

## CIRCULAR ECONOMY INNOVATION TOOLS

### Schools of thought –Performance Economy

Qualification Programme Handbook Module 3

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## 2. INTRODUCTION

### 2.1. INTRODUCTION

This document can either be used as background material for trainers and participants in a **workshop** or also by individual readers (**self-study** or within a self-formed study-group). For both



Indicative questions encourage you to reflect what you have just read.

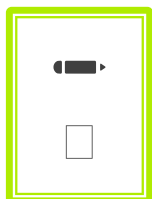
cases, there are notes provided that guide through the material.

In addition, throughout the text, you will find some indicative questions framed and marked by “?” that encourage to reflect what you have just read.



Cross-references to the case studies and further MOVECO materials help to deepen your knowledge about circular economy.

Moreover, there are cross- references to the case studies or other MOVECO material (such as the fact sheets) marked by “💡”.



Practical exercises are pointed out for trainer-led workshops or self-study by individual readers or a self-formed study group

Further, the pencil sign points out practical exercises that can be done as part of a trainer-led workshop or in self-study by individual readers or a self-formed study group.

For the **practical** work, there are several **case studies** that invite discussion or reflection – paired with empty templates for worksheets that encourage looking at a self-chosen practical product example. In the end, there is a short quiz to test the knowledge gained in this section of the toolbox. You will find any specific terminology explained in the **glossary**. If you use this section as part of a workshop, there is an **evaluation form** at the very end that can be used to collect feedback at the end of the workshop.



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**“Doing the right things is more important than doing the things right!”**

**Peter Druker**

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### 3. CONTENT

#### 3.1 PERFORMANCE ECONOMY - GENERAL OVERVIEW

Modern life, our consumption patterns, at least in industrialized countries, have led to the situation where 20% of the population consumes 80% of the resources. In our economy, there is a wealth of products for daily consumption: food, furniture, electric and electronic equipment, toys, vehicles and mobile phones that ensures daily comfort to a level that exceeds needs and covers our dreams.

If we enter a small child's room today, we will find a multitude of toys, many of them containing carcinogens or dangerous substances for the physical health of the adult to be. So we can ask why we get around so many products that we will throw away in a very short time to replace them with others. We could ask, and it would be natural to do it, why do we consume so many resources and how much the industrial economy is compatible with the resources the Planet Earth supplies us? Why is our model take-make-dispose? Why are we consuming so many virgin resources and produce an increased volume of waste while nature does not?



Please have a look at the MOVECO "Circular Economy: Terms& Definitions" fact sheet in the section: the concept of circular economy, as well as in the section school of thought. For more information

Please check the Circular Economy schools of Thought handout you are provided with for information and definitions.

#### 3.1.1 PERFORMANCE ECONOMY DEFINITION

Performance economy is a notion that can be easily connected to the cradle to cradle principles and you should start with the last one the study of schools of thought. It answers a question about the circular economy: how can we achieve higher value, continuous and long-lasting in time, without consuming large amounts of resources? The answer was formulated by Stahel (2010)<sup>1</sup> who believes this to be possible through an intelligent exploitation of science and knowledge that can change the future by decoupling the creation of value through a wise use of materials, goods and technology.

Some definitions:

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"...selling services rather than products, an idea referred to as the 'functional service economy', now more widely subsumed into the notion of 'performance economy' <sup>2</sup>

"Collaborative consumption or Sharing Economy is the practice of sharing human resources through peer-to-peer services and replacing traditional ownership with sharing, lending and borrowing. This socio-economic model allows businesses to drastically lower the costs of certain services for clients and increase revenues by eliminating expenses such as immovable assets and other investments".<sup>3</sup>

Circular economy is not a new approach. We can remember that many years ago we threw away almost nothing, reuse, refurbish, repair, and were concepts very familiar to all of us. Some would comment that it was a circular economy based on poverty (Stahel 2010 ) but in any case the result consisted in using goods longer, reconditioning & repairing actions and less waste.

Nowadays we can speak about abundance, about new life quality, new patterns of consumption and new expectation from technological development. This new approach, unfortunately increase our ecological footprint, increase the quantity of virgin resources consumption and the quantity of waste we produce from a linear economy that is still the main approach, both for companies, people or authorities.

As W. Stahel said<sup>4</sup> during Disruptive Innovation Festival (DIF)<sup>5</sup> „the resources provided by the Planet Earth are non-renewable except for: rainfall, sun light, biomass, animals and peoples".

The definition of increasingly sophisticated consumer patterns emerged with the first industrial revolution. We find different examples within history, on how industrial revolution started. A very interesting story is based on "A petition From the Manufacturers of Candles, Tapers, Lanterns, Sticks, Street Lamps, Snuffers, and Extinguishers, and from Producers of Tallow, Oil, Resin, Alcohol, and Generally of Everything Connected with Lighting".<sup>6</sup>

It was, in fact an Open letter to the French Parliament, originally published in 1845 (Note of the Web Publisher)

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**"We are suffering from the ruinous competition of a rival who apparently works under conditions so far superior to our own for the production of light that he is flooding the domestic market with it at an incredibly low price; for the moment he appears, our sales cease, all the consumers turn to him, and a branch of French industry whose ramifications are innumerable is all at once reduced to complete stagnation. This rival, which is none other than the sun, is waging war on us so mercilessly we suspect he is being stirred up**

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<sup>2</sup> <https://www.ellenmacarthurfoundation.org/circular-economy/schools-of-thought/performance-economy>

<sup>3</sup> <https://lovata.com/blog/sharing-economy-collaborative-consumption-definition-statistics-examples.html>

<sup>4</sup> The Performance Economy - <https://www.youtube.com/watch?v=oOLT0r-9ZM>

<sup>5</sup> <https://www.thinkdif.co/sessions/a-good-disruption>

<sup>6</sup> <http://bastiat.org/en/petition.html>



**against us by perfidious Albion (excellent diplomacy nowadays!), particularly because he has for that haughty island a respect that he does not show for us.**

**We ask you to be so good as to pass a law requiring the closing of all windows, dormers, skylights, inside and outside shutters, curtains, casements, bull's-eyes, deadlights, and blinds – in short, all openings, holes, chinks, and fissures through which the light of the sun is wont to enter houses, to the detriment of the fair industries with which, we are proud to say, we have endowed the country, a country that cannot, without betraying ingratitude, abandon us today to so unequal a combat".**

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The candles showed, for that moment in time, the living standard and the need for housing comfort. It was a big change in everyday life of consumers and an increased role of material objects. But not only that. We can consider, for the moment in time that it was a **disruptive innovation process**<sup>7</sup>.

Many good things happened and the increase of living standards is only part of them. According to different sources<sup>8</sup> in the next period millions of persons will join the middle class and that will create an increased use of virgin resources. And if the model of economic development will still be based on consumption of natural resources we all, as well as future generation, will have a serious problem.

The answer was provided by Walter Stahel, who coined the concept "More from less" dully explained in Performance economy<sup>9</sup> book. It is explained that both companies and governments can profit from technological progress. That can be done exploiting science and knowledge by decoupling wealth and resource consumption while creating jobs at local and regional level.

On the other hand we know that the three components of value creation are: people (social), planet (environmental) and profit (economy) and they are difficult to be balanced because the distribution of responsibilities is not simple. There are companies having, based on their global supply chains, a huge impact upon people and natural capital. They have a big responsibility not only from economical point of view but from environmental point of view as well and re-designing the way resources are consumed will create a great benefit to everybody.

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<sup>7</sup> Disruptive innovation which changes how things are done or specific technological functions are fulfilled, without necessarily changing the underlying technological regime itself. Examples include the move from manual to electric

typewriters and to word processors, or the change from incandescent to fluorescent lighting; Techopolis (2012) Business models for ecoinnovation- final report under Framework Contract B5/ENTR/2008/006-FC-LOTS

<sup>8</sup> Capturing the world's emerging middle class/By David Court and Laxman Narasimhan

<https://www.mckinsey.com/industries/retail/our-insights/capturing-the-worlds-emerging-middle-class>

<sup>9</sup> Stahel, Walter (2010) The Performance Economy, Second Edition, Palgrave-MacMillan, London

Fiscal incentives are important if we wish to shift from over consumption to re-use of materials, in the transition from linear economy to circular economy. In the report New Era, New Plan, Europe<sup>10</sup> the question is: "Why would any country be against the fact that people want to find a job? We should tax the things that we don't want to be used abundantly". That means, for the future, a new way of taxation will probably emerge, not on the labour force (as it is now) but on the scarce resources.

Performance economy introduce new business models transforming our way of thinking. Under



Please have a look at the MOVECO training handbook /module: Business models/ IV Product as a Service

this new business model companies will start to sell performance instead of goods by integrating science into their corporate strategy through smart solutions, smart goods and smart materials.

### 3.1.2 PERFORMANCE ECONOMY – SELLING PERFORMANCE

Selling goods as services can be nowadays linked mainly to:

- Hotels, apartments, offices, and time – share schemes for holiday represents accommodation as a service;
- Public transport, airlines, taxis, Uber, rental cars and car sharing represents mobility as a service
- Renting some room in your house (In Romania it is usual to rent some spare room to a student)
- Coworking or using the same space for work/business
- Hobby equipment, ice skates, snowboards

One of the most important sector that is under great change pressure, based on the volume of waste generated annually, is Electric and Electronic Equipment (EEE) because the huge volume of waste generated on an annually basis. Steps were done in implementing the new business model based on refurbishment and product life extension through selling performance instead of goods. We speak about washing machines, phones, TV sets, household appliances, computers and many other EEE products.

Some benefits for the companies in the manufacturing phase can be:

- Raw material flows improvement
- Recovered materials and parts

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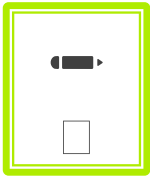
<sup>10</sup> The ExTax Project, et al.(2016) New Era, New Plan, Europe - A fiscal strategy for an inclusive, circular economy



- Decrease of landfilling costs
- Increase of refurbished product volume
- Extension of product lifetime
- Profit

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A good example can be Phillips - Philips Circular lighting solution is a simple one selling light instead of luminaires. They use a modular design systems that are fully repairable and easy to be replaced. A very good example is Schiphol-airport.<sup>11</sup> New and innovative business models are developed by Philips moving from traditional selling process to selling performance to end-users.



Practical exercises 1 - look at the you tube video Schiphol Airport installs Philips Circular lighting in Lounge 2 [https://www.youtube.com/watch?v=\\_11r0NYfl](https://www.youtube.com/watch?v=_11r0NYfl)

Find some benefits of this solution provided by Philips and evaluate the circular elements.



Think about consumer's opinion and experience regarding buying performance instead of goods.

Think about a company producing a very useful good for all of us: washing machine each household has/needs.

Over the past decades the prices, in real terms, dropped due to consumer and retailer demand for lower cost

appliances, with negative effects on the products lifespan, the quality of the products and the way they are removed from the market at the end of their life cycle (legal and illegal).

Because of the great number of appliances on the market the pressure on resources is high and producers have to make certain decisions if they wish to obtain the same revenue. They might have two options: Increased revenues in use phase, increased revenue in the disposal phase.

Having circularity in mind and if the producer wish to exploit the whole product lifecycle, a new business model will be used: selling performance (services) instead of goods and this is at the core of performance economy or service economy.

<sup>11</sup> <http://www.lighting.philips.com/main/cases/cases/airports/schiphol-airport>

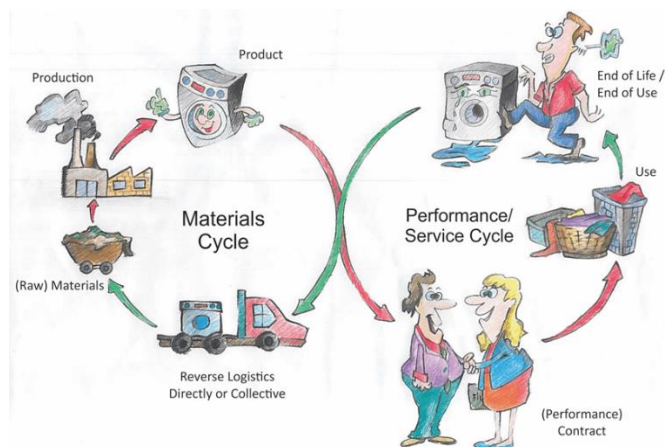


Figure 1. Performance economy – design of CCI BN Amalia Pop Mustafa

When it comes to the washing machine, people are cautious about renting instead of the property on the washing machine, and because they make a direct connection with the personal clothing. Still considering the environmental effects, easier maintenance, no risks, people start thinking to change their mind set from ownership to buying services.

The new paradigm of sharing economy is based on:

- Ownership of the good is changed (people will not own the washing machines anymore)
- The risks and liabilities will be included into internal processes (manufacturing) and that will increase the design quality as the good needs to be:
  - Easy to operate
  - Good service quality (performance)
  - Component dismantle (the modular design)
  - Easy to use components after the end of life (upcycling)
  - The producer needs to assume the responsibilities for a product as a system.

The benefits the owner has lie in:

- Future resource security ( they already use the dismantled components to create new products/services in closed loops, over and over, materials efficiency means low production costs,
- A good price for future resources (resources for today at the yesterday price)
- Increased corporate competitiveness – when costs of materials, waste, energy increase they have an competitive advantage;
- New jobs creation – for new tasks

### 3.1.3 PERFORMANCE ECONOMY – BENEFITS FOR BUSINESS

When changing the paradigm new processes are developed along the value chain:

- The owner (manufacturer) takes all internal responsibilities for repair – and this approach includes workload (more jobs in maintenance services)

- If the first user, for example, renounces to use a washing machine still suitable for use, returns the good to its owner. The washing machine will be repaired & refurbished for reuse. That means – workload for repairing the good.
- Dismantling a product in end of life phase = workload (the dismantling process may include: cleaning the product, parts, and components)
- The quality control become much more important – they will need many controllers = workload.

It is clear that some jobs will decrease in number (selling goods) but some other jobs will occur in an increased number: maintenance, manufacture, internal control, design, etc.

New job creation is part of the social pillar of sustainability and provides room for using a very important renewable resource – people.

Moreover people have the power to innovate and to create and improve things being an important driver for development.

### 3.1.4 PERFORMANCE ECONOMY – IN A NUTSHELL

#### 1. Design phase

In the new model, selling performance instead of goods designers have to:

- Find smart/innovative solution for energy and water use;
- Re-design goods to reuse parts or components, in the manufacture phase through:
  - Quick and easy parts disconnection
  - Clear instructions to disassembly sequences
  - simplify the product architecture
- Re-design goods to increase their life cycle;
- Re-design goods easy to upgrade, easy to adapt
- anticipate legislation changes
- Re-design goods for easy recycling, refurbishing, repairing;
- limit the number of materials, less material consumption
- use recyclable materials, nontoxic, non-harmful chemicals
- use modular components (easy to repair)



Practical application 1: Imagine one of your company product. Can you find ways to re-design it? Can you provide some examples to your peers?

Consider the design phase of some of your products. How many steps in the list from above are usually used?

## 2. Manufacture phase

- More from less by applying smart solution, smart goods and smart materials:
- Less energy consumption for the goods manufactured; It is important to use both for production process or for own premise mainly renewable energy. Less fossil fuels energy should be use.
- Water stewardship; can water be discarded into natural system? What kind of action your company take to do so? And for what cost? Does your company complies with environmental legislation?
- Increased product performance (how well do you sell your product in the marketplace?)
- Ownership (risks and liabilities remain yours) you might need to take more action to decrease the risks and liabilities.



Practical application 2: Check the study case Casa Ema in Cradle to Cradle section

Considering the manufacturing phase please make a sound analysis of water consumption in your company.

## 3. Use phase

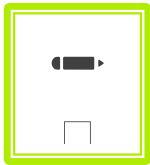
- Customers buy service/performance not the product;
- The changed statute: user not owner;
- Has a stewardship duty;
- Profit from a fixed price (for the service based on contract);
- Can change the good at any point;
- Can buy the good at any point if wishes

## 4. End of life phase

The end of life phase is longer because:

- Components and parts become resources for new products (upcycling);
- The price of resources is lower than virgin raw materials; you already have them at the yesterday price;
- The corporate security works based on resources security
- Less waste/less waste costs;
- Increased revenue produced by upgraded products

### 3.2 EXERCISE 1



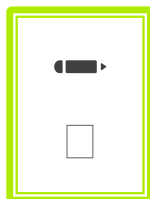
Exercise 1 : Watch this video of Walter Stahel - The Performance Economy  
<https://www.youtube.com/watch?v=o0LTo0r-9ZM>

Now imagine your business. Think about how you can benefit from performance economy.

Identify actual situation of one product you have

Define the four phases of your product in a Performance Economy model.

Discuss with your peers and share ideas!



Exercise 2 : Read the study case Internet enabled pay-per-wash: a model offering multiple benefits

<https://www.ellenmacarthurfoundation.org/case-studies/internet-enabled-pay-per-wash-a-model-offering-multiple-benefits>

Check the study case provided by Ellen Mc Arthur Foundation and identify the most important success drivers of the business model applied by Bundles<sup>12</sup>

Make a list of success drivers and discuss with your peers.

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<sup>12</sup> <https://www.bundles.nl/en/#>

### 3.2 CASE STUDIES - ATELIERELE PEGAS - APE RIDER PROJECT

#### A new business model - smart bike sharing dockless kind



Picture credit: Atelierele Pegas

The Pegasus Workshops has launched a new and ambitious project: Ape Rider is a smart bike sharing service - dockless kind. You can borrow a bicycle and leave it in many essential spaces made available to you. Problems identified: The current needs of over-crowded cities, the rising values of global pollution, the tendency of sedentary or the creation of alternative and efficient transport systems.

**Pegas Solution** Bike Sharing management, Ape Rider, similar to the Uber, will work in the system „You pay as you go“. There is a single cost of 1.9 lei for 30 minutes. The bicycles that are part of this system are specially built by Pegas for it and have their own design.

Bike sharing bicycle Ape Rider incorporates the specific attributes for such a bicycle: the quality of materials, anticorrosive treated components and prolonged resistance to weathering, optimum functionality for high periods of use, minimal maintenance actions or secure anti-theft items.

Basically, with the introduction of this system, the step towards a new era in the field of alternative transport systems is being made. It should also be mentioned here that this system is one of the friendliest of its kind with the environment.

#### **The system**

The system works because of a smart antitheft connected to every bike that lets you locate and unlock the nearest bike with your smartphone. Scan the QR code and you can leave immediately!

Therefore, the system is based on exponential independence as regards the user's action in the sense that it can lift or park the bike in a lot of convenient city spaces.

The interaction with the system is done only through the mobile phone or a similar device. Identifying the location of an available bike, booking bicycles, paying through the phone,



Picture credit: Atelierele Pegas

GPS tracking or motion sensor are the specific attributes of intelligent antitheft installed on the Ape Rider bicycles?

The system is powered by a solar panel located on the bicycle basket. The GPS location of the smart lock allows a precise location at any time of the bicycle fleet.

### **Business model**

#### **1. Design stage :**

- Intelligent/Innovative solution for digitizing the service's safety system
- A new type of bicycle – redesigned to be more resilient, easier maintenance, use/reuse of components in the production stage
- Easy disassembly after completing the initial life cycle;
- Simplified product architecture
- Redesigning bicycles so that their life cycle grows;
- Redesigning bicycles to be easily improved or adapted
- Redesigning bicycles for repair, recycling or remodeling
- Limiting the number of materials, reducing material consumption
- Use of recyclable materials, non-toxic, nonharmful substances?
- Use of modular components (easy to repair)

#### **2. Production stage**

- Application of Intelligent solutions for a smart product
- Increasing product performance
- Digitizing the system as a measure of risk mitigation
- Low consumption of materials/raw material, energy, water?

#### **3. Use stage**

- Customers purchase the service/the performance not the product;
- Changed status: the user is not the owner of the bicycle;
- Has a duty of administration during use;
- The profit from a fixed price;

#### **4. End stage of life**

The end-of-life phase is longer because:

- The components and parts become resources for new products (upcycling);

### **Benefits:**

- Reducing the pollution in Bucharest
- Increasing the number of jobs because of the maintenance services
- Reduced pressure on resources due to the processes of reuse, recycling, remodelling

## 4. QUESTIONS & ANSWERS

### 4.1 QUIZ - QUESTIONS

1. Is Performance Economy introducing:

- A new philosophy?
- New business model?
- A process ?

2. Selling performance means:

- The customer become the owner
- The manufacturer remains the owner
- both are available

3. Selling performance can:

- Increase the liability for consumer?
- Risks and liabilities are included into manufacturing process
- there are no risks and liabilities for manufacturer

4. In performance economy the job number :

- Decrease
- Increase
- Nothing changes

5. Selling performance instead goods creates for manufacturer:

- Less waste
- Less resources security
- Higher prices for resources.



## 4.2 QUIZ - SOLUTIONS

4. 1. Is Performance Economy introducing:

A new philosophy?

**New business model?**

A process ?

2. Selling performance means:

The customer become the owner

**The manufacturer remains the owner**

both are available

3. Selling performance can:

Increase the liability for consumer?

**Risks and liabilities are included into manufacturing process**

there are no risks and liabilities for manufacturer

4. In performance economy the job number:

Decrease

**Increase**

Nothing changes

5. Selling performance instead goods creates for manufacturer:

**Less waste**

Less resources security

Higher prices for resources.

## 5. GLOSSARY

- **Bio-based material:** "Bio" is Greek for life. Bio-based material refers to a product's main constituent consisting of a substance, or substances, originally derived from living organisms. These substances may be natural or synthesized organic compounds that exist in nature. This definition could include natural materials such as leather and wood, but typically refers to modern materials. Many of the modern innovations use bio-based materials to create products that biodegrade. Some examples are: cornstarch, derived from a grain and now being used in the creation of packaging pellets; bio-plastics created with soybean oil, now being used in the creation of many modern products like tractors, water bottles, and take away cutlery."<sup>13</sup> **Biodegradable material:** "A material which microorganisms can break down into natural elements (i.e. water, biomass, etc.)."<sup>14</sup>
- **Biological metabolism** - The natural processes of ecosystems are a biological metabolism, making safe and healthy use of materials in cycles of abundance<sup>15</sup>
- **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<sup>16</sup>
- **Cascading:** see MOVECO fact sheet "Circular Economy: Terms & Definitions"
- **Compostable material:** "Materials that can be disposed with biological materials and decay into nutrient-rich material."<sup>17</sup> **Circular economy** - regenerative economy in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing energy and material loops
- **Cradle-to-Cradle®:** see MOVECO fact sheet "Supporting Tools for a Circular Economy"
- **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"<sup>18</sup>
- **Decision** - "shall be binding in its entirety. A decision which specifies those to whom it is addressed shall be binding only on them"<sup>19</sup>
- **Directive** - "shall be binding, as to the result to be achieved, upon each Member State to which it is addressed, but shall leave to the national authorities the choice of form and methods"<sup>20</sup>

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<sup>13</sup> <https://sustainabilitydictionary.com/2006/02/17/bio-based-material/> (26.03.2018) // "A material that is partially, or entirely made of biomass." <https://www.ceguide.org/Glossary> (26.03.2018)

<sup>14</sup> <https://www.ceguide.org/Glossary> (26.03.2018)

<sup>15</sup> Cradle to Cradle terminology - MBDC-<http://www.c2cproducts.com/detail.aspx?linkid=1&sublink=26>

<sup>16</sup> Cradle to Cradle terminology - MBDC-<http://www.c2cproducts.com/detail.aspx?linkid=1&sublink=26>

<sup>17</sup> <https://www.ceguide.org/Glossary> (26.03.2018)

<sup>18</sup> Cradle to Cradle terminology - MBDC-<http://www.c2cproducts.com/detail.aspx?linkid=1&sublink=26>

<sup>19</sup> European Network of Environmental law Organizations 2012 Implementation of the Waste Framework Directive in the EU Member States

<sup>20</sup> European Network of Environmental law Organisations 2012 Implementation of the Waste Framework Directive in the EU Member States

- **Down-cycle** - to recycle (something) in such a way that the resulting product is of a lower value than the original item : to create an object of lesser value from (a discarded object of higher value)<sup>21</sup> see: MOVECO fact sheet “Circular Economy: Terms & Definitions”
- **Eco-Effectiveness** – “The central strategy in the cradle-to-cradle development method and seeks to create industrial systems that emulate healthy natural systems. The central principle of eco-effectiveness is that “waste equals food.” The concept was developed in response to some of the perceived limitations of eco-efficiency which critics claim only slow down the rate of environmental depletion and don’t reverse the production of unused or non-recycled waste”.<sup>22</sup>
- **Eco efficiency** – “Management philosophy that aims at minimizing ecological damage while maximizing efficiency of the firm's production processes, such as through the lesser use of energy, material, and water, more recycling, and elimination of hazardous emissions or by-products.”<sup>23</sup>
- **Ecological sustainability** – “a bio-centric school of sustainability thinking that, based on ecology and living systems principles, focuses on the capacity of ecosystems to maintain their essential functions and processes, and retain their biodiversity in full measure over the long-term contrasts with technological sustainability based on technical and engineering approaches to sustainability”<sup>24</sup>
- **Ecosystem** - the interactive system of living things and their non-living habitat<sup>25</sup>
- **Ecosystem redesign** - a coherent framework for redesigning our landscapes, buildings, cities, and systems of energy, water, food, manufacturing and waste through the effective adaptation to and integration with nature’s processes<sup>26</sup>
- **Energy efficiency:** “Energy efficiency improvements refer to a reduction in the energy used for a given service (heating, lighting, etc.) or level of activity. The reduction in the energy consumption is usually associated with technological changes, but not always since it can also result from better organization and management or behavioral changes (“non-technical factors”).”<sup>27</sup>
- **Energetic use:** incineration of waste material that includes the use of the generated heat and energy for other processes
- **(Final) disposal:** see MOVECO fact sheet “Circular Economy: Terms & Definitions”

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<sup>21</sup> Merriam Webster dictionary

<sup>22</sup> <https://sustainabilitydictionary.com/2005/12/03/eco-effectiveness/visited> 26/02/2018

<sup>23</sup> <http://www.businessdictionary.com/definition/eco-efficiency.html> -visited 01.03.2018

<sup>24</sup> Orr D (1992) Ecological literacy: education and the transition to a post-modern world. State University of New York Press, Albany.

<sup>25</sup> Tansley AG (1935) The use and abuse of vegetational concepts and terms. Ecology 16:284-307 doi:10.2307/1930070

<sup>26</sup> with adaptations from

[https://www.researchgate.net/publication/301966198\\_Regenerative\\_Development\\_regenerative\\_development\\_and\\_Design](https://www.researchgate.net/publication/301966198_Regenerative_Development_regenerative_development_and_Design) (26.06.2018)

<sup>27</sup> <https://hub.globalccsinstitute.com/publications/energy-efficiency-recipe-success/definition-and-scope-energy-efficiency> (26.03.2018)

- **Incineration:** Waste destruction in a furnace by controlled burning at high temperatures. Incineration removes water from hazardous sludge, reduces its mass and/or volume, and converts it to a non-burnable ash that can be safely disposed of on land, in some waters, or in underground pits. However, it is a highly contentious method because incomplete incineration can produce carbon monoxide gas, gaseous dioxins, and/or other harmful substances.<sup>28</sup>
- **Innovation** - production or adoption, assimilation, and exploitation of a value-added novelty in economic and social areas<sup>29</sup>
- **Landfilling:** “The disposal and burying of solid waste. The degradation of the waste results in the creation of local air and water pollution.”<sup>30</sup>
- **Lean production** - approach to management that focuses on cutting out waste, whilst ensuring quality<sup>31</sup>
- **Life-cycle** - series of stages in form and functional activity through which a system passes between successive recurrences of a specified primary stage<sup>32</sup>
- **Life-cycle analysis:** see MOVECO fact sheet “Supporting Tools for a Circular Economy”
- **Life-time** - the duration of the existence of a given particular system<sup>33</sup>
- **Locational patterns** - the patterns that depict the distinctive character and potential of a place and provide a dynamic mapping for designing human structures and systems that align with the living systems of a place<sup>34</sup>
- **Negative externality** - occurs when production and/or consumption imposes external costs on third parties outside of the market for which no appropriate compensation is paid<sup>35</sup>
- **Optimization** - finding an alternative with the most cost effective or highest achievable performance under the given constraints, by maximizing desired factors and minimizing undesired ones<sup>36</sup>
- **Permaculture** - a system of agricultural and social design principles centered around simulating or directly utilizing the patterns and features observed in natural ecosystems<sup>37</sup>
- **Place** - the unique, multi-layered network of ecosystems within a geographic region that results from the complex interactions through time of the natural ecology (climate, mineral and other deposits, soil, vegetation, water and wildlife, etc.) and culture (distinctive customs,

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<sup>28</sup> <http://www.businessdictionary.com/definition/incineration.html> (27.06.2018)

<sup>29</sup> with adaptations from <http://www.ericshaver.com/the-many-definitions-of-innovation/> (27.06.2018)

<sup>30</sup> <https://www.ceguide.org/Glossary> (26.03.2018)

<sup>31</sup> with adaptations from <https://www.tutor2u.net/business/reference/introduction-to-lean-production> (27.06.2018)

<sup>32</sup> <https://www.merriam-webster.com/dictionary/life%20cycle> (26.06.2018)

<sup>33</sup> With adaptations from <https://en.wikipedia.org/wiki/Lifetime> (26.06.2018)

<sup>34</sup> [https://www.researchgate.net/publication/273379786\\_Regenerative\\_Development\\_and\\_Design](https://www.researchgate.net/publication/273379786_Regenerative_Development_and_Design) (25.06.2018)

<sup>35</sup> with adaptations from <https://www.economicshelp.org/micro-economic-essays/marketfailure/negative-externality/> (26.06.2018)

<sup>36</sup> <http://www.businessdictionary.com/definition/optimization.html> (26.06.2018)

<sup>37</sup> <https://en.wikipedia.org/wiki/Permaculture> (27.06.2018)

expressions of values, economic activities, forms of association, ideas for education, traditions, etc.)<sup>38</sup>

- **Recommendations and opinions** - shall have no binding force<sup>39</sup>
- **Recycling**: see MOVECO fact sheet “Circular Economy: Terms & Definitions”
- **Refurbishment**: “The refurbishment of something is the act or process of cleaning it, decorating it, and providing it with new equipment or facilities.”<sup>40</sup>
- **Regenerative design** - a system of technologies and strategies, based on an understanding of the inner working of ecosystems that generates designs to regenerate rather than deplete underlying life support systems and resources within socio-ecological wholes<sup>41</sup>
- **Regenerative development** - a system of technologies and strategies for generating the patterned whole system understanding of a place, and developing the strategic systemic thinking capacities, and the stakeholder engagement/commitment required to ensure regenerative design processes to achieve maximum systemic leverage and support, that is self-organizing and self-evolving<sup>42</sup>
- **Regulation** - shall have general application. It shall be binding in its entirety and directly applicable in all Member States. – Source - Article 288 TFEU,<sup>43</sup>
- **Remanufacturing**: “The process of cleaning and repairing used products and parts to be used again for replacements.”<sup>44</sup>
- **Restorative design** - sometimes called restorative environmental design; a design system that combines returning polluted, degraded or damaged sites back to a state of acceptable health through human intervention<sup>45</sup>
- **Resource efficiency**: “A percentage of the total resources consumed that make up the final product or service.”<sup>46</sup> re-use: see MOVECO fact sheet “Circular Economy: Terms & Definitions”
- **Secondary resource/ secondary raw materials**: “Waste materials that are recovered, recycled and reprocessed for use as raw materials.”<sup>47</sup>
- **Servitization** - refers to industries using their products to sell “outcome as a service” rather than a one-off sale<sup>48</sup>
- **Source to sink** - simple linear flows from resource sources (farms, mines, forests, watershed, oilfields, etc.) to sinks (air, water, land) that deplete global sources and overload/pollute global sinks<sup>49</sup>

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<sup>38</sup> [https://www.researchgate.net/publication/273379786\\_Regenerative\\_Development\\_and\\_Design](https://www.researchgate.net/publication/273379786_Regenerative_Development_and_Design) (25.06.2018)

<sup>39</sup> [http://eur-](http://eur-lex.europa.eu/summary/chapter/environment.html?root_default=SUM_1_CODED%3D20.SUM_2_CODED%3D2003&locale=en)

[lex.europa.eu/summary/chapter/environment.html?root\\_default=SUM\\_1\\_CODED%3D20.SUM\\_2\\_CODED%3D2003&locale=en](http://eur-lex.europa.eu/summary/chapter/environment.html?root_default=SUM_1_CODED%3D20.SUM_2_CODED%3D2003&locale=en)

<sup>40</sup> <https://www.collinsdictionary.com/de/worterbuch/englisch/refurbishment> (26.03.2018)

<sup>41</sup> Mang, Pamela & Reed, Bill. (2017). Update Regenerative Development and Design 2nd edition.

<sup>42</sup> <https://www.sciencedirect.com/science/article/pii/S2212609015300327> (26.06.2018)

<sup>43</sup> <http://eur-lex.europa.eu/legal-content/en/TXT/HTML/?uri=CELEX:12016E288>

<sup>44</sup> <https://sustainabilitydictionary.com/2005/12/03/remanufacturing/> (26.03.2018)

<sup>45</sup> [https://www.researchgate.net/publication/273379786\\_Regenerative\\_Development\\_and\\_Design](https://www.researchgate.net/publication/273379786_Regenerative_Development_and_Design) (24.06.2018)

<sup>46</sup> <https://sustainabilitydictionary.com/2005/12/03/remanufacturing/> (26.03.2018)

<sup>47</sup> <https://sustainabilitydictionary.com/2005/12/03/remanufacturing/> (26.03.2018)

<sup>48</sup> <https://www.k3syspro.com/servitization/> (24.06.2018)

- **Stewardship** - ethic of companies, organizations and individuals that embodies the responsible planning and management of resources<sup>50</sup>
- **Sourcing**: “the act of getting something, especially products or materials, from a particular place”<sup>51</sup>
- **System thinking** - holistic approach of analysis and planning that focuses on the way the parts of a system interrelate each other and how systems work over time and within the context of larger systems<sup>52</sup>
- **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”<sup>53</sup>
- **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”<sup>54</sup>
- **Upcycle** - “to recycle (something) in such a way that the resulting product is of a higher value than the original item: to create an object of greater value from (a discarded object of lesser value)”<sup>55</sup>
- **Upcycling**: see MOVECO fact sheet “Circular Economy: Terms & Definitions”
- **Waste**: see MOVECO fact sheet “Circular Economy: Terms & Definitions”

More: <https://www.ceguide.org/Glossary>

## 6 REFERENCES

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Page 14 - Ape Rider services Picture credit Atelierele Pegas

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<sup>49</sup> [https://www.researchgate.net/publication/273379786\\_Regenerative\\_Development\\_and\\_Design](https://www.researchgate.net/publication/273379786_Regenerative_Development_and_Design) (25.06.2018)

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<sup>51</sup> <https://dictionary.cambridge.org/dictionary/english/sourcing> (26.03.2018)

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<sup>53</sup> Cradle to Cradle terminology – MBDC-<http://www.c2cproducts.com/detail.aspx?linkid=1&sublink=26>

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## 6.2. ONLINE RESOURCES

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## 6.3. OTHER RESOURCES

- Circular economy stakeholder's platform - <https://circulareconomy.europa.eu/platform/en/good-practices/circular-business-models-creating-climate-fit-life>

- European Union Raw Materials Knowledge Base (EURMKB)  
[https://ec.europa.eu/growth/sectors/raw-materials/specific-interest/knowledge-base\\_en](https://ec.europa.eu/growth/sectors/raw-materials/specific-interest/knowledge-base_en)

## 7. IMPRINT

This document is a publication within the MOVECO project.

Full title: MOVECO – Mobilising Institutional Learning for Better Exploitation of Research and Innovation for the Circular Economy

Project duration: 12/2016–05/2019

Project code: DTP 1-349-1.1

Funding scheme: As part of the Danube Transnational Programme, MOVECO is an Interreg project, co-funded by the European Regional Development Fund (ERDF) and the Instrument for Pre-Accession Assistance (IPA).

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This document has been edited by Monica Muresan on behalf of all project partners of the MOVECO project (project identity: DTP 1-349-1.1).

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