



# SUSTAIN E+ TRAINING

## SUSTAIN E+ PROJECT

### MODULE 9 – CIRCULAR ECONOMY. MATERIALS AND WASTE



Erasmus+

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## 1. Introduction to the topic

A circular economy is defined as an economy that retains the value of materials and products for as long as possible, moving from a linear economy (take-make-dispose) to a system where resources are used more efficiently and waste is reduced<sup>1</sup>. Moving from a linear to a circular economy requires transformation to a system that uses less material, extends the longevity of products, increases product use and recirculates products, components and resources back into the material flows of the economy.

In 2020, the global economy was estimated to be 8.6% circular, meaning that more than 90% of the world is still stuck in a linear economy where material and products do not get recycled or reused, but end up being wasted. Between Paris and Glasgow climate conferences, more than half a trillion tonnes of virgin materials were consumed. Therefore, the circularity gap got worse; in these six years, the global economy consumed 70% more than what the Earth can safely replenish. This cannot continue—we only have one planet<sup>2</sup>.

Managers of Erasmus+ projects must face the challenge of designing and developing projects considering circular practices, choosing the right options and making the more sustainable decisions.

Different materials are used during an Erasmus+ project implementation. Activities as partners' meetings, training and events organisation, or developing tools and reports at each partner's office, involve the use of materials and waste production. The use of paper, ink cartridges, electronic devices, packaging, cups and plates, etc. is usual in the Erasmus+ projects and the managers must learn on its impact and the best practices that they can implement to promote circular economy.

Applying the concept of circular economy, materials and waste must be considered together as part of the same cycle.

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<sup>1</sup> <https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview>

<sup>2</sup> Circle Economy (2022). *The Circularity Gap Report*.

Therefore, both are included in an only module, which is developed with this approach.

## 2. Learning objectives

A competence profile for a sustainable project management implementing circular economy principles may include the following skills and knowledge areas:

- Concept of circular economy and need: what is and what for.
- European policy: aim, plans, rules.
- United Nations approach: hierarchy and meaning of the terms Reduce by design, Refuse, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose and Recycle.
- Circular economy's best practices, both generally speaking and applied to Erasmus+ projects.
- Barriers to implement circular economy practices.
- Impact of raw materials consumption: current figures and trends.
- European Commission's ecodesign law and EU voluntary ecolabel for different product groups
- European Commission's Circular Economy Action Plan: measures for specific products such as electrical and electronic equipment, food and packaging, plastics.
- Best practices related to materials applied to Erasmus+ projects: paper, cups, plates and cutlery, ink cartridges, packaging, electrical and electronic equipment and furniture, office design.
- Impact of waste and need for the best managing.
- Best practices on waste treatment, particularly regarding waste produced developing Erasmus+ projects: paper, plastic, organic waste, WEEE, etc.

At the end of this module, learners should be able to:

- Distinguish circular economy practices from linear practices.
- Apply the hierarchy when implementing circular economy practices.
- Identify barriers to implement circular economy practices and solutions.
- Define and apply circular economy's best practices to Erasmus+ projects.
- Apply the criteria of the EU ecolabel for different product groups.
- Identify types of waste and possible best practices to apply.
- Apply the best practices for waste sorting, labelling and delivery for reuse or recycling.

There is a need for training programs that provide learners with the necessary knowledge and skills to integrate circular economy criteria into project management processes. European Commission is urging state members and organisations to take action in this regard and training is needed.

### 3. Learning contents

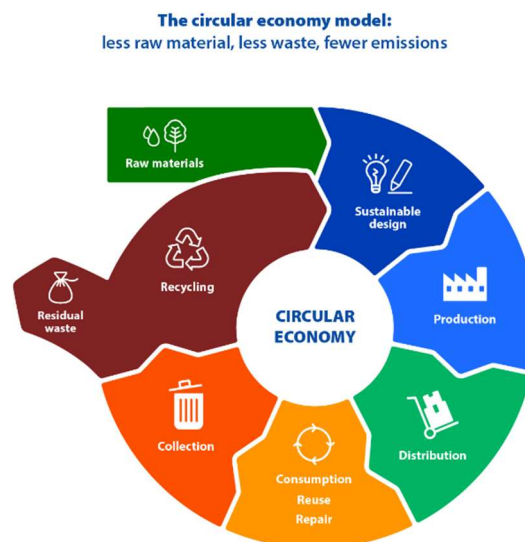
#### *Chapter 1 – Circular economy*

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##### 1.1 Concept and need

The circular economy is a sustainable model of production and consumption, which involves sharing, leasing, repairing, refurbishing, reusing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended.

Extracting and using raw materials has a major impact on the environment. It also increases energy consumption and CO<sub>2</sub> emissions. However, a smarter use of raw materials can lower CO<sub>2</sub> emissions. In addition, circular economy also implies reducing waste to a minimum. When a product reaches the end of its life, its materials are kept within the economy wherever possible. These can be productively used again and again, thereby creating further value.



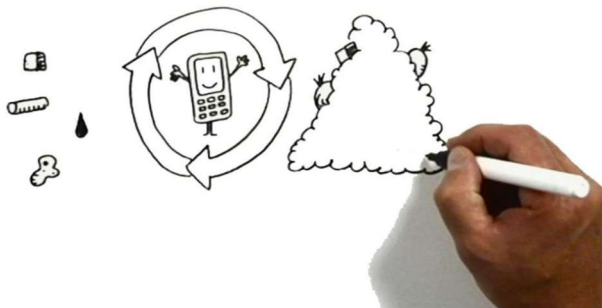
Source:

[https://www.europarl.europa.eu/resources/library/images/20230222PHT76206/20230222PHT76206\\_original.jpg](https://www.europarl.europa.eu/resources/library/images/20230222PHT76206/20230222PHT76206_original.jpg)

Circular economy means a departure from the traditional, linear economic model, which is based on a take-make-consume-throw away pattern and relies on large quantities of cheap, easily accessible materials and energy.<sup>3</sup>

## 1.2 European policy

Parliament wants Europeans to switch to a circular economy by using raw materials more efficiently and reducing waste.



Source: [https://multimedia.europarl.europa.eu/en/video/repair-reuse-and-recycle\\_V007-0034](https://multimedia.europarl.europa.eu/en/video/repair-reuse-and-recycle_V007-0034)

In line with EU's 2050 climate neutrality goal under the Green Deal, the European Commission proposed in March 2022 the first package of measures to speed up transition towards a circular economy, as announced in the Circular Economy Action Plan. The proposals include boosting sustainable products, empowering consumers for the green transition, the review of the construction product regulation, as well as a strategy on sustainable textiles.

In November 2022, the European Commission proposed new EU-wide rules on packaging, including proposals to improve packaging design, such as clear labelling, to promote reuse and recycling.

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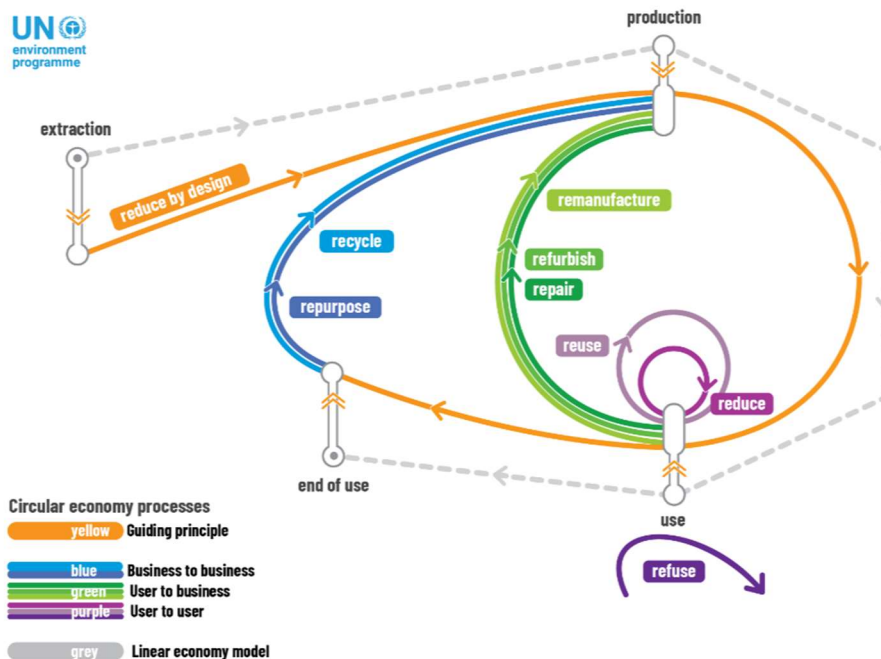
<sup>3</sup> <https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits>

It also calls for a transition to bio-based, biodegradable, and compostable plastics. The Parliament called for tighter recycling rules and binding 2030 targets for materials use and consumption in a resolution adopted on 9 February 2021.<sup>4</sup>

### 1.3 United Nations approach

United Nations highlights the reduction by design as guiding principle and states that circularity builds upon value retention loops, from the most impactful to the least, which define the priorities:<sup>5</sup>

1. Reduce by design: reducing the amount of material used, particularly raw material, should be applied as an overall guiding principle from the earliest stages of design of products and services.
2. From a user-to-user perspective: Refuse, Reduce and Reuse.
3. From a user-to-business intermediary perspective: Repair, Refurbish and Remanufacture.
4. From business-to-business: Repurpose and Recycle.



<sup>4</sup> <https://www.europarl.europa.eu/news/en/headlines/priorities/circular-economy/20210128STO96607/how-the-eu-wants-to-achieve-a-circular-economy-by-2050>

<sup>5</sup> <https://buildingcircularity.org/>



Source: <https://buildingcircularity.org/>

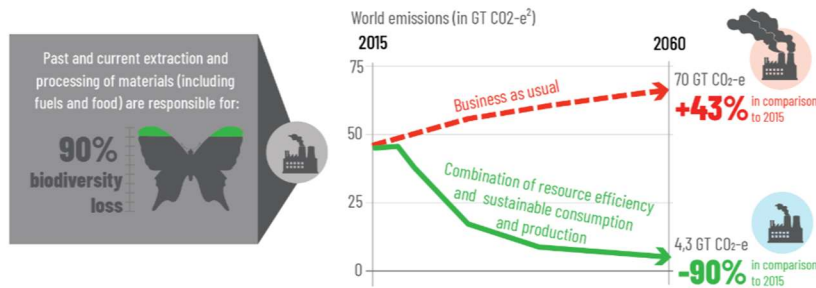
1	Reduce by design	<p>As an overall principle, reduce by design leads to the design of products and services that are using less materials per unit of production, and/or during their use.</p> <p>Reduce by design therefore influences all stages of the life cycle of a product or a service: less raw material is extracted, the production has been designed to be using less materials, consumption patterns and end of life of such products and services are influenced by the design in order to lead to less impact and less waste.</p>
2.1	Refuse	<p>Refuse is a user choice to buy or use less, shifting to more sustainable lifestyles, for example rejecting packaging, shopping bags, or other products that are considered unnecessary. Refuse can also apply to a specific element of a product, such as refusing the use of hazardous substances.</p>
2.2	Reduce	<p>Reduce implies people rethinking how they can best meet their needs and live their aspirations with minimal impacts on the planet and the people around them.</p> <p>It is a user choice to use items and services for a longer time, and buy less frequently.</p>
2.3	Reuse	<p>Re-use refers to the using again of a product, object or substance that is not waste, for the same purpose for which it was conceived, without the necessity of repair or refurbishment.</p> <p>Re-use and re-sell imply a user choice to hand over to another user, most frequently without intermediary and with no modification of the product or service. It applies to the use of second hand products, or product reused after cleaning.</p>
3.1	Repair	<p>Repair refers to the fixing of a specified fault in an object that is a waste or a product and/or replacing defective components, in order to make the waste or product a fully functional product to be used for its originally intended purpose. Repair extends the product lifetime, for example by replacing broken parts, or removing defects. A user sends its product for repair, to a business intermediary, from the retailer or directly in repair shops.</p>

3.2	Refurbish	Refurbish refers to the modification of an object that is a waste or a product to increase or restore performance and/or functionality or to meet applicable technical standards or regulatory requirements, with the result of making a fully functional product to be used for a purpose that is at least the one that was originally intended.
3.3	Remanufacture	Remanufacture refers to a standardized industrial process that takes place within industrial or factory settings, in which cores (product or module which has been sold, worn or it is no longer functional) are restored to same-as-new, or better condition and performance. The remanufacturing process is in line with specific technical specifications, including engineering, quality, and testing standards, and typically yields fully warranted products.
4.1	Repurpose	<p>In repurpose, by reusing discarded goods or components adapted for another function, the material gets a distinct new life cycle (i.e. plastics used in handbags).</p> <p>Converting old or discarded materials into something useful allows to return them into the economy retaining some of its value, if not all its value.</p>
4.2	Recycle	<p>Recycle refers to the relevant operations which prevent waste disposal, and allows material to re-enter the loop.</p> <p>Recycling operations usually involves the reprocessing of waste into products, materials or substances, though not necessarily for the original purpose.</p>

The organisation highlights the importance of applying the circularity concept to fight against climate change by combining circular approaches with the current efforts to implement renewable energy and energy efficiency actions.

## WHY TAKE ACTION

The 1.5° target of the Paris agreement can **only** be achieved by **combining** circular approaches with the current efforts on renewable energy and energy efficiency<sup>1</sup>



Data source: IRP (2019): Global Resources Outlook 2019: Natural Resources for the Future We Want. A Report of the International Resource Panel, United Nations Environment Programme, Nairobi, Kenya.  
1: Ellen MacArthur Foundation (2019): Completing the Picture: How the Circular Economy Tackles Climate Change  
2: One GT CO<sub>2</sub>-e is one billion tons of CO<sub>2</sub>-equivalent emissions

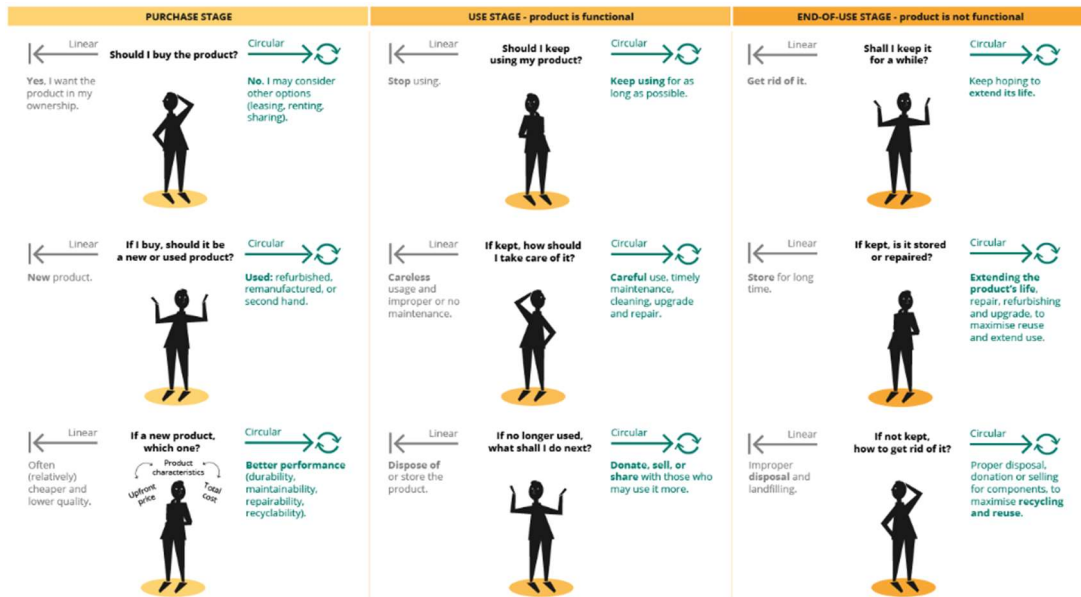
Source: <https://buildingcircularity.org/>

### 1.4 Circular economy's best practices

As consumers, we face consumption choices every day. In making choices, our decisions favour actions representing either circular or linear consumer behaviour.

Consumer choices at specific points in a product's life cycle have the greatest potential to increase the product's circularity: the point of acquiring a product, the use phase and the end-of-use/-life stage.<sup>6</sup>

<sup>6</sup> <https://www.eea.europa.eu/publications/influencing-consumer-choices-towards-circularity/enabling-consumer-choices-towards-a>



Source: <https://www.eea.europa.eu/publications/influencing-consumer-choices-towards-circularity/enabling-consumer-choices-towards-a>

Project managers face similar choices when designing and developing an Erasmus+ project. They make decisions involving the use of materials and the waste management. The circular economy way of thinking includes:

- Consider the options of leasing, renting and sharing before purchase. It can be applied for instance to office equipment as printers.
- Think if second-hand products may be used, such as office furniture.
- Consider recycled materials such as paper or ink cartridges.
- When buying a new item, take into account features such as durability, maintainability or reparability. It applies for instance to computers.
- Clean, maintain and repair to extend the lifespan of products.
- Think if you may use waste as new materials, packaging for instance.
- Donate, sell or share those products that you do not want else.
- Give the product as waste for recycling must be the last option.

## 1.5 Practical activity

### 1.5.1 Worksheet: Circular economy

See the European Parliament's video, *Planned obsolescence: why things don't last*, and look for the term that best suits the following definitions.

Home > Video > Planned obsolescence: Why things don't last



Source: [https://multimedia.europarl.europa.eu/en/video/planned-obsolescence-why-things-don-t-last\\_N01-PUB-170608-OBSO](https://multimedia.europarl.europa.eu/en/video/planned-obsolescence-why-things-don-t-last_N01-PUB-170608-OBSO)

1. Policy of designing a product with an artificially limited useful life or a purposely frail design, so that it becomes obsolete after a certain pre-determined period of time upon which it decrementally functions or suddenly ceases to function. (Planned obsolescence)
2. Consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal. Life cycle stages include acquisition of raw materials, design, production, transportation/delivery, use, end-of-life treatment and final disposal. (Life cycle).
3. Alternative economic model, to replace the current linear model of “take – make – waste”, that involves using resources efficiently and prioritizing renewable inputs, maximizing a product’s usage and lifetime in order to extract the maximum value and recovering and reusing by-products and waste to make new materials or products. (Circular economy).
4. Service compensation model in which the owner sells access to underutilized assets to subsequent customers. One of the main differences with leasing is that the typical period of usage for sharing platforms is much shorter. Also, the number of users of assets in a sharing platform is much greater, justifying the name of this change in behaviour as “collaborative consumption.” (Sharing platform).

### 1.5.2. Case study<sup>7</sup>

Coca-Cola Company launched a reusable plastic (PET) bottle which can be used across multiple soda brands. When a consumer finishes a drink, they can return the bottle to the point-of-sale, then the producer collects those bottles to be refilled and reused. On average, those bottles are reused up to 25 more times, reducing overall plastic use by 90%. Introduced in Latin America in 2018, it's their fastest growing packaging format and is now being scaled to other continents.



Source: <https://archive.ellenmacarthurfoundation.org/case-studies/a-reusable-drinks-bottle-design-for-multiple-brands>

This circularity initiative works in this way:

1. Consumers return empty bottles to retailers who store them and then give them back to Coca-Cola upon delivery of a new order. Consumers pay indirect deposits on bottles by receiving a discount on their next purchase when they return an empty bottle to a store.
2. Coca-Cola takes the multi-branded mix of bottles back to a bottling facility where paper labels are washed off. Bottles are then cleaned, refilled, and rebranded with a fresh label.

The Universal Bottle is an example of 'upstream innovation' - tracing a problem back to its root cause and tackling it there. It means that rather than just focusing on how to deal with recoverable material turning into waste, we work to keep that packaging in use for as long as possible.

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<sup>7</sup> <https://archive.ellenmacarthurfoundation.org/case-studies/a-reusable-drinks-bottle-design-for-multiple-brands>

### 1.5.3. Exercise

Learn on options of circular economy for plastic by identifying whether the following ideas are linear or circular, and giving the reasons that have led you to every choice:

1. Company B collects used plastic packaging and uses a new technology, called pyrolysis, to turn the plastic back into oil, which is sold as fuel to transportation companies. (Linear)
2. Company C has a chain of shops that provide hot coffee to go. The company has decided to give its customers discounts when they bring a reusable cup with them, rather than using a single-use takeaway cup. (Circular)
3. Company D delivers its chemical products to different industries by using 1000-litre returnable containers. The company collects the empty containers from its customers, refills the containers with the same products and delivers them again. (Circular)
4. Company A takes used plastic packaging and turns it into street furniture such as benches. (Linear)

## Chapter 2 – Materials

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### 2.1 Impact of raw materials consumption

The world's population is growing and with it the demand for raw materials. However, the supply of crucial raw materials is limited.

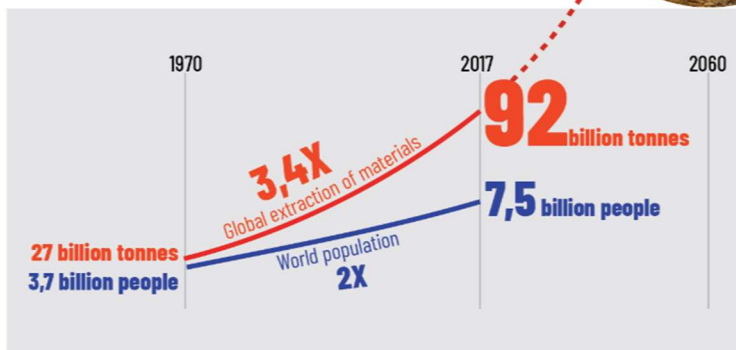
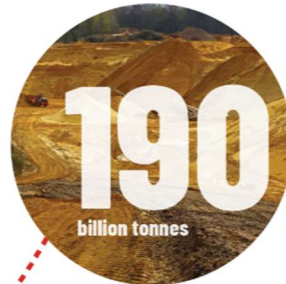
European Commission states that the unsustainable natural resource use is having a huge impact on the environment. Projected increases in global population and the number of affluent people living in cities is expected to further deplete natural resources beyond sustainable limits. We only have one Earth but by 2050, we will be consuming as if we have three planets.



United Nations also warns about the need of disconnecting natural resource use and environmental impacts from economic activity and human well-being.<sup>8</sup>

## WHY TAKE ACTION

**it is impossible to continue extracting as we have been doing**



If we continue business as usual, we will **double** the extraction of materials<sup>1</sup> in 2060, **far beyond the planetary boundaries<sup>2</sup>.**

Source: IRP (2019): Global Resources Outlook 2019: Natural Resources for the Future We Want. A Report of the International Resource Panel, United Nations Environment Programme, Nairobi, Kenya  
1: "Materials" include biomass, fossil fuels, metals and non-metallic minerals, being a subset of natural resources which encompasses all material plus water and land.  
2: For more information: <https://www.stockholmresilience.org/research/planetary-boundaries/planetary-boundaries/about-the-research/the-nine-planetary-boundaries.html>

Source: <https://buildingcircularity.org/>

## 2.2 Ecodesign and ecolabel

Ecodesign is the design of products or services that takes into account the environmental impact throughout a product's life cycle.

European Commission has been promoting ecodesign from a long time. The current Ecodesign Directive 2009/125/EC has a long track record of delivering benefits to businesses, consumers and the environment. The proposal for a new Ecodesign for Sustainable Products Regulation, published on 30 March 2022, is the cornerstone of the Commission's approach to more environmentally sustainable and circular products.

<sup>8</sup> <https://buildingcircularity.org/>



The proposal establishes a framework to set ecodesign requirements for specific product groups to significantly improve their circularity, energy performance and other environmental sustainability aspects. The framework will allow for the setting of a wide range of requirements, such as:

- product durability, reusability, upgradability and reparability
- presence of substances that inhibit circularity
- energy and resource efficiency
- recycled content
- remanufacturing and recycling
- carbon and environmental footprints
- information requirements, including a Digital Product Passport, which will provide consumers and businesses information about products' environmental sustainability.<sup>9</sup>

The EU Ecolabel is the official European Union voluntary label for environmental excellence. Established in 1992 and recognised across Europe and worldwide, the EU Ecolabel certifies over 30 different categories of products with a guaranteed, independently-verified low environmental impact. To be awarded the EU Ecolabel, goods and services should meet high environmental standards throughout their entire life cycle: from raw material extraction through production and distribution to disposal.

The label also encourages companies to develop innovative products that are durable, easy to repair and recyclable.



Source: [https://environment.ec.europa.eu/topics/circular-economy/eu-ecolabel-home\\_en](https://environment.ec.europa.eu/topics/circular-economy/eu-ecolabel-home_en)

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<sup>9</sup> [https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products\\_en](https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products_en)

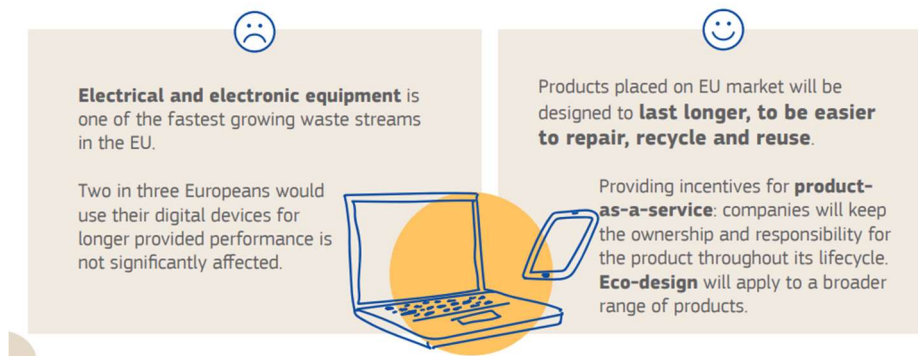
Over 83,000 goods and services have been awarded the EU Ecolabel and are available on the EU market. Examples of product categories with EU ecolabel are Electronic displays, Coverings, Cleaning products, Furniture, Clothing and textiles, Do-it-yourself products, Lubricants, Paper, Gardening or Personal care products. For these categories, specific criteria have been defined by the European Commission.<sup>10</sup>

## 2.3 European Commission’s Circular Economy Action Plan

The new European Commission’s Circular Economy Action Plan presents actions along the entire life cycle of products in order to modernise and transform European economy while protecting the environment. It is changing the way we produce and consume sustainable products need to become the norm to reduce resource use and waste generation.

These are some examples of suggested measures by EC related to the design of the products, and how they are applied in relevant sectors:<sup>11</sup>

### ELECTRONICS and ICT



The infographic is divided into two columns. The left column has a sad face icon and discusses the current waste problem of electrical and electronic equipment. The right column has a happy face icon and discusses future design goals for products, including 'last longer, to be easier to repair, recycle and reuse' and 'product-as-a-service'.

**Electrical and electronic equipment** is one of the fastest growing waste streams in the EU.

Two in three Europeans would use their digital devices for longer provided performance is not significantly affected.


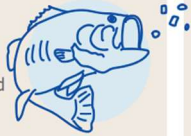


Products placed on EU market will be designed to **last longer, to be easier to repair, recycle and reuse**.

Providing incentives for **product-as-a-service**: companies will keep the ownership and responsibility for the product throughout its lifecycle. **Eco-design** will apply to a broader range of products.

<sup>10</sup> [https://environment.ec.europa.eu/topics/circular-economy/eu-ecolabel-home\\_en](https://environment.ec.europa.eu/topics/circular-economy/eu-ecolabel-home_en)

<sup>11</sup> European Commission (2020). *Circular Economy Action Plan. The European Green Deal*

PLASTICS

<p></p> <p><b>Consumption of plastics is expected to double</b> in the coming 20 years. By 2050, plastics could account for 20% of oil consumption, 15% of greenhouse gas emissions, and there could be more plastics</p> 	<p></p> <p><b>Single-use products</b> will be <b>phased out</b> wherever possible and replaced by durable products for multiple use.</p>  <p><b>Acting on microplastics</b> - restricting intentionally added microplastics, increasing the capture of microplastics at all relevant stages of the product lifecycle.</p>
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FOOD and PACKAGING

<p></p> <p>In 2017 packaging waste reached in Europe a record of <b>173 kg per inhabitant</b>.</p> 	<p></p> <p>New legislative initiative on reuse to <b>substitute single-use packaging</b>, tableware and cutlery by reusable products in food services, as well as targets for reducing packaging waste will be proposed.</p>
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Source: <https://op.europa.eu/en/publication-detail/-/publication/6e6be661-6414-11ea-b735-01aa75ed71a1/language-en/format-PDF/source-search>

## 2.4 Best practices related to materials



Making an inventory of the products that you already have, as well as a list with the materials that you really need, helps reduce the consumption. Acquire only what you need. Prioritize the use of the products in stock before purchasing more items.

Include criteria of sustainability at the time of purchasing products to choose those designed considering circularity features such as durability, reparability, recycled content or recycling ease.


The EU label can be a good guide to choose sustainable products. Pay attention to new information requirements (including a Digital Product Passport) that European Commission is developing for textiles, construction, vehicle batteries, electronics, packaging and food.

Regarding materials widely used in offices, meetings and events, you can apply the following particular criteria:

Paper	Go paperless: zero paper is the best working practice. Issue digital certificates, reports, invoices, fliers, etc. instead or paper ones.
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	<p>Avoid printing. Read documents on your computer screen. Reuse file folders. Reuse cardboard boxes for storage. If paper is needed, use paper with EU label or recycled paper. Buy recycled paper materials such as notebooks, envelopes, etc. If printing is needed, set up printers to automatically print double sided. Try to use the paper in a way that makes it easier to reuse and recycle: avoid spilling things on it and getting it dirty; add as few materials like staples and glue to it as possible; and don't crumple or shred it up when finished. Reduce paper towel use by providing air dryers.</p>
<p>Cups, plates and cutlery</p>	<p>The use of reusable materials, such as cups, spoons, etc. that can be washed and re-used is more ecological than using recyclable materials. Keep your office, meetings and events with real plates and cutlery. Provide your office with a dishwasher or a sink to wash the dishes. Where the use of reusable materials is not possible, choose compostable cups, plates and cutlery made of vegetal organic materials. Take-out containers can also be made from bamboo, plant fiber and clear compostable PLA (polymer created from cornstarch, sugarcane or sugarbeets).<sup>12</sup></p> <div style="display: flex; justify-content: space-around;">   </div>

<sup>12</sup> <https://store.worldcentric.com/store/>

	 <p>Source: <a href="https://store.worldcentric.com/store/">https://store.worldcentric.com/store/</a></p>
Ink cartridges	<p>For printings, move to printer-ink leasing with the use of refillable or recyclable cartridges.</p> <p>Use double-sided printing or give the minimum volume of printing.</p>
Packaging	<p>Work with all suppliers to reduce packaging.</p> <p>Encourage litterless lunches with reusable lunch bags instead of paper or plastic bags which are used once and then tossed.</p> <p>Place fountains or water stations throughout your office and give reusable water bottles to employees and remove bottled water from vending machines.</p> <p>Buy coffee, tea and sugar in bulk. No sugar packs or stir straws.</p> <p>Use compostable bags.</p>
Electrical and Electronic Equipment	<p>Acquire high-quality durable mobile devices, computers, screens, printers, etc.</p> <p>Buy products made with recycled content.</p> <p>Maintain and repair the devices, replace the broken components.</p> <p>Donate used working electronic devices to make sure others can reuse them. Schools, local libraries, community centers and nonprofit organizations may accept computers and other equipment.</p>
Furniture	<p>Reuse desks, chairs, etc. from existing offices.</p> <p>Choose new items with a high recycled content, with easily separable parts, without plastic materials.</p> <p>Eliminate materials where not needed, for example exposed services, less partitions, self-finishing surfaces.</p> <p>Acquire high-quality durable furniture.</p> <p>Repair the damaged pieces of furniture.</p>

## 2.5 Practical activity

### 2.5.1. Worksheet: Materials

Think of the materials to use when organising your next event and decide the options you can implement considering the circular economy principles.

Paper materials	1. Digital format	2. Made of recycled paper	3. Paper with ecolabel	4. Recyclable material
Leaflets				
Posters				
Slides				
Notebooks				
Satisfaction surveys				
Attendant list				
Attendant certificates				

Coffee and meals	1. Reusable items	2. Made of organic materials	3. Made of recycled materials	4. Recyclable material
Cups				
Plates				
Cutlery				
Take-out containers				
Bags				

Napkins				
Water containers				
Sugar packs				
Tea packs				
Coffee packs				

Electrical and Electronic Equipment	1. Long lifespan	2. Made with recycled content	3. Maintained device	4. Repairable device
Computer				
Screen				
LCD projector				

Furniture	1. Long lifespan	2. Made with recycled content	3. Made of separable and recyclable pieces
Chairs			
Tables			

### 2.5.2. Case study<sup>13</sup>

Circular economy concept is also applied to the office design.

To make sure the office space is adaptable to change without wasting materials or products, its present and future use should be a key consideration during the design phase:

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<sup>13</sup> <https://www.morganlovell.co.uk/inspiration/insights/the-circular-economy>



- Waste should be designed out wherever possible through smart design, using new technologies and off-site prefabrication, as well as only ordering the amount of material needed.
- Designers should be specifying materials that are reused, reclaimed, or refurbished, or that contain high levels of recycled content.
- Spaces should be designed with easy deconstruction in mind to maximise reusability elsewhere at the end of their life.



Source: <https://www.morganlovell.co.uk/insights/the-circular-economy>

Some best practices can be taken into account in the office design, such as:

- Consider the different scenarios that would change the use of the space, and design accordingly. Ensure that the spaces are easily adaptable to future needs. In the onion skin model, the core of the office is the structural elements, with the other elements attached to this structure, moving out by each layer of the 'onion skin'.
- Reuse existing materials such as ceilings and carpets, furniture or flooring tile. Through retaining the materials for their initial use, the quantity of materials having to be sourced or manufactured is minimised.
- Recycling is the outermost ring of the circular economy, and so is less desirable than reuse or designing out waste. However, it is not always possible to use reused or refurbished products, so you should look to source products with high levels of recycled content within them.
- Part of a successful circular office is ensuring longevity of the space. Longevity involves ensuring that the products installed are repairable, or replacement parts are widely available. Materials and equipment should be easily accessible, including through access panels in the walls and ceilings for concealed plant.



- Where possible, mechanical fastenings should be used, as they allow for materials and products to be removed and separated, whereas adhesives and glues can prevent easy separation of materials.
- Install materials that can easily be removed; demountable partitions, for example. Composite materials, made of different materials bonded together, should be avoided. Materials that are difficult to manage at end of life, such as PVC, should be avoided too.
- Prepare a 'Deconstruction & Disassembly Guide', in digital format, to describe and show visual (images and videos) information.

### 2.5.3. Exercise

Learn about the circularity gap regarding mobile phones by thinking of the background and main figures from GSMA (2022). *Strategy Paper for Circular Economy: Mobile devices*, and answering the following questions about yourself.

#### Background:

The environmental impact of the telecommunications sector is derived from activities throughout the value chain, from raw material extraction and processing, production and assembly of electronic devices to packaging and transportation, as well as by the energy consumed through use of devices and in waste management.

The use of connected devices is expected to grow. Mobile technology is already harnessing the Internet of Things and artificial intelligence to create solutions to mitigate climate change. Demand for these solutions will further accelerate the consumption of raw materials required to manufacture these devices.

#### Figures:<sup>14</sup>

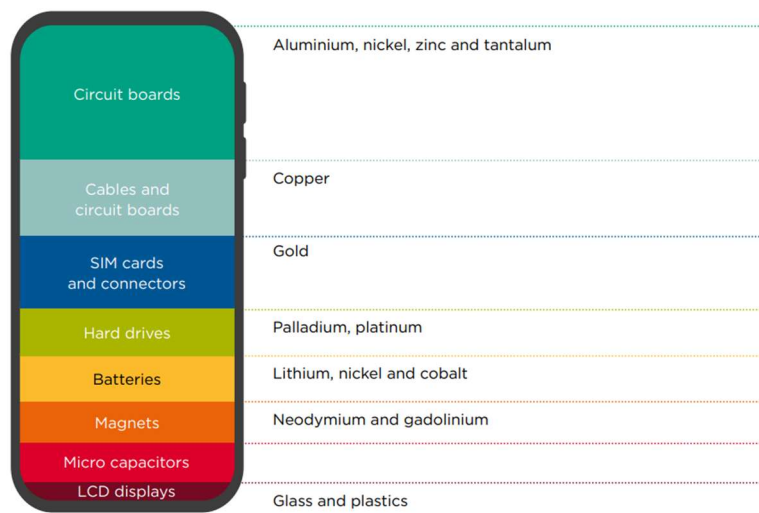
Around 2 billion phones are sold annually, and more than 90% of the global population owns a mobile phone. In 2021, there were an estimate of 7.78 billion active smartphones and feature phones around the globe. By 2030, the total number of smartphones and feature phones is predicted to reach nine billion.

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<sup>14</sup> GSMA (2022). *Strategy Paper for Circular Economy: Mobile devices*

80% of the climate impact from a smartphone comes from the production stage of the device and its components.

More than 50 different materials could be found in an average smartphone, such as: 29% plastic, 16% ceramics, 15% copper and compounds, 10% silicon plastics, 10% other metals, 9% epoxy, 8% other plastics and 3% iron. The material in all 7.78 billion smartphones and feature phones around the globe could contain 124,000 tonnes of copper, 2,721 tonnes of silver, 264 tonnes of gold and 117 tonnes of palladium.



Source: GSMA (2022). *Strategy Paper for Circular Economy: Mobile devices*

The average use time of a phone is around three years. However, the technical lifespan is between four and seven years.

The current rate of consumption of devices contributes to the growing generation of e-waste. Official take-back rates of mobile phones rarely exceed 15%, meaning that 85% of mobile phones are not formally recycled.

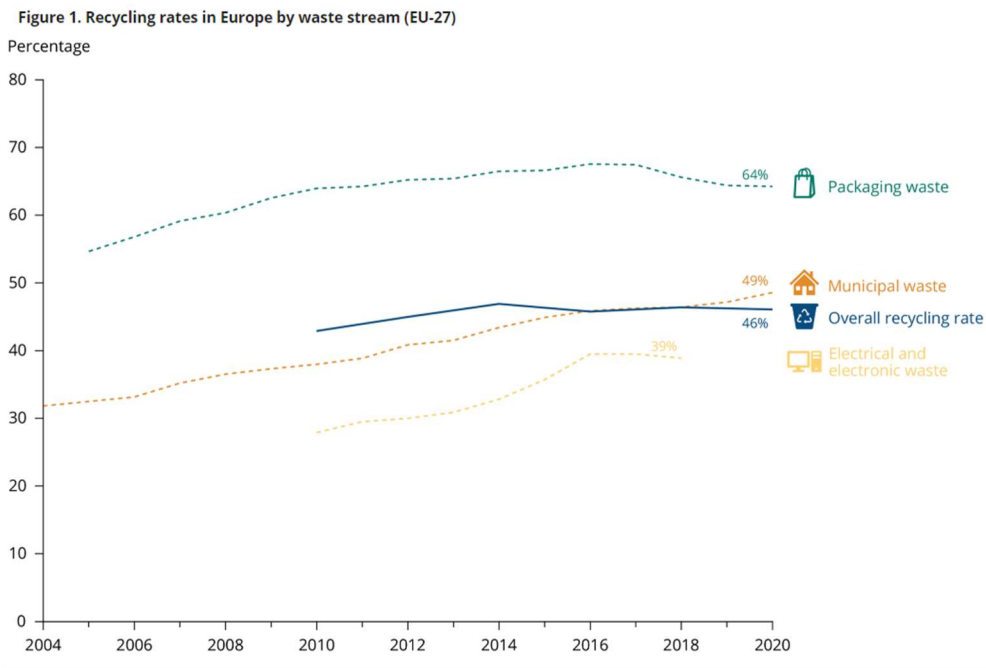
## Chapter 3 - Waste

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### 3.1 Impact of waste

The European Union produces more than 2.5 billion tonnes of waste every year.

The waste recycling rate— the proportion of waste generated that is recycled — is growing in Europe, which indicates progress towards using more waste as a resource and achieving a circular economy. However, the rate of progress is slowing down, with packaging waste recycling actually decreasing in the past 5 years. Achieving a circular economy and improving the environmental performance of waste management requires a faster rate of progress, as the majority of waste ends up in disposal operations such as incineration and landfill.



Source: <https://www.eea.europa.eu/ims/waste-recycling-in-europe>

Recycling rates of municipal waste, packaging waste and waste electrical and electronic equipment (WEEE) — which represent significant sources of secondary materials and critical raw materials — are slowly increasing in Europe, indicating a move towards using waste as a resource and a more circular economy.

The overall recycling rate, the ratio between total waste generated excluding major mineral wastes and the quantities that were managed through recycling, remain below half of the total waste generation for the period where data are available, displaying a rate of 46% in 2020.<sup>15</sup>

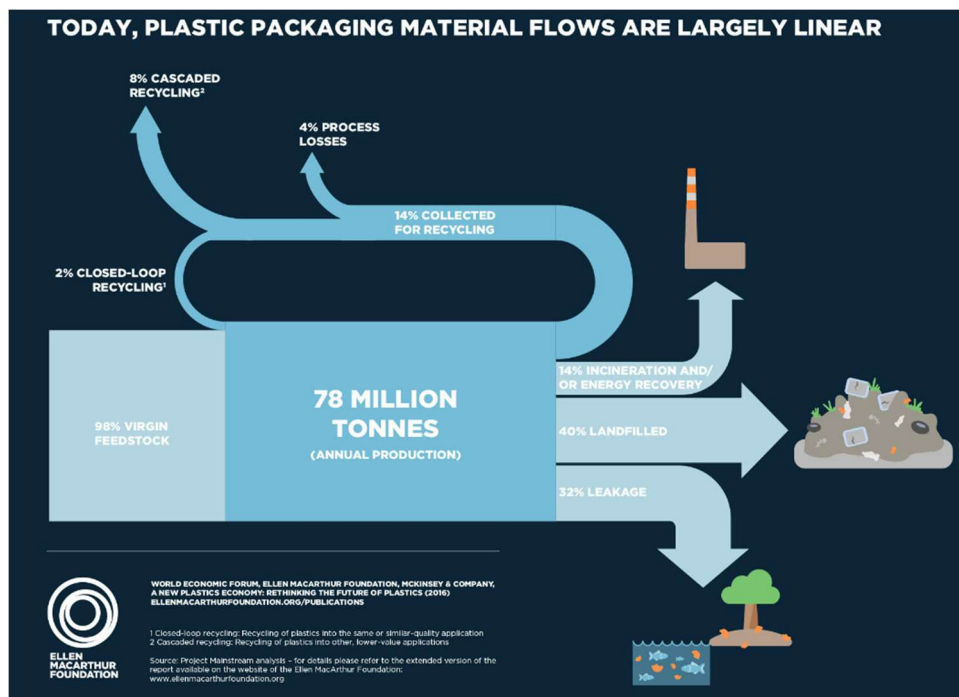
<sup>15</sup> <https://www.eea.europa.eu/ims/waste-recycling-in-europe>

### 3.2 Plastics

Plastics are versatile materials, but the way we use them is incredibly wasteful. We take oil and gas from the earth to make plastic products that are often designed to be used only once, and then we throw them away.

Year on year, millions of tonnes of plastic, worth billions of dollars, ends up in landfills, is burned, or leaked into the environment. A staggering 8 million tonnes leaks into the ocean every year — and that number is rising.<sup>16</sup>

Nowadays, single-use plastics account for 40% of the plastic produced every year. Many of these products, such as plastic bags and food wrappers, have a lifespan of mere minutes to hours, yet they may persist in the environment for hundreds of years. Plastics contain additives making them stronger, more flexible, and durable, but many of these additives can extend the life of products with some estimates ranging to at least 400 years to break down.<sup>17</sup>



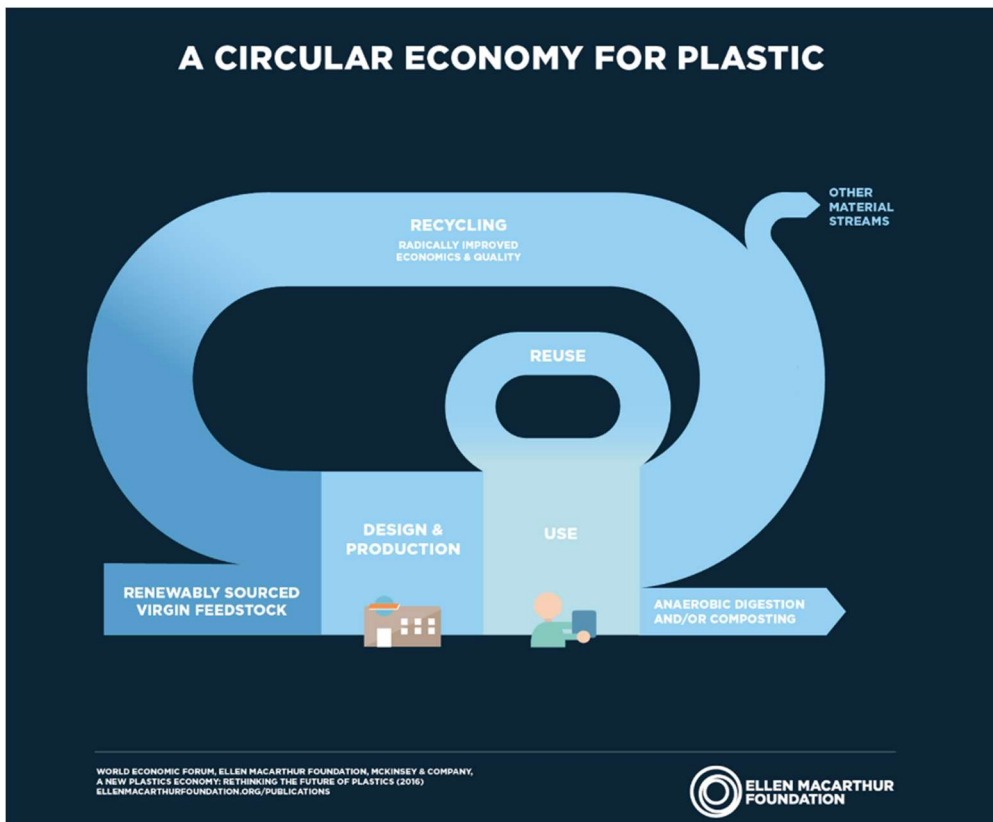
Source: <https://ellenmacarthurfoundation.org/plastics-and-the-circular-economy-deep-dive>

<sup>16</sup> <https://archive.ellenmacarthurfoundation.org/explore/plastics-and-the-circular-economy>

<sup>17</sup> Nacional Geographic (2019). *The world's plastic pollution crisis explained*

The vision for a circular economy for plastic has six key points:

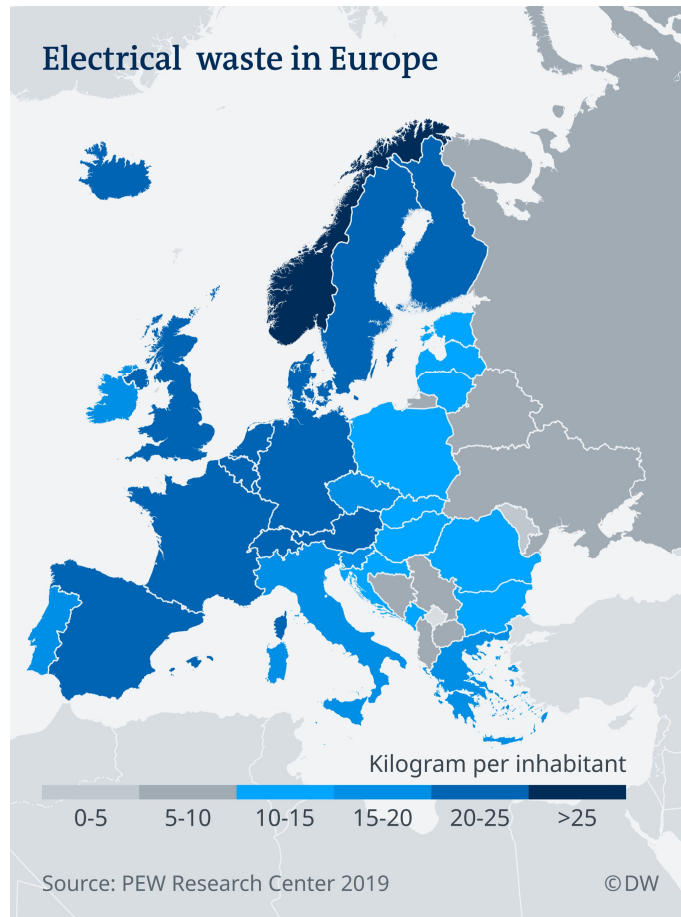
1. Elimination of unnecessary plastic packaging through redesign, innovation, and new delivery models is a priority.
2. Reuse models are applied where relevant, reducing the need for single-use packaging.
3. Innovation must ensure that all plastic packaging is 100% reusable, recyclable, or compostable.
4. Development of a dedicated system to ensure that all plastic packaging is reused, recycled or composted in practice. It includes collecting and sorting, a physical chemical or biological breakdown process, and then the rebuilding of a material that is reintroduced.
5. The use of plastic is fully decoupled from the consumption of finite resources.
6. All plastic packaging is free of hazardous chemicals, and the health, safety, and rights of all people involved are respected.



Source: <https://ellenmacarthurfoundation.org/plastics-and-the-circular-economy-deep-dive>

### 3.3 Waste Electrical and Electronic Equipment (WEEE)

There is an evident data gap on what happens to the WEEE when the first consumer no longer need the equipment but not return in to authorised agencies. For instance, the limited data available suggest that in Europe only the 15% of mobile devices are recycled.<sup>18</sup>



Source: <https://www.dw.com/en/the-eu-declares-war-on-e-waste/a-51108790>

WEEE can have a significant impact on the environment. They refers to any discarded electrical or electronic devices, including computers, smartphones, and other electronic equipment. As technology advances, companies and individuals tend to upgrade their devices frequently, which results in a high volume of WEEE.<sup>19</sup>

<sup>18</sup> <https://www.dw.com/en/the-eu-declares-war-on-e-waste/a-51108790>

<sup>19</sup> <https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93325/e-waste-in-the-eu-facts-and-figures-infographic>

One major impact of WEEE is the environmental damage caused by improper disposal of electronic devices. WEEE contains a variety of toxic materials, such as lead, mercury, gold, silver and cadmium, that can harm human health and the environment when not disposed of properly.

If not recycled or disposed of correctly, these materials can leach into the soil and water, causing damage to ecosystems and human health.<sup>20</sup>

The key aspects of the end-user can manage of the WEEE circular economy are:

- Selecting equipment in terms of durability and efficiency.
- Implementing a WEEE management program.
- Properly disposing of WEEE by recycling or donating to organizations.
- Educating society on the importance of proper WEEE disposal.

### 3.4 Paper

Globally, annual paper demand is over 400 million tonnes.<sup>21</sup> Unsurprisingly, massive rates of paper production requires massive amounts of natural resources. Approximately 24 trees, 300 million liters of water, and 32 million BTUs of energy are used to produce just 1 ton of paper. Clearly this has a significant environmental impact, both upstream during production and raw material sourcing, and downstream when the paper and production byproducts are disposed.<sup>22</sup>

One key aspect of a circular paper economy is the use of recycled paper as a raw material. This reduces the need to harvest new trees and also cuts down on the amount of waste paper that ends up in landfills.

Another important aspect of a circular paper economy is the design of products for longevity and recyclability. This means that paper products are designed to be easy to disassemble, repair, refurbish, and recycle, which can prolong their useful life and reduce the need to produce new products.

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<sup>20</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0959652622022703>

<sup>21</sup> <https://www.statista.com/statistics/1089078/demand-paper-globally-until-2030/>

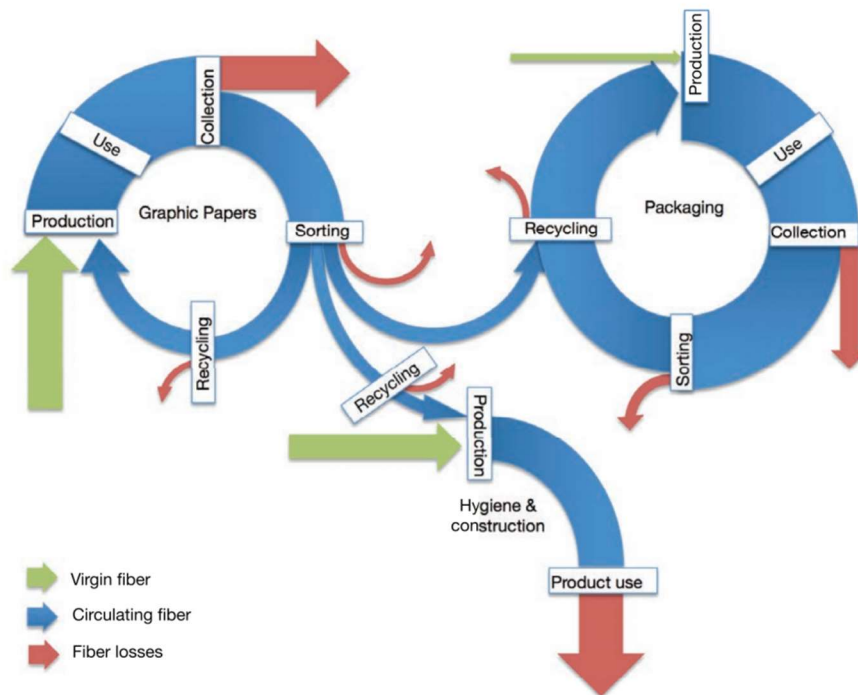
<sup>22</sup> <https://community.materialtrader.com/the-complete-guide-to-a-circular-economy-of-paper/>



In addition to these steps, circular paper economy also includes measures to optimize the use of resources, such as reducing water and energy consumption in the production process, and the use of sustainable and renewable energy sources.

Overall, the circular paper economy aims to create a sustainable and efficient system for the production, use, and disposal of paper products. By reducing the need to harvest new trees, minimising waste, and designing products for longevity and recyclability, it can help to protect the environment and conserve natural resources.

While virgin fibres will always be needed in the pulp and paper industry, eco-design and eco-management can help reduce dependence on resources and increase the value chain's resilience.<sup>23</sup>



Source: <https://community.materialtrader.com/the-complete-guide-to-a-circular-economy-of-paper/>

<sup>23</sup> World Economic Forum (2016). *White paper. Design and Management for Circularity – the Case of Paper*



The key aspects of the end-user can manage of the circular paper economy are:<sup>24</sup>

1. Use of recycled paper as raw material: reduces the need to harvest new trees and decreases the amount of waste paper that ends up in landfills.
2. Select long-live and recyclable products: Products are designed to be long-lasting, efficient and easy to reuse and recycle. This prolongs their useful life and reduces the need to manufacture new products.
3. Optimization of resources use: make a correct estimation of the amount of paper needed. Purchasing and production should always be in line with needs and avoid excessive provisioning.
4. Creating a closed loop system: Ensure recycling of consumed products, segregating waste and managing collection with companies.
5. Minimizing waste: the Circular paper economy aims to minimize waste by recycling, reusing and regenerating paper products.
6. Protecting the environment and conserve natural resources: By implementing these key aspects, the circular paper economy can help to protect the environment and conserve natural resources.

### 3.5 Organic waste

In the circular organic waste economy, organic waste is collected separately from other types of waste, such as plastic and paper. This allows for the organic waste to be properly processed and turned into valuable resources. For example, food scraps and yard waste can be composted, which creates a nutrient-rich soil amendment that can be used to improve soil quality and grow healthier plants. Additionally, organic waste can also be used to produce biogas, which is a clean and renewable source of energy.

This approach is part of the larger circular economy concept, which aims to keep resources in use for as long as possible and minimize waste.

One of the key benefits of the circular organic waste economy is that it helps to reduce the amount of waste that ends up in landfills. Landfills are a significant source of methane, a potent greenhouse gas that contributes to climate change.

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<sup>24</sup> <https://community.materialtrader.com/the-complete-guide-to-a-circular-economy-of-paper/>

By diverting organic waste from landfills and instead using it to create valuable resources, the circular organic waste economy helps to reduce methane emissions and mitigate the impacts of climate change.<sup>25</sup>

The key aspects to apply circular economy criteria to organic waste are:

- Separating organic waste from other types of waste and properly processing it to create valuable resources such as compost and biogas.
- Diverting organic waste from landfills and reducing the amount of methane emissions.
- Minimizing waste and promoting the use of resources for as long as possible as part of the larger circular economy concept.

### 3.6 Best practices related to waste

#### Recycling codes

Before sorting, it is necessary to know what material the waste is made of.

For example, some products appear to be made of plastics but then turn out to be organic compounds. For this reason there are recycling codes that are used on products to identify their composition and facilitate the recycling process.

If there is ever any doubt about the composition of a waste, these codes help ensure that it can be segregated correctly.<sup>26</sup>

Some examples of recycling codes are the following:

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<sup>25</sup> European Environment Agency (2020) Bio-waste in Europe – turning challenges into opportunities

<sup>26</sup> [https://administracion.gob.es/pag\\_Home/en/Tu-espacio-europeo/derechos-obligaciones/empresas/productos/gestion-residuos.html#-02963a4898b5](https://administracion.gob.es/pag_Home/en/Tu-espacio-europeo/derechos-obligaciones/empresas/productos/gestion-residuos.html#-02963a4898b5)



Source: <https://www.recycling.com/wp-content/uploads/2008/05/Recycling-Codes-Free-Download.pdf>

### Waste sorting scheme

The sorting of waste is a key aspect when it can no longer be used. At this point, waste must be prevented at all costs from ending up in landfill. For proper recycling of these materials, sorting is necessary at the first moment of disposal.

For this purpose, different containers must be permanently installed to allow the collection of waste of different types. The sorting approach may vary depending on the country, municipality or region where the waste is generated.

In general, waste is usually separated into:

- Paper/cardboard
- Plastic and metal (cans)
- Organic waste
- Glass
- Others (WEEE, fluorescent tubes, batteries...)

Sorting at offices should be adapted to the type of local collection that is subsequently available. Colours are very useful to help identify the suitable bin for placing each waste.<sup>27</sup>



Source: <https://eeb.org/wp-content/uploads/2020/03/Separate-collection-factsheet.pdf>

### Awareness

Employees' awareness on the benefits of sorting waste is absolutely necessary. If it is not done or is done incorrectly, it may affect the environment. That is why awareness-raising talks are necessary and also impact talks where the negative effect can be seen. Waste management must be discussed in every office to prevent waste from ending up in landfills.<sup>28</sup>

### Monitoring

Waste bins must be reviewed periodically to check that the waste sorting criteria are been implemented correctly.

A periodic visual inspection that the criteria are being followed will check if people understand and are aware of them. Monitoring will verify if waste sorting is being done correctly and incentives or punishments can be handed out depending on the results obtained.

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<sup>27</sup> <https://eeb.org/library/explained-europes-new-laws-for-separate-waste-collection/>

<sup>28</sup> <https://eeb.org/library/harmonising-waste-separate-collection-across-europe/>

## Second life for products

Sometimes a product that is not useful for some tasks, projects or people may be useful in other situations. This is what the circular economy is based on: adding value to a possible waste product and giving it another use. Donation makes this possible. In the scope we are in, it can happen at the following points:

- Food

The ideal option is to calculate the expected food consumption during meetings or events. This prevents overprovisioning and the generation of surplus food.

For various reasons this estimate may not be correct and food is left over. At that moment the food can become waste or can be donated to other people who can make use of it.

The food can be taken home by the members of the meeting themselves to be eaten later. If the members are not local or the quantity is too large. This food can also be donated to local charities. Thus reducing the waste generated.

- Electrical and electronic equipment

Technology is advancing fast. The technical requirements of software are increasingly demanding on hardware and electronic devices are starting to malfunction. In some cases the devices are no longer useful for the project, so a new product is purchased.

At that point the device may become junk, or it may be repurposed for other functions that require fewer capabilities inside or outside the organisation.

Outside the organisation, these devices may be donated to local libraries or schools where they can be given a second life. Thus reducing the waste generated.

- Furniture

Following the same goal of extending the life of the products, this practice can also be applied to furniture. Sometimes organisational changes, rebranding or other decisions cause office furniture in good condition to be replaced.

At that moment it is no longer useful for the company, but it can be used by other people. Thus giving a second life to the product and generating less waste.

### Delivery for recycling

When a product has no value for us nor for everyone and we think of throwing it, we should deliver the waste for recycling through the municipal waste collection scheme or contacting with a company that is authorised for waste management according to the national, regional, local law.

## 3.7 Practical activity

### 3.7.1. Worksheet: Waste

After having defined protocols on sorting for recycling at your office, with subsequent information and awareness raising for all employees, an inspection is made to check the waste that are inside the containers to know if they are correctly sorted or not.

The following worksheet can be used for this purpose. Remember to adapt the colours to your local rules if it is necessary:

Bin	Correctly segregated	Incorrectly segregated	Observations (explain what you find in each bin)
Paper			
Plastic and Metal (cans)			
Organic waste			
Glass			
WEEE			

Now think: what are you going to do for solving the mixed waste that you found?



### 3.7.2 Case study

Some case studies are introduced as real examples of best practices implemented to reduce waste impact.

<p>Argonne national laboratorie has implemented an organic waste collection system at its sites for processing mainly food waste and paper towels.</p> <p>This has resulted in a 24% increase in waste diversion. And they have managed this organic waste to produce compost.</p>	 <p><b>COMPOSTING PROGRAM</b></p> <p>Source: <a href="https://www.anl.gov/sites/www/files/2020-08/Waste%20Management%2011.18.pdf">https://www.anl.gov/sites/www/files/2020-08/Waste%20Management%2011.18.pdf</a></p>
<p><u>Pay-as-you-thrown.</u> In many countries and cities around the world, a policy of paying more if you generate more waste has been implemented. This is the case of the city of Wheaton, Illinois, USA.</p> <p>In this city, the general recycling fee was replaced by a system of stickers that had to be attached to the rubbish bags and had a recycling cost in its price.</p> <p>The more waste you generated, the more stickers you needed and the more you had to pay.</p>	 <p>Source: <a href="https://icma.org/success-stories/community-driven-approach-to-improved-waste-management">https://icma.org/success-stories/community-driven-approach-to-improved-waste-management</a></p>

### 3.7.3. Exercise

I propose you an interactive game to select where the waste will go.

The dynamic is to select a piece of waste and decide where it should be removed. This game can be done with the waste that is within reach during the activity in person and with the appropriate sorting containers in the region.

You can do the exercise through the following link designed according to the local recycling criteria defined by the City of Alexandria, Virginia (US).



Source: <https://recollect.net/waste-sorting-game/>

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<https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93325/e-waste-in-the-eu-facts-and-figures-infographic>

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## **Chapter 5 – Training instructions for trainers**

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### **5.1 Exploitation of the practical activities given in the module under the trainer perspective**

Further instructions for the trainers are provided to help them exploit the proposed practical activities. Some of these practical activities are completed with additional useful information to develop the training sessions.

Activity	Resources	Time	Competence	Skill
1.5.1 Worksheet: Circular economy European Parliament's video, Planned obsolescence: why things don't last	Computer LCD projector Screen Online connection	15 min	Barriers to implement circular economy practices European policy: aim, plans, rules	Identify the barriers to implement circular economy practices and solutions
1.5.2 Case study Coca-Cola's reusable plastic (PET) bottle	Computer LCD projector Screen Online connection	15 min	Circular economy's best practices	Distinguish circular economy practices from linear practices
<p>The initiative has provided interesting benefits:</p> <ul style="list-style-type: none"> <li>• The use of a Universal Bottle avoids the production of billions of plastic bottles across Latin America every year. In Brazil alone, it meant Coca-Cola produced 1.8 billion fewer bottles in 2019.</li> <li>• Compared to single use PET bottles, greenhouse gas emissions are reduced by 47%. Even with washing factored in, water consumption is reduced by 45% - water is a major consideration in large cities like Sao Paulo which has suffered from serious droughts in the last decade.</li> <li>• Lower prices combined with the reward system for returned bottles drives consumer loyalty, resulting in a return rate above 90% and a 15% higher likelihood of repurchase.</li> <li>• Logistics and storage are simplified with a single bottle design across brands so Coca-Cola can cut costs and improve efficiency, whilst providing more flexibility to consumers to choose their preferred beverage.</li> </ul>				
1.5.3. Exercise Identifying circular economy practices	Computer LCD projector Screen	15 min	Circular economy's best practices	Distinguish circular economy practices from linear practices
2.5.1. Worksheet: Materials	Computer LCD projector Screen	30 min	Best practices related to materials applied to Erasmus+ projects	Define and apply circular economy's best practices to Erasmus+ projects Apply the hierarchy when

Choosing materials for a project event				implementing circular economy practices
2.5.2 Case study Office design	Computer LCD projector Screen Online connection	30 min	Best practices related to materials applied to Erasmus+ projects	Define and apply circular economy's best practices to Erasmus+ projects.
<p>UK Green Building Council transformed its office in London. With an embodied carbon footprint of 139 kgCO<sub>2</sub>/m<sup>2</sup>, UKGBC's office is 22% better performing than the embodied carbon of a comparable standard fit out. Other standout environmental features include a 48% reduction in emissions from lighting and a 99.4% rate of construction waste diverted from landfill.</p> <p><a href="#"><i>The sustainable office refurbishment for the UK Green Building Council headquarters - YouTube</i></a></p>				
2.5.3 Exercise Circularity gap regarding mobile phones	Computer LCD projector Screen Online connection	30 min	Impact of raw materials consumption: current figures and trends	Identify the barriers to implement circular economy practices and solutions
<p>Questions:</p> <ol style="list-style-type: none"> <li>1. In your case, what is the duration of a mobile phone? How often do you buy a new device?</li> <li>2. When the phone is damaged, do you take it for repair? Or, on the contrary, do you think of buying a new one?</li> <li>3. What do you do with your old phone? Do you think of reuse or recycling options?</li> <li>4. Do you consider circular criteria when purchasing a new device? Do you know if it is made in a modular way by means of easily separable pieces so that repair will be possible? Do you know if some of their components come from recycling?</li> </ol>				
5.2.1 Chapter 1: Circular economy Barriers to implement circular economy practices	Computer LCD projector Screen	1.5 hours	Barriers to implement circular economy practices	Identify the barriers to implement circular economy practices and solutions
5.2.2 Chapter 2: Materials	Computer LCD projector Screen	1.5 hours	EU ecolabel for different product groups	Apply the criteria of the EU ecolabel for

Working with EU ecolabels	Online connection			different product groups
3.7.1. Worksheet: Waste On-site waste inspection	Tablet or sheet of paper	30 min	Best practices related to the treatment of waste produced developing Erasmus+ projects: paper, plastic, organic waste, WEEE, etc.	Apply the best practices for waste sorting, labelling and delivery for reuse or recycling.
3.7.2 Case study Examples of best practices related to waste	Computer LCD projector Screen Online connection	30 min	Impact of waste and need for the best managing.	Identify types of waste and possible best practices to apply.

Circular economy is the only solution that can match the scale of the plastic pollution problem. Innovation ideas are catalysing systemic change at a global scale. Here are a few examples<sup>29</sup>:

a) Ooho is edible and biodegradable packaging for beverages and condiments made from brown seaweed, a renewable natural resource. It contains the product for the period of use without the need for single-use beverage bottles, cups, and condiment sachets.

The condiment sachets are available on the Just Eat food delivery platform. During the initial trial with ten restaurants, the use of 46,000 sauce sachets made from single-use plastic were avoided.

The water capsules were trialled at the 2019 London marathon, eliminating the need for more than 30,000 single-use plastic cups and bottles.



<sup>29</sup> <https://archive.ellenmacarthurfoundation.org/explore/plastics-and-the-circular-economy>

Sources: <https://ellenmacarthurfoundation.org/plastics-and-the-circular-economy-deep-dive>; <https://www.notpla.com/>

b) Moving from a liquid to a solid product can:

- Lower the cost of transport and reduce transport emissions
- Be more convenient for a consumer
- Increase e-commerce opportunities
- Present an opportunity to rethink the delivery model
- Make it easier to provide large quantities of product
- Allow you to use less packaging material per volume of product

Founded in the UK in 1995, Lush sells a wide range of solid products across hair, body, fragrance, toothpaste, and beauty care categories.

Most products are sold naked in store, meaning that packaging that was previously required to contain the product (bottle, container, tube) has been eliminated.

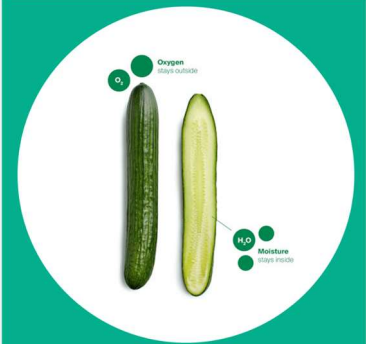


Sources: <https://ellenmacarthurfoundation.org/plastics-and-the-circular-economy-deep-dive>; <https://www.lush.com/uk/en?t=1683553912078>

Apeel is a plant-derived coating for fruit and vegetables which slows water loss and oxidation. It extends shelf-life without the need for plastic packaging, such as shrink wrap on fruit and vegetables.

A single cucumber supplier is expected to eliminate more than 30,000 kg of shrink wrap per year using Apeel. A full life cycle analysis (LCA) has been conducted for Apeel coated products, and they outperform the baseline product in all cases.

Apeel is been used already for avocados, cucumbers, lemons, oranges, mangos, limes, apples, mandarins and grapefruits, in North America and Europe.



Sources: <https://ellenmacarthurfoundation.org/plastics-and-the-circular-economy-deep-dive>; <https://www.apeel.com/>

3.7.3. Exercise Interactive game to deliver waste	Computer LCD projector Screen Online connection	30 min	Best practices related to the treatment of waste	Apply the best practices for waste sorting, labelling and delivery for reuse or recycling.
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## 5.2 Other practical activities

### 5.2.1 Chapter 1: Circular economy

The aim of this practical activity is identifying the existing barriers to implement circular economy practices. These barriers could be due to different type of factors such as economic, market, social, etc. It is important to identify them to take action to boost circular economy.

The trainer will use the following template to guide participants to think of these barriers.

Question	Linear	Circular	Barriers
PURCHASE STAGE			
Should I buy the product?	Yes. I want the product in my ownership	No. I may consider other options (leasing, renting, sharing)	



If I buy, should it be a new or used product?	New product	Used: refurbished, remanufactured or second hand	
If a new product, which one?	Often (relatively) cheaper and lower quality	Better performance (durability, maintainability, repairability, recyclability)	
<b>USE STAGE</b>			
Should I keep using my product?	Stop using	Keep using for as long as possible	
If kept, how should I take care of it?	Careless usage and improper or no maintenance	Careful use, timely maintenance, cleaning, upgrade and repair	
If no longer used, what shall I do next?	Dispose of or store the product	Donate, sell or share with those who may use it more	
<b>END-OF-USE STAGE</b>			
Shall I keep it for a while?	Get rid of it	Keep hoping to extend its life	
If kept, is it stored or repaired?	Store for long time	Extending the product's life, repair refurbishing and upgrade, to maximise reuse and extend use	
If not kept, how to get rid of it?	Improper disposal and landfilling	Proper disposal, donation or selling for components, to maximise recycling and reuse	

The activity will be developed by the trainer following this sequence:

1. Explanation of the circular economy concept by using the contents of this module.
2. Introduction of the aim of the activity.
3. 15 minutes to individually read and think of the barriers.

4. Sharing of the individual thoughts and discussion for 30 minutos.
5. Drawing and writing the conclusions on the template by the trainer in 15 minutos.









The activity will last about 1.5 hours.



### 5.2.2 Chapter 2: Materials

This practical activity aims to work on the EU ecolabels, by using the information available on the European Commission website.

1. The trainer will explain what Ecolabel is by using this module.
2. The trainer will present the product groups with EU ecolabel from this link: [https://environment.ec.europa.eu/topics/circular-economy/eu-ecolabel-home/product-groups-and-criteria\\_en](https://environment.ec.europa.eu/topics/circular-economy/eu-ecolabel-home/product-groups-and-criteria_en)

#### Current product groups and criteria

 <p><b>Cleaning</b></p> <p>Clean privately or professionally with less substances.</p>	 <p><b>Clothing and textiles</b></p> <p>Textiles and footwear with sustainable fibres.</p>	 <p><b>Coverings</b></p> <p>Floor, roof, and all coverings reducing an impact on land.</p>	 <p><b>Do it yourself</b></p> <p>Paint and varnishes which are safe for you, your family, and the environment.</p>
 <p><b>Electronic equipment</b></p> <p>Energy efficient screens and displays, built for the future.</p>	 <p><b>Furniture and mattresses</b></p> <p>Make the spaces we are in safer, reducing impacts on the forests.</p>	 <p><b>Gardening</b></p> <p>Provide the best conditions for your garden to thrive.</p>	 <p><b>Holiday accommodation</b></p> <p>Find your next eco-friendly holiday accommodation.</p>

 <p><b>Lubricants</b></p> <p>Care for biodiversity and avoid hazardous substances.</p>	 <p><b>Paper</b></p> <p>Lower your daily environmental impact with eco-friendly alternatives.</p>	 <p><b>Personal and animal care products</b></p> <p>Find everything for your daily routine from cosmetics to hygiene products.</p>
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Source: [https://environment.ec.europa.eu/topics/circular-economy/eu-ecolabel-home/product-groups-and-criteria\\_en](https://environment.ec.europa.eu/topics/circular-economy/eu-ecolabel-home/product-groups-and-criteria_en)

- To work on the floor coverings product group, first the trainer will ask the participants what environmental impacts they think that these products may have and the circular economy criteria that could be applied. For doing this, they will use the following template:

Materials	Impact	Criteria to avoid/reduce the impact
Origin of the wood, cork and bamboo		
Coatings, adhesives and other chemical products applied to the raw materials		
System to place/join the pieces of material		

- Then the trainer will show the factsheet related to the EU Ecolabel criteria for wood-, cork- and bamboo-based floor coverings to the participants, and the participants will correct/complete the info in the previous table: [https://ec.europa.eu/environment/ecolabel/documents/Wood\\_Floor\\_Coverings\\_Factsheet.pdf](https://ec.europa.eu/environment/ecolabel/documents/Wood_Floor_Coverings_Factsheet.pdf)

The activity will last about 1.5 hours.

### Chapter 3: Waste

This activity aims to share best practices among participants and to promote knowledge sharing. Therefore, it needs to be done after the theoretical part.

Form small working groups (3-4 people) and carry out the following steps.

A scenario should be drawn up, a meeting, office tasks for a certain period of time, etc. The waste are already produced and the groups need to build a plan for reusing and recycling. They must work to develop together:

1. Identify the possible waste generated in the activity.
2. Identify the waste that can be reused.
3. Identify the waste that need to be recycled.
4. Identify the necessary containers for that.
5. Identify what they will do this collected waste.
6. Think if any of them could be avoided and how.

After this, each group will read their results out loud, generating a forum for debate on best practices and knowledge sharing.

The activity will last about 1.5 hours.

### 5.3 Tips and examples of best practices to apply this module to your own training activity

The aim of the following list is providing trainers with useful tips to develop the practical activities to achieve the learning objectives .

- First of all, define the learning objectives of every training session.
- Plan and explain participants the activities and their times. Establish breaks.
- Blend the exposition of theoretical contents with different practical activities to improve the understanding and keep participants' attention.
- Encourage everyone participation by creating a comfortable environment where all contributions are considered right to address a subject.

- Let participants enough time to think of the subject before giving an answer.
- Encourage a respectful, enriching debate among participants promoting the exchange of different ideas and points of view.
- Invite participants to share their own experiences since everyone uses materials and produces waste on a daily basis.
- Drive the group to draw conclusions to close every debate.
- Use the wide range of materials that are published on the Internet. Take advantage of videos, charts, data, case studies, etc. provided by reliable sources.
- Encourage participants to look up useful materials in the Internet and make their own presentations about pre-selected subjects.
- Implement in the training venue some of the best practices related to circular economy that you will explain during the training, and encourage participants to identify and use them. Teach by example.
- Include a test after each training session for participants to reinforce relevant concepts and evaluate their acquired knowledge. It is a good tool for laying the foundations and promoting further learning.

### ***Module assessment***

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1. The circular economy is:

A model based on the existence of large quantities of cheap, easily accessible materials (0 points)

A departure from the traditional, linear economic model, which is based on a take-make-consume-throw away pattern (4 points)

Not related to climate change (0 points)

Responsibility for governments and large companies (0 points)

2. When developing an Erasmus+ project, what decisions do you make in relation to products use:

I purchase products with better performance regarding durability, maintainability, repairability and recyclability (4 points)

I stop using the product when it breaks and buy a new one (1 point)

If the product can't be repaired, I give it for recycling (2 points)

If the product can't be repaired, I consider donate, sell or share with those who may use it more (3 points)

3. What practices do you implement regarding the paper use?:

I reuse file folders and cardboard boxes for storage (3 points)

I deliver the used paper for recycling (1 point)

I use paper with EU label or recycled paper (2 points)

I go paperless, I only use digital files (4 points)

4. In relation with packaging, what do you consider?

I work with all suppliers to reduce packaging (3 points)

I encourage reusable lunch bags instead of paper or plastic bags which are used once and thrown (4 points)

I place fountains or water stations throughout the office and encourage the use of reusable water bottles (4 points)

I deliver the used coffee capsules for recycling (1 point)

5. What criteria do you apply in the meals of your project events?

I provide reusable materials, such as cups, spoons, plates, etc. that can be washed and re-used (4 points)

I choose single-use compostable cups, plates and cutlery made of vegetal organic materials (3 points)

I buy coffee, tea and sugar in bulk (4 points)

I use recycled paper cups for coffee and water (2 points)

6. What do you take into account regarding electrical and electronic equipment and office furniture?

I choose new items with a high recycled content, with easily separable parts, without plastic materials (4 points)

I maintain and repair the devices/furniture, replacing the broken/damaged components (4 points)

I donate working electronic devices and furniture to make sure others can reuse them (3 points)

I give the e-equipment and furniture for recycling (1 point)

7. At one project meeting, the catering produced more food than was consumed, generating waste. What should be done with this food, which is in good condition?

Donating the food to a local charity to distribute to the needy (3 points)

Each member of the meeting will take this food home with them (4 points)

The food will be sorted and disposed as organic waste in the appropriate bin (2 point)

The food will be thrown to the rubbish without being sorted (0 points)

8. The laptop of one of the project members is old. The device is working properly, but it no longer has the technical qualities to enable him to carry out his work to a high standard. The company has bought a new and more powerful computer. What should you do with the old one?

Depositing it in the designated place, labelling it correctly for recycling (2 points)

Leaving it in the office drawer, it may be useful at a later date (1 point)

Donating this computer to a local library or study centre. It is still good for those simple tasks (4 points)

Throwing it to the rubbish without being sorted (0 points)

9. There is a drawer unit at the office that is not in use. That room is needed for other purpose. What should you do with this furniture?



Leaving it along in the office's waste collection zone. The local resource manager will take care of its correct recycling (2 point)

Sending a mailing to the whole office offering the furniture. Someone may be able to give it a second use at the same office (4 points)

Finding another place for the object. It has not been used for some time, but may be needed later (1 point)

Offering the furniture to a nearby school. Maybe someone needs it more than we do and can come to pick it up. (3 points)

10. Coffee capsules have been a revolution at the office and in meetings. But the waste produced contains a mixture of used coffee and the plastic container that holds it. What do you do to recycle it?

I return them to the producer. Some companies that manufacture capsules are committed to reducing their impact on the environment, therefore they collect the capsules for recycling (4 points)

I throw out the coffee capsule in the plastic container if the local waste management scheme allows it (3 points)

I throw out the coffee capsule in the organic container (0 points)

I separate the coffee from the container. Then I throw out each in the appropriate container (organic/plastic) (4 points)