

# **Circular economy and international trade**

**Assessing the impact of European circular economy strategies in  
international trade**

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## Abstract

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Title of the thesis <b>Circular economy and international trade.</b> Assessing the impact of European circular economy strategies in international trade.		
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Abstract <p>The purpose of the research is to study the current situation of the circular economy and how the transition to a circular economic model can affect international trade. The study is focused on the current situation of the circular economy in Europe and how the policies affect international trade. Statistics and data are analysed in order to know how effective is the transition from the linear economy model to a more circular one.</p> <p>The theoretical framework covers three main topics. Firstly an explanation about what circular economy is. Secondly, the relation between circular economy and international trade and the different effects on it is presented. This is followed by a deeper study of the European Union policies in circular economy and the effect in international trade is introduced.</p> <p>Qualitative methods are used as well to study and give credibility to the thesis with statistics. The data was obtained carefully from international associations and governments. Statistical data is mainly obtained from Eurostat. The discussion of the results studies the current situation of circular economy and international trade in circular economy in Europe.</p> <p>Valuable information about the European Union member performances in a circular economy was obtained. The study results that European policies are working, but the lack of mandatory legislation and inequality between the different members is slowing down the transition to a more circular economy and the creation of new trade markets as the secondary raw materials market.</p>		
Keywords Circular Economy, International trade, Climate change, European Union, Circular economy action plan.		

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# 1 INTRODUCTION

## 1.1 Thesis Background

Every day seems more clear that a transition of our current economic model to a circular economy will be beneficial. The linear economy has a really big impact on our environment with the polluting processes and a big amount of waste that is not recycled. (Government of The Netherlands 2017.)

The circular economy is a model of production and consumption that the European Union with some other nations is trying to implement in their economies. It involves sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials as long as possible. Moving to a circular economy model could deliver us direct benefits by reducing pressure on the environment, improving the security of the supply of raw materials, increasing competitiveness, stimulating innovation, boosting the economic growth (an additional 0.5% of gross domestic product) and, creating jobs (700.000 jobs in Europe just by 2030). (European Parliament 2020.)

This transition to a circular economy has brought linkages with international trade. The trade of wastes materials between countries, trade-in secondary raw materials, trade-in secondhand goods, or in refurbishment and remanufacturing will be necessary if we want to have a productive and competitive economy. A structural change will be needed to transform the economic system, and international trade will be of great importance in this regard. A successful change from a linear economy to a circular economy will not be possible without the mutual supportiveness of circular economy strategies and trade policies as well as international cooperation on circular economy value chains (OECD 2018.)

The assessment of the impact of European circular economy strategies on international trade will be completed by complementing the European Commission Circular Economy Action Plan with more detailed information about the importance of international trade. The Circular Economy Action plan by European Commission is based on Europe's new agenda for sustainable growth with measures regarding all the life cycle of products. The plan has been updated in 2020 since the original one in 2015 based now on the importance of keeping the used resources in Europe. As in the same plan, it is said, Europe will not achieve this transformative change if all the members decide to act alone. (European Commission 2020.)

## 1.2 Thesis objectives, research questions, and limitations

The thesis research goal is established to make a brief statement of the purpose of the research project. The aim of the thesis will help also to find some research objectives. These objectives finally will help to settle the thesis main research question and lead a greater specificity to the report. The thesis objectives also help to operationalize the main question, guiding the writer on how to answer it. Objectives are a key step together with the thesis aim to provide an answer to the report. (Saunders et al. 2015, 45-46.)

The thesis aims to provide the reader a better understanding of sustainability and circular economy, and how international commerce can be essential in the transition to the economical model. As a result of the study, an assessment of companies and even governments who want to promote the Circular economy model is made.

The thesis's main objective is: studying the current state of the circular economy and how the transition to a circular economic model can affect international trade.

Determining the research questions is one of the most important parts to start research. The research question will be at the center of the study. These questions provide an understanding of the research and which are the main ideas that are going to be answered. A good criterion for checking the quality of the research at the end is to see how the research questions have been answered. (Saunders et al. 2015, 42.)

The main research question of the thesis is:

How can international trade support the transition to a more circular economy?

Sometimes the research question is difficult to answer in a direct way. To make the main research question easier to answer, a series of sub-questions should be asked. Answering these sub-questions will help to answer the main question in a segmented way. In this thesis, the sub-questions are the following:

- How is the current situation regarding the circular economy?
- How will the current trade agreements affect this transition?
- How will the European Union circular economy strategies affect the international trade?

There are always some limitations when conducting research. The first limitation is about the geographic situation because this study is concentrating on a really big area as is the European Union. So, the outcome of the thesis can exclude some areas with trade relation-

ships with Europe and the circular economy status won't be analyzed in those areas. Another limitation is potentially the uncertainty or limitation in some indicators. In the case of the second-hand good markets, in a lot of cases there's not control so it is impossible to have reliable statistics, or at least statistics that show how it is the real situation. Also, the thesis cannot take into account specific economical situations, political decisions that can affect directly or indirectly this assessment. In order to succeed, the laws issued by the European Parliament will be taken into account making the research more valid at polyvalent. Despite the fact there are some limitations, the research provides accurate and reliable information for the case of study.

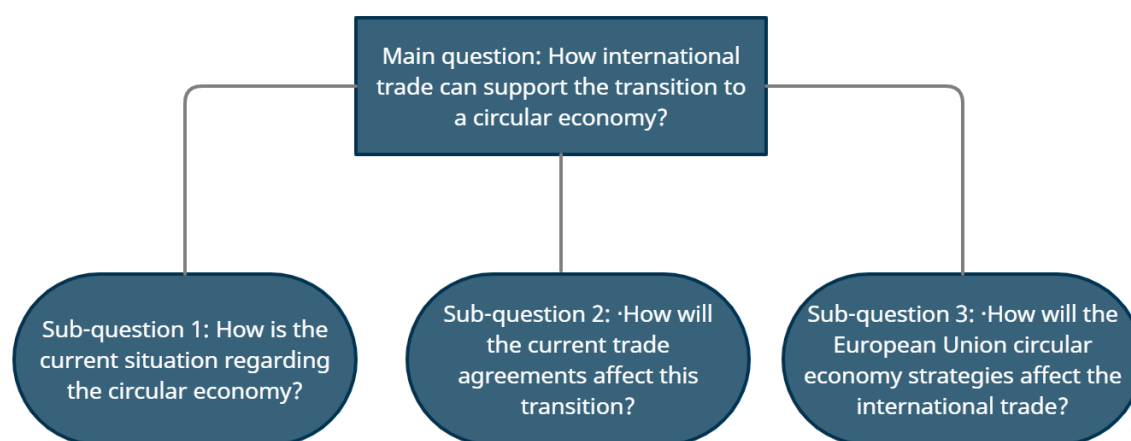


Figure 1. Research questions.

### 1.3 Theoretical framework

The theoretical framework serves as a clear guide for building and supports the study. Using an appropriate theoretical framework will be useful in order to understand better the problem, purpose, and research questions. (Grant & Osanloo 2016.)

The thesis aims to assess the importance of international trade in the transition to a Circular Economy in the European Union in order to improve the European Commission's Circular Economy Action plan. As the thesis it is mainly connected with the Circular Economy, the theory of the Circular Economy will be introduced with some examples. Advantages, disadvantages will be shown in the research.

To know where we are going we have to know where we come from. That's why the current economic system, based on the linear economy will be also introduced in order to understand why the transition is so important. Also, advantages and disadvantages with some common examples will be introduced.



Also the theoretical explanation of the dilemma between Circular economy and international trade will be introduced to the research.

Once the research is carried out, the results of it will be analyzed and the European Commission's Circular Economy Action plan will be complemented. The thesis will include suggestions for improving the performance of the Circular Economy in Europe and provide ideas for a better transition and more confidence to international companies.

#### 1.4 Research methodology and data collection

In this subchapter, the methodology and data collection used during the thesis will be introduced. The methodology used during this research has been chosen after which topic was going to research.

When the researcher needs to fix a research methodology has to take into account the different research methods that can be used. In this thesis the most common are used: qualitative and quantitative research methods had been used in order to make the study more reliable and answer the main question. In business research studies, normally both methods are used. Quantitative research refers to numeric data and its subsequent study, while qualitative data, can contain numbers but are not analysed mathematically. Qualitative data also concentrate on understanding and trust of information in order to make sense of the topic to study. (Saunders et al. 2015, 169-170.)

As the main objective of this research is to assess the impact of European circular economy strategies, the method mainly used will be qualitative. At the same time, qualitative method will be in order to give greater validity to the study and know how the current situation in Europe is. The data collection methods will be the research in different official statistics database, as Eurostat or different governmental data services.

Secondary data, important as well for the report, will be used during the study. This data will be collected from books, applied sciences articles, scientific articles, and internet reliable sources. These data will help to give credibility to everything exposed in the thesis.



## Figure 2. Research methodology and data collection

The research started in December 2020. The process started by contacting the thesis tutors from LAB University of Applied Sciences and Universitat Politècnica de València and planning about the thesis idea and how to develop it in the proper way. The active research started at beginning of 2021. By the beginning of March 2021, the thesis plan was made, including the different schedules to start the investigation. The author started collecting data from the Circular economy and international trade, finally focusing on the case of Europe and its effects. Data were collected mainly from secondary sources. The data that can be founded in the theoretical framework was collected mainly from different government information, intergovernmental economic organizations, and NGOs, including previous studies, reports, and press notes among others. These data established the basis for the report as the theoretical part of the thesis. In middle March the study continued with the collection of data, which included data about the evolution of different circular economy indicators in Europe and their effect on international trade. At the beginning of April 2021, the data was ready so the research results were analysed. The thesis was finished by the end of April.

### 1.5 Thesis structure

The structure of the project is divided in seven different chapters. The theory of Circular economy and Lineal economy will be introduced and the current situation in Europe together with some data will be presented. After that, data analysis will be done. Suggestions regarding the European Commission's Circular Economy Action plan will be also done. The final chapter will summarize the thesis.

The first chapter is the introduction gives to the reader a brief general idea about what the thesis is about. The thesis background, research objectives, research questions, limitations of the thesis. An overview of data collection methods and the thesis structure is also given.

The second chapter introduces how the Circular Economy model is. The differences between the circular economy model and the linear economy model. Also, some examples about circular economy businesses are given.

In the third chapter, the relation between circular economy and international trade is introduced to the reader. The reader will know about the importance of international trade in the circular economy and the most important goods and services traded in regarding circular economy. A brief explanation about the importance of trade policies is included also in the chapter, as well as, some information about how the current Covid-19 pandemic is affecting

the international trade regarding the circular economy. Finally, the dilemma about if international trade can be considered as an efficient tool for the transition to a more circular economy is studied.

In the fourth chapter, the current situation about circular economy and international trade in Europe is commented on. First, the situation of circular economy in Europe followed by the effects of the European circular economy policies in the international trade is introduced. After this, the effects of these policies in the demand of raw materials, the trade-in secondary raw materials, the effects of European policies in international trade, and the interaction with trade restrictions are presented to the reader.

The statistical data of the research is studied in the fifth chapter. First of all the data acquisition process is introduced to the reader, and after that, all the data collected is presented. In this case, the data was mainly collected from Eurostat and included data from important fields in the fields of production and consumption, waste management, secondary raw materials, and competitiveness and innovation, to track the transition to a more circular economy in Europe. After the data is introduced, the results are discussed.

Chapter six is the conclusion. This chapter concludes the thesis and the most relevant information about the research is presented. The answers to the main research question and the sub-questions are presented to the reader. That is followed by a brief study of the validity and reliability of the data studied during the research. Finally, some suggestions for further research are done for future research.

The last chapter is the summary. This chapter aims to give an overview to the reader about all the most important findings of circular economy, international trade and European union approach have been studied during the research.

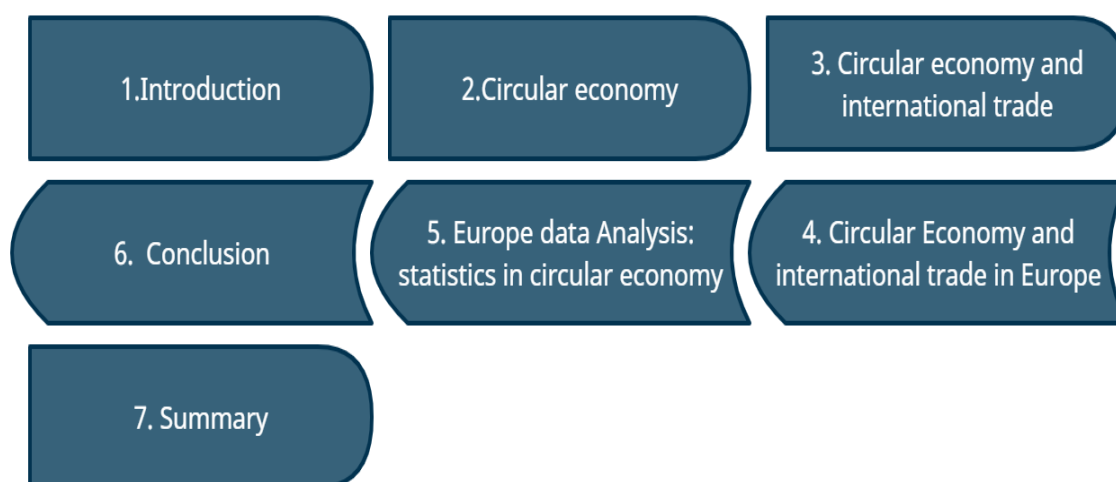


Figure 3. Thesis structure.

## 2 CIRCULAR ECONOMY

This chapter introduces the reader to the circular economy. The aim of this part of the report is that the reader gets familiarized with the Circular economy strategy. It will be an overview that may help to and understand the important role that circular economy will take in the near future in our lives.

### 2.1 Definition of the circular economy

The circular economy is known as a production and consumption model. The model is based mainly on sharing, leasing, reusing, repairing, refurbishing, and recycling the materials and products as many times as possible in order to give a longer life to the products. What this model is trying to achieve is to reduce as much as possible the waste. Once a product reaches the end of its life or use, the produce or materials from it are kept in the economy as long as possible. Like this, all the products materials and products can be used again creating a higher value to them. (European Parliament 2020.)

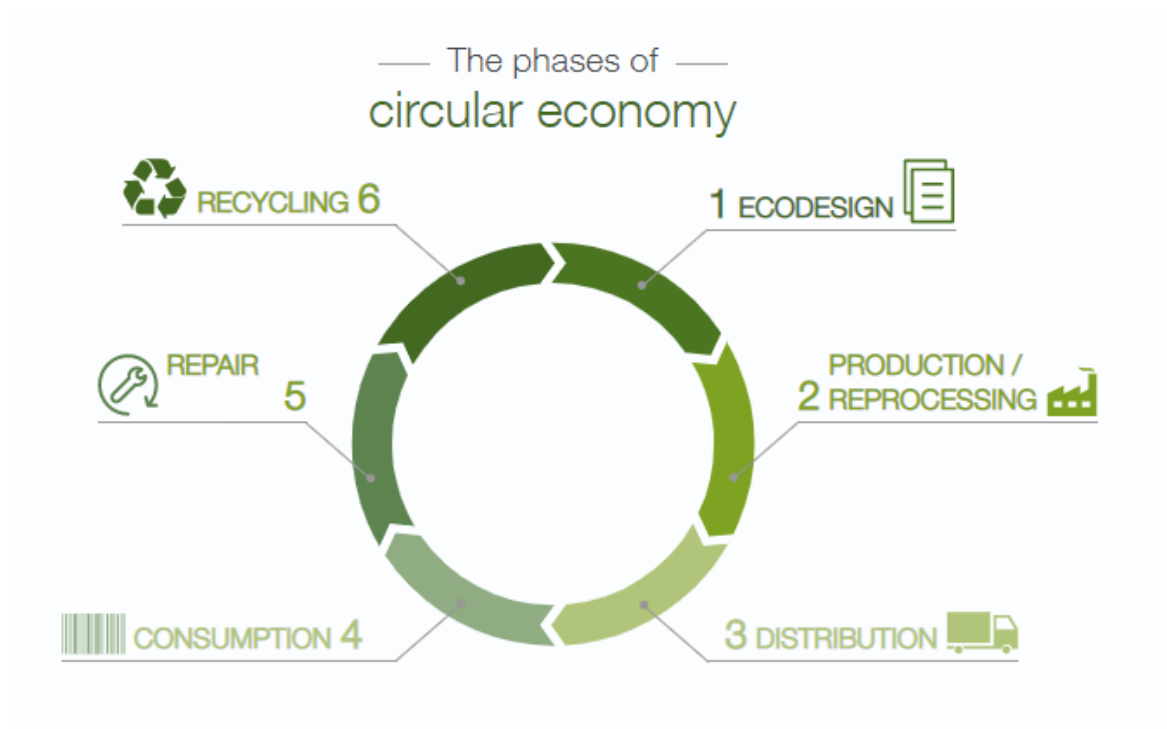


Figure 4. Phases of a circular economy. (Iberdrola 2020.)

The circular economy is mainly based on 6 different Stages: ecodesign, production and reprocessing, distribution, consumption, repair and reuse, recycling.

The ecodesign refers to a design attractive to people, that takes care of the environment and maximizes business impact due to the long life-cycle by designing a circular system

around it. The key aim of the ecodesign is to reduce to the minimum the overall environmental impact of a product or service. Innovative designs in products and services that take into account the lifecycle, starting from the raw materials to the use of it, or its possible future refurbished. A good eco-design will manage to create long-life products, easy to recycle or reuse, and services with the same characteristics. Europe works for ecodesign. Since 2009 Directives are establishing a framework for the setting of ecodesign requirements for energy-related products. (Stiftelsen Svensk Industridesign 2018.)

The production has to be done following the most innovative technologies in order to produce the least amount of nocive gases for the environment. The use of renewable energies must be a priority. Also, the production will be done using the least amount of new origin raw material and using recycled materials in all the cases where it is possible. At the same time, the produced products have to be easy to repair, improve or recycle. (European Comission 2008, 1-3.)

The distribution process will be essential in the circular economy. Purchasing used or replaced items, recover usable raw materials or semifinished components, and feed them back into the manufacturing phase of the supply chain. Rental of products or services will also need distribution. A good logistic chain will be necessary to meet the needs of the industry. (Meier 2020.)

The consumption, use, and reuse is the main process. Without consumption, there's no benefit. The consumption of circular economy products can be done in different ways. Buying long-life products that can be easily repaired or upgraded. Consume products or services without ownership, as a rental, sharing o leasing. Buying local and seasonal fair trade products. Finally choosing things that don't consume more materials or generate waste. (European Environmental Bureau 2017, 2-3.)

The repairing process will provide longer life to the products. In order to guarantee it, circular economy products are designed to be easy to repair and upgrade. Also, repairing manuals in all the products can help the process. This process also provides more rights to consumer and avoid premature obsolescence of products. The businesses with technical assistance will also benefit during this process. (European Comission 2020, 3.)



Figure 5: Lasts steps of the circular economy. (Strawbees 2020.)

The last process of the circle is recycling. Once the product is not useful anymore, all the materials from eating have to be recycled. At the same time, all the waste during the production process, consumption, and repair must be recycled also. Other processes related to recycling, as the reduce and reuse have great importance also in the circular economy. Reuse of products, for example, selling them in second-hand stores, or new uses as the production of new products takes an important role. Also, reducing the usage of new extraction raw materials support the circular economy. The use of recyclable and reused materials in new products and their packaging efficiency of them take great importance. The main goal of the recycling process is to avoid the new extraction of raw material. (Plastics Recyclers Europe 2018.)

The use of the product-as-a-service approach is also an intelligent circular economy strategy. Changing from physical to non-physical products is the best way to reduce the use of raw material. In this case, the product does not change: products provide the same functionality and provide more efficient use of the product Economical activities like car-sharing companies, online services as online libraries or video clubs, or management and repair services. (Sell et al. 2020)

## 2.2 From linear economy to circular economy

The growth of population, limited resources, and the continuous damage to the environment has been the main reasons for governments to start Circular programs. The linear economy is based on a buy-use-delete system that aggravates the previous ones. (RAEE Andalucía 2020.)

The world consumption of raw materials as fuel, petrol or minerals is increasing until the point that in the next forty years is expected to be double and by 2050 it is thought that will be increased around 70%. (United Nations 2015.)

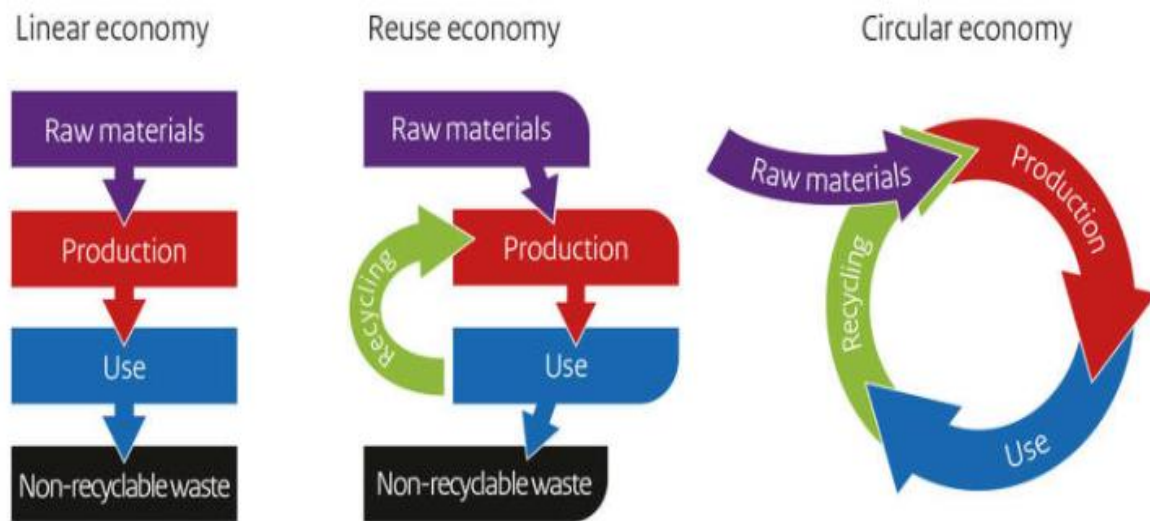


Figure 6. Linear economy, reuse economy, and circular economy. (Government of The Netherlands 2017.)

For a long time, our economy has been linear. After the use of products, the waste was thrown away. In the case of the circular economy, materials are reused or recycled. The circular economy will ensure the existence of food, shelter, heating, and other necessities that a linear economy can not. Preventing waste from materials making more efficient products, reusing them, and obtain raw materials needed sustainably are the main facts that are not accomplished in the linear economy. (Government of The Netherlands 2017.)

The way that actually is used in linear economy business models is responsible for 90% of biodiversity loss. On the other hand, the circular economy model could be the solution of the 45% for reaching zero CO<sub>2</sub> emission by 2050. (Sell et al. 2020)

The introduction of the Circular economy model, according to a European Commission study, will provide an increase of 0,5% GDP and create around 700000 new jobs in the European Union. (Cambridge Econometrics, Trinomics, and ICF 2018.)

The transition to a circular economy is not just based in the environment. A study done by McKinsey Quarterly studied 28 companies and how could them adapt to circular. The study concludes that all of them could benefit from adopting at least 3 or 4 activities from 6 circular economy activities purposed and 10 could improve their profitability adopting 5 from 6. The six activities were regenerate, loop, exchange, virtualize, share and optimize. Regeneration

activities are the ones focused on the use of renewable energy and materials. Share activities refer to sharing products and the use of eco designs. The optimizing process refers to avoid waste creation. Loop refers to remanufacture and recycle materials. Virtualize refers to offer services, or even products, online. Finally, exchange refers to the use of more efficient, environmentally friendly, and new technologies. (McKinsey Quarterly 2017.)

### From eco-efficiency to eco-effectiveness

There are two sides to the coin of sustainability depending if we speak about the linear economic model and circular economy model. Even though the linear economy is not the most efficient for the environment, some sustainability issues can be applied that differentiate it from the circular economy model. When speaking about sustainability in the linear economy model, is focused on being ecological efficient. That means to reduce the ecological impact by getting the same output extending the life availability of resources and slowing down the overload of the raw materials and the system. With a circular economy model, sustainability is achieved by rising the eco-effectiveness of the materials life cycle. The eco-efficiency is achieved in the linear economic model by making processes more sustainable, but to have the same outcome. The eco-effectiveness is achieved in the circular economy model by searching for substitutes to non-sustainable outcomes improving the social and environmental impact. (Kenniskaarten 2020.)

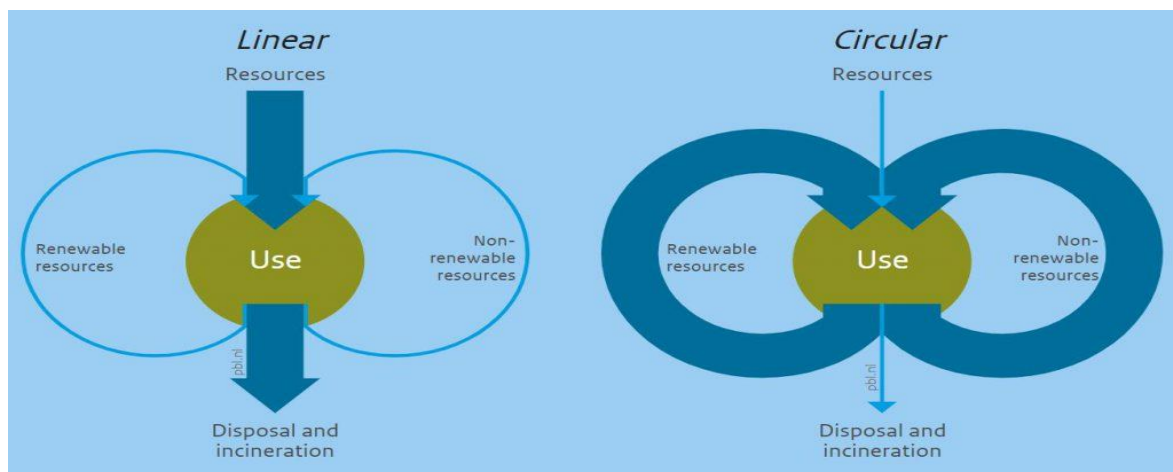


Figure 7: Sustainability in linear and circular economic models. (Kenniskaarten 2020.)

### 2.3 Circular economy business models

One of the keys to the transition to the circular economy is the companies. A circular economy business model serves to reduce the extraction of raw materials and is more efficient.

Normally this extraction is replaced by bio-waste resources with bio-based, renewable, or recovered materials. Waste also takes an important role in the circular economy business



models. Recycling waste and turn it into secondary raw materials takes an important role in these business models. Also sharing models can reduce the demand for new products, and, product service can be also a good model to give longer life to products and benefits to companies. (OECD 2018, 3.)

There are several examples of circular economy business models. Several of these circular economy business models are based on the following examples. *Hire and leasing products*, as an alternative to purchasing them. *Performing/Service system* businesses are based on delivering products where the manufacturer retains the ownership of the product, providing high control of the product to the producer and also interest in producing long last products. Incentivized return companies model is the one that offers financial or another incentive to the return of used products that can be refurbished and sold. *Asset management* business models are based on maximizing product lifetime thinking about what can be reused, repaired, or redeployed at a different site. *Collaborative consumption* models are the ones that provide rental or sharing of products between particular or different businesses. *Long-life product* strategies are the ones used by companies with good repair services. (Zero Waste Scotland 2020.)

In order to create the improvement of the condition of the circular business models, innovative and efficient policies from governments will be needed. The government has to help to destroy barriers to circular economy business models. Barriers as the mispricing of natural resources that results from under-priced externalities and the provision of subsidizing for extractive sectors, the transition costs that make difficult the collaboration within and across value chains, the trade policies that restrict cross borders flows and secondary material feedstock, or the status quo biases that are often inherent in investment a customer behaviour. (OECD 2018, 10.)

<b>Kind of business model</b>	<b>Linear</b>	<b>Circular</b>
<b>Set plan</b>	Take-make-dispose	Reduce-reuse-recycle
<b>Focus</b>	Eco-Efficiency	Eco-Effectivity
<b>System boundaries</b>	Short term	Long term, multiple life cycles
<b>Reuse</b>	Downcycling	Upcycling, high-grade recycling
<b>Business model</b>	Focuses on products	Focuses on services

Table 1: Sustainability in business models. (Kenniskaarten 2020.)

### 3 CIRCULAR ECONOMY AND INTERNATIONAL TRADE.

This chapter introduces the reader to the active role of international trade in the circular economy. This part of the report aims to inform the lector about the importance of international trade in the circular economy and how it can help to have a more efficient transition. It will be an overview of the current situation of international trade in the circular economy model, its importance and the troubles that international trade can generate in the transition to the circular economy model

#### 3.1 Importance of international trade in the circular economy

Globalization is a fact. At present, the economy is increasingly interconnected between countries. The material flow between economies is closed related to the concept of the circular economy. The material flow will give a second life to a lot of products. At the same time, the products can be used in a more efficient way contributing to recirculation of natural resources, optimal utilization of resources, and also improving sustainable global economic development. (Chen 2009, 2.)

The transition to a circular economy has broad linkages to linkages with international trade and commerce. The need for trade in second-hand goods, end-of-life products, secondary materials, and waste has brought the need to strengthen trade relationships between countries. It will be explained in more detail later. (Yamaguchi 2018, 2.)

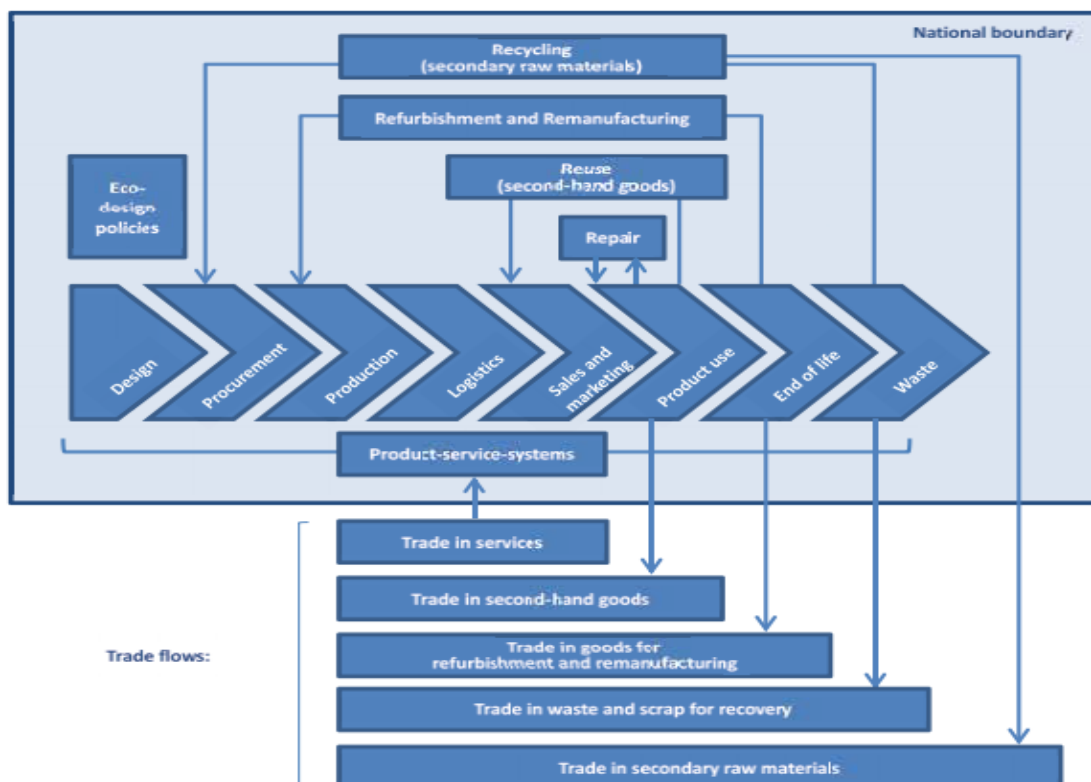


Figure 8. Stages of circular economy and trade flows. (OECD 2018, 5.)

International trade has a potential impact on the circular economy transition trade flows. Lowering the demand for primary and secondary materials. Lowering the exports of materials and waste. Increase of services as remanufacturing, reuse, and repair, as well as business models in product-service systems. (OECD 2018, 4.)

Domestic policies are continuously increasing in place to follow the circular economy objectives. But domestic policies alone are not enough to facilitate the transition to a more efficient global circular economy. Efforts are required regionally and globally in order to revise trade disciplines, check recyclability and reparability common standards, eco-design requirement between other tools to make the international cooperation easier. (Yamaguchi 2018, 5.)

A recent study carried shown that around 70% of the most frequent barriers relate to differences in regulations. Trade barriers had been created due to diverging regulations on secondary material and waste trade. Well-designed trade policies can support transitions to a more circular economy by removing trade barriers to goods, and services, supporting like this a clean technology diffusion. Removing the trade barriers will attract to move to a more circular-economy model. (Tamminen 2020.)

Many countries have urged the WTO to fit the current realities regarding circular economy with the covid-19 recovery action plan supporting the creation of fresh international markets greener and more accessible to developing countries. (Sitra. fi 2020.)

### **Trade-in waste and scrap**

The importance of trading waste is that can provide opportunities to direct waste to countries with a comparative advantage in sorting and processing activities. These materials have significant importance for material and energy recovery under proper controls. For example, in 2014, India produced 13% of global secondary steel production despite a low amount of domestic steel scrap. It was possible due to trade in waste and scrap for material recovery. (OECD 2018.)

Even though international trade in waste is regulated by multilateral environmental agreements, trade flows in waste continue to be considered negative for the environment and it is generally thought that should be avoided. But if controls are followed, does not create negative effects in the environment. (Yamaguchi 2018.)

It is difficult to make a conclusion regarding the last restrictions imposed by some countries in order to protect the environment. This could lead to an increase in the illegal trade in

waste. At the same time, could worsen some recycling industries that are capable and efficient enough to process the waste correctly. More innovation, waste management standards, and biodegradable waste are needed to make a fully circular economy and sustainable waste trade. (Sembiring 2019, 8.)

The problem remains in illegal waste trade and lack of compliance of the rules in countries considered in developing process or underdeveloped. Adding this to the not accomplishment of the proximity principle, make some organizations consider this tool against Circular economy models. (Zero Waste Europe 2020.)

### **Trade-in secondary raw materials**

The secondary raw material is an alternative for raw material and consequently, its extraction. These materials are recycled and introduced in manufacturing processes providing advantages as less raw material usage and reducing manufacturing costs. There's a high importance in the waste collection and recycling process (European Commission 2016.)

Natural resources are unequally displayed around the world. The fact of trading secondary raw materials is considered as an important circular economy. First of all will provide more environmentally friendly resources to countries with a lack of raw material, and also will encourage the recycling of it. The role of the design is crucial if the materials want to be recycled as much as possible and avoiding hazardous content. (Yamaguchi 2018.)

### **Trade-in second-hand goods**

The trade of second-hand goods is a good opportunity to bring a new life to a product that has been already used. While using a second-hand good, the useful life of the products is improved and extraction of raw materials and polluting production processes are avoided. Also, gives the consumer the opportunity of buying products cheaper than in the case of first-hand goods. (European Commission 2008.)

Even though calculating the effects of second-hand trade is difficult since second-hand trade is mainly between two persons, it is calculated that just during 2019, 253.000.000 tonnes of CO<sub>2</sub> were saved in Europe, Latin America, and North Africa thanks to it. It is also calculated that other materials as 1.5 million tonnes of plastics, 9.5 million tonnes of steel, and 0.9 million tonnes of aluminium were saved. (Adevinta 2019.)

The international trade on second-hand goods can provide advantages as the previous ones mentioned on a big scale. Exporting for example the excess of goods from a company located in one country to another one will provide a second life to the goods, benefits for

the seller and better prices for the buyer, as well as, less nocive impact on the environment. (OECD 2018.)

Despite the benefits, other disadvantages need to be taken into account. The import of second-hand goods, as in the case of cars, can slow down the transition to 0 carbon economies in some countries. From different organizations, as OECD, the removal of trade barriers has been purposed during the recent years, but also an increase of the import barriers to polluting goods, as the case of machinery or old means of transport. (OECD 2018.)

### **Trade-in goods for refurbishment and remanufacturing**

The trade of improved or rebuild materials can also help a more Circular Economy transi-tion. Even though during the remanufacturing process, new raw materials are used, the amount of raw material consumption is much higher than the production of new products. As it was introduced at the beginning of the report, the design is of vital importance in this process.

The trade-in refurbishment or remanufacturing products can provide a new life to the prod-ucts and machinery. At the same time, it can encourage the creation of new businesses, that can provide the repairing service, or repairing and selling service. (OECD 2018)

### **Trade-in services**

The trade-in services are referred to as service transactions between people who reside in different countries. The main trade in services regarding circular economy are IT services, environmental consulting services, leasing or rental of services, maintenance, repair, waste collection, and some construction services. (SITRA 2018, 36.)

Some trade in services as digitization, circular supply, resource recovery, or collaborative consumption have been implemented during the last years in order to provide more options to the consumers and more environmentally-friendly solutions as well. The international trade in services will provide more tools to the companies and consumers in order to make a more efficient circular economy model. (tecnun 2020,8-19.)

## **3.2 Importance of trade policies in the transition to a circular economy**

Integrating circular economy in foreign policies is in line with the 2030 Agenda. Making a balance between economic, social, and environmental will be necessary to achieve Sus-

tainable Development goals. The foreign policies should cover areas as development cooperation, international diplomacy, migration and security, and the case of study of this project, international trade agreements. (Ashraf 2020, 9.)

Trade agreements can play an important role in the rapid advance to a more circular economy. Countries can improve their environmental agenda and demonstrate leadership by linking trade agreements with their environmental policies. (United Nations environment program 2020, 65.)

Trade policies, as free trade in circular products, non-discrimination and transparency can improve the transition to a more circular economy. At the same time, harmonization of standards, as quality or material content will facilitate the transition. The appearance of these agreements can extend the responsibility of the producers, encouraging them to design better quality and more circular products. (Yamaguchi 2020, 35.)

The World trade organization can be a really useful tool in order to make countries cooperate to have a more efficient trade. The World trade organization can create synergies between different countries, make the different policymakers aware of the circular economy, and cooperate with other organisations the help to contribute to a more circular economy business model. (Sitra.fi 2020.)

The developing countries must also be taken into account in the trade sustainable trade. Cooperation between as many nations as possible will be necessary to change the linear economy. At the same time, these countries can provide knowledge, innovation, and solutions to improve the transition. (Sitra.fi 2020.)

### 3.3 Sustainable trade and circular economy after the pandemic

During the pandemic, even though many countries settled protectionist measures, was proved that international trade is important and necessary. Countries all over the world have strengthened their trade relationships in order to provide between them sanitary material. In our new normality seems even more important, where the necessity of vaccines makes international cooperation necessary. (Olson 2020.)

Aik Hoe Lim, director of the world trade organization Trade and environment division, thinks that is now the time to discuss how could international trade set up and promote a more sustainable and strong economy after the pandemic global crisis. The creation of a more sustainable economy will be more attractive, and resilient to a new crisis. At the same time,

useful free trade policies for environmentally friendly trade and products can boost the economy in a different sector that was critically affected by the pandemic. (Trade, development, and environment Hub 2020.)

The pandemic has forced governments, companies organizations, and schools to rethink how they will make their future operations. The virtual world has arrived to stay, and now even in a more clear way. Quarantines all over the world brought the need of working, studying, shopping, or even leisure to reinvent themselves and move to the online world during the quarantine in different countries. It also brought blue skies to the most polluted cities in the world, making their citizens more conscious about the need for more environmentally friendly policies. International trade shouldn't stay away and reinvent itself to a more circular economy international trade. (Olson 2020.)

The World trade organization insisted on a more sustainable recovery, taking advantage of the current situation. Instead of focusing on going back to the previous business models. Leaders must follow the 2030 agenda and provide easy trade agreements to promoting it and circular economy and mitigate the effect of polluting processes. These measures can connect and improve relationships between different economies, facilitating as well the rapid response of flow in goods in case of future pandemics o disasters. Recovery and the use of greenways trade and will help to improve the use of secondary raw materials and boost the creation of circular economy markets more rapidly. Finally, the new green trade agreements have to guarantee the supply chain of food in the less powerful countries. (UNEP 2020, 3.)

### 3.4 International trade dilemma

Even though international trade can be used as a very effective tool for the circular economy, it generates controversy for different aspects that can be a hindrance to the development of a real and environmentally responsible circular economy.

Many associations have denounced bad practices in international trade, that can provide negative effects to the environment or different social groups. Even though many countries have clear guidelines to approach companies to have a more circular economy business model, there is not regulation to stop the bad practices in international trade.

At the same time, in some cases, the trade can lead to disadvantages to some developing countries worsening not just the environment, also the innovation and development.

### Proximity principle

Consumers every day are more aware of social, economic, and environmental aspects. That's why many of the consumers decide to consume and purchase products that are produced in the domestic market. Following these consumption habits, consumers think that they are helping not just the local economy, also the environment. When buying local products, the supply chain is much shorter and indeed, less polluting. (Greenpeace Mexico 2020.)

This principle has big importance when speaking about food. With the consumption of seasonal and proximity food. In the case of agriculture, local consumption protects biodiversity and is respectful of the fauna. The crop uses the resources that originally exist in the land, and there is no need to import others. At the same time, if it is consumed locally, overexploitation is avoided. (Crea Salud 2020.)



Figure 9. Eat Local. (Gargano 2020.)

At the same time, during and after the Covid19 pandemic has boosted local consumption. Consumers post Covid19 prefer to support local products, with fairer, cleaner a shorter supply chains. The main factors that led to the change were to support the local economy during a time of crisis, healthier food consumption, supply chain issues regarding border controls, and environmental reasons. (Ewing-Chow 2020.)





Figure 10. Supply Chain Issues due to covid-19 crisis in the UK. (Edwards 2021.)

But in all the cases factors as the production processes, the supply chain, and the raw materials need to be studied from environmental aspects in order to determine if proximity consumption is the most eco-friendly decision in all the cases.

### **Trade of waste**

The trade of waste has been criticized by several organisations. Several developed countries export their waste to underdeveloped countries, where the waste is just stack in landfills polluting the environment, worsening living conditions with hazardous waste, and provoking the extraction of more raw material.

In the European Union, a large amount of waste is shipped every day all around the world. It has been a common practice during the last years but it is considered as not economically viable for developing countries. They don't have enough resources for recycling it properly and in a lot of cases, the waste ends just piled in dumps. Some associations as Zero Waste Europe, have denounced the situation and have encouraged the European Union to have stronger regulation to avoid it. At the same time, they aim to the proximity principle and keep the waste in European countries as a Circular Economy measure. (Zero Waste Europe 2020.)

### **Trade of second-hand goods with developing or underdeveloped countries**

The trade with developing or undeveloped countries can suppose the end of the life cycle for some products. Even though the life of the product can be extended, in many cases

these countries do not provide enough resources to recycle the goods, and the different materials are considered automatically as waste. The developed countries have an important role to avoid it, improve infrastructures and invest in the development of recycling procedures in these countries. (Malhotra 2020.)

Trade of second-hand goods can produce bad effects in some developing countries and worsen the Circular Economy model. The transition to more energy and environmentally efficient practices in developing economies is much slower than in developed countries, and importing goods, as for example second-hand cars, can damage the process. (OECD 2018.)

Also, the trade of second-hand clothes has been a common practice in the last years, as in the case of south Saharan countries. It has provided affordable clothes to the inhabitants of these countries, but at the same time, it has undermined local economies and has worsened the situation for entrepreneurs. At the same time, it has made the supply chain longer. On the other hand, it has to be taken into account that it has created jobs in the supply chain, trade, distributing, and repairing. (eldis.org 2020.)

## 4 CIRCULAR ECONOMY AND INTERNATIONAL TRADE IN EUROPE

This chapter introduces the reader to the current situation regarding the circular economy and international trade in Europe. During the development of this chapter, the action plan of the European Commission will be studied and assessed by international trade tools and how can be implemented by the European Union.

### 4.1 Circular Economy in the European Union

European Union plans to approach a more economic model by 2030. During the last years, different measures and action plans have been written in order to establish specific guidelines for the members, promoting In this way green policies in order to achieve the European green deal, in which Europe committed to achieving climate neutrality by 2050. (European Commission 2020.)

In the action plan presented by European Union regarding the transition to a circular economy, the new product policy framework is presented. The objective of these new policies is to make more suitable products, services, and business models in order to produce as little waste as possible. The main objective is to improve the value chain, adapting them to the circular model while implementing policies progressively. (European Commission 2020, 3.)



Figure 11. European Circular Economy Action Plan. (Water Europe 2020.)

The European Circular Economy action plan is focused, as well, on adopting measures in production and design in order to keep the resources inside European borders as long as possible. At the same time, the plan establishes trends to reduce the footprint, make a more

circular material use rate, and contributing positive effects to the economy while reducing the negative effects in the environment. (IISD 2020.)

The measures include the production of sustainable products as the general norm in the European Union, producing easy to repair and upgrade products, long-life products, and easy to recycle. At the same time, aims to forbid single-use products. To succeed on it, also empower companies to make a better labelling and give more information in sale points about the products, its origin, and even their useful life. The action plan also focuses on the different sectors that have more opportunities and potential to improve their performance with the use of circular economy business models, as well as the ones that use a greater amount of resources (information communication technology, packaging, textiles, plastics, batteries and vehicles, food and construction and buildings). Finally, the European Union wants to reduce the production of waste by transforming it into other useful resources of high quality, avoiding the export of waste or even the illegal shipments of waste. (IISD 2020.)

The transition to a circular economy model is the great importance for European countries. The model can strengthen the industrial base and boost the creation of new companies besides the incentive the innovation. At the same time, it will provide European citizens with more functional, more effective, and better quality products. (European Commission 2020, 2.)

#### 4.2 Effects of European circular economy policies in international trade

In the following subchapter, the current situation regarding the circular economy and international trade in Europe will be studied.

Since Europe introduced his first Circular economy action plan in 2015 there has been more clear instructions about how to approach a more efficient economy. With the reduction of imports of raw materials, improving the recycling processes, and the dependence from other countries together with the introduction of measures to propitiate a more efficient transition to the circular economy model, Europe is considered as a global reference in sustainability and start a global trend. (European Commission 2019.)

Even though the Circular economy has been gaining world knowledge all around Europe during the last years, the linkages between international trade and the circular economy in the rest of the world continue to be quite unexplored. However, awareness about the environment has increased worldwide. Countries as China or India are managing new legislations in order to ban the import of plastic waste and other kinds of hazardous waste. (Cohen 2015.)

In order to succeed in the transition to a more circular economy, production and consumption habits need to be improved and be more efficient. But in a globalized world, big transformation cannot be done just in Europe. The European Union will need to ask for and promote changes on a regional and international scale. Europe knows that positive or negative effects on their policies will be also visible out of European borders. Understanding the external effects of internal European Union policies, including international trade, is a matter of importance. Studying these effects could allow the identification of impacts of the European policies in third countries, as opportunities or obstacles regarding the environment, but also permits to predict possible policies from third countries. (Kettunen et al. 2019, 11.)

Recently Europe has been making efforts in order to promote the circular economy more internationally. Europe has implemented several “circular economy missions” with political and business meetings to show and promote the benefits of a more circular economy. With these different missions, Europe wants to increase the cooperation with third countries regarding environmental policies by signing agreements, initiatives and promoting more sustainable and inclusive growth. In the circular economy action plan from the European Union, it is shown and said that working across different policy areas will be necessary to implement the plan. The engagement of the public and private sectors from inside and outside Europe will be crucial to make a more efficient economy. (switchtogreen Europe 2020.)

Also, during recent years, Europe has implemented an action plan for small and medium-sized enterprises with the objective of raising EU SME's awareness about the potential of the circular economy. Measures such as facilitating the access of these companies to international green markets for entrepreneurs, and uptaking and sharing technologies from partner countries to improve the environmental efficiency of business all around the world. (switchtogreen Europe 2020.)

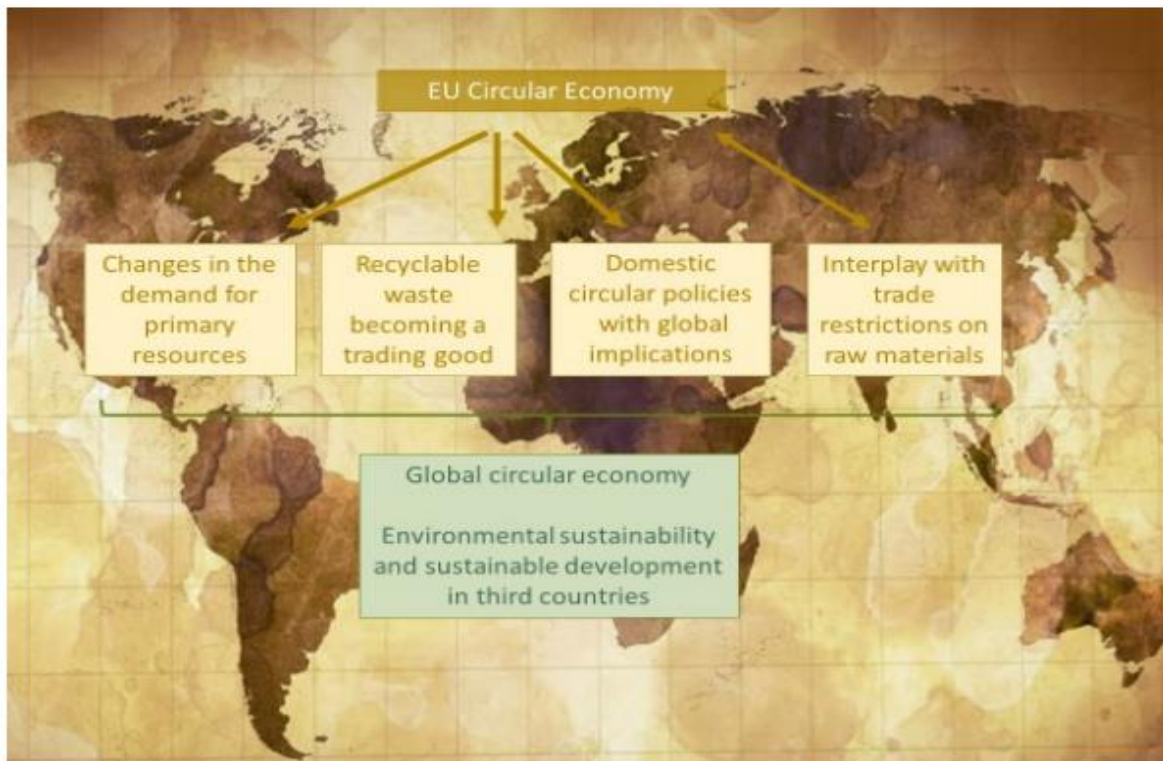


Figure 12. Effects of European Union Circular economy. (Kettunen et al. 2019, 10.)

As we can see in the figure, European Circular economy strategies generate different interactions that have a worldwide effect related to international trade, even though just domestic policies are applied.

### **Changes in the demand for primary resources**

Most developed countries in the world, including European Union and its different members, depend on other third countries, mainly in the developing process, in order to import the necessary raw material. (Kettunen et al. 2019, 12.)

A list of the most important raw materials used in Europe was created by European Union in order to track how dependent Europe is on other countries with different raw materials.

Even though the circular usage of raw materials in Europe has increased in the last years, still needs to improve. One of the objectives of the European Commission is to be less dependent on imports in raw materials, improving the local economy and the environment. In the European circular economy action plan, different actions as the creation and improvement of the current technologies regarding the production of secondary raw materials take an important role. In order to do this Europe aims to improve the reusing, circularity, and recyclability of the products, by the standardization of labelling, and the creation of a secondary raw materials market giving like this a longer life to the raw material and avoiding the import and the extraction of new raw materials. (European Commission 2020.)



In case that Europe achieve to improve the circularity of raw material usage in the following years, as is mentioned in the plan, will have effects on international trade. Resource-rich states suppliers of raw materials will be affected by a reduction of the exports of these materials. That could suppose an advance to the circularity of products and an environmentally friendly opportunity to all these countries that are dependent on raw materials exports. At the same time a problem to these developing economies that has their main economic sources based on the extract and export of raw materials, reducing like this the international trade. Europe and developing countries should take into account the situation by taking advantage of the different opportunities as growing domestic markets and developing new strategies in order to improve their economic performance. (Kettunen et al. 2019, 13-14.)

### **Trade-in secondary raw material**

The transition to a circular economy model needs to be introduced in the production lines of recycled materials, as recycled waste or reusable components, in order to give them a longer life and avoid the extraction of new ones. International trade in secondary raw materials takes place when a country is not capable of managing its recyclable waste, or just prefers not to do it. Sometimes the export of recyclable waste takes place in the same country as the production of products, due to the fact that some companies have their recycling centres where the production centres, which can be economically cheaper for the companies. (Kettunen et al. 2019, 15.)

Natural resources won't be with us forever if we continue exploiting them as now. Also, as it is said in the European Union circular economy action plan, Europe should reduce its dependence on raw materials. In order to solve this, Europe presents the secondary raw materials, obtained from recycling processes as a part of the solution. At the same time, following the European Green Deal, Europe is supposed to increase the binding specification and quality standards of recycled pieces or materials of new products, so the use of these secondary raw materials will increase. At the same time, this increase will translate also into an increase in trade in this field. (SecondTrade 2020.)



Figure 13. Waste management. (Chamber of commerce of Moslise 2019, 13.)

Even though in some statistic shows to which countries the European Union recyclable waste was exported, the data cannot be tracked completely due to illegal exports of waste. The import of e-waste can help developing countries to reduce the technology gap while exporting recyclable waste to developing countries as Thailand, India, Vietnam, or Indonesia, generating the phenomenon called “waste dumping”. Europe takes part in this phenomenon, which refers to exporting waste to countries that don’t have the proper capacity of recycling that amount of waste they are receiving, generating improper waste management, disposal, and bad effects in the environment. (Kettunen et al. 2019, 16.)

Europe should prioritize the intra trade or trade with countries where the waste management is supported by appropriate circular economy measures. At the same time, in case Europe starts importing waste for recycling and repair, could lead to the creation of employment, improve domestic waste management. (Kettunen et al. 2019, 16.)

### **Domestic Circular policies in the European Union and its effect on international markets**

Even though in the past there were several measures regarding the environment and circular economy in Europe and the different members, we can establish the Roadmap for a Resource-Efficient Europe guidelines from 2011 as the first big attempt to make a transition to a more circular economy by the European Union. This document included initiatives regarding waste legislation, sustainable constructions, and a commitment to improving the circularity of materials. It wasn’t until the end of 2015 when the European Union establish the Circular economy action plan. The plan included actions and directives on municipal waste treatment, packaging, and in single-use-plastics. It also included actions for reuse and recycling with some targets by 2030 and 2035, also introducing new laws, as the separation of municipal textile and biowaste. In 2017 European Commission started to engage stakeholders and NGOs for consultations, conferences, and promote innovation in the industrial sector with more than 10 billion euros of public funding between the years 2016 and 2020. (Ellen MacArthur Foundation 2020.)

One of the main points of the action plan is the design. The European Union has been introducing several measures to promote a more circular economy design. Improving durability, reusability, and designing easy-to-repair and upgrade products are the main point. At the same point, the plan aims to design products that can be produced with secondary raw materials in order to reduce the amount and dependence of raw materials. At the same time, it aims to ban the use of single-use products. (European Commission 2020, 4.)



This progress in the circular designs can provoke an international impact, as other countries can adopt similar policies and standards in the design in order to facilitate and increase their exports to the European markets. (Kettunen et al. 2019, 20.)

European policies and the circular economy action plan have focused as well on waste management. Europe plans to reduce drastically the amount of waste produced. By 2030, is planed that non-recyclable waste from municipalities will be reduced to 50%. Regarding recyclable waste, the European Commission has been working on restrictions legislation in batteries, packaging, vehicles, and e-waste that will incentivize the recycling processes in order to reintroduce into the market the waste again. (European Commission 2020, 13.)

These new measures to incentivize the use of secondary raw materials can create an international market with more opportunities for countries with the capability of the process of recyclable waste. This can provide benefits to the countries that cannot manage a big amount of non-processed second raw material while creating benefits to the countries that import it by introducing the recycled raw materials again in the market. (Kettunen et al. 2019, 20.)

Another of the main points of the circular economy plan of the European Union that can generate a direct international effect in the trade is the creation of a market of secondary raw materials. The introduction of requirements for recycled content in products will help to increase the demand for secondary raw materials. At the same time standardizing the recycling processes, the end of life of materials will help to normalize the use of secondary raw materials in Europe and all over the world. The restriction of use in some hazardous materials while improving the enforcement at borders. Finally, the market will be observed in order to find key secondary raw materials. European Commission 2020, 14.)

All these measures in the secondary raw materials market can have effects on the international trade as the support for developing standards in the international industries regarding sorted plastic and recycled plastics. Ensure the development of certifications for materials in the European Union and third countries, and also ensure that the plastics and other kinds of waste are treated in the same way in third countries that in Europe. At the same time, the creation of this secondary raw material market can generate great opportunities for European Union members and third countries, but a better quality standard for plastics and recycled plastics will be needed in a global way. Any difference in these standards can generate market barriers between the European Union and third countries. (Kettunen et al. 2019, 21.)

### **Interaction with trade restrictions in raw materials**

The transition to a more circular economy has generated trends not just in Europe, all around the world. Digitalization, use of cleaner energies, and cleaner transitions. At the same time, developing countries are facing a growing situation with a large increase in the population due to economical growth. This has an effect on the global consumption and trade of raw materials. Some developing countries have decided to restrict the export of raw materials to third countries in order to protect the local industry and not to consume all of them. (Kettunen et al. 2019, 14.)

Many of the raw materials are produced in a small group of countries. That fact encourages all countries in the group to increase the restrictions when one of them decides to do it. This fact can produce a limit on the exports and consequently an increase in the prices in the international markets. (WTO 2019.)

This fact has a big influence in Europe due to the European strong dependency on raw materials. But at the same time, this kind of trend can have a positive effect on international trade and the circular economy. These trends can work as a push factor for raw material-dependent economies by boosting the re-use of materials, recycling, and use of secondary raw materials while fostering as well the international trade of secondhand goods or secondary raw materials. (Kettunen et al. 2019, 14.)

#### **4.3 Circular economy in European trade agreements**

One of the points that the European Commission said will support the Circular Economy action plan, is the creation of free trade agreements in order to enhance the transition to a more circular economy. With these trade agreements, Europe pretends to have the most efficient circular economy markets. (European Commission 2020, 18.)

Europe has considered free trade agreements as a powerful tool to improve the economies and political relationship between different countries and Europe. Free trade agreements make facilities for companies to grow by expanding their markets far from the national ones. Europe has more than 65 preferential partners, and the number continues to increase every year. (European Commission 2020.)

The European Union currently disposes of a total of 80 free trade agreements. Since 2010, in all the agreements a chapter called Trade and sustainable development is included. This chapter pretends to make all the free trade agreements from European Union with third countries as less damaging for the environment as possible. Use of sustainable resources,

avoid the exploitation of natural resources like fish, and environmental cooperation between countries is required in the agreements. (Kettunen et al. 2019, 24.)

While just in two free trade agreements circular economy is mentioned, it continues being far from being one of the most important points in the European Union free trade agreements. The circular economy is mentioned in the free trade agreements with México (2018) and the proposals for a free trade agreement with New Zealand. Both, the agreement and the proposal urge countries to promote a circular economy as an essential part of their cooperation agreements. Since 2010, the amount of references and related concepts has increased. Concepts as energy-efficient products and goods and environmental agreements are mentioned in all agreements, and several of them, mention sustainable production and consumption. Any of the different agreements include any mandatory aspect regarding this but aim to the different countries to promote and facilitate trade in specific products that respect or don't damage the environment. (Kettunen et al. 2019, 24.)

Improving the current and future free trade agreements by implementing more concise practical circular economy policies can suppose a better integration of the circular economy and several opportunities for the countries that promote the agreement. While the transition to a more circular economy takes place in Europe, free trade agreements improve and boost the transition and the implementation of circular economy policies, production, and consumption. Any kind of agreement including environmental matters can be considered as a step in the right direction. (Institute for European Environmental Policy 2020.)

Although all the environmental measures are taken into account as the right steps in the transition to a more circular economy, the implementation of real circular economy policies in the different trade agreements is a key factor for the effective progress to a circular economy model. Unfortunately, trade agreements that include the most innovative and larger number of circular economy measures are quite recent, so a study of its effects on the economy is not possible to study and the last reports about free trade agreements by the European Union do not include any conclusion about the circular economy measures taken into account in the different agreements. (Kettunen et al. 2019, 26.)

### **Trade barriers for European circular economy**

Even though global co-operation and free trade agreements are considered as key matters for the transition to a more circular economy, some countries have set in practice protectionist measures affecting the transition to a more circular economy in Europe and the world. (Sitra.fi 2020.)

The trade barriers linked to a circular economy are the different trade policies that different states implement in order to restrict the free trade of different goods and services. These trade barriers can be taxes, quotas, and tariffs. As a clear example, we can speak about the ban on waste import that the Chinese government imposed in 2018. These kinds of bans, barriers promote innovation in the exporters as the European Union, but can also have a negative effect, meaning an increase in the number of waste exports to countries without the necessary means to recycle properly all the materials. (Kettunen et al. 2019, 28.)

Other barriers as the lack of international standards on waste quality is an important factor that produces a bad effect on the international trade and European Economy. European Commission has work in the last years to realize new standards to set the quality of waste and hazardous waste in order to promote the standardization of eco-labels avoiding the implementation of new extraction hazardous raw materials. At the same time, another common barrier is the lack of international consensus about what can be considered waste. Rules of end of life waste are not the same all around the world, so in some countries, waste that could be recovered as raw material if it is exported, is not. Having international standards in both things could improve the circularity of materials flow in the international markets. (Kettunen et al. 2019, 29.)

## 5 EUROPE DATA ANALYSIS: STATISTICS IN CIRCULAR ECONOMY

The objective of the study is to understand the different effects of circular economy policies on international trade and how international trade can support the transition to a more circular economy by answering the questions presented in the introduction chapter. This chapter will justify the approach that was used in the study and the validity and reliability of the data. The study contains qualitative data that gave support to the thesis with reliable data.

In this chapter, the gathered data is introduced. The data is based on different circular economy indicators that Europe is using in order to track how the transition from the lineal economy to the circular economy is being implemented in European economies. The data studied can be grouped into 4 big groups: production and consumption, waste management, secondary raw materials, and competitiveness and innovation.

These different groups of data were chosen due to the fact that Europe considers them as the main players in the circular economy. European policies in the circular economy are focused in improve the data in the previously mentioned fields of study. The data will be compared as well with findings from the information presented in the theoretical framework, together with the possible effects of new European policies in the circular economy. After the introduction and individual analysis of the different groups of data and sub-data will be followed by an analysis of it. It will provide a deep analysis of the current situation of the Circular economy in Europe, its effects on international trade.

Statistics by countries show the three countries with the best performance and the three countries with the worst performance following according to circular economy criterion.

### 5.1 Production and consumption

Unsustainable production and consumption are the reason for a big part of the environmental issues that humans have generated on the Earth. Economical activities have deteriorated the environment by the continuous extraction of raw materials, the use of it, and its consequent generation of waste. Circular economy business models supported by policies have an important role to stop these facts. By implementing more circular economy businesses and policies, the current production and consumption model based in a lineal economy will be changed into a close circle where the extraction of new raw materials will be avoided and the generation of the end of life waste will decrease significantly. (Cristina Calvo-Porrall 2020, 1.)

Tracking the production and consumption is necessary in order to check how a circular economy model improves, due to the fact that we are speaking about two of the most important things of it. Changing the production processes and consumption habits are fundamental tasks to set a more circular model. Reuse, repair, and recycling will result in a decrease in the amount of extraction of new raw materials, less production of waste, and production of long-life products. (Iberdrola 2020.)

In order to study how is the current situation regarding production and consumption related to the circular economy in the European Union, the data about sufficiency for raw materials and generation of municipal waste in Europe will be introduced.

### Sufficiency for raw materials in Europe

The raw material is one of the most important things to take into account in a circular economy model. The extraction of new raw material can generate several environmental impacts, so the sufficiency of it has relative importance in order to prevent its extraction and improve the recycling of raw materials, and avoiding waste. The European Union action plan for the Circular economy targets specific actions to improve this sufficiency (Eurostat 2020a.)

Consequently, the current situation of sufficiency for raw materials in Europe with the help of some graphics and tables.

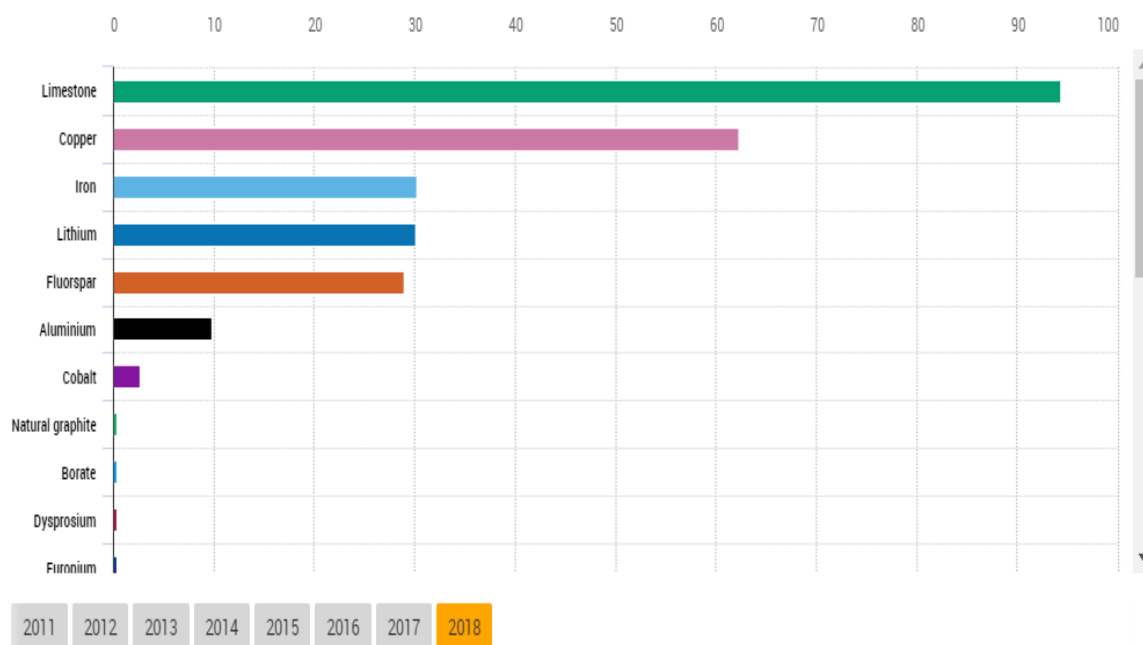


Figure 14. Sufficiency of raw materials in Europe by materials in 2018. (Eurostat 2020a.)

This indicator from the European Union measures the dependency on raw materials in %. The indicator is made from the next formula:

$$\frac{\text{Import} - \text{Export}}{\text{Domestic production} + \text{import} - \text{export}}$$

Figure 15. Formula regarding the sufficiency of the raw materials in Europe. (Eurostat 2020a.)

This formula is applied in order to study how dependent Europe is from the most critical raw materials for Europe. The data refers to the year 2018. The highest recovery rate in raw materials was founded in Limestone (94,3%), commonly used in construction materials. At the same time, it is quite high in Copper (62,3%). Other materials present less percentage of external independence, as, Iron (30,2%), Lithium (30.1%), Fluorspar (29%), aluminium (9,8%) and cobalt (2,6%). From other critical European raw materials as Borate, Dysprosium, Indium, Silicon, or Europium the self-sufficiency is 0%. Due to the lack of recycling methods, the values of the sufficiency of raw materials as magnesium (0) or borate (0) is non-existent. It has to be taken into account also that due to the increase of demand for some materials as Silicon or copper, even if 100% of it could be recycled, the European Union would not self-sufficient. (Eurostat 2020a.)

### **Generation of municipal waste per capita**

One of the main goals of the European Commission, regarding their Circular economy plans, is to reduce the amount of waste produced by the different members of the Union. In a more circular economy model, products, materials, and resources are kept as long as possible, reducing the amount of waste and improving the quality of products. In the European Union, mainly speaking, the waste comes from the packaging of products. During the last decades, the citizens have started to demand more ecological products and greener packaging. Prevention, recycling, and energy recovery are key matters in order to improve performance. (Eurostat 2020b.)

Consequently, the current situation of the generation of municipal waste per capita in Europe will be analyzed with the help of some graphics and tables.

### Municipal waste generated, 2005 and 2019



Figure 16. Municipal waste generated, 2005 and 2019. (Eurostat 2020b.)

In these graphic shows the last 20 years regarding the average generation of waste in kg per capita. The situation in Europe has been stable. European citizens generation of waste per capita in the year 2005 was 513 kg per capita, while in 2020 it has been reduced just until 502 kg per capita. (Eurostat 2020b.)

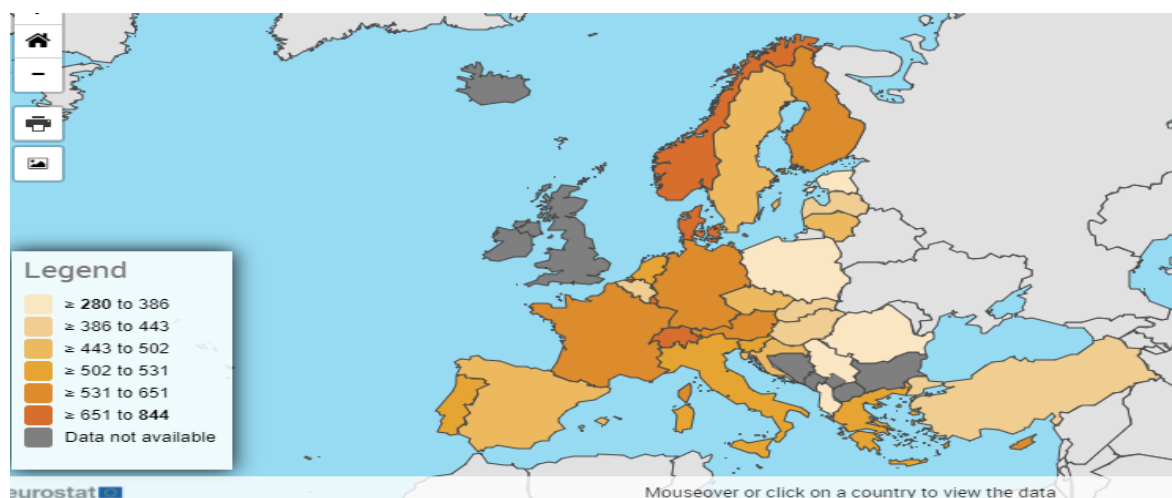


Figure 17. Municipal waste generated in 2019 by countries. (Eurostat 2020b.)

Regarding the regional situation, countries with the higher generation of waste in 2019 were Denmark (844 kg per capita), Luxemburg (791 kg per capita), and Malta (694 kg per capita). On the other hand, Romania (280 kg per capita), Poland (336 kg per capita), and Estonia (369 kg per capita). Comparing the current situation with the past, the countries that have achieved to reduce their waste generation per capita are Spain (177 kg per capita less), Estonia (84 kg less), and Romania (75 kg per capita less). (Eurostat 2020b.)

Even though the indicator can be affected by an economic crisis, this indicator can be used as a tool in order the check if the consumption habits of the population and the production



have changed in Europe in the last two decades. The data was collected from the different municipalities from each country. (Eurostat 2020b.)

## 5.2 Waste management

Waste management indicators are a useful tool in order to know how advanced is a circular economy model. The management of waste supposes the recovery of energy, reuse of materials, creation of secondary raw materials, and longer life cycle of the products. At the same time, the illegal deposit of waste is reduced and more employment is generated in Europe. (European Commission 2018.)

### The recycling rate of municipal waste

The recycling of municipal waste is a key step in the circular economy process. The recycling process gives a second life to products used by citizens, moving them from the linear model to the circular. Municipal waste refers to the waste generated by the final consumers in their households or similar. It supposes 10% of the European Union waste generation. (Eurostat 2019a.)

The recovery of this kind of waste can help to reduce the European dependency on raw material, improving environmental performance. Currently, only 12% of the industrial inputs from the European union come from recycled materials. (Circular City Funding 2020.)

Consequently, the current situation of recycled municipal waste per capita in Europe will be analyzed with the help of some graphics and tables.

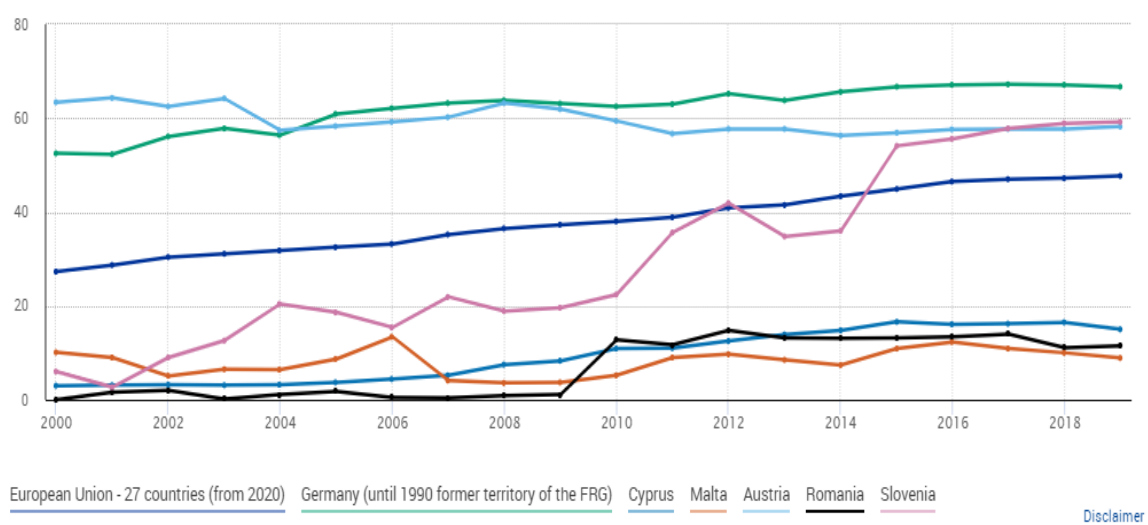


Figure 18. The recycling rate of municipal waste. (Eurostat 2019a.)

During the last decades, the European performance regarding the recycling rate of municipal waste has improved, even though, the increase of the rate has slowed down in the last four years. The average rate of recycled municipal waste in Europe was around 47.7% in 2019, while in 2000, the first year the data was collected, was around 27.3%. (Eurostat 2019a.)

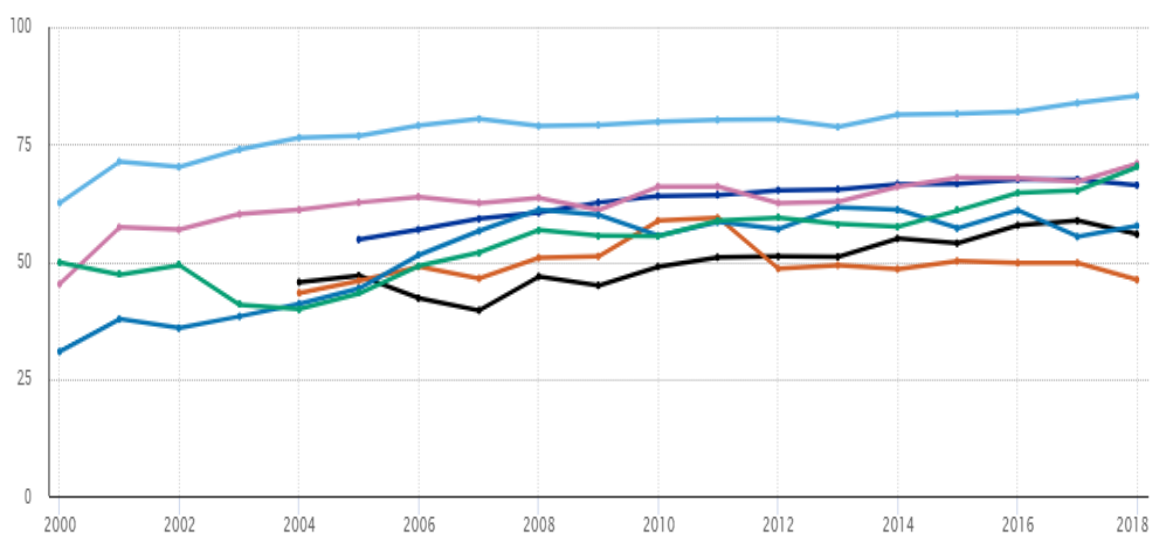
Regarding the different members, the countries where the municipal waste is recycled the most are Germany (66.7%), Slovenia (59.2%) and, Austria (58.2%). On the other hand, in countries that even though their performance has improved in the last decades, the recycling rate continues to be really low. It is the case of Malta (8.9%), Romania (11.5%), and Cyprus (15%). (Eurostat 2019a.)

### Recycling rate of packaging waste

Recycling packaging is another key matter for the European Union. Recycling packaging could provide the opportunity of feeding the material back into consumption, providing a longer life to the materials, avoiding waste, and taking care of the seas. By 2030 European Union's target is that 70% of the packaging is reused or recycled. (Eurostat 2018a.)

In order to improve these data, switching to more efficient and sustainable materials in the packaging is essential. The use of biological-based materials and recycled, avoiding as much as possible one-use plastics, can improve drastically the target. (Isustainrecycling 2017.)

Consequently, the current situation of the recycling rate of packaging waste in Europe will be analysed with the help of some graphics and tables.



European Union - 27 countries (from 2020) Belgium Latvia Luxembourg Hungary Portugal Finland

Disclaimer

Figure 19. The recycling rate of packaging waste. (Eurostat 2018a.)

Since the data is tracked, the rate of recycled packaging waste has improved in Europe, with the exception of 2018, where the rate decreased. The average of recycled packaging waste in the European Union is 66.3% in 2018, while the first complete data collected in 2005 showed that 54.7 of the packaging waste was recycled. (Eurostat 2018a.)

Regarding the different members, Belgium is leading the packaging waste recycling (85.3%) followed by Luxemburg (70.9%) and Finland (70.2%). On the other hand, even though their results are close to the average, the three countries where the packaging waste is less recycled in Europe are Hungary (46.1%), Latvia (55.8%), and Portugal (57.6%). (Eurostat 2018a.)

### The recycling rate of e-waste

European Union has been tracking the amount of e-waste recycling in the last years in order to improve environmental performance and move to a more circular economy model. E-waste is the classification of waste such as computers, tv, fridges, and mobile phones. The consumption of all of them has been increased drastically in recent years in Europe. (Eurostat 2018b.)

Recycling e-waste is considered a key factor due to the fact that all of them are recyclable, but can also contain hazardous materials that can generate bad effects on the environment. While recycling e-waste, the new extraction of raw materials as heavy metals, plastics, and glass can be avoided, reducing the dependency on raw material imports. (Cifani 2017.)

Consequently, the current situation of recycling rate e-waste in Europe will be analyzed with the help of some graphics and tables.

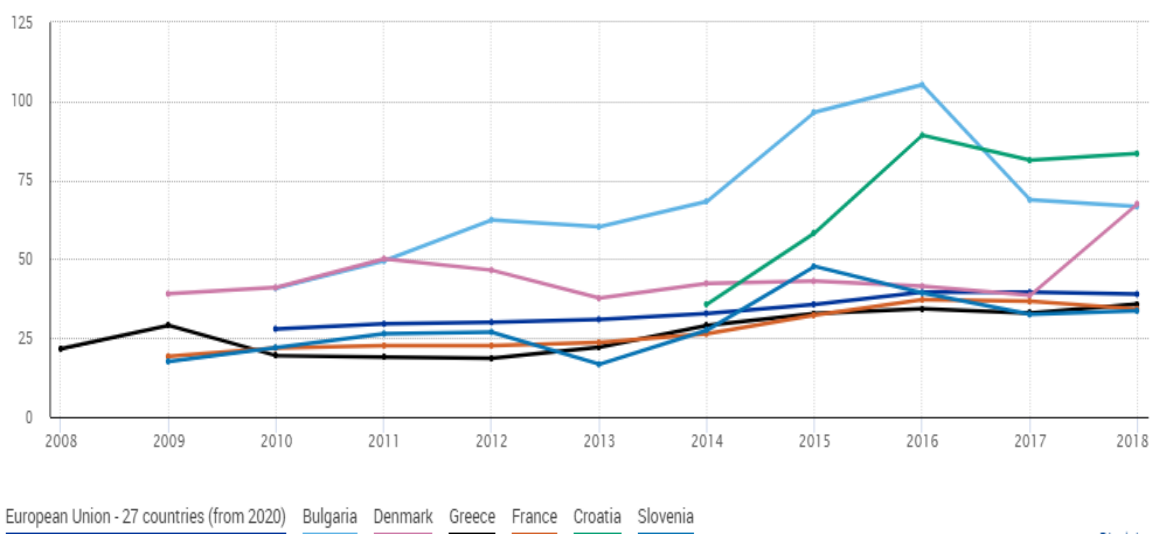


Figure 20. Recycling rate of e-waste. (Eurostat 2018b.)

Since data is tracked, the e-waste recycled in the European Union has improved, but on a slow basis. The average rate of e-waste recycled in Europe by 2018 was 38.9%, while the first year that was possible to track the statistic, in 2010, was 27.9%. (Eurostat 2018b.)

Regarding the different European members, Croatia was the country with the highest e-waste recycle rate by 2018 was Croatia (83.4%) followed by Denmark (67.5%), and Bulgaria (66.7%). On the other hand, some European countries should improve their performance, as is the case of Slovenia (33.6%), France (34.2%), and Greece (35.8). Since there are such a big difference, the European Union is trying to aim to the countries with the worst rates to follow successful models as the Danish. (Eurostat 2018b.)

### 5.3 Secondary raw materials

Tracking the use and trade of secondary raw materials is a good way to study the health circular economy model. When we speak about secondary raw materials we refer to the insertion of recycled and reuse materials that can be used for the creation of new ones, giving a new life to them and improving the circularity. (Kettunen et al. 2019, 13-14.)

#### **Circular material use rate**

A circular economy model is a model where materials are recycled and fed back into the economy, reducing the waste and decrease the extraction of raw materials. The circular material rate shows the number of recycled materials that are introduced again in the offer and demand of materials. (Eurostat 2019.)

In order to study the current situation of circular material use in the European Union, data from Eurostat will be studied. The data corresponds to a rate that is calculated by summing the aggregated demand of the Domestic material consumption and the circular use of materials. The circularity of the materials is calculated by the amount of recycled waste minus the imported waste plus the exported waste to recovery abroad. (Eurostat 2019.)

Consequently, to study the current situation of circular material use in Europe will be analyzed with the help of some graphics and tables.

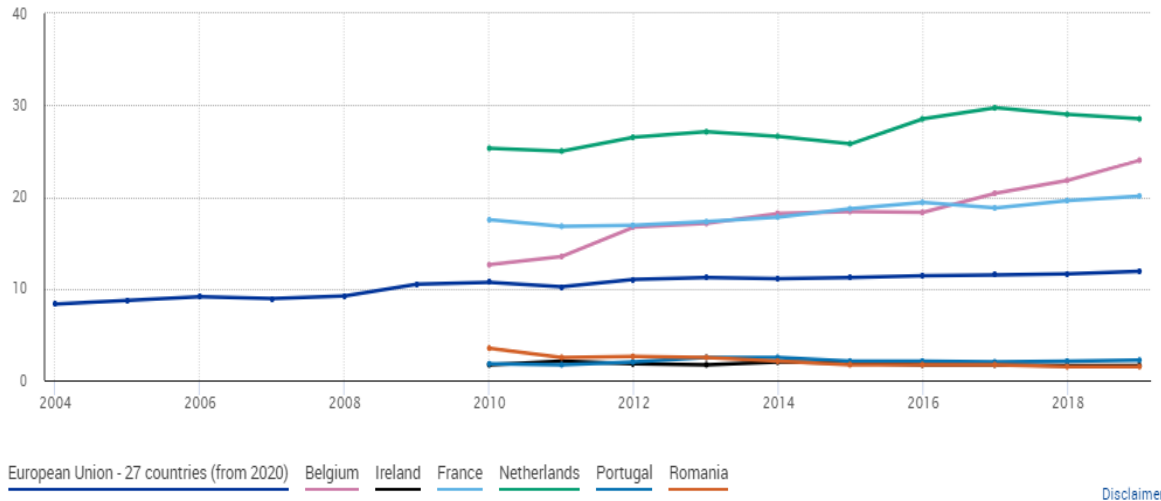


Figure 21. Circular material use rate. (Eurostat 2019.)

Since data is tracked, the circular material use rate has improved in the European Union but on a slow basis. The average rate of circular material use in the European Union in the first year the track was done was around 8,3%, while in 2019, the rate was 11,9%. (Eurostat 2019.)

Regarding the different European Union members, The Netherlands has been the country with the best rate in circular material use in the last years (28.5%), followed by Belgium (24%), and France (20,1%). On the other hand, countries that should improve their performance are Romania (1,5%), Ireland (1,6%), and Portugal (2,2%). (Eurostat 2019.)

### **Contribution of recycled materials to raw materials demand. End-of-life recycling input rates**

This is considered another indicator vital for the Circular economy. In this indicator, the use of secondary raw materials is monitored in the European Union. The circular economy is based in increasing the amount of recycled material in order to introduce it back into the production process and consequently into the economy, reducing the production of waste and the extraction of new raw materials. (Eurostat 2016.)

Consequently, to study the contribution of recycled materials to raw materials demand in Europe, the data will be analyzed with the help of some graphics and tables.

MATERIAL	↕	
Lead		75
Limestone		58
Copper		55
Vanadium		44
Nickel		33.9
Yttrium		31.4
Zinc		30.8
Molybdenum		30
Iron		24
Titanium		19.1
Sapele wood		15
Aluminium		12.4
Platinum		11.5
Praseodymium		10
Palladium		9.7
Magnesium		9.5
Aggregates - crushed rock, other sands (not silica), pe...		8
Germanium		1.7
Neodymium		1.3
Gypsum		1.1
Bismuth		1
Tantalum		1
Tellurium		1
Natural rubber		0.9
Indium		0.1

Table 2. Contribution of recycled materials to raw materials demand (Eurostat 2016.)

The previous figure shows the percentage of cases that recycled critical raw materials for Europe are used instead of new extraction ones. From the available data, the most outstanding data is the amount of Lead recycled, which is recycled and introduced again in the production (75%). Other products as Lime Stone (58%) and Copper (55%), as we can see, are recovered in more than half of the cases for new production. (Eurostat 2016.)

### Trade-in recyclable raw materials

The indicator is part of the monitoring framework that Europe wants to use to know the current situation about the transition to a more circular economy model. The trade of materials that are recycled and reintroduced again to the production is what we refer to as trade-in recyclable raw materials or trade-in secondary raw materials. The indicator provides a clear image of the cross-border movements in secondary raw material and helps to obtain a picture of the current trends in markets between European countries and third countries. (Eurostat 2020.)

Consequently, to study the current situation of recyclable raw materials trade in Europe will be analyzed with the help of some graphics and tables.

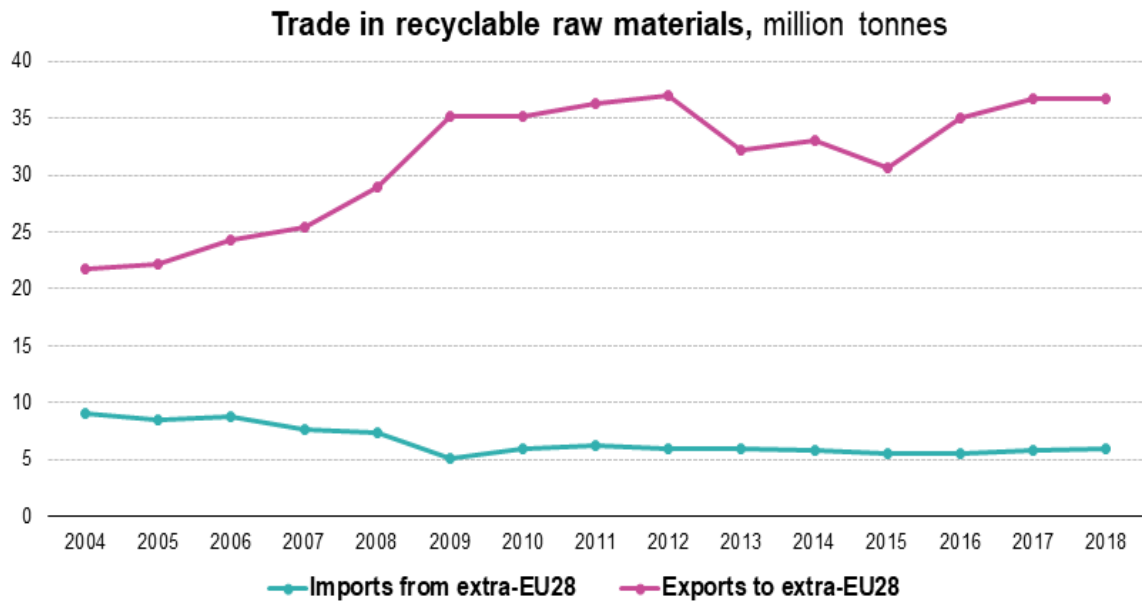


Figure 22. Trade-in recyclable raw materials. (Eurostat 2019c.)

The graphic shows the number of tonnes of recyclable raw materials that European Union countries trade with third countries. The graphic shows the total amount in tonnes of exports and imports of these materials. As we can see, since data is tracked, Europe has increased the amount of recyclable waste traded with other third countries, while has reduced the imports from other ones. (Eurostat 2019c.)

Regarding the different European Union countries, in 2019, the country where the most amount of recyclable waste is traded is Germany, around 1.6 million tonnes, followed by Spain with around 1.6 million tonnes, and finally by the Netherlands, with around 1.3 million traded tonnes. The countries where fewer tonnes of recyclable materials are traded are Cyprus, with 41 tonnes, Malta, with 1129 tonnes, and Czechia with 8215 tonnes. In the case of the countries with less trade, the population of them has also to be taken into account. (Eurostat 2019c.)

Turkey and China are the main destinations for European recyclable waste, even though the exports of recyclable waste have been reduced by almost a 50% in the last years. At the same time, Europe receives recyclable waste mainly from Switzerland, Norway, United States, and Russia. (Eurostat 2019c.)

In order to know how international markets affect in a direct way, the amount of capital that the trade between Europe and other third countries generates in recyclable raw materials will be studied.

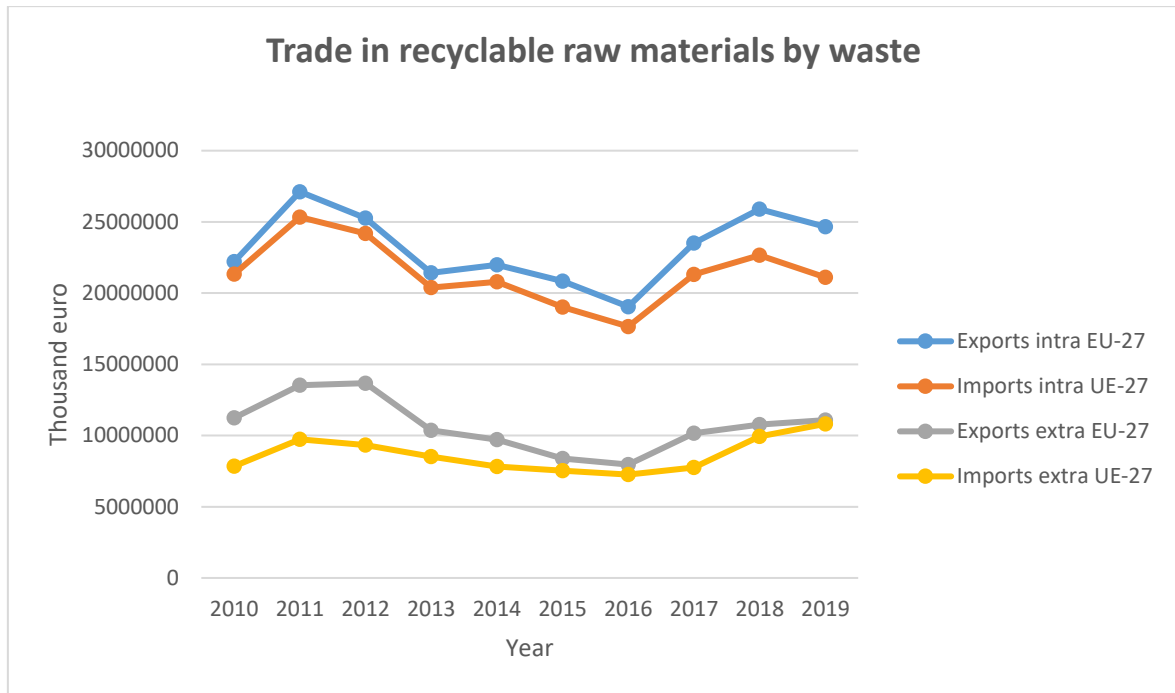


Figure 23. Trade-in recyclable raw materials by the waste in thousand euros (Adapted from Eurostat 2019d.)

As we can see in the figure the exports of recyclables inside the different European Union countries, even though the amount decreased in 2019, generates the biggest amount of capital, followed by the imports intra-European union. At the same time exports and imports generated more or less the same amount of capital in 2019.. (Eurostat 2019d.)

In order to know the ammount of waste traded in tonnes by the current 27 European countries the imports extra-UE, exports extra-EU and the imports intra-EU from years 2018 and 2019, will be studied with the help of the following figures



	TIME	2018	2019		TIME	2018	2019
<b>IMPORTS EXTRA-UE</b>				<b>EXPORTS EXTRA-EU</b>			
European Union - 27 countries (from		9.271.636	8.877.945	European Union - 27 countries (from		25.627.808	25.467.976
Germany (until 1990 former territory		1.745.654	1.646.581	Netherlands		5.683.000	5.613.710
Spain		1.477.459	1.416.710	Belgium		3.883.858	3.725.303
Netherlands		1.223.840	1.311.654	Germany (until 1990 former territory		2.986.593	2.876.496
Greece		624.698	719.814	Italy		2.005.109	1.935.480
Italy		745.182	622.289	France		1.947.465	1.857.402
Belgium		649.469	603.310	Sweden		1.059.229	1.178.624
Sweden		663.324	595.818	Spain		1.166.907	996.039
Portugal		579.623	469.019	Denmark		999.444	991.519
France		470.381	413.622	Poland		637.735	986.749
Austria		227.282	240.776	Romania		731.617	907.161
Denmark		187.546	180.002	Lithuania		788.044	736.350
Poland		79.193	104.203	Ireland		736.013	723.296
Bulgaria		101.765	101.018	Bulgaria		413.157	457.406
Slovenia		142.006	99.367	Estonia		447.865	370.071
Croatia		74.497	77.714	Latvia		470.516	364.229
Lithuania		57.679	63.855	Greece		422.802	362.861
Latvia		33.241	34.287	Finland		229.308	304.599
Ireland		30.932	32.205	Croatia		168.470	259.385
Hungary		30.958	30.710	Portugal		155.001	164.709
Finland		36.031	28.449	Hungary		144.951	150.731
Romania		27.028	24.903	Austria		100.140	145.147
Estonia		16.119	22.413	Slovenia		121.357	135.612
Luxembourg		29.645	16.597	Malta		171.470	63.623
Slovakia		9.844	13.244	Slovakia		50.432	59.149
Czechia		6.048	8.215	Cyprus		58.351	54.039
Malta		1.860	1.129	Czechia		48.737	47.799
Cyprus		333	41	Luxembourg		238	486

Table 3. Imports and exports extra EU. Trade-in recyclable raw materials by countries. (Adapted from Eurostat 2019d.)

As we can see in the figure, the imports had been reduced in the last year while the exports have maintained more or less the same level. The countries that more import recyclable waste are Spain, Netherlands and Greece. The ones that export more are Netherlands, Belgium and Germany. The population of the countries has also to be taken into account. (Eurostat 2019d.)

TIME	2018	2019
<b>IMPORTS INTRA-EU</b>		
<b>European Union - 27 countries (from</b>	49.191.946	47.905.897
<b>Germany (until 1990 former territory</b>	9.466.244	9.382.201
<b>Italy</b>	6.286.462	6.053.960
<b>Belgium</b>	5.957.489	5.852.899
<b>Netherlands</b>	5.657.913	5.847.807
<b>Spain</b>	4.481.513	4.666.931
<b>Austria</b>	3.022.134	3.075.158
<b>France</b>	2.841.752	2.525.687
<b>Luxembourg</b>	2.515.827	2.319.405
<b>Poland</b>	1.805.455	1.608.956
<b>Portugal</b>	1.344.068	1.131.106
<b>Slovenia</b>	907.935	921.872
<b>Czechia</b>	882.327	888.450
<b>Hungary</b>	612.851	642.546
<b>Sweden</b>	623.657	529.559
<b>Romania</b>	389.832	376.317
<b>Lithuania</b>	307.407	298.329
<b>Greece</b>	436.767	283.408
<b>Bulgaria</b>	180.234	274.015
<b>Denmark</b>	230.127	267.199
<b>Slovakia</b>	490.396	252.103
<b>Croatia</b>	232.747	227.723
<b>Estonia</b>	159.160	159.947
<b>Finland</b>	126.882	139.656
<b>Latvia</b>	165.048	125.640
<b>Ireland</b>	66.480	54.050
<b>Cyprus</b>	999	781
<b>Malta</b>	243	195

Table 4. Imports and exports intra EU. Trade-in recyclable raw materials by countries. (Adapted from Eurostat 2019d.)

As we can see in this figure, the amount of imports of recyclable raw material inside the European Union has been also reduced from 2018 to 2019 by 2 millium tonnes. At the same time, we can see that the trade of recyclable materials inside European Union is much bigger than outside. (Eurostat 2019d.)

#### 5.4 Competitiveness and innovation

In order to preserve the environment and improve competitiveness and innovation, the circular economy model will be needed. The development of innovative technologies will improve the product designs for easier re-use, create new jobs and improve the competitiveness in the circular economy market. (European Commission 2020.)

#### **Private investments: gross value added related to circular economy sectors**

The private sector is a key matter for the European Union in the transition to a circular economy model. The circular economy can create several workplaces in the next decades generating economic growth. At the same time, innovation and investments in sectors as

design, secondary raw material, recycling procedures, and industries are important for the circular economy. (Eurostat 2018c.)

In order to study the current private sector, a Eurostat indicator will be used. This Indicator shows the amount of money invested in intangible goods, numbers of persons employed in the sector, and value-added at factors costs in the recycling, repair, and reuse sectors. (Eurostat 2018c.)

Consequently, to study the current situation of circular private investments in Europe will be analyzed with the help of some graphics.

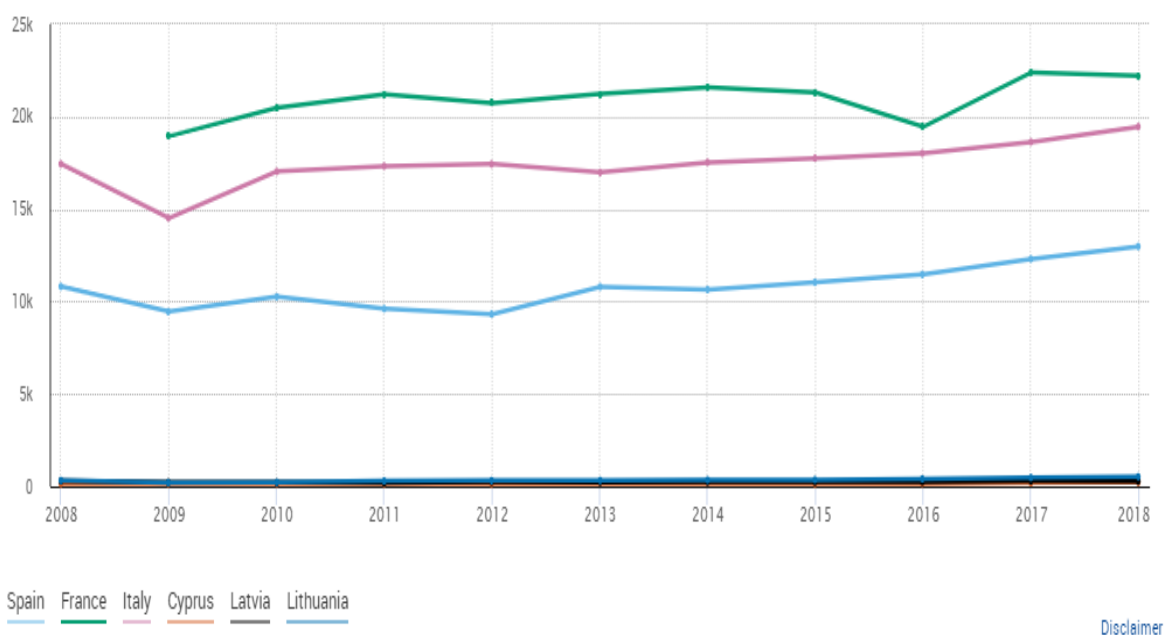


Figure 24. Private investments: gross value added related to circular economy sectors. (Eurostat 2018c.)

Since data is tracked from 2008 the situation, the European Union has improved. The first year the data was tracked the gross income of the sector was around 110108 million €, while in 2018 was around 130800 million €. (Eurostat 2018c.)

Making a comparison between countries is difficult, due to the fact that some of them consider the data as confidential, and it is just taken into account in the European Union average. From the countries where data is collected, France and Italy are the countries where the gross income in the sector is higher, around 20000 million €, followed by Spain, 12900 million €. On the other hand in Lithuania represents less than 525 million € and in Latvia and Cyprus less than 285 million €. (Eurostat 2018c.)

## Jobs in the circular economy

The circular economy is supposed to generate not just a positive effect in the environment, also in the economies from different countries. Different circular economy businesses are starting to grow, mainly in Europe, enabling the creation of new job opportunities in fields like design, circular investments specialists, customer service, reverse logistics managers, product life managers, apart from other traditional job vacancies the businesses normally generate. (Wenzel 2019.)

The amount of jobs by the circular economy is an indicator used to monitor the progress in the transition to a more circular economy. The contribution, specifically from sectors as recycling and repair has a potential benefit to the employment in local economies. Job creation is one of the key priorities for the European Union and its circular economy plans. (Eurostat 2018c.)

Consequently, the current situation of employment in circular economy business in Europe will be analysed with the help of some graphics.

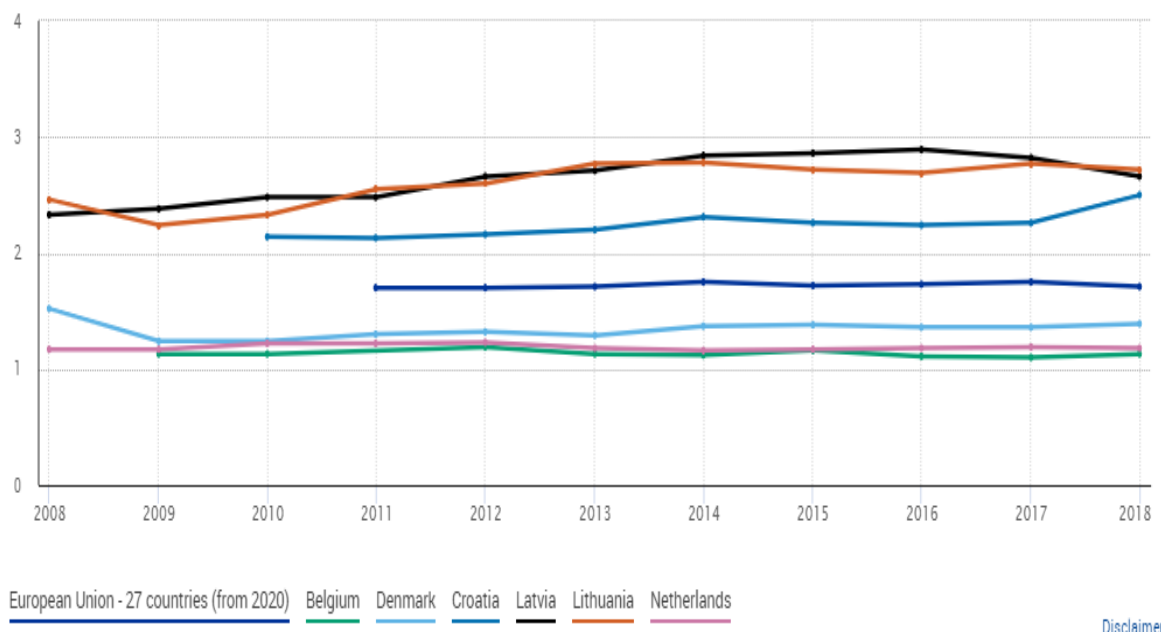


Figure 25. Jobs in circular economy in Europe. (Eurostat 2018c.)

These graphics show us the percentage of jobs in circular economy from the total number of employments, excluding those who work in compulsory military service. In the graphic, we can see the general projection from the European Union countries, with the three countries with most and the three countries with least employment in circular economy business models. (Eurostat 2018c.)

Since data is tracked from 2011, until 2018, the percentage of employment in the circular economy in the European Union has varied between 1,70% and 1,79%. The countries that have higher percentage of employment in circular economy in 2018 are Lithuania (2,75%), Latvia (2,66%), and Croatia (2,5%). On the other hand, the countries with less employment in circular economy jobs are Denmark (1,39%), The Netherlands (1,18%), and Belgium (1,13%). (Eurostat 2018c.)

### Patents related to recycling and secondary raw materials

Innovation is part of the Circular economy. The development of new technologies, processes, and business models are key matters. The development of techniques of waste collection, transport, storage, and recycling is critical to reducing the dependence on commodities, improving the environment and the economy in Europe supporting the domestic economy. (Eurostat 2016b.)

Consequently, to study the current situation of the creation of patents related to recycling and secondary raw materials in Europe, data will be analyzed with the help of some graphics.

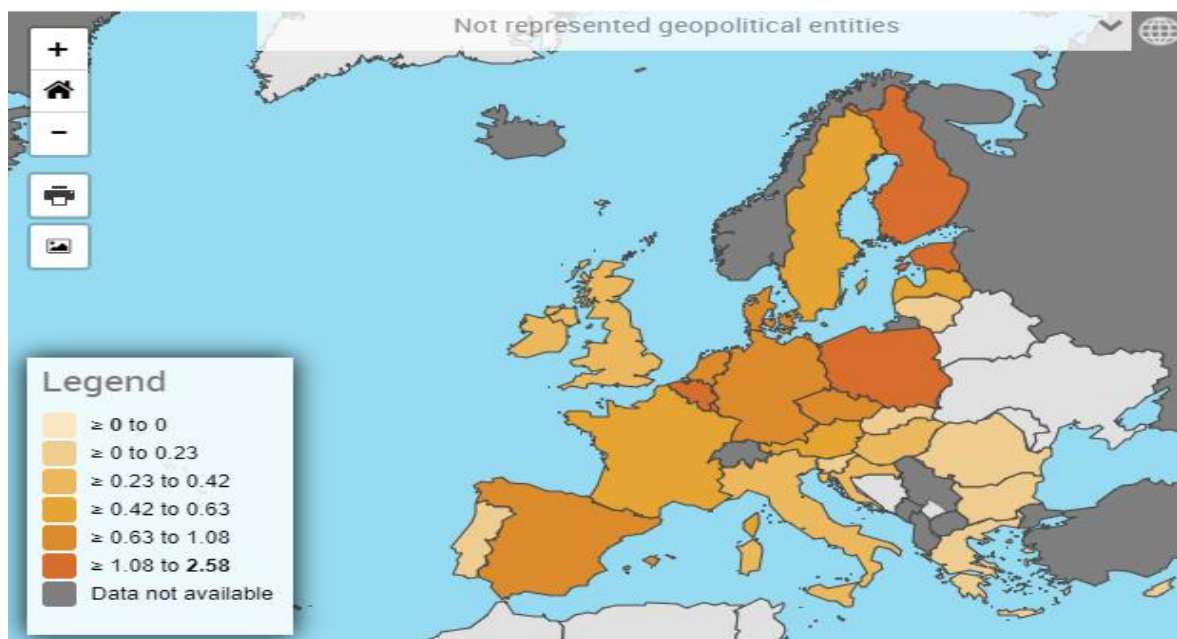


Figure 26. Patents related by the circular economy in 2016 by countries. (Eurostat 2016b.)

The data that we can see in the map refers to the number of patents related to recycling and raw materials by European countries in 2016.

Since data is tracked, the European countries have created between 230 and 340 patents in the sectors previously mentioned per year. In 2016, 269 patents were created in the European Union. (Eurostat 2016b.)

Regarding the different European Union country members in 2016, the one that created the most number of patents per milium inhabitants was Luxemburg (2,58), followed by Finland (1,91) and Estonia (1,52). The situation regarding innovation in this sector is quite unequal in Europe, due to the fact that there are some countries as Slovenia, Portugal, Malta, Lithuania, or Cyprus where the amount of patent created in 2016 was 0. (Eurostat 2016b.)

In order to revert this situation, the European Union is financing several projects that pretend to improve the innovation in these key sectors for the circular economy and the wellbeing of the European economy. (Eurostat 2016b.)

## 6 CONCLUSION

During this chapter, the thesis will be concluded and the most relevant information collected during the research will be presented. At the same time, the research questions will be answered and presented. The reliability and validity of the thesis will be analyzed. At the end of the chapter, the researcher makes suggestions for further research.

### 6.1 Answer to research questions

The research focused on how the transition to a circular economy can affect international trade, focusing on the case of Europe and its different policies regarding this transition. The main research question was: how international trade can support the transition to a circular economy. The answer to the main research question will be answered after introducing the answer to the sub-questions, that will be presented and answered below:

#### **Sub-question 1: How is the current situation regarding the circular economy?**

The circular economy is an economic model based on sharing, leasing, reusing, repairing, refurbishing, and recycling materials. This economic model promotes the production of longer-life products, that can be even updated, easy to repair, and recyclable. This model is pretended to change the current linear economic model, with short-life, new raw materials, and waste creation during the time of life of the product. The transition to a more circular economy will suppose an environmental improvement and it can lead to the creation of jobs and new business opportunities.

Every time more governments and businesses are concerned about this fact and are working to establish policies to start this transition. The European Union can be considered as a benchmark due to the fact that since 2015 has worked on an action plan, updated every year to start the transition and reduce the dependence on new extraction raw materials.

The research topic is focused on the current situation of the Circular Economy in the European Union and the effects that generate in international trade. In order to track the current situation, European Union is collecting data on yearly basis about different aspects related to the Circular economy. The data is divided into four main parts: products and consumption, waste management, secondary raw materials, and, competitiveness and innovation.

Production and consumption in the European Union are key data for monitoring the transition to a circular economy in Europe. The data studied regarding these fields is the sufficiency of raw materials and the generation of municipal waste per capita.

The European Union is emphasizing more efficient production processes, aiming to the use of eco-design and reduce of new extraction raw materials and partnerships on trade. At the same time is aiming to a better performance regarding recycling processes. In the case of sufficiency of raw materials, since data is tracked, Europe has achieved to improve the sufficiency in all the raw materials considered as essential for Europe with the exception of aluminum, cobalt, and natural graphite. It has to be taken into account that the environmental performance could have been improved in these cases, but also the demand for these raw materials. Regarding the waste generation, seems that Europe has achieved at least to stop, and even reduce a slightly waste generation, even though from 2014 until 2019 a slight increase in waste generation per capita has been notified.

Since 2015, the European Union has been appealing to the consumer to have a responsible consumption, with the implementation of labels, as the EU ecolabel. But if to improve drastically the environmentally friendly consumption in the circular economy framework, an improvement in labeling, with more information to the consumers will be necessary. (Dodick 2020, 7-9.)

Waste management is another of the data the European Union is tracking to check the efficiency of the transition to a more circular economy model. The recycling rate of municipal waste, the recycling rate of packaging waste and, the recycling rate in e-waste are studied in the report. Since there's information in all these fields, the performance in Europe has improved in all of them. In the case of municipal recycling rate, has been an increase of more than 20% in 20 years and now is situated around 48%. Despite this, there is a big difference between European economies. While in Germany, there's a recycling rate of 66,7%, in other countries like Malta is around 8,9%. Regarding packaging recycling, Europe established as an objective to have a rate of around 70% in 2030. In 2018, the rate was around 66,3%, and even though, in the last studied years, the increase has been reduced, the goal is close to being achieved, and there are no big differences between member countries. Finally regarding e-waste, from 2010 to 2018, Europe has improved also the rate, from 27,9% to 38,9%.

The use of secondary raw materials also takes an important role in the Circular economy and trade in Europe. The research is studied by the data from Eurostat in different fields as circular material usage rate, the contribution of recycled materials to the raw materials demand, and the trade-in recyclable raw materials. Europe circular material use rate in 2019 is around 11,9%, while in 2004 (before implementing the direct circular economy measure was around 8,3%). Then we can say, the European Union still has a great potential to improve the rate of usage of secondary raw materials. Also, differences between members



are quite high, while countries as Netherland or Belgium use more than 24% of secondary raw materials in their production, others as Romania just use 1,5%. Regarding the recycled raw materials, Europe has specialized in Lead, Limestone, or Copper, wherein in more the 50% of cases, the raw material is recycled and introduced again in the production chain. Finally, we can appreciate that in Europe the trade of recyclable raw materials in tonnes is much bigger inside the Euro Zone than to third countries. It can be due to the fact that free trade area and easy policies.

Finally, competitiveness and innovation are also measured and studied by European Union authorities. Private investments in circular economy sectors have increased more than 20000 milium euros since the first data was tracked in 2008 until 2018. The number of workers who have a job related to the circular economy in 2018 was 1,79% of the total, while in 2011 was 1,71%. Even though this data can be affected also by different economical situations as a crisis. A positive aspect of these indicators is that the situation is similar between all the European countries, even though the creation of jobs as an effect of European circular economy policies should increase. Regarding the patents related to recycling and circular economy, data is really irregular and we cannot make clear conclusions from it, apart from the need for more innovation and research. The countries that more patents per inhabitant realized were Luxemburg, Finland, and Estonia.

Overall, the European situation regarding circular economy has improved significative but still shows several weaknesses. Europe should create more innovative measures to push efficiently the transition. Also, the lack of mandatory legislation and unified labeling criteria is producing a much more slow transition to a Circular economy than it could be with strict measures. (Dodick 2020, 24.)

### **Sub-question 2: How the current trade agreements will affect this transition ?**

Free trade agreements are necessary to make a more efficient trade of circular materials between the different economies in the world.

Even though during the last years due to the Covid-19 crisis, among other facts, some governments have become more protectionist, a lot of countries all around the world dispose of free trade agreements that can facilitate the circular economy trade. Several organizations and governments, like the European one, aim to the liberalization of all the markets that can have a good effect in the transition to a more circular economy.

On the other hand, trade barriers, as in the case of waste, can suppose an advantage or incentive to these economies that can adapt their system to a more circular one, specializing in the recycle, and sales of secondary raw materials.

**Sub-question 3: How will affect the European Union circular economy strategies the international trade?**

Even internal policies in Europe can have different effects on other economies due to the fact that we live in a globalized world.

European Union policies in the circular economy can have different effects on other third economies around the world. The first main effect would be the reduction in raw materials imports, due to the fact that European circular economy policies are trying to make the European economy less dependent on them. I can also suppose an increase of trade of services, as for example the design, which is vital in the creation process of circular products. Also the creation of a secondary raw materials market, where recycled raw materials will be traded between economies. Finally, the trade of second-hand goods will be increased as well.

**Main question: How can international trade support the transition to a more circular economy?**

International trade can help to boost the transition to the circular economy by giving longer life to products, the specialisation of production of circular products and services as repairing, refurbishment between others.

Trade-in services, second-hand goods, goods for refurbishment and remanufacturing, trade-in waste and scrap for recovery, and trade in secondary raw materials are considered important to have a competitive circular economy model. Trade can suppose the specialisation of the economies, making them more effective in circular processes while improving the shelf life of the products. At the same time, the creation of synergies and cooperation between countries can provide knowledge, innovation, and solutions to improve the transition to circular economy models.

In order to boost the trade-in circular material and avoid the massive creation of waste, the same classifying standards must be applied in the different countries regarding secondary raw material and waste. At the same time, the creation of new free trade agreements and elimination of trade barriers in products and services related to the circular economy is of vital importance to continue progressing.

Europe as one of the most important economies in the world takes an important role into the transition.

## 6.2 Validity and reliability

The main purpose of the research was to find answers to the research questions introduced previously. In the research answers to these questions were found. Information used was the secondary source from different documents and database, mainly from official organisations as European Commission, WTO, OECD, and governments. This makes the information reliable and can be consulted in the references. According to these statements, the research can be considered valid and reliable.

## 6.3 Suggestions for further research

As mentioned at the beginning of the thesis, the research is focused on a big scope, even though was focused mainly on Europe. The economy is continuously changing; governments, policies, crises... and with it the premises. To get more specific results the situation country by country should be studied, together with the trade interactions between third countries. These further studies will be also showing new information, due to the fact that we are speaking about a transition, that takes place every day.

## 7 SUMMARY

The main aim of the thesis is to provide a deeper understanding of the importance of global markets, how every single policy makes an effect on them, and how can we use them to promote a faster a more efficient transition to a circular economy. The thesis studies in a more concrete way the current situation of the circular economy transition in Europe. The different policies and trade agreements are studied together with the possible effects in the international markets.

At the beginning of the thesis, the concept of circular economy is introduced. The different main stages for the transition to a circular economy (eco-design, production and reprocessing, distribution, consumption, repair and reuse, and recycling) are introduced and explained to the lector. Also, the differences between the current economic model, the lineal economy, and the circular economy are presented together, explaining the main differences between both economy models and the possible benefits of a transition between them. Finally, the importance of circular economy business models is explained.

After this, one of the main objectives of the thesis is explained. The linkages between circular economy and international trade are introduced to the lector. The importance of the support that international trade can give to the most important circular materials (waste and scrap, secondary raw materials, second-hand goods, refurbishment and remanufacturing, and in-services) is explained. Also the importance of the trade policies and the current situation regarding how Covid-19 is affecting the trade in the circular economy. Finally, the dilemma of international trade can be considered as the main factor of the circular economy is presented to the audience explaining the proximity principle, problems with the trade of waste, and the trade of second-hand goods with developing countries.

Finally, the current situation regarding the circular economy and international trade in Europe is introduced. The different measures that European Commission introduced in the last years are shown together with some statistics in important fields of the circular economy (production and consumption, waste management, secondary raw materials, and competitiveness and innovation). A study of the possible effect in the international trade due to the circular economy policies introduced by Europe is also presented. Finally, the importance of the trade agreements, for a more efficient circular economy transition, between Europe and third countries is studied. Trade barriers and the possible effects are studied as well.

The findings of the research are providing more detailed information about how international trade can support or been affected by a transition to a circular economy, studying in a more

concrete way the case of Europe. Information found in the main governments and organizations is collected, examined, and linked in order to provide more concrete and specific information.

## References

### Printed sources

- Saunders, M., Lewis, P., & Thorngill, A. (2015). *Research methods for business students* (3rd ed.). Pearson. Birghingham.
- Ashraf, N. (2020). *The integration of climate change and circular economy in foreign policies*. Bruxelles.
- Cristina Calvo-Porrá, J.-P. L.-M. (2020). *The Circular Economy Business Model: Examining Consumers' Acceptance of Recycled Goods*. A Coruña.
- Katutunen, M., Gionfra, S., & Montevielle, M. (2019). *EU circular economy and trade: improving policy coherence for sustainability*. Bruxelles.

### Electronic sources

- Adevinta. (2019). *The Second Hand Effect Report 2019*. Retrieved on 10 February 2021. Available at <https://static.schibsted.com/wpcontent/uploads/2020/06/04123109/schibsted-adevinta-second-hand-effect-2020.pdf>
- Cambridge Econometrics, Trinomics, and ICF. 2018. *Impacts of circular economy policies in the labor market*. Retrieved on 20 February 2021. Available at [https://circulareconomy.europa.eu/platform/sites/default/files/ec\\_2018\\_-\\_impacts\\_of\\_circular\\_economy\\_policies\\_on\\_the\\_labour\\_market.pdf](https://circulareconomy.europa.eu/platform/sites/default/files/ec_2018_-_impacts_of_circular_economy_policies_on_the_labour_market.pdf)
- Chamber of Commerce of Molise. 2018. *Input study on "How to stimulate secondary raw material markets" Workshop*. Retrieved on 30 April 2021. Available at: [https://www.interregeurope.eu/fileadmin/user\\_upload/tx\\_tevprojects/library/file\\_1524152378.pdf](https://www.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1524152378.pdf)
- Chen, J. Z. 2009. *Material Flow and Circular Economy*. Retrieved on 10 January 2021. Available at <https://onlinelibrary.wiley.com/doi/epdf/10.1002/sres.968>
- Cifani, S. 2017. *E-Waste Management: The Importance of Recycling E-Waste*. Retrieved on 10 February 2021. Available at <https://www.dumpsters.com/>
- Circular City Funding. 2020. *Waste management and material recycling*. Retrieved on 20 February 2021. Available at <https://www.circularcityfundingguide.eu/circular-sector/waste-management-and-material-recycling/>
- Cohen, S. 2015. *The Growing Level of Environmental Awareness*. Retrieved on 15 February 2021. Available at: [https://www.huffpost.com/entry/the-growing-level-of-envi\\_b\\_6390054](https://www.huffpost.com/entry/the-growing-level-of-envi_b_6390054)
- Crear Salud. 2020. *Eating seasonal and local food*. Retrieved on 11 February 2021. Available at <https://crearsalud.org/comer-alimentos-ecologicos-de-temporada-y-locales/>
- Dodick, J. 2020. *A Review of the European Union's*. Retrieved on 22 February 2021. Available at <http://www.r2piproject.eu/wp-content/uploads/2017/04/A-Rview-of-the-European-Unions-Circular-Economy-Policy.pdf>

- Edwards, W. 2021. Supply chain issues due to the covid-19 crisis. Retrieved on 1 March 2021. Available at <https://es.noticias.yahoo.com/fotos-camiones-aparcados-aeropuerto-manston-reino-unido-caos-brexit-nueva-cepa-coronavirus-cierre-frontera-francia-115556873.html>
- Baden & Barber. 2020. The impact of the second-hand clothing trade on developing countries. Retrieved on 28 February 2021. Available at <https://www.eldis.org/document/A20014>
- Ellen MacArthur Foundation. 2020. The EU's Circular Economy Action Plan. Setting the world's largest single market on a transition towards a circular economy. Retrieved on 28 February 2021. Available at <https://www.ellenmacarthurfoundation.org/assets/downloads/EU-Case-Study-june2020-EN.pdf>
- European Commission. 2008. Communication from the commission to the European Parliament and the council Sustainable Consumption and Production and Sustainable Industrial Policy. Brussels. Retrieved on 18 February 2021. Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52008DC0397&from=EN>
- European Commission. 2020. EU trade agreements: delivering for Europe's businesses. Retrieved on 1 March 2021. Available at <https://trade.ec.europa.eu/doclib/press/index.cfm?id=2211>
- European Commission. 2020. Green Deal: Sustainable batteries for a circular and climate-neutral economy. Retrieved on 10 March 2021. Available at [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_20\\_2312](https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2312)
- European Commission. 2019. A Sustainable Europe by 2030. Retrieved on 30 January 2021. Available at [https://ec.europa.eu/info/publications/reflection-paper-towards-sustainable-europe-2030\\_en](https://ec.europa.eu/info/publications/reflection-paper-towards-sustainable-europe-2030_en)
- European Commission. 2020. A new Circular Economy Action Plan For a cleaner and more competitive Europe. Brussels. Retrieved on 28 January 2021. Available at [https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC_1&format=PDF)
- European Environmental Bureau. 2017. Leading examples of grassroots circular economy initiatives and lessons for policymakers. Retrieved on 23 January 2021. Available at <http://makeresourcescount.eu/wp-content/uploads/2017/02/EEB-Report-on-Circular-Consumption-Patterns-1.pdf>
- European Parliament. 2016. Strategy for secondary raw materials. Retrieved on 30 January 2021. Available at <https://www.europarl.europa.eu/legislative-train/theme-new-boost-for-jobs-growth-and-investment/file-strategy-for-secondary-raw-materials>
- European Parliament. 2020. Importance and benefits of the circular economy. Retrieved on 18 January 2021. Available at <https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits>
- Eurostat. 2016. Contribution of recycled materials to raw materials demand - end-of-life recycling input rates. Retrieved on 30 January 2021. Available at

<https://ec.europa.eu/eurostat/databrowser/bookmark/3e951583-9e23-4ecd-ab03-4060eb845b83?lang=en>

- Eurostat. 2016b. Patents related to recycling and secondary raw materials. Retrieved on 5 April 2021. Available at [https://ec.europa.eu/eurostat/cache/metadata/en/cei\\_cie020\\_esmsip2.htm](https://ec.europa.eu/eurostat/cache/metadata/en/cei_cie020_esmsip2.htm)
- Eurostat. 2018a. Recycling rate of packaging waste by type of packaging. Retrieved on 5 April 2021. Available at [https://ec.europa.eu/eurostat/cache/metadata/en/cei\\_wm020\\_esmsip2.htm](https://ec.europa.eu/eurostat/cache/metadata/en/cei_wm020_esmsip2.htm)
- Eurostat. 2018b. Recycling rate of e-waste. Retrieved on 5 April 2021. Available at [https://ec.europa.eu/eurostat/cache/metadata/en/cei\\_wm050\\_esmsip2.htm](https://ec.europa.eu/eurostat/cache/metadata/en/cei_wm050_esmsip2.htm)
- Eurostat. 2018c. Private investments, jobs, and gross value added related to circular economy sectors. Retrieved on 5 April 2021. Available at [https://ec.europa.eu/eurostat/cache/metadata/en/cei\\_cie010\\_esmsip2.htm](https://ec.europa.eu/eurostat/cache/metadata/en/cei_cie010_esmsip2.htm)
- Eurostat. 2019a. Recycling rate of municipal waste. Retrieved on 5 April 2021. Available at [https://ec.europa.eu/eurostat/cache/metadata/en/cei\\_wm011\\_esmsip2.htm](https://ec.europa.eu/eurostat/cache/metadata/en/cei_wm011_esmsip2.htm)
- Eurostat. 2019b. Circular material use rate. Retrieved on 5 April 2021. Available at [https://ec.europa.eu/eurostat/cache/metadata/en/cei\\_srm030\\_esmsip2.htm](https://ec.europa.eu/eurostat/cache/metadata/en/cei_srm030_esmsip2.htm)
- Eurostat. 2019c. Trade-in recyclable raw materials. Retrieved on 5 April 2021. Available at <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20190304-2>
- Eurostat. 2019d. Trade-in recyclable raw materials. Retrieved on 5 April 2021. Available at [https://ec.europa.eu/eurostat/cache/metadata/en/cei\\_srm020\\_esmsip2.htm](https://ec.europa.eu/eurostat/cache/metadata/en/cei_srm020_esmsip2.htm)
- Eurostat. 2020. Generation of municipal waste per capita. Retrieved on 5 April 2021. Available at [https://ec.europa.eu/eurostat/cache/metadata/en/cei\\_pc031\\_esmsip2.htm](https://ec.europa.eu/eurostat/cache/metadata/en/cei_pc031_esmsip2.htm)
- Eurostat. 2020a. EU self-Circular Economy indicators. Available at [https://ec.europa.eu/eurostat/cache/metadata/en/cei\\_pc010\\_esmsip2.htm](https://ec.europa.eu/eurostat/cache/metadata/en/cei_pc010_esmsip2.htm)
- Ewing-Chow, D. 2020. COVID-19 Has Given Consumers Five New Reasons To Eat Local. Retrieved on 20 March 2021. Available at <https://www.forbes.com/sites/daphneewingchow/2020/07/30/covid-19-has-given-consumers-five-new-reasons-to-eat-local/?sh=a3020f3ccc48>
- Gargano. 2020. Eat Local. Retrieved on 5 March 2021. Available at <https://fi.pinterest.com/pin/292804413250497580/?autologin=true>
- Government of The Netherlands. 2017. Retrieved on 5 January 2021. Available at <https://www.government.nl/topics/circular-economy/from-a-linear-to-a-circular-economy>
- Grant, C., & Osanloo, A. 2016. Understanding, selecting, and integrating a theoretical framework. Retrieved on 15 January 2021 Available at <https://scholar.google.fi/citations?user=gCvzN9UAAA&hl=es&oi=sra>
- Greenpeace Mexico. 2020. ¿Por qué es mejor consumir local que en supermercados? Retrieved on 5 March 2021. Available at <https://www.greenpeace.org/mexico/blog/8701/por-que-es-mejor-consumir-local-que-en-supermercados/>



- Kenniskaarten. 2020. How is circular economy different from linear economy? Reduce, reuse and recycle. Retrieved 30 April 2021. Available at: <https://kenniskaarten.het-groenebrein.nl/en/knowledge-map-circular-economy/how-is-a-circular-economy-different-from-a-linear-economy/>
- Iberdrola. 2020. The circular economy, a new model for sustainable production and consumption. Retrieved on 5 January 2021. Available at <https://www.iberdrola.com/environment/circular-economy-3-rs>
- IISD. 2020. European Commission Adopts Circular Economy Action Plan. Retrieved on 5 January 2021. Available at <https://sdg.iisd.org/news/european-commission-adopts-circular-economy-action-plan/>
- Institute for European Environmental Policy. 2020. EU circular economy and trade: Improving policy coherence for sustainable development. Retrieved on 5 January 2021. Available at <https://ieep.eu/news/eu-circular-economy-and-trade-improving-policy-coherence-for-sustainable-development>
- Isustainrecycling. 2017. Importance Of Recycling Packaging Waste. Retrieved on 25 January 2021. Available at <https://isustainrecycling.com/importance-recycling-packaging-waste/>
- Malhotra, M. 2020. Developing Countries Need New Solutions: Waste Management Rethought. Retrieved on 30 January 2021. Available at <https://medium.com/age-of-awareness/developing-countries-need-new-solutions-waste-management-rethought-8655717d20dd>
- McKinsey Quarterly. 2017. Mapping the benefits of a circular economy. Retrieved on 14 January 2021. Available at <https://www.mckinsey.com/business-functions/sustainability/our-insights/mapping-the-benefits-of-a-circular-economy>
- Meier, M. 2020. Opportunities In The Circular Economy For Wholesale Distributors. Retrieved on 13 February 2021. Available at <https://www.digitalistmag.com/improving-lives/2020/01/27/opportunities-in-circular-economy-for-wholesale-distributors-06202472/>
- OECD. 2018. Business Models for the Circular Economy. Retrieved on 2 February 2021. Available at <https://www.oecd.org/environment/waste/policy-highlights-business-models-for-the-circular-economy.pdf>
- OECD. 2018. International Trade and the Transition to a Circular Economy. Retrieved on 1 February 2021. Available at <https://www.oecd.org/environment/waste/policy-highlights-international-trade-and-the-transition-to-a-circular-economy.pdf>
- Olson, S. 2020. Arnet. Will COVID-19 advance sustainable trade? Retrieved on 13 January 2021. Available at <https://artnet.unescap.org/trade/advocacy/e-forum/will-covid-19-advance-sustainable-trade>
- Plastics Recyclers Europe. 2018. Circular economy. Retrieved on 17 February 2021. Available at <https://www.plasticsrecyclers.eu/circular-economy>
- RAEE Andalucía. 2020. Economía Circular vs Economía Lineal. Retrieved on 13 January 2021. Available at <https://www.raeeandalucia.es/actualidad/economia-circular-vs-economia-lineal>

- SecondTrade. 2020. Green Deal: SECONTRADE an essential player in the European circular economy. Retrieved on 23 February 2021. Available at <https://secontrade.com/blog/en/2020/09/08/green-deal-secontrade-an-essential-player-in-the-european-circular-economy/>
- Sell, Malena; Forslund, Tim. 2020. How can the international trade regime support a circular transition after the coronavirus crisis? Retrieved on 10 March 2021. Available at <https://www.sitra.fi/en/articles/how-can-the-international-trade-regime-support-a-circular-transition-after-the-coronavirus-crisis/>
- Sembiring, M. 2019. Global Waste Trade Chaos: Rising Environmentalism or Cost-Benefit Analysis? Retrieved on 30 January 2021. Available at [https://www.rsis.edu.sg/wp-content/uploads/2019/07/NTS-Insight-Global-waste-trade\\_010719.pdf](https://www.rsis.edu.sg/wp-content/uploads/2019/07/NTS-Insight-Global-waste-trade_010719.pdf)
- Sitra.fi. 2020. How can the international trade regime support a circular transition after the coronavirus crisis? Retrieved on 27 February 2021. Available at <https://www.sitra.fi/en/articles/how-can-the-international-trade-regime-support-a-circular-transition-after-the-coronavirus-crisis/>
- Stiftelsen Svensk Industridesign. 2018. Sustainability guide. Ecodesign. Retrieved on 24 January 2021. Available at <https://sustainabilityguide.eu/ecodesign/>
- Strawbees. 2020. Reduce, reuse and recycle. Retrieved 30 April 2021. Available at <https://strawbees.com/sustainability/>
- switchtogreen Europe. 2020. Circular Economy Action Plan I. Retrieved on 1 February 2021. Available at <https://www.switchtogreen.eu/circular-economy-strategy/>
- Tamminen, S., Sell, M., Forslund, T., Tipping, A., Soprana, M., & Belmann, C. 2020. Trading Services for a Circular Economy. IISD. Retrieved on 21 February 2021. Available at <https://www.iisd.org/system/files/2020-10/trading-services-circular-economy.pdf>
- Tecnun. 2020. Economía Circular aplicada al sector servicios. Available at <https://dadun.unav.edu/bitstream/10171/59492/1/Econom%C3%ADa%20Circular%20aplicada%20al%20Sector%20Servicios.pdf>
- Trade, development and environment Hub. 2020. Sustainable trade after COVID-19: Can we do better? Retrieved on 3 March 2021. Available at <https://tradehub.earth/2020/07/21/sustainable-trade-after-covid-19-can-we-do-better/>
- UNEP. 2020. Circular economy. Retrieved on 27 January 2021. Available at [unep.org](https://www.unep.org/circular-economy/).
- United Nations. 2015. Sustainable development goals. Retrieved on 26 February 2021. Available at <https://www.un.org/sustainabledevelopment/sustainable-consumption-production/>
- United Nations environment program. 2020. Sustainable trade-in resources: global material flows, circularity, and trade. Retrieved on 13 March 2021. Available at <https://www.un.org/en/>
- Water Europe. 2020. European Commission releases a new Circular Economy action plan. Retrieved 30 April 2021. Available at: <https://watereurope.eu/european-commission-releases-a-new-circular-economy-action-plan/>

- Wenzel, E. 2019. Green Beez. 5 emerging jobs in the circular economy. Retrieved on 31 January 2021. Available at <https://www.greenbiz.com/article/5-emerging-jobs-circular-economy>
- WTO. 2019. Export restrictions on strategic raw materials and their impact on trade and global supply. Retrieved on 25 February 2021. Available at [https://www.wto.org/english/res\\_e/publications\\_e/wtr10\\_forum\\_e/wtr10\\_oecd2\\_e.htm](https://www.wto.org/english/res_e/publications_e/wtr10_forum_e/wtr10_oecd2_e.htm)
- Yamaguchi, S. 2018. International Trade and the Transition to a More Resource Efficient and Circular Economy; A Concept Paper. Retrieved on 13 March 2021. Available at <https://www.oecd-ilibrary.org/docserver/847feb24-en.pdf?expires=1612883327&id=id&accname=guest&checksum=984170BADA67876B893ABF20F35C5FB2>
- Yamaguchi, S. 2020. International trade and circular economy - Policy alignment. Retrieved on 27 February 2021. Available at [https://www.oecd-ilibrary.org/environment/international-trade-and-circular-economy-policy-alignment\\_ae4a2176-en](https://www.oecd-ilibrary.org/environment/international-trade-and-circular-economy-policy-alignment_ae4a2176-en)
- Zero Waste Europe. 2020. Waste Trade. Retrieved on 17 January 2021. Available at <https://zerowasteeurope.eu/waste-trade/>
- Zero Waste Scotland. 2020. What are circular economy, business models? Retrieved on 17 January 2021. Available at <https://www.zerowastescotland.org.uk/content/what-are-circular-economy-businessmodels#:~:text=What%20are%20circular%20economy%20business,for%20as%20long%20as%20possible>