

# TOO4TO

SUSTAINABLE MANAGEMENT: TOOLS FOR TOMORROW



With the support of the  
Erasmus+ Programme  
of the European Union

PROJECT NUMBER 2020-1-PL01-KA203-082076

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# TOO4TO MODULE

Circular Economy, Economics & Sustainability, Sustainable Production  
PART 2



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# INTRODUCTION

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Being aware of an **environmental load** of commonly utilized pattern of the economy "take – make – dispose" **forces us to take action** in the direction of **sustainability** and **circularity**. The modern economy's innovation race has caused lost sight of basic necessities, common sense, and our role we should play in our complicated system. Hence, reducing the negative impact is no longer enough. It is time to change the way of product and services development as well as resources management in order to try to have as many beneficial effects as possible.

**How can companies assess and implement Circular Economy?**

## Available Tools

**Material Flow Analysis**

**Eco-design**

**Life Cycle Assessment**

**Circular CANVAS**

# MATERIAL FLOW ANALYSIS (MFA)

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## Definition

**Material Flow Analysis (MFA)** is known as the quantification and assessment of mass fluxes and processes of matter (water, food, excreta, wastewater, etc.), substances (nitrogen, phosphorus, carbon, etc.) or end products (diapers, batteries, etc.) in a defined period. MFA can be expressed in kilograms/year or kilograms/capita/year. The method (developed by Brunner & Rechberger in 2004) allows for the identification of issues as well as the quantification of the impact of possible solutions on resource recovery and pollution.

# LEVELS AND OBJECTIVES OF MFA

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## National & regional level of MFA

- Creation of sustainable cycles;
- Environmental protection and material efficiency at country level;
- Increase in regional value added;
- Reduction of environmental pollution by promotion of new technologies and projects.

## Operational level of MFA

- Optimization of the production process;
- Increased energy and material efficiency;
- Reduction of operating cost;
- Avoidance and reduction of emissions and wastes.

However, in both cases a lot of data needs to be implemented in order to perform MFA, which makes it difficult in the context of developing countries. There is a need to deal with uncertainties.

# HOW TO CARRY OUT MFA?

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1. Identify the key (material flow) related issue;

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2. Analyze system boundaries (selection of the relevant matter processes, indicator substances\*);

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3. Quantify mass flows of matter and indicator substances;

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4. Identify weak points in a system;

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5. Develop and evaluate scenarios and schematic representation, interpretation of the obtained results.

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\***indicator substances** - chemical elements such as nitrogen (N), phosphorus (P), carbon (C), carbon dioxide (CO<sub>2</sub>) or ammonia NH<sub>3</sub>. These substances can be considered either as pollutants (e.g. eutrophication) or resources (e.g. fertilizer in agriculture).

# MFA AVAILABLE SOFTWARE

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- **STAN** (subSTance flow ANalysis) – supports carrying out MFA analysis according to the Austrian standard ÖNORM S 2096 (MFA-Application in waste management) under consideration of data uncertainties ([Link to STAN](#));
- **OMAT** (online material flow analysis tool) – free, open source tool that can be use to perform MFA. It is similar to STAN, but does not require to install any program on the computer. Moreover, it is focused more on the Economy Wide – MFA rather than Substance Flow Analysis ([Link to OMAT](#));
- **e!Sankey** – for visualization of material and energy flow & **Umberto** – for life cycle assessment and resource efficiency ([Link to e!Sankey & Umberto](#)).





# ECO-DESIGN

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## Definition

„The integration of environmental aspects into the product development process, by balancing ecological and economic requirements. Eco-design considers environmental aspects at all stages of the product development process, striving for products which make the lowest possible environmental impact throughout the product life cycle.” – *European Environmental Agency*

The principles of eco-design can be found in the document:

ISO/TR 14062:2002

Environmental management — Integrating environmental aspects into product design and development

[Link to ISO/TR 14062:2002 document](#)

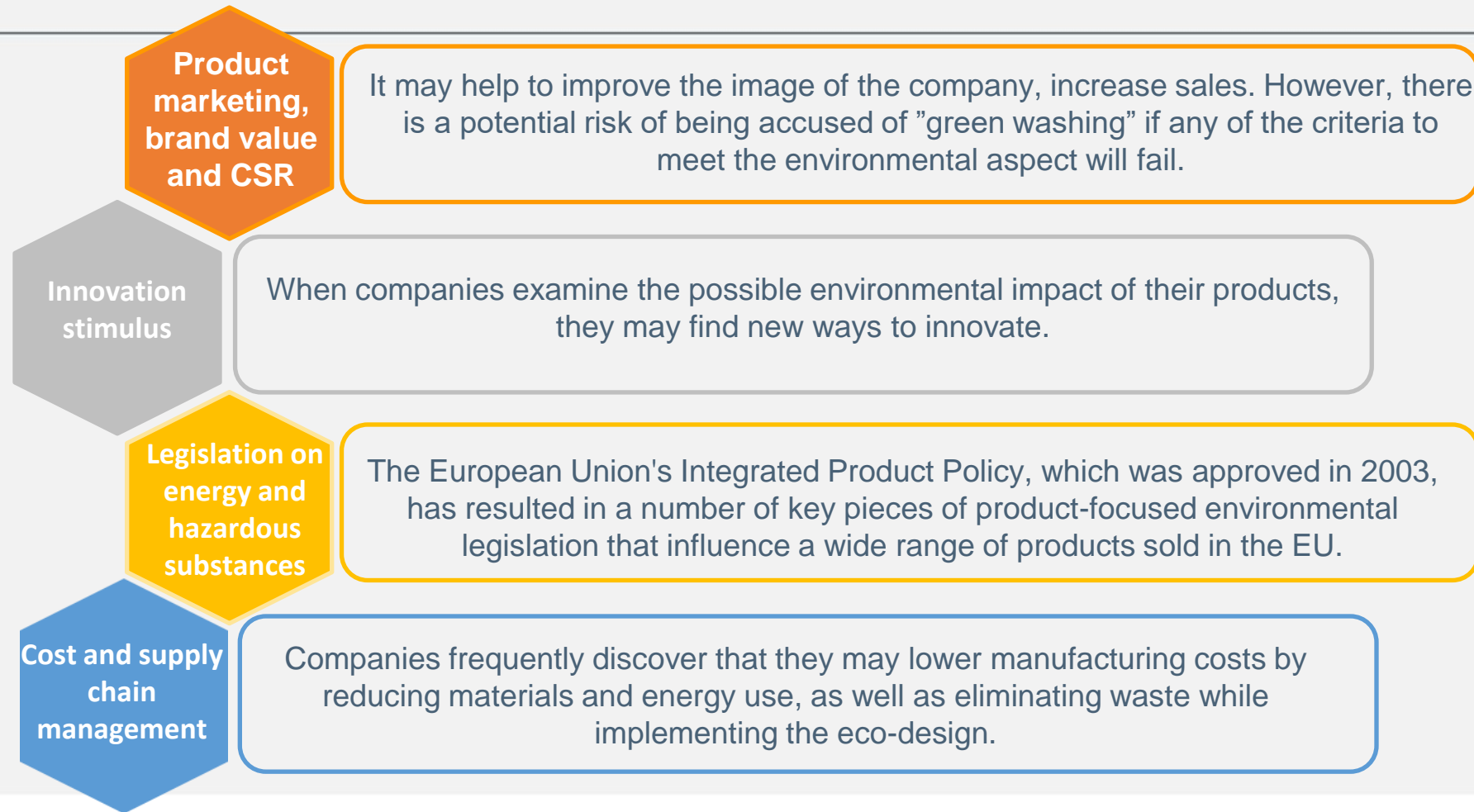


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# BARRIERS AND DRIVERS OF ECO-DESIGN IMPLEMENTATION



# MAIN BENEFITS OF ECO-DESIGN

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## Environmental

- Lower impact of development, production and finally the end product on the environment.

## Economic

- Competitiveness;
- Higher yield of raw materials and energy usage;
- Transport optimization (lower fuel consumption, reduced emission).

## Social

- Better image of the company within the society;
- Increasing the awareness of environmental issues and differentiation among competitors.



# LIMITATION AND BARRIERS OF ECO-DESIGN

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- **Time limitations.** Designers need to meet criteria of product functionality, cost aesthetic character and regulatory compliance, eco design is an additional aspect that requires additional time during the product development stage.
- **Not perceived as responsibility.** SMEs do not feel strong and influential enough to significantly change the approach to the product, pushing the responsibility to the large entrepreneur.
- **No alternative available.** Due to the perceived dangers associated with such advances, business have been hesitant to invest in the creation of alternatives to the current environmental challenges.
- **Fear of cost.** SMEs may find it difficult to access the necessary environmental information and the cost involved. When they begin to look at how eco design is normally implemented in todays organization, they are overwhelmed and ready to dismiss it as a waste of time and money.

# EXAMPLES OF ECO-DESIGN IMPLEMENTATION

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**IKEA** introduced to its offer a KUNGSBACKA collection which is a front that doesn't require any new wood or oil-based plastic. They're made of repurposed wood and wrapped in a recycled plastic foil. A sustainable option that does not sacrifice quality, design, or pricing.



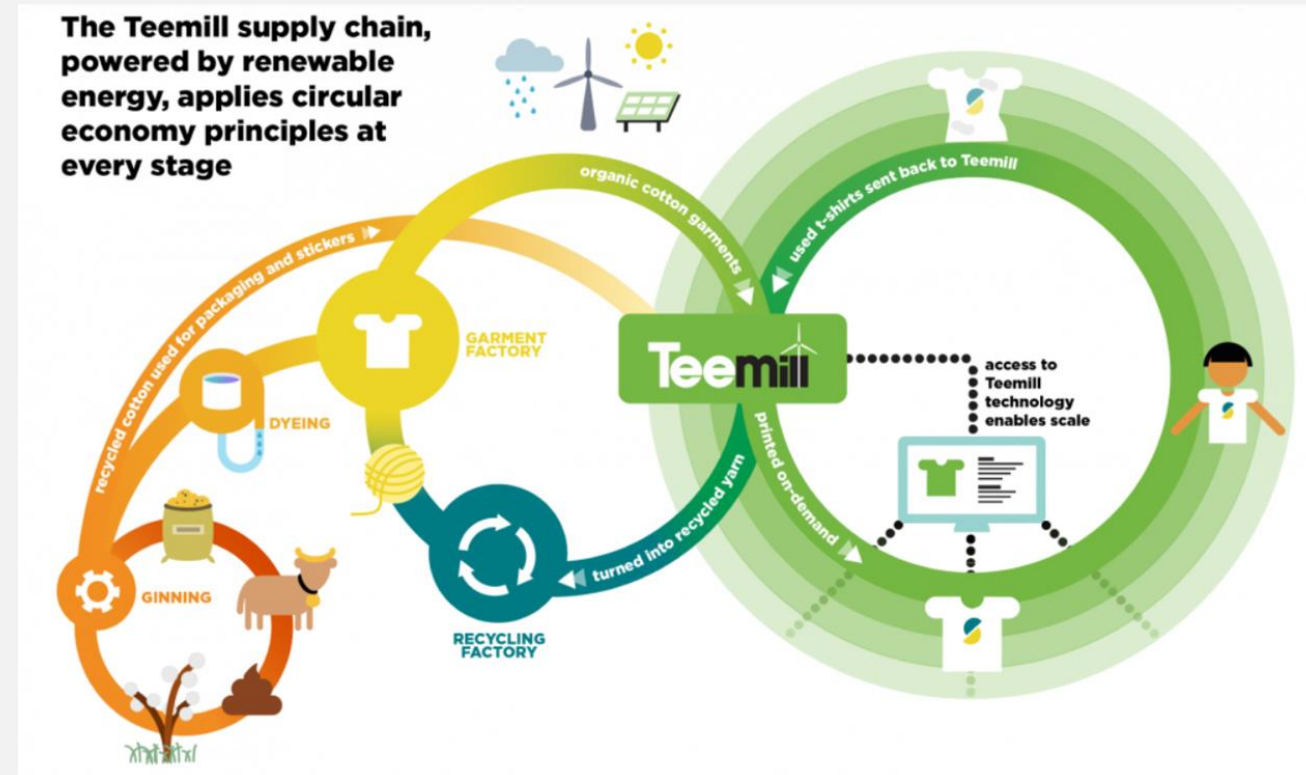
A clean modern expression with a soft, matte black finish. KUNGSBACKA kitchen fronts are made from recycled materials to reduce waste of resources by giving new life to discarded materials.

# EXAMPLES OF ECO-DESIGN IMPLEMENTATION - TEEMILL

**Teemill** is a technology-driven fashion company that was founded in 2009.

Teemill has created a circular manufacturing process that recycles discarded t-shirts while also regenerating natural systems.

Products are made in real time, seconds after they are purchased, ensuring that only what is required is produced with no waste. This refers to when a buyer places an order online and specifies the color, size, and design.



Source: [Link to Teemill - an example of eco-design implementation](#)

# EXAMPLES OF ECO-DESIGN IMPLEMENTATION - LEGO

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In the last three years the **LEGO Group** tried hard to find the material that will be enough strong, durable and of high quality that will meet the company's requirements of quality and safety.

In 2018, LEGO started to produce elements from bio-polyethylene (bio – PE), made from sugarcane. However, this material is not enough hard and strong.

In 2020, LEGO started to remove the single-use plastic in their LEGO set boxes.

In 2021, they established another step on their road to sustainable products and started to use PET plastic from discarded bottles to produce bricks.



# LIFE CYCLE ANALYSIS (LCA)

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## Definition

A life cycle analysis (LCA) is an internationally recognized approach for analyzing the environmental implications of a process, product, or activity throughout its "life cycle" (e.g. AS/NZS ISO 14044:2006, ISO 14040 (2006), and ISO 14044 (2006)).

This type of analysis covers the extraction of raw materials, the production of a finished product, its maintenance and performance in service, and the item's eventual disposal or recycling at the end of its useful life.

[LCA video](#)

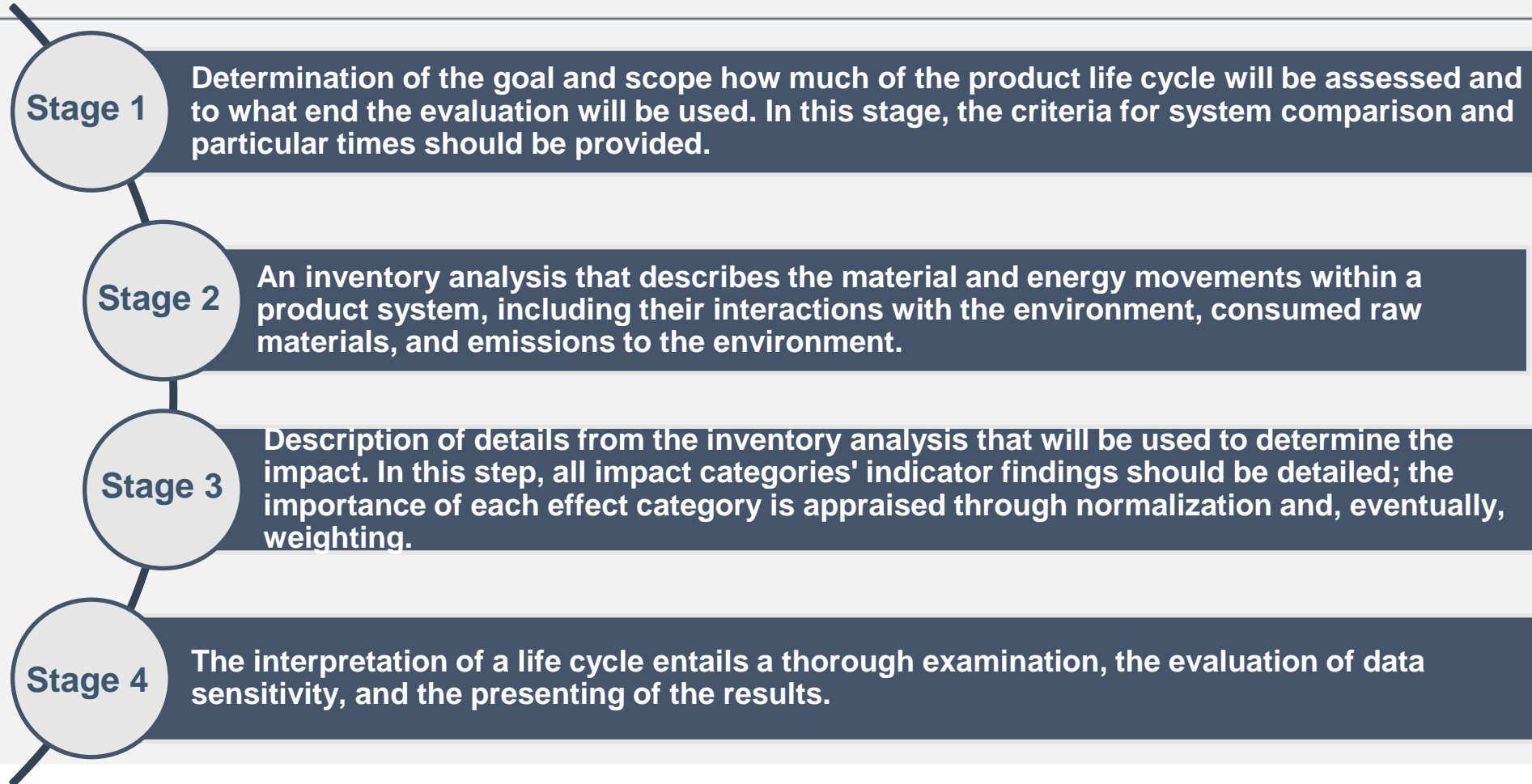


# WHO MIGHT BE INTERESTED IN LCA?

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- **Product Management and Research & Development.** New products should emit as little pollutants as possible. This can be for a variety of reasons — business policy, legislation, or client demand – but it usually just means making better use of company resources.
- **Marketing and sales.** Communication of competitive product may influence customer demand for sustainability.
- **Executive level and strategic management.** Incorporation of sustainability in the entire business may help to avoid risks and act strategically.
- **Supply chain management.** In many industries supply chain has the most detrimental effect on the environment. Sourcing from different suppliers might have a significant impact on the product footprint.

# STAGES OF LCA?



# LCA BENEFITS

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Helps to the search for the most available life cycles, such as those with the least detrimental environmental impact.

Helps to adopt the direction and priorities in strategic planning, design or design product, or process change in industry, public organizations, or non-governmental organizations.

Helps to choose key indications of an organization's environmental behavior, including measurement and evaluation tools, primarily for the purpose of analyzing the state of its environment.

Promotes marketing with a link to environmental statement or eco-labeling formulation.



# LCA DRAWBACKS

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Expensive and time consuming

Should be done together with a more comprehensive study hence it will not show the best or the most cost effective product or process.

It is quite specialized, and they can't always be applied to similar tasks.

Depends on assumptions, uncertainties (when there is not enough data) and scenarios.



# SUSTAINABLE SUPPLY CHAIN

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Research shows that the **company's supply chain** has the **greatest impact** on the **environment**. Rather than changing other company operations, firms can typically make the most effect by changing their supply chain.



Climate change, water security, deforestation, human rights, fair work standards, and corruption are all examples of global challenges that must be addressed.

Source: [Sustainable supply chain](#)



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# HOW TO ACHIEVE SUSTAINABLE SUPPLY CHAIN?

## Sourcing

- Most businesses begin their sustainability initiatives by focusing on energy and water procurement, as well as sourcing sustainable materials for their goods.

## Operation

- Look for operational processes or stages that could be more efficient and reduce resource utilization across the supply chain.

## End of a product's lifespan

- Design things that can be upcycled and reused to reduce waste and obsolete items.

## Data & communication

- Assess the effectiveness of the first three activities and reinforce any associated efforts by engaging with customers, supply chain partners, and other stakeholders.

Source: [Sustainable supply chain](#)

# SUSTAINABLE SUPPLY CHAIN SOFTWARE

**Alpega TMS** ([Link to Alpega software](#)) is a global logistics software firm with over 30 years of experience in shipping. Alpega TMS is a scalable software solution for managing all logistics network transportation procedures and activities. The transportation management system provides end-to-end insight as well as advanced analytics to help companies make better business decisions. It provides a collaboration platform so that all parties involved have the most up-to-date information and configurable alerts about the shipments in progress, placing an emphasis on what counts while the rest is automated.



Source: [Link to Alpega TMS](#)

# EXAMPLES OF SUSTAINABLE SUPPLY CHAIN - STARBUCKS

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**Starbucks** one of the largest coffee seller is going to be a **resource positive company**.

## What are its achievements?

- Starbucks created the Coffee and Farmer Equity Practices in 2001 in collaboration with Conservation International.
- Since 2015, it has used 100% renewable Energy in its over 9000 company-operated stores.
- Since 2018, more than 18,000 Starbucks employees have registered in an online sustainability and environmental stewardship course sponsored by the corporation.

Moreover, Starbucks is a pioneer in ethical sourcing for decades.



# EXAMPLES OF SUSTAINABLE SUPPLY CHAIN - SUBARU

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In 2002, the president of **Subaru's** Japanese parent company Fuji Heavy Industries issued a zero-waste edict. Subaru's philosophy of continuous improvement involves all associates workers in the process, rewarding ideas that improve car quality, safety, or environmental stewardship with cash and other incentives.

## What are its achievements?

- As a result, since 2000, the company has reduced trash creation by 60%. Subaru recycled about 94 million pounds of material in 2016, including 80 million pounds of metal, during the manufacturing of each vehicle.
- They persuaded suppliers to ship parts in reusable containers, such as Styrofoam packing for 80 engine parts, which is now reused numerous times.
- Plastic polymer bumpers that have been damaged are ground up and returned to the molding machine.
- Cafeteria garbage is composted, and staff take the finished product home to use in their gardens.
- Some goods in the production line are recycled, while others are returned to a supplier.

It is the first U.S. auto plant that achieved zero-landfill status.

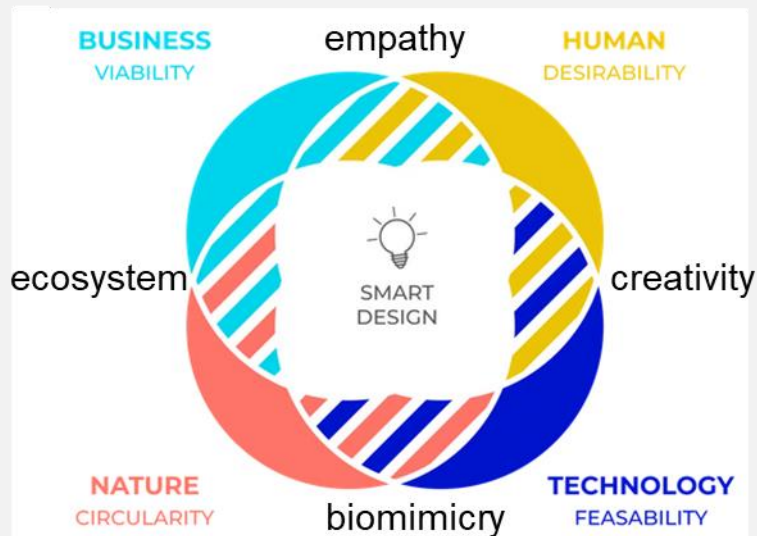
*"We have sent nothing to a landfill since May 4, 2004,"*

Source: [Link to Subaru - zero waste factory](#)

# CIRCULAR CANVAS

The **Circular Canvas** is Circulab's first tool for helping businesses rethink their business models or projects and make long-term benefits. Adopt systems mindset and strike a balance between economic viability, the environment, and long-term sustainability.

INNOVATIVE  
SYSTEM THINKING



The **Circular Canvas** can be applied to:

- a business model;
- a product/service;
- a type of client;
- a partner;
- an equipment;
- a flow;
- an event.



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# CIRCULAR CANVAS - OBJECTIVES & PRINCIPLES

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## Objectives:

1. **To analyze** of a business activity and the way how it creates value (social, economic or ecosystemic).
2. **To improve** the company's resilience by anticipating potential hazards.
3. **To create** new business and ecosystemic opportunities.

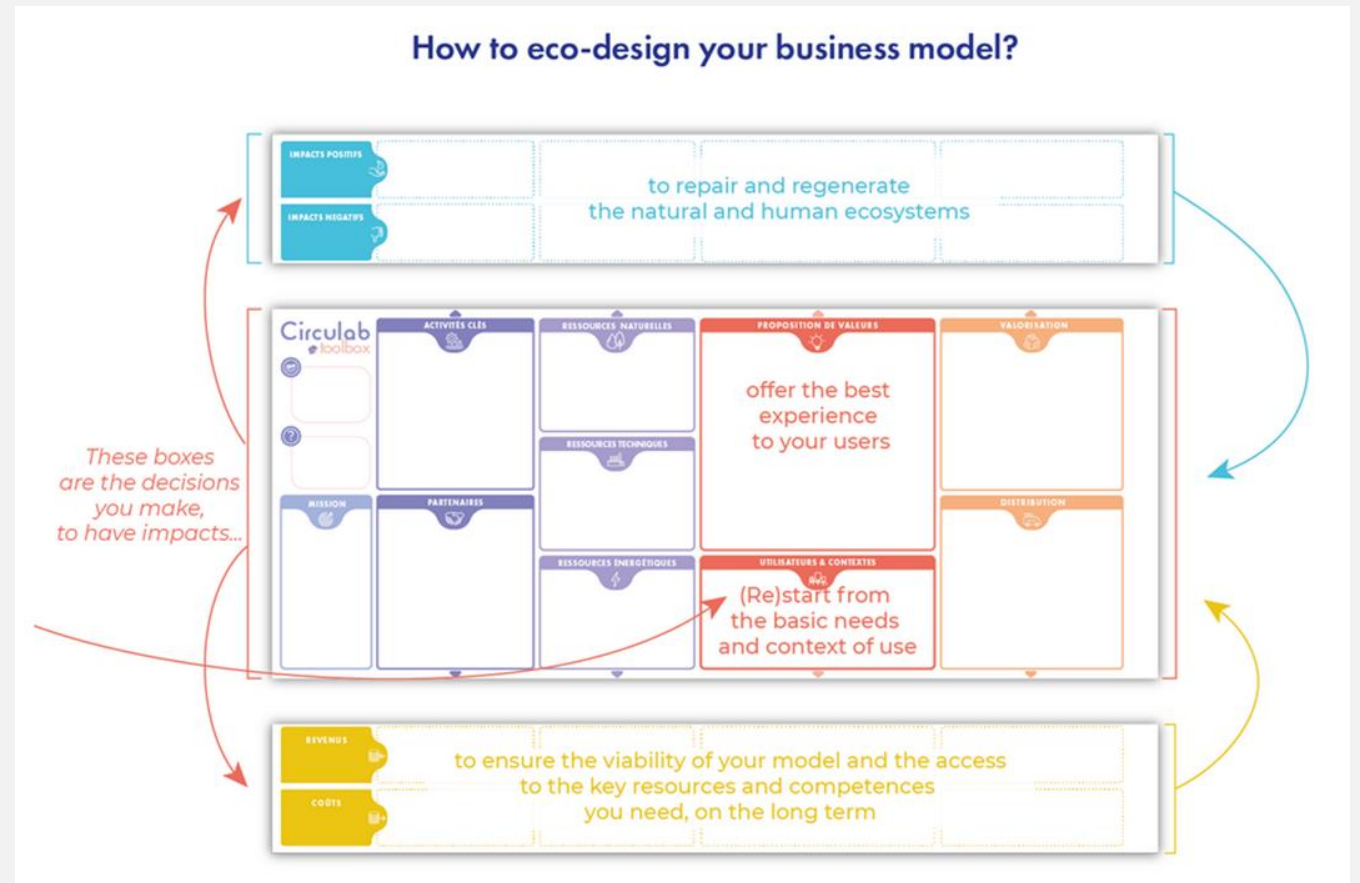
## Principles



# CIRCULAR CANVAS – HOW TO START?

Circular canvas is not an individual task.

The **strategy** is based on **collaboration** rather than competition. It encourages you to start a conversation by cooperating within your own organization and with your essential partners. Indeed, the circular economy necessitates the involvement and motivation of all stakeholders in order to achieve better results.



# CIRCULAR CANVAS – WHAT CAN BE ACHIEVED?

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Collective  
strategy for  
development

Identification of  
local synergies

Shared  
understanding of  
the circular  
economy

Shared vision of  
value chain

Employee  
ownership

Ideas and  
invitation for  
future projects.

Circular Canvas is available for free on the website: [Link to Circular Canvas](#)

Download, try and check how does it work 😊



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- Supply chain:

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<https://convoy.com/blog/sustainable-supply-chain-leaders/>

# SELF-STUDY QUESTIONS

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- How the selected company can protect natural resources?
- What kind of actions can be taken by companies in order to reduce their impact on the environment?
- How to improve the business processes to go towards circularity?