

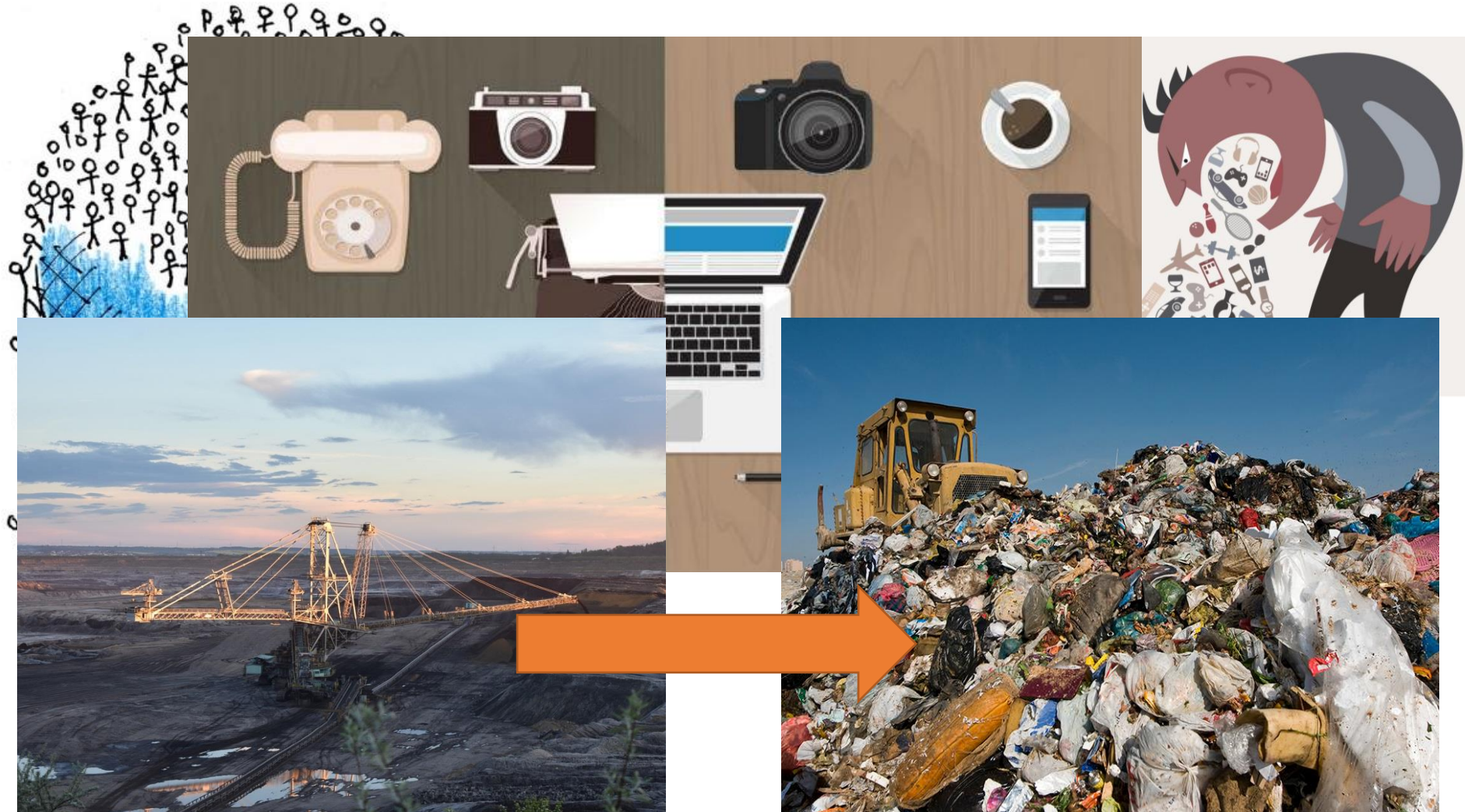
M3. Environmental Management, Impact and Risk Assessment

3.2. Circular economy

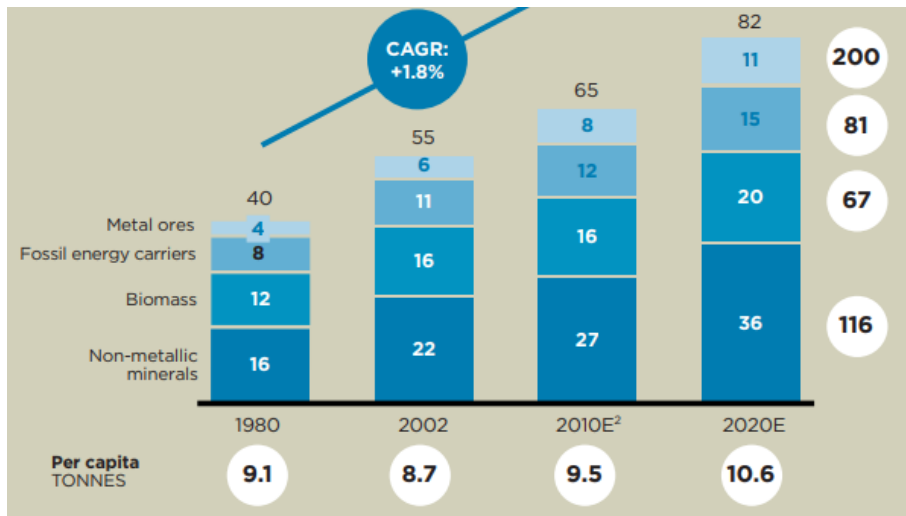
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Environmental effects and impacts



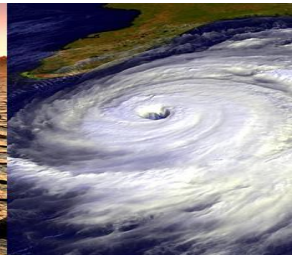
Linear economy



✓ **21 billion tons** of **materials** used in production **do not get incorporated** in the final product

Linear economy - limitations

- Loss of value in materials and products → non-recycled waste
- **Exhaustion of limited resources** → Security and stability of supplies of raw materials
- Interdependence of countries with different resources
- **Waste generation** → the life product is constantly declining, consumers want new products faster
- **Environmental degradation and climate change**
- Price and supply risks

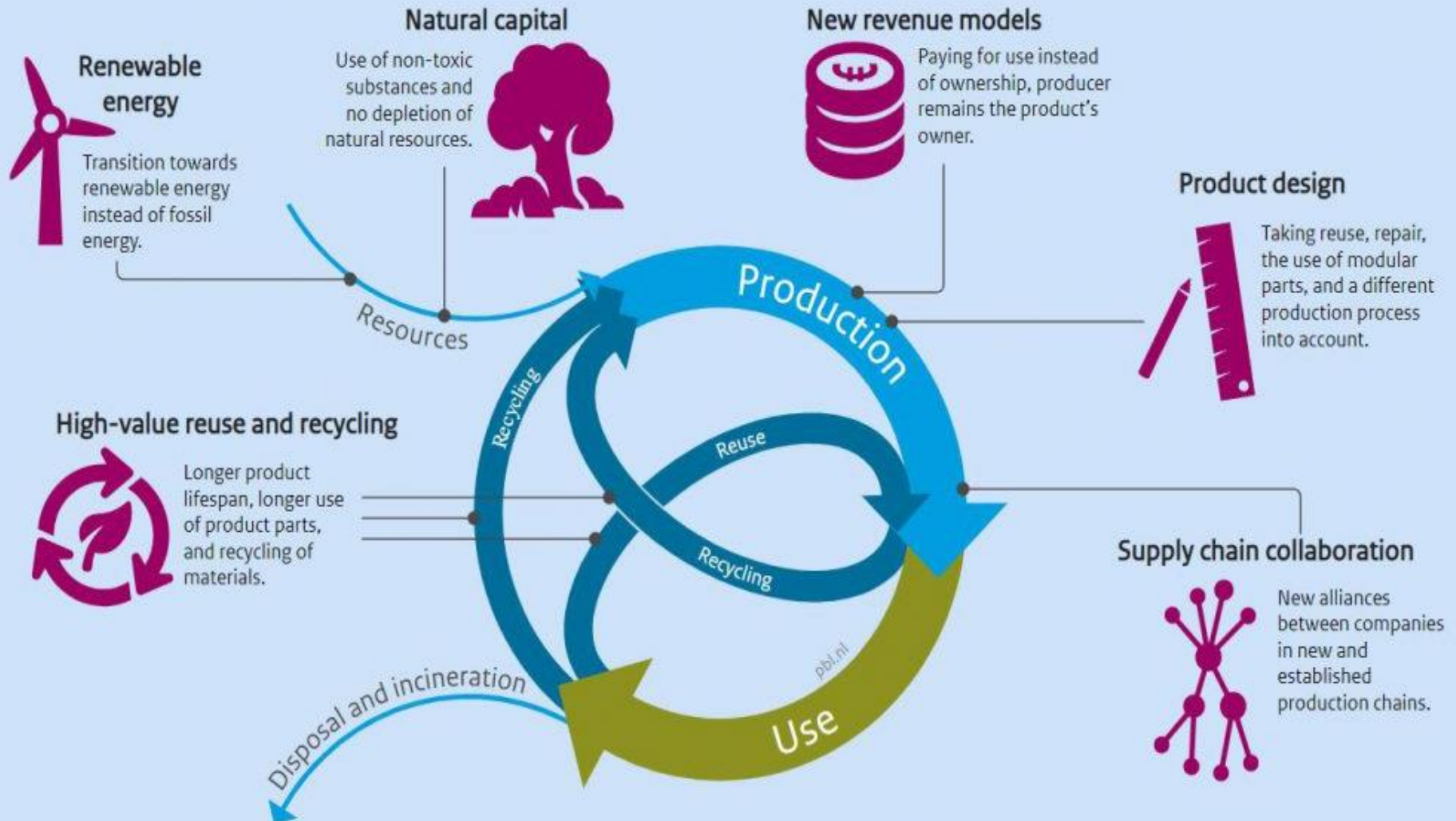


Circular economy

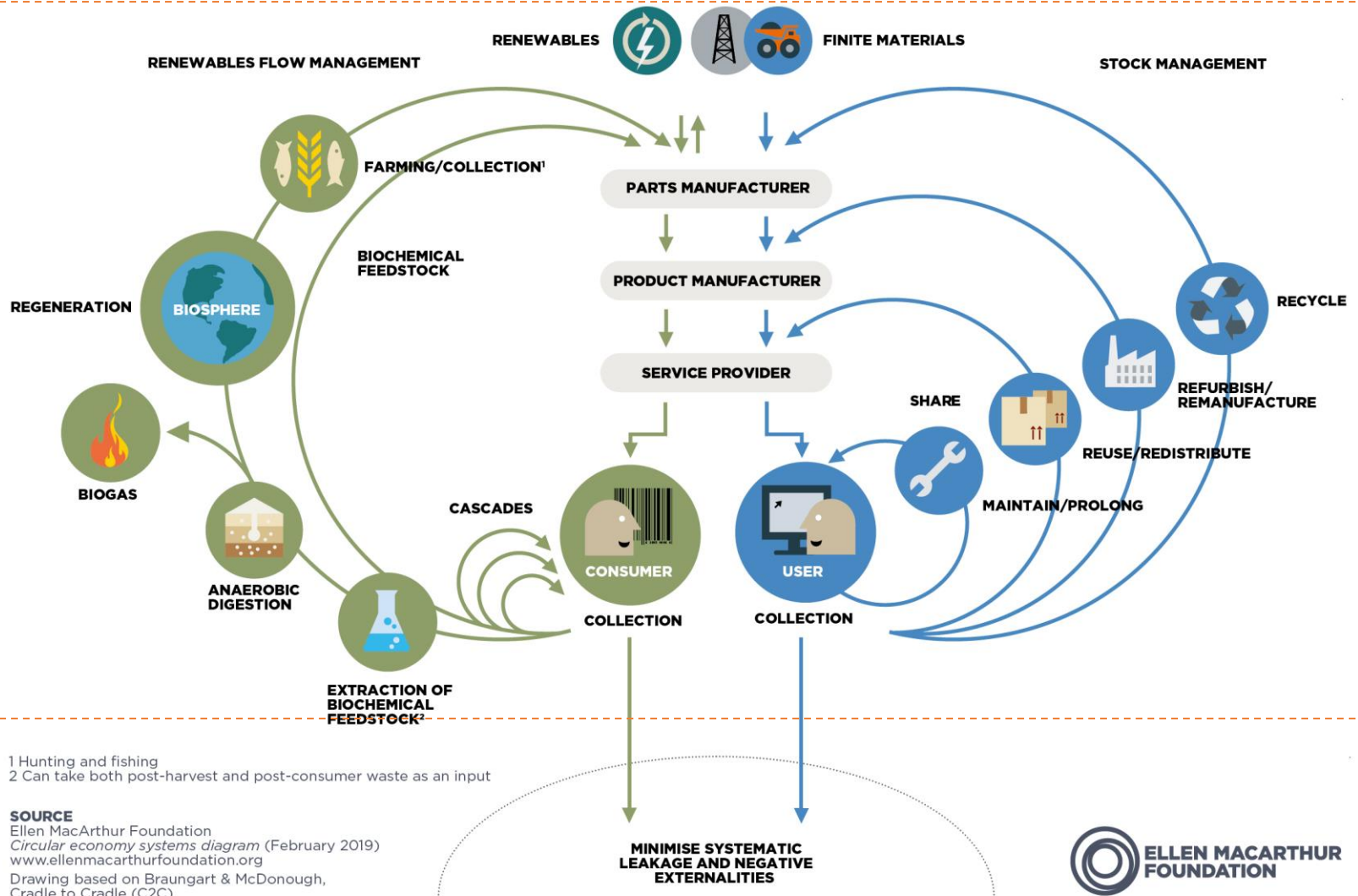


- ***Circular economy is an economy that produces zero waste.***
- It is a new paradigm, an economic circuit in which, from the design phase, the design of products or processes, falls into two categories: either it uses a biodegradable component or a component with 100% recycling potential.

Circular economy



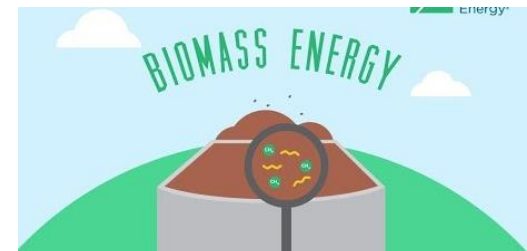
Circular economy principles



Circular economy principles

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

- When resources are needed, the circular system selects them wisely and chooses technologies and processes that use renewable or better-performing resources, where possible.
- A circular economy also enhances natural capital by encouraging flows of nutrients within the system and creating the conditions for the regeneration of, for example, soil.

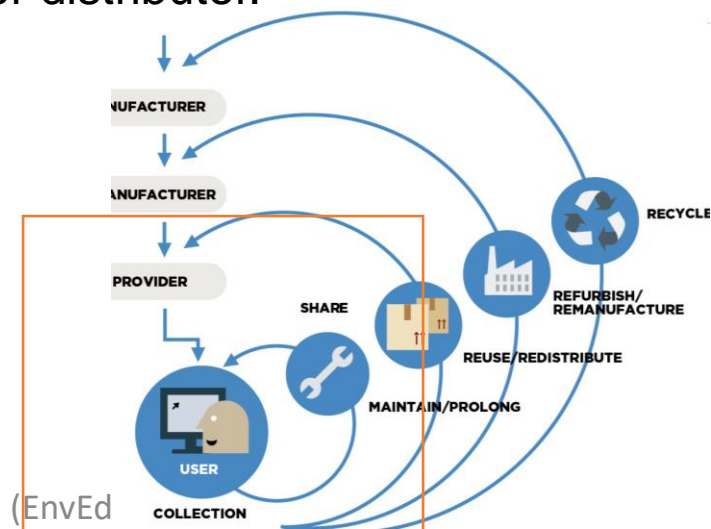


Circular economy principles

Principle 2. Resource Loops

Reuse cycles are used to exploit the residual value of a product after the consumer no longer wants it. Ex: second hand market (second hand market).

- ✓ creates a market for consumers to generate value from purchases that are considered unnecessary or unused.
- ✓ This loop delivers the product to a service provider or distributor.

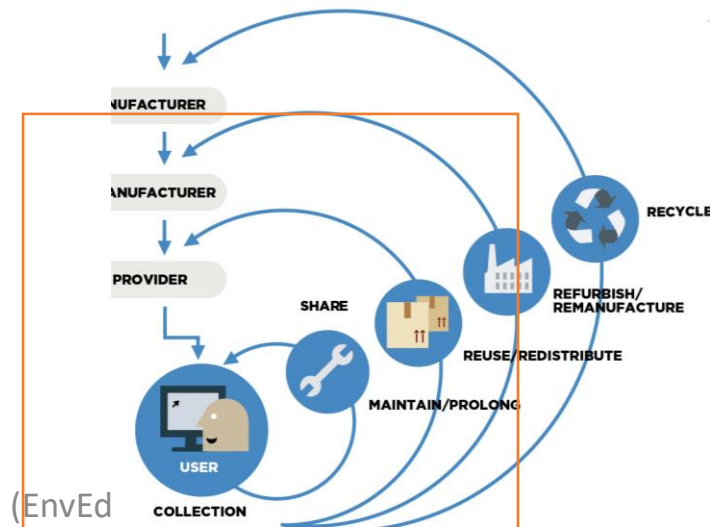


Circular economy principles

Principle 2. Resource Loops

Reconditioning - renewal, re-manufacture and restoration of a product in a new state and / or appearance. When a product has a high level of wear or consists of several components, the component parts of one product are used to repair another product.

→ The reconditioning loop delivers the product back to the product manufacturers to be reintegrated into their supply chain.

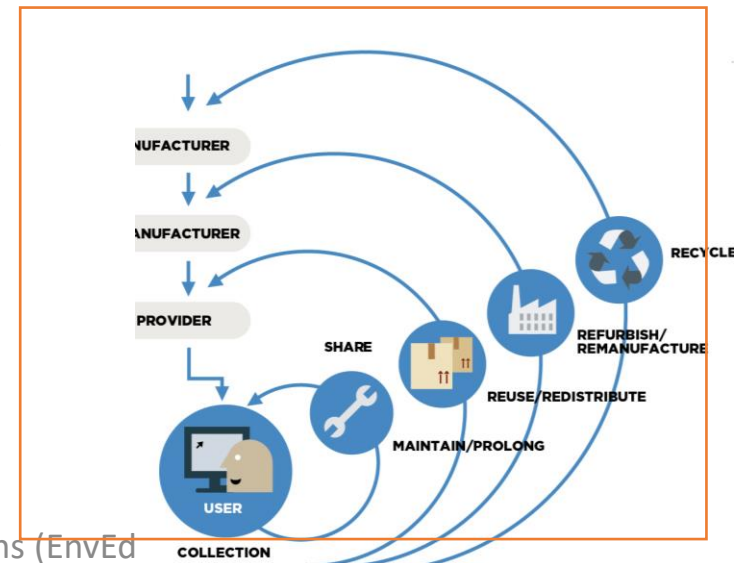


Circular economy principles

Principle 2. Resource Loops

Recycling turns waste into reusable materials

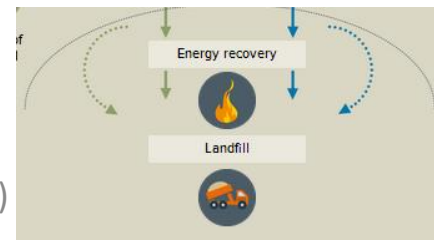
- focuses on the intrinsic value of the materials used in the manufacture of products
- reduces the impact on raw material consumption
- reduces the consumption of raw materials by creating alternative materials, often at a reduced price and with fewer limited resources.



Circular economy principles

Principle 3. Design for system efficiency

- ✓ refines the process of the circular economy by revealing and design negative externalities.
- ✓ includes the reduction of damage to systems and areas such as: food, mobility, shelter, education, health and management of externalities, such as: land use, air and water pollution, noise pollution and the release of toxic substances into the environment.
- ✓ Efficiency and effectiveness are key factors for the success of the circular economy.
- ✓ Negative externalities are known as costs incurred by a third party (recovery of wasted resources).

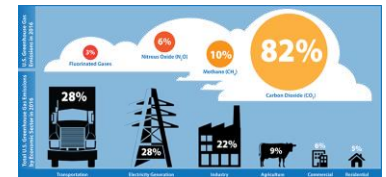


Circular economy benefits

Fewer Greenhouse Gas Emissions

The circular economy has the potential to reduce greenhouse gas emissions and the use of raw materials, optimize agricultural productivity and decrease the negative externalities brought by the linear model. When it comes to reducing greenhouse gases, a circular economy can be helpful:

- ✓ Because it uses **renewable energy** that in the long run is less polluting than fossil fuels.
- ✓ Thanks to **reusing** and **dematerializing**, fewer materials and production processes are needed to provide good and functional products.
- ✓ Because residues are seen as **valuable** and they are absorbed as much as possible in order to be reused in the process.
- ✓ Since the preferred choices will be **energy-efficient** and **non-toxic materials** and manufacturing and recycling processes will be selected.



Circular economy- benefits

- **Fewer Negative Externalities** → negative externalities such as land use, soil, water and air pollution are better managed, as well as the emission of toxic substances and climate change.
- **Substantial material and energy savings** → the circular economy model has the potential to lead to a bigger (up to 70%) amount of material savings. On the environmental point of view, it also avoids bigger pollution materials would represent.
- **Increased Potential For Economic Growth**
- **Volatility Reduction And Safeguarded Supplies**
- **Improved customer interactions and loyalty**



Circular economy- benefits

- **Healthy and Resilient Soils**
- **Conservation of nature reserves**
- **Creation of employment opportunities** (increasing recycling and repair practices, new innovation processes)
- **The possibility of influencing prices decreases**
- **New Profit Opportunities**
- **The Demand For New Services**
- **Improving products and reducing production costs**



Upcycle House

The house is built of processed recycled materials and Upcycle House investigates how much it's actually possible to reduce the CO₂ footprint by using upcycled materials to the extent possible.

The loadbearing structure: two prefabricated shipping containers

The roof and facade cladding is made from recycled aluminium soda-cans.

Facade panels - post-consumer recycled granulated paper.

The kitchen floor is clad in tiled champagne cork-leftovers, and the bath tiles are made from recycled glass.

Walls and floors are covered with OSB-panels consisting of wood-chips that are bi-products of various production sites, pressed together without glue.

The CO₂ emission from Upcycle House is **0,7 KG CO₂/M²/YR** compared to **5,0 KG CO₂/m²/yr for a benchmark house**.

A potential reduction of 5590 tons of CO₂ – per year.



What : Passive solar energy

How : The water in the plastic bottle wall absorbs the sun's rays, which counters potential overheating during the summer.

What : Natural ventilation

How : Operable windows placed in the optimal heights enables natural ventilation, which lowers the need for mechanical ventilation.

What : Indoor climate

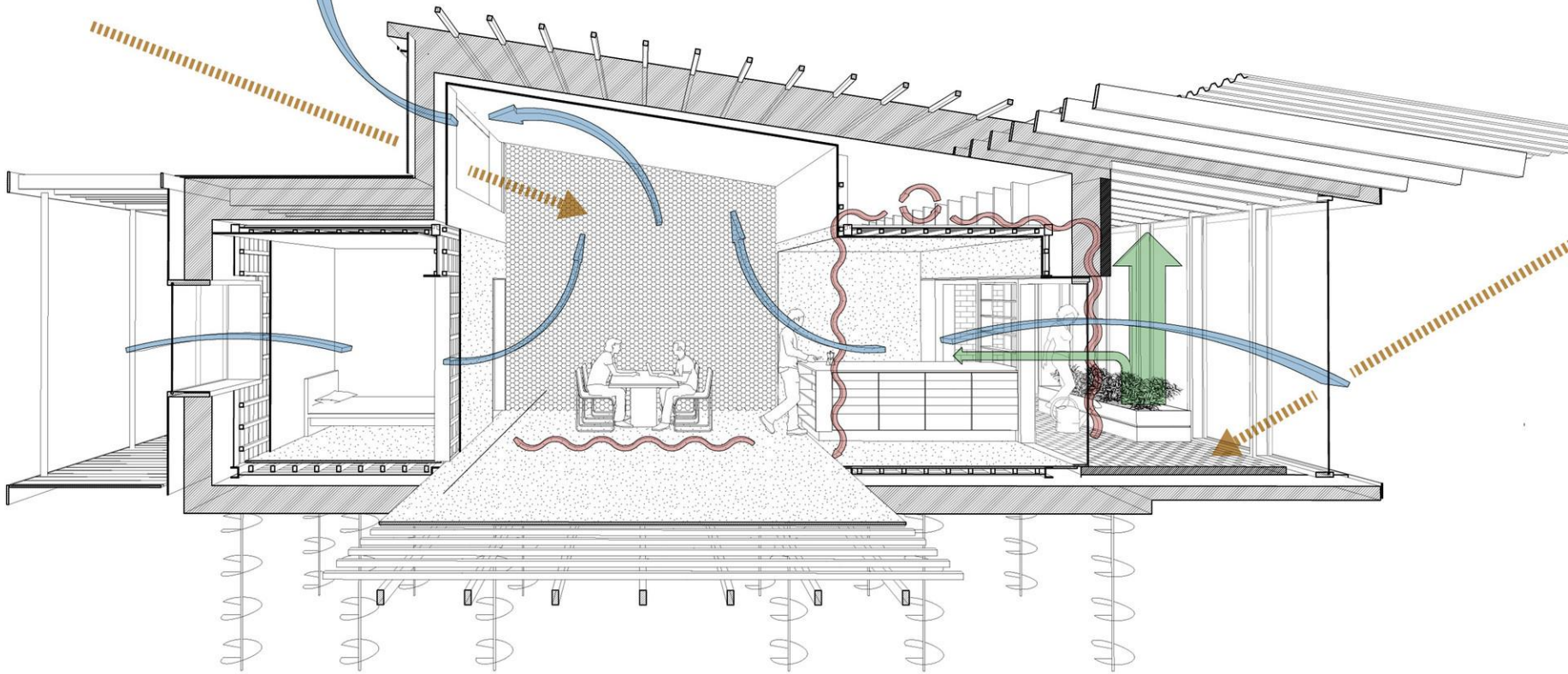
How : The clerestory window facing west, is dimensioned to allow for maximum light in-take without risk of overheating and glare issues. Correct use of daylight minimizes the energy, consumed by electrical lighting.

What : Ventilation strategy

How : In the void between the container and the roof, a air-to-air ventilation system is installed, that utilizes the difference in temperature between the green house and the interior spaces.

What : Bio-diversity

How : The flora of the greenhouse results in an increase in biodiversity, and contributes with a higher understanding of natural cycles. The plants also generate oxygen, which results in a better indoor climate.



What : Roof overhang

How : The roof overhang around the house provides covered outdoor areas, making them useable for bigger parts of the year. The overhang also shields the facade from the rain, so maintenance costs are kept low.

What : Shading

How : The roof overhang protects the house from solar rays, so the risk of overheating is minimized during the summer.

What : Thermal mass

How : The greenhouse is clad with recycled bricks, that function as thermal mass. The bricks are heated by the sun, and the excess temperature in the greenhouse can be tapped, when the overall temperature of the house has dropped.

What : Homegrown

How : The east-facing greenhouse allows for homegrown produce, which lowers the need for storebought food and has a positive impact on the family's economy.

Thank you for your attention!



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