PRO 5972 Business Sustainability (BS) and Circular Economy

2023

Class 6

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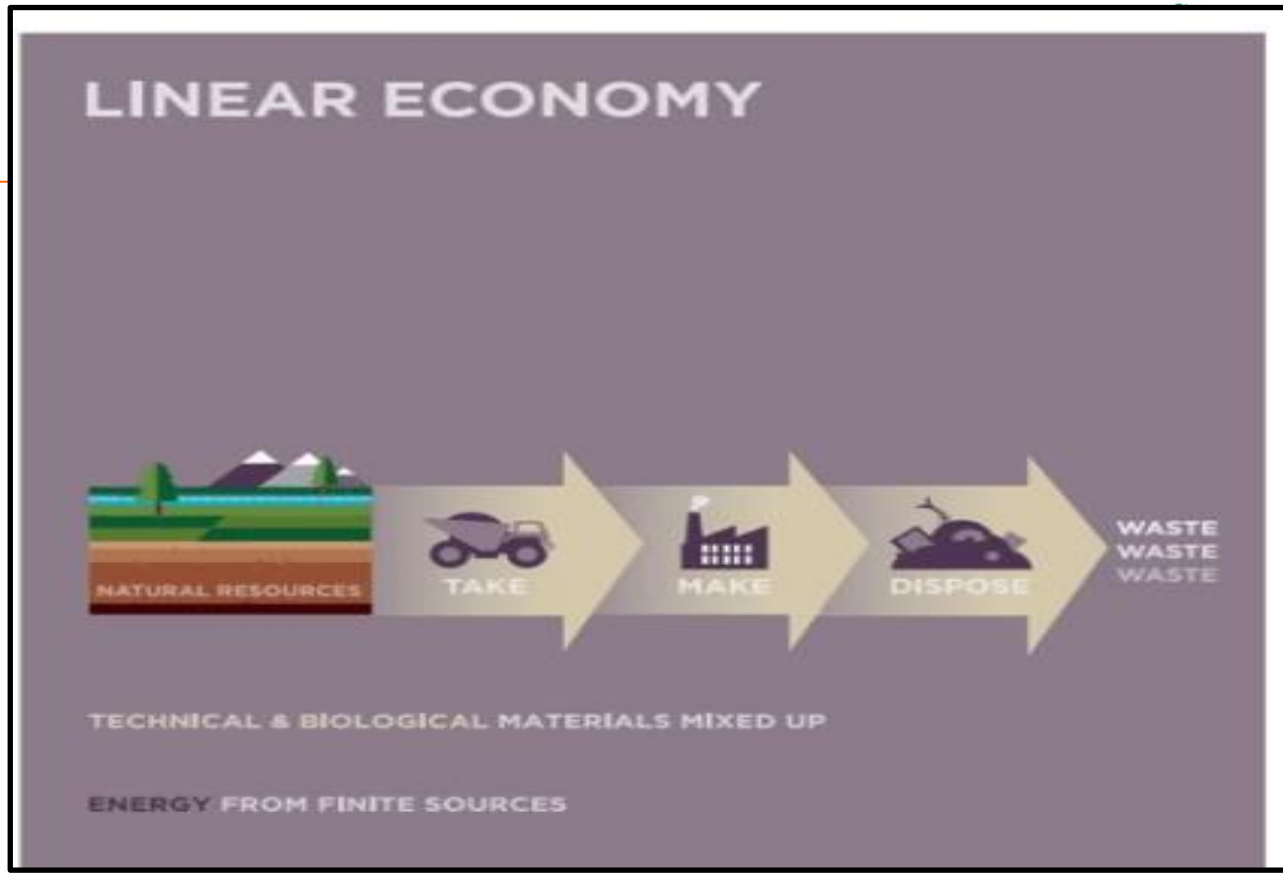
A transformation in our ability to make things changed society.

We've been at a turning point before. In 1684 Thomas Savery invented the steam engine and it changed everything. This invention kick-started the industrial revolution, which transformed our ability to make things. Raw materials and energy were seemingly infinite, and labour was readily available. For the first time in history, goods were mass produced.
https://www.youtube.com/watch?v=0RXH9W5Fnpg&t=2s

HOWEVER....

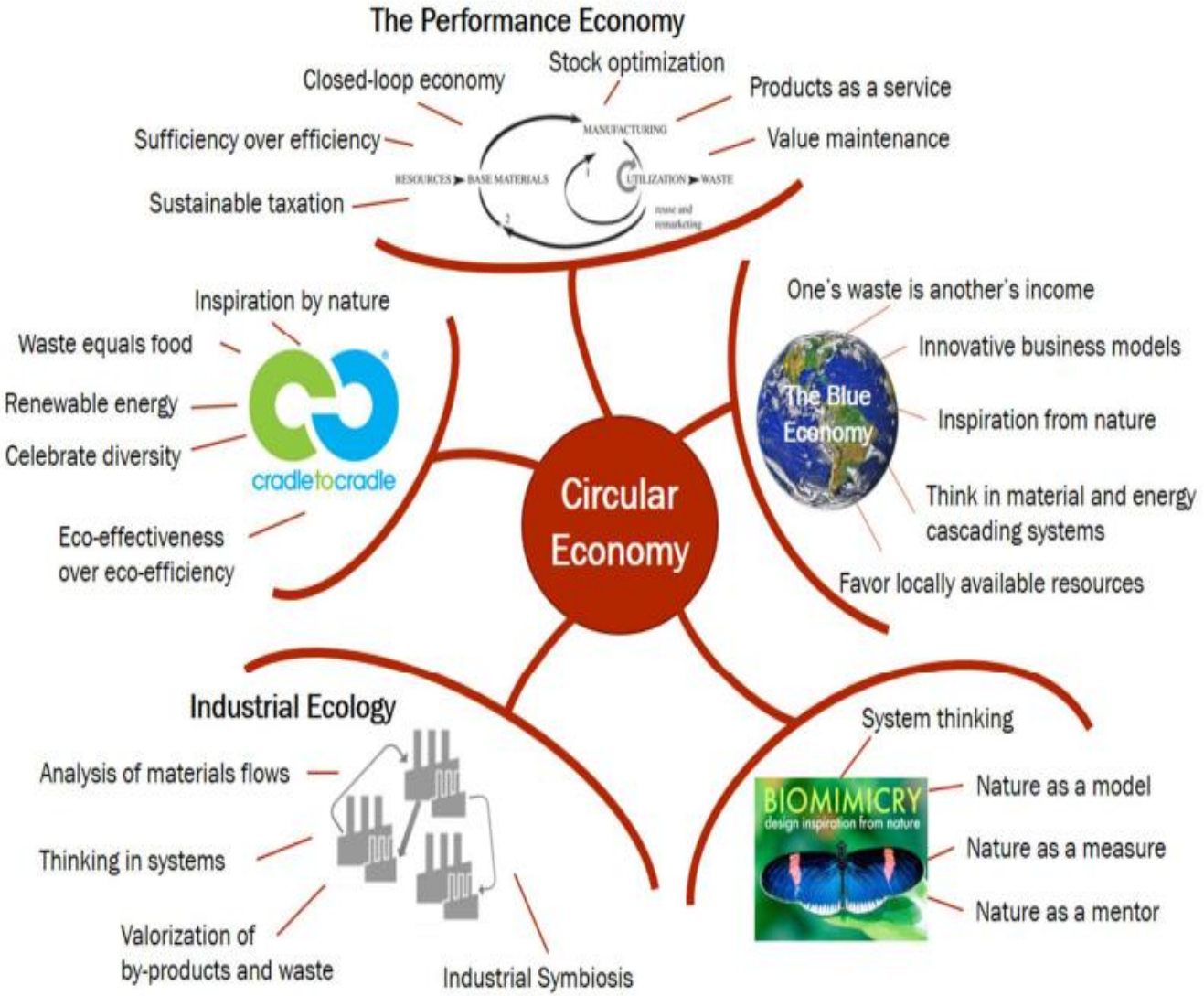


Resources extraction has tripled since 1970 to a massive 92 billion tons per year. It is projected to grow by another 70% by 2050.
The use of fossil fuels, that have driven this growth, has already contributed to a 1.1 C average global temperature increase
The global food system contributes around 70% of biodiversity loss and also consumes 70% of available freshwater.

The influence of the various schools of thought on circular economy

Cradle to Cradle framework: "*design products and manufacturing processes where material flows are safe, restorative, regenerative, and based on closed-loop cycles*" (Morseletto, 2019) (https://www.ellenmacarthurfoundation.org/circular-economy/concept/schools-of-thought)

https://www.youtube.com/watch?v=fP8PRA-OajU

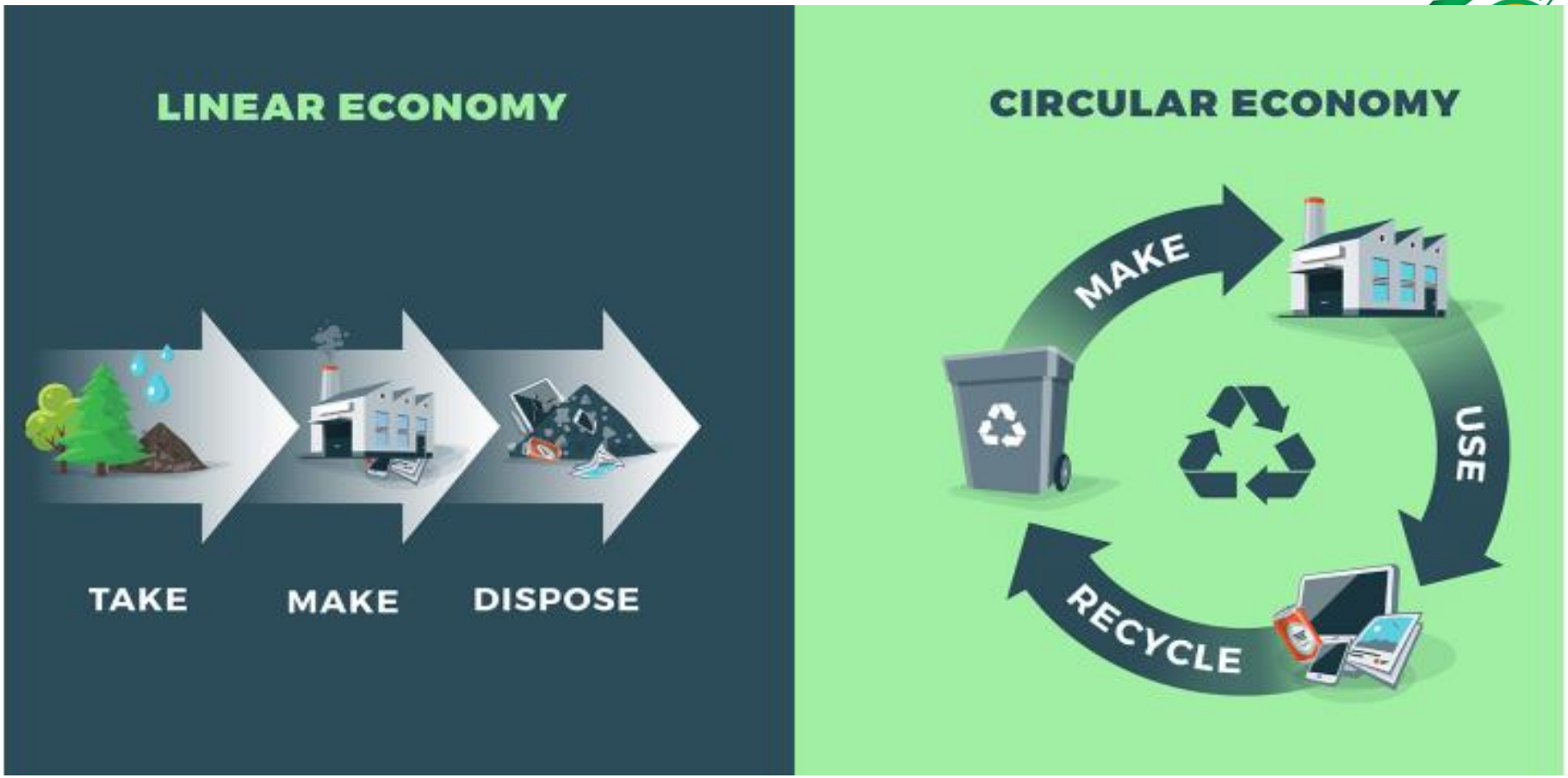


What is Circular Economy?

"*a circular model, which emphasizes a reduced use of raw materials and the reuse, repair, redesign, remanufacturing and recycling of resources at every step of the value chain, ensures that materials or resources keep their maximum possible value as they move and are retained within different value chains (as stated in the United Nations Environment Programme (UNEP) circularity platform)".*

"*an industrial system that is restorative or regenerative by intention and design*" (EMF, 2015)

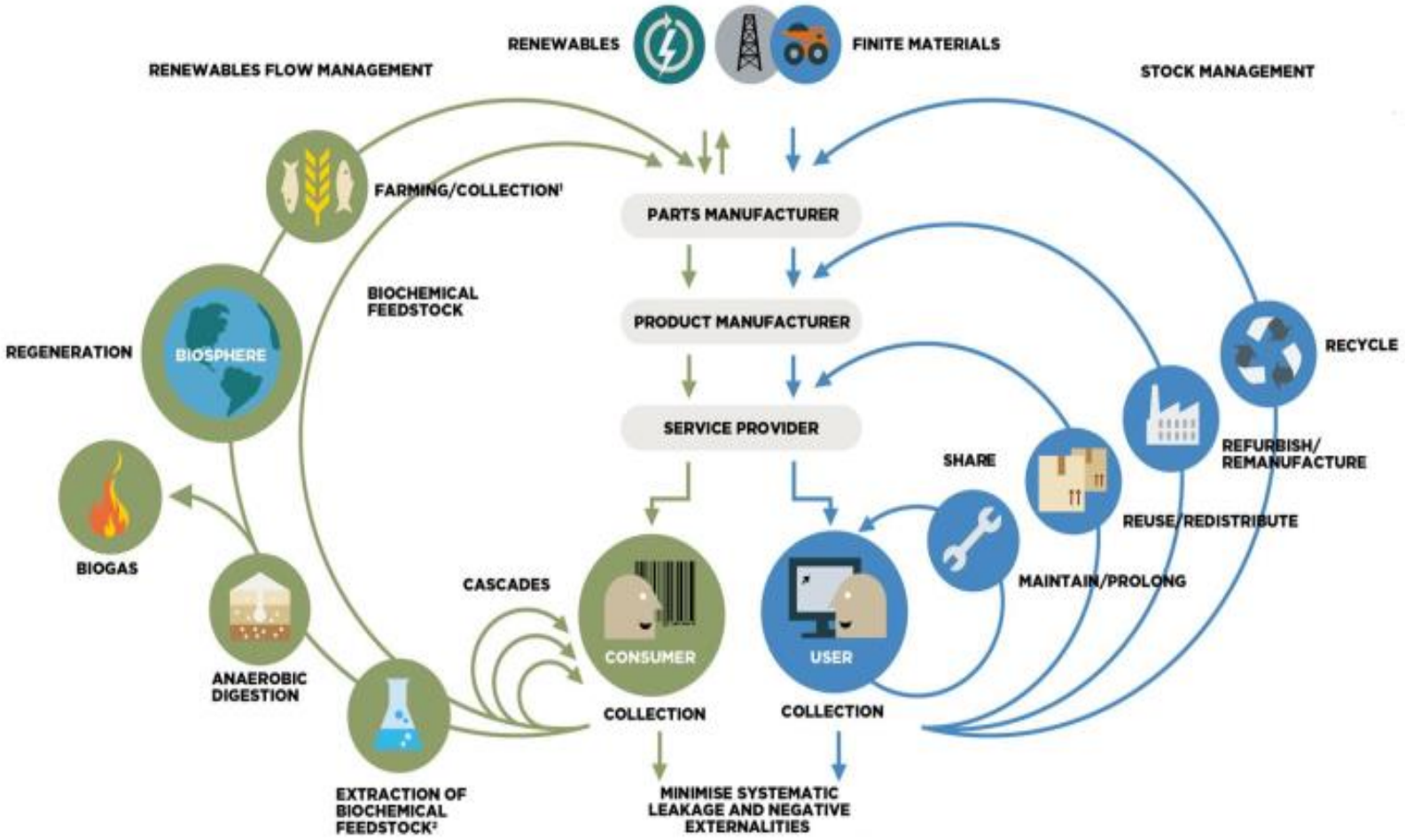
Restorative: meaning repair/give back/build up again "make something well again"
Regenerative: restore, renew, revitalize and ensure rebirth to sources of energy and materials by taking into account future needs, wants and desires of society and nature"; "make it better"
Regenerative agriculture: "maintaining and improving resources through continuous organic renewal of the complex living system (Dahlberg, 1991).



Take-make-dispose
Short term, from purchase to sales
Focuses on products

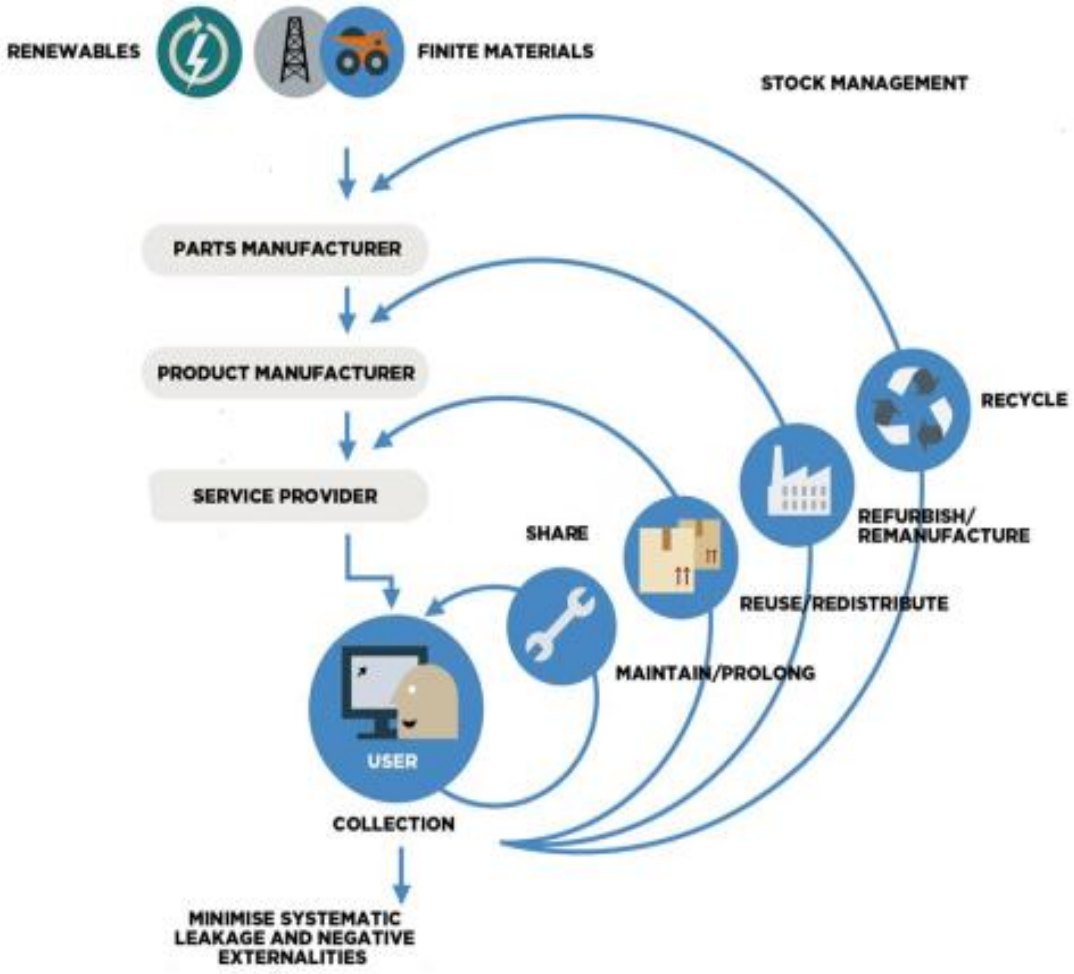
Reduce-reuse-recycle
Long term, multiple life cycles
Focuses on services

Butterfly Diagram (EMF, 2013)



Butterfly Diagram (EMF, 2013)

Technical reverse Cycles



COMMODITIES

Resource-poor Japan unearths metal riches in its trash

Nation's discarded electronics seen to contain more gold than South African deposits

Maintain/repair: Fix part when it brakes.

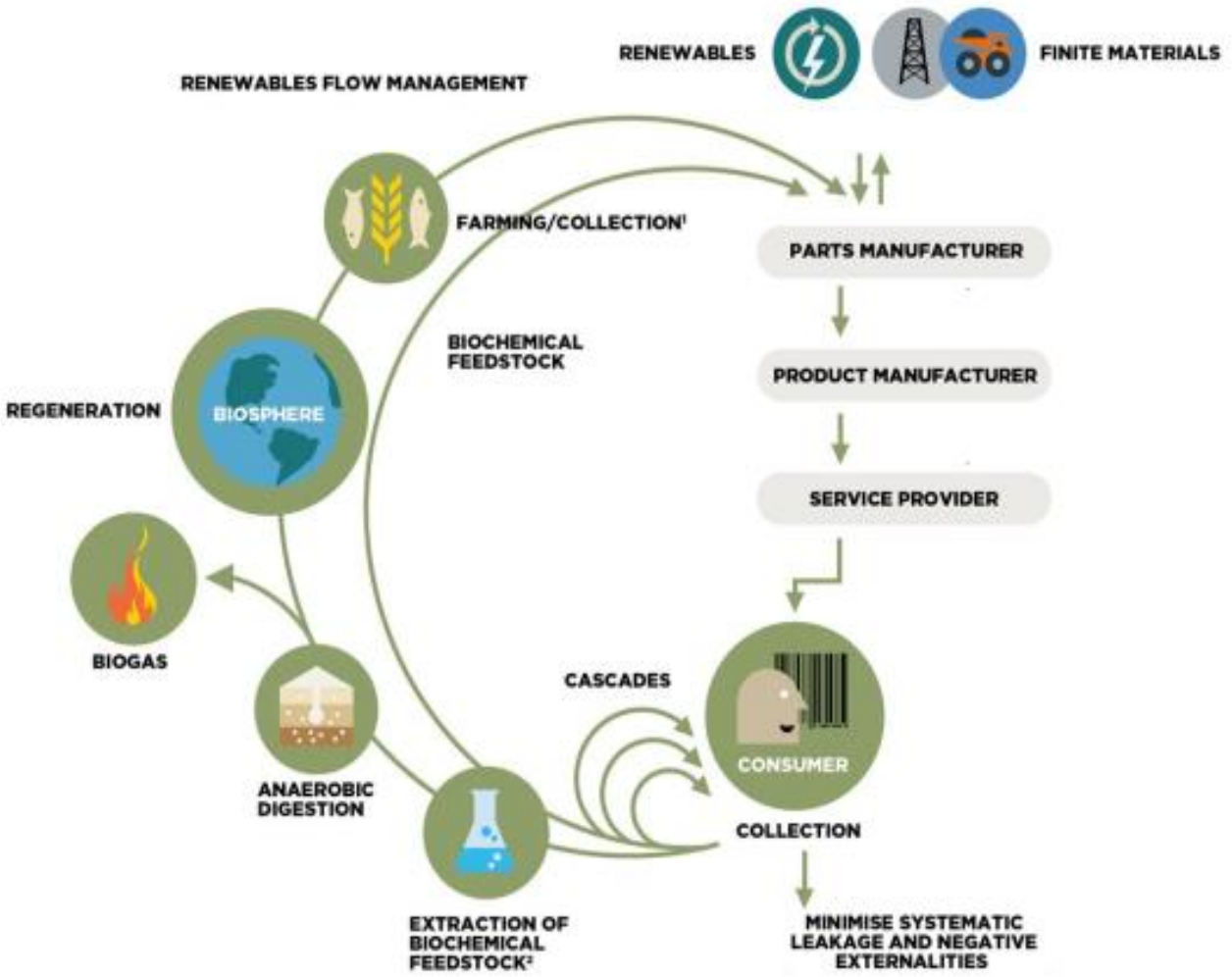
Reuse/redistribute: Sell product to a colleague.

Remanufacturing/Refurbish: company buys it back and replace major parts.

Recycle/recover: Extract raw materials to use again.

Butterfly Diagram (EMF, 2013)

Biological Reverse Cycles



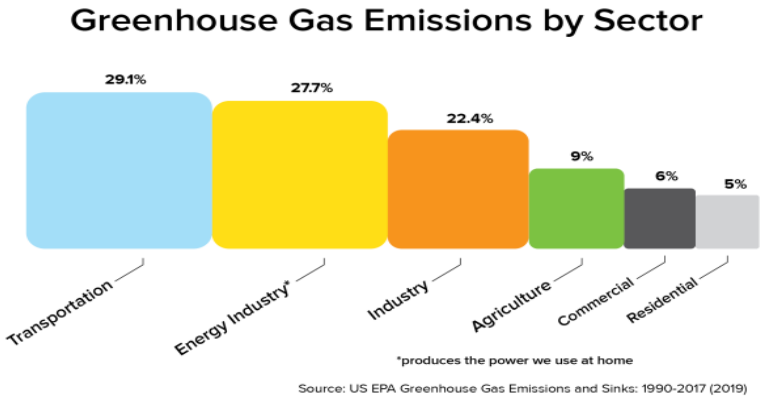
ecoscraps™

https://www.ecoscraps.com/

Works on recycling of food waste

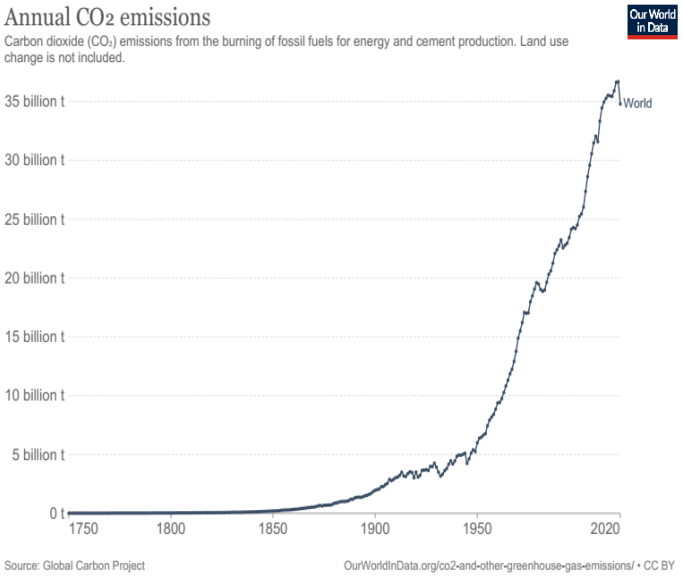
(https://www.youtube.com/watch?v=zCRKvDyyHmI)

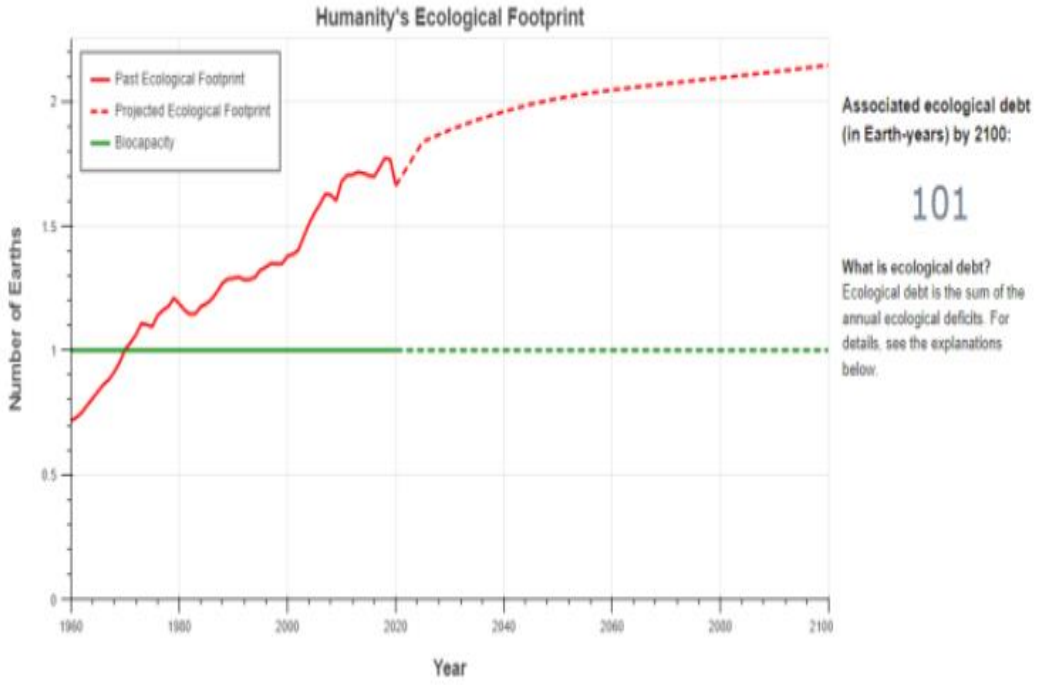
Is the planet more circular?



Ecological Footprint

The Ecological Footprint is the only metric that measures how much nature we have and how much nature we use.

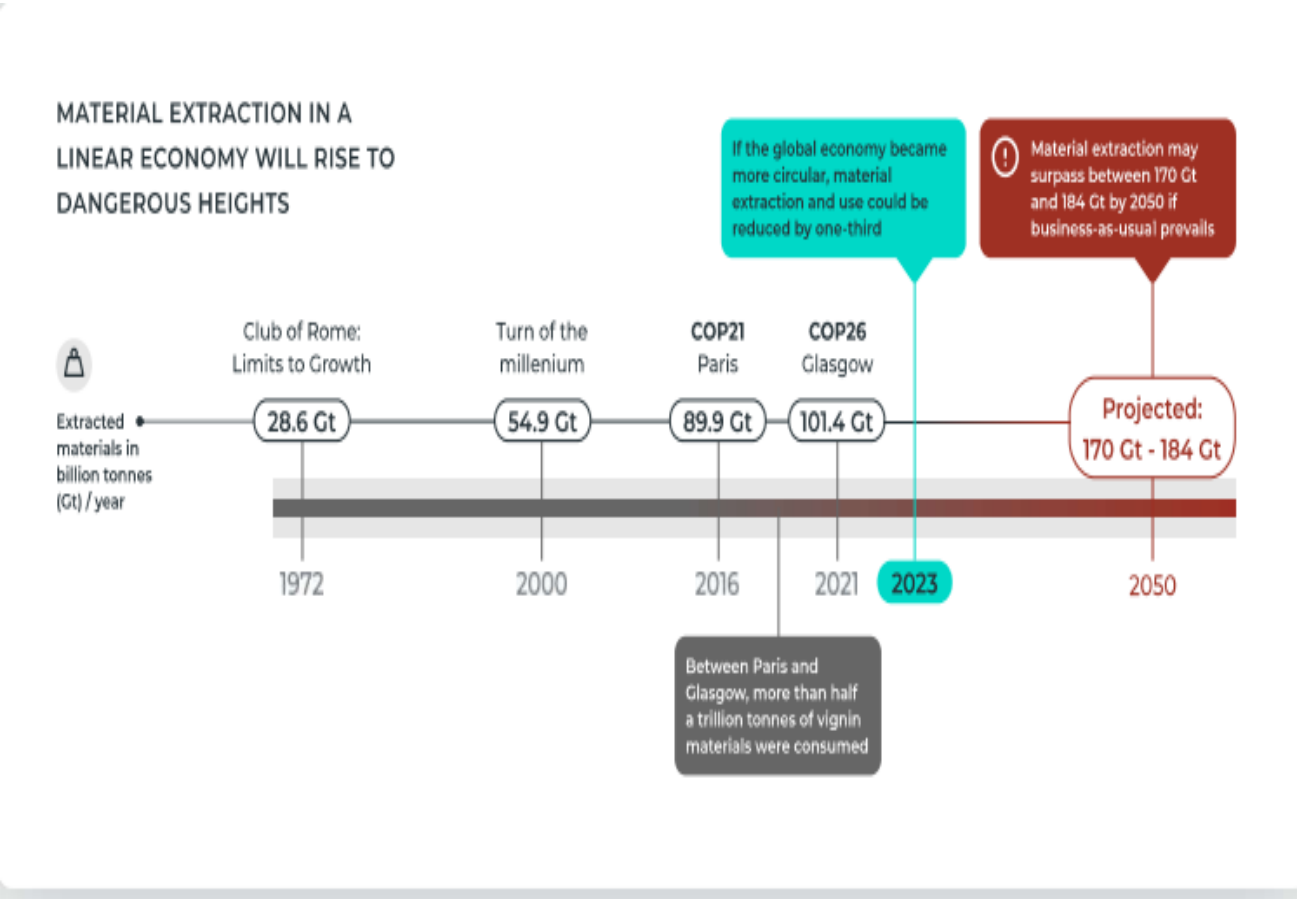




Is the planet more circular?

Documentary: The Real Price of Shipping

https://www.youtube.com/watch?v=FXH7FzTikYo



2023: GLOBAL ECONOMY IS 7.2% CIRCULAR
2018: 9,1%
2020: 8,6%

More than 90% of materials are wasted, lost or remain unavailable for reuse for years.

Fonte: Circularity GAP Report 2023.

Circular Economy in Brazil

Survey by the National Confederation of Industry (CNI) in 2019 shows that 76.4% of the country's industries adopt some sort of process linked to the Circular Economy in order to increase the useful life of products and materials.

Water reuse, material recycling and reverse logistics are the main situations found in the range of practices of the Brazilian industry.

Reasons: the reduction of costs, followed by operational efficiency and the opportunity for new business.

THE KEY LEVERS TO TRANSITION TOWARDS A CIRCULAR ECONOMY

1. NARROW: USE LESS

Narrow strategies reduce material and energy use. Currently, material use is highly inefficient and ineffective; we can deliver similar social outcomes by using much less and phasing out fossil fuels, for example. This doesn't mean being worse off, but rather focussing on using materials efficiently: think in terms of riding a bike instead of driving a car, eating less meat and living in a space that suits your needs. Using less is a core tenet of the circular economy—yet currently, the threshold for sustainable consumption, 8 tonnes per person,[28] is being surpassed by 1.5 times.

2. SLOW: USE LONGER

Slow strategies aim to keep materials in use for as long as possible, for example through design for durability and repairability. A more circular economy is also a slower one: materials, components and products—and even buildings and infrastructure—that we lock in stocks are made to last. This will lower material demand in the long run, in essence also serving to *narrow* resource flows.

3. REGENERATE: MAKE CLEAN

Regenerate strategies phase out hazardous or toxic materials and processes, and substitute them with regenerative biomass resources. A circular economy aims to mimic natural cycles—by shifting to more regenerative farming practices, for example—while also maximising the share of circular biomass that enters the economy.[29] Regeneration can happen both at the systems level (by designing regenerative processes) as well as at the product level (by switching synthetic to organic fertilisers, for example).

4. CYCLE: USE AGAIN

Cycle strategies aim to cycle and reuse materials at their highest value: they maximise the volume of secondary materials re-entering the economy, ultimately minimising the need for virgin material inputs and therefore also *narrowing* flows. Of course, virgin materials will always be needed to a degree: all materials degrade and can't be cycled infinitely, use energy, and require blending with virgin materials to maintain strength and functionality.

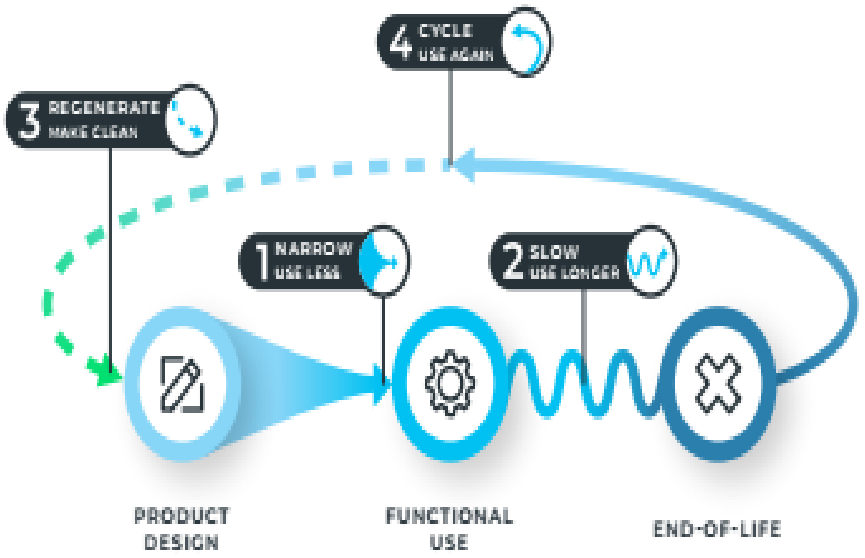


Figure two depicts the four flows to achieve circular objectives: narrow, slow, regenerate and cycle.

CIRCULAR SOLUTIONS
FOR THE FOOD SYSTEM

The unique properties of the global food trade and the importance of food as a basic human need—and right—necessitate a systemic approach to sustainable food production and consumption for a planet of 8 billion people. This modelled scenario shows that global food production can be done in a circular manner; it is not necessary to sacrifice crop yields to reduce environmental impacts[79] if food systems are designed on closed nutrient cycling, water-nutrient management is improved, and symbiosis is ingrained within and between systems that are regenerative. Changing food consumption is also key: reducing high-impact foods, such as meat, as well as excessive caloric intake, and cutting food waste across the value chain (but particularly at the post consumer stage) are fundamental if the global food system is to remain within planetary boundaries.[80,81] According to our analysis, applying these four circular solutions to this system could help reverse the global overshoot of planetary boundaries:

1. PUT HEALTHIER, SATIATING FOODS FIRST

Healthy daily calorie intakes are averaged at around 2,600.[82] Prioritise satiating and healthy foods with a lower environmental impact—ideally shifting calories from meat, fish and dairy towards cereals, fruits, vegetables and nuts.

2. GO LOCAL, SEASONAL AND ORGANIC

Prioritise the production and consumption of local, seasonal and organic produce, which can lead to a reduced need for fertiliser, heating fuels, and transportation and processing services.

3. MAINSTREAM REGENERATIVE AGRICULTURE

Scale up regenerative and circular agricultural processes that encourage closed nutrient loops. This model supports healthy soils and ultimately keeps the land arable for far longer than typical farming processes. If meat remains in our diets, it should be reared within this model.

4. NO MORE AVOIDABLE FOOD WASTE

Abolish food waste along the supply chain and at the consumer level through better management of transport and storage, more refrigeration and smart planning, and technology at the consumer and food service levels.

Case:

A taste of circular economy for food in São Paulo

https://www.youtube.com/watch?v=w_vyKl3NcsM&t=17s

The Globally Important Agricultural Heritage Systems (GIAHS) are agroecosystems inhabited by communities that live in an intricate relationship with their territory. These evolving sites are resilient systems characterized by remarkable agrobiodiversity, traditional knowledge, invaluable cultures and landscapes, sustainably managed by farmers, herders, fisherfolk, and forest people in ways that contribute to their livelihoods and food security. Through the Globally Important Agricultural Heritage Systems Programme, the Food and Agriculture Organization of the United Nations has designated over 60 sites around the world.
(source: https://www.fao.org/giahs/en/)

https://www.youtube.com/watch?v=v5v6J7rCql4&t=11s

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Review

How is the circular economy embracing social inclusion?

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Table 1
Categories and subcategories of analysis in S-LCA Guide.

Main categories	Subcategories
Workers	promotion of employee wellness and equity, increased quality of life (employee), improved working conditions, job declines, training and education, forced re-education, health and safety issues
Communities (or Local Community)	job creation, job declines, setting the disappearance of low-level jobs, training and education, lower quality of life, higher health costs, health and safety issues, material supply guarantee, strengthening of the community, increased social wellbeing, social isolation, value-added creation and distribution, infrastructure and resource availability, political participation, lack of social acceptance
Suppliers +Value Chain Actor	elimination of socio-political supply risk, supply chain risk, material supply guarantee, market monopoly, increased competitiveness
Consumers	reduced costs of ownership, lower prices of goods, increased consumption, misuse of personal data, improved customer relationships, lack of transparency, lack of social acceptance
Society	social benefits, higher health costs, material supply guarantee, resource competition, resource imbalance, shifting problems, gender inequality, unequal distribution of opportunities, social equality, social inequality, social conflicts, increase in innovation, lack of transparency, lack of social acceptance
Children	training and education, health and safety issues

Source: elaborated by authors based on Luthin et al. (2023).

Table 10

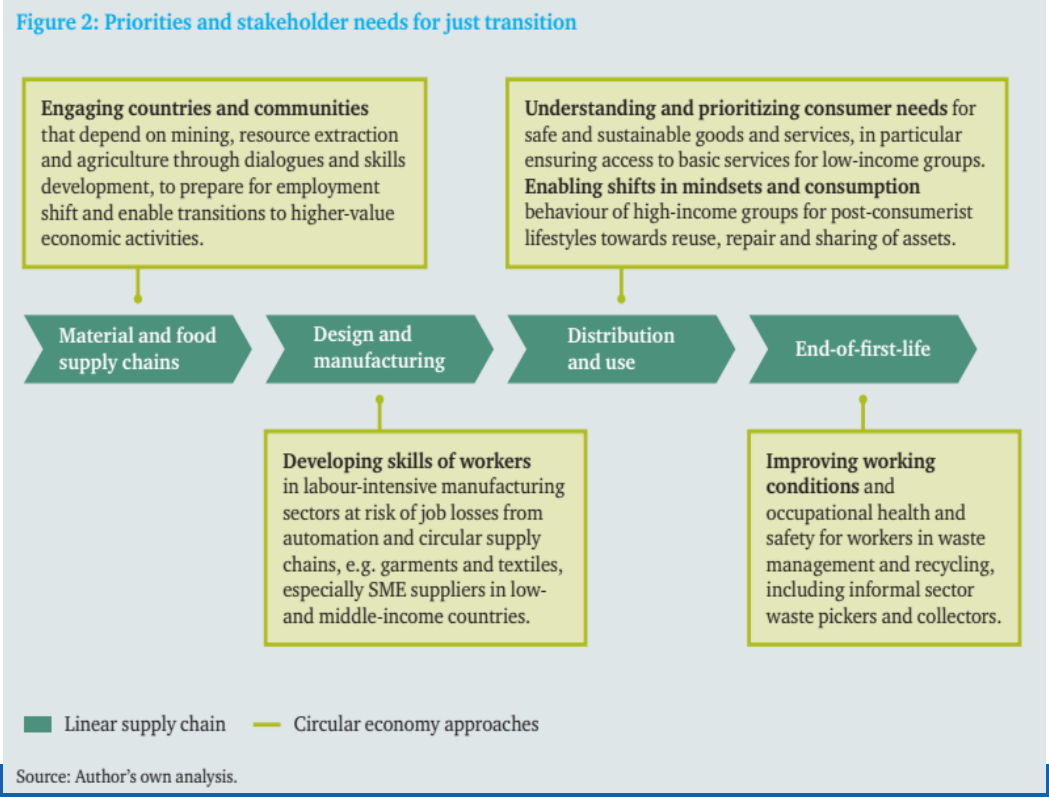
Intersections between circular strategies and stakeholders.

	Children	Community	Workers	Consumers	Society	Suppliers	Total
Recycle	0	5	2	9	3	6	25
Reduce	2	19	8	22	12	7	70
Remanufacture	0	1	1	0	3	0	5
Repair	0	7	3	11	7	5	33
Replace	0	3	0	1	1	1	6
Reuse	0	18	8	22	20	9	77
Total	2	53	22	65	46	28	216

Circular Economy and Social Inclusion

According to the International Labor Organization (ILO) there will be a growth of 6 million jobs globally by 2030, mainly in the area of waste management and recycling, service sector, repair (repair) and rent-based business models. However, the transition to a circular system can enhance the wage inequality, displacement of workers and jobs.

EC does not automatically address social objectives such as SDG 2 (zero hunger), SDG5 (gender equality) and SDG10 (reduction of inequalities).



Transforming our World: The 2030 Agenda for Sustainable Development (https://sustainabledevelopment.un.org/post2015/transformingourworld/publication)

Table 1: Circular economy in the 2030 Agenda framework: contributions and gaps

	Direct positive contributions through circular economy	Gaps in addressing social dimensions in the circular economy	Requirements to enable circular economy transition
SDG 1 (No poverty)		•	
SDG 2 (Zero hunger)		•	
SDG 3 (Good health & wellbeing)	•		
SDG 4 (Quality education)			•
SDG 5 (Gender equality)		•	
SDG 6 (Clean water and sanitation)	•		
SDG 7 (Affordable and clean energy)	•		
SDG 8 (Decent work and economic growth)	•		
SDG 9 (Industry, innovation and infrastructure)	•		
SDG 10 (Reduced inequalities)		•	
SDG 11 (Sustainable cities and communities)	•		
SDG 12 (Sustainable consumption and production)	•		
SDG 13 (Climate change)	•		
SDG 14 (Life below water)	•		
SDG 15 (Life on land)	•		
SDG 16 (Peace, justice and strong institutions)			•
SDG 17 (Partnerships for the goals)			•

Source: Schröder, P. (2020). *Promoting a just transition to an inclusive circular economy*. Royal Institute of International Affairs.

Circular Business Models

BM: describes *how a firm does business* (Magretta, 2002)

It refers to "*the logic of a firm, the way it operates and how it creates value for its stakeholders*" (Casadeus-Masanell and Ricart, 2010)

Technical reverse cycles

1. repair and maintenance
2. Reuse and redistribution
3. Refurbishment and remanufacturing
4. Recycling
5. Cascading and repurposing

Biological reverse cycles

6. Organic feedstock

Source: Ludeke-Freund et al (2019)

Case Native (the Balbo Group)

Pioneer in large-scale regenerative sugar cane production in Brazil
Creates a strong organic sugar brand that is now the world´s leading producer and retailer of organic sugar (**responsible for 15.5% of the world market of organic sugar)**
Scale up
Applies the principles of regenerative agriculture as:
Eliminating the practice of burning unused parts of the sugar cane plant prior to harvesting
Using zero tillage to re-incorporate the significant volumes of organic matter that sugar cane produces back into the soil´s physical structure
It produces 100% of energy to process sugar cane from sugarcane bagasse (the pulpy residue left after the juice of the sugarcane has been extracted)

(https://www.youtube.com/watch?v=G-pr0cYzuDQ&t=116s)

CBPak

- Packaging company
- Polymer made from cassava to food packaging industry
- It is made from 96% biodegradable materials

Other cases...

- https://www.youtube.com/watch?v=xmTQA-RNygQ (plastic waste)