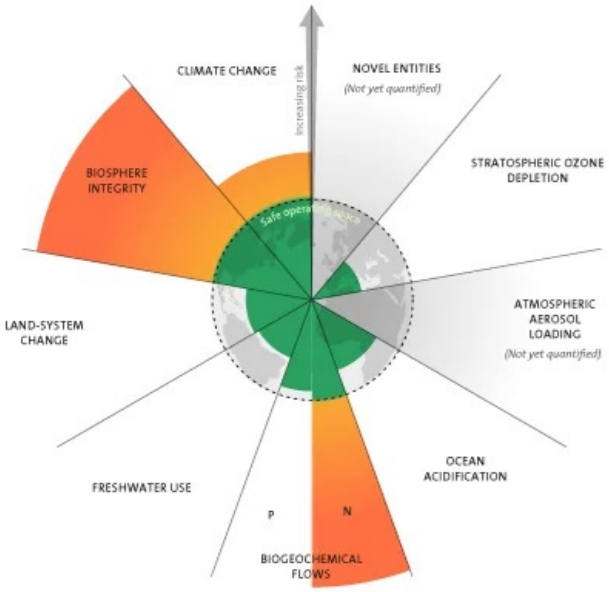
7th of May 2024

The 9 planetary boundaries



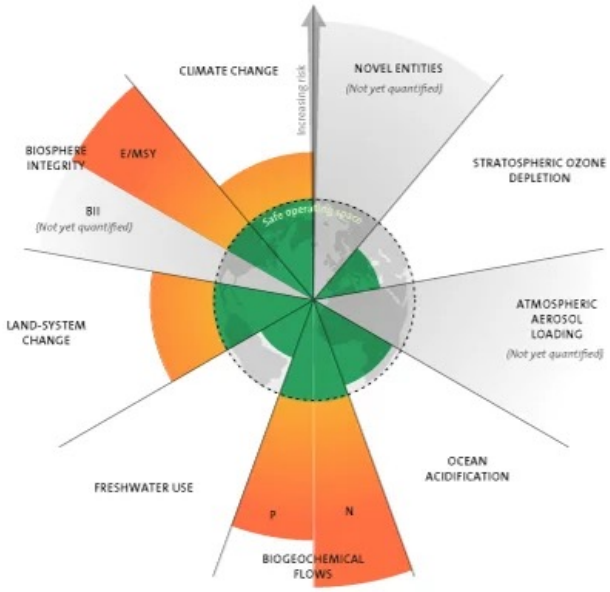
Credit: Stockholm Resilience Centre, based on analysis in Persson et al 2022 and Steffen et al 2015

2009



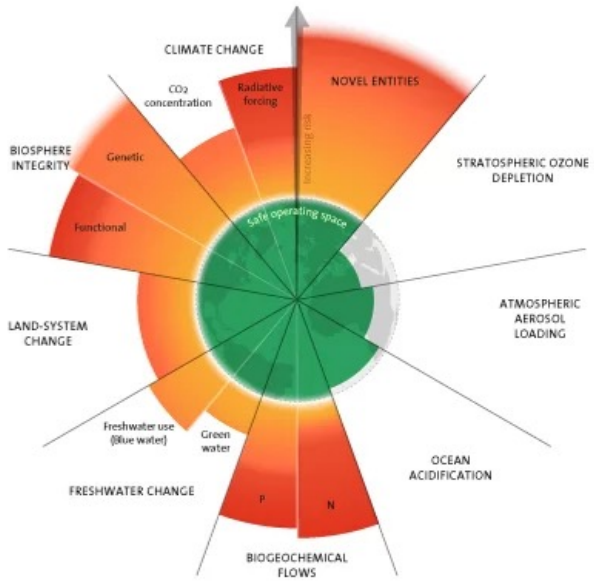
3 boundaries crossed

2015



4 boundaries crossed

2023



6 boundaries crossed

Source : Stockholm Resilience Center Licence CC BY-NC-ND 3.0

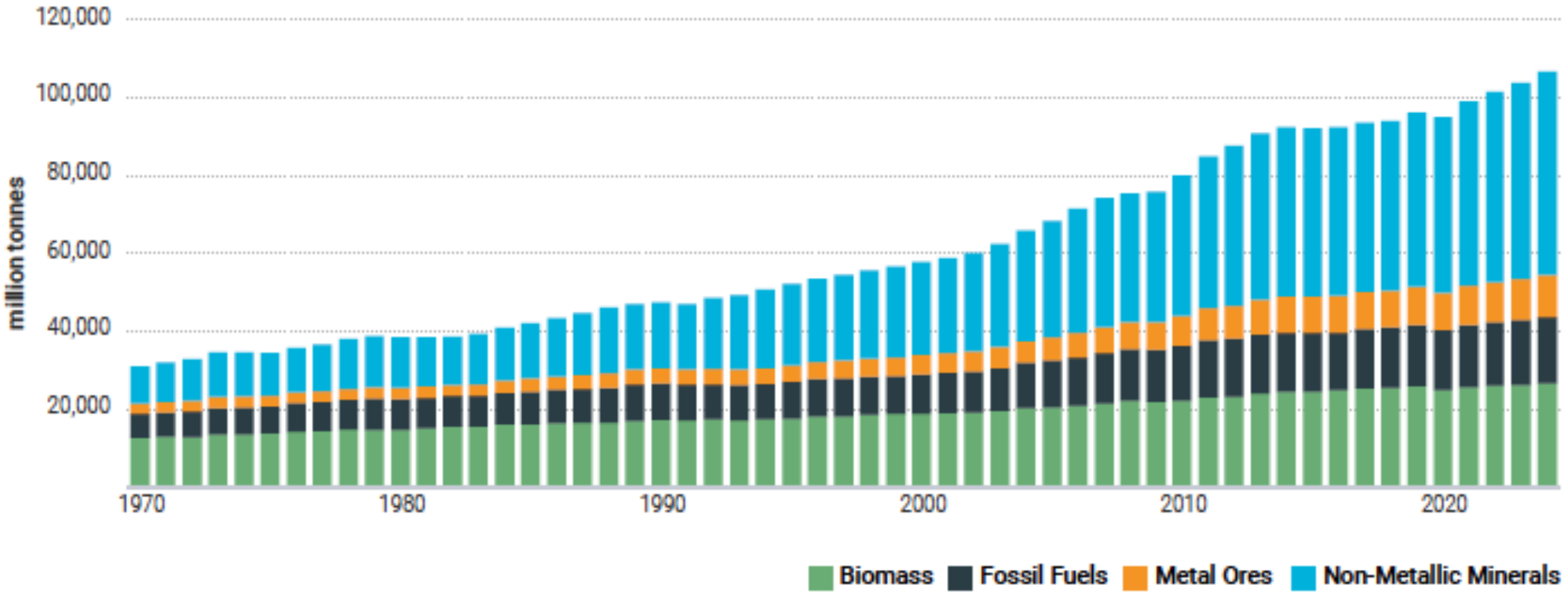
See also :
https://global-tipping-points.org
https://exnaturae.ong/tour-dhorizon-des-limites-planetaires/ for interactions between planetary boundaries (in French)


climate change
freshwater use
nitrogen and phosphorus cycles
ocean acidification
chemical pollution
atmospheric aerosol loading
ozone depletion
biodiversity loss
land use change
ENVIRONMENTAL CEILING
the safe and just space for humanity
SOCIAL FOUNDATION
water
income
education
resilience
voice
jobs
energy
social equity
gender equality
health
food
INCLUSIVE AND SUSTAINABLE ECONOMIC DEVELOPMENT

Circular Economy

According to the 2024 edition of the UN's *Global Resource Outlook*, trends in the increased use of global resources have continued or accelerated since 2019, and resource extraction could increase by 60% by 2060 compared to 2020 levels.

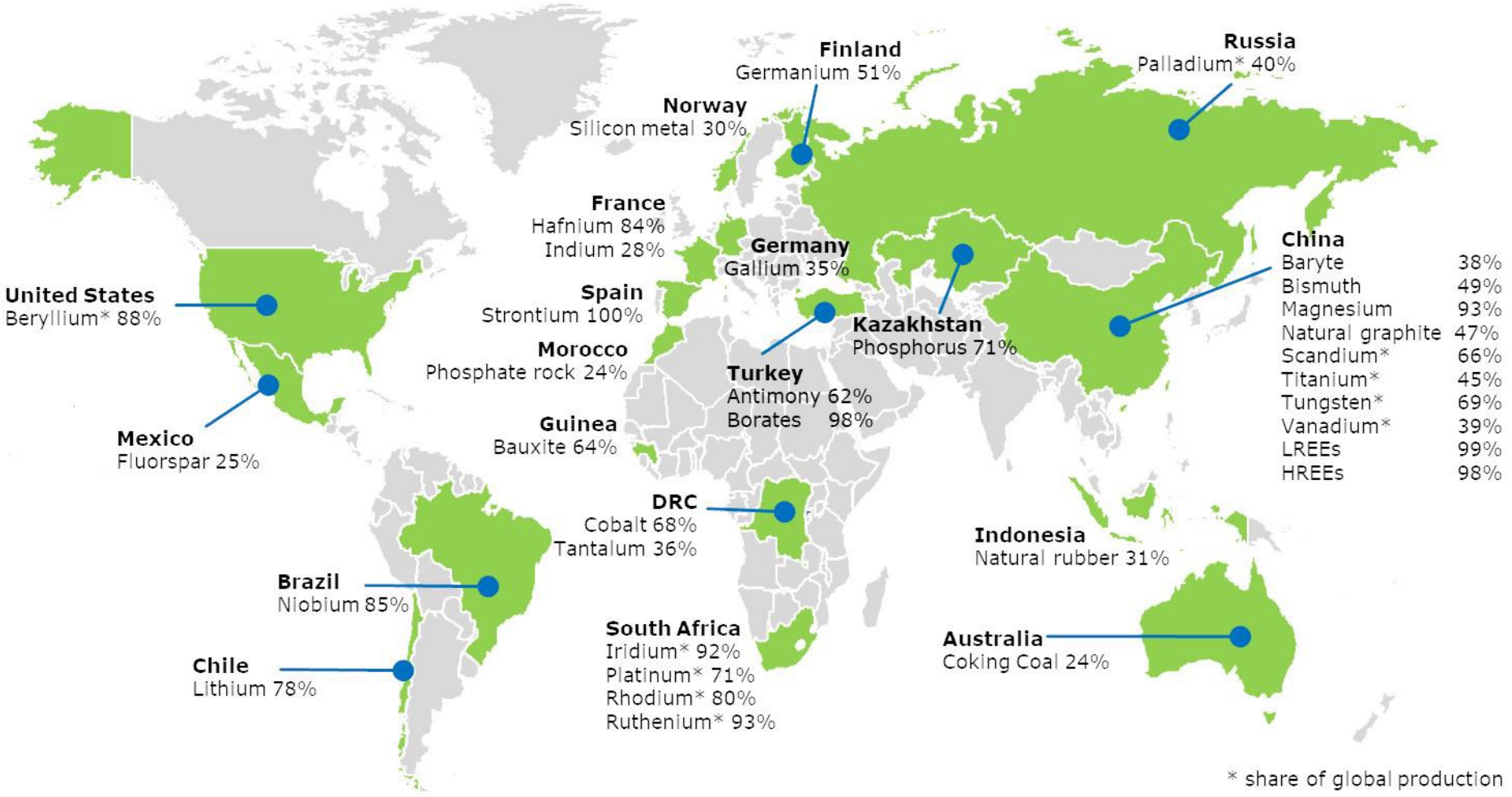
Figure 2.9: Global material extraction, four main material categories, 1970 – 2024, million tonnes.



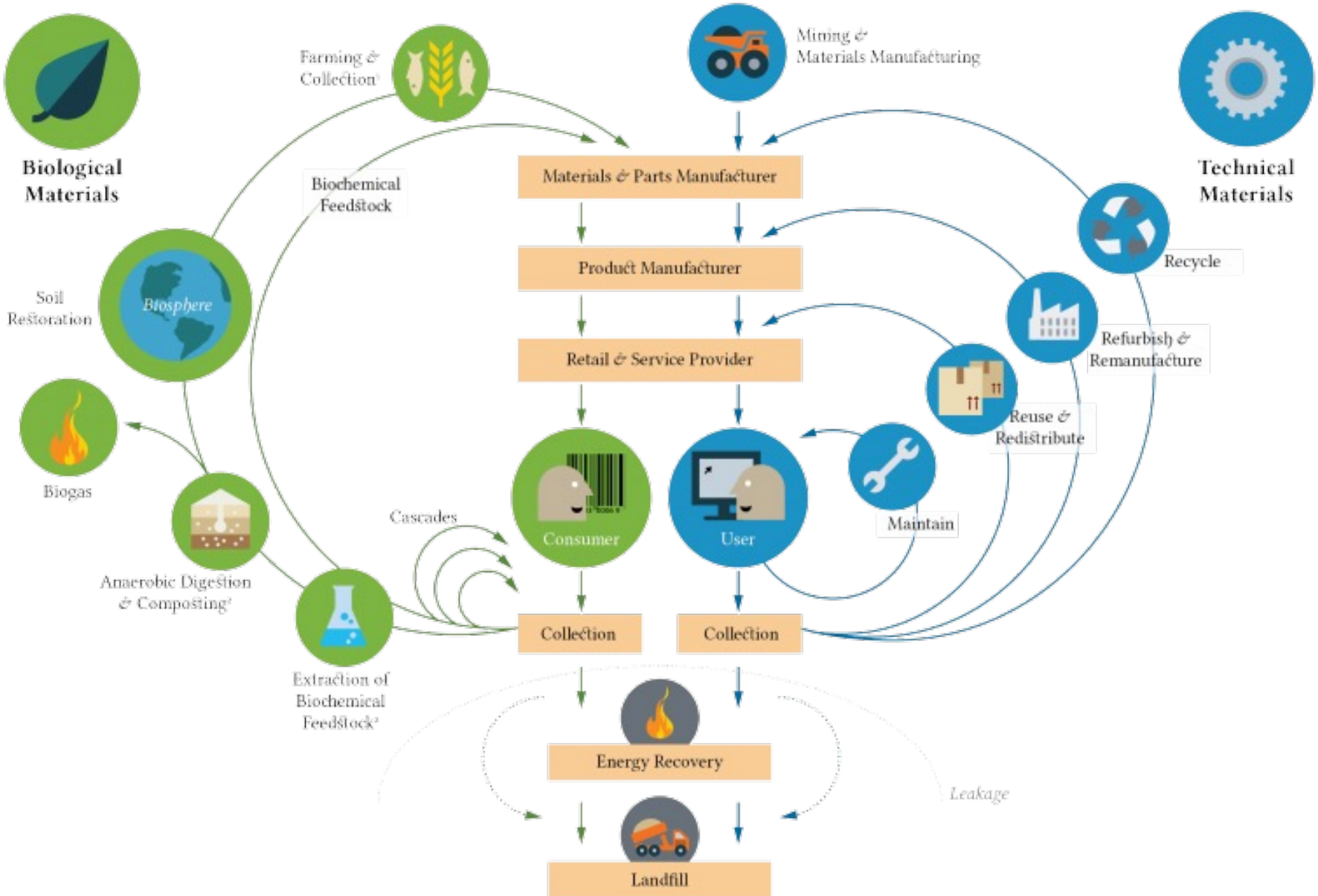
Source: Global Material Flows Database (UNEP 2023a).

: Crops, crop residues, grazed biomass, wood...
: Coal, oil, natural gas, shale, and tar sands
: Iron, aluminum, copper, and other non-ferrous metals
: Sand, gravel, and clay for construction and industrial purposes

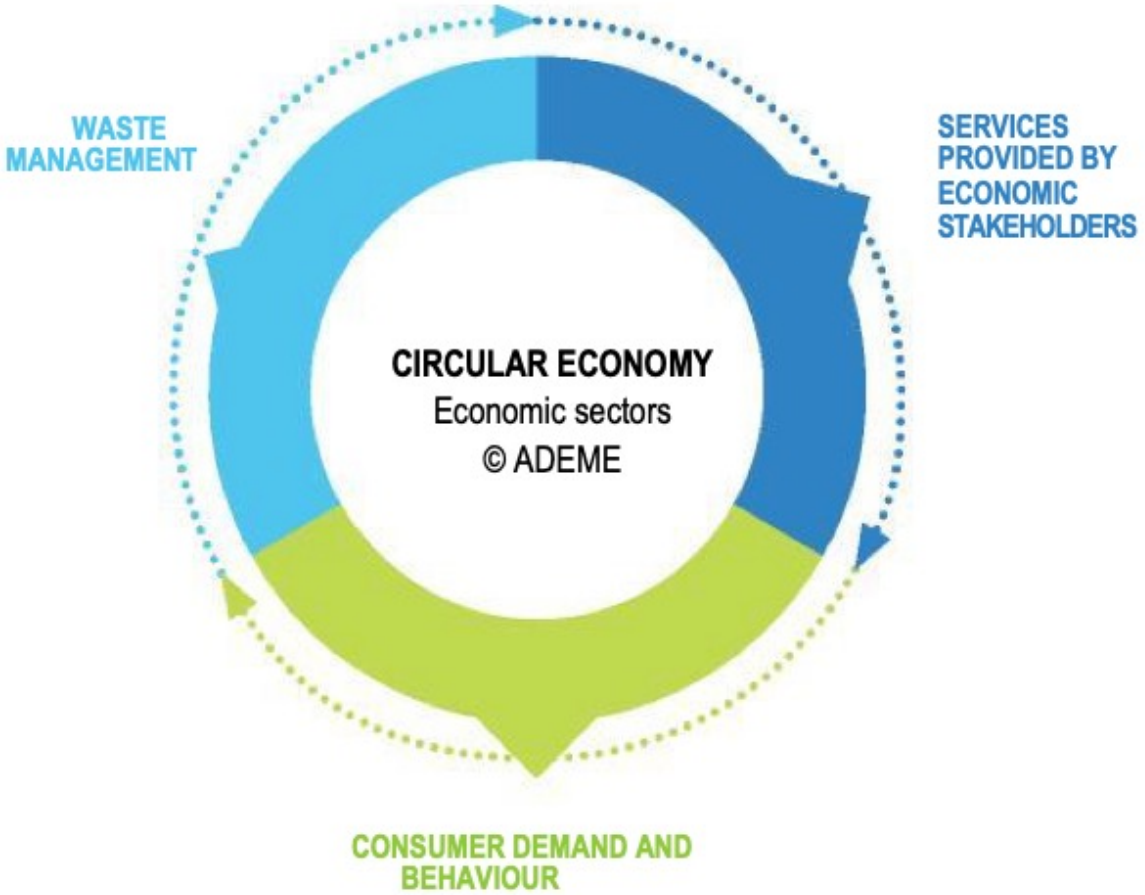
Biggest supplier countries of Critical Raw Materials to EU



Source: communication of the European Commission on the critical raw materials resilience (2020)
https://eur-lex.europa.eu/legal-content/FR/TXT/?uri=CELEX%3A52020DC0474


Biological Materials
Farming & Collection
Mining & Materials Manufacturing
Technical Materials
Biochemical Feedstock
Materials & Parts Manufacturer
Product Manufacturer
Retail & Service Provider
Recycle
Refurbish & Remanufacture
Reuse & Redistribute
Maintain
Soil Restoration
Biosphere
Biogas
Anaerobic Digestion & Composting
Cascades
Consumer
User
Collection
Collection
Extraction of Biochemical Feedstock
Energy Recovery
Leakage
Landfill

CIRCULAR ECONOMY THREE FIELDS, SEVEN PILLARS



Extraction/exploitation and sustainable purchasing

Eco-design

Industrial ecology and the region

Functional economy

Extending the duration of use

- Reusing
- Repairing
- Repurposing

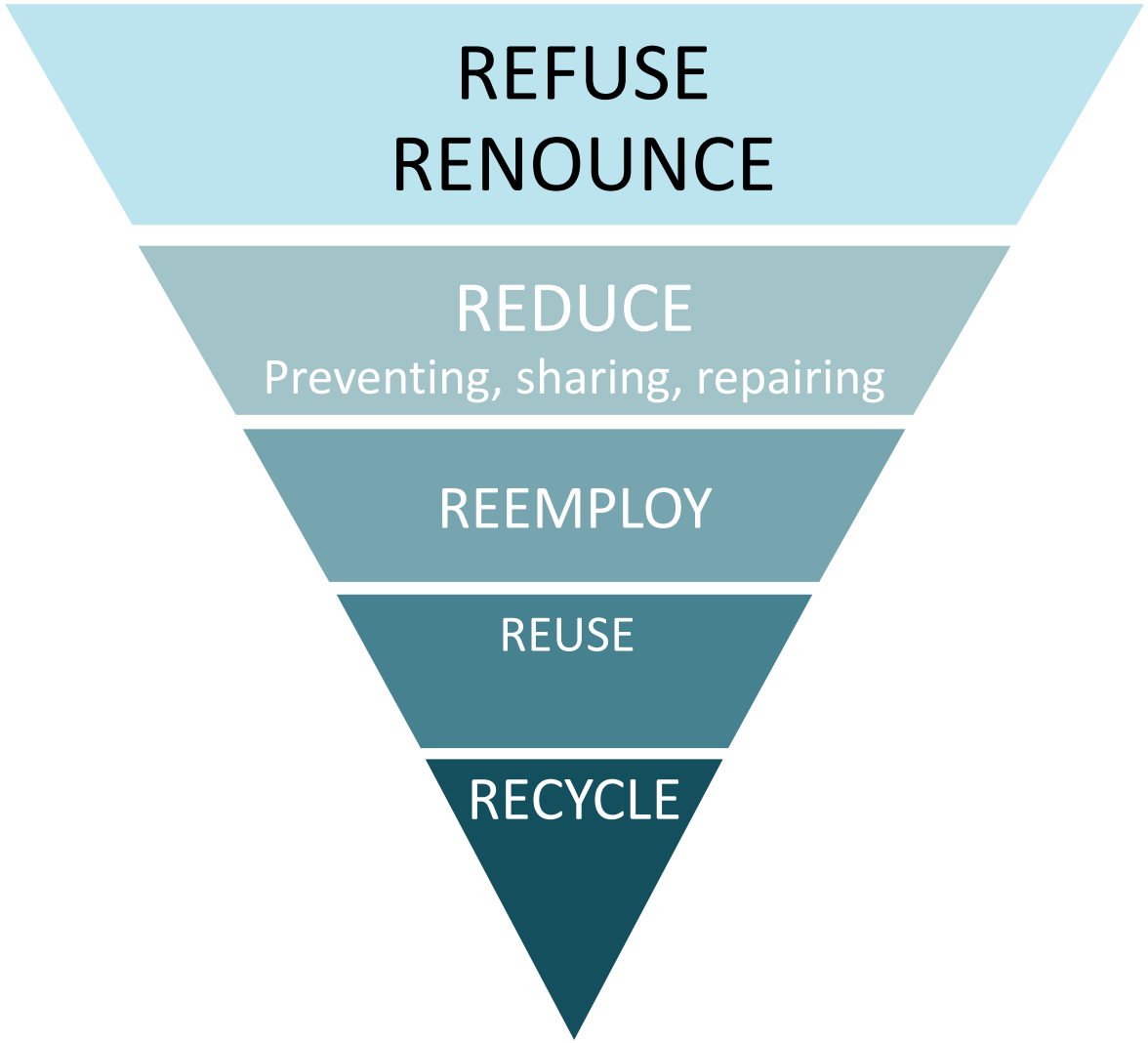
responsible consumption

- Purchasing
- Collaborative consumption
- Using

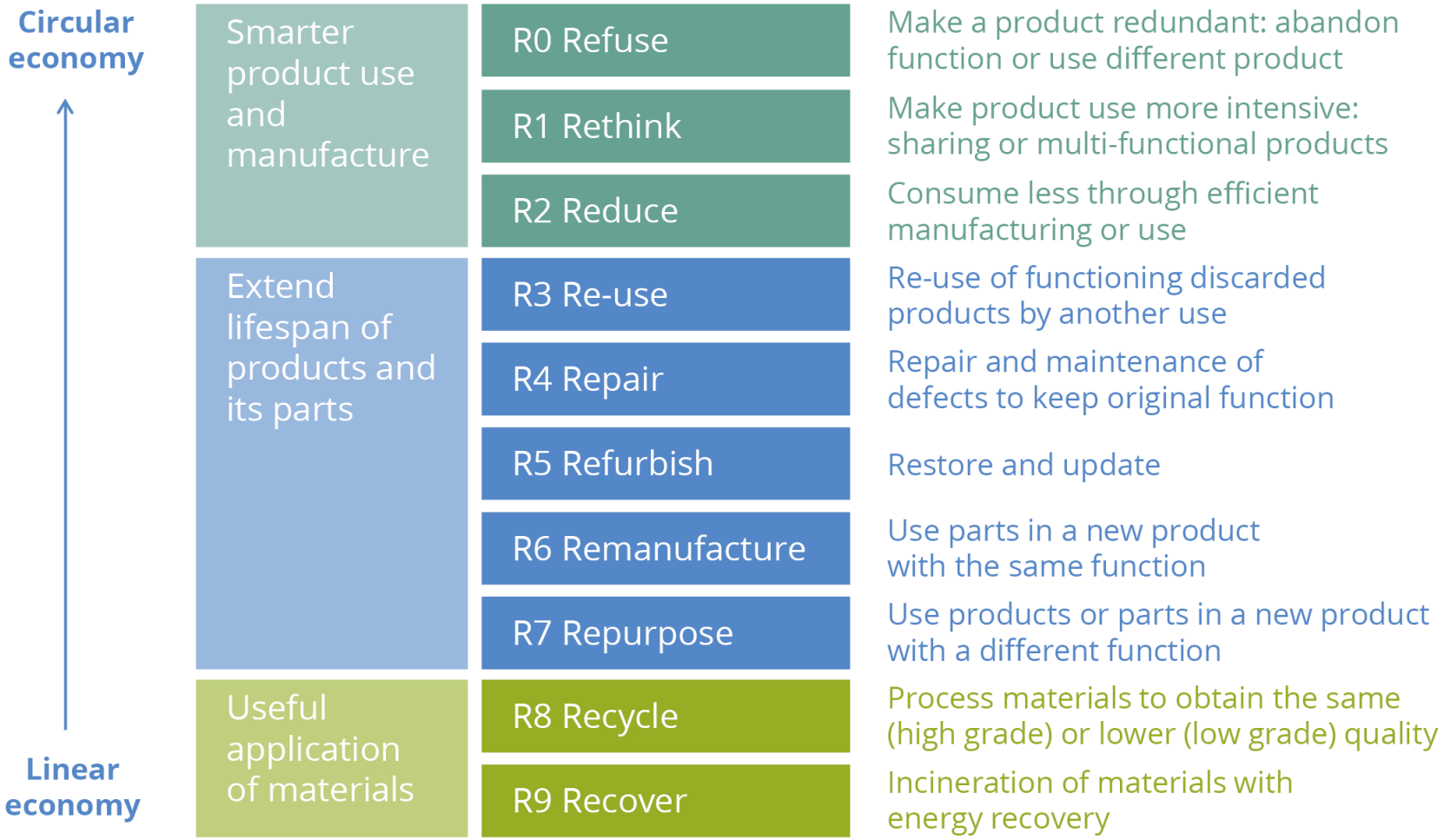
Recycling (waste and organic matter)

https://cdn.paris.fr/paris/2021/02/09/c40e13e8138b3687e2fda2ea033350e6.pdf

Waste


REFUSE
RENOUNCE
REDUCE
Preventing, sharing, repairing
REEMPLOY
REUSE
RECYCLE

Strategies in a circular economy



Source: https://pre-sustainability.com/articles/why-so-difficult-to-become-truly-circular/
after *PBL (2017). Circular economy: measuring innovation in the product chain, J.Potting, M. Hekkert, E. Worrell et al.*

Eco-design

Eco-design : a definition

Definition by ISO 14006 standard (non-official translation)

« A methodical approach that considers environmental aspects in the design and development process, aiming to reduce negative environmental impacts throughout the product or service life cycle. »

EEA Glossary

The integration of environmental aspects into the product development process, by balancing ecological and economic requirements. Eco-design considers environmental aspects at all stages of the product development process, striving for products which make the lowest possible environmental impact throughout the product life cycle.

Source: https://www.eea.europa.eu/help/glossary/eea-glossary/eco-design

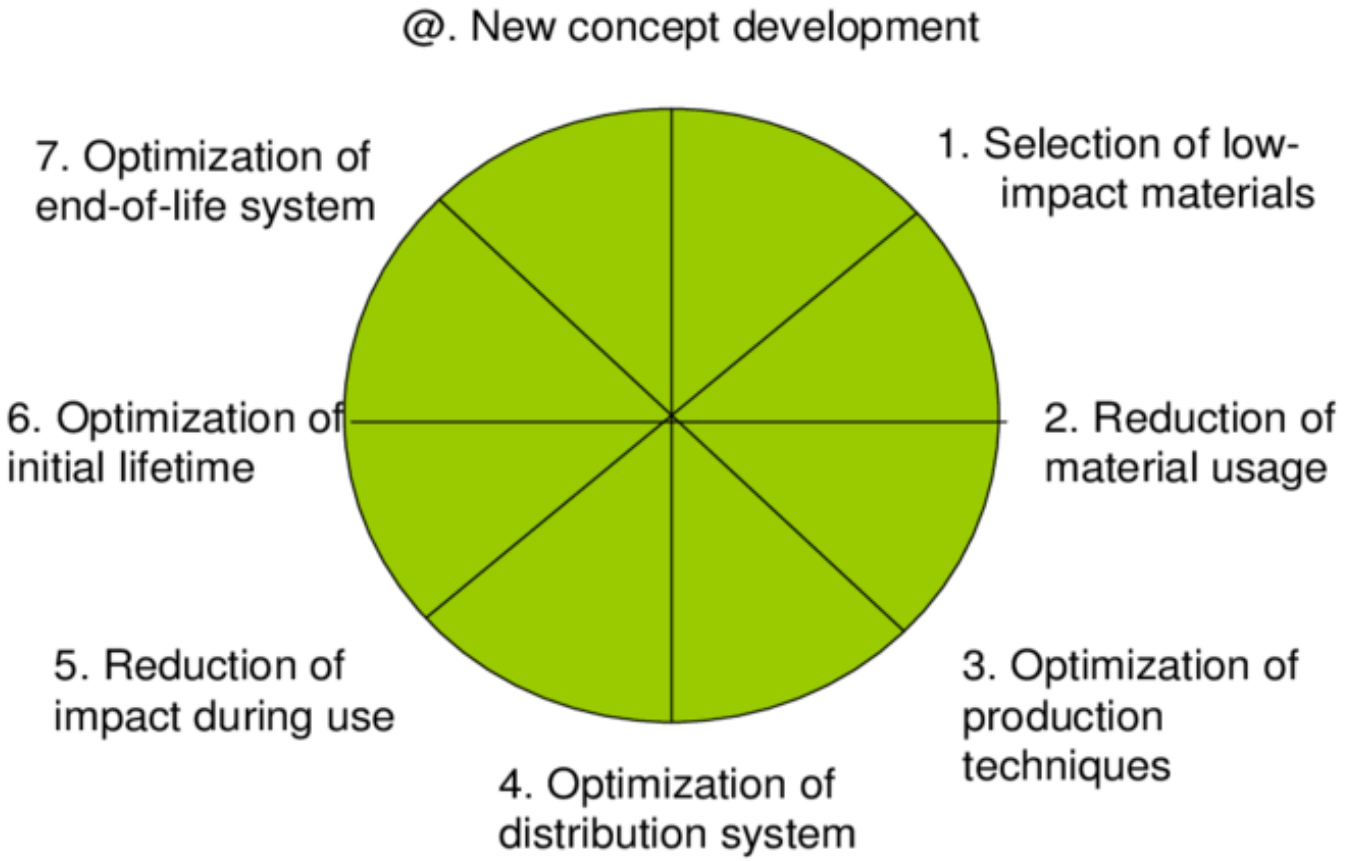
Eco-design : five principles

Eco-design is an approach :

1. which focuses on a product, a service or an organisation
2. which is multi-phases (life-cycle)
3. which is multi-criteria
4. which anticipates *and avoid* impacts transfers from one phase to another and from one criterium to another
5. which makes compromises between ecological footprint and the constraints of the organisation (because we all must do)

The life cycle of products

Roue de Brezet



Life Cycle Assessment (LCA)

A method standardized by ISO 14040 standard.

Four phases:

1. Definition of objectives and scope of the study (functional unit, boundaries, etc.).
2. Life cycle inventory (data collection, inventory of inputs and outputs).
3. Life cycle impact assessment (conversion of flows into impact categories).
4. Interpretation (study of impact profiles obtained, sensitivity analysis, completeness and consistency checks, recommendations).

16 indicators in the European PEF*

1. Climate change
2. Fine particles
3. Depletion of water resources
4. Depletion of non-renewable energy resources
5. Land use
6. Depletion of non-renewable mineral resources
7. Depletion of the ozone layer
8. Acidification
9. Ionizing radiation
10. Photochemical ozone formation
11. Terrestrial eutrophication
12. Marine eutrophication
13. Freshwater eutrophication
14. Human carcinogenic toxicity
15. Freshwater ecotoxicity
16. Human non-carcinogenic toxicity

*PEF = Product Environmental Footprint – See the PEF Category Rules Guidance (pp. 47-49).

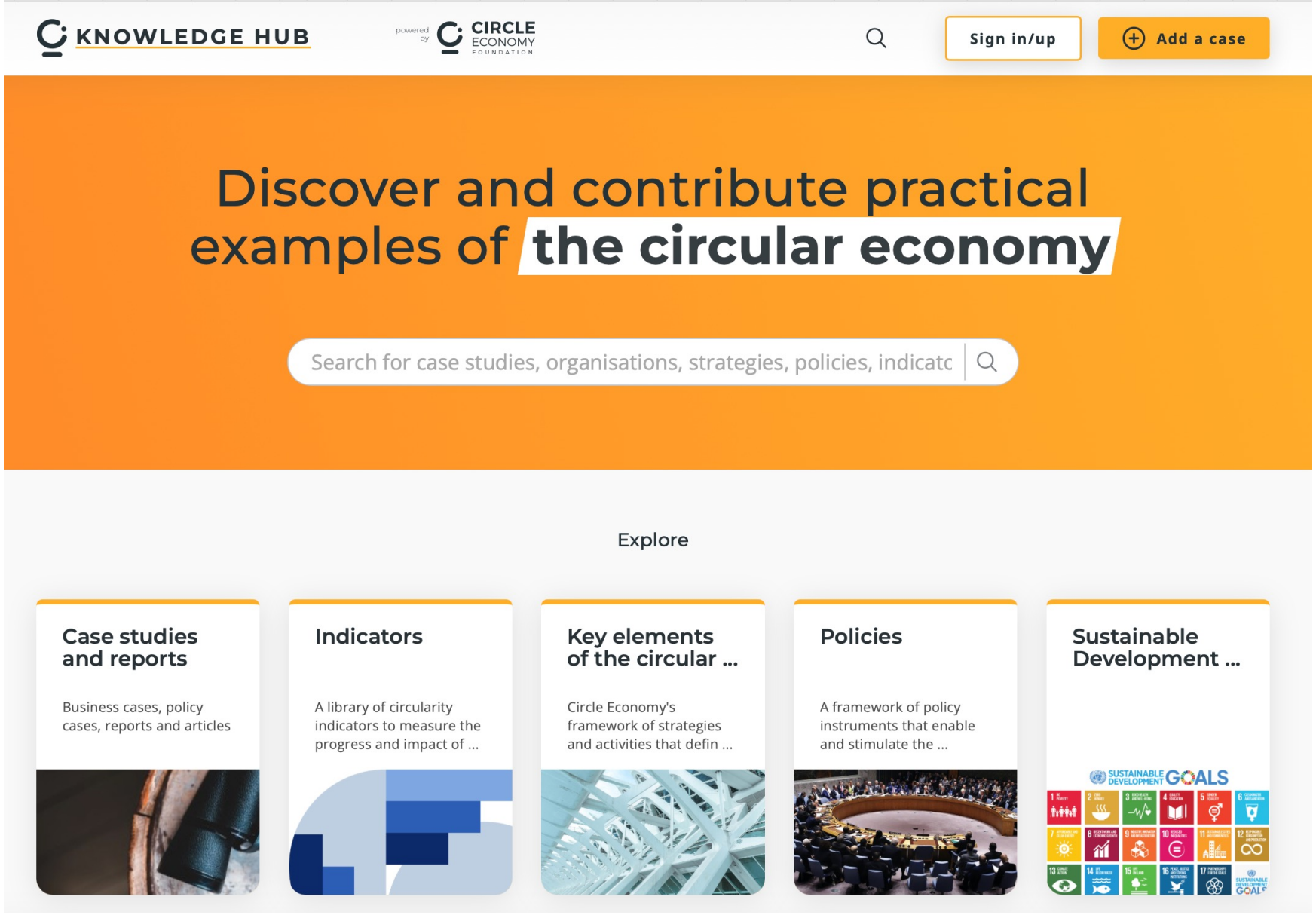
The 4 phases of a life cycle analysis:

Phase 1: Definition of objectives and scope of the study The intended application of the analysis, the targeted audience, and the desired level of precision are specified first. The functional unit (FU) is defined; it corresponds to the reference unit used to quantify the performance of the service provided by a product to the user. It includes identifying the function(s) of the product being studied, the level of performance achieved by the function(s), and the reference service life (RSL). The service life conditions the number of renewals and thus the impacts during the use phase. The study boundaries are then defined, corresponding to the life cycle stages considered, study quality criteria, and cutoff rules used to neglect elements provided they have negligible mass and impacts.

Phase 2: Life cycle inventory This involves the balance of all incoming and outgoing flows of the system under study. The data necessary for calculations are collected and quantified in appropriate units. They are then normalized to the reference flow, allowing them to correspond to the FU.

Phase 3: Life cycle impact assessment It allows for the transition from identified and quantified flows to environmental indicators. These indicators measure the environmental impacts caused by the product through characterization of emission flows and resource consumption. This step is performed automatically in life cycle assessment software.

Phase 4: Interpretation The obtained results are interpreted to draw conclusions from the study or to improve parts of it. Analysis of impact profiles is carried out, as well as sensitivity analysis, completeness and consistency checks of the study. The life cycle assessment practitioner then guides their client to suggest environmental actions to prioritize.



The Knowledge Hub of the Circular Economy Foundation : https://knowledge-hub.circle-economy.com

Other source: https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy

“Eco-designing” sets: 3 examples of initiatives

Standardisation of sets structural elements

A project led by Le Collectif de 17h25

The starting point

When analysed at the level of an opera house, the standardization of sets structural elements is perceived by stakeholders as an effective lever for reducing resource consumption through the reuse of the same structures from one production to another, assembly and disassembly times, the volume of set storage, the financial cost of sets.

In the case of opera co-productions, whose model has become widespread for financial reasons, the benefits identified above are shared by co-producers. In this case, standardisation also reduces the volume of set transportation.

Implemented at the industry level, this standardisation of sets structural elements would produce much bigger effects.

The idea

The challenge is therefore to determine the largest possible common foundation of standard elements that can be used in creating a set *without compromising the artistic design*. As a consequence, the project specifically explores the practices of set construction workshops when translating an artistic vision into concrete sets.

Reemployment of sets elements

The case of Bordeaux Opera and Limoges Opera

For the creation of sets, Bordeaux and Limoges already explore singular ways of experimentation. Whatever reasons drive them, the fact remains that each team tests new ways of doing things, adjusts them, analyses their limitations, and moves forward.

In Bordeaux, they are developing a "zero-purchase" approach, seeking new methods of providing costumes, accessories, and set elements, through exchanges or other forms of partnership.

In Limoges, they are exploring new modes of collaboration with set designers and stage directors, notably commissioning sets serving both opera and theatre productions (with some minor adjustments or transformations).

Prioritizing reuse over eco-design has also led them to address circularity issues more from a creation perspective (in a risk and opportunity analysis) than from a technical one. Through their specific approaches and their shared project, the two teams acknowledge that circularity issues are transforming the creative professions.

Reemployment of sets elements

The Green Season – the case of Opera North

"Building on Opera North's previous sustainable productions, such as Handel's *Alcina* in 2022, and the staging of *Not Such Quiet Girls* in the Howard Assembly Room in 2018, the Autumn season of 2023 was our first sustainable season of three productions.

All three **Green Season** productions used shared scenic elements to create three interlinked yet distinctive designs, enabling Opera North to reduce its use of materials and its carbon footprint. All sets, props and costumes in the season were sourced from previous productions or purchased second-hand.

In addition, more matinee performances were introduced in order to make it easier for audiences to travel on public transport."

Source : https://www.operanorth.co.uk/about-us/sustainability/

The Project Butterfly

The Project Butterfly

The Project Butterfly will go through the entire process of opera co-creation and co-production of a sustainable opera – from the opera commission to the public attendance and the sharing of the sustainable practices experimented, with a particular focus on engaging young audiences throughout the whole process.

[...]

The final production will strongly rely on advanced digital technologies and showcase the pathways for a more sustainable opera production.

THANK YOU !

Thierry Leonardi

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