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5.3 Introduction of circular business strategies in the textile and clothing sector

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Funded by the Erasmus+ Programme of the European Union

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This educational material was developed within Erasmus+ funded project *Education Partnership of Textile and Clothing Sector Materials & Sustainability (SusTexEdu).*

The aim of the project is to research and develop education related to the textile and clothing industry and textile materials, sustainable development and the circular economy

Project coordinator: Metropolia AMK (FI)
Partners: Hogent (BE), Mome (HU), Omnia (FI), TTHK (EE), TTK UAS (EE), University of Borås (SE)
Funding: *Erasmus+*
Project duration: 2022-2024

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About the use of study material:

This educational material forms a learning package that will be tested in the project's partner organizations in the fall of 2023.

As this study material is still in the testing phase, it should not be distributed to people outside the course.

Students are asked for feedback about the study unit with an electronic survey, the answer to which is optional.

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Organizational aspects of learning …

CONTENT

- Circular economy concept
- Sustainable development and circular economy
- Material cycles in the circular economy
- Circular economy strategies (to maintain or increase the value of the material)

COMPETENCE-OBJECTIVES

After completing the course, the student will be able to:

- Explain the meaning and necessity of the circular economy
- Knows how the concept of sustainable development was formed
- Can describe, how to relate it to the circular economy
- Describe different material cycles
- Name circular economy strategies and can create connections with the field

WORKLOAD

At TTK, the study module corresponds to one (1) credit, i.e. xx hours:

- Lectures, 2 x 2 hours
- learning activities, 2x2.5 hours
- Independent reading assignment, 6 hours
- Electronic mini-exam, 12 hours

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Introduction to Circular Economy

Introduction of Circular Economy Strategies
1. PART

Today ...

- ...we think about what circular economy means and how it has been tried to be defined. Let's talk about the importance of the circular economy (for the environment, people and the economy).
- ...we will look at concepts such as the linear economic system and sustainable development and find out how the circular economy is related to them.
- ...we learn about circular economy strategies
- …we are trying to understand what connections the circular economy has with the textile and clothing industry

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Background of circular economic thinking

The circular economy has been talked about for decades in terms of different concepts and has many thinking models and ideologies associated with it, so it is difficult to trace its exact origins.

- Knees 1988, Pearce and Turner 1990.

Examples are e.g. cradle-to-cradle product life cycle (life cycle), product-service systems, sharing economy.
Find out more *Ellen MacArthur foundation*

"What is the circular economy?"

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Some of the legal foundations of the circular economy and the events that gave birth to the idea and regulations of sustainable development

1972 in Stockholm, the first UN environmental conference Human Environment

1972 Stockholm Declaration

- 1972 UNEP (Establishment of the United Nations Environment Programme)
- 1972 "The limits of growth" (Meadows, et.al), Club of Rome
- **1987 The Brundtland Report ,“Our common future” (Oxford University Press)**
- **1992 Concept of Sustainable Development (Rio Declaration, Earth Charter), Rio de Janeiro**
- **1992 - UN Environment Conference Environment and development**

  Harmony of man and environment

  Recognizing that a damaged environment precludes a person's quality of life

  Principles of international environmental law
- 2012 Rio + 20, The Future We Want

2015 NY, Agenda for Sustainable Development - 17 Goals for 2030+

2015 Paris Climate Conference. The Climate Agreement was signed in 2016

2022 Stockholm +50 - *A healthy planet … UN Environmental Conferences*

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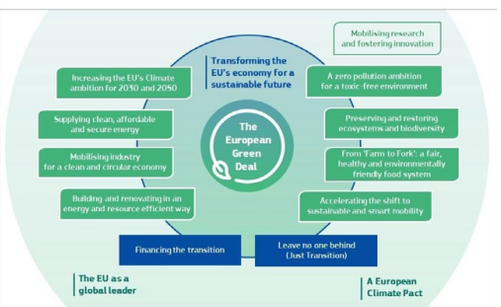
International and regional agreements

UN Paris Climate Agreement

1. Long-term perspective (long-term low greenhouse gas emission development strategies (LT-LEDS)). Transparency.
2. Focus on global reduction of climate impact. 3 main goals:
3. to keep the global temperature rise below 1.5 degrees Celsius until the end of the century.
4. Increase the capacity to adapt to climate change.
5. incl. Carbon-free solutions becoming competitive (in economic sectors that account for more than 70% of emissions (mainly transport, electrical production)).



European Green Deal

"Fit for 55" goal - to reduce GHG emissions by at least 55% by 2030, compared to the (base) year 1990.

A climate-neutral continent by 2050.
Economic growth decoupled from the use of resources.

Implementation of circular economy strategies

Circular Economy Action Plan *CEAP* (2020).

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Extract from Circular Economy Action Plan - CEAP

Commission will consider establishing sustainability principles and other appropriate ways to regulate the following aspects:

- **improving product durability, reusability, upgradability and reparability,** addressing the presence of hazardous chemicals in products, and increasing their energy and resource efficiency;
- increasing recycled content in products, while ensuring their performance and safety;
- enabling remanufacturing and high-quality recycling;
- reducing carbon and environmental footprints;
- restricting single-use and countering premature obsolescence;
- introducing a ban on the destruction of unsold durable goods;
- **incentivising product-as-a-service or other models where producers keep the ownership of the product or the responsibility for its performance throughout its lifecycle** ;
- mobilising the potential of digitalisation of product information, including solutions such as digital passports, tagging and watermarks;
- rewarding products based on their different sustainability performance, including by linking high performance levels to incentives.

Lesson activity 1.

What is meant by the circular economy?

Think yourself

What do you already know about the circular economy?

What is the first thing that comes to mind when you think of the word "circular economy"? Write down your thoughts. Keep the note.

Time 5 min

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Lesson activity 1.

What is meant by the circular economy?

Group of 2-3

Discuss what is your perception of the circular economy?

How do your perceptions differ?

Time 10 min

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Lesson activity 1.

What is meant by the circular economy?

Group of 2-3

Based on your current knowledge, how would you define circular economy?

Write down a short (sentence) definition.

Time 10 min

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In order to understand why the circular economy is being talked about so much now, we need to understand the current production and consumption models.

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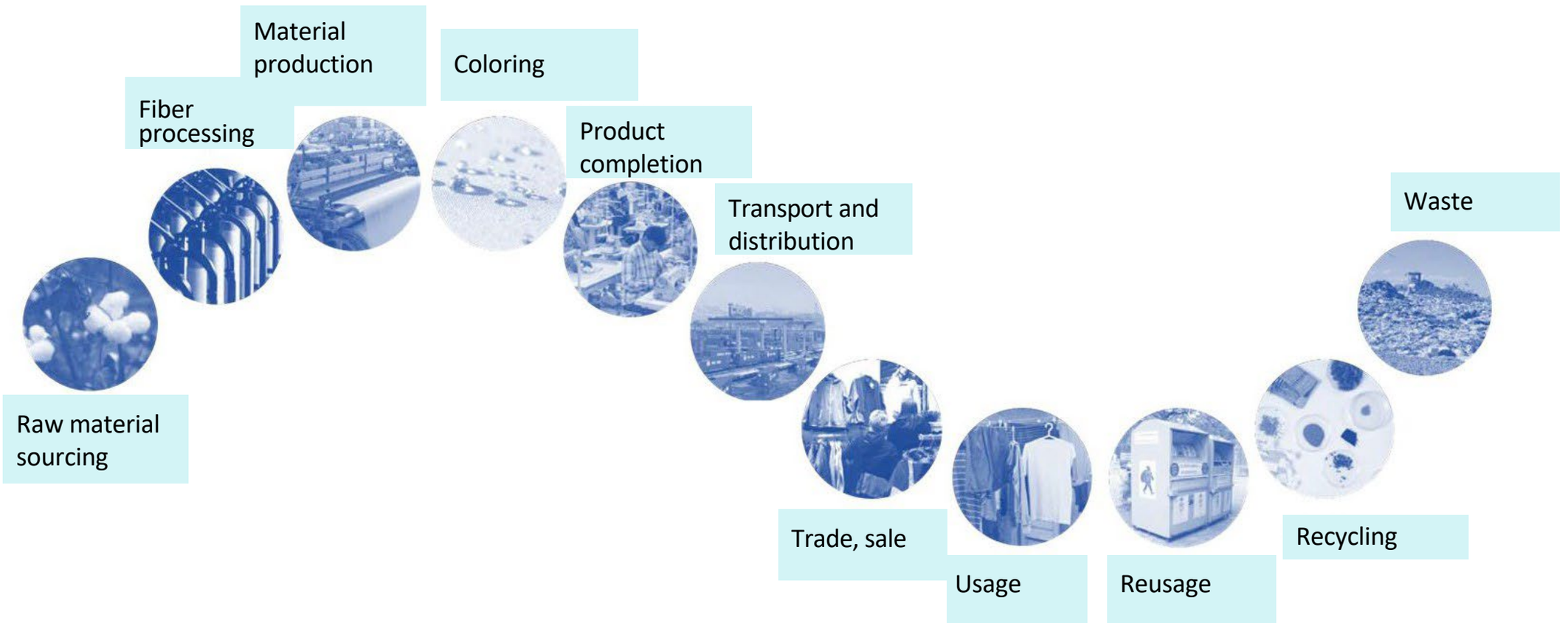
Linear production and consumption …



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Raw material

97% of the fibres used in the clothing and textile industry come from primary sources.

57% polyester (non-renewable, energy-intensive, problematic microfiber)

27% cotton (water crisis, forced labor, toxicity)

Source: Ellen MacArthur Foundation (2017)

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Production processes

- 17-20% of all water pollution caused by industry is caused by textile dyeing and finishing processes.
- Up to 25-30% of the material is wasted in the production of fabric and clothes.
- Working conditions are inhumane and dangerous.

Sources: Gullingsrud (2017), Australian Circular Textile Association (ACTA), Niinimäki (2018)

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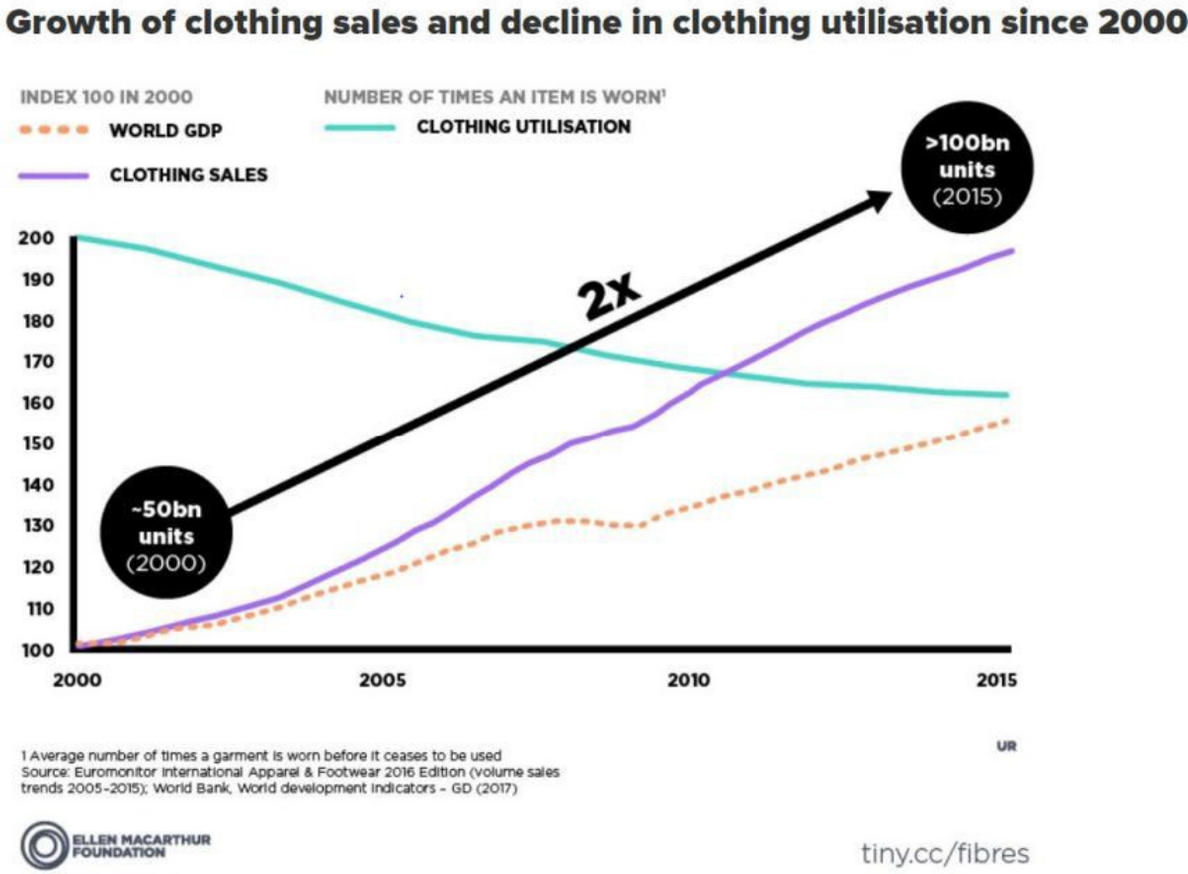
Overproduction

- Over the past 15 years, global clothing production has roughly doubled.
- About 30 percent of clothing produced worldwide is never sold.



Source: House of Commons Environmental Audit Committee (2019), Ellen MacArthur Foundation (2017)

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Environmental impact resulting from production and products

"According to the International Panel on Natural Resources, approximately 50 % of greenhouse gas emissions and as much as 90 %of the loss of nature due to land-use change are the result of the use and processing of natural resources (IRP 2019).

The circular economy plays a key role in achieving global climate and nature goals.”

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Sale

- Global consumption of clothing is estimated at 62 million tons (62,000,000,000 kg) per year.
- According to some estimates, total clothing sales will triple by 2050.

Source: House of Commons Environmental Audit Committee (2019), Ellen MacArthur Foundation (2017)

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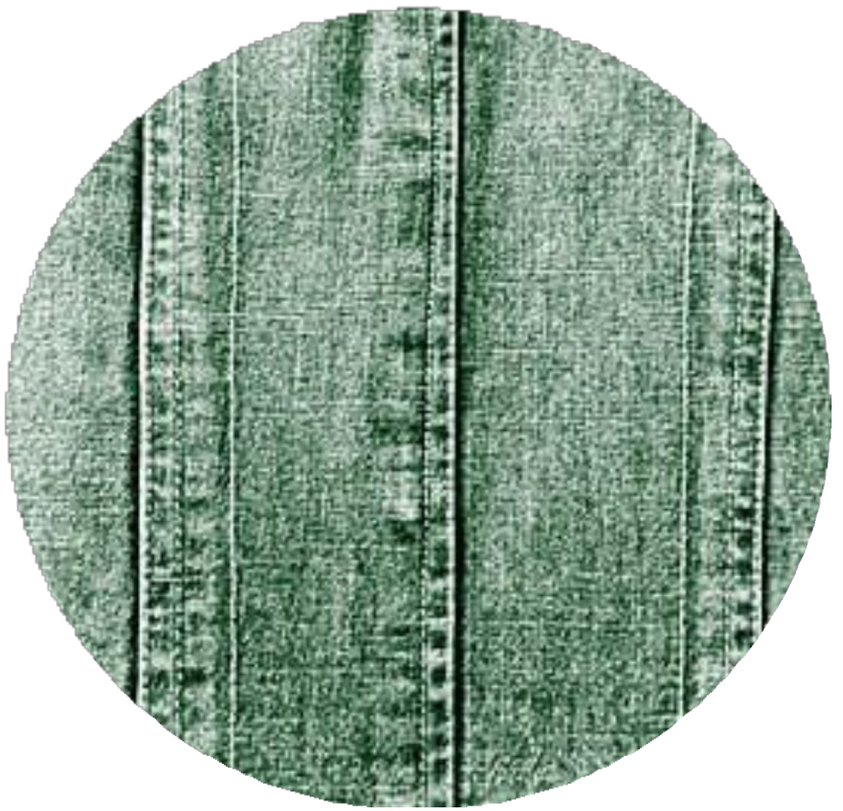
Using

- In the last 15 years, the use of clothing has decreased by 36% (EMF 2017).
- 70% of the contents of our wardrobes are in passive use (WRAP 2012).
- In Finland, 30% of clothing purchases are impulse purchases (Niinimäki 2011), how many in your country?



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Reusing

Estimate of how much clothing is recycled vary.

- Only 1-5% of the material used to make clothes is converted into new clothes.
- 73% of used textiles end up in landfills or are incinerated.

Source: Ellen MacArthur Foundation (2017)

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In conclusion

There are many problems in the textile and clothing industry just like any other industry.

Production and consumption methods are currently unsustainable.

Things must change in all areas if we are to stay within the Earth's carrying capacity.

Source:
The Fashion Industry Waste Is Drastically Contributing To Climate Change
by Valentina Portela (2021)

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Earth carrying capacity

1. Population growth
2. Increase in consumption
3. Resource scarcity
4. Environmental pollution and "footprint"
5. Climate problems

Related Issues:

6. Health protection
7. Social problems (inequality, poverty, etc.)

Source: *World Atlas*

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Importance of circular economy

Environment

- Global consumption of materials such as biomass, fossil fuels, metals and minerals is expected to double over the next 40 years (European Commission, 2020).
- It is predicted that the annual waste generation in the European Union will increase by 70 % by 2050.
- Climate change: the extraction and use of raw materials has a significant impact on the environment. It also increases energy consumption and carbon emissions linked to climate change.

Importance of circular economy

Environment

"A circular economy can halt the loss of nature worldwide and restore biodiversity 2000 levels by 2035."

The key is the implementation of circular economy solutions in four key sectors, which are: Agriculture and food, buildings and construction, textile and fiber sector, forest sector.

Source: Forslund jt, SITRA 2022

Importance of circular economy

Environment

In addition to environmental benefits, the transition to a circular economy could improve:

- reliability of supply of raw materials,
- to increase the competitiveness of companies,
- create new jobs (up to 700,000 by 2030)
- promote innovation and increase economic growth.

Source: *European Parliament* (2023)

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Importance of circular economy

Environment

"Waste prevention, eco-design and material reuse could bring savings to EU companies" help prevent price fluctuations when sourcing materials.

Source: European Parliament (2023)

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Importance of circular economy

Environment

The European Green Development Program is essentially related to the circular economy. The program names circular economy as (social) benefits, e.g.

- clean air, clean water, healthy soil and biodiversity
- preferring public transport
- healthy and reasonably priced food
- creating future jobs
- providing the necessary training during the transition.

How do we stay within the Earth's carrying capacity at this speed?

Sustainable development

Globally, the goal is **Sustainable Development**.

"Sustainable development is global, regional and local continuous and controlled social change aimed at ensuring good living opportunities for current and future generations. This also means that the environment, people and the economy are taken into account equally when making decisions and acting."

Source: Gro Harlem Brundtland (1987)

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Sustainable development

Sustainable development was discussed for the first time at the UN Brundtland Commission in 1987. The commission's work resulted in a process that has progressed interactively both in states, municipalities and in an international context.

The policy of sustainable development has gradually developed and shaped itself into an increasingly comprehensive and versatile whole.

Sustainable developments 3 pillars

ECOLOGICAL SUSTAINABILITY

The main condition of sustainable development is the preservation of biological diversity and the functioning of ecosystems, as well as the long-term adaptation of human economic and material activities to the sustainability of nature.

SOCIAL AND CULTURAL SUSTAINABILITY

The key issue is the transfer of welfare conditions from one generation to the next.

Continued population growth, poverty, food and health, gender equality and education are global social sustainability challenges with significant implications for ecological and economic sustainability

ECONOMICAL SUSTAINABILITY

Financial sustainability is balanced growth in terms of content and quality, which is not based on long-term indebtedness or the realization of reserves.

A sustainable economy is a prerequisite for the central functions of society and thus for growing and increasing well-being.

Balance between profit and social/environmental goals.

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Agenda 2030

"Agenda 2030, the UN's target program for sustainable development, aims to eliminate extreme poverty and sustainable development that takes equal account of the environment, economy and people."

"Sustainable development is essentially about the idea of planetary boundaries. Human activity must be adapted to the natural resources of the earth and the sustainability of nature.

The program contains 17 main goals and 169 sub-goals to be achieved by 2030.

Source: *Sustainable development goals by UN*

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The circular economy is one of the "tools" by which sustainable development can be achieved.

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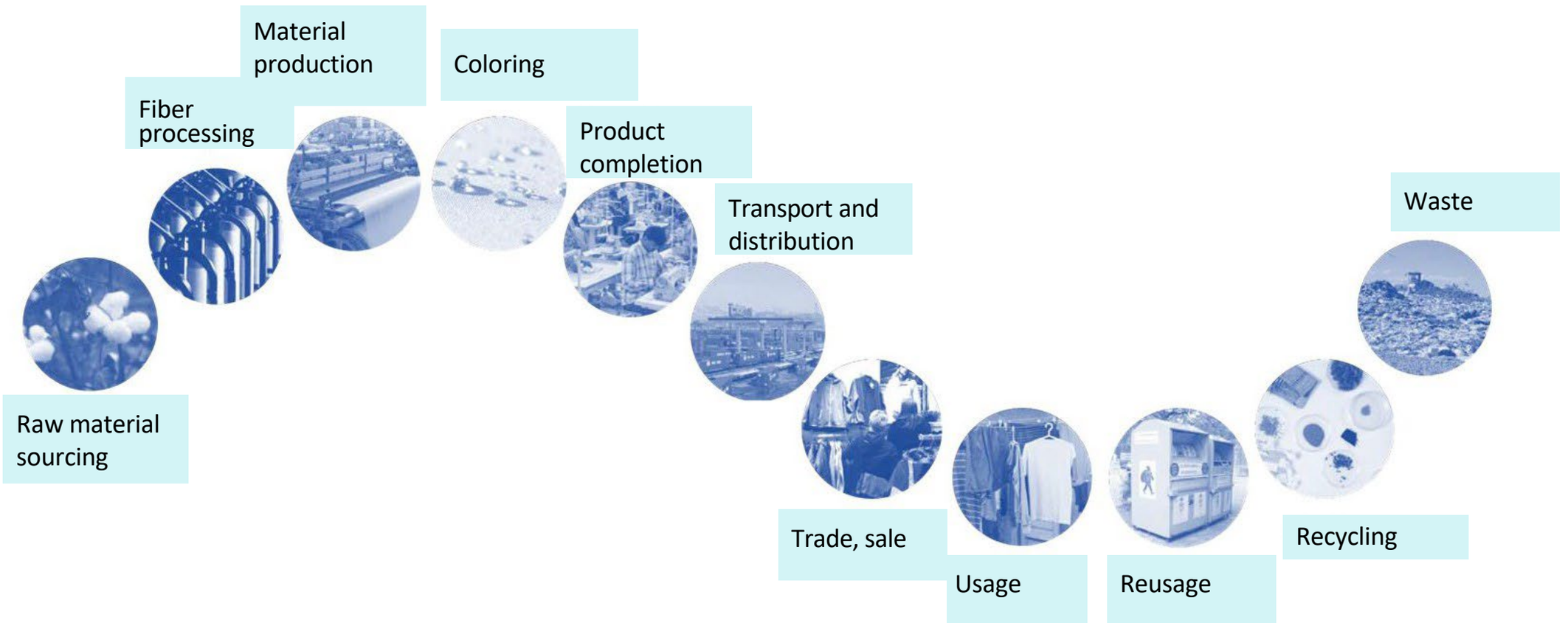
Linear production and consumption ...



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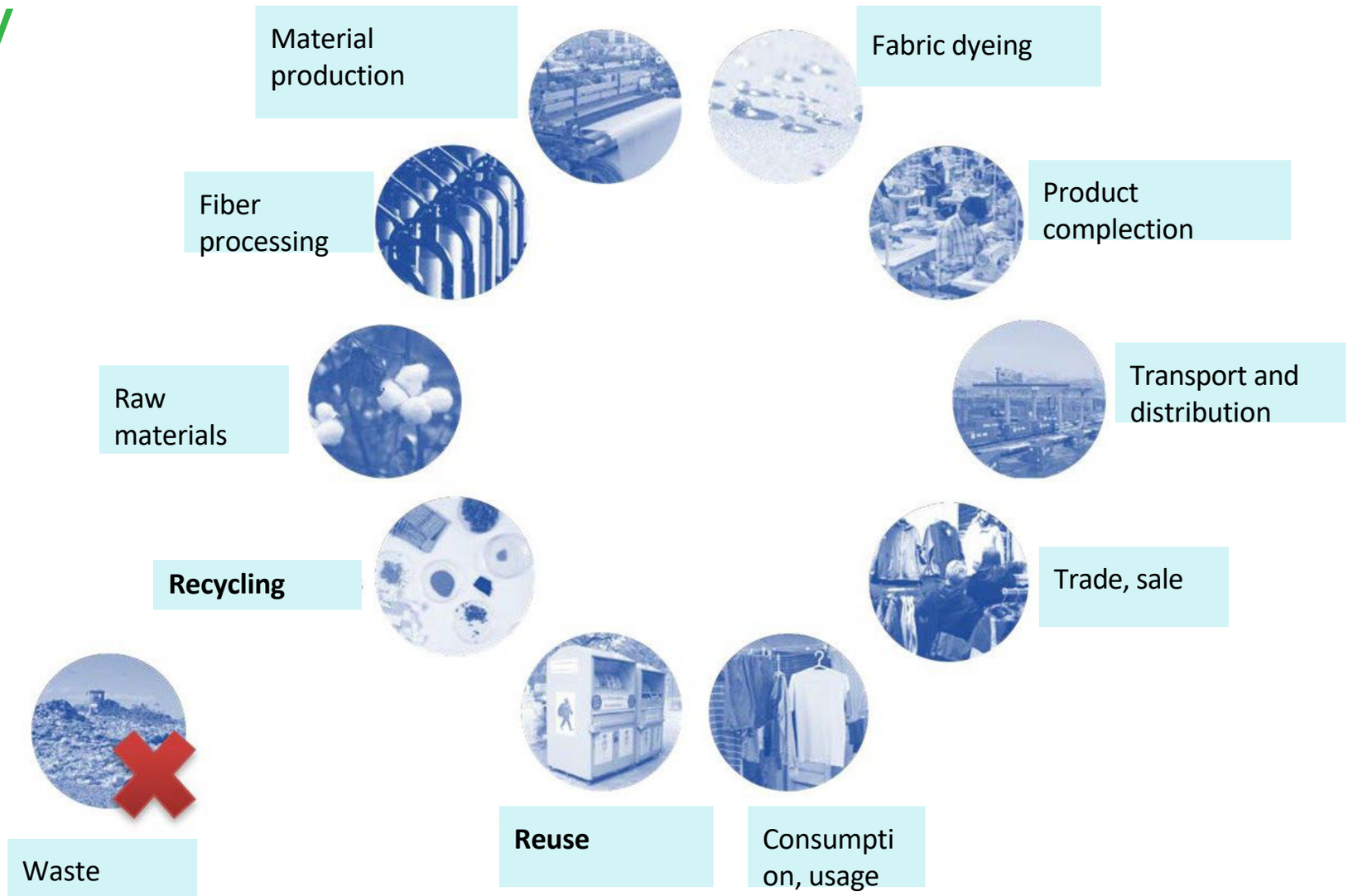
… to circularity



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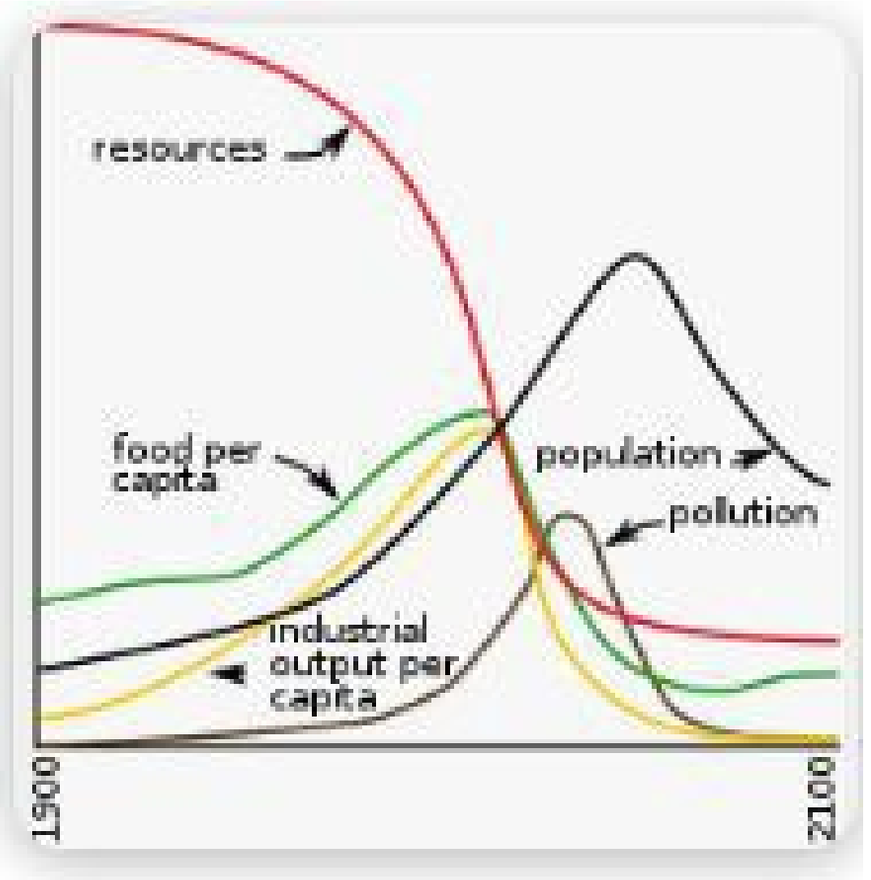
How is circular economy defined?

Circular economy in brief

- **Circular economy is an economic model** where the goal is to save natural resources by keeping raw materials, materials, products and their various components in use for as long as possible. This can happen, for example, through lending, renting, reusing, repairing, refurbishing and recycling.
  - Longevity of products and preservation of value of resources
- The circular economy is the basis of zero emissions. The aim is to close the material, energy and substance loops so that there is as little waste and wastage as possible.
  - Waste = raw material

Circular economy in brief

- The "promise" of the circular economy is a greener business compared to the current linear economy.
- With the circular economy, companies can pursue business growth without burdening the environment, within the limits of the earth's carrying capacity.
  - We are talking about the so-called decoupling from the use of natural resources.



Source: UN

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More definitions…

"Circular economy means a production and consumption model where existing materials and products are used as much as possible by borrowing, renting, reusing, repairing, renovating and reusing. In this way, the life cycle of the products is extended.

In practice, this means reducing the amount of waste to a minimum. When the product's life cycle comes to an end, its materials are tried to be used if possible, in which case they create added value again."

Source: *European Parliament*

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More definitions …

"The circular economy is an economic model where goods are not continuously produced, but consumption is based on the use of services, not their ownership: sharing, renting and recycling. In this way, the value associated with materials is preserved in society for as long as possible.

In a circular economy, economic growth does not depend on the consumption of natural resources."

"An economic model that does not focus on the production of more and more goods, but in which consumption is based on the use of services instead of ownership - sharing, renting and recycling.

Materials are not destroyed in the end, but are used again and again to make new products..."

Source: *Sitra*

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Lesson activity 2. **Exercise 1.**

Free discussion thinking about the circular economy

Group of 2-3

As a group, you previously wrote down how you would define a circular economy.

Did you get any new ideas during the lecture? Would you define the circular economy differently now? How?

5-10 min

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Exercise 2.

Video clip on circular economy

Part 1. Look for short video clips (approx. 10 min) about the circular economy related to the textile and clothing industry. Preferably from the textile and clothing industry.

- Why did you choose this footage?
- Who or what entity published it? When?
- What is the main message of the film clip?
- What does the circular economy mean in the textile and clothing industry in the context of the selected video?
- Would you recommend watching the video clip to other students? What could fellow students learn from this?

Exercise 2.

Video clip on circular economy

Part 2. Getting to know the tasks of fellow students

Watch video clips submitted by others and comment on one of them.

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Circular strategies

Introduction of circular business strategies
2. PART

Purposes

- ...we will understand even better what connections the circular economy has with the textile and clothing industry.
- ...we can talk about circular economy principles and name circular economy strategies.
- ...we know how to describe how different materials and products can circulate in the circular economy.

Let's remember …
Principles of circular economy

1) Systems thinking
2) Resilience through diversity
3) Elimination of waste and pollution (including proceeding from the waste hierarchy)
4) Closed circuits
5) Energy efficiency, use of renewable energy sources
6) Considering the resilience of natural systems

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Material circulation

In the circular economy, we talk about closed (continuous) cycles.

The circular economy is often described by the Ellen MacArthur Foundation's butterfly diagram, which separates **biological and technical cycles**.

In the context of the textile and clothing industry, it is important that we look specifically at what happens in technical cycles.

At the same time, we must take into account that the textile and clothing industry uses natural (biological cycle) materials such as cotton, linen, wool, hemp, etc.

It is based on the **waste hierarchy / hierarchy of the material use.**

Waste hierarchy

The hierarchy can also be seen in the circular economy butterfly diagram. (pg 51)

Priority order means the order of importance of waste management operations. The waste hierarchy is defined in the EU waste directive.

Source: Axil-IS

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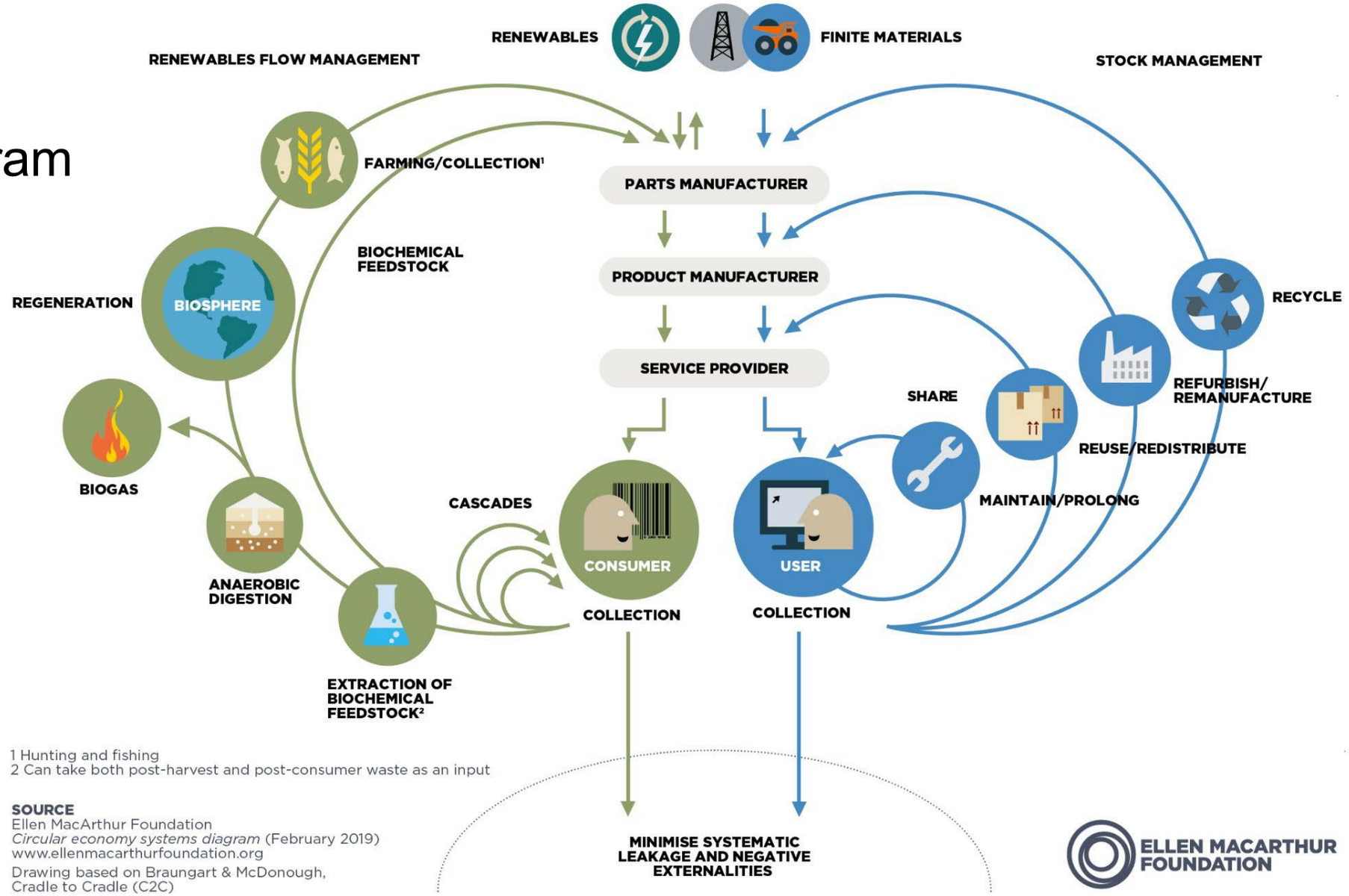
Butterfly diagram



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Lesson activity 3.

Give examples on the Butterfly diagram

Pair/group of 3

Draw a diagram similar to a butterfly diagram on A4-A3 paper and add explanations to the terms related to the technical and biological cycle.

Use the website of the Ellen MacArthur Foundation for information

https://ellenmacarthurfoundation.org/.

30 min

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Circular economy strategies

The purpose of the circular economy is to decouple economic growth from the use of primary raw materials by creating a circular production and consumption system with as few losses as possible.

Goals

- as little waste as possible (zero- or non-waste cycle)
- Closed circle/cycle (“cradle to cradle” LC if possible)
- material recycling with the highest possible value (upcycle), if increasing the value is not possible, then with the same or lower value
- production and/or diversification of material/products or use in the same way (in unaltered form)
- rethinking the business model
- recycling of hazardous waste chemicals
- energy recovery in the new cycle (biogas collection and energy use)

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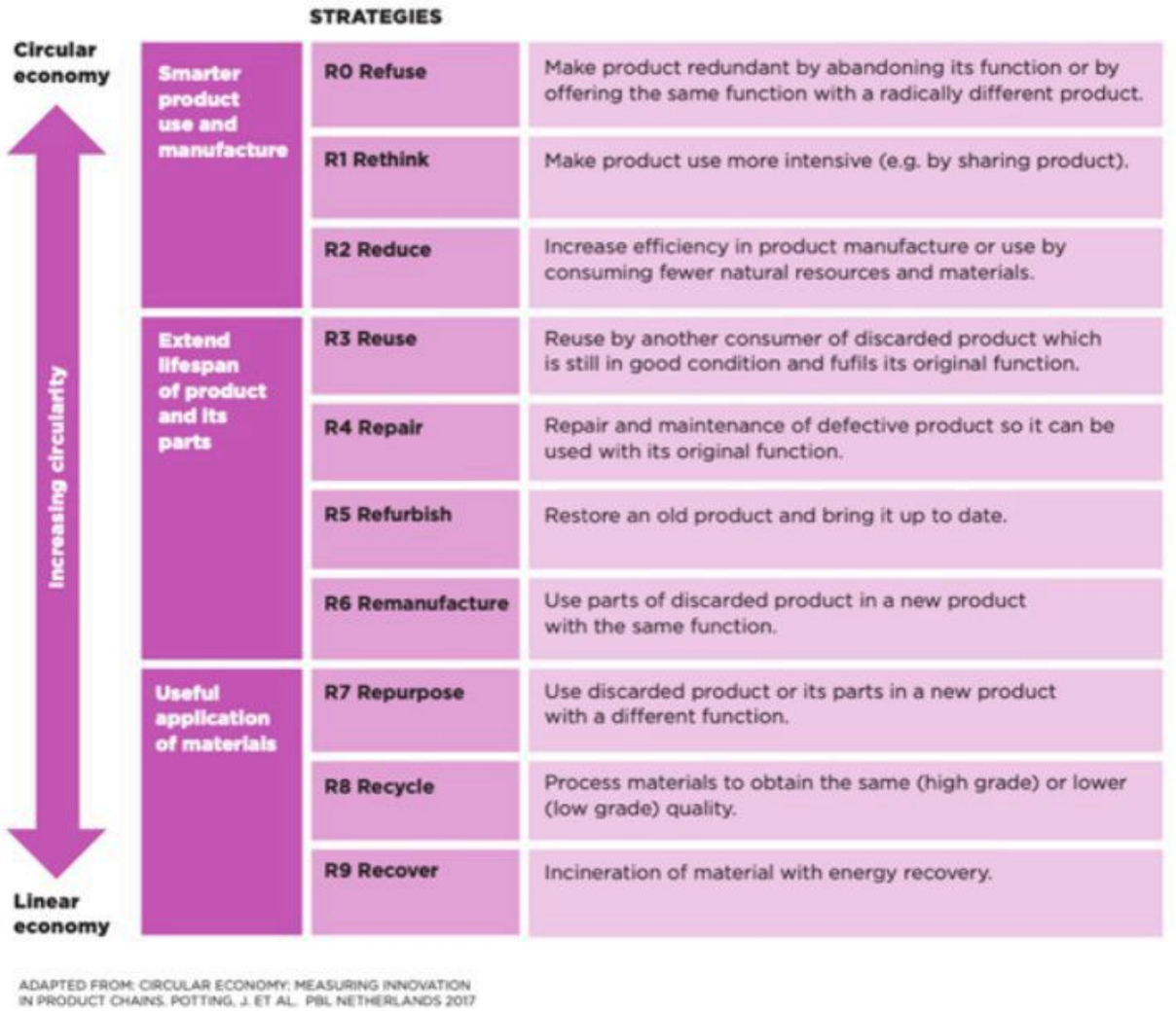
Circular economy strategies

R-ladder

Divides strategies into 3 blocks:

I. Utilization of material (recycling or energy use).
II. Extending the life of the product/product components,

    i.e. strategies aimed at extending the life cycle and durability
III. Smarter product use



ADAPTED FROM: CIRCULAR ECONOMY: MEASURING INNOVATION IN PRODUCT CHAINS. POTTING, J. ET AL. PBL NETHERLANDS 2017

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Circular economy strategies

I. **Utilization of material (recycle or energy use)**

R9 Recovery - energy use (including burning for energy)

R8 Recycle - recycling material to obtain NEW material of equal, lower or higher value

R7 Repurpose - **repurposing**, use of a discarded (discarded) product or its parts in a new product with a different function

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Circular economy strategies

II. Extending the life cycle of the product/product components.

R6 Remanufacture - parts of a discarded product are used in a new product with the same function

R5 Refurbish - restore and update the old product

R4 Repair - repair and maintain the defective/broken product so that it can be used with its original function

R3 Reuse - reuse of the product by the next (2nd, 3rd, etc. circle) users.

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Circular economy strategies

III. Smarter product use

R2 Reduce - Reducing, increasing product production efficiency (including resource, material and energy efficiency)

R1 Rethink - Change the intensity of product use (expand the number of users, e.g. sharing service)

R0 Refuse - multifunctionality of the product. Giving the product different functions or giving a different function zone than before

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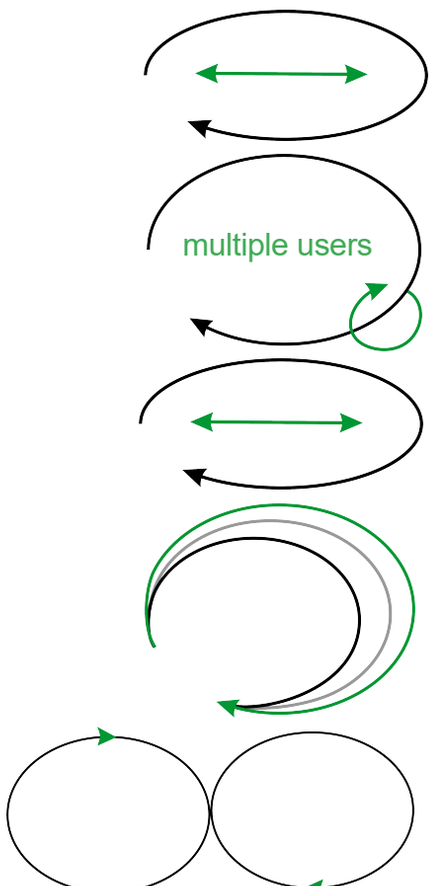
Circular Strategies in the textile and clothing industry

- New materials based on secondary raw materials. Recycling of materials.
- Reduction of material use, including digital optimization (direct dematerialization in modeling, material cutting, use of auxiliary materials).
- Secondary markets, reusing.
- Life cycle extension during maintenance (repair and maintenance workshops, service provision)
- Sharing , e.g. sewing, knitting, repair and maintenance workshops on a sharing platform (also considered a manifestation of social innovation, less need to produce sewing machines and accessories, etc.)
- The construction of the garment uses parts of previous garments (modulation techniques, possible in small-scale operations), adaptability
- More environmentally friendly materials and optimized resource use (water, electricity, raw materials, digitization help in optimization)
- "Green" supply chain (GSS)
- Long-life materials and products (emphasis on high-quality product, slower material and product chain, including the use stage of the product).
- Use of more standard solutions (possibly, in turn, better adaptability). Timeless fashion
- Homogeneous materials (easier processing) vs mixed fibers (more durable product) etc.

Circular business models in textile and clothing industries (Bocken 2016)



- *Longevity and durability:* This business-model approach is focused on extending the lifetime of garments, thus reducing the need for purchasing new items and allowing for various modes of reuse. It is often combined with design for repair, customized production for promoting emotional product attachment, and offers of repair and maintenance services.
- *Access-based models:* These business models are based on renting, leasing, and sharing of garments. Examples include renting of workwear or hospital or restaurant linen, single-occasion clothing (including wedding or dinner dresses), and baby clothes (including reusable diapers) or leasing everyday-wardrobe sharing. Access-based models aim to lower resource utilization by increasing the use rate of the product stock.
- *Collection and resale:* Business models related to resale focus on extending the useful life of textiles beyond the first user. Textile-collection and resale models include secondhand retail as well as collection and resale to the market for reuse and recycling.
- *Recycling and reuse of materials:* These models emphasize turning textile waste into raw materials to produce new textiles. They involve reusing parts and cuts and producing recycled fibers for re-spinning and use in other products.

Lesson activity 4.

Think of your product and its strategy

Independently/pair

Think of a product that you want to bring, for example, and use circular economy strategies around it.

Write and draw on A4-A3 paper.

30 min

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SusTexEdu project (Education Partnership of Textile and Clothing Sector Materials & Sustainability, Agreement number 2021-1-FI01-KA220-HED-000023002) was funded by the Erasmus+ programme of the European Union.

Visit *the project website* to see all the intellectual outputs of the project.

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