

# MOVECO Toolbox

**Schools of thought**

***Cradle to Cradle***



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DATE, PLACE, COUNTRY

NAME OF PRESENTER, ORGANIZATION

# Aims of this tool

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**To understand** the importance of different schools of thoughts for new circular design, manufacture, use and end of life with the aim to keep materials, products and components within the technical or biological cycle for longer periods, at their highest potential, and evaluate strategical circular development of a company;

**To learn** how to apply circular design approaches that can be implemented within a company/product lifecycle and define measures to improve the company circularity.

**To define** steps in developing the company circularity through new ways of thinking



# Content of this tool

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- **Introduction to circular economy**
- **Cradle to cradle definitions**
- **Cradle to cradle design**
- **Cradle to Cradle certification**

# Circular economy definition

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“A **circular economy** would benefit our environment, but it's also smart economics. The idea is to keep a given resource circulating for as long as possible. That means designing products, processes and services to optimize the use of resources, so that when something reaches the end of its useful life, we re-use, repair, or remanufacture it for another use. Or we recycle the materials it contains and re-inject them into the economy elsewhere.”

- Quote by Karmenu Vella, European Commissioner for Environment, Maritime Affairs and Fisheries ([www.unep.org/ourplanet/may-2016/articles/go-circular](http://www.unep.org/ourplanet/may-2016/articles/go-circular))

# Bad design

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During different industrial revolutions history provide us with many examples of bad design :

- Titanic is one of them
- Telephones, cars, buildings and so on



Can you think about an example of such a bad design?

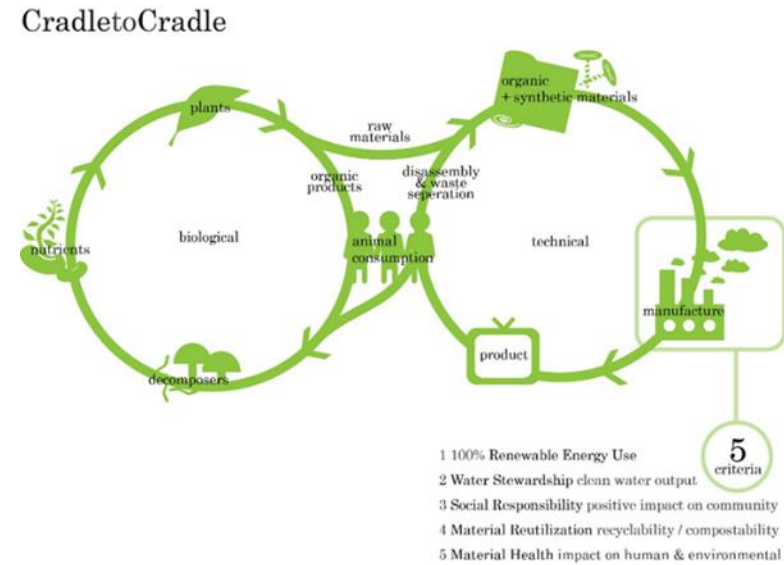
# What is cradle to cradle ?

Cradle to Cradle (C2C) or designing products “for continuous recovery and reutilisation as biological and technical nutrients”

Source: <https://www.ellenmacarthurfoundation.org/circular-economy/schools-of-thought/cradle2cradle>

“Cradle-to-cradle designs are examples of “eco-effective” business practices that optimize human health, recyclable and compostable materials, product life, use of renewable energy, water efficiency and quality while keeping the manufacturers socially responsible. The eco-effective, cradle-to-cradle philosophy responds to the “eco-efficiency” approach, which only seeks to minimize the negative environmental impacts of a business or industry”.

Source: <http://www.ecomii.com/ecopedia/cradle-to-cradle>,



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[https://commons.wikimedia.org/wiki/File:Biological\\_and\\_technical\\_nutrients\\_\(C2C\).jpg](https://commons.wikimedia.org/wiki/File:Biological_and_technical_nutrients_(C2C).jpg)  
[https://commons.wikimedia.org/wiki/File:Biological\\_and\\_technical\\_nutrients\\_\(C2C\).jpg](https://commons.wikimedia.org/wiki/File:Biological_and_technical_nutrients_(C2C).jpg)

# Cradle to Cradle definitions

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**Cradle to Grave** - A Cradle to Grave system is a **linear model** for materials that begins with resource extraction, moves to product manufacturing, and, ends with a “grave” – when the product is disposed of in a landfill or incinerator.

Source: Cradle to Cradle terminology – MBDC-<http://www.c2cproducts.com/detail.aspx?linkid=1&sublink=26>

# Cradle to Cradle definitions

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**Biological metabolism** - The natural processes of ecosystems are a biological metabolism, making safe and healthy use of materials in cycles of abundance.

**Biological Nutrient** - A material used by living organisms or cells to carry on life processes such as growth, cell division, synthesis of carbohydrates and other complex functions. Biological Nutrients are materials that can biodegrade safely and return to the soil to feed environmental processes.

Source: Cradle to Cradle terminology – MBDC-<http://www.c2cproducts.com/detail.aspx?linkid=1&sublink=26>



# Cradle to Cradle definitions

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**Technical metabolism** - Modelled on natural systems, the technical metabolism is MBDC's term for the processes of human industry that maintain and perpetually reuse valuable synthetic and mineral materials in closed loops.

**Technical nutrient** - A material that remains in a closed-loop system of manufacture, reuse, and recovery called the technical metabolism, maintaining its value through infinite product life cycles.

Source: Cradle to Cradle terminology – MBDC-<http://www.c2cproducts.com/detail.aspx?linkid=1&sublink=26>

# Introduction to the topic - general

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Imagine that companies in Danube Region will produce healthy products, biodegradable, that contain nutrients for nature – we speak about biological metabolism

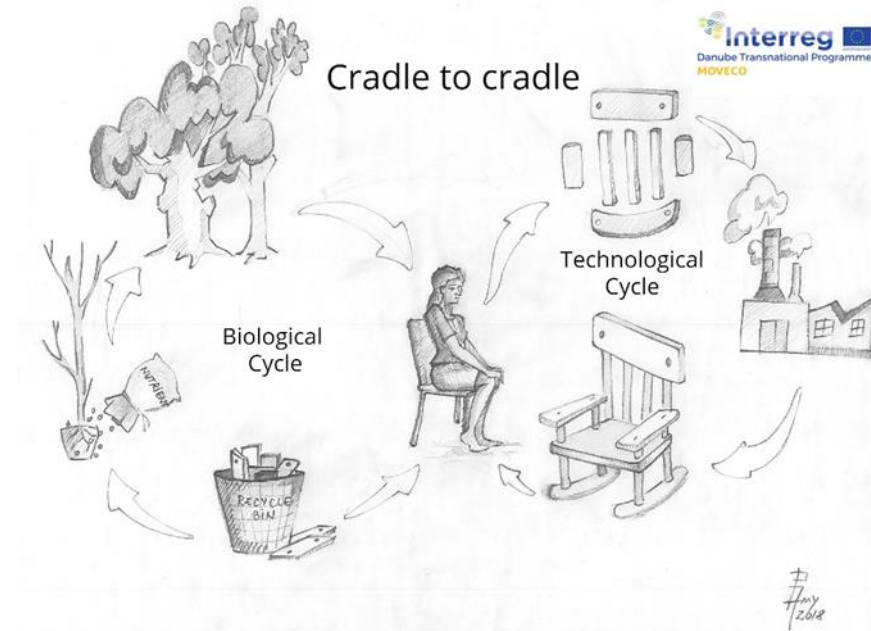
Moreover through recycling, refurbishing and reusing parts and components of some product enter the technical cycle - we speak about technical metabolism

# The Cradle to Cradle principles

→ “Waste equals food”/ “Everything is a nutrient for something else”

→ “Use current solar income”

→ “Celebrate diversity”



# Cradle to Cradle criteria

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There are **five criteria** for cradle to cradle model :

- 100% renewable energy use
- Water stewardship – clean water output
- Social responsibility – positive impact on community
- Material Reutilization – recyclability/composability
- Material health

# 100% renewable energy use

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“Renewable energy is energy that is collected from renewable resources, which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat. Renewable energy often provides energy in four important areas: electricity generation, air and water heating/cooling, transportation, and rural (off-grid) energy services”

Source: Wikipedia - [https://en.wikipedia.org/wiki/Renewable\\_energy](https://en.wikipedia.org/wiki/Renewable_energy)

The sources of renewable energy are very important and they could power most of the companies or world.

What kind of technology should be used? Wind mills, Solar plants - Residential rooftop panels

Sources: Onshore wind, Offshore wind, Wave energy, Geothermal energy, Tides mills

# Principle 1 – waste equals food

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“Everything is a nutrient for something else” is based on the assumption that all materials return to either the natural environment (biological cycle) or the technical environment (technological cycle), depending on their use.

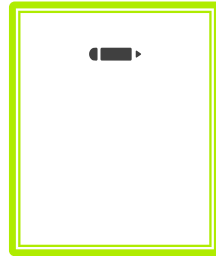
As everything we consume will eventually end up in our natural system, their influence has to be a positive one and that needs to be **based on the product design** as a first step. A design process that includes this principle will cover the material health and material reutilization.

# Water Stewardship

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Considering business sector, water represents both a risk and opportunity as lack of water means business failure that is why, more than others, businesses need to manage water flows in premises, manufacturing processes and supply chains. The opportunity means that businesses can provide innovative solutions to freshwater challenges.

See *Casa EMA case study*



Exercise 1- Can you find some examples, around you concerning water stewardship?

# Social Responsibility

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“**Corporate Social Responsibility** is a management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders”.

- <https://www.unido.org/our-focus/advancing-economic-competitiveness/competitive-trade-capacities-and-corporate-responsibility/corporate-social-responsibility-market-integration/what-csr> visited 05.06.2018

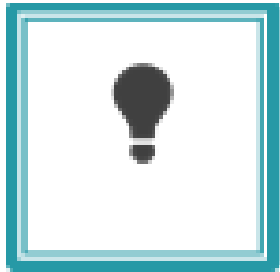
**Corporate Social Responsibility** can be a strategic business management voluntary model or a charity, sponsorships or philanthropy model “that addresses many and various topics such as human rights, corporate governance, health and safety, environmental effects, working conditions and contribution to economic development. Whatever the definition is, the purpose of CSR is to drive change towards sustainability”.

- Financial Times - [http://lexicon.ft.com/Term?term=corporate-social-responsibility--\(CSR\)](http://lexicon.ft.com/Term?term=corporate-social-responsibility--(CSR)) visited 05.06.2018



# Practical application

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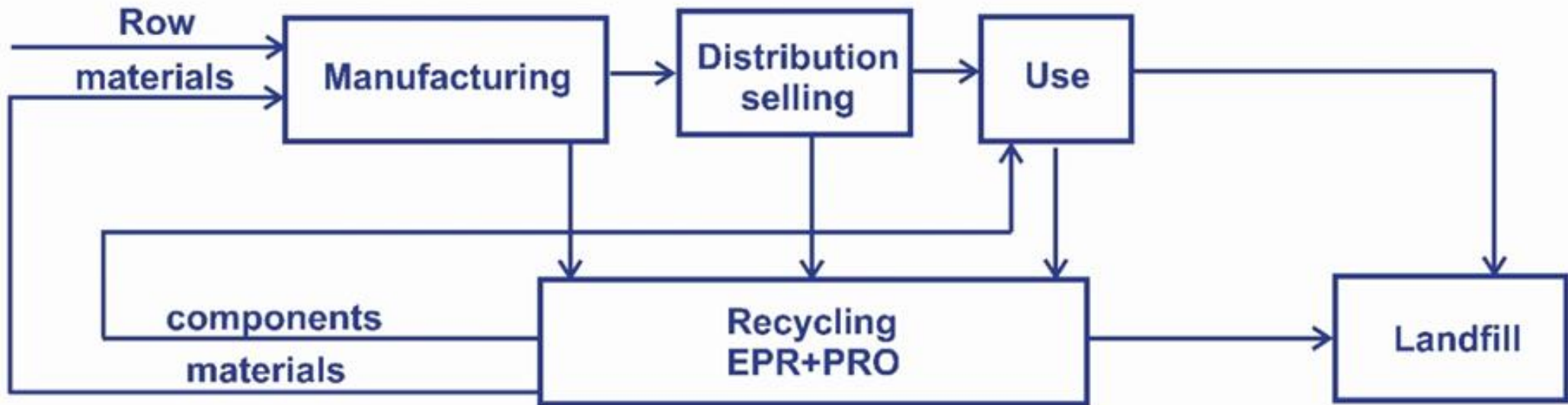


You can have a look to ROMBAT study case included in the Module: Circular Economy Principles

**Best practice example** is company **ROMBAT**, Romania that voluntary includes CSR as business management strategy.

You can find the case study in Module 2 Principles of Circular Economy,

# Material reutilization-recyclability / compostability



# Material health

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Material health: consists of no use of harmful (toxic) substances within a product. From scientific point of view there is a need to research to find suitable “positive”, biocompatible substances to use for manufacturing processes. Of great importance to each and every company is to identify the chemical composition of the materials (raw materials or secondary raw materials) which are found within the product and can create an impact on human or environment.

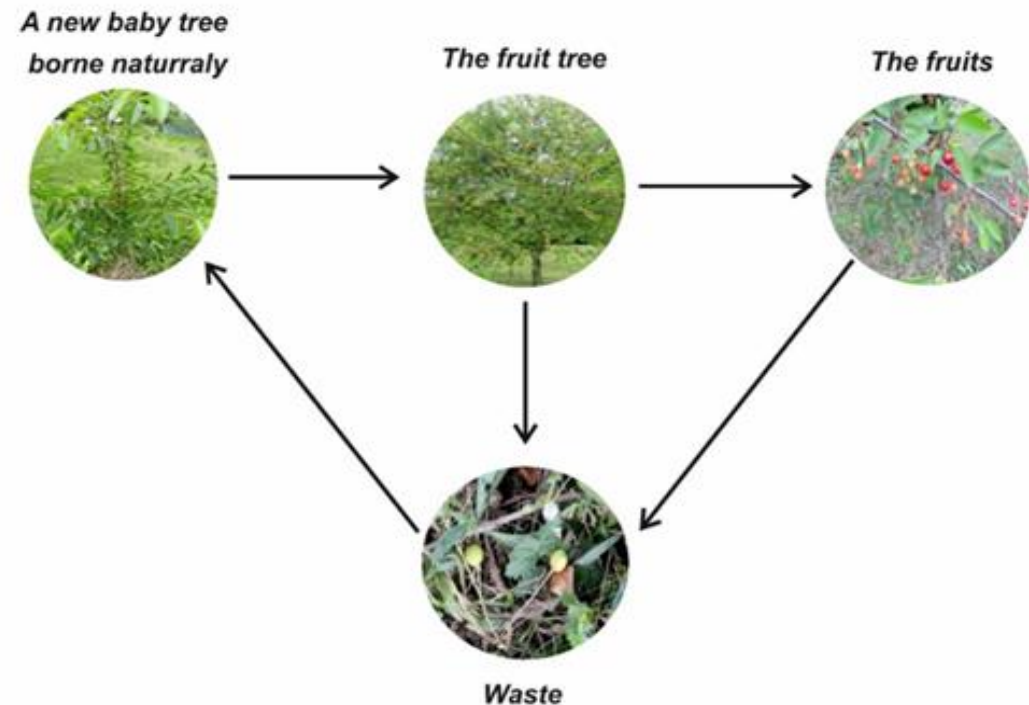
Impact on human & environmental, are based on the three principles described by Michael Braungart:

- “Waste equals food”/ “Everything is a nutrient for something else”
- “Use current solar income”
- “Celebrate diversity”

# “Waste equals food”/ “Everything is a nutrient for something else”

Is based on the assumption that all materials return to either the natural environment (biological cycle) or the technical environment (technological cycle), depending on their use.

As everything we consume will eventually end up in our natural system, their influence has to be a positive one and that needs to be based on the product design as a first step. A design process that includes this principle will cover the material health and material reutilization.



# Healthy materials – example Ecovative

ECOVATIVE has a Cradle to Cradle™ gold certificate as “Mushroom Materials fit well within the five categories of evaluation for certification”.

They use : available agricultural waste from their neighbour farmers, mycelium (a natural organism), renewable energy, and “.... process fits within the earth’s carbon cycle by sequestering carbon atoms for the life of our Mushroom Material products, and then slowing releasing carbon back to the soil or water upon composting. Mushroom Materials are biological nutrients, and are completely compostable in home and municipal systems”.

<https://ecovatedesign.com/press-kit> visited on May 28th 2018



# “Use current solar income”

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There are enough renewable energy sources (e.g. sunlight, wind, biomass, geothermal, rainfall, heat, tides).

Fossil fuels are non-renewable energy sources that are limited. Their combustion emits global carbon emissions, which is a driver for climate change. Because these fuels are used on a global scale their depletion puts pressure on mother Earth, which is why it is becoming increasingly important for people, companies and other organizations to use renewable energy technologies as much as possible.

The design process that includes this principle will cover renewable energy and carbon management, water stewardship, and social fairness.

# Practical exercise

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Energy is very important for each and every company as well as energy saving. Can you imagine some innovative ways to save energy?

Try to get out from the box!

# “Celebrate diversity”

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**Ex: water stewardship** – as water is an essential resource that needs to be properly managed in a responsible way to preserve and maximise its quality and promote healthy ecosystems. Each company must take measures so that water used in the production can be discharged into natural receptors without harming the ecosystems. As we are going to show later on for Cradle to Cradle™ gold certification, there is a need for companies water footprint, taken and discharged water quantities, water quality, the process of discharging and more.

More about stewardship you can find in the module: principles of circular economy of the MOVECO toolbox.



# Cradle to cradle design

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Cradle to Cradle thinking goes beyond the reduction of negative impact on us or environment and one step is rethinking the design and encourage designers to introduce concepts that enable the value generation such as:

- 1) Intelligent materials pooling,
- 2) Eco-effectiveness, and
- 3) The Triple Top Line.

# Intelligent materials pooling

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“Intelligent materials pooling is a framework for the collaboration of economic actors within the technical metabolism, which allows companies to pool material resources, specialized knowledge and purchasing power relating to the acquisition, transformation and sale of technical nutrients and their associated products. The result is a mutually beneficial system of cooperation amongst actors along the supply chain that supports the formation of coherent technical metabolisms and the enabling of product-service strategies. ”

Michael Braungart et al., Cradle-to-cradle design: creating healthy emissions et al., Cradle-to-cradle design: creating healthy emissions - strategy for eco-effective product and system design, Journal of Cleaner Production (2006)

# Eco effectiveness

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The concept of eco-effectiveness offers a positive alternative to traditional eco-efficiency approaches for the development of healthy and environmentally benign products and product systems” . That means Eco-effectiveness provides an absolute positive environmental impact on systems as it "is modelled on the successful interdependence and regenerative productivity of natural systems. In nature, all outputs from one process become inputs for another. The concept of waste does not exist.”

Michael Braungart et al., Cradle-to-cradle design: creating healthy emissions et al., Cradle-to-cradle design: creating healthy emissions- strategy for eco-effective product and system design, Journal of Cleaner Production (2006),

# Triple top line

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According to Sustainability dictionary – TTL is “The effect that attention to sustainable management of natural, financial, and human capital has to an organization by increasing revenues (by offering more desirable products and services) and reducing costs and expenses throughout operations (through more streamlined operations. While many of these benefits are measured in terms of triple bottom line accounting, even more valuable are their effects to a company’s top-line financial performance because they require less capital investment and reduce the cost of capital.”

Sustainability dictionary - <https://sustainabilitydictionary.com/2005/12/04/triple-top-line/>

# Practical activity

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Speak with your peers and share **non-confidential** information

Think about your company: Does the selection of materials consider the **decomposition** and **disassembly** phases as an input?

Are the used materials **healthy**?

Can the materials and components be **upcycled** or **down cycled**, at for what cost?

How much **secondary materials** (recycled) or refurbished parts are included in the final product?

# Cradle to Cradle certification

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**Cradle to Cradle®** is a registered trademark of McDonough Braungart Design Chemistry, LLC (MBDC). Cradle to Cradle Certified™ is a certification mark licensed exclusively for the Cradle to Cradle Products Innovation Institute.

see: <https://www.c2ccertified.org>

# Swimming pool Casa EMA – study case

**The problem:** Because of the susceptibility of being ingested at all times, the water in the swimming pools must reach the quality of the drinking water.

**The solution:**

The EMA House Processing Technology stream consists of: water treatment with ozone, filtration and final disinfection with chlorine. Innovative pool water treatment technology at Casa EMA keeps pool water within legal limits, allowing it to be reused for several months, reducing drinking water considerably, which is very low (add only water evaporate). This technology reduces water consumption considerably, making it a sustainable economy to reduce water consumption.



**Picture credit ICPE Bistrita /Romania**

# Benefits

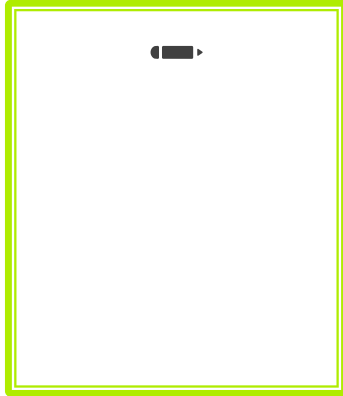
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- ❖ The water quality is = drinking water
- ❖ The water consumption decreases
- ❖ The water consumption costs decrease
- ❖ The clients trust increase
- ❖ An increased number of services provided to clients



# Exercise 1

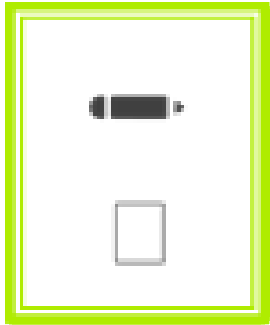
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Exercise 1 Design a biological and technical metabolism for preferred materials

# Exercise 2

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Exercise 2 Use Cradle to Cradle certification criteria to decide your green design priorities.

Source:

[https://venturewell.org/tools\\_for\\_design/measuring-sustainability/cradle-to-cradle/cradle-cradle-exercise/](https://venturewell.org/tools_for_design/measuring-sustainability/cradle-to-cradle/cradle-cradle-exercise/)

# Contact

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Contact details of the host organization (= MOVECO Partner)

This training was delivered by

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