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Resource Efficiency and Circular Economy in the Indian Context

Foundations of RE and CE

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Learning objective

After completion of, participants will be able to

- explain the rationale of RE and CE;
- summarize the principles of lifecycle thinking;
- differentiate conceptual implications of RE and CE; and
- contextualise RE and CE to international debates.

Introduction: warm-up

Exercise 2.1: Open brainstorming

- Please provide a brief definition for a) Resource Efficiency (RE) and b) Circular Economy (CE).
- Draw a small picture reflecting RE and CE according to your understanding.

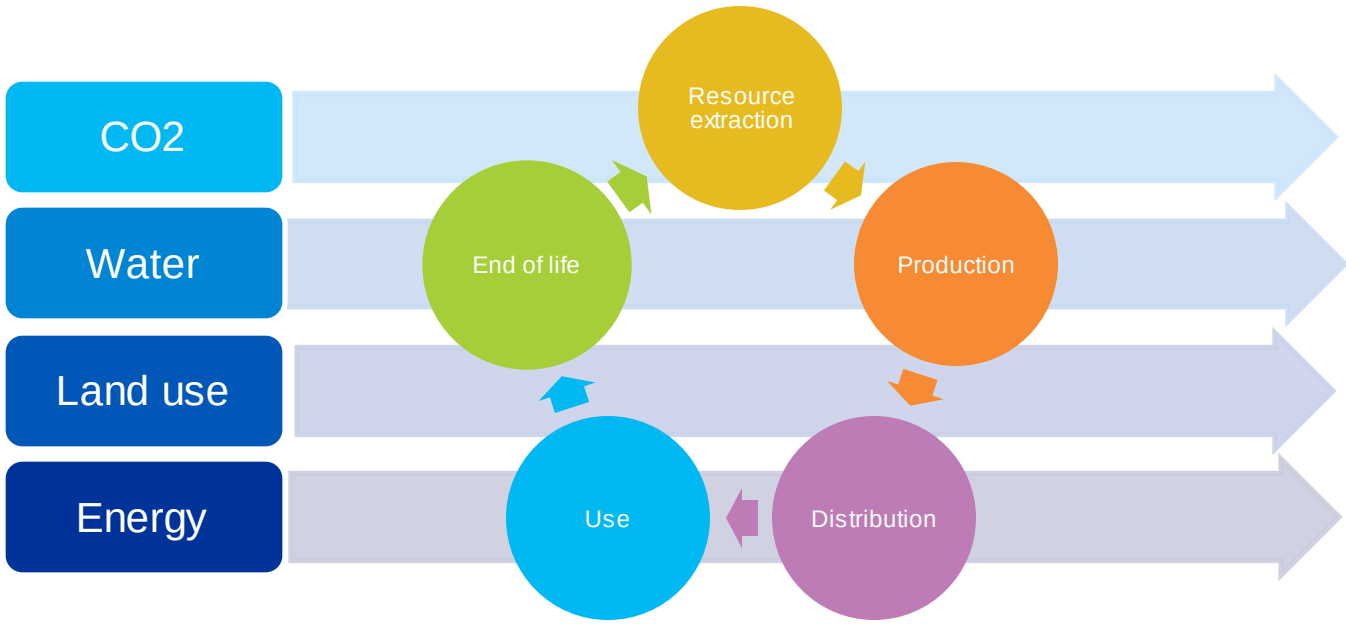
Estimated time requirement: 10 min

Introduction to lifecycle thinking

Introduction to lifecycle thinking

Impact categories

Lifecycle stages



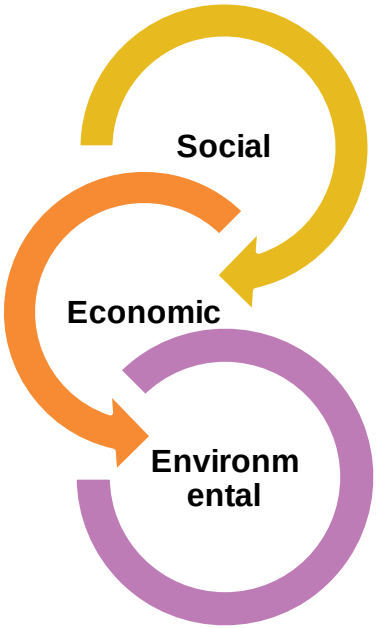
Introduction to lifecycle thinking

Application of lifecycle thinking

- Reduce a product's resource use and its impacts on the environment
- Improve its socio-economic performance through its entire lifecycle
- Analyse the nexus of economic, social and environmental impacts within an organization, factory, brand etc.

Introduction to lifecycle thinking

- Going beyond the traditional focus on production and manufacturing
- Involves all impacts of a product/ service over its entire lifecycle
- In each lifecycle stage there is a potential to increase resource efficiency (RE) and improve product performance
- Basis for Lifecycle Assessments (LCAs) and Circular Economy (CE)



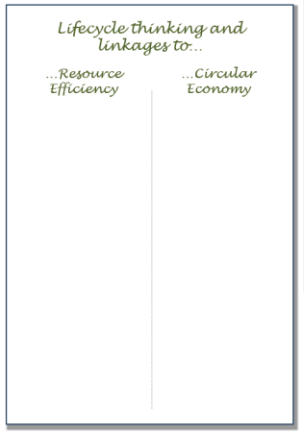
More about lifecycle thinking and lifecycle analysis in Module 4!

Introduction: warm-up

Exercise 2.2: Brainstorming on flipchart

- Form 4 groups and discuss the following questions:
  - How does lifecycle thinking connect to the concepts of RE and CE?
  - How do the concepts overlap, and how are they different from one another?
  - Can you think of practical, real-life examples on RE and CE?
- Document your discussions on a the prepared flipchart.

Estimated time requirement: 10 min



Introduction to resource efficiency and circular economy

- At its core, resource efficiency (RE) is a simple **input-output** measure
- RE seeks to achieve „more with less“ by either
  - minimising the required input at constant output; or
  - maximising the desired output at constant input.

Which element do we seek to optimise?

$$\frac{\text{Required input}}{\text{Desired output}}$$

$$\frac{\text{10 litres of gasoline}}{\text{100 km travelled}}$$ *Liters used per distance travelled?*

$$\frac{\text{1 km travelled}}{\text{1 litre of gasoline}}$$ *Distance travelled per liters used?*

Introduction to resource efficiency and circular economy

- As per the Indian RE strategy, resource efficiency or resource productivity is the **ratio between a given result and the natural resources required** for it
- Thus, RE it is not an end in itself but rather a **means of optimisation** to achieve a given goal
- Increasing RE offers numerous benefits:

Economic
- Monetary savings
- Reduced price spikes
- Improved competitiveness
- Edge in export market

Social
- Reduction of displacement
- Avoidance of social & political conflicts
- Long-term access to resources
- Job creation

Environmental
- Mitigation of ecological degradation
- Energy savings
- Reduction of GHG emissions

Introduction to resource efficiency and circular economy

Introduction to resource efficiency and circular economy

Circular Economy: one concept, many definitions

So far, large parts of the environmental movement have mainly been concerned with restricting our actions, reducing, abandoning and describing a negative ecological footprint. **But why be less bad when we can be good?** […] We should go fundamentally new ways: **Products and services are thought from beginning to (new) beginning, from cradle to cradle.**

- Cradle to Cradle NGO

A sustainable policy of conserving natural resources requires the creation of closed material cycles. **Modern waste policy is an important part of it.** It makes sure that waste is reused or recycled as effciently as possible.

- Federal Environmental Protection Agency, Germany

Looking beyond the current take-make-waste extractive industrial model, **a circular economy aims to redefine growth**, focusing on positive society-wide benefits. It entails **gradually decoupling economic activity from the consumption of finite resources, and designing waste out of the system**. Underpinned by a transition to renewable energy sources, the circular model builds economic, natural, and social capital.

- Ellen MacArthur Foundation

Introduction to resource efficiency and circular economy

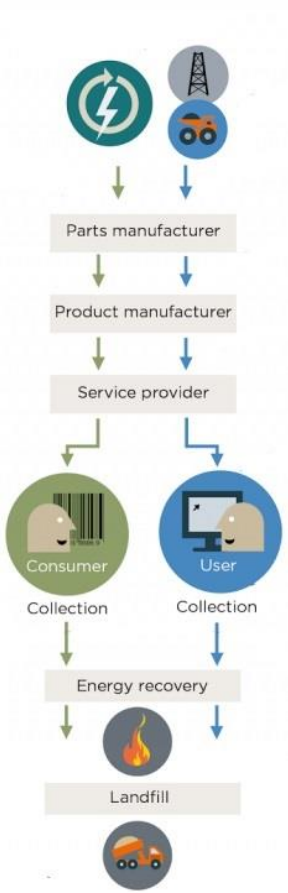
Circular Economy definition in India

"A circular economy is a regenerative system in which resource input and waste, emission and energy leakages are minimized by reducing, closing and narrowing material and energy loops. This is achieved through long-lasting and environmentally sensitive design, requiring lean maintenance and promoting repair, refurbishing, reuse, remanufacturing and recycling."

- RE & CE Status Paper, India

Introduction to resource efficiency and circular economy

- The circular economy is often contrasted by today's **linear economy** which operates on a take-make-dispose basis and follows a cradle-to-grave logic
- The linear economy is characterised by
  - high requirement for raw materials;
  - high consumption rate of products; and
  - high generation of waste (by-)products.



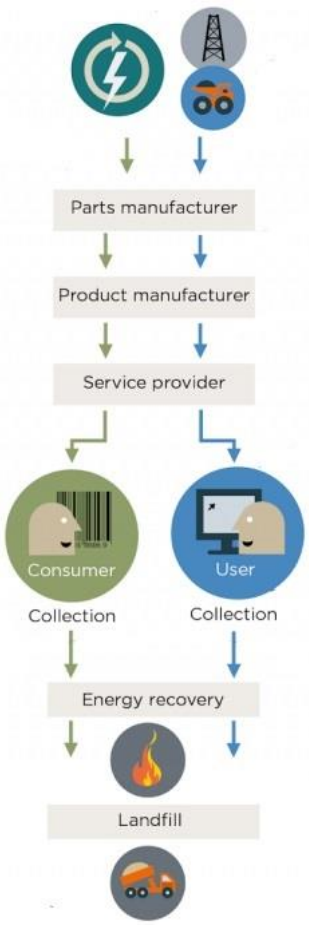
Picture source: https://www.ellenmacarthurfoundation.org/circular-economy/concept/infographic (adapted)

Introduction to resource efficiency and circular economy

The transition to a circular economy requires a paradigm shift across the entire production and consumption system.

Linear	Circular
Raw materials & waste	Raw materials only
Competition	Collaboration
Individuals	Ecosystem
Do less bad	Do good and positive
Added value	Shared value
Standardised production	Local and adapted production
Downcycling	Upcycling

Principles of circularity



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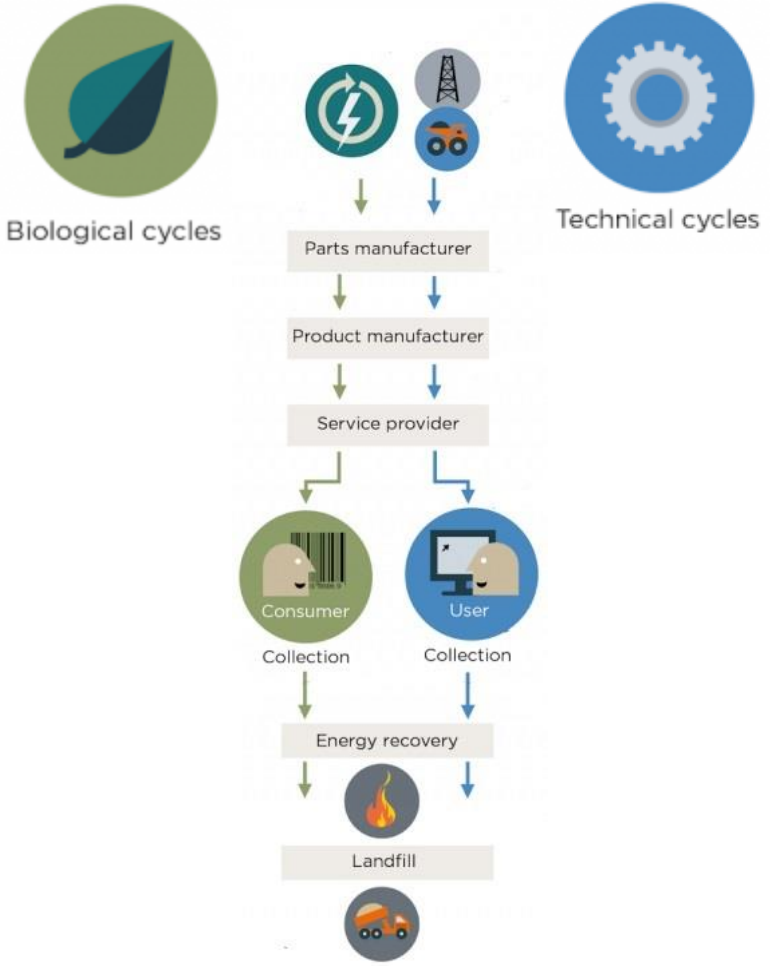
Principles of circularity



Picture source: https://www.ellenmacarthurfoundation.org/circular-economy/concept/infographic (adapted)

Principles of circularity

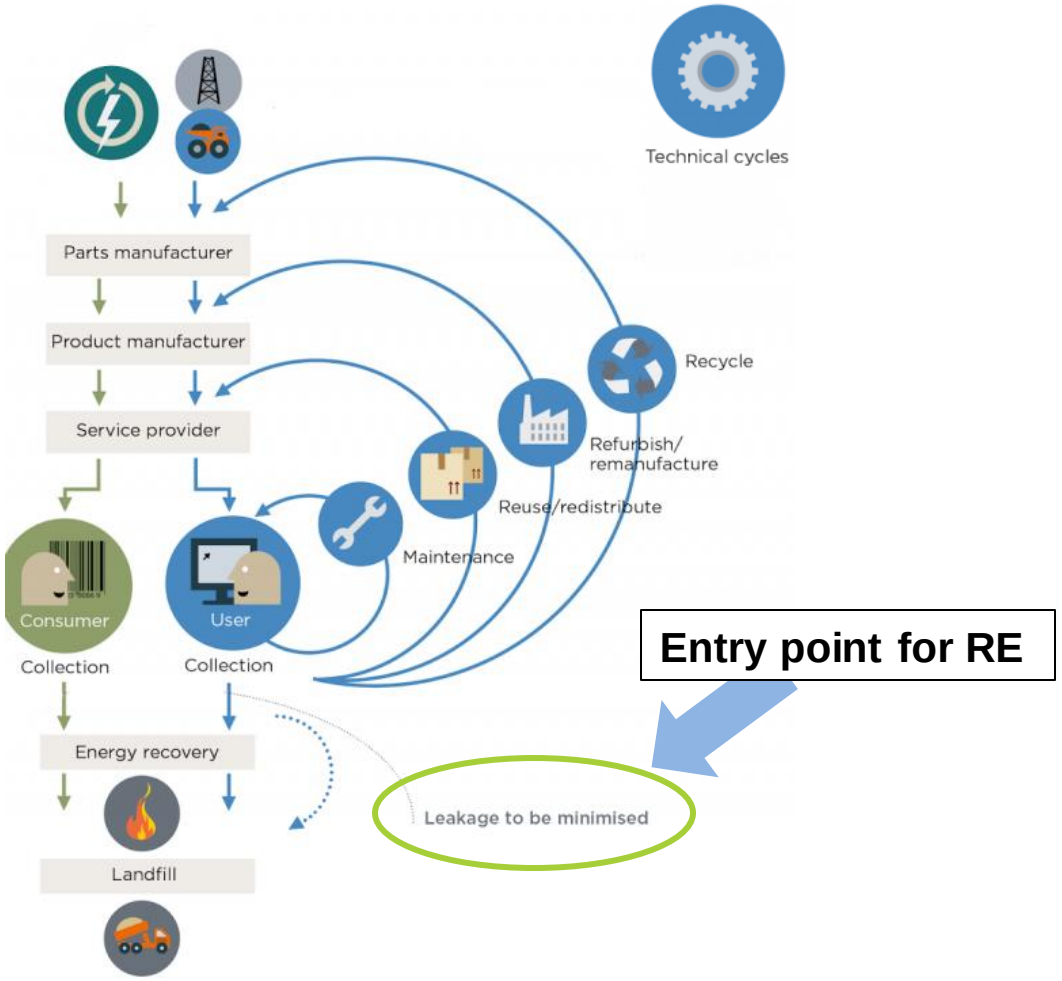
Maintenance:
Keeping a product in good condition without changing the user

Reuse/redistribute:
Reintroduction of a product on the market (with minimal maintenance)

Refurbish:
Returning a product to good working condition

Remanufacture:
Disassembly and recovery at the component level

Recycling:
Material recovery



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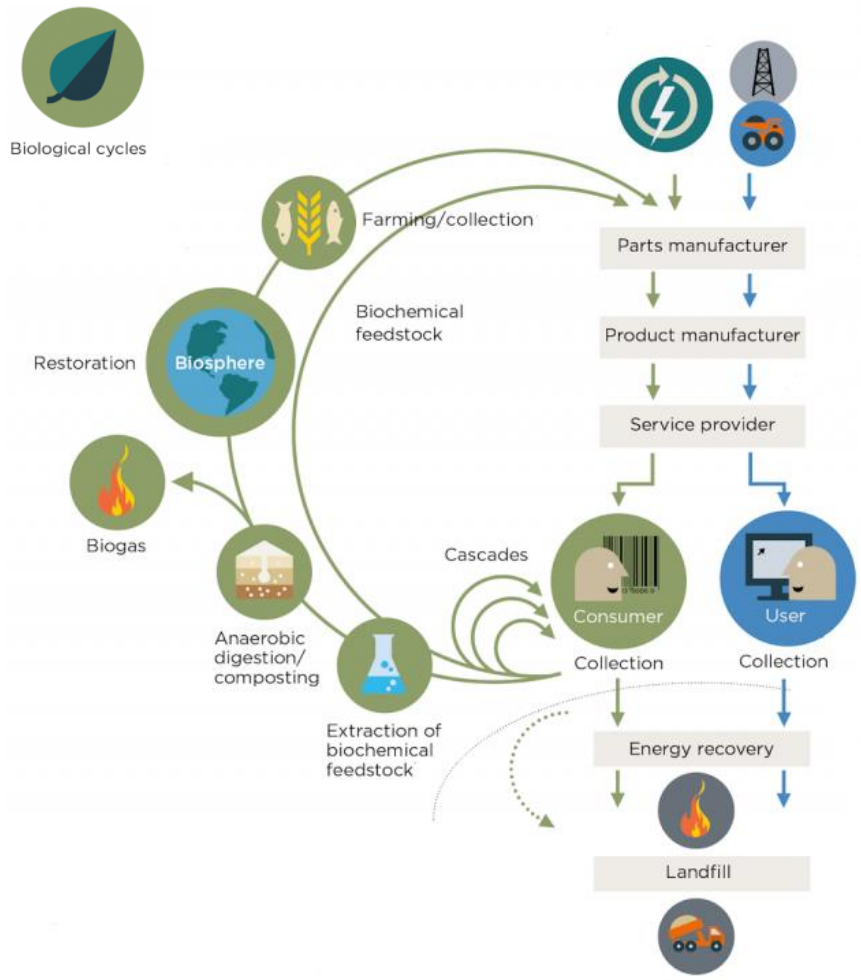
Principles of circularity



Cascading:
Putting materials/components into different use after end-of-life across different value streams

Biochemical feedstock:
Biological components that can be returned to the biosphere through various processes:

- Biomass conversion
- Anaerobic digestion
- Composting

Restoration:
Replenish soil by making materials available to plants and other organisms

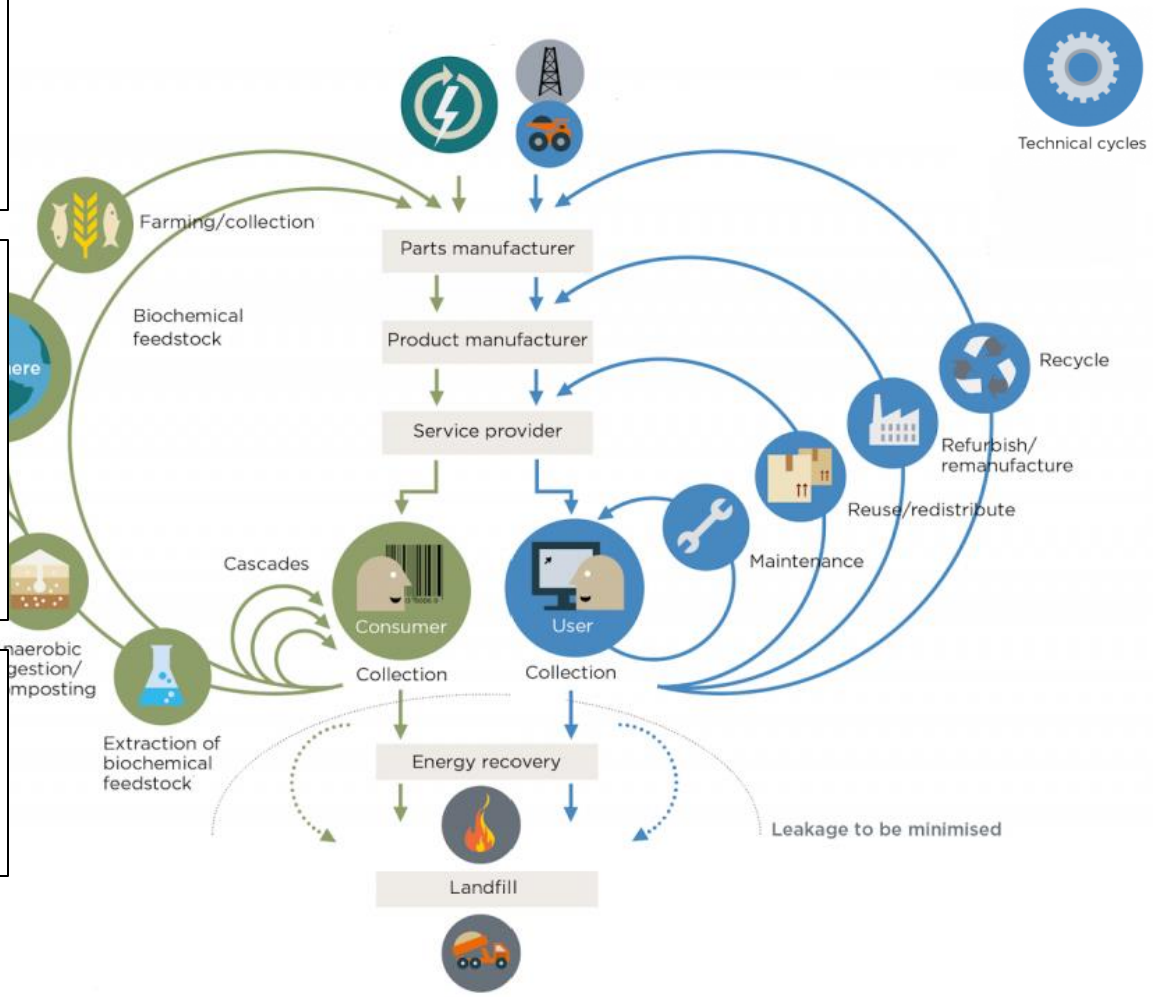
Picture source: https://www.ellenmacarthurfoundation.org/circular-economy/concept/infographic (adapted)

Principles of circularity

Principle 1
Preserve & enhance natural capital by controlling finite stocks and balancing renewable flows

Principle 2
Optimise resource yields by circulating products, components, and materials at their highest utility at all times in both, technical and biological cycles.

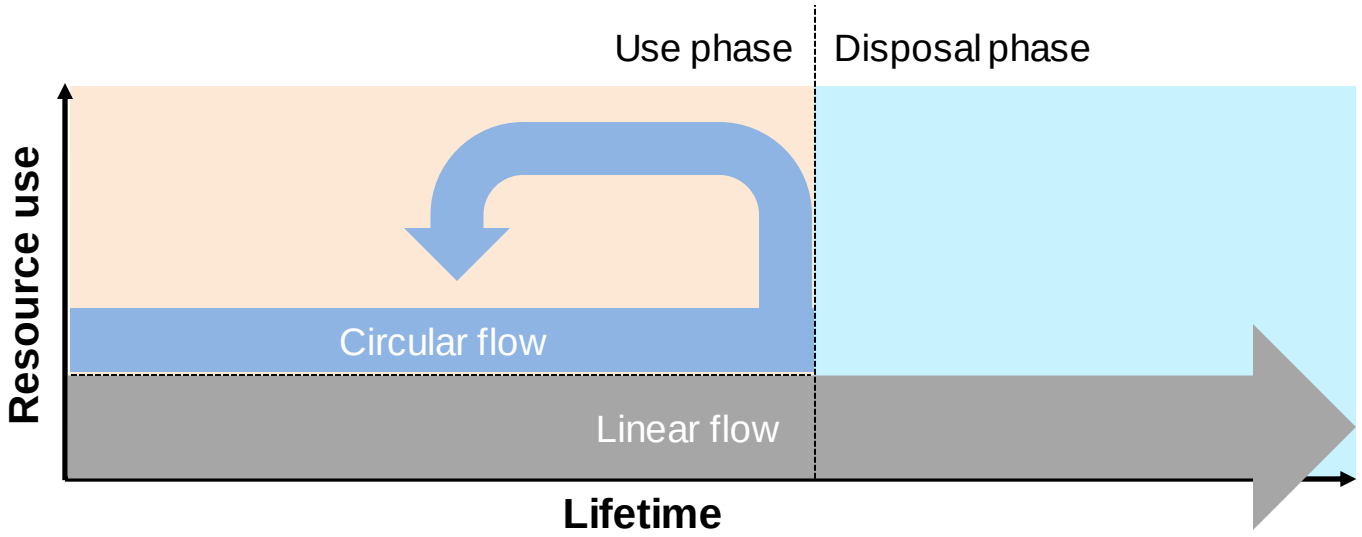
Principle 3
Foster system effectiveness by revealing and designing out negative externalities



Picture source: https://www.ellenmacarthurfoundation.org/circular-economy/concept/infographic (adapted)

Strategies in a circular economy

- Circular strategies focus on resources in well-defined use scenarios; three key strategies: closing, slowing and shrinking loops
- Strategies aim at keeping resources and products at their highest value for as long as possible by managing resource use per unit of time



Picture source: https://discardstudies.com/2017/11/13/moving-the-circular-economy-beyond-alchemy/ (adapted)

Strategies in a circular economy

Closing loops: Increasing the proportion of materials captured before disposal for recirculation in technical or biological cycles

e.g. increasing the recycled content in a mobile phone

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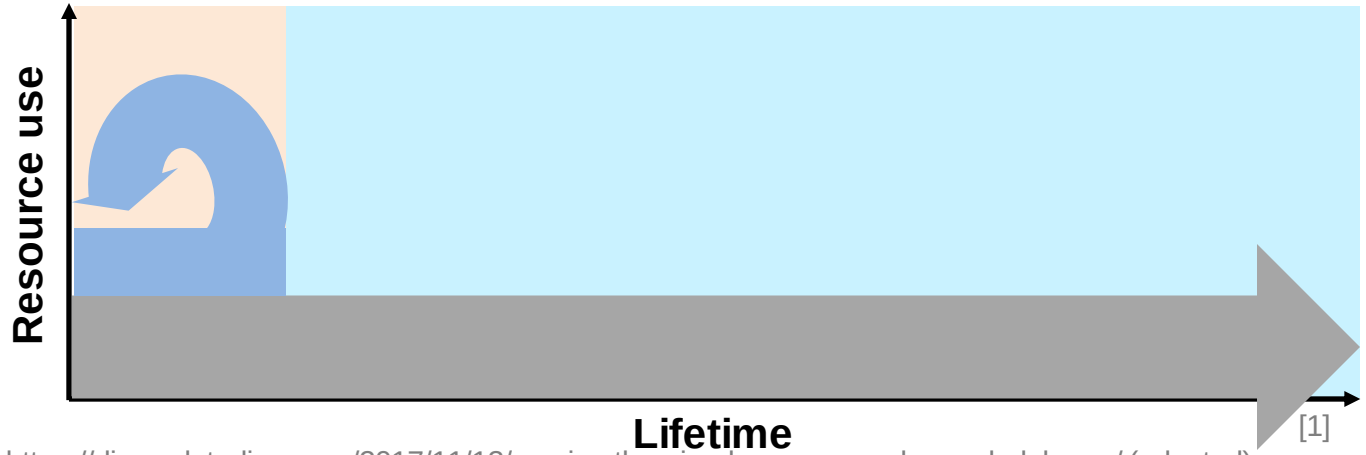

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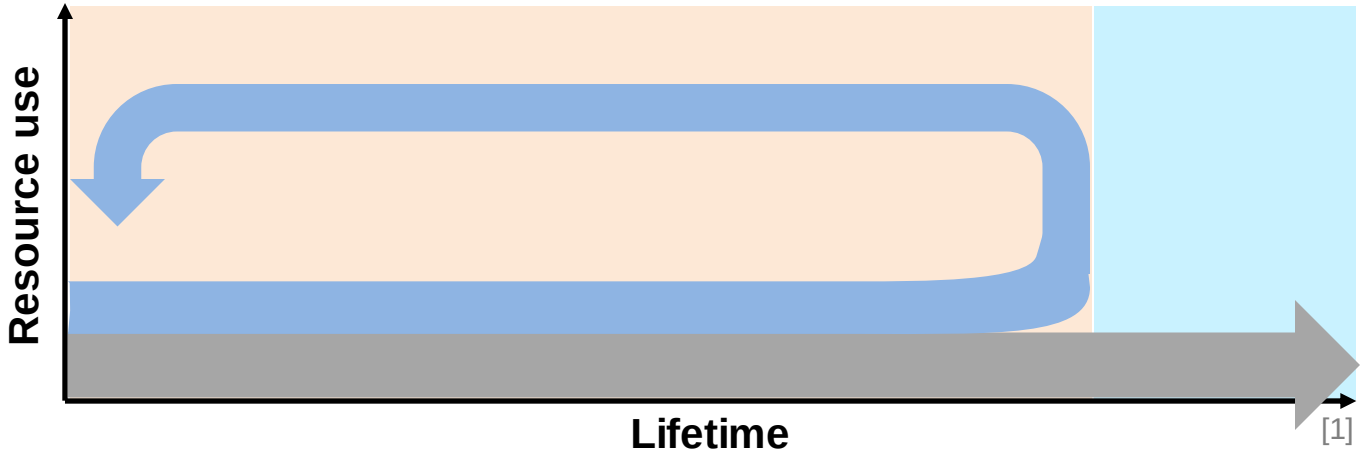
Picture sources: [1] https://discardstudies.com/2017/11/13/moving-the-circular-economy-beyond-alchemy/ (adapted)
[2] https://www.ellenmacarthurfoundation.org/circular-economy/concept/infographic (adapted) [3] https://www.interpack.com/en/TIGHTLY_PACKED/SECTORS/NON- FOOD_PACKAGING/News/Packaging_Symbols,_Part_3_Recycling

Strategies in a circular economy

Slowing loops: Extending or intensifying the time materials spent in use before being recycled or disposed

e.g. keeping the mobile phone in use for longer

[2]



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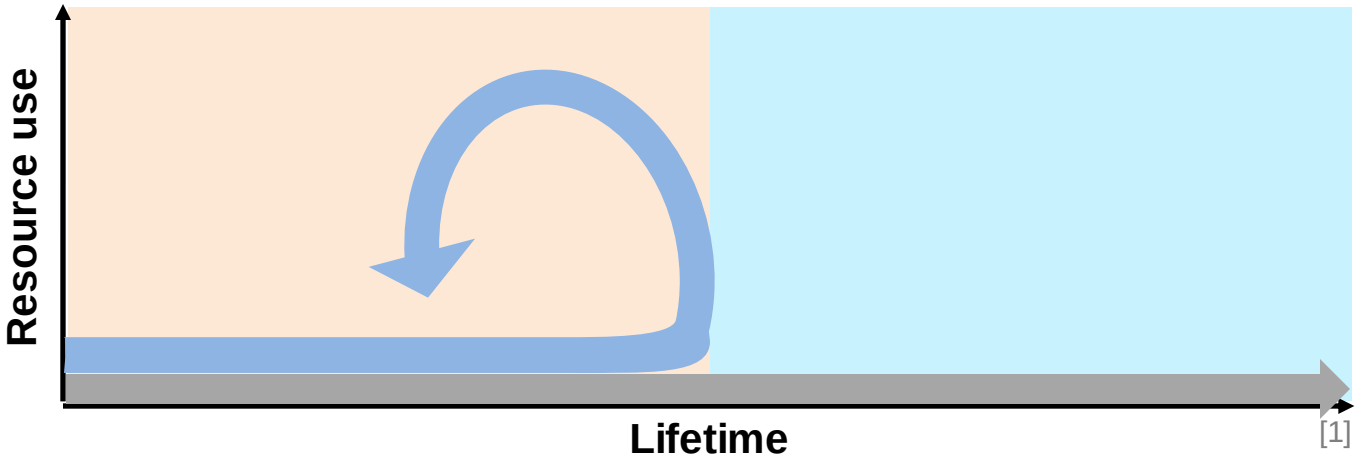
Picture source: [1] https://discardstudies.com/2017/11/13/moving-the-circular-economy-beyond-alchemy/ (adapted) [2] https://www.vectorstock.com/royalty-free-vector/time-around-clock-icon-vector-19579935

Strategies in a circular economy

Shrinking loops: Decreasing overall material use by doing more with less (e.g. increasing lifespan, durability or resource efficiency in production)

e.g. producing a mobile phone using less resources

[2]



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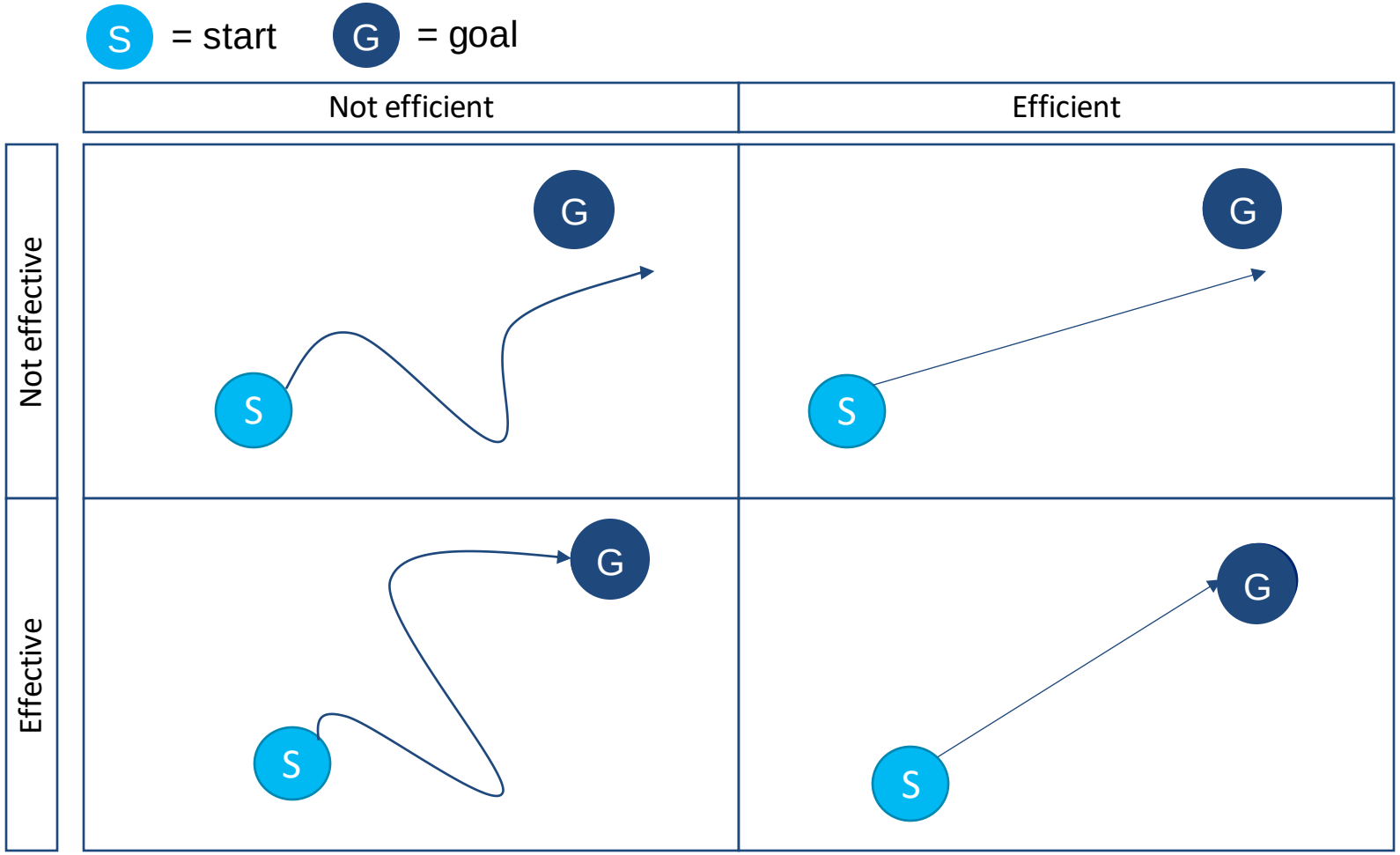
Picture source: [1] https://discardstudies.com/2017/11/13/moving-the-circular-economy-beyond-alchemy/ (adapted) [2] https://www.iconfinder.com/icons/4937588/car_meter_dashboard_gauge_odometer_speedometer_velocimeter_icon

Conceptual considerations on RE and CE

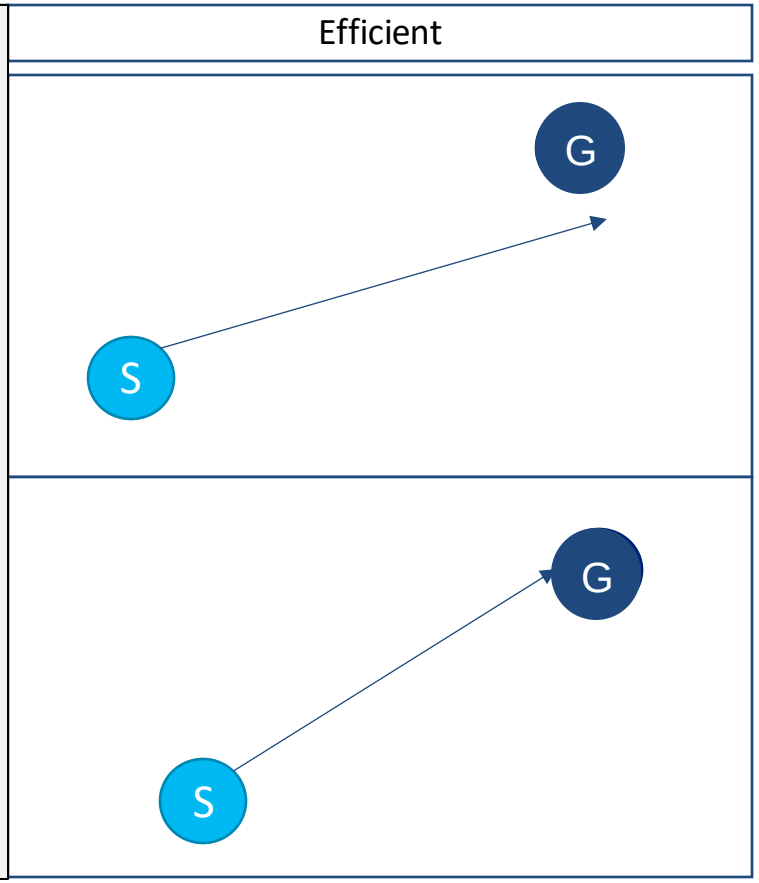


Conceptual considerations on RE and CE

S = start G = goal

Eco-efficiency describes the relation between input and output.

Optimisation leads to reduction in **less toxic waste per product**.

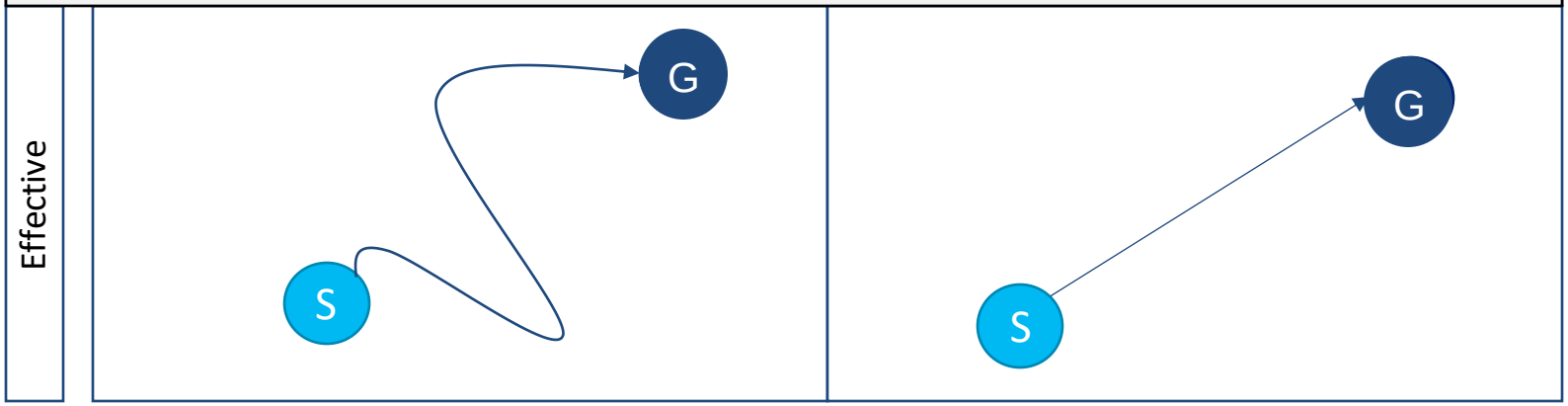


Conceptual considerations on RE and CE

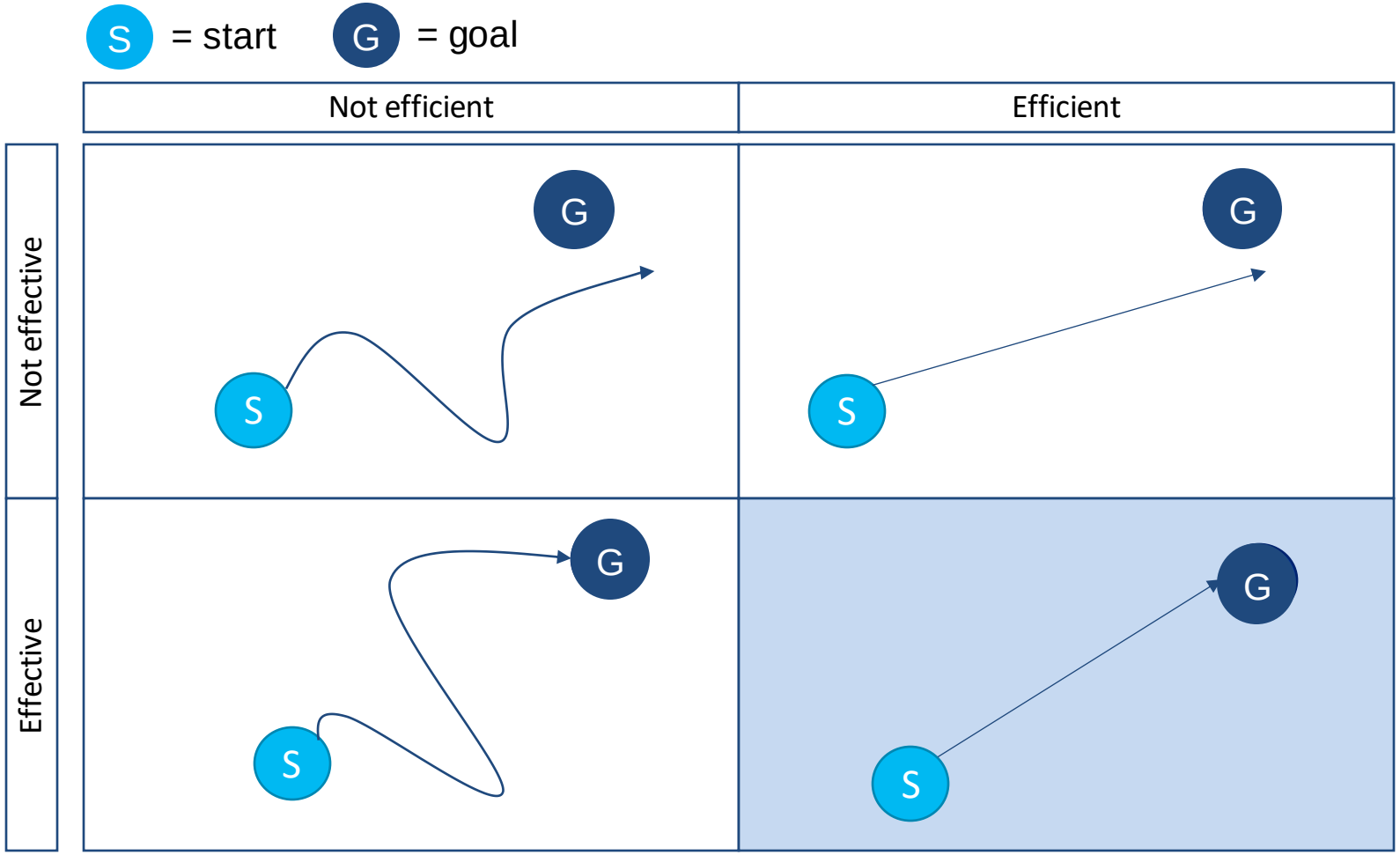
S = start G = goal

Eco-effectiveness (in a circular economy) describes the degree to which extent a goal has been achieved.

Optimisation leads substitution of harmful substances and **elimination of toxic waste** on a product-level – but at times at questionable efficiency.



Conceptual considerations on RE and CE



Conceptual considerations on RE and CE

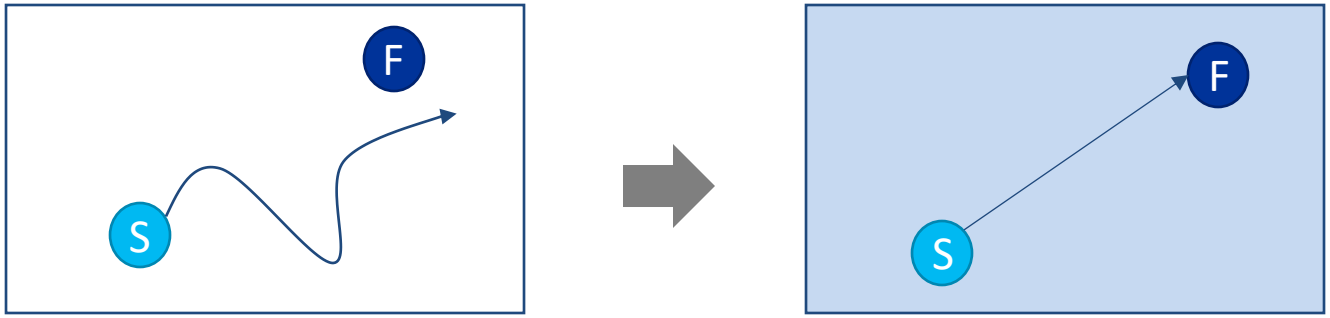
Making sense of RE and CE

- RE and CE are normative concepts that seek to reduce in the use of raw inputs by increasing material circulation and minimizing losses.
- The concepts also suggest maximizing wealth and wellbeing within the limits of the natural environment.
- They are are not opposing concepts but two sides of the same coin to promote optimal use of resources.

Conceptual considerations on RE and CE

Making sense of RE and CE

- Optimal solutions are both effective and efficient
- RE optimizes system components, whereas CE fosters system effectiveness



Conceptual considerations on RE and CE

[1]

“I was in platinum LEED-certified building, for example, and this building contains recycled PVC. But the material PVC was never made to be recycled. ***It’s like making the wrong things perfect. Recycling PVC just makes things perfectly wrong.*** *Recycling of the wrong stuff makes an even bigger problem out of it. There is not one good reason to put PVC in a green building. The whole life cycle of PVC is a nightmare.”*

- Michael Braungart, founder of Cradle to Cradle

[2]

Picture source: [1] https://www.metropolismag.com/uncategorized/qa-michael-braungart/ [2] https://epea-hamburg.com/cradle-2-cradle/

RE and CE in the international context

Exercise 2.3: Open brainstorming

- What are the global environmental drivers which necessitate RE and CE?
- What international (multilateral) initiatives and agreements are you familiar with?
- To what extent do they relate to the concepts of RE and CE?
- How do India and other countries/regions contribute to the fulfilment of these initiatives?

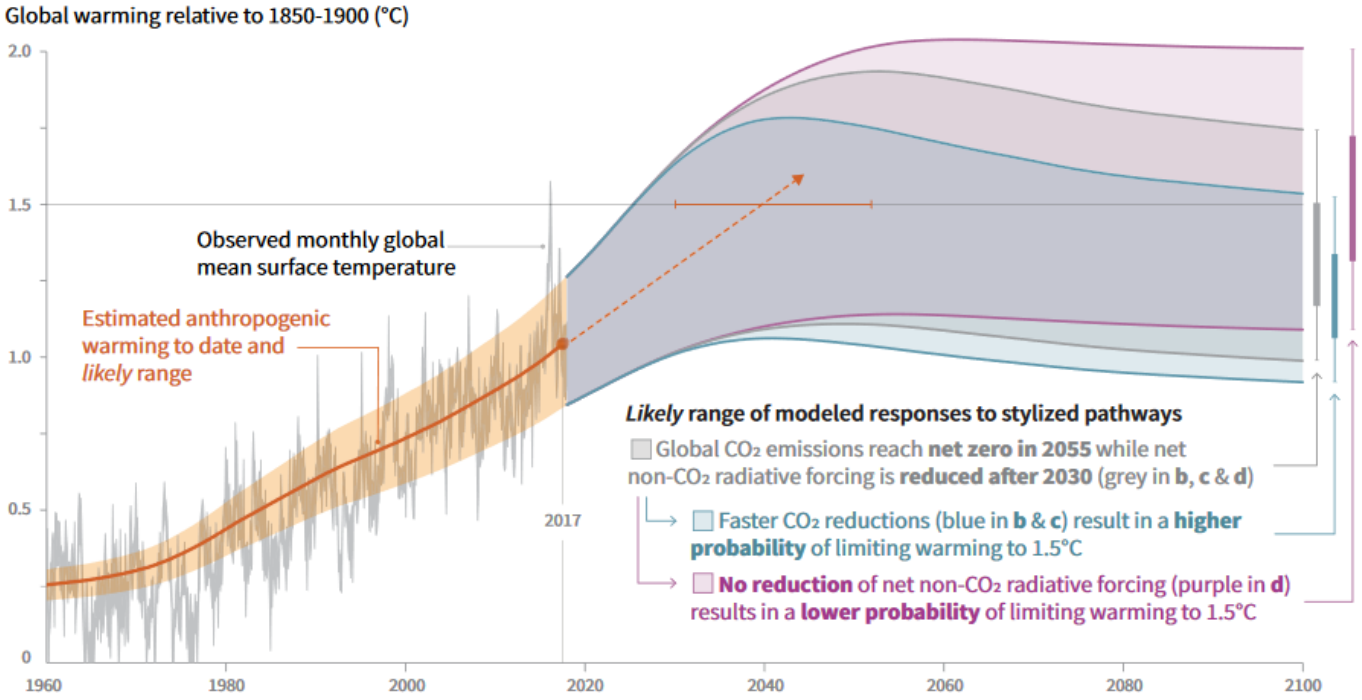
Estimated time requirement: 10 min

RE and CE in the international context

Intergovernmental Panel on Climate Change (IPCC):

Human activities are estimated to have caused ~1.0°C of global warming above pre-industrial levels.

Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate.

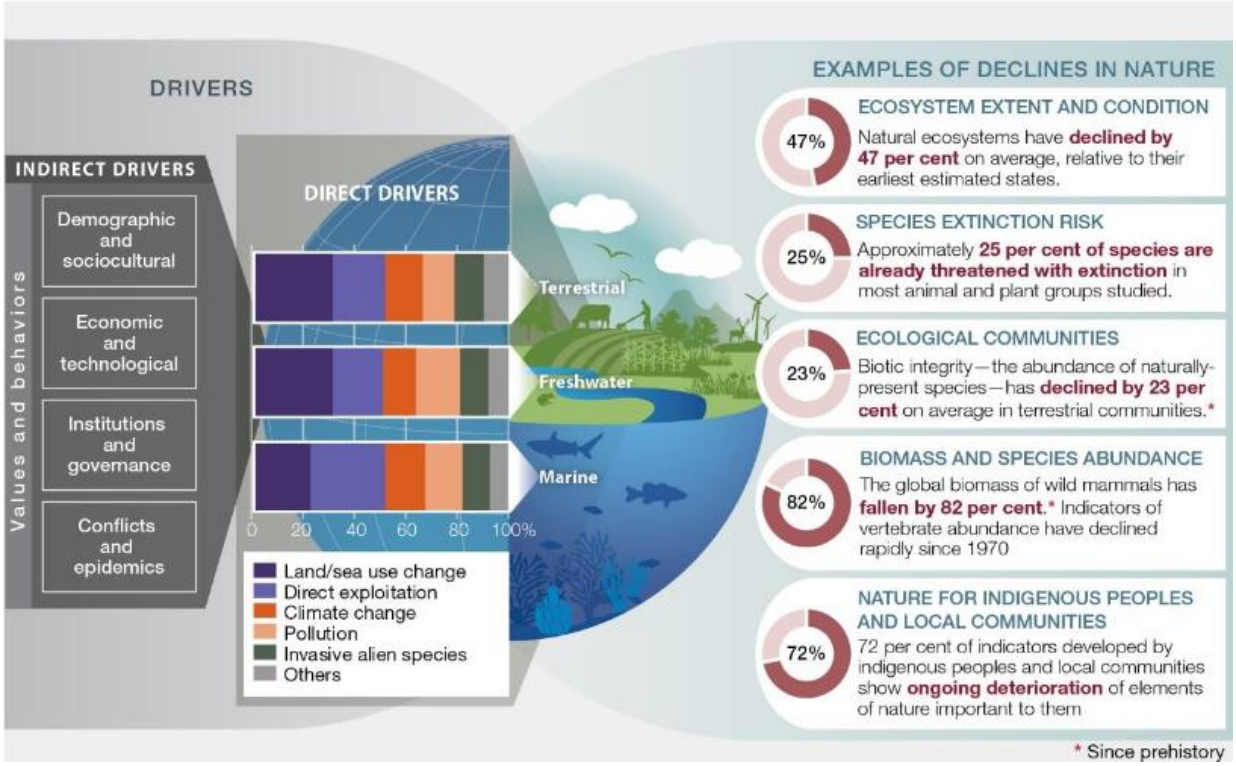


Picture source: https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf

RE and CE in the international context

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2019):

Global biodiversity and ecosystem functions and services are deteriorating at unprecedented speed and scale.

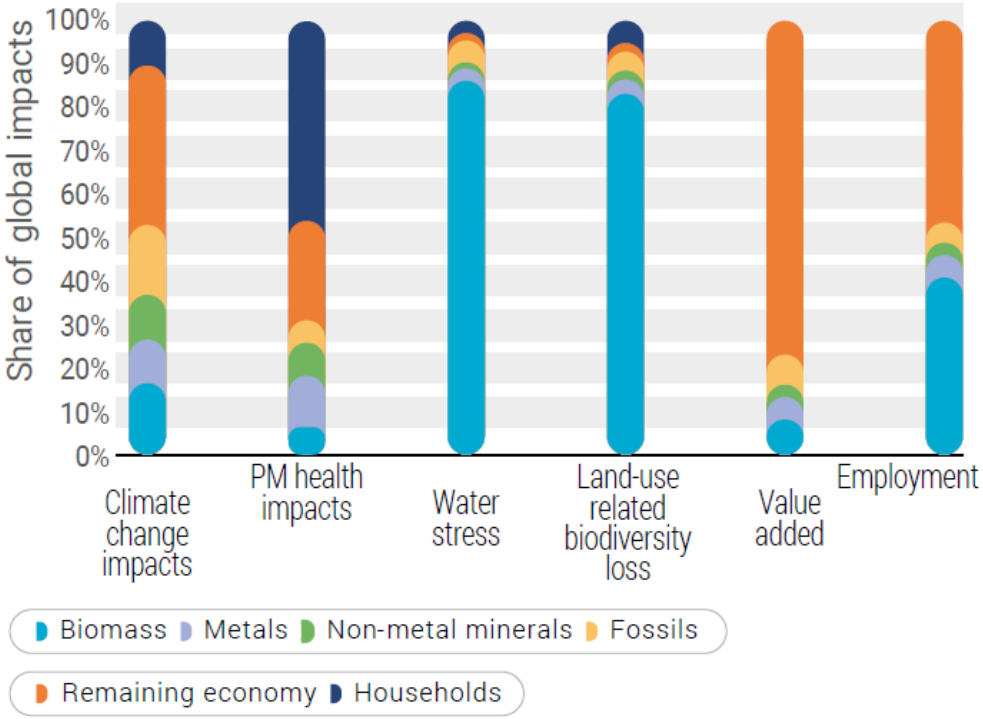


Picture source: https://ipbes.net/sites/default/files/ipbes_7_10_add.1_en_1.pdf

RE and CE in the international context

International Resource Panel (IRP, 2019):

Extraction and processing of materials, fuels and food make up about half of total global greenhouse gas (GHG) emissions and more than 90 percent of biodiversity loss and water stress



Picture source: http://www.resourcepanel.org/file/1172/download?token=muaePxOQ

RE and CE in the international context

- There is an urgent need for holistic interventions based on RE and CE in order to halt climate change and biodiversity loss
- RE and CE have become essential parts of global multilateralism; central pillars include the Agenda 2030, the Paris Agreement and the G20 Dialgoue on Resource Efficiency

"Policies should be evaluated on a life cycle basis to reveal burden shifting and synergies across life cycle stages and industrial sectors."

- IRP/UNEP 2020, Resource Efficiency and Climate Change: Material Efficiency Strategies for a Low-Carbon Future

RE and CE in the international context

G20 Resource Efficiency Dialogue

- Launched in 2017 during G20 Summit in Hamburg, Germany; meetings with international organizations, private company and academia
- Latest follow-up during G20 Osaka Summit (2019) calls for developing in a roadmap to “effectively promote, not to prescribe or restrict, the future activities of the G20 Resource Efficiency Dialogue”

[1]

[2]

Picture sources: [1] https://de.usembassy.gov/2017-president-trump-g20-summit-hamburg/ [2] https://static.ohga.it/wp-content/uploads/sites/24/2019/07/g20-1024x570.jpg

RE and CE in the international context

The Paris Agreement

- Within the United Nations Framework Convention on Climate Change (UNFCCC), signed by 195 UNFCCC member after a consensus was reached in 2015
- Each country must determine, plan and regularly report on its contribution to mitigate global warming through Nationally Determined Contributions (NDCs)

Picture sources: https://economictimes.indiatimes.com/india-on-track-to-achieve-set-targets-under-paris-agreement/articleshow/61598846.cms
https://unfccc.int/news/circular-economy-crucial-for-paris-climate-goals

RE and CE in the international context

Agenda 2030

- Collection of 17 global goals designed to be a "blueprint to achieve a better and more sustainable future for all.“
- The **Sustainable Development Goals** (SDGs,) were set in 2015 by the United Nations General Assembly and intended to be achieved by the year 2030.

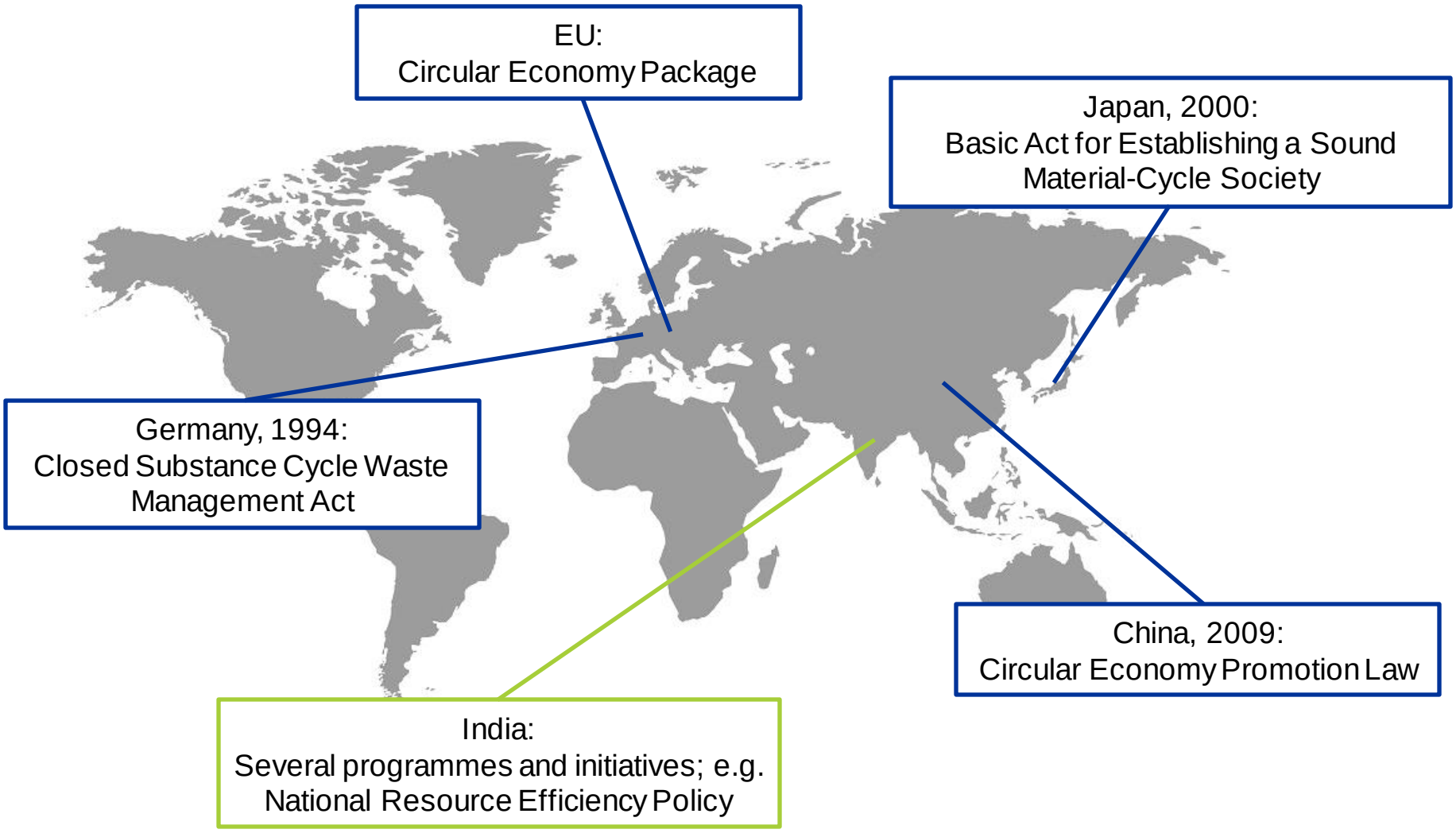
Picture source: https://www.stadt-koeln.de/artikel/05634/index.html

RE and CE in the international context

Agenda 2030

Picture source: https://gcap.global/wp-content/uploads/2018/11/SGDs.png+

RE and CE in the international context



Picture source: https://cdn1.vectorstock.com/i/1000x1000/66/15/grey-political-world-map-vector-16486615.jpg (adapted)

Summary

Take-home messages

- Today‘s economy operates on a take-make-dispose basis, thus creating increasing amounts of waste
- RE and CE are two sides of the same coin but ultimately seek to achieve the same goal: optimal use of resources
- Lifecyle thinking is essential to achieve this goal and can identify opportunities in all lifecycle stages
- RE and CE have become important pillars of multilateralism and contribute to the achieve of the SDG and the Paris Agreement

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