MOVECO

CIRCULAR ECONOMY INNOVATION TOOLS
EU legislation package on waste and circular economy

Qualification Programme Handbook

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»The Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment. It shall promote scientific and technological advance«.

From article 3 Treaty on European Union (aims of the Union)

2 INTRODUCTION

2.1 INTRODUCTION

The course presents an overview of European Union legislation relevant to environmental obligations stemming from extended producer requirements for products unto which this principal applies. With the recently approved and published legislative block dedicated to support the transitions of the EU to become circular in terms of material flows, extended producer responsibility schemes should be considered as an appropriate tool to encourage eco-design an better waste management for a wider range of product groups. As such, it is expected the number of schemes supporting extended producer responsibility will increase in the future. According to the last legislative amendments extended producer responsibility should be applied for (waste) electronic and electrical equipment, (end-of-life) vehicles, packaging and packaging waste as well as batteries and accumulators. This course provides a basic overview of waste legislation in the European Union, its historical evolution and its increasing focus not only on waste but also on product design and the introduction of products to the market. The materials do not contain any specific information of end-of-life vehicles.

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

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

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.

3 CONTENT (90')

3.1 FOR TRAINERS: HOW TO WORK WITH THIS SECTION IN THE WORKSHOP

Module structure and its time frame

Module – 3 school hours long in total – will give quick insight into EU legislation and its effect on national legislation, regarding adopting secondary legal instruments into national legislative framework. It will also give participants insight into useful practical sources of information to refer to national waste legislation that concerning the SME's work on day to day basis. Module consists of three parts:

1. Introduction (15')
2. Lecture (90')
3. Evaluation and debriefing (30').

Learning objectives of the module

- Understand of EU legislative framework and basic requirements and how this effects national legislation.
- Identify legal obligations stemming from waste legislation, extended producer requirements and polluter pays principle.
- Identify sources of information, consultancy and services.
- Point out main differences, which could affect transitions between different national markets.

3.2 HOW EUROPEAN UNION ENVIRONMENTAL PROTECTION LEGISLATION WORKS AND ITS OBJECTIVES – WITH EMPHASIS ON WASTE MANAGEMENT

The European Union[1] has some of the world's highest environmental standards, developed over decades. Environment policy helps the EU economy become more environmentally friendly, protects Europe's natural resources, and safeguards the health and wellbeing of people living in the EU.

Environmental quality is central to our health, our economy and our well-being. Our societies and economies face several serious challenges, not least those of climate change, unsustainable consumption and production, as well as various forms of pollution.

[1] http://eur-lex.europa.eu/summary/chapter/environment.html?root_default=SUM_1_CODED%3D20,SUM_2_CODED%3D2003&locale=en (22.2.2018)

EU environmental policies and legislation protect natural habitats, keep air and water clean, ensure proper waste disposal, and improve knowledge about toxic chemicals and help businesses move toward a sustainable economy.

The EU treaties are binding agreements between EU member countries. With regard to the environment, the most important treaties are the Treaty on the European Union and the Treaty on the functioning of the European Union.

EU environmental policy is based on Articles 11 and 191-193 of the Treaty on the Functioning of the European Union (TFEU). Under Article 191, combating climate change is an explicit objective of EU environmental policy. Sustainable development is an overarching objective for the EU, which is committed to a 'high level of protection and improvement of the quality of the environment' - Article 3 of the Treaty on the European Union.

Article 3, paragraph 3 of the Treaty on European Union (TEU): The Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment. It shall promote scientific and technological advance.

Article 11 of TFEU (ex Article 6 TEC): Environmental protection requirements must be integrated into the definition and implementation of the Union's policies and activities, in particular with a view to promoting sustainable development.

For economic operators producing and placing products on the market proper waste management in accordance with common waste legislative requirements is vital. Their daily business is most frequently impacted by demands, obligations and rules set out in directives, which member states have transposed into their national legislative framework, regulations that apply directly in all member states and decisions.

3.3 CURRENT LEGISLATION RELEVANT TO WASTE AND EPR REGULATED WASTE STREAMS

After the first United Nations Conference on the Environment in Stockholm in 1972; the Commission became active in initiating an original Environmental Community policy in line with growing public and scientific concerns on the limits to growth. The first EU Environmental Action Plan was adopted in 1972, where waste management was highlighted as a priority.

Initial waste legislation was designed to protect both the environment and public health. It reflected a need for strict control of waste flows to "dispose" of them as cheaply as possible.

The nature of EU waste legislation has continuously evolved, since the 1970s. Originally, legislation was focused on problems associated with poor infrastructural arrangements for waste collection and disposal.

Before[2] the mid-1970s, waste was largely regarded as a local matter in all Member States, and the Community had no legislation concerned with waste disposal. The adoption of the Waste Framework Directive 75/442/EEC in 1975 was in part a response to the introduction by some Member States of legislation intended to provide a national framework for waste policy, and sought to set out a coherent set of measures applicable in all Member States.

The original Directive from 1975 had only two definitions:

- "waste" meaning any substance or object which the holder disposes of or is required to dispose of pursuant to the provisions of national law in force;
- "disposal" meaning the collection, sorting, transport and treatment of waste as well as its storage and tipping above or underground,
    - the transformation operations necessary for its re-use, recovery or recycling.

The meanings of both definitions have since been altered in following directives, where the term dispose has been substituted by discard with disposal referring to less favourable waste management measures such as incineration and landfill.

The latest amendment to Waste framework Directive 2008/98/EC, Directive 2018/851 includes a definition for waste management, which encompasses the collection, transport, recovery (including sorting) and disposal of waste, including the supervision of such operations and the after-care of disposal sites including actions taken as a dealer or broker.

The Framework Directive was followed in the late seventies, by Directives on toxic waste, PCB disposal and waste oils. Since then, EU law related to waste has continued to expand with Directives regulating different disposal methods from landfill to incineration and regulating specific product-based waste streams including Directives on packaging batteries, electrical equipment and vehicles to manage increasing volumes of these waste streams from consumer sources.

Recent changes in waste legislation support a refocus of our view of waste solely through the perspective of waste management, requiring new consideration to options, which exploit waste as a valuable resource.

This Waste Framework Directive, 2008/98/EC reset the baselines for much of waste management, defining and redefining key terms and concepts; such as:

- when waste ceases to be waste,
- the waste hierarchy in EU law (i.e. prevention, preparation for reuse, recycling, other recovery, e.g. energy recovery and then disposal be the order of preference) and
- set new targets for recycling and recovery.

[2] https://ieep.eu/uploads/articles/attachments/ef889079-1471-41a8-ab29-3080b392d5fb/6.1_Overview_of_waste_policy_-_final.pdf?v=63664509871 (22.2.2018)

In 2015, the European Commission presented an ambitious ***Circular Economy Package, which included measures that would help*** stimulate Europe's transition towards a circular economy, boost global competitiveness, foster sustainable economic growth and generate new jobs.

The Circular Economy Package consisted of an EU Action Plan for the Circular Economy that established a concrete and ambitious programme of action, with measures covering the whole cycle: from production and consumption to waste management and the market for secondary raw materials. The package included revised legislative proposal on waste.

The transition to a more circular economy, where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised, is an essential contribution to the EU's efforts to develop a sustainable, low carbon, resource efficient and competitive economy. Such transition is the opportunity to transform our economy and generate new and sustainable competitive advantages for Europe.

On the 30th of May 2018, the circular economy legislative package consisting of four directives of the European parliament and the Council:

- **2018/851** amending Directive 2008/98/EC on waste;
- **2018/849** amending Directives 2000/53/EC on end-of-life vehicles, 2006/66/EC on batteries and accumulators and waste batteries and accumulators, and 2012/19/EU on waste electrical and electronic equipment;
- **2018/855** amending Directive 94/62/EC on packaging and packaging waste; and
- **2018/850** amending Directive 1999/31 on landfill of waste;

were published in the Official Journal of the European Union. The amending Directives must be transposed by Member States before 5th of July 2020. These amending Directives set the legislative framework anticipated to support the shift towards a more sustainable future and closure of material loops within the economy though:

- the design of more durable products,
- products that are suitable for reuse,
- product components that can be easily dismantled and reused or remanufactured and efficiently recycled without losing the value of their materials.

The circular economy legislative package emphasises the need to improve municipal waste management, introducing a new definition for municipal waste in amending Directive 2018/851. Municipal waste means:

a) mixed waste and separately collected waste from households, including paper and cardboard, glass, metals, plastics, bio-waste, wood, textiles, packaging, waste electrical and electronic equipment, waste batteries and accumulators, and bulky waste including mattresses and furniture;

b) mixed waste and separately collected waste from other sources, where such waste is similar in nature to composition to waste from households;

?

Which products does your organisation place on the market?

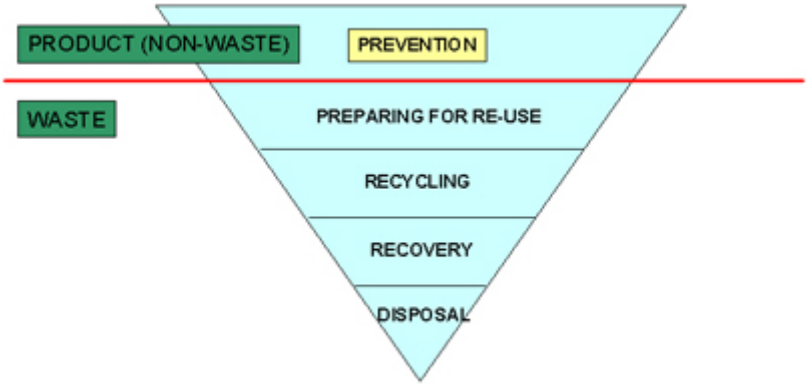
Municipal waste does not include waste from production, agriculture, forestry, septic tanks and sewage network and treatment, including sewage sludge, end-of-life vehicles or construction and demolition waste. The definition is without prejudice to the allocation of responsibilities for waste management between public and private actors.

3.3.1 WASTE FRAMEWORK DIRECTIVE 2008/98/EC

The Waste Framework Directive (2008/98/EC) subsequently referred to as WFD is still the cornerstone of waste legislation in the European Union. The Directive from 2008 repealed the old Framework Directive (Directive 2006/12/EC) and incorporated and repealed the Hazardous Waste Directive (Directive 91/689/EEC) and the Waste Oil Directive (Directive 75/439/EEC).

The WFD continues to emphasise measures for waste management to protect the environment and human health. The original definition for waste, as any substance or object which the holder discards or intends or is required to discard remains intact.

The directive defines the priority order in waste prevention and management legislation and policy though the waste hierarchy (see below).



Picture 1: EU waste hierarchy

"**Prevention**" means measures taken before a substance, material or product has become waste that reduces:

a) the quantity of waste, including through the re-use of products or the extension of the life span of products;

b) the adverse impacts of the generated waste on the environment and human health; or

c) the content of harmful substances in materials and products.

"**Re-use**" means any operation by which products or components that are not waste are used again for the same purpose for which they were conceived;

What kind of waste does your organisation encounter and how does it handle them?

"**Treatment**" means recovery or disposal operations, including preparation prior to recovery or disposal;

"**Recovery**" means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II sets out a non-exhaustive list of recovery operations;

"**Preparing for re-use**" means checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing;

"**Recycling**" means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations; and

"**Disposal**" means any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy.

The directive introduces the conditions under which, when fulfilled, residues can be classified as by-products. **By –products** occur if the item is not the primary aim of production, where:

- *Further use of the substance or object is certain;*
- *The substance or object can be used directly, without any further processing other than normal industrial practice;*
- *The substance or object is produced as an integral part of the production process; and*
- *Further use is lawful i.e. the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.*

The directive determines **End-of-waste status**, when certain specified waste, ceases to be waste, within the definition of the WFD, when it has undergone a recovery, including recycling, operation and complies with the following conditions:

- *The substance or object is commonly used for a specific purpose;*
- *A market or demand exists for such a substance or object;*
- *The substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and*

- *The use of the substance or object will not lead to overall adverse environmental or human health impacts.*

To support the design of products, which are easier to reuse, recycle and recover, **extended producer responsibility** (EPR) is recognised as an instrument, which may encourage such measures. **Extended producer responsibility is** a strategy to support better design for managing post-consumer waste streams, requiring the producer to take financial, operation and / or other responsibilities for waste product management.

Amending Directive 2018/851 extends the intention for design of products to include also components of products. As such, article 8 has been modified to: "Member States may take appropriate measures to encourage the design of **products and components** to reduce environmental impacts and the generation of waste… "

and

"Measures shall encourage the development, production and marketing of **products and components** that are suitable for multiple uses, that contain recycled materials, are **technically durable** and **easily reparable** that are after becoming waste, **suitable for preparing for re-use, recycling** in order to facilitate proper implementation of the waste hierarchy. The measures shall take into account the impact of products throughout their life cycle, the waste hierarchy and where appropriate, the potential for multiple recycling"

Directive 2018/851 introduces a definition for **Extended producer responsibility** schemes which are defined as a set of measures taken by Member States to ensure that producers of products bear financial responsibility or financial and organisational responsibility for the management of the waste stage of a product's life cycle.

A new article 8a in Directive 2018/851defines minimum requirements for **Extended producer responsibility schemes**:

"Where extended producer responsibility schemes are established including pursuant to other legislative acts of the Union, Member States shall:

(a) define in a clear way the roles and responsibilities of all relevant actors involved, including producers of products placing products on the market of the Member State, organisations implementing extended producer responsibility obligations on their behalf, private or public waste operators, local authorities and, where appropriate, re-use and preparing for re-use operators and social economy enterprises;

(b) in line with the waste hierarchy, set waste management targets, aiming to attain at least the quantitative targets relevant for the extended producer responsibility scheme as laid down in the waste framework directive, the directive on packaging and packaging waste, the directive on waste electronic and electrical equipment, the end of life vehicle directive and the directive on batteries and accumulators and set other quantitative targets and/or qualitative objectives that are considered relevant for the extended producer responsibility scheme;

(c) ensure that a reporting system is in place to gather data on the products placed on the market of the Member State by the producers of products subject to

extended producer responsibility and data on the collection and treatment of waste resulting from those products specifying, where appropriate, the waste material flows, as well as other data relevant for the purposes;

(d) ensure equal treatment of producers of products regardless of their origin or size, without placing a disproportionate regulatory burden on producers, including small and medium-sized enterprises, of small quantities of products

(e) ensure that the waste holders targeted by the extended producer responsibility schemes established are informed about waste prevention measures, centres for re-use and preparing for re-use, take-back and collection systems, and the prevention of littering.

(f) take measures to create incentives for the waste holders to assume their responsibility to deliver their waste into the separate collection systems in place, notably, where appropriate, through economic incentives or regulations.

EPR schemes must

- have a clearly defined geographical, product and material coverage without limiting those areas to those where the collection and management of waste are the most profitable;
- provide an appropriate availability of waste collection systems within the areas referred to in point (a);
- have the necessary financial means or financial and organisational means to meet its extended producer responsibility obligations;

- EPR schemes for packaging and waste packaging must cover costs for the products that the producer puts on the market in the Member State concerned:

  – costs of separate collection of waste and its subsequent transport and treatment, including treatment necessary to meet the Union waste management targets, taking into account the revenues from re-use, from sales of secondary raw material from its products and from unclaimed deposit fees;

  – costs of providing adequate information to waste holders,

  – costs of data gathering and reporting.

All schemes must ensure that costs:

- *in the case of collective fulfilment of extended producer responsibility obligations, are modulated, where possible, for individual products or groups of similar products, notably by taking into account their durability, reparability, re-usability and recyclability and the presence of hazardous substances, thereby taking a life-cycle approach and aligned with the requirements set by relevant Union law, and where available, based on harmonised criteria in order to ensure a smooth functioning of the internal market;*

and

- *do not exceed the costs that are necessary to provide waste management services in a cost-efficient way. Such costs shall be established in a transparent way between the actors concerned.*

How does extended producer responsibility affect your business?

Article 9 of Directive 2018/851 greatly expands the provisions for prevention defined in the 2008 WFD. Amongst other it:

- *encourages the design, manufacturing and use of products that are resource-efficient, durable (including in terms of life span and absence of planned obsolescence), reparable, re-usable and upgradable;*
- *targets products containing critical raw materials to prevent that those materials become waste;*
- *encourages the re-use of products and the setting up of systems promoting repair and re-use activities, including in particular for electrical and electronic equipment, textiles and furniture, as well as packaging and construction materials and product and*
- *encourages as appropriate and without prejudice to intellectual property rights, the availability of spare parts, instruction manuals, technical information, or other instruments, equipment or software enabling the repair and re-use of products without compromising their quality and safety; etc.*

Article 10 of Directive 2018/851 also expands the stipulations referring to recovery in comparison to the 2008 WFD.

Re-use and Recycling stipulated in Article 11 of the 2008 WFD expands on the initial demands, requiring Member states to take appropriate measures to promote re-use of products and preparing for reuse activities … and high quality recycling, defining municipal waste preparing for reuse and recycling targets and deadlines for these targets to a minimum of:

- *55 % by weight by 2025*
- *60 % by weight by 2030 and*
- *65 % by weight by 2035.*

The 2008 WFD defines responsibility for waste management, requirements for hazardous waste management, waste oils and bio-waste. It determines which waste management operations must be backed with permits and registration.

Member states are required to establish waste management plans and waste prevention programmes. Hazardous waste management undertakings must be subject to inspections and record keeping. The directive designated collection, reuse and recovery targets for certain material waste streams.

Annex I defines disposal operations, while annex II defines recovery operations. As the WFD repeals the hazardous waste directive, annex 3 defines properties of waste, which render it hazardous.

Decision 2000/532/EC referred to by the 2008 WFD, determines a list of waste, including hazardous waste. The list takes into account the origin and composition of waste. The inclusion of a substance or object in the list shall not mean that it is waste in all circumstances. A substance or object shall be considered waste only when the definition of waste according to the directive, applies. The decision defines 20 categories of waste or chapter and explains how to classify different waste streams within these categories. Waste packaging is classified under chapter 15; waste electrical and electronic equipment is found in chapter 16, specifically in subchapter 16 02; while waste batteries and accumulators are listed under 16 06. All these wastes can also be found in municipal waste streams from households they have been attributed special classification in chapter 20 under separately collected fractions of municipal waste.

Within the Circular economy legislative package, amendments to the Waste Framework Directive have as such included:

- *Clearer, more binding and transparent unified minimal requirements for producer responsibility organisations managing extended producer schemes.*
- *New targets for preparing for reuse and recycling for certain material waste streams in Member States.*
- *New definitions, i.e. extended producer responsibility schemes.*
- *Unified methods to calculate waste stream management in MS.*

A new annex IVa amends directive 2008/98/EC determining examples of economic instruments and other measures to provide incentives for the application of the waste hierarchy.

3.3.2 DIRECTIVE ON PACKAGING AND PACKAGING WASTE 94/62/EC

The first EU measures on the management of packaging waste were introduced in the 1980s with the Directive 85/339/EEC14 on beverage containers. This Directive failed to bring about harmonisation of national policies. Therefore Member States and economic operators requested the Commission to propose a comprehensive legislation with a general purpose to harmonise the measures taken at the Member State level for the management of packaging and packaging waste. As a result, the 94/62/EC Packaging and Packaging Waste Directive (PPW Directive) was adopted in 1994 with the aim to harmonise national measures to reduce the impacts of packaging and packaging waste to the environment and to safeguard the functioning of the internal market.

The PPW Directive with the **Single market Treaty Article as its legal base** set a **dual objective** in order to:

- ***Prevent impacts on the environment*** *for all Member States and third countries (environmental objective); to this end it has provisions on re-use of packaging, prevention and recycling of packaging waste and other forms of packaging recovery as well as substance restrictions.*
- ***Ensure a good functioning of the Internal Market*** *without imposing obstacles to trade and causing distortions and restriction of competition within the EU (internal market objective).*

The Directive has underwent modifications since 1994 to accommodate a common understanding of what items can considered packaging as well as other changes linked to technological development. It was modified in 2015 (Directive (EU) 2015/720 to include special provisions for single use plastic carrier bags. The directive follows the waste hierarchy, though it does not refer to preparation for reuse yet. It determines quantified targets for recovery and recycling for Member States.

All packaging placed on the market must comply with the **Essential Requirements** defined in the directive. Harmonised EN standards have been developed to help producers comply with requirements specific to:

- *The manufacture and composition of packaging*
- *The reusable nature of packaging*
- *The recoverable nature of packaging with reference to*
    - *Material recovery*
    - *Energy recovery*
    - *Composting*
    - *Biodegradable packaging.*

Harmonised standards EN also offer guidance to verify absence of certain heavy metals. The list of European standards referring to packaging and packaging waste:

- EN 13427: Packaging - Requirements for the use of European Standards in the field of packaging and packaging waste
- EN 13428: Packaging - Requirements specific to manufacturing and composition – Prevention by source reduction
- EN 13429: Packaging - Reuse
- EN 13430: Packaging - Requirements for packaging recoverable by material recycling
- EN 13431: Packaging - Requirements for packaging recoverable in the form of energy recovery, including specification of minimum inferior calorific value
- EN 13432: Packaging - Requirements or packaging recoverable through composting and biodegradation – Test scheme and evaluation criteria for the final acceptance of packaging
- CR 13695-1 Packaging - Requirements for measuring and verifying the four heavy metals present in packaging
- CEN/TR 13695-2 Packaging - Requirements for measuring and verifying dangerous substances present in packaging (

The PPW Directive follows the waste hierarchy as set out in the WFD adopted in 2008, through putting priority on waste prevention. Although the Directive predates the Waste Framework Directive 2008/98/EC, the waste hierarchy is mentioned as an objective of the PPW Directive in the proper order of the later WFD. Separate Articles deal in a detailed way in particular with waste prevention, recovery and recycling as well as separate waste collection. The concept of extended producer responsibility is mentioned as a **"may be introduced" soft law requirement.**

Preventive measures may consist of national projects to introduce producer responsibility to minimise the environmental impact of packaging or similar actions adopted, if appropriate in consultation with economic operators, and designed to bring together and take advantage of the many initiatives taken within Member States as regards prevention. They shall comply with the two main objectives of the directive, to reduce the impact of packaging on the environment and to support the functioning of the internal market.

The directive defines concentration levels of heavy metals present in packaging. These should not exceed 100 ppm by weight except for specified lead crystal glass.

For marking and identification of packaging materials, the Directive refers to Commission Decision 97/129/EC.

The Directive emphasises the relevance of data collection and consumer awareness i.e. information for users of packaging.

Member States need to notify the drafts of measures which they intend to adopt within the framework of this Directive to the Commission. Within the Circular economy legislative package amendments to the packaging and packaging waste Directive have been prepared encompassing:

- *New material based targets for preparing for reuse and recycling*
- *Methods to calculate the attainment of the targets in MS.*

The latest amendment to PPWD, **Directive 2018/852** from the circular economy package harmonises PPWD definitions with those in the WFD. Article 5 of the amendment amongst other details measures to encourage packaging reuse such as:

a) The use of deposit-return schemes;

b) The setting of qualitative or quantitative targets;

c) The use of economic incentives

d) The setting up of a minimum percentage of reusable packaging placed on the market every year for each packaging stream.

Article 6 determines targets, requiring a minimum of **65 %** of all packaging waste by weight to be recycled no later than **31st of December 2025**. It defines targets for specific materials contained in packaging waste in this period:

i. *50 % of plastic;*
ii. *25 % of wood;*
iii. *70 % of ferrous metals;*
iv. *50 % of aluminium;*
v. *70 % of glass;*
vi. *75 % of cardboard and paper and*

a minimum of **70 %** of all packaging waste by weight to be recycled no later than **31st of December 2030**, where it defines targets for specific materials contained in packaging waste in this period:

i. *55 % of plastic;*
ii. *30 % of wood;*
iii. *80 % of ferrous metals;*
iv. *60 % of aluminium;*
v. *75 % of glass and*
vi. *55 % of cardboard and paper.*

Member States must ensure that by 31 December of 2024, extended producer responsibility schemes are established for all packaging in accordance with amended articles 8 and 8a of the WFD 2008/98/EC.

3.3.3 DIRECTIVES ON ELECTRONIC AND ELECTRICAL EQUIPMENT

To address these problems two pieces of waste legislation have been put in place: The Directive on waste electrical and electronic equipment (WEEE Directive) and the Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS Directive). Additionally a directive addressing the eco-design of electrical and electronic equipment tackles the products before they are put on the market (Eco-design directive).

3.3.3.1 DIRECTIVE 2012/19/EU ON WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

The first WEEE Directive (Directive 2002/96/EC) entered into force in February 2003. The Directive provided for the creation of collection schemes where consumers return their WEEE free of charge. These schemes aim to increase the recycling of WEEE and/or re-use.

In December 2008, the European Commission proposed to revise the Directive in order to tackle the fast increasing waste stream. The new WEEE Directive 2012/19/EU entered into force on 13th of August 2012 and became effective on 14th of February 2014.

The Directive determines measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste from electrical and electronic equipment (WEEE). The measures also target efficient resource use and impacts from resource use.

The Directive contains an indicative list of EEE, which fall within ten different categories. After the 15th of August 2018, a set transitional period will have expired and EEE must be divided only into six different categories.

Member states must encourage cooperation on product design between producers, recyclers and measures to promote design and production of EEE, notably in view of facilitating re-use, dismantling and recovery of WEEE, its components and materials. Eco-design requirements for reuse and treatment of WEEE must be applied.

The Directive supports measures to achieve a high rate of separate collection. Collection and transport of separately collected WEEE must be carried out in a way that provide optimal conditions for preparing for reuse and recycling and prevent hazardous substances to spread to the environment.

The directive applies extended producer responsibility. From 2019, the minimum collection rate to be achieved annually shall 65 % of the average weight of EEE placed on the market in the three preceding years in the MS, or alternatively 85 % of WEEE generated on the territory of the member state. Annex 5 determines minimum recovery targets for each category of WEEE.

The Directive determines permit requirements for treatment facilities and requirements for WEEE shipments outside the respective MS.

Each member state must establish a register of producers, including producers supplying EEE by means of distance communication. Producers supplying EEE by means of distance communication must be registered in the MS they are selling to.

Producers must provide information for treatment facilities free of charge about preparation for re-use and treatment.

Amending Directive 2018/849 of Directive 201/19/EU includes additional reporting provisions the member states must comply with and has introduced new article 16a requiring Member States to make use of economic instruments and other measures to provide incentives for the application of the waste hierarchy such as those indicated in the new annex IVa to Directive 2008/98/EC.

3.3.3.2 DIRECTIVE 2011/65/EU ON THE RESTRICTION OF THE USE OF CERTAIN HAZARDOUS SUBSTANCES IN ELECTRICAL AND ELECTRONIC EQUIPMENT (ROHS-2)

Even when waste electrical and electronic equipment is collected separately for recycling, certain hazardous substances contained in old equipment can pose risks to health and the environment. This affects workers in recycling plants in particular. The most effective way to reduce such risks is to substitute such substances in electronics and electric equipment with safer materials. Restricting the use of hazardous substances is likely to enhance the possibilities and economic profitability of recycling of waste electrical and electronic equipment and decrease the negative impact on the health of workers in recycling plants.

Initial EU legislation restricting the use of hazardous substances in electrical and electronic equipment (RoHS Directive 2002/95/EC) entered into force in February 2003. The legislation required heavy metals such as lead, mercury, cadmium, and hexavalent chromium and flame retardants such as polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE) to be substituted by safer alternatives.

In December 2008, the European Commission proposed to revise the Directive. The RoHS recast Directive 2011/65/EU became effective on 3rd of January 2013.

The second RoHS directive provides the framework for the gradual extension of the requirements to all electrical and electronic equipment (EEE), including cables and spare parts. It introduces restrictions of new substances and presents a methodology for the assessment of new hazardous substances in EEE with restrictions mainly based on waste-related criteria. It provides a review of the list of restricted substances, new substance restrictions and clearer, more transparent rules for granting, renewing or revoking exemptions, with the obligation of manufacturers to apply for exemptions and to carry out the necessary assessment. Annex 2 to the directive sets limit values by weight for homogeneous materials for contents of Mercury (Hg: 0.1%), Cadmium (Cd: 0.01%), Lead (Pb: 0.1%), Chromium VI (Cr6+: 0.1%), polybrominated biphenyls (PBB: 0.1%), and polybrominated diphenyl ethers (PBDE: 0.1%). Annex III contains a list of exemptions to this requirement.

The RoHS-2 Directive was recently amended with Directive (EU) 2017/2102.

These amendments facilitate second-hand market operations (e.g. reselling) and repair of electrical and electronic equipment. It extends the lifetime of existing equipment, including costly medical devices, and boosting the repair and second hand market for certain types of equipment. It allows hospitals to buy and sell used medical devices also after 21st of July 2019.

The Directive has two targeted exclusions from the scope of the existing RoHS Directive, without diminishing environmental protection: pipe organs, for reasons of cultural heritage, and certain non-road mobile machinery.

?

Does your organisation have a system to handle hazardous substances?

3.3.3.3 DIRECTIVE 2009/125/EC ESTABLISHING A FRAMEWORK FOR THE SETTING OF ECO-DESIGN REQUIREMENTS FOR ENERGY-RELATED PRODUCTS

The directive provides consistent EU-wide rules for improving the environmental performance of products, such as household appliances, information and communication technologies or engineering. The Directive sets out minimum mandatory requirements for the energy efficiency of these products. This helps prevent creation of barriers to trade, improve product quality and environmental protection

The first framework setting eco-design requirements for energy using products was set in Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005. In 2009, the directive was recast to Directive 2009/125/EC. The new directive broadens the scope of products covered by this legislation, which is evident from the title of the Directive, where energy-using products have been changed to energy related products. Energy-related product means any good that has impact on energy consumption during use. It targets not only final products but also components and sub-assemblies intended to be incorporated into products.

Eco-design is defined as the integration of environmental aspects into product design with the aim of improving the environmental performance of a product throughout its whole lifecycle.

The directive refers to generic and specific eco-design requirements; generic requirements are requirements originating from the environmental profile of the product without set limit values for particular environmental aspects, while specific eco-design requirements are quantified requirements relating to a particular environmental aspect of a product, such as energy consumption during use, calculated for a given unit output performance. The Eco-design Directive is implemented through product-specific Regulations, directly applicable in all EU countries.

The directive is complemented by Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU.

Eco-design and Energy Labelling Regulations are complemented by harmonised European standards. These technical specifications indicate that a product complies with the mandatory requirements. Only then can the manufacturer affix the CE marking and sell it in the EU.

Products must comply with demands for CE marking. A CE marking must be affixed and an EC declaration of conformity must be issued.

A list of generic eco-design requirements is published in annex I based on phases of the product life cycle. Amongst the requirements contained in the list are:

- *ease for reuse and recycling through the number of materials and components used,*
- *use of standard components,*
- *time necessary for disassembly,*
- *complexity of tools necessary for disassembly,*
- *use of component and material coding standards for the identification of components and materials suitable for reuses and recycling (including marking of plastic parts in accordance with ISO standards),*
- *use of easily recyclable materials, easy access to valuable and other recyclable components and materials,*
- *easy access to components and materials containing hazardous substances together with incorporation of used components,*
- *avoidance of hazardous substances detrimental to reuse and recycling,*
- *lifetime extension implementing availability of spare parts,*
- *modularity,*
- *upgradeability,*
- *reparability, and*
- *reference to chemical legislation with regard to hazardous substances; all of which resonate with the design requirements for transition towards a circular economy.*

The directive defines reuse as any operation by which a product or its components, having reached the end of their first use, are used for the same purpose for which they were conceived, including the continued use of a product which is returned to a collection point, distributor, recycler or manufacturer, as well as reuse of a product following refurbishment. Part 2 of this annex determines information, which must be supplied to consumers on maintenance, extended life expectancy measures, end-of-life measures and information for treatment facilities concerning disassembly, recycling or disposal at end-of-life.

?

Are you aware of any obligatory eco-design requirements relevant for your products?

3.3.4 DIRECTIVE 2006/66/EC ON BATTERIES AND ACCUMULATORS AND WASTE BATTERIES AND ACCUMULATORS

The Directive prohibits the placing on the market of certain batteries and accumulators with a mercury or cadmium content above a fixed threshold. In addition, it promotes a high rate of collection and recycling of waste batteries and accumulators and improvement in the environmental performance of all involved in the life-cycle of batteries and accumulators, including their recycling and disposal.

The aim is to cut the amount of hazardous substances - in particular, mercury, cadmium and lead - dumped in the environment; this should be done by reducing the use of these substances in batteries and accumulators and by treating and re-using the amounts that are used.

The Directive applies to all types of batteries and accumulators, apart from those used in equipment to protect Member States' security or for military purposes, or in equipment designed to be sent into space

Its main purpose is the improvement of the environmental performance of batteries and accumulators and of the activities of all economic operators involved in the lifecycle of batteries and accumulators. These operators include producers, distributors, end-users and also operators involved in the treatment and recycling of waste batteries and accumulators.

To this end the Directives contains provisions on:

- *the prohibition of hazardous materials used in batteries,*
- *information to the end users (labelling of batteries),*
- *collection targets and recycling rates and prohibition of the disposal in landfills or by incineration of waste industrial and automotive batteries,*
- *"producer responsibility" obligations.*

The Directive also closely corresponds to the most pertinent concepts in the Waste Framework Directive, such as extended producer responsibility, resource conservation through setting collection and recycling targets, eco design through reduction of hazardous substances in new production. Moreover and in contrast to the other Directives, it also complements the landfill

Directive 1999/31/EC by incorporating a landfill ban for industrial and automotive batteries and accumulators.

Instead of referring to the waste hierarchy in general, the **Batteries Directive**, mostly due to the characteristics of this waste stream, mentions in its objectives only collection, treatment, recycling and disposal of batteries. **Waste prevention is not mentioned**. Life cycle thinking with **reference to eco-design** in obliges Member States to promote the substitution of hazardous substances in batteries, such as mercury, cadmium and lead. Easy removal through design is also encouraged. The directive refers to **Extended producer responsibility** in regard to waste management obligations. The producers have to bear the cost of collecting, treating and recycling industrial, automotive and portable batteries and accumulators, as well as the costs of campaigns to inform the public of these arrangements. Small producers may be exempted from this obligation if this does not impede the proper functioning of the collection and recycling schemes. All producers of batteries and accumulators have to be registered.

This legislation prohibits the placing on the market of most batteries and accumulators with a certain mercury or cadmium content and establishes rules for the collection, recycling, treatment and disposal of batteries and accumulators.

The aim is to cut the amount of hazardous substances - in particular, concerning cadmium, portable batteries and accumulators, including those incorporated in appliances, with a cadmium content by weight of more than 0.002 % are prohibited (except for portable batteries and accumulators for use in emergency and alarm systems or medical equipment). An exemption from this prohibition is established for portable batteries and accumulators for cordless power tools until 31st of December 2016, enabling the recycling industry and consumers along the whole value chain to further adapt to the relevant substitute technologies.

To ensure that a high proportion of spent batteries and accumulators are recycled, Member States must take whatever measures are needed (including economic instruments) to **promote and maximise separate waste collections** and prevent batteries and accumulators being thrown away as unsorted municipal refuse. They have to make arrangements enabling end-users to discard spent batteries and accumulators at collection points in their vicinity and have them taken back at no charge by the producers. Collection rates of at least 25 % had to be reached by 26th of September 2012 and 45 % by 26th of September 2016 respectively.

According to Directive 2013/56/EU amending the Directive on batteries and accumulators, it must be possible to **remove batteries and accumulators readily and safely**. Thus, appliances incorporating batteries and accumulators must be accompanied by instructions on how these can be safely removed by either the end-user or by independent qualified professionals.

Member States also have to ensure that batteries and accumulators that have been collected are **treated and recycled using best available techniques.** Energy recovery is not considered a recycling process.

As a minimum, treatment must include **removal of all fluids and acids**. Batteries and accumulators must be treated and stored (even if only temporarily) in sites with impermeable

surfaces and weatherproof covering, or in suitable containers. The Directive also establishes obligations in relation to the efficiencies of the recycling processes to which batteries are subject to, depending on their chemical composition.

Member States may dispose of batteries and accumulators containing cadmium, mercury or lead in landfills or underground storage if there is no viable end-market for the recycling products, or if a detailed assessment of environmental, economic and social impact concludes that recycling is not the best solution,. Otherwise, it is prohibited to put waste from industrial and automotive batteries and accumulators into landfill, or to incinerate it; only residues from treating and recycling them may be disposed of in these ways.

Treatment and recycling may take place outside the Member State concerned or even outside the Community, provided EU legislation on the shipment of waste is respected.

End-users must receive information on several subjects and through different channels:

- on the potential effects on the environment and human health of the substances used in batteries and accumulators, and on the collection and recycling arrangements at their disposal, through campaigns or directly by distributors;
- on the capacity of the accumulator or the portable battery or on the presence of chemicals above a certain threshold, information will be given using visible, legible and indelible markings on batteries, accumulators and battery packs;
- on the need to ensure separate collection for batteries or accumulators, the symbol of the crossed-out wheeled bin is to be used.

Member States must report to the Commission on the implementation of the Directive and the measures they are taking to encourage developments affecting the impact of batteries and accumulators on the environment (including new recycling and treatment techniques).

?

What do you think of the concept of extended producer responsibility?

Amending Directive 2018/849 of Directive 2006/66/EC includes additional reporting provisions the member states must comply with and has introduced new article 22a requiring Member States to make use of economic instruments and other measures to provide incentives for the application of the waste hierarchy such as those indicated in the new annex IVa to Directive 2008/98/EC.

4 QUESTIONS & ANSWERS

4.1 QUESTIONS FOR PARTICIPANTS TO STIMULATE THE DEBATE

4.1.1 WHAT IS THE DIFFERENCE BETWEEN A EUROPEAN DIRECTIVE AND A REGULATION? LIST SOME IMPORTANT DIRECTIVES AND REGULATIONS RELEVANT TO PRODUCTS OR WASTE!

Directives and regulations are two forms of laws that can be passed by the European Union. A directive is a legislative act that sets out a goal that all EU countries must achieve. However, it is up to the individual countries to decide how.

Regulations are law and the national governments do not have to take any actions themselves to implement EU regulations. When a regulation comes into force, it overrides all national laws dealing with the same subject matter and subsequent national legislation must be consistent with and made in the light of the regulation. Some important directives and regulations concerning waste and products:

- Waste framework directive 2008/98/EC,
- Directive on packaging and packaging waste 94/62/EC,
- Directive 2012/19/EU on waste electrical and electronic equipment (WEEE),
- Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS-2),
- Directive 2009/125/EC establishing a framework for the setting of eco-design requirements for energy-related products,
- Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators,
- Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling
- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH),

4.1.2 WHAT ISSUES DO THE ESSENTIAL REQUIREMENTS FOR PACKAGING AND WASTE PACKAGING ADDRESS ACCORDING TO DIRECTIVE 94/62/EEC

All packaging placed on the market must comply with the **Essential Requirements** defined in the directive 94/62/EEC, which address:

- *The manufacture and composition of packaging*
- *The reusable nature of packaging*

- *The recoverable nature of packaging with reference to*
    - *Material recovery*
    - *Energy recovery*
    - *Composting*
    - *Biodegradable packaging.*

4.1.3 WHICH DIRECTIVES APPLY TO (WASTE) ELECTRONIC AND ELECTRICAL EQUIPMENT?

Directive 2012/19/EU determines measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste from electrical and electronic equipment (WEEE).

Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

Directive 2009/125/EC establishing a framework for the setting of eco-design requirements for energy related products

The Waste Framework Directive (2008/98/EC)

4.1.4 WHAT IS EXTENDED PRODUCER RESPONSIBILITY AND WHICH ARE THE MAIN WASTE STREAMS TO WHICH IT IS APPLIED CURRENTLY?

To support the design of products, which are easier to reuse, recycle and recover, **extended producer responsibility** (EPR) is recognised as an instrument, which may encourage such measures. **Extended producer responsibility is** a strategy to support better design for managing post-consumer waste streams, requiring the producer to take financial, operation and / or other responsibilities for waste product management.

The main waste streams to which it is currently applied are:

Packaging and packaging waste

Waste electronic and electrical equipment

Waste batteries and accumulators

End-of-life vehicles

4.1.5 WHAT IS THE WASTE HIERARCHY?

The waste hierarchy defines the priority order in waste prevention and management. The priority order is:

- "Prevention" meaning measures taken before a substance, material or product has become waste that reduces:
    - the quantity of waste, including through the re-use of products or the extension of the life span of products;
    - the adverse impacts of the generated waste on the environment and human health; or
    - the content of harmful substances in materials and products.
- "Preparing for re-use" meaning checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing;
- "Recycling" meaning any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations; and
- ""Recovery" meaning any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II sets out a non-exhaustive list of recovery operations;
- "Disposal" meaning any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy.

5 GLOSSARY

- **Bio-based material:** ""Bio-"is Greek for life. Bio-based material refers to a products 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." [3] **Biodegradable material**: "A material which microorganisms can break down into natural elements (i.e. water, biomass, etc.)."[4]
- **Biological metabolism** - The natural processes of ecosystems are a biological metabolism, making safe and healthy use of materials in cycles of abundance[5]
- **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[6]
- **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."[7] **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"[8]
- **Decision** – "shall be binding in its entirety. A decision which specifies those to whom it is addressed shall be binding only on them"[9]
- **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"[10]

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[3] 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)

[4] https://www.ceguide.org/Glossary (26.03.2018)

[5] Cradle to Cradle terminology – MBDC-http://www.c2cproducts.com/detail.aspx?linkid=1&sublink=26

[6] Cradle to Cradle terminology – MBDC-http://www.c2cproducts.com/detail.aspx?linkid=1&sublink=26

[7] https://www.ceguide.org/Glossary (26.03.2018)

[8] Cradle to Cradle terminology – MBDC-http://www.c2cproducts.com/detail.aspx?linkid=1&sublink=26

[9] European Network of Environmental law Organizations 2012 Implementation of the Waste Framework Directive in the EU Member States

[10] 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)[11] 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".[12]
- **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."[13]
- **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"[14]
- **Ecosystem** - the interactive system of living things and their non-living habitat[15]
- **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[16]
- **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")."[17]
- **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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[11] Merriam Webster dictionary

[12] https://sustainabilitydictionary.com/2005/12/03/eco-effectiveness/visited 26/02/2018

[13] http://www.businessdictionary.com/definition/eco-efficiency.html -visited 01.03.2018

[14] Orr D (1992) Ecological literacy: education and the transition to a post-modern world. State University of New York Press, Albany.

[15] Tansley AG (1935) The use and abuse of vegetational concepts and terms. Ecology 16:284–307 doi:10.2307/1930070

[16] with adaptations from https://www.researchgate.net/publication/301966198_Regenerative_Development_regenerative_development_and_Design (26.06.2018)

[17] 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.[18]
- **Innovation** - production or adoption, assimilation, and exploitation of a value-added novelty in economic and social areas[19]
- **Landfilling**: "The disposal and burying of solid waste. The degradation of the waste results in the creation of local air and water pollution."[20]
- **Lean production** - approach to management that focuses on cutting out waste, whilst ensuring quality[21]
- **Life-cycle** - series of stages in form and functional activity through which a system passes between successive recurrences of a specified primary stage[22]
- **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[23]
- **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[24]
- **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[25]
- **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[26]
- **Permaculture** - a system of agricultural and social design principles centered around simulating or directly utilizing the patterns and features observed in natural ecosystems[27]
- **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,

[18] http://www.businessdictionary.com/definition/incineration.html (27.06.2018)
[19] with adaptations from http://www.ericshaver.com/the-many-definitions-of-innovation/ (27.06.2018)
[20] https://www.ceguide.org/Glossary (26.03.2018)
[21] with adaptations from https://www.tutor2u.net/business/reference/introduction-to-lean-production (27.06.2018)
[22] https://www.merriam-webster.com/dictionary/life%20cycle (26.06.2018)
[23] With adaptations from https://en.wikipedia.org/wiki/Lifetime (26.06.2018)
[24] https://www.researchgate.net/publication/273379786_Regenerative_Development_and_Design (25.06.2018)
[25] with adaptations from https://www.economicshelp.org/micro-economic-essays/marketfailure/negative-externality/ (26.06.2018)
[26] http://www.businessdictionary.com/definition/optimization.html (26.06.2018)
[27] https://en.wikipedia.org/wiki/Permaculture (27.06.2018)

expressions of values, economic activities, forms of association, ideas for education, traditions, etc.)[28]

- **Recommendations and opinions** - shall have no binding force [29]
- **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."[30]
- **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[31]
- **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[32]
- **Regulation** - shall have general application. It shall be binding in its entirety and directly applicable in all Member States. – Source - Article 288 TFEU, [33]
- **Remanufacturing:** "The process of cleaning and repairing used products and parts to be used again for replacements."[34]
- **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[35]
- **Resource efficiency**: "A percentage of the total resources consumed that make up the final product or service."[36] 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."[37]
- **Servitization** - refers to industries using their products to sell "outcome as a service" rather than a one-off sale[38]

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[28] https://www.researchgate.net/publication/273379786_Regenerative_Development_and_Design (25.06.2018)
[29] http://eur-lex.europa.eu/summary/chapter/environment.html?root_default=SUM_1_CODED%3D20,SUM_2_CODED%3D2003&locale=en
[30] https://www.collinsdictionary.com/de/worterbuch/englisch/refurbishment (26.03.2018)
[31] Mang, Pamela & Reed, Bill. (2017). Update Regenerative Development and Design 2nd edition.
[32] https://www.sciencedirect.com/science/article/pii/S2212609015300327 (26.06.2018)
[33] http://eur-lex.europa.eu/legal-content/en/TXT/HTML/?uri=CELEX:12016E288
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[35] https://www.researchgate.net/publication/273379786_Regenerative_Development_and_Design (24.06.2018)
[36] https://sustainabilitydictionary.com/2005/12/03/remanufacturing/ (26.03.2018)
[37] https://sustainabilitydictionary.com/2005/12/03/remanufacturing/ (26.03.2018)
[38] https://www.k3syspro.com/servitization/ (24.06.2018)

- **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[39]
- **Stewardship** - ethic of companies, organizations and individuals that embodies the responsible planning and management of resources[40]
- **Sourcing:** "the act of getting something, especially products or materials, from a particular place"[41]
- **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[42]
- **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"[43]
- **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 "[44]
- **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)"[45]
- **Upcycling**: see MOVECO fact sheet "Circular Economy: Terms & Definitions"
- **Waste**: see MOVECO fact sheet "Circular Economy: Terms & Definitions"

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

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[39] https://www.researchgate.net/publication/273379786_Regenerative_Development_and_Design (25.06.2018)
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[42] https://searchcio.techtarget.com/definition/systems-thinking (27.06.2018)
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[44] Cradle to Cradle terminology – MBDC-http://www.c2cproducts.com/detail.aspx?linkid=1&sublink=26
[45] Merriam Webster dictionary

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Page 8: EU Waste hierarchy, European environmental agency; https://www.eea.europa.eu/publications/waste-prevention-in-europe-2017

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