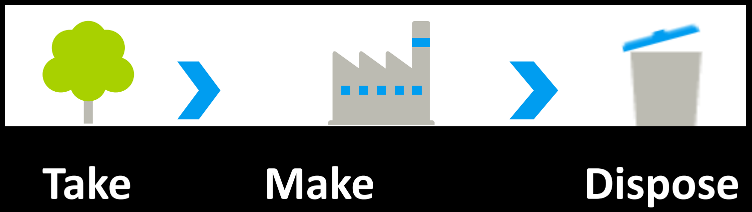
Module 1: What is the Circular Economy (CE)

- Diagrams : Linear and Circular Economy
- Why we need CE?
- Four principles of CE

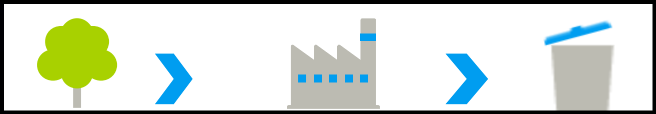
We have in front of us a "thirsty"world for raw material!

The industry has "super - production"...



…. cheap raw materials, cheap energy, cheap loan (get a loan today, pay tomorrow)…..

Agriculture is "thirsty"...



Take Make Dispose

Wow ….

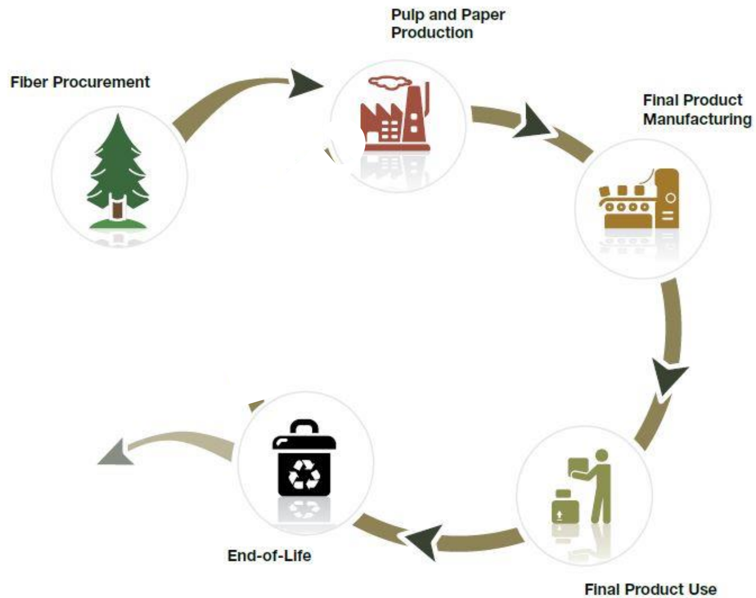
Today, we Humans are using nature 1.7 times faster than it can regenerate its ecosystems.

EARTH OVERSHOOT DAY

Our water resources

are under pressure

Packaging box, from production to the use!



Source : The life cycle of printing and writing papers (from AF&PA)

Colleges, let's leave the past behind?....

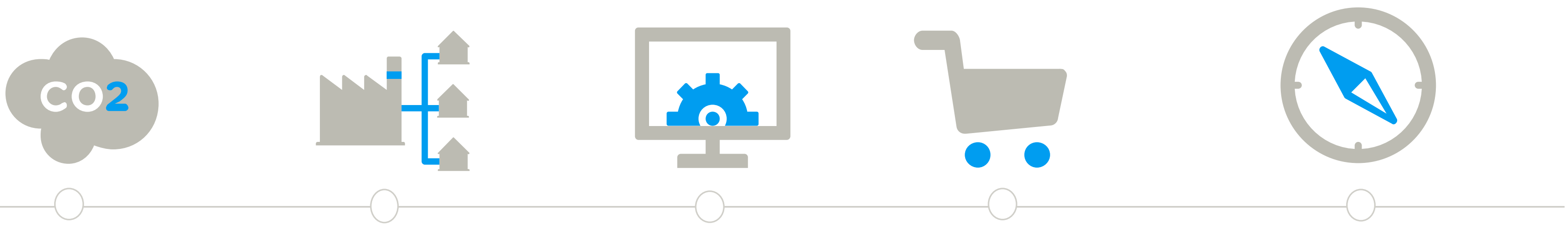
and analyze :

What if today's good things become tomorrow's raw material?

Will the earth forgive us that we use it without criteria/limits?

When? Or...

Key factors….but not limited



Climate changes

Lack of raw material

Industrial Revolution

Customer expectations

Regulations , Legislation

90 natural elements that make up everything! How many are left? Are they enough? Are they sustainable?

Serious threat

Growing threat

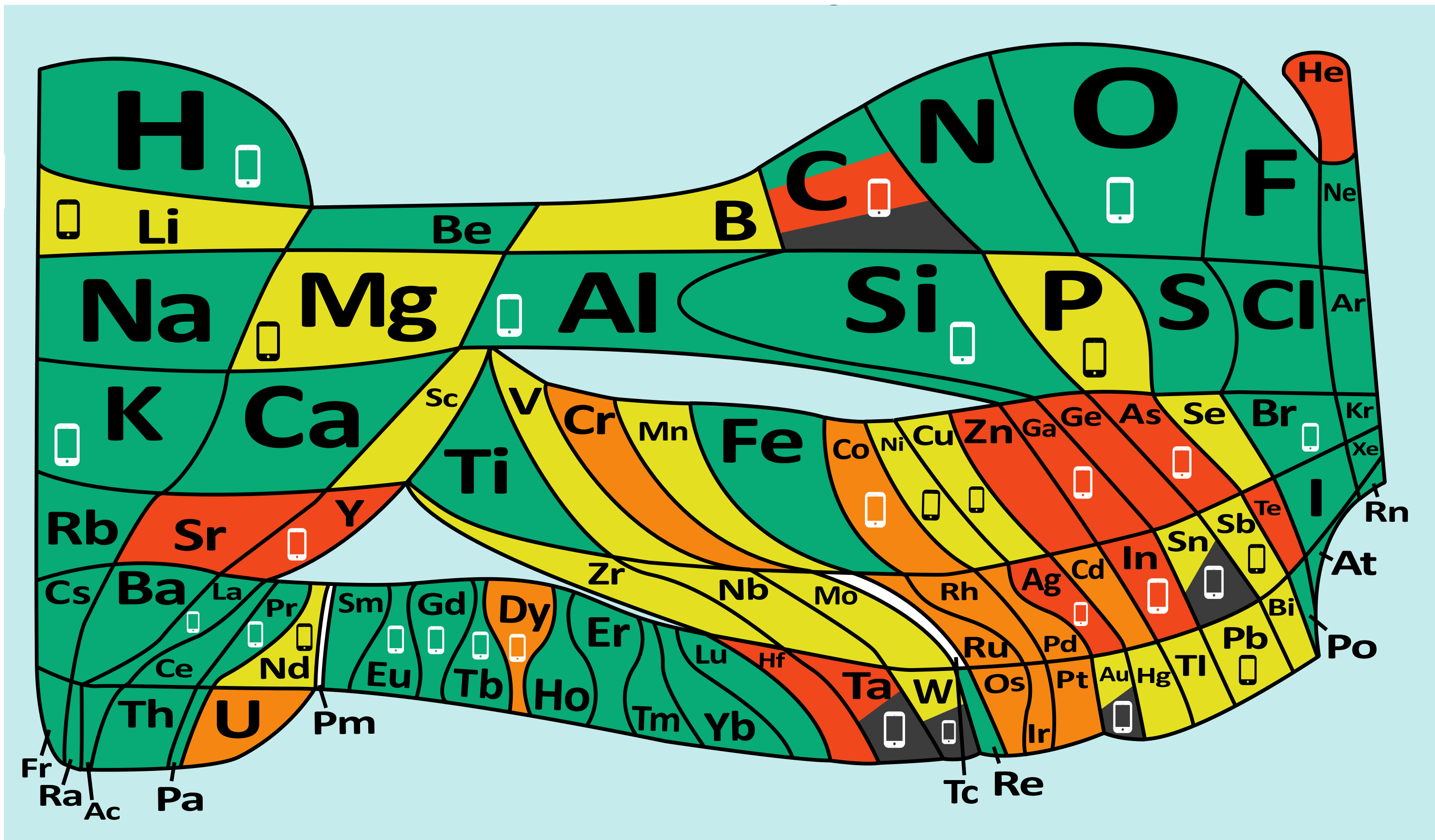
In the limit, will be absent

Plentiful supply

Synthetic

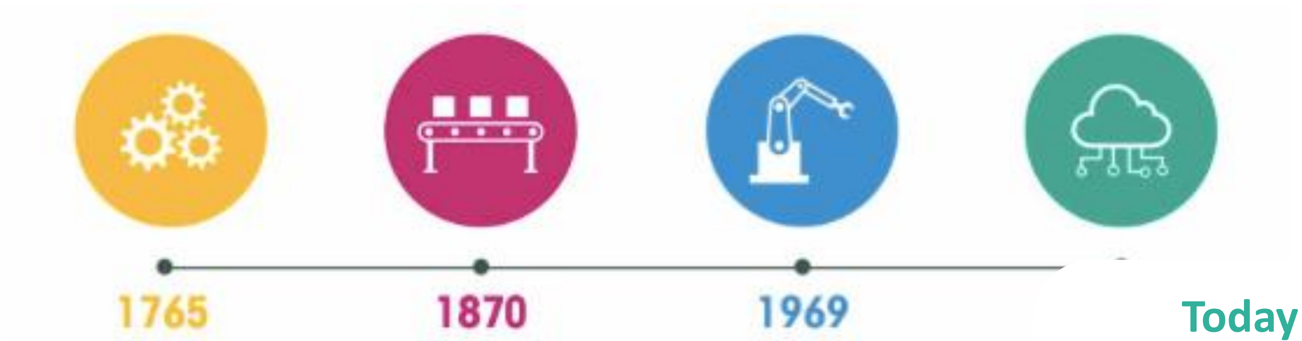
source of conflicts

Elements that constitute a cellular



Source : Association of Chemists European (EuChemS) a version of updated table _ the Mendeleev , 2021

Four Industrial Revolutions



Today!

1 Mechanization
locomotives with steam

2 Series production
Based on energy and fuels

3 Automation manufacturing
Grounded to electronics and technology information

4 New technologies
Internet, Artificial Intelligence, to much data I-Cloud, Cybernetics and more

Customer expectations !

Linear Economy

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

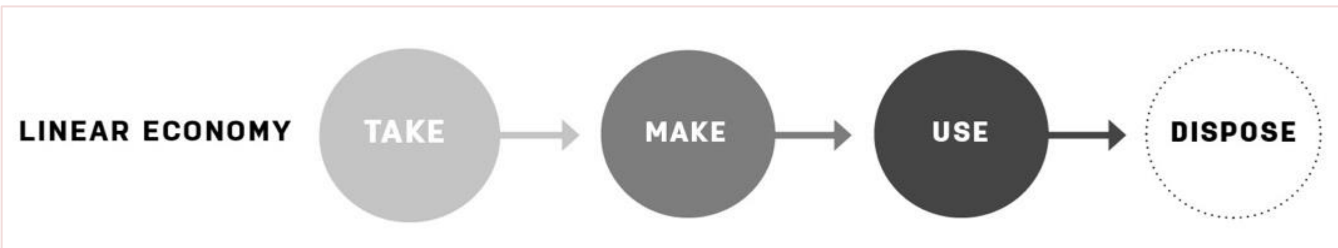
Challenge today…

Instead of being stuck with the disappointments of the present, we have the opportunity to redesign the future by opening new perspectives and horizons for us today, but also for the generations to come.

How can we transform our economy into one where ,

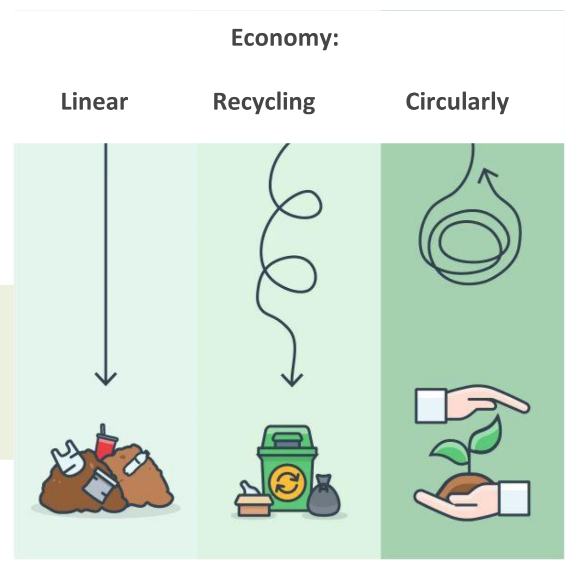
- waste will be eliminated
- sources to circulate and
- nature to regenerate?

From a Linear Economy to a Circular Economy



Let's move from the **product-oriented** economic model to the **outcome-oriented** model.

the "Take, Make, Dispose" model, where resources are extracted, later are turned into products, and thrown in the environment when often take a long time to assimilate.

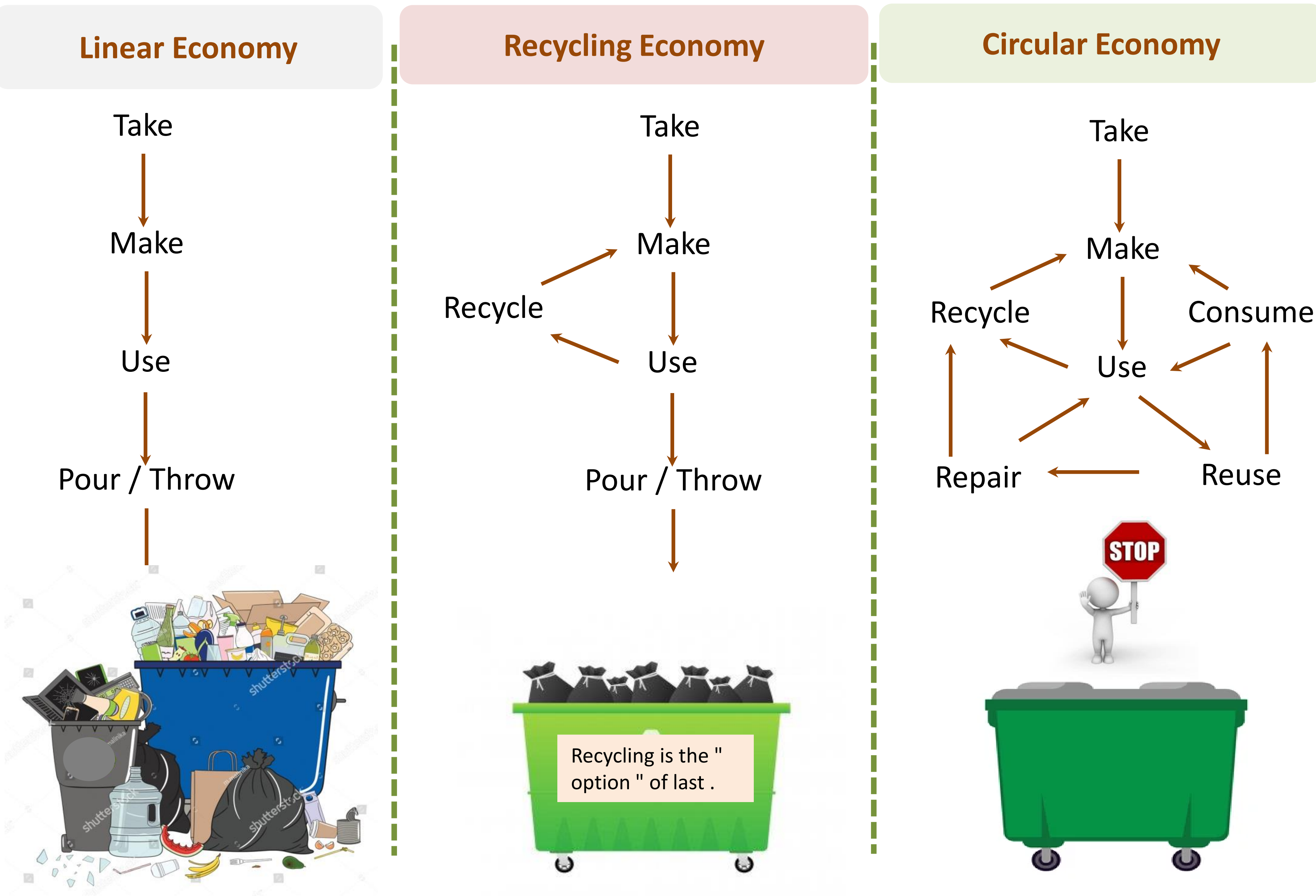


From a Linear Economy to a Circular Economy

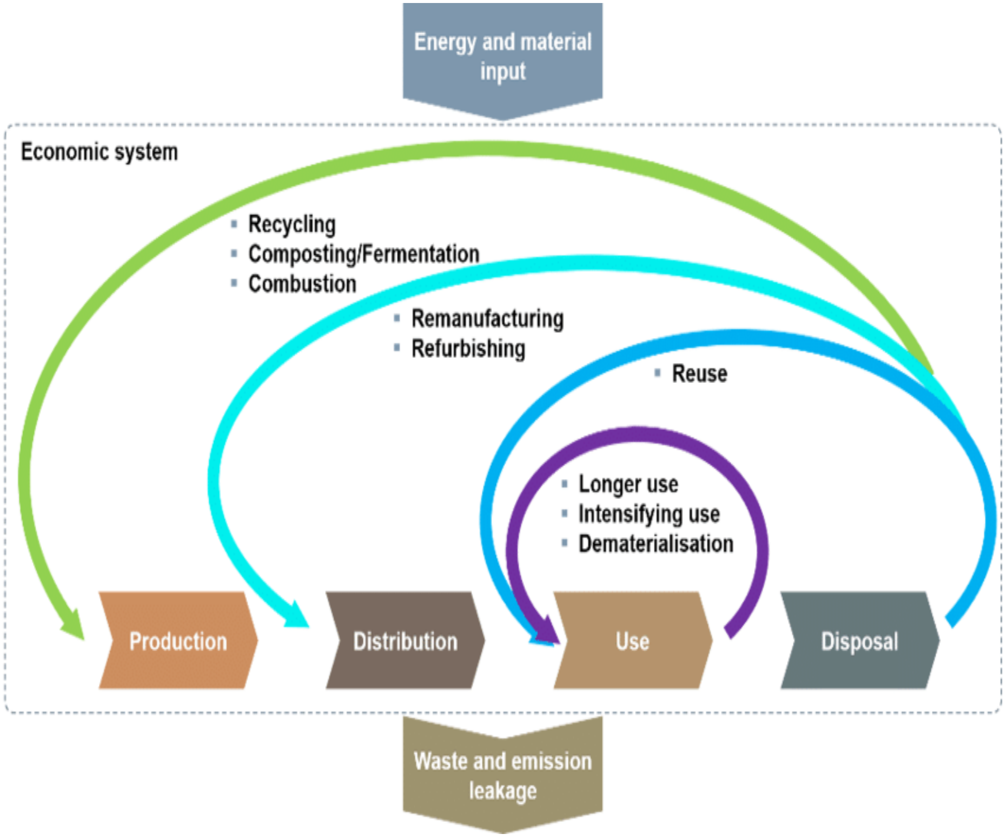
Linear Economics is not working for 3 reasons :

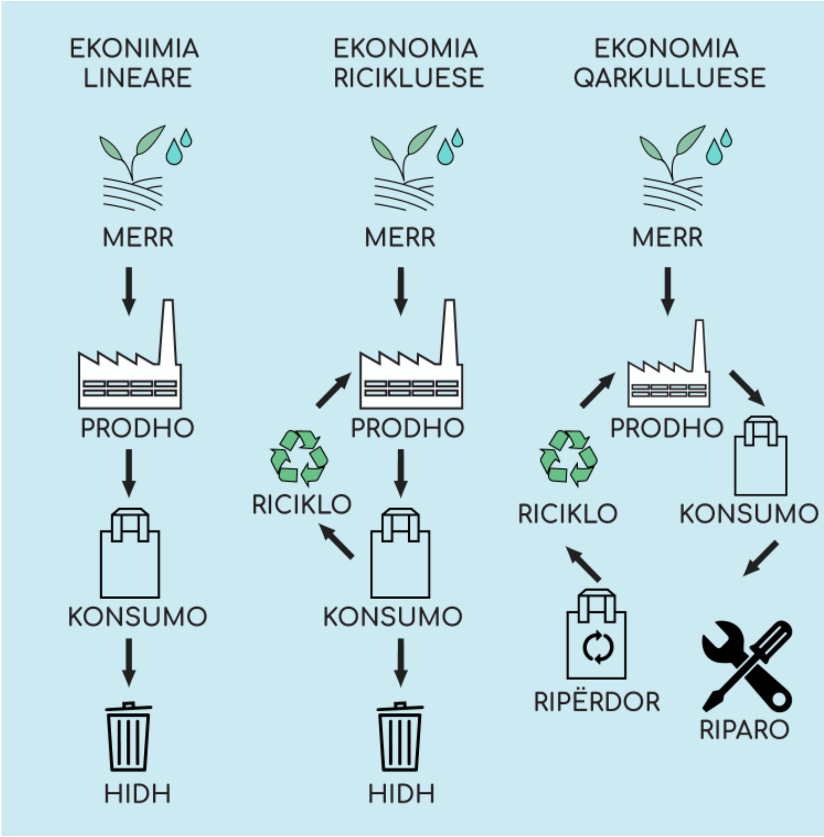
- resources such as fossil fuels, food and water are more and more dificult to found.
- Biodiversity is threatened worldwide.
- We take the ecological services provided by nature for granted.
- The financial system has almost failed.

Economic development schemes



Linear and circular economy





Circular economy definition?

The circular economy is a transformative framework:

- **Eliminates waste and pollution**
- **Circulates products and materials, and**
- **Regenerate nature**

Why do we need circular economy? What's wrong with linear economics?

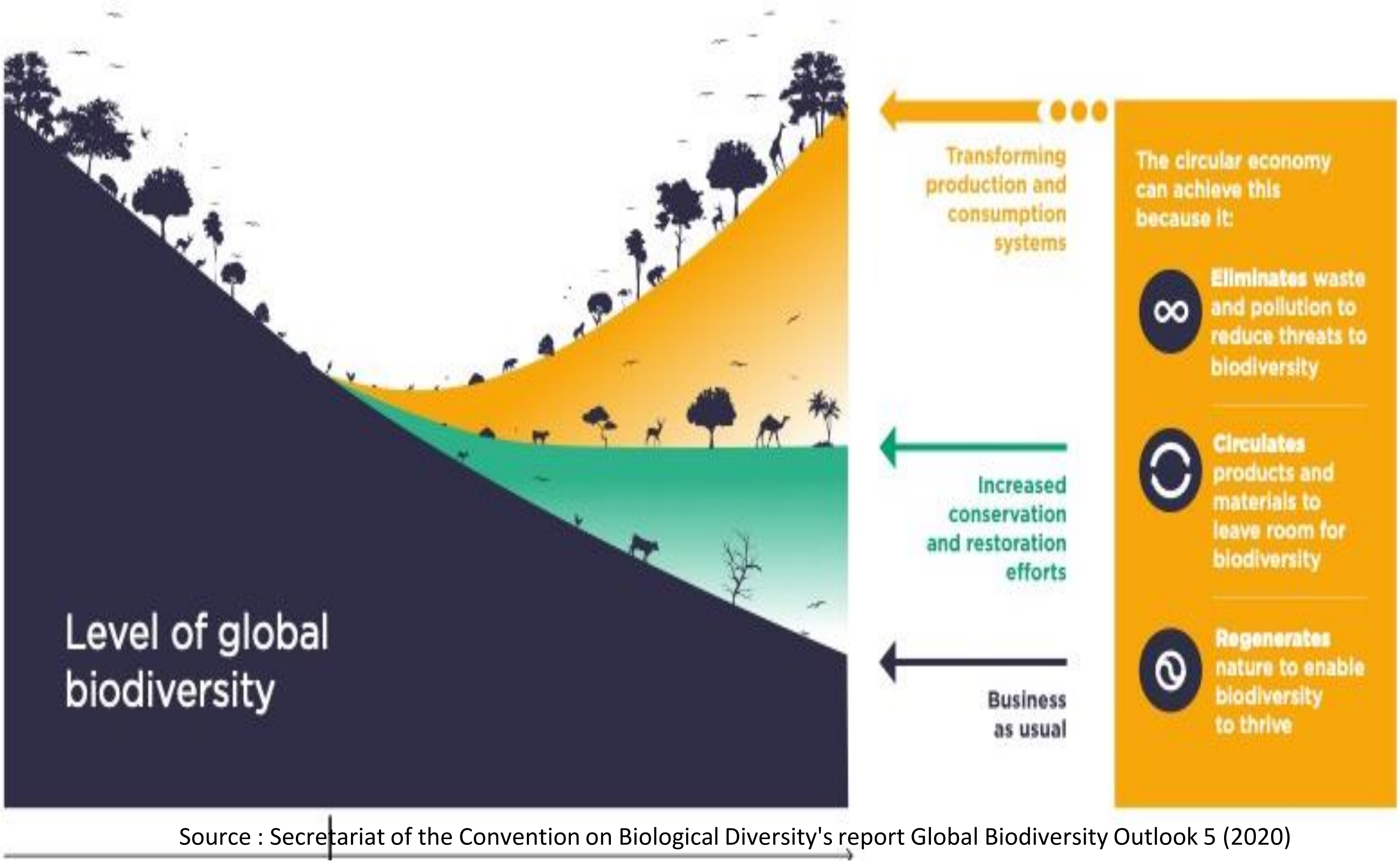
- Linear Economy underestimates biodiversity
- Linear Economy it relies on cheap materials, cheap energy and cheap credit (take credit today, pay tomorrow).
- Resources are becoming increasingly difficult to extract
- Our current financial system has become unsustainable.
- The standard of living has changed, as has our economy.

- •Cotton and polyester make up 85% of all fibres produced yearly.
- •Cotton is a very water-thirsty crop, and we need about 3 m3 or 14 tubs of water for one cotton blouse.
- •Polyester production depends on oil, and 1 kg of polyester fibre or synthetic fibre requires about 1.1 kg of oil to produce. So it's a resource-intensive industry on many fronts.

More facts:

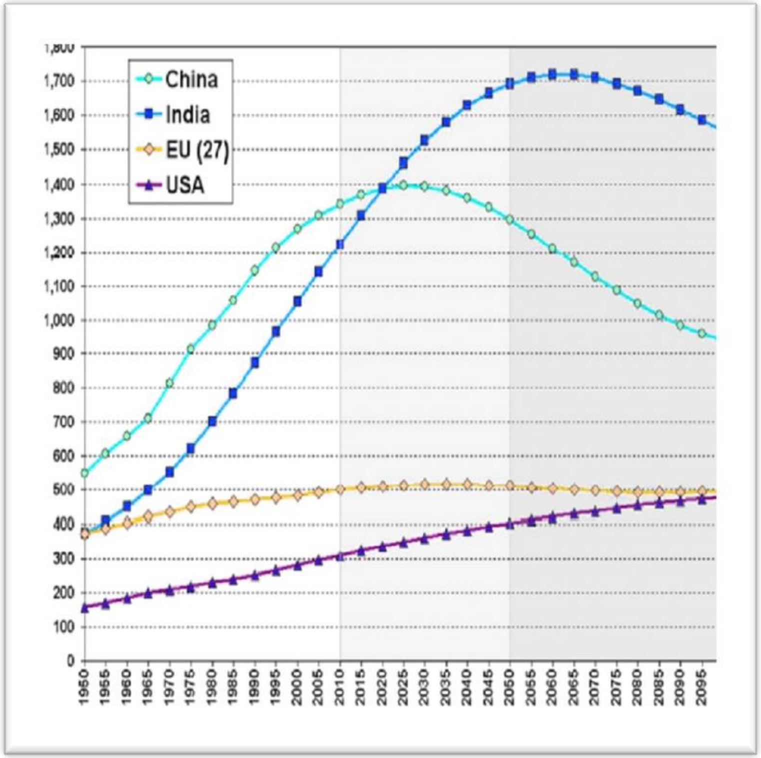
- Today, 1 ton of big blocs of rocks is moved for 1 gram of gold (Circular Economy: 300 kg of gold, >2,500 kg of silver, value >10,000 Euros are obtained from 1 ton of mobile phones)

Why we need circular economy?



Source : Secretariat of the Convention on Biological Diversity's report Global Biodiversity Outlook 5 (2020)

Why we need circular economy?



More than 3 billion new customers entering the market in the next 20 to 30 years will put enormous pressure on the resource base if we continue in our current, linear ways.

According to the UN: a World population of 7.6 billion residents today is expected to overtake IN

- 8.6 billion IN the year 2030,
- 9.8 billion in 2050 and
- 11.2 billion in 2100. (China, India)

Four principles of the circular economy

- Waste = Food
- Build resilience through diversity
- Use energy from renewable resources
- Think in system

1. Waste = Food

This principle takes into account the continuous circulation of materials and products. A substance or product that is no longer used should not become 'waste' but should become part of a new cycle of use.

Natural system, example: Birds eat berries, and poultry "waste" contains berry seeds. Consequently, the bird's "waste" is fertilizer for the blackberry seeds, enabling them to grow as plants. So the 'Waste' of the birds is 'food' for the reproduction of the blackberry.

Human-made system, example. I drink wine from the glass bottle. When the bottle is empty I throw it in the glass recycling bin. The bottle is then pressed, melted and formed into a new glass bottle. So the 'waste' of the glass bottle became 'food' for the new glass bottles.

2. Build resilience through diversity

Diverse systems with many different components are more resilient. Elasticity is defined as the system's ability to change as it continues to develops.

Natural system , example : Jungle .

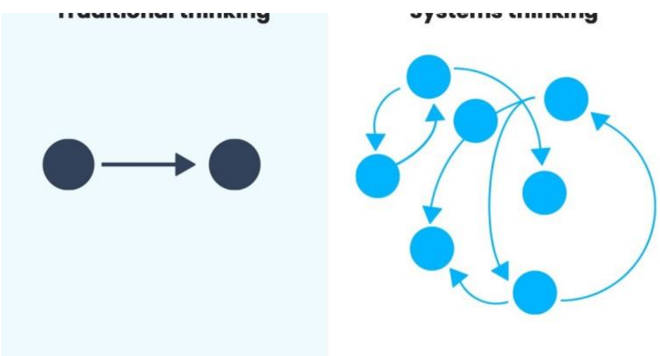
Human-made system, example; An organic farm with mixed crops (not one crop, but a variety of different plants).

3. Use energy from renewable resources

The sun is one of the primary renewable energy sources (wind energy, tidal power, etc.), but not the only one. For example, the other source is geothermal heat, created deep in the earth.

Natural system , example : photosynthesis .

Human-made system, example; A "solar" unit (converts sunlight into electricity).



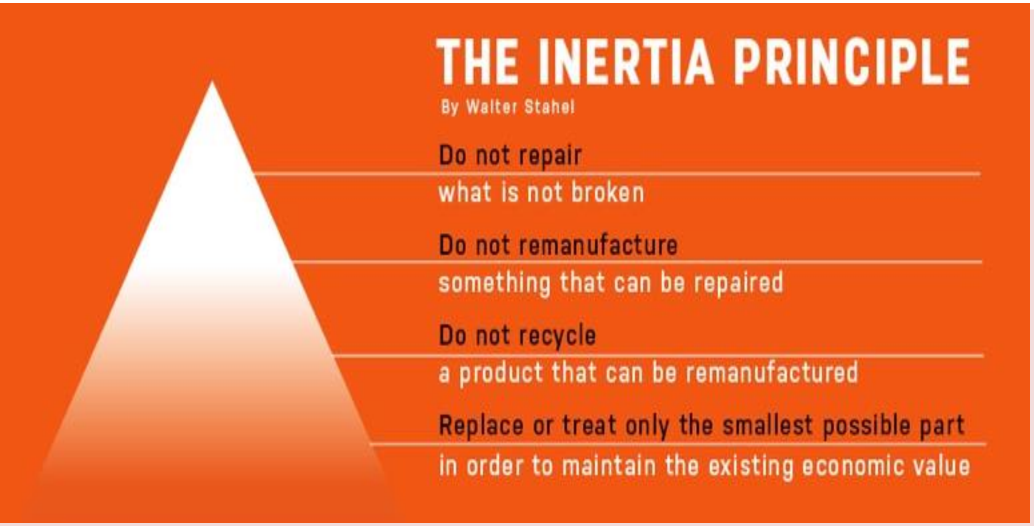
4. Think in system .

Essential is the ability to understand how parts of a system affect each other and how the whole system affects each of its part.

Natural system, example : Food chain. If one species goes extinct, it can affect many other species, as they may be interdependent.

Human-made system, example : Now we have energy saving lamps. We feel good with these, because they save electricity.

Smaller loop, big benefit in the system!



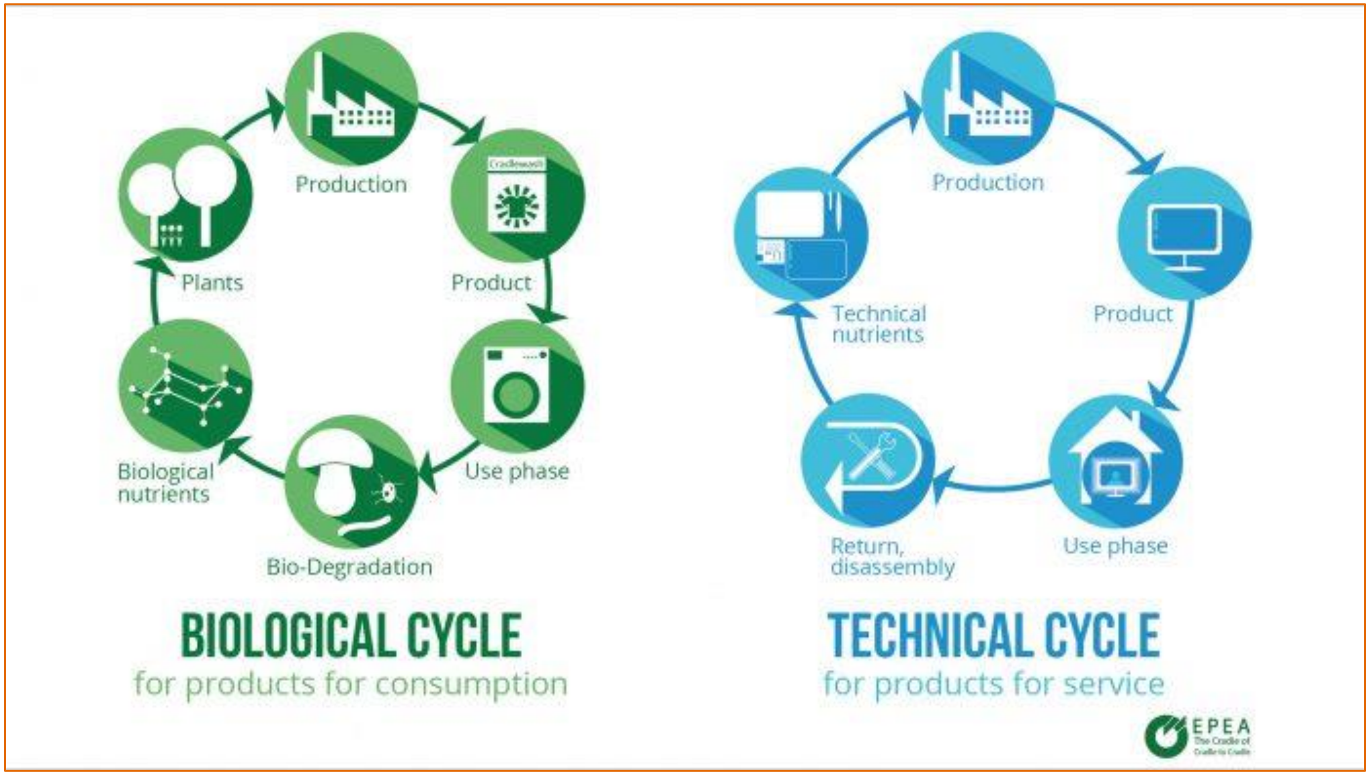
The principle of inertia:

There are two ways to extend the life of a product:

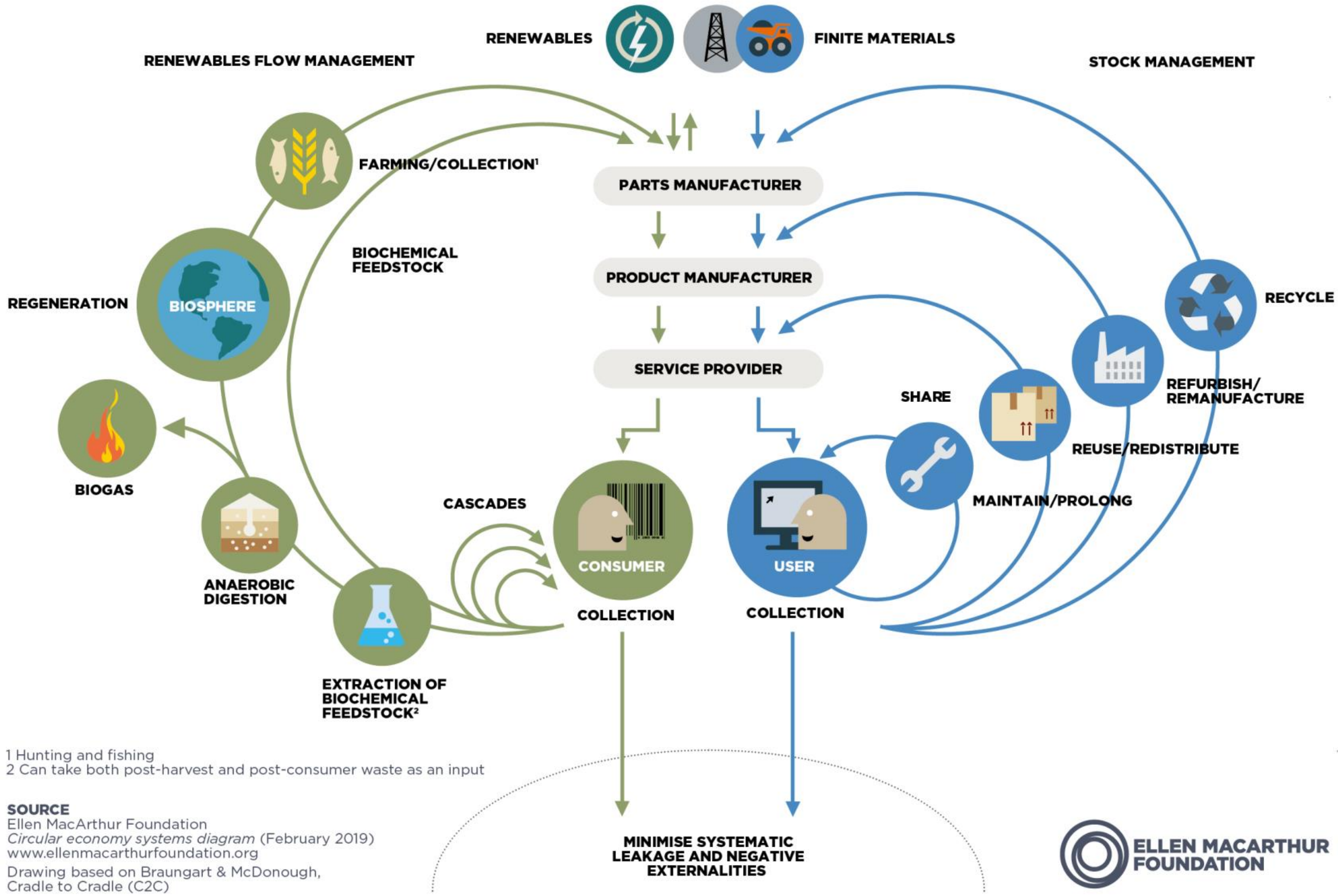
- long use and
- giving the product a second, third, etc. life

Don't repair what isn't broken,
Don't remanufacture something that can be repaired,
Don't recycle a product that can be remanufacture

Two basic cycles of Circular Economy

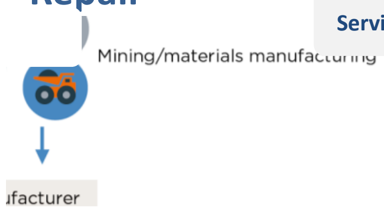


The " butterfly " diagram in circular economy



Technical Cycle Management

Maintain, Repair

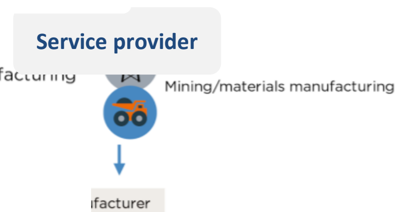


Gather

Maintenance extends the life and keeps the product in good condition.

Reuse , Redistribute

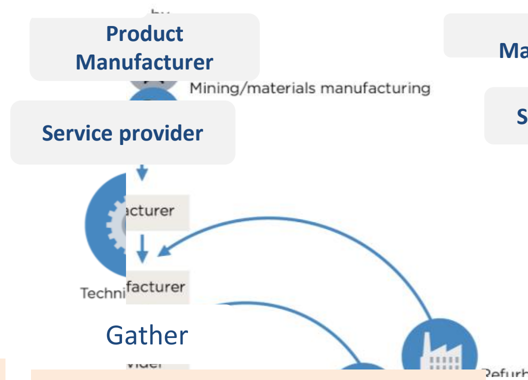
-



Gather

Redistribution and **re**use of a product.
Re-entry into use, after the first cycle, to be used again in a second, third cycle,…

Reproduce , renovate

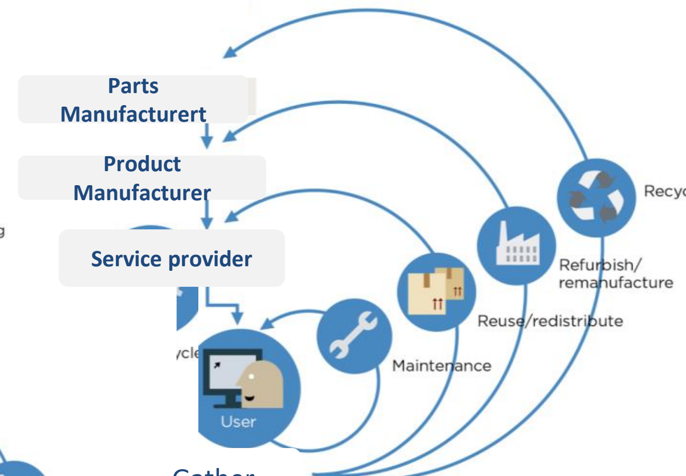


Gather

Renewal is the replacement or repair of parts that are damaged. The goal is to get the product back to working order.

Reproduce means the complete dismantling of products where the functional parts are reused in a new product. This results in products that are as good as new.

Recycle



Gather

Recycling is the process of recovering materials to be used for the same or other purposes. Recycled materials can also be used as new products.

Source : Adapted from Ellen MacArthur

Biological Cycle Management

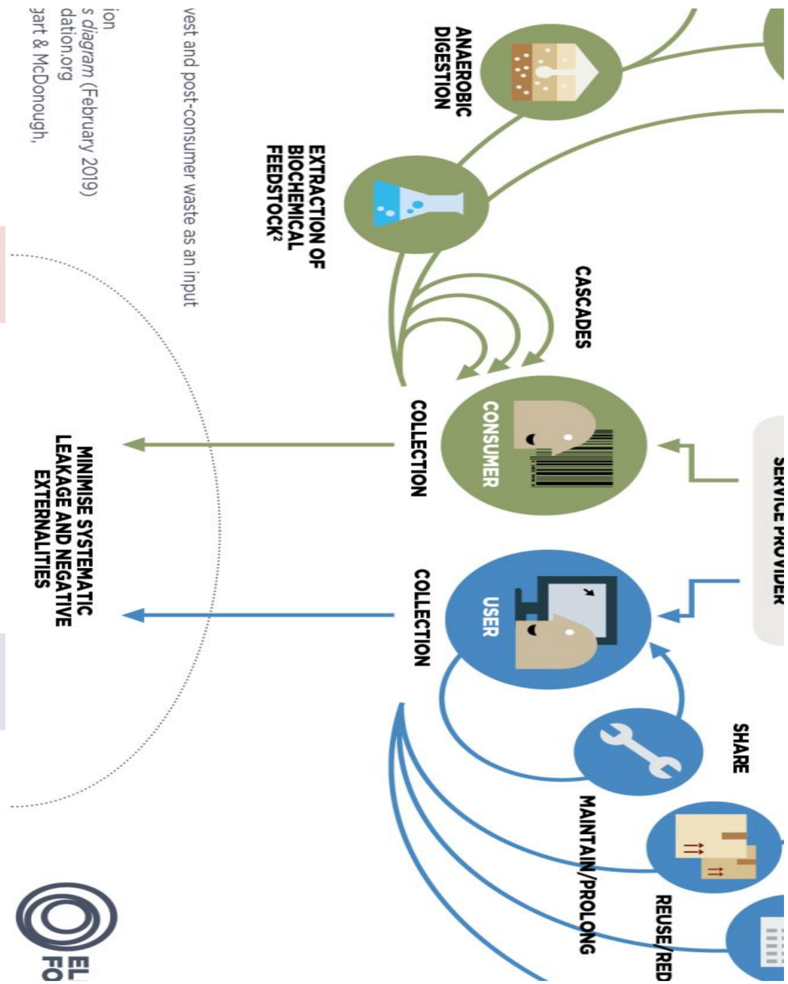
Food : agriculture , hunting , fishing .

The biosphere is the global sum of all ecosystems on the planet,her regeneration is necessary.

Composting, biological nutrients are dissolve by microorganisms and returned to the soil as new resources.

Anaerobic digestion is a fermentation process where microorganisms dissolve organic matter, and produce biogas.

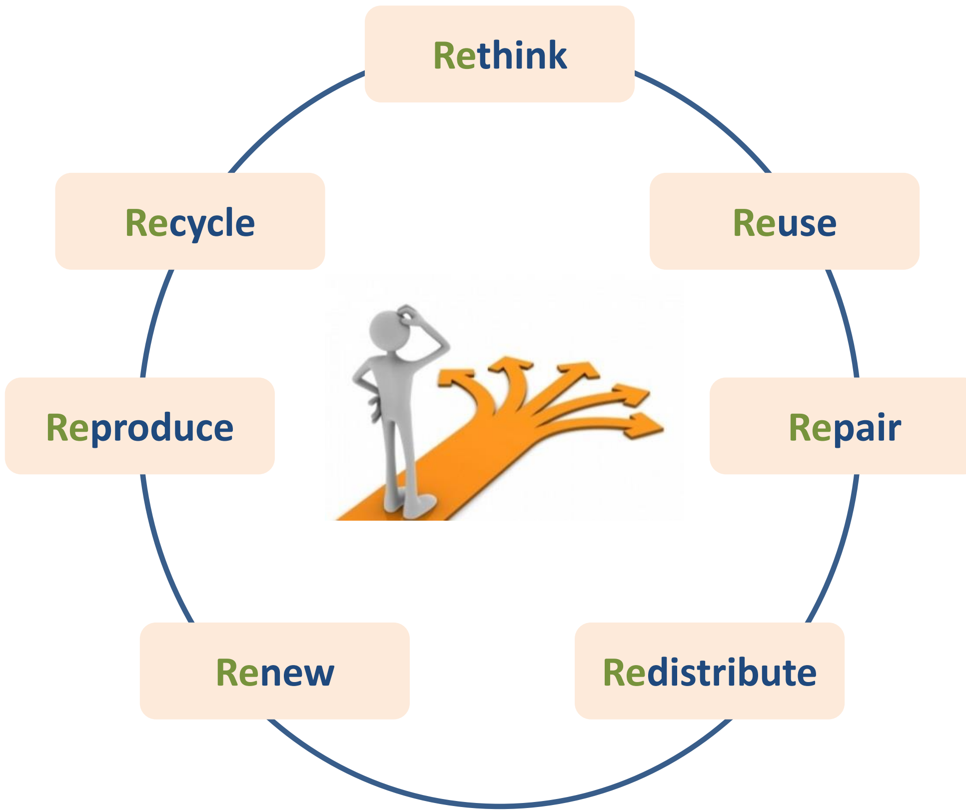
Biochemical feedstock extraction: plants or plant-based material that is not used for food can be converted into bio-fuel.



Processing is the reuse of bio-based components and materials. Eventually, the degraded material is able to be safely returned to the biosphere. **Recycling** is the process of recovering materials that will be used for the same purpose or for other purposes. Recycled materials can also be used for new products.

Source : Adapted from Ellen MacArthur

The 7 R's of Circular Economy



So , the Circularly Economy is ..

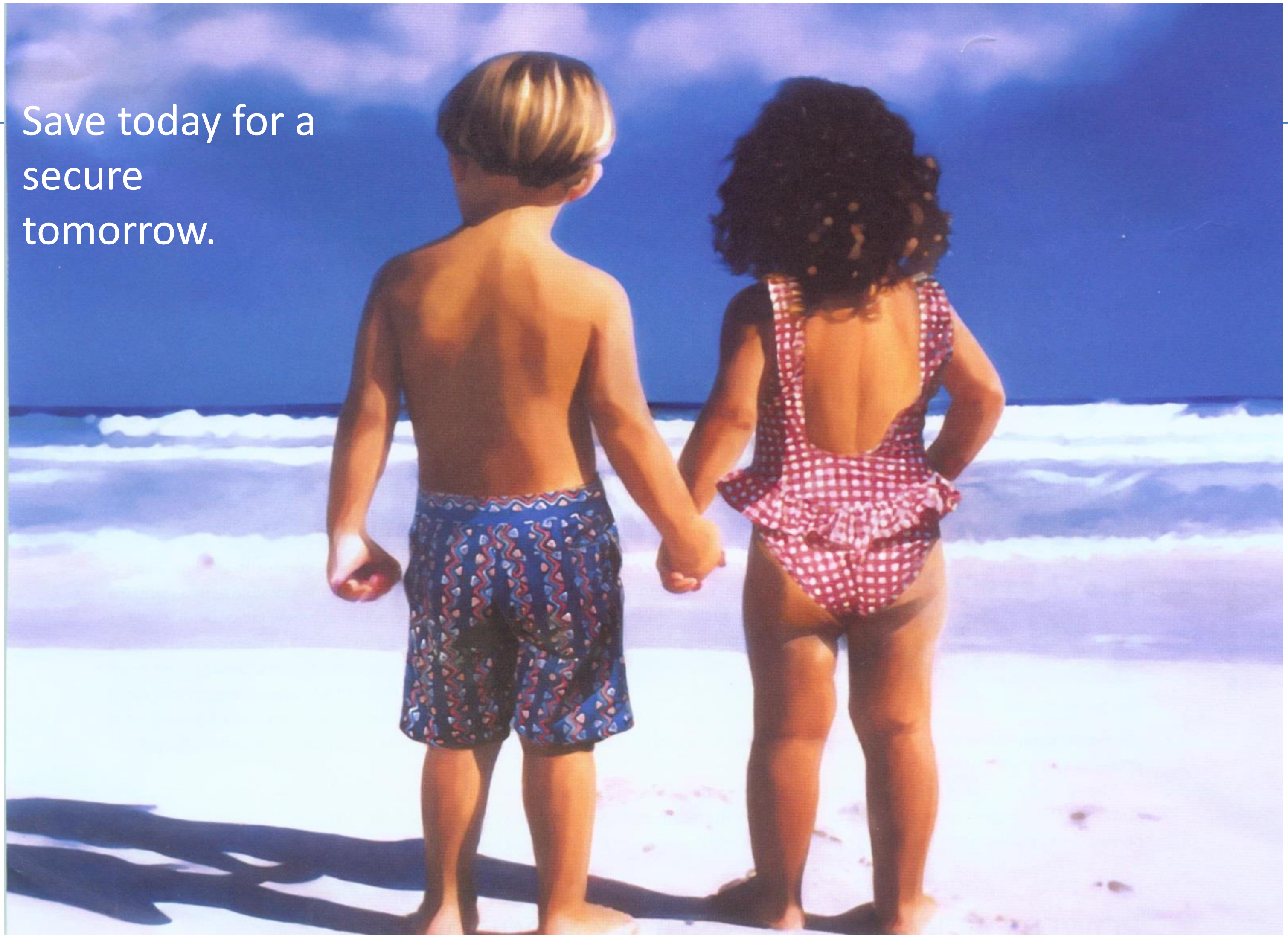
(Re) Design of wastes and pollution

Circulation of products and materials

Natural system recovery

Solution for all!

It's time to turn trash ,
into the treasure !!



Their future is our concern !

Thank you , Prof. Enkelejda Gjinali.

Free Discussion !

Lunch !

References

- OECD, *The Circular Economy: What, Why, How and Where,* *https://www.oecd.org/cfe/regionaldevelopment/Ekins-2019-Circular-Economy-What-Why-How-Where.pdf*

- The Ellen MacArthur Foundation, *Toward the Circular Economy, 2013, https://ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-*

- European Environmental Centre, *Beyond water quality —Sewage treatment in a* circular