



# Train2Sustain – developing capacity to teach sustainability in VET

## Unit 5

### Circular Economy

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# Glossary

## Glossary for Units 1 – 7 ALPHABETIC ORDER

Artificial intelligence	<b>Artificial intelligence (AI)</b> is <a href="#">intelligence</a> —perceiving, synthesizing, and inferring information—demonstrated by <a href="#">machines</a> , as opposed to intelligence displayed by <a href="#">non-human animals</a> and <a href="#">humans</a> . Example tasks in which this is done include speech recognition, computer vision, translation between (natural) languages, as well as other mappings of inputs.
Biocapacity	The <b>biocapacity</b> or <b>biological capacity</b> of an <a href="#">ecosystem</a> is an estimate of its production of certain biological materials such as <a href="#">natural resources</a> , and its absorption and filtering of other materials such as <a href="#">carbon dioxide</a> from the atmosphere
Biodiversity	<b>Biodiversity</b> or <b>biological diversity</b> is the variety and variability of <a href="#">life on Earth</a> . Biodiversity is a measure of variation at the <a href="#">genetic</a> ( <a href="#">genetic variability</a> ), <a href="#">species</a> ( <a href="#">species diversity</a> ), and <a href="#">ecosystem</a> ( <a href="#">ecosystem diversity</a> ) level.
Carbon footprint	A <b>carbon footprint</b> is the total <a href="#">greenhouse gas (GHG) emissions</a> caused by an individual, event, organization, service, place or product, expressed as <a href="#">carbon dioxide equivalent</a> (CO <sub>2</sub> e)
Carbon handprint	A carbon handprint is <b>the opposite of a footprint</b> . It recognises the actions you take to have a positive impact on the climate, over and above reducing your own carbon footprint if you do enough of these, they might even outweigh the size of your carbon footprint.
Circular economy	A <b>circular economy</b> is a model of <a href="#">production</a> and <a href="#">consumption</a> , which involves <a href="#">sharing</a> , leasing, <a href="#">reusing</a> , repairing, refurbishing, and <a href="#">recycling</a> existing materials and products as long as possible
Decarbonization	The term decarbonization literally means <b>the reduction of carbon</b> . Precisely meant is the conversion to an economic system that sustainably reduces and compensates the emissions of carbon dioxide (CO <sub>2</sub> )
Deforestation	<b>Deforestation</b> or <b>forest clearance</b> is the removal of a <a href="#">forest</a> or stand of trees from land that is then <a href="#">converted</a> to non-forest use. <a href="#">[3]</a> Deforestation can

	involve conversion of forest land to <a href="#">farms</a> , <a href="#">ranches</a> , or <a href="#">urban</a> use. The most concentrated deforestation occurs in <a href="#">tropical rainforests</a>
Eco-design	<b>Ecological design</b> or <b>ecodesign</b> is an approach to designing products and services that gives special consideration to the environmental impacts of a product over its entire <a href="#">lifecycle</a>
Ecological footprint	The <b>ecological footprint</b> is a method promoted by the <a href="#">Global Footprint Network</a> to measure human demand on <a href="#">natural capital</a> , i.e. the quantity of nature it takes to support people and their economies.
Energy-efficient	Energy efficiency is <b>the use of less energy to perform the same task or produce the same result</b> . Energy-efficient homes and buildings use less energy to heat, cool, and run appliances and electronics, and energy-efficient manufacturing facilities use less energy to produce goods.
Environmentally friendly	<b>Environment friendly processes</b> , or <b>environmental-friendly processes</b> (also referred to as <b>eco-friendly</b> , <b>nature-friendly</b> , and <b>green</b> ), are <a href="#">sustainability</a> and <a href="#">marketing</a> terms referring to <a href="#">goods and services</a> , <a href="#">laws</a> , guidelines and policies that <a href="#">claim</a> reduced, minimal, or no harm upon <a href="#">ecosystems</a> or the <a href="#">environment</a> .
European circular economy action plan	The EU's Circular Economy Action Plan (CEAP) was a <b>comprehensive body of legislative and non-legislative actions adopted in 2015, which aimed to transition the European economy from a linear to a circular model</b> . The Action Plan mapped out 54 actions, as well as four legislative proposals on waste.
Fertilisers	<b>Fertiliser</b> is any material of natural or synthetic origin that is applied to soil or to plant tissues to supply <a href="#">plant nutrients</a> .
Fossil fuels	A <b>fossil fuel</b> is a <a href="#">hydrocarbon</a> -containing material formed naturally in the <a href="#">Earth's crust</a> from the remains of dead plants and animals that is extracted and <a href="#">burned</a> as a <a href="#">fuel</a> . The main fossil fuels are <a href="#">coal</a> , <a href="#">oil</a> , and <a href="#">natural gas</a> .
Greenhouse emission	<b>Greenhouse gas emissions</b> from human activities strengthen the <a href="#">greenhouse effect</a> , contributing to <a href="#">climate change</a> . Most is <a href="#">carbon dioxide</a> from burning <a href="#">fossil fuels</a> : <a href="#">coal</a> , <a href="#">oil</a> , and <a href="#">natural gas</a> .
Greenhouse Emissions	Greenhouse gas emissions from human activities strengthen the greenhouse effect, contributing to climate

	change. Most is carbon dioxide from burning fossil fuels: coal, oil, and natural gas. The largest emitters include coal in China and large oil and gas companies.
Greenwashing	is a form of <u>advertising</u> or <u>marketing spin</u> in which <u>green PR</u> and <u>green marketing</u> are deceptively used to persuade the public that an organization's products, aims and <u>policies</u> are <u>environmentally friendly</u> .
Holistic process	<b>relating to or concerned</b> with wholes or with complete systems rather than with the individual parts.
Innovation	<b>Innovation</b> is the practical implementation of <u>ideas</u> that result in the introduction of new <u>goods</u> or <u>services</u> or improvement in offering goods or services
Lean management	<b>Lean manufacturing</b> is a <u>production method</u> aimed primarily at reducing times within the <u>production system</u> as well as response times from suppliers and to <u>customers</u> .
Lean principles	The five principles are considered a recipe for improving workplace efficiency and include: 1) defining value, 2) mapping the value stream, 3) creating flow, 4) using a pull system, and 5) pursuing perfection.
Linear economy	he traditional model where raw materials are collected and transformed into products that consumers use until discarding them as waste, with no concern for their ecological footprint and consequences.
Muda, Mura, Muri	<b>Muda, mura and muri</b> are three types of wasteful actions that negatively impact workflow, productivity and ultimately, customer satisfaction.
Organic farming	Organic farming, also known as ecological farming or biological farming, is an agricultural system that uses fertilizers of organic origin such as compost <u>manure</u> , <u>green manure</u> , and <u>bone meal</u> and places emphasis on techniques such as <u>crop rotation</u> and <u>companion planting</u> .
Pesticides	In general, a pesticide is a chemical (such as <u>carbamate</u> ) or <u>biological agent</u> (such as a <u>virus</u> , <u>bacterium</u> , or <u>fungus</u> ) that deters, incapacitates, kills, or otherwise discourages pests
Product Life cycle	Product life-cycle management is the succession of strategies by business management as a product goes through its life cycle. The conditions in which a product is sold changes over time and must be managed as it moves through its succession of stages.

Product-as-a-service	Product as a service is the concept of selling the services and outcomes a product can provide rather than the product itself.
Pull production	<b>A method of production control in which downstream activities signal their needs to upstream activities.</b> Pull production strives to eliminate overproduction and is one of the three major components of a complete just-in-time production system.
Recycling	<b>Recycling</b> is the process of converting <u>waste</u> materials into new materials and objects. The <u>recovery of energy from waste materials</u> is often included in this concept. The recyclability of a material depends on its ability to reacquire the properties it had in its original state
Renewable energy	<b>Renewable energy</b> is energy that is collected from <u>renewable resources</u> that are naturally replenished on a <u>human timescale</u> . <sup>1</sup> It includes sources such as <u>sunlight</u> , <u>wind</u> , the movement of <u>water</u> , and <u>geothermal heat</u>
Sustainability	<b>Sustainability</b> is a societal goal that relates to the ability of people to safely co-exist on <u>Earth</u> over a long time.
Sustainable household	A sustainable home is <b>one that is built or retrofitted in a way that conserves resources, optimizes energy and water use and that will last longer with quality systems.</b> A sustainable house is built with low-impact, high-performance materials. They are efficient in terms of manufacturing, shipping, and installing.
Sustainable label	Eco labels <b>set minimum environmental and health standards and verify products that meet the criteria.</b> They're designed to inform consumers, brands, and manufacturers that labelled products are more environmentally friendly than most.
Sway	Sway is a digital storytelling app that helps you create professional, interactive designs for your images, text, videos, and other media in minutes.
The 5s	5S stands for the 5 steps of this methodology: <b>Sort, Set in Order, Shine, Standardize, Sustain.</b> These steps involve going through everything in a space, deciding what's necessary and what isn't, putting things in order, cleaning, and setting up procedures for performing these tasks on a regular basis.

The European action Plan	It aims to: Re-orient capital flows towards sustainable investment, in order to achieve sustainable and inclusive growth; Manage financial risks stemming from climate change, natural disasters, environmental degradation and social issues; and. Foster transparency and long-termism in financial and economic activity.
Value chain	A <b>value chain</b> is a progression of activities that a firm operating in a specific industry performs in order to deliver a valuable <u>product</u> (i.e., <u>good</u> and/or <u>service</u> ) to the end <u>customer</u> .
Value stream	A <b>value stream</b> is the set of actions that take place to add value to a customer from the initial request through realization of value by the customer. The value stream begins with the initial concept, moves through various stages of development and on through delivery and support. A value stream always begins and ends with a customer.
Waste management	<b>Waste management</b> or <b>waste disposal</b> includes the processes and actions required to manage <u>waste</u> from its inception to its final disposal. This includes the <u>collection</u> , transport, treatment and disposal of waste, together with monitoring and regulation of the waste management process and waste-related <u>laws</u> , technologies, economic mechanisms.

# 1 Introduction to Circular Economy

## The Topic

The world's population has grown rapidly in recent years, which means that more and more raw materials are needed. This already leads us to the first problem: natural resources are only available in limited quantities, as they can only renew themselves to a certain extent. At the same time, however, about **2.5 billion tonnes of waste** are produced **in the EU every year**.

But instead of following this linear economy, which uses more and more raw materials and at the same time generates more and more waste, it is necessary to switch to an economic model in which fewer new resources are needed and waste is avoided, thus protecting the limited raw materials available and thus also the environment, and at the same time saving money.

One economic model that can provide a remedy in this regard is the **circular economy**. In a circular economy, an attempt is made to **keep resources in circulation for as long as possible** in order to **consume as few resources as possible and avoid waste**.



But what exactly is a circular economy? What can we do to promote such an economic model? And isn't recycling actually the same as a circular economy? These and many other questions will be explored in this unit.

In the following chapters, you will learn in detail what the circular economy is and how the European Circular Economy Action Plan developed by the European Commission has already influenced our economy in this respect and will continue to do so in the coming years. In addition, we will explain the benefits for our environment, but also for the economy and the population resulting from an increased shift to a circular economy. We will also show you the challenges that go hand in hand with this. Afterwards, you will learn what companies, but also all of us, can do to contribute to a circular economy and we will show you how this economic model is implemented in different European countries.

## 1.1 European Action Plan

What are you doing with products that you don't use anymore? Do you throw them away as soon as you do not need them anymore? Then this reflects today's society very well. Because until now, the system of a linear economy is usually followed, which is characterised by the phases of take - make - dispose. Products are therefore thrown away after use and landfilled or incinerated (see



Fig. 1 on the left). This is why this economic model is also called a throwaway economy. However, many of the resources that a product consists of could still be reused.

In order to save resources and our planet, there are increasing attempts to switch to a circular economic model, a so-called **circular economy**. In contrast to a linear economy, a circular economy is characterised by the fact that products are not thrown away after use or when they are broken, but are **reused, recycled, repaired or refurbished** (see Fig. 1 on the right). A circular economy thus has the following goals:

- to avoid waste and pollution
- to use products and materials for as long as possible
- to regenerate the natural environment

The figure 1 shows a linear economy with the "take-make-dispose" principle as well as a circular economy.

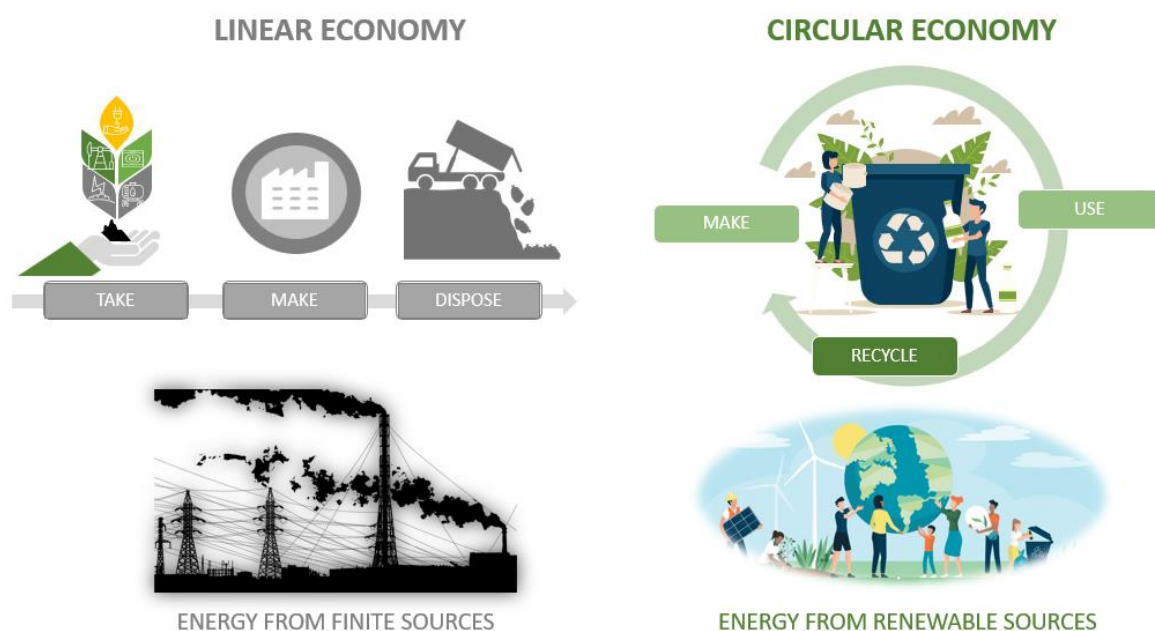


Figure 1. Differences between linear and circular economy

There are many different definitions of the term circular economy, but the organisation Circle Economy has set itself the task of summarising the key components from all those definitions. As a result, 8 elements were presented that form the core of a circular economy and facilitate it:

- **Preference for renewable resources:** ensuring that renewable, reusable and non-toxic resources in the form of materials and energy are used efficiently.
- **Extending the life cycle:** maintenance, repairs and upgrading of resources that are already in use, as well as the possibility to return products to companies
- **Using waste as a resource:** using waste as a secondary raw material and, where possible, recovering it through reuse or recycling
- **Rethinking the business model:** considering how to create greater value and incentives through business models focused on interactions between products and services

- **Creating shared value:** collaboration of companies within the supply chain and with the public to create transparency and shared value
- **Designing for the future:** using durable materials in the design of products to create long-lasting products
- **Embracing digital technologies:** tracking and optimising resource use and increasing connectivity within the supply chain through digital platforms and technologies that provide insight
- **Strengthening and promoting knowledge:** further developing research, fostering innovation networks, structuring knowledge and being honest in disseminating results.

### Indicator

In the following video the concept of the circular economy and its benefits are explained in more detail: [https://www.youtube.com/watch?v=ERhqAniY-w&ab\\_channel=TalousjanuoretTAT](https://www.youtube.com/watch?v=ERhqAniY-w&ab_channel=TalousjanuoretTAT)

In order to protect the environment and generate a competitive advantage for the EU at the same time, the **European Circular Economy Action Plan** was launched by the European Commission in 2015 as one of the key building blocks of the Green Deal. Since 2020, a new action plan has been in place, comprising 35 measures and legislative proposals that address the life cycle of products, and aims to help **ensure that resources used within the EU remain in the economy for as long as possible**. This action plan mainly relates to the textile, construction, building and electronics sectors, because these are currently the sectors that consume the most resources.

A characteristic of this action plan is that different parties are supposed to work together in order to obtain a comprehensive circular economy. The goals of the European Action Plan include:

- make sustainable products the norm in the EU
- reduce waste
- make the circular economy work for people, regions and cities
- take the lead in global efforts towards a circular economy

The plan includes several initiatives to promote more sustainable products, services and consumption patterns and to prevent waste. The aim is to **achieve a functioning economy that uses high-quality secondary raw materials and takes responsibility for waste** - not only at EU level, but **at global level**.

### Interaction

Which target groups are addressed by this action plan - what do you think?

As you can see on the figure 2, the action plan addresses the entire life cycle of products and thus also different target groups:

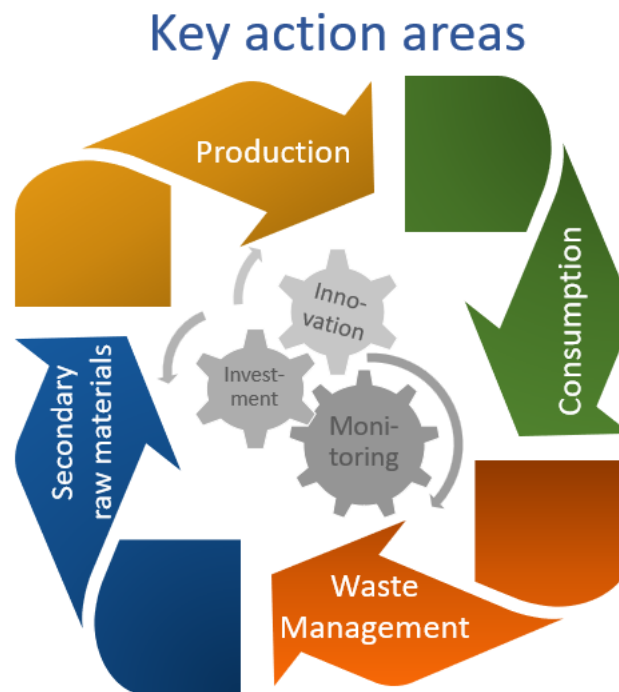


Figure 2. Key action areas of the European Circular Economy Action Plan

The action plan already focuses on the production of products so that companies start to develop more durable and resource-efficient products in order to avoid unnecessary use of resources and waste. To make products more durable, reusable, or easier to repair, a new law is planned that companies will be subject to in the future.

In addition, the action plan also addresses consumers and public authorities. In order to motivate them to participate in a circular economy, they should in future receive all relevant information on the **life cycle** and **environmental impact of products** as well as possible repair services or instructions. In addition, more action will be taken against **greenwashing** and public procurement will be monitored more closely to ensure that environmentally friendly actions are taken without creating additional administrative burdens for contracting authorities. Training and consulting services on the topic of the circular economy will also be offered more frequently.

Waste management is also considered to play an important role, as only a thorough separation of waste can lead to effective recycling and the production of new, high-quality products from these recycled materials. Therefore, legislative proposals regarding waste collection and separation are planned in the action plan and intensive cooperation between member countries is sought so that a **common, effective waste management system** can emerge.

Recycled materials can be reused as secondary raw materials for the production of new products, which leads to a **conservation of natural raw materials**. Therefore, the action plan calls for all products to have a minimum share of recyclable ingredients in the future, and the strengthening of the European market for secondary raw materials is pushed.

## 1.2 Benefits and Challenges

As the linear economic system is currently still predominant and yet fundamentally different from the circular one, the transition is associated with a number of challenges:

### Technical challenges

One challenge in this area is, for example, the design of new, more durable products, as this must take into account the reparability and separability of materials, which is not so easy with certain products, such as electronic devices. In addition, the technologies needed for the design and manufacture of these products are often still insufficiently developed.

### Operational challenges

In a circular economy, jobs are created that were not present in a linear economy and, in turn, various occupations are no longer needed, e.g. due to lower demand for raw materials, etc. This means that existing staff often do not have the necessary skills to implement a circular model and thus need to be retrained. In order to be able to support this economic model, acceptance by the employees is necessary and there must be a willingness to change the organisational structures. In addition, the new products must be made palatable to customers in order to counteract the currently prevailing throwaway society and to convince them to buy sustainable products.

### Financial challenges

A shift to a circular economy is usually accompanied by high investments, e.g. for the development of a new business model, for the purchase of new machines or research and development. The retraining of staff, which has already been mentioned, also involves considerable costs.

### Official regulations

Often, existing laws still stand in the way of a conversion to a circular economy. For example, a best-before date must be indicated on food, which leads to a lot of food being thrown away even though it could still be eaten. On the other hand, many countries still lack regulations regarding proper waste disposal and separation, for example, which would make it easier to recycle objects and reduce pollution of the environment. General regulations and advice on how to implement a circular economy also still need to be brought out across the EU.

Although there are several challenges in moving from a linear economy to a circular economy, there are many benefits to this shift. Below you will find the positive impacts that this circular economy brings:

## Decarbonisation

The circular economy system has a major advantage in terms of the environment. By switching to a circular economy, emissions can be reduced and thus decarbonisation can be promoted, which can subsequently lead to the achievement of climate targets. Decarbonisation refers to the reduction of carbon dioxide emissions by using low-carbon energy sources and avoiding fossil fuels. A study by the Austrian Chemical Industry Association (FCIO) has shown that decarbonisation can be greatly advanced if plastics are recycled instead of thrown away in the future, as burning them causes enormous damage to the environment. The circular economy is therefore an important step towards climate neutrality.

### Indicator

Watch the following video to see how a circular economy can influence our climate enormously: <https://youtu.be/9yPnfDVd6Fc>

## Conservation of resources

By keeping resources in circulation as long as possible and avoiding waste generation as much as possible, the limited raw materials still available on our planet can be conserved. This also leads to an increase in biodiversity in our natural world, which has been greatly diminished by previous exploitations of nature (figure 3).

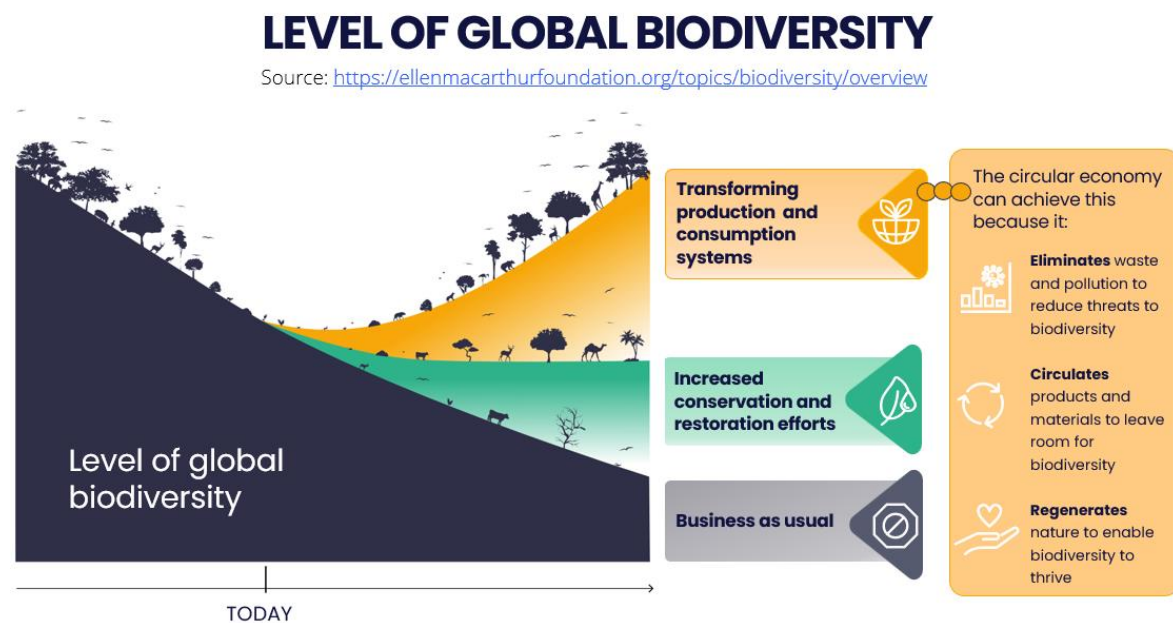


Figure 3. Three scenarios of the development in the level of global biodiversity

### Creation of new jobs

A shift to a circular economy can create many new jobs. For example, the production of renewable energy will increasingly require the involvement of agriculture and forestry, which will lead to an increased demand for personnel in this sector, especially in rural areas. Another demand for personnel will arise, for example, in the redesign of products so that raw materials can remain in circulation as long as possible.

### Increasing competitiveness

An economy as well as companies that switch to a circular model can benefit from an increase in their competitiveness, among other things because they are only dependent on the already scarce raw materials to a very small extent due to the reuse of products and their components. For individual companies, a rapid changeover can also lead to a first-mover advantage and, in addition, it strengthens the reputation of a company if it operates in a sustainable and resource-saving manner.

### Cost reduction

The implementation of a circular economic model not only entails investments, but producers can also save many costs. For example, material costs are much lower, and production and disposal costs can also be reduced. Consumers can also save costs if they do not always buy products new and throw them away after use, but if, for example, used products are bought, if they make use of repairs or just rent objects instead of buying them.

### Building long-term customer relationships

Since in a circular economy products are often sold as a service and repairing broken items is a high priority, it is easy for companies to build long-lasting relationships with their customers, as they will always come back to the seller for repairs or replacements. Both parties benefit from this: For companies, it means a relatively secure, long-lasting source of income and consumers have a contact person when they need one (for repairs, for the return of products, etc.)

#### Practice

It is crucial that students learn about the importance of a circular economy. To foster this understanding, you could include activity A09 in your classes. It is about determining the lifecycle and circularity of a product and finding possibilities to make it even more circular.

You can find the instructions as well as supporting documents of this activity A09 "Lifecycle Analysis" here: <https://www.train2sustain.eu/instructors/>

## 2 Actions for a Circular Economy

### Interaction

You have heard a lot about the circular economy now - but what can we do to promote it? Take a few minutes and think about what actions both individuals and businesses could take in this regard!

Now that you have thought about what can be done to promote a circular economy, you can watch the following video, which explains several approaches: <https://youtu.be/zCRKvDyyHml>

We can start at different stages of a product life cycle to facilitate a circular economy: in the planning, design and production of products or services, in the use or consumption of them and also at the point where someone no longer wants to use the product.

### Design and Production

The impact of a product on the environment is already decided in the design phase. Until now, companies have unfortunately been offered too few incentives to design their products in a circular way, which means that many products break very quickly and are difficult to reuse, repair or recycle. But this is now set to change with the European Action Plan and its **planned legislative initiative on sustainable product policy**. The action plan lists the following opportunities for companies to promote the circular economy and operate in a circular way:

- Extending the life cycle of products, making them easier to reuse, refurbish and repair, eliminating hazardous chemicals, improving energy and resource efficiency
- Increased proportion of recyclable ingredients in products
- Enabling remanufacturing and high-quality recycling
- Reducing the carbon and environmental footprint
- Limiting single-use products
- Prohibiting the destruction of unsold, long-life products
- Incentivising models in which products are seen as a service and producers remain the owners of the products
- Advancing the digitalisation potential of product information
- Incentivising high performance levels and more sustainable products

Examples of areas where a new design of products is necessary are the textile industry, information technology, the furniture industry and intermediate products with immense environmental impacts such as steel, cement or chemicals.

But not only design plays an important role in **promoting a circular economy**, rather **all processes within a value chain** must be aligned with it. For example, it is important to use environmentally friendly machines for manufacturing, to make production more efficient and to avoid waste during production. Another important point is to reduce packaging and use environmentally friendly alternatives to plastic, for example. But also the distribution of the products has to be environmentally friendly, for example by using renewable energy for trucks.

### Important

To protect the environment, it is important to make the entire value chain of products correspondingly environmentally friendly - starting with planning and ending with delivery. However, it is not only products that are affected, it is **also necessary to act sustainably when it comes to services**.

In order to implement all these changes in an organisation, it is usually **necessary that the organisation adapts its processes or even the entire business model accordingly**. Various internal processes will probably have to be changed and often this is also accompanied by investments. So, at first glance, it seems that a changeover to circular ways of working and products would involve an enormous effort, both in terms of time and organisation as well as financially. But if companies make these efforts in the near future, they can benefit from a considerable **first-mover advantage**, since until now the majority of all entrepreneurial activities have been based on linear processes.

### Indicator

The following video shows you what an organisation can do to become more sustainable and the benefits of moving to a circular working style quickly:

[https://www.youtube.com/watch?v=50gCByhYXD0&ab\\_channel=WorldinArts](https://www.youtube.com/watch?v=50gCByhYXD0&ab_channel=WorldinArts)

One business model that is becoming increasingly popular due to its numerous advantages is the **"product-as-a-service" approach**, i.e. a concept in which products are not sold but the licence to use them is granted to the clientele for a monthly fee. If repairs have to be made or something has to be replaced, this is done by the producer. As soon as a product is no longer used, it can be returned to the producer. You can find out more about this approach in this video: <https://www.youtube.com/watch?v=jZlpcGloj88>.

## Using Products or Services

To reduce the overall consumption of raw materials, it is also up to us as consumers. Because by simply throwing away products as soon as we no longer need them, we contribute to enormous environmental burdens through pollution and waste. But what can we do to extend the lifetime of raw materials and contribute to a circular economy?

We have the following alternatives for extending the life of products:

- **Licences for the use of various products**

As already described in the previous section, the **"product-as-a-service"** concept is increasingly gaining in importance. It therefore makes sense for us consumers to make use of this offer and benefit from the advantages. These advantages include the fact that a product does not have to be purchased but can be used for a monthly fee. The advantage over renting an object is that the producer takes care of the product and repairs or replaces it if it no longer works. If one no longer needs the product, it can



simply be returned to the producer and made available to another person for further use. In this way, the items usually remain in circulation much longer than would have been the case if they had been bought privately.

- **Sharing**

Another way to keep resources in circulation for longer is to share things instead of buying everything yourself. This takes advantage of the fact that an object is not standing empty or unused, but during the times when one person does not need it, it can be used by others. In order to support the sharing of products, there are usually online platforms where interested people can connect. An example of this is car sharing, where a car is not bought by one person, but can be reserved by different people via an online platform and used for the specified, usually short, duration.

- **Renting**

To ensure that products can be used for as long as possible, it is also advisable to rent certain things for a certain period of time instead of buying them. The cost of renting is lower than the actual purchase price. Nowadays, most products can be rented, e.g. bicycles, books, clothes or houses.

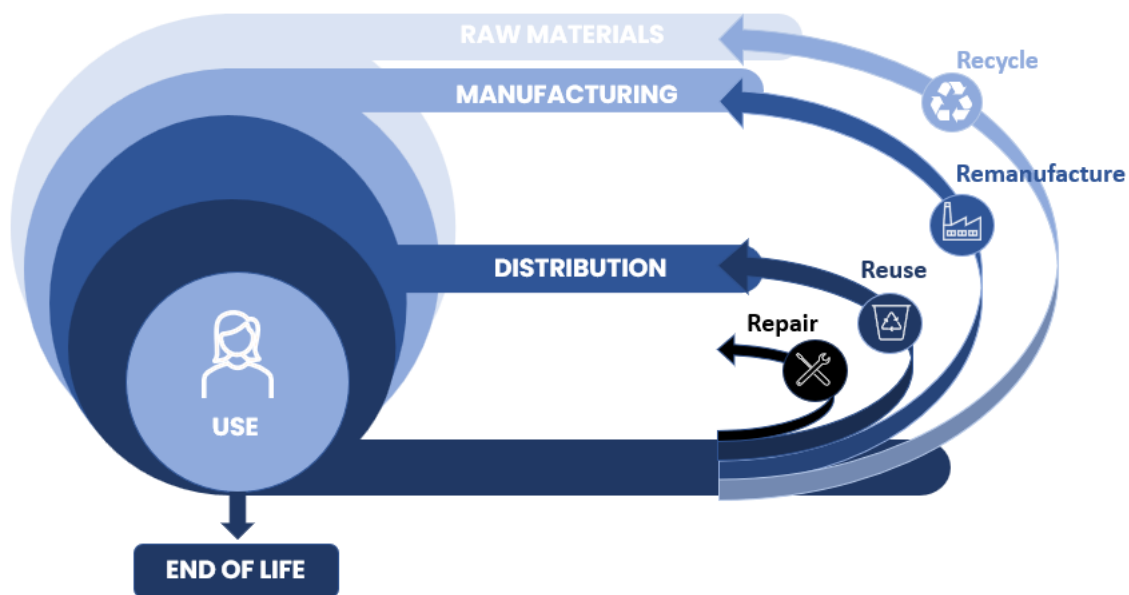
### Important

Another aspect that should not be underestimated is the acceptance of corporate activities by the population. As soon as you as a consumer buy products that have been produced under environmentally harmful conditions, you accept the practices of this company. But when these products are no longer bought, it is a signal to organisations that they need to change something. Therefore, it is important that you are **fully informed about the companies** you buy products from and their practices, and that you **only buy products that have been produced under environmentally friendly conditions!**

Have you already implemented one of the possibilities mentioned to extend the useful life of products or raw materials? Then that's great, keep up the good work!

## After using a Product or Service

If a product is no longer used, either because it has broken or because you simply want to buy a new one, it should never be thrown away. In figure 4 you can see several alternatives of what can be done with items when they are no longer needed at home.



Source: <https://www.eu-umweltbuero.at/assets/Uploads/EUropainfo-2-18-web.pdf> S.23

Figure 4. Options for prolonging product lifetime

Before a product is finally thrown away, it can be:

- **Repaired**  
If a product no longer works, it is often thrown straight into the bin. It is smarter to try to **repair it yourself or take it back to the seller and ask for a repair**. This way, resources can be saved and the product can be used longer. Nowadays, there are often **repair workshops** where you can learn how to repair certain things - you can find information about such workshops in your area on the internet.
- **Reused**  
Instead of buying disposable products, we recommend buying reusable products. After using them, you can usually **return them to the seller or to other places** so that they can be **used again by other people**. One example of this is buying second-hand clothes. Another example is glass bottles (beer, wine, milk, etc.), which are reused by the producer when he gets them back.
- **Remanufactured**  
In remanufacturing, items are taken back by the company, disassembled, repaired, cleaned and then resold. The quality and performance of the products are the same as those of a new product, so the products are like new. If you buy such products, they are in no way inferior to new ones and you can use them without a bad conscience.
- **Recycled**  
If products can no longer be repaired, reused or remanufactured, it is important to recycle them so that they or parts of them can still remain in circulation. The waste that can be recycled is turned into new raw materials in waste facilities. Therefore, you should make sure to separate your waste so that it is easier to collect recyclable parts and **recycle them as secondary raw materials**.

### Indicator

So, we have now also found the answer to the question we asked ourselves at the beginning of this unit (Is recycling the same as circular economy?): Recycling is a factor that can contribute to the prevention of waste but **recycling only refers to the end of a product's life cycle**. In the case of the **circular economy**, as you have already heard, it is important not to start there, but already at the planning and design stage of a product, in order to make the entire life cycle of a product sustainable and to be able to **avoid waste and pollution from the beginning**.

The aim is that a product is only finally disposed of when neither the product itself nor its components are still usable.

### Remember

Products should be designed in such a way that they do not have to end up in the rubbish immediately after use but can be reused or simply repaired. If this is not possible, the products or their components should at least be recyclable.

You have now learned about some alternatives to simply throwing items away. But in order to implement all these points, the **efforts of companies** and other organisations are also needed. They have **to make repairs, reuse, refurbishment and recycling possible**. For example, repair services need to be offered and products need to be designed in such a way that they can be easily repaired. Similarly, opportunities need to be created to bring products back so that they can be reused or remanufactured. And **opportunities for waste disposal and separation** must be provided by both businesses and other public institutions.

### Digression

Since all products will end up in the rubbish sooner or later, **efficient waste management is essential**. The consistent separation of waste makes recycling simpler, recyclable materials can be filtered out more easily, the quality of recycled materials increases, and producers prefer to reintegrate them into the production of products.

Therefore, it is **extremely important that each individual** in the private household and at work **separates waste correctly and accurately**. In figure 5 you can see how waste should be separated in Finland.









							
<b>General or combustible waste</b>	<b>Biowaste</b> Brown recycling bin	<b>Plastic</b> Yellow recycling bin	<b>Metal</b> Black recycling bin	<b>Glass</b> Blue recycling bin	<b>Carton</b> Blue recycling bin	<b>Paper</b> Green recycling bin	<b>Clothes and other usable waste</b>
Dirty packaging made from plastic, paper or cardboard Diapers and sanitary towels Plastic items (toys, dish- and toothbrushes, containers) Unusable textiles and clothes, shoes, bags, brushes, make-up Ash and cigarette butts, cat sand, dog waste bags, dust bags Occasional drinking glasses, porcelain, crystalware and ceramics Incandescent light bulbs and halogen lamps Eggshells	Food leftovers, spoiled food Fruit and vegetable peels, coffee filters and teabags Fish trimmings and bones, cut flowers, napkins, paper towels, egg cartons Solid and congealed fats Cooking oil in a sealed carton packaging	Food packaging, such as tomato boxes, yogurt cups or packaging for sliced meats Shampoo, soap and washing liquid bottles Plastic bottles, canisters and containers Plastic bags and wrappings The packaging should be dry and clean.	All metals Tins and beverage cans Foil and aluminium containers Frying pans Tools, screws and nails Empty spray cans and paint cans Aluminium lids from butter packages and yoghurt cups	Glass bottles Glass jars Remove lids and caps. Only glass jars and glass bottles are sorted as glass. Crystalware, drinking glasses and ceramics should be sorted as combustible waste.	Milk and juice cartons Cereal boxes, pizza boxes etc. Paper bags Cardboard boxes Paper tubes from toilet paper rolls etc. The packaging should be dry, clean and flattened.	Dry and clean paper Daily newspapers, magazines Leaflets, catalogues Envelopes Books (the cover is sorted as combustible or general waste)	Usable: Clothes Other textiles Shoes Accessories Toys Sport equipment

Figure 5. Waste separation in Finland

But to make progress in our economy, it is necessary that not only a few people and organisations work on such a circular economy, but that this happens in a **collaborative, holistic process**. So, for example, it is important that companies work together in supply chains, but also that workers within an organisation collaborate and that the public sector is also involved. Only then is it possible to shift the whole economy to a circular economy and achieve various sustainability goals.

Here are a few examples of efforts towards a circular economy:

#### Example

In the following video you can see what can be done in the automotive industry, for example, to act in a sustainable and circular way: <https://www.youtube.com/watch?v=xCh8QLo1lw>

In this video you can see how repair cafés work: <https://www.youtube.com/watch?v=Ng1q-xI25xc>

You can also check the lifecycle of a product by watching this video: <https://youtu.be/-9lRowyICbo>

#### Practice

Activity A10 is again about extending the lifecycle of a product. Students will get to know an example of the lifecycle of a product and find solutions on how to extend this lifecycle.

You can find the instructions as well as supporting documents of this activity A10 “How to extend a Product’s Lifecycle” here: <https://www.train2sustain.eu/instructors/>

### 3 Circular Economy in different Countries

For a long time, environmental aspects were hardly considered within the EU, as the focus was clearly on economic growth and wealth. But in recent years, an awareness of the importance of sustainability and the circular economy has evolved in the EU and in the member states. In order to remain sustainably competitive, as you already know, the European Action Plan was introduced, which pushes for a natural and sustainable use of raw materials.

Measures have also been taken about the sustainable handling of waste. For example, various directives have been introduced in the EU in relation to waste management, which many countries have turned into federal laws. EU waste legislation aims to halve food waste and waste disposal into the sea by 2030 and further reduce harmful landfill by 2035. 65% of household waste and 75% of packaging waste must be processed for reuse or recycling by 2030.

To accelerate the shift to a circular economy, the Circular Economy Package was compiled in 2022, which includes several initiatives:

- Making sustainable products the norm
- Ecodesign-laws for sustainable products and Work Plan 2022–2024
- Empowering consumers to a green transformation
- Strategy for sustainable textiles
- Construction Products Regulation

#### Digression

You can watch this video to find out more about this Circular Economy Package:

<https://www.youtube.com/watch?v=-WF1yh3rftg>

#### Indicator

If you want to find out more about circular economy in and different circular initiatives around Europe, or if you want to get active in this area and do some network building, you can visit the European Circular Economy Stakeholder Platform:

<https://circulareconomy.europa.eu/platform/en>

So, as you can see, the circular economy has a high priority in the EU and also in the member states - in theory. But in reality, there are quite big differences between the member states in terms of achieving the targets. Some are well on their way, have drawn up their own roadmaps and have already made great progress. Others, on the other hand, are still far away from achieving the goals.

Finland, the Netherlands, Scotland and Slovenia are considered as pioneers and are the most successful representatives of the circular economy. They are on a very good track to achieve the targets set and have already achieved some of them.

Austria and Germany are far ahead in terms of recycling, but in Austria, for example, only 9% of all materials used are circular, which means that there is still a lot to be done in these countries.

To further advance the circular economy, investments in areas of waste prevention and reduction, reuse, repair and recycling are essential. In terms of waste management, Belgium has already achieved the 2020 recycling targets, making it one of the best performing nations. Denmark, on the other hand, is the leader in Europe when it comes to per capita production of municipal waste.

Estonia still lacks a comprehensive strategy for a sustainable circular economy, which is reflected in overcapacity in incinerating waste and a lack of capacity for recycling. In Greece, up to 80% of waste management still takes place in multiple illegal landfills and mechanical-biological treatment. Furthermore in this country the recycling rate is just 17%.

### Example

Here you can find the first draft for the Austrian circular economy strategy:

[https://www.bmk.gv.at/dam/jcr:ccbbe6aa-d0eb-4dbb-ae50-cab89e251cd5/Kreislaufwirtschaftsstrategie\\_Begutachtungsentwurf.pdf](https://www.bmk.gv.at/dam/jcr:ccbbe6aa-d0eb-4dbb-ae50-cab89e251cd5/Kreislaufwirtschaftsstrategie_Begutachtungsentwurf.pdf)

Here is the Finnish circular economy strategy: <https://ym.fi/en/strategic-programme-to-promote-a-circular-economy>

Here is the Danish circular economy strategy: <https://www.en.mim.dk/media/223010/alle-faktaark-1.pdf>

Here is the Portuguese circular economy strategy:

[https://circulareconomy.europa.eu/platform/sites/default/files/strategy\\_-\\_portuguese\\_action\\_plan\\_paec\\_en\\_version\\_3.pdf](https://circulareconomy.europa.eu/platform/sites/default/files/strategy_-_portuguese_action_plan_paec_en_version_3.pdf)

To further promote the change to a more circular economy, different improvements would be needed. You can find some examples for possible improvements below:

## EU level

If the whole world would use resources as the EU does, we would currently need three planets. That is why it is highly relevant to take action at this level. More training programs on how to get more sustainable and circular for member states as well as companies could be offered by the EU.

**Recycling** is an important pillar for a sustainable circular economy. We can start at this point if we already use more recycled products in the production of goods. In addition, it would significantly help to reduce the amount of residual household waste through better recycling.

It probably comes as no surprise to anyone that the **textile industry** is one of the biggest polluters. Fast fashion in particular is driving the consumption of resources at breakneck speed. That is why a comprehensive package of measures is urgently needed at EU level. This should definitely include aspects such as

- repair structures
- second-hand
- the durability of textiles
- the promotion of eco-design
- the use of recycled materials

### Digression

If you want to find out more about Fast Fashion and its countermeasures, you can check out the developed materials of the Erasmus+ project "Weareable": <https://www.weareable-fashion.eu/resource-toolbox/>. There you can find learning materials, a game, and a workshop design that you could also use in your teaching.

A significant measure would also have to be taken with regard to the sustainable use of **electrical appliances**. Technical devices should no longer be regarded as disposable items. This rethinking would be stimulated by a "right to repair". Since we have a massively high consumption of resources due to digitalisation, especially in the area of electronics, strengthened rights in warranty and durability issues would be an important step in the right direction. Industry could also make greater use of repair-friendly design and affordable, easily accessible spare parts.

At EU level, it would also be possible to introduce plastic taxes for **plastic waste** that cannot be recycled. This would help to push plastic recycling more strongly. However, this step should not go in the direction of deceiving consumers with "bio plastics", as these are not always more environmentally friendly per se.

## Country level

At the state level, many steps can be finalised to implement circular economy. In a state, a uniform collection fraction for recyclables can be integrated so that recyclable resources can be returned to the cycle. Public infrastructure should also be better equipped with **recyclables collection bins** so that society also recycles in public places. Saving raw materials should also start with the youngest children and should therefore also be addressed in kindergartens and schools. This better equipment should also be provided at public recreational areas such as playgrounds, bike paths and hiking trails to prevent littering in nature and help valuable resources find their way back into the cycle.

In **trades**, it could be made more attractive to collect recyclable packaging by offering services. This would require more advice for businesses and awareness-raising among employees.

Essential to a sustainable circular economy would be new **innovations** that can be realised at the research level of a state. It would be important to push ahead strongly in areas of even further optimised ecological packaging design. Smart collection containers would also make sense in order to make the return of recyclable materials even more attractive. These containers could recognise resources and credit bonuses to the user's smartphone.

## Local level

A big change needs many helping hands - that's why it depends on every single person when it comes to supporting the circular economy. But what can each individual do?

- **Recycle better, not just more:** everyone should check the municipal guidelines to find out what goes in which box. Only properly separated, a resource can be reused and turned back into something useful. Recycled food waste, in particular, can be used instead of harmful pesticides and fertilisers. These recycling points should be found in every community - just check your local homepage.
- **Turn off the faucet and the lights:** Sounds plausible, but even small steps will get us there. If your home is powered by renewable energy, or you can monitor energy usage with the help of a smart meter, you'll save even more resources.
- **Household appliances should be carefully selected:** They pollute the environment throughout their life cycle. The PolyCE association brings together companies that act sustainably throughout the process. When they buy a new appliance, check if it is a member of PolyCE. But before buying a new device, they should of course consider whether a new device is necessary or whether a repair might be enough.
- **Think first, then buy:** when buying a new product, it is of course essential to use sustainable alternatives. The most sustainable alternative, however, is not to get the cycle going in the first place, but simply to use what is already available. If you think before you buy, you will often find that you don't really need a product. This reflective consumer behaviour not only saves you money but also valuable resources.

### Example

If you want to learn even more than the points above – check out this website. Here you have 100 tips and tricks to live sustainably, and you can also test yourself where there may be room for improvement: <https://www.sitra.fi/en/projects/100-smart-ways-to-live-sustainably/>

### Interaction

Try to think of further possibilities for countries, organisations or private people to act more circular. What could they change? Maybe you could also change some of these things in your own professional or private life.

In the following, you can find some good practice examples about how different European countries are working on transforming to a circular economy:

- Re-using is an important issue for the Flemish region of Belgium. They employ about 5.000 people who are mostly in risk of social exclusion in the re-using sector and a goal of 7 kg of reused goods per capita was set. This results in less waste and in an inclusion of those people into the labour market and society.



- Slovenia is following the circular triangle (Circular Economy, Circular Change, Circular Culture) (figure 6). To mention some examples: It focuses on a modular product design in order to enable reusing and repairing products or parts of it easily. It also uses digitalisation for their way to a circular economy, e.g., by building a sharing economy and using new technologies and smart design for improvements of systems and sectors with negative impacts on the environment.



Source:

[https://circulareconomy.europa.eu/platform/sites/default/files/roadmap\\_towards\\_the\\_circular\\_economy\\_in\\_slovenia.pdf](https://circulareconomy.europa.eu/platform/sites/default/files/roadmap_towards_the_circular_economy_in_slovenia.pdf)

Figure 6. Slovenian circular economy triangle

- The waste of resources is often gigantic, especially in the area of food - which is why some organisations in Austria are setting a good example. "Die Fairmittlerei", for example, takes over factory-fresh food that deviates from the norm and donates it to charitable organisations. Thus, the organisation opposes the waste of human, financial and natural resources. The start-up "Unverschwendet" rescues surplus food from agriculture by processing it into sustainable delicatessen. In this way, the value chain is efficiently preserved.
- In the German city of Berlin, the "CRCLR Haus" is dedicated to the circular economy. In this centre interested people and institutions always meet to exchange new ideas and work together on projects. In this cooperation, a broad repertoire of projects has already been able to gain a foothold in society.
- As Denmark is a large producer of waste, recycling is a very important issue there. There are more than 10 different types of waste, which leads to a high number of wastes that can be re-used and a lot of heat can be produced to warm households. One example that promotes recycling is the Danish organisation Sønderborg Forsyning. They provide citizens with information and support about waste separation and offer workshops to young people to show the importance of waste separation and recycling.
- Finland aims to become a global pioneer in a world in which our economic competitiveness and well-being can no longer be based on the wasteful use of natural resources. Rather than offering products, the foundation for earnings will be services, the recycling of products and intelligence-based digital solutions. Finland was the first country in the world to prepare a national road map to a circular economy in 2016, under the leadership of Sitra. Just like the first road map, the updated version published in March 2019 also includes descriptions of the essential circular economy measures to which Finnish stakeholders have already committed themselves.

- The Loop, a Portuguese start-up, began with a simple idea — helping Portuguese families save money by creating a system to buy back and resell textbooks. Book in Loop, started in 2016, makes it possible to sell back used textbooks and buy used ones at lower rates. The next project was BabyLoop — helping families save money by creating a system to buy back, recondition, and resell things like car seats and strollers. Since then, the Loop has morphed into something bigger and more complex. It's a company with more than 100 employees in a building in central Coimbra. It operates both as a green tech company and a think tank, churning out ideas and concepts as well as software and hardware.

### Example

Watch this video to see how future circular cities could look like:

[https://www.youtube.com/watch?v=T6mK-Ukr\\_ts](https://www.youtube.com/watch?v=T6mK-Ukr_ts)

## 4 Summary

### Save Knowledge

In order to protect the environment and thus save our planet, it is important to switch from the currently prevailing linear economic model to a circular one. Instead of throwing away products after use, they should be repaired, reused, remanufactured or at least recycled. This economic model is also called a **circular economy**.

To support this shift to a circular economy, the **European Circular Economy Action Plan** was launched, which contains various measures and legislative proposals in this regard. The goals of this action plan include bringing more sustainable products to the market and reducing waste by keeping products in the economic cycle for as long as possible. It refers to all stages in the life cycle of a product - production, use, waste management and the use of secondary raw materials and thus includes various actors from the economy, e.g. producers or consumers.

Circular economy does not - as many assume - describe the recycling of products, but to achieve it, it must already be started with the design and production of objects, i.e. they must be durable and resource-saving. Even during their life cycle, a lot can be done to promote a circular economy, e.g. by **sharing products, renting them or just paying the licence to use them**. After their life of use, they should not be thrown away, but repaired, reused or remanufactured where possible. If this is not possible, at least recycling is important.

**Efficient waste management** must also be pursued. However, in order for these actions to be carried out by companies and individuals, it is important that governments support and incentivise this.

## 5 Resources

[https://ec.europa.eu/environment/legal/law/6/pdf/01\\_aile\\_waste\\_law\\_circular\\_economy\\_speakers\\_notes.pdf](https://ec.europa.eu/environment/legal/law/6/pdf/01_aile_waste_law_circular_economy_speakers_notes.pdf)

<https://de.statista.com/statistik/daten/studie/1694/umfrage/entwicklung-der-weltbevoelkerungszahl/>

<https://waste-reduction.de/en/lineare-wirtschaft>

<https://www.circle-economy.com/circular-economy/key-elements>

<https://www.europarl.europa.eu/news/de/headlines/economy/20151201STO05603/kreislaufwirtschaft-definition-und-vorteile>

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

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<https://www.twi-global.com/technical-knowledge/faqs/what-is-decarbonisation>

<https://www.circularfutures.at/themen/kreislaufwirtschaft/>

<https://www.fcio.at/media/15100/studie-chemieindustrie-klimaneutralitaet-september-2020.pdf>

[https://www.researchgate.net/publication/341569675\\_Sharing\\_for\\_a\\_circular\\_economy\\_an\\_analysis\\_of\\_digital\\_sharing\\_platforms'\\_principles\\_and\\_business\\_models](https://www.researchgate.net/publication/341569675_Sharing_for_a_circular_economy_an_analysis_of_digital_sharing_platforms'_principles_and_business_models)

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<https://www.ceguide.org/Strategies-and-examples/Make/Remanufacturing>

[https://www.ey.com/en\\_gl/eu-institutions/why-waste-management-can-accelerate-circular-economy-in-europe](https://www.ey.com/en_gl/eu-institutions/why-waste-management-can-accelerate-circular-economy-in-europe)

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