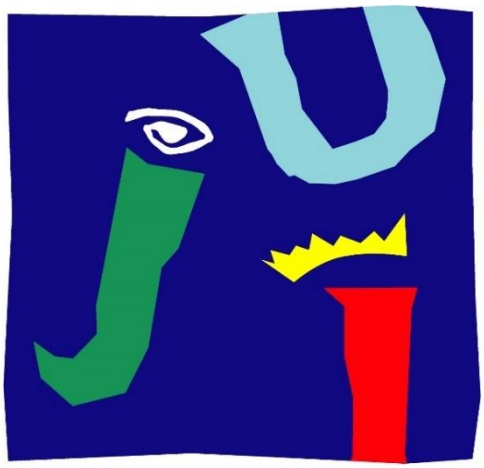
CIRCULAR ECONOMY: ANALYSIS OF THE AGENTS IMPLIED IN THE FOOD INDUSTRY



UNIVERSITAT JAUME·I

Author: Ana Castillo Ribes

Tutor: Luis Martínez Cháfer

DEGREE IN BUSINESS ADMINISTRATION AND MANAGEMENT

AE1049 – END OF DEGREE PROJECT

ACADEMIC YEAR 2020-21

INDEX

A. TABLES INDEX

B. FIGURES INDEX

C. IMAGES INDEX

1. INTRODUCTION

In recent years, public awareness of the importance of caring for the environment has been on the rise, both in Spain and in many other countries. In fact, we can see how private and public entities, governments and consumers themselves are adapting their business models, legislation and consumption patterns, respectively, in favour of environmental preservation.

In the business world, in particular, care for the environment has a dual motivation: concern for the environment itself and the competitive advantages of being known as environmentally and ethically sustainable. Even so, many companies still refuse to change their business models. Consequently, national and European legislation will be very important in this transition towards more environmentally sustainable business and consumption patterns.

This social and cultural context described above will frame the following work, which will aim to analyse the different actors involved in the food industry, and thus see the importance of each one in the decisions regarding the promotion of the circular economy in this sector.

In order to address this main objective, we will analyse the food distribution sector in the Valencian Community and the agents and factors involved in it to determine which aspects of the value chain need to be addressed in order to move from a linear to a circular model and to tackle the environmental problem of packaging food products with materials that are difficult to recycle, and which are mostly single use.

In addition, during this analysis we will look for good practices framed in some of the agents analysed, which could be possible solutions to this problem.

Finally, the most interesting conclusions obtained from this research will be presented and a series of guidelines or aspects that we have discovered that can be improved and that can be applied in our territory will be commented on, to see if these possible solutions can be replicated in our territory and if they are real and environmentally efficient solutions.

2. THEORETICAL FRAMEWORK

In this section we will give some theoretical descriptions that we have been able to collect from different sources on the linear and circular economy models, in order to provide a better understanding of the issues we are going to discuss and to achieve a better understanding of the following work.

2.1. Concept of Linear Economy

Linear economy can be defined as the set of phases that products go through from the extraction of their raw materials from natural environments until the moment they are disposed of as wastes. As Ellen MacArthur Foundation says in their book 'Towards the circular economy' (2013, p.2) "Traditional linear consumption patterns ('take-make-dispose') are coming up against constraints on the availability of resources", "Companies harvest and extract materials, use them to manufacture a product, and sell the product to a consumer – who then discards it when it no longer serves its purpose." (Ellen MacArthur Foundation, 2013, p.6).

Image 1. Linear Economy Model

Source: Antonio Serrano Acitores webpage

In this model, companies follow the traditional production and consumption model that is based on producing from raw materials and disposing of the products once their useful life is over. This system damages ecosystems from the first phase of extraction of raw materials to the last phase of waste disposal, which means constantly extracting resources from nature and throwing away waste to landfills and, in some cases, to nature.

2.2. Concept of Circular Economy

The alternative to the linear economy model is a circular economy model. "The central ideas of the Circular Economy are the elimination of waste by design, respect for the social, economic and natural environment, and resource-conscious business conduct" (Sariatli, 2017, p.1).

The implementation of this model is very important for sustaining the planet's natural resources, taking into account that, as stated in WWF's 2012 'Living Planet Report' (2012, p.12), "it currently takes 1.5 years for the Earth to regenerate the renewable resources people use and to absorb the carbon emissions produced in a year" and "by 2030 we will need resources equivalent to two planets to sustain the world's population."

As the Ellen MacArthur Foundation says (2013, p.7), “A circular economy is an industrial system that is restorative or regenerative by intention and design. It replaces the ‘end-of-life’ concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models.” This model not only collects waste from the end of the “take – make – dispose” process and reintroduces it into this linear chain, but advocates an integrated system in which, from the introduction of raw materials and their transformation, the treatment of this waste is taken into account so that at the end of the product’s useful life it can be transformed into input and reincorporated into the production cycle as raw material. In this way, waste is avoided and at the same time the necessary natural resources are reduced.

As a summary of all these definitions given by experts in the field, we can say that achieving a circular economy model means achieving a sustainable model that maximises the available resources so that they remain in the production cycle for as long as possible, maintaining the value of these resources in the economic cycle for as long as possible, thus preventing and minimising the generation of waste and the negative effects of obtaining primary resources on the environment and society.

Image 2. Circular Economy Model

Source: Antonio Serrano Acitores webpage

3. EMPIRICAL FRAMEWORK

In order to carry out this analysis work, a research study will be carried out on the recent circular economic model, based on reuse, reintroduction of products into the economy and minimum waste generation. Most of the information will come from secondary sources such as bibliographic references, statistical data and reports, press articles, scientific papers and other web portals.

To explain this model in a more exhaustive way, we will analyse the agents involved, focusing this work on the food industry and, specifically, on single-use packaging. This section will analyse the involvement of each of the actors and their role in implementing the circular model.

Subsequently, a benchmarking of this sector around the world will be carried out. In this way, we will learn about good practices currently being carried out and how to apply them in our country.

3.1. Data sources

In this section there will be the list and a little explanation of the data sources we found relevant information for this work:

Databases:

- Statista: Statista is one of the leading providers of market data and consumer information. On their portal you can find more than one million statistics on approximately 80.000 topics.
- INE: The National Statistics Institute is an autonomous organization attached to the Ministry of Economic Affairs and Digital Transformation through the State Secretariat for Economic Affairs and Business Support. In its website you can find demographic, consumer, employment and economic data, among others.
- Eurostat: Eurostat is the statistical office of the European Union. Eurostat produces European statistics in partnership with National Statistical Institutes and other national authorities in the EU Member States. This partnership is known as the European Statistical System (ESS). It also includes the statistical authorities of the European Economic Area (EEA) countries and Switzerland.
- Fundación Cotec: Cotec is a private non-profit organisation whose mission is to promote innovation as a driver of economic and social development. To this end, it collects and generates data, analyses it and, on the basis of this, draws up proposals and issues opinions in its so-called Cotec Reports.

Food distribution companies:

- Consum: Consum began in 1975 as a consumer cooperative, with the opening of its first establishment in Alaquàs (Valencia) and a group of 600 consumer members. It currently has more than 730 supermarkets, 15.300 workers and 3.300.000 member-customers, being present in the Valencian Community, Catalonia, Murcia, Castilla-La Mancha, Aragon and Andalusia.
- Mercadona: In 1977 it began its activity within the Cárnicas Roig Group, a family business located in La Pobla de Farnals (Valencia). It currently has more than 1.500 supermarkets located throughout Spain and more than 15 in Portugal.
- Masymas: In 1981 it was decided to open the first supermarket in Pedreguer (Alicante), since then it has opened the 130 shops that Masymas has today, shops that are distributed throughout the Valencian Community and the Region of Murcia.

- Linverd: Linverd was born in 2021, the first ecological supermarket without plastic packaging in Spain. It is a family business located in Barcelona and was born out of the family's dissatisfaction with the daily consumption of packaging that pollutes.

Packaging companies and support services companies.

For example:

- ECOLAC
- Seijaenvases
- Multibisol
- AINIA
- AMIPLAS
- VAERSA

Relevant legislative bodies:

- European Union bodies:
    - LIFE programme: The LIFE programme is the EU's funding instrument for the environment and climate action. Created in 1992, it has co-financed thousands of projects.
    - EUR-Lex: webpage where you can access to European Union Law.
    - European Environmental Agency (EEA): the EEA is an agency of the European Union, whose task is to provide sound, independent information on the environment.

- Spanish Government:
    - Ministry of Ecological Transition and the Demographic Challenge
    - Ministry of Agriculture, Fisheries and Food
    - Ministry of Social Rights and Agenda 2030
    - Ministry of Finance

- Generalitat Valenciana:
    - Regional Ministry of Sustainable Economy, Productive Sectors, Trade and Labour
    - Regional Ministry for Agriculture, Rural Development, Climate Emergency and Ecological Transition
    - Regional Ministry for Innovation, Universities, Science and the Digital Society

A variety of newspapers and press releases.

For example:

- elDiario.es
- Europa Press
- Levante-EMV
- La Vanguardia
- El Salto
- Financial Food
- Food Retail

3.2. Context of the research

The context of this research on the food industry is limited to the area of the Valencian Community, analysing the agents involved in the area and those that affect the sector directly at higher levels, such as Spanish and European legislation.

The Valencian Community is the fourth most populated autonomous community in Spain, with approximately 5 million citizens. In 2019, this autonomous community has a GDP per capita of 23.206 €, an economic growth of 2,1% and an average expenditure per person of almost 12.000 €.

The food industry has got a great importance in the Valencian Community, since, as we have seen in the previous point, several of the supermarkets with the highest sales volume in the country, such as Mercadona and Consum, have been founded in the community. This may have been favoured by its location, as the Valencian Community has a large coastline for fishing, large fields for agriculture and large plains for extensive livestock farming, making it easy to find suppliers of all types of foodstuffs in the area.

3.3. Scientific methodology and statistical study

In order to know and understand in greater depth the aspects that affect the use of packaging in the food industry and to find solutions to the problem that this causes for the environment, we are going to use a case study methodology.

In this case study we will analyse the agents involved in this sector in order to discover the weight that each one of them has in the decisions regarding the manufacture of

packaging. We will also look for examples of good practices in the manufacture, distribution and treatment of packaging carried out in other parts of the world, which we could introduce in the Valencian Community and promote the circular economy from different aspects.

All this will be based on existing information from secondary sources, such as databases, different corporate and governmental websites, and press articles. The information and data obtained from these and other sources will be triangulated to obtain definitive conclusions.

4. RESULTS

Based on the data sources mentioned in the previous point "3.1. Data sources", we have managed to compile the following information on the consumption of single-use packaging in supermarkets and on some good practices of forecasting, management and recovery of this waste in Europe and Spain.

4.1. Characterization of the agents implied

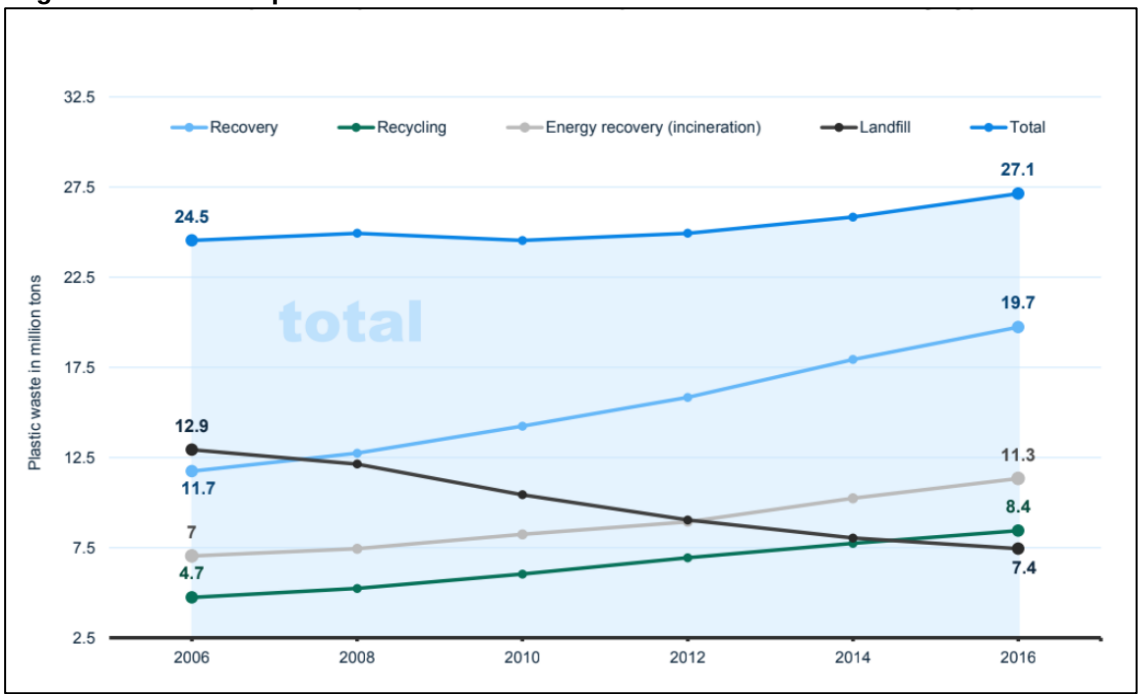
In this subsection we can see the Characterisation Map, where we can find all the information obtained ordered and classified according to the stakeholders affected by each of the data.

4.1.1. Europe, European Union, and European Union Legislation

From the **Statista** database we have obtained information from a study called "Plastic waste in Europe", from which we have obtained information on rates and comparisons of plastic use and recycling between the countries of the European Union.

As we can see in the following graph (Figure 1), in Europa, the amount of plastic waste ending up in landfills has decreased, while rates of other disposal methods have increased.

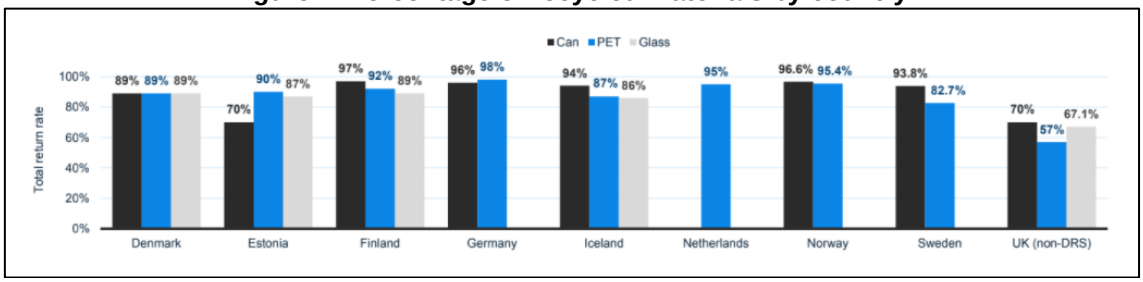
Figure 1. Amount of plastic waste and its different treatments at the end of its useful life



Fuente: Statista

In addition, in this study we find an analysis of the effectiveness of the Deposit Return System, a government incentivised reward system for recycling. In the following graph (Figure 2) we can see the difference between the countries with this incentive system implemented compared to the UK, which does not have it in place.

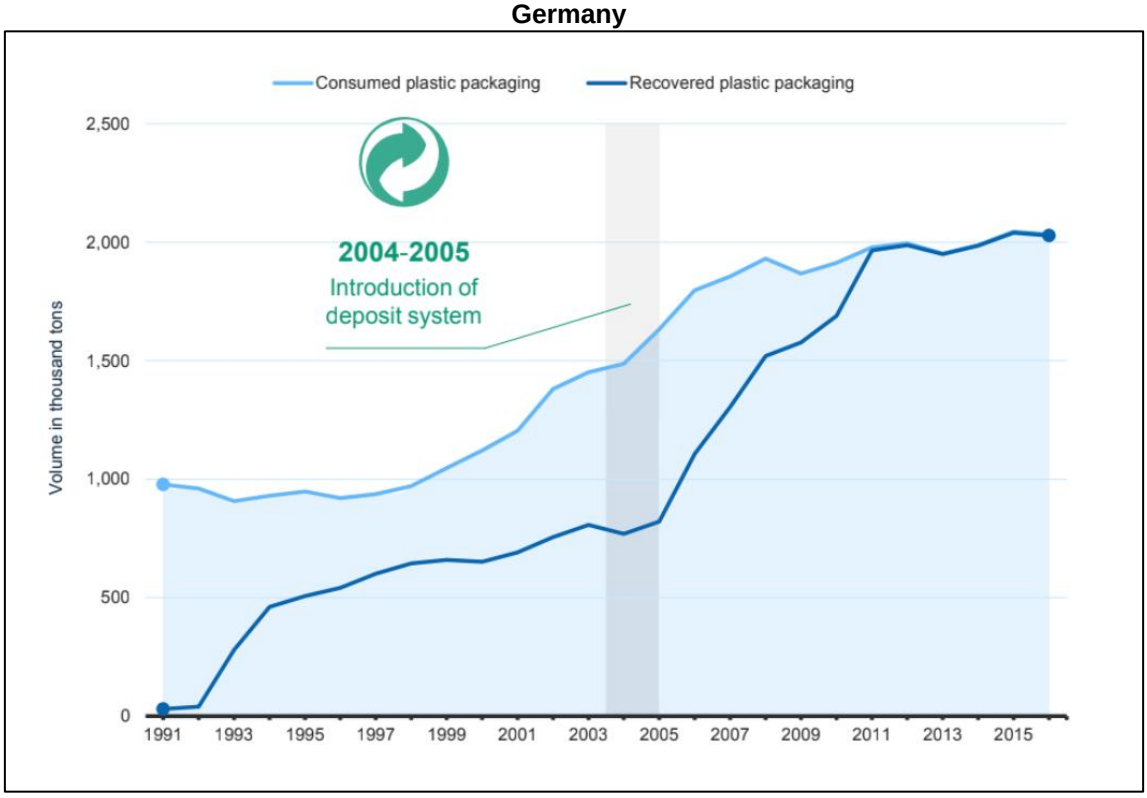
Figure 2. Percentage of recycled materials by country



Fuente: Statista

Regarding to this reward system (DRS), as we can see in the following graph (Figure 3), Germany is a great example. This country has implemented a series of laws since 1993 to achieve today that almost 100% of the packaging produced is recovered.

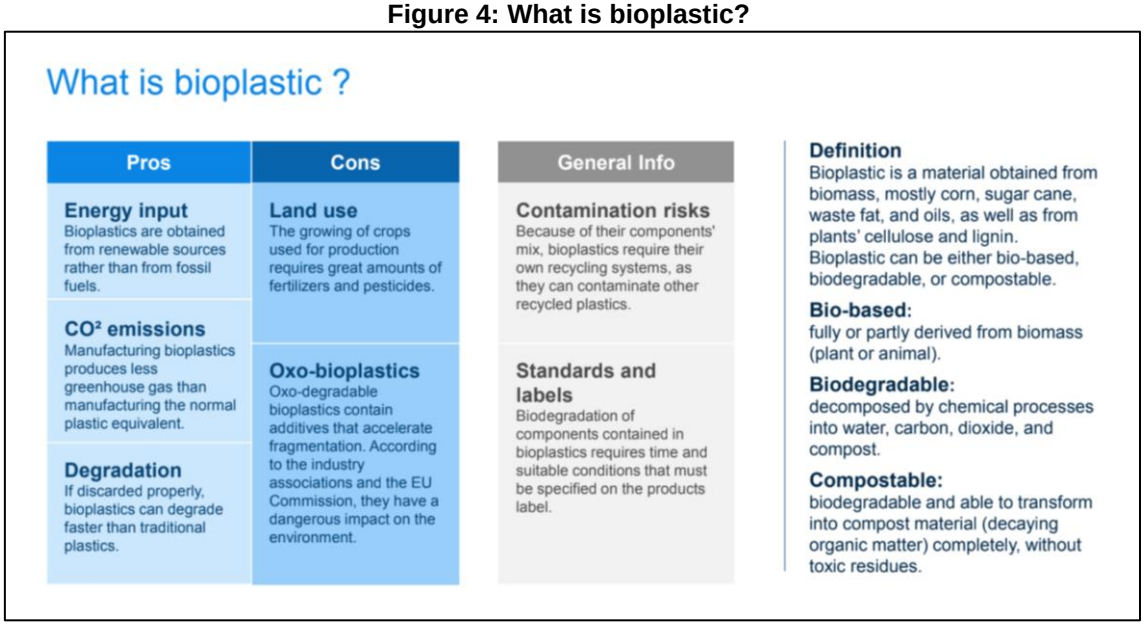
Figure 3: Effect of the introduction of the DRS on the recovery of plastic packaging in Germany



Fuente: Statista

And, on the other hand, we can also see in this study an example of eco-innovation, bioplastic, which is a biodegradable plastic that is beginning to be studied for its implementation in the UE territory, although its pros and cons are still being weighed up, it is a good line of research for which to continue studying.

Figure 4: What is bioplastic?



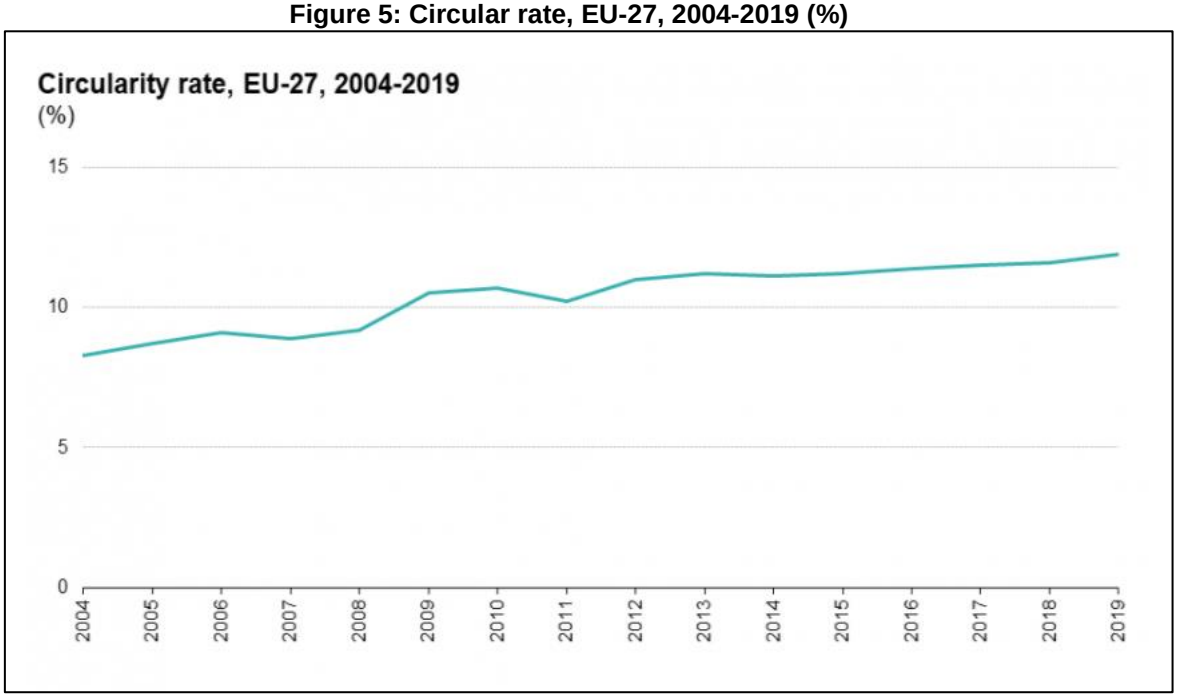
Fuente: Statista

From the **Eurostat** database we have found comparative information between EU member states regarding recycling rates, circularisation of the economy and targeted innovation, measured in number of patents.

As there was no indicator to measure the circularity of an economy on a macroeconomic level, Eurostat has created an indicator called "Circular material use rate", which measures the contribution of recycled materials towards the overall use of materials.

As we can see in the graph below (Figure 5), following the criteria of this indicator we can observe that there is a growing trend towards circularity in Europe as a whole. This indicator is significantly lower than other circularity indicators, such as the recycling rate, which stands at 56%, or plastic-specific recycling, measured in 2018 at 41,5%.

Figure 5: Circular rate, EU-27, 2004-2019 (%)



Fuente: Eurostat

A table with the most relevant data for this work is presented below (Table 1), taking as a reference the average level of the European Union, and comparing it with Spain and other member states generally well rated in environmental matters.

In the first row of the table, we can see data on the percentage of plastic packaging recycled in each country. Surprisingly, this indicator shows that Spain is above some of the most renowned countries in environmental matters.

On the other hand, the second row shows the data of the "Circular material use rate" index mentioned above. With respect to this indicator, we can see that Spain is below the European average and that countries such as Germany and The Netherlands are far ahead of us, especially the latter, with the highest rate in the entire EU, so we will see later on how they act to obtain this data.

And finally, we can observe in the last row the "Number of patents related to recycling and secondary raw materials" of each country, this being an indicator of the importance given to innovation in each country. In this case, Spain is among the first in Europe, being responsible for 10,8% of patents of this type in the European Union.

Table 1: Indicators from Eurostat

	Europe	Spain	Germany	The Netherlands
Recycling rate of plastic packaging (percentage) (2018)	**41,5**	50,7	46,4	50,4
Circular material use rate (percentage) (2019)	**11,9**	10,2	12,2	28,5
Number of patents related to recycling and secondary raw materials (2016)	**269,14**	29,09	66,53	15,69

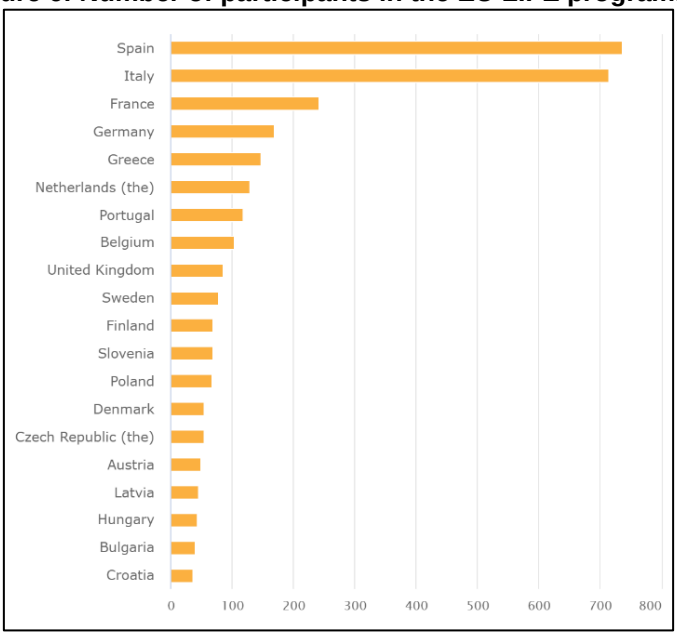
Source: Own elaboration based on Eurostat data

According to Eurostat, “Differences in the circularity rate across Member States are due not only to the amount of recycling in each country, but also to structural factors in national economies”. Therefore, to improve our data as a country we should take a broad view of our factors as a nation and not only try to improve our recycling and waste treatment system.

From the website of **the EU's LIFE programme**, we have obtained information about the projects that this programme has in 43 countries, both European and non-European.

As can be seen in the following bar chart (Figure 6) showing the TOP20 countries with the most participants in the EU LIFE programme, Spain is the country with the highest number of participants, with a total of 737 companies involved.

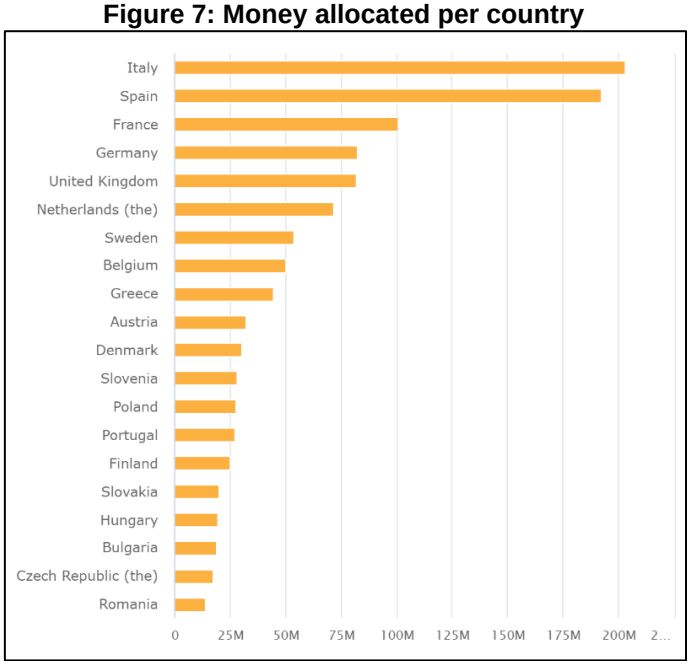
Figure 6: Number of participants in the EU LIFE programme



Source: LIFE programme 2014-2020 datahub

As can be seen below (Figure 7), Spain is not the country with the highest level of funding in the LIFE programme. This is since the nature and size of the projects carried out in our country means that the programme bases consider that a smaller capital contribution is necessary. Even so, the difference with the country that receives the largest amount of funding (Italy) is not significant, as this country receives 202.988.908 € and Spain 192.185.338 €, so the difference is approximately 10,8 million euros.

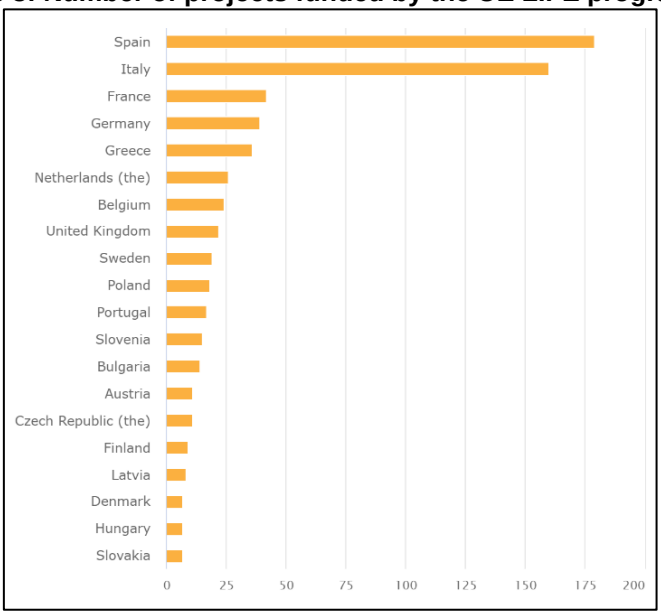
Figure 7: Money allocated per country



Source: LIFE programme 2014-2020 datahub

In the following graph (Figure 8) we can see that Spain, although it is not the country with the largest amount of financial investment in the programme, continues to be the country with the largest number of projects developed within this programme, having developed a total of 179 projects, 19 more than Italy, the second country with the second largest number of projects developed by the LIFE programme.

Figure 8: Number of projects funded by the UE LIFE programme



Source: LIFE programme 2014-2020 datahub

European legislation for packaging and packaging waste can be found on the **EUR-lex** website. This website contains Directive 94/62/EEC of 20 December 1994, which coordinates the national measures on the management of packaging and packaging waste to ensure a high level of environmental protection and the functioning of the internal market.

This directive is still in force, although it has subsequently been amended by:

- Directive 2004/12/EC of the European Parliament and of the Council of 11 February 2004.
- Directive 2005/20/EC of the European Parliament and of the Council of 9 March 2005.
- Regulation (EC) nº 219/2009 of the European Parliament and of the Council of 11 March 2009 adapting certain acts subject to the procedure laid down in Article 251 of the Treaty to Council Decision 1999/468/EC.
- Commission Directive 2013/2/EU of 7 February 2013 amending Annex I to Directive 94/62/EC.

The measures set out in this directive include:

- The minimum percentage of recycling and recovery of packaging that will be accepted from the publication of this directive (Figure 9).
- The need for governments to encourage the use of recycled materials in the manufacture of new packaging.
- Establish systems for the return, collection and recovery of packaging and packaging waste, as well as a system for identifying the material from which each package is made.
- Limits on the amount of heavy metals that can be found in packaging and packaging waste.
- Etc.

Figure 9: Minimum percentage of recycling and recovery of packaging by material

	Current targets (%)	By 2025 (%)	By 2030 (%)
All packaging	55	65	70
Plastic	25	50	55
Wood	15	25	30
Ferrous metals	50 (incl. Al)	70	80
Aluminium	-	50	60
Glass	60	70	75
Paper and cardboard	60	75	85

Source: European Commission webpage

In addition to the above-mentioned directive on packaging and packaging waste, the European Union published the Directive 2008/98/EC of the European Parliament and of the Council, a directive on waste, which can also be accessed from the **EUR-lex** website and from which the following information can be found.

As stated in Article 4 of this directive, the order of waste treatment is: prevention, preparation for re-use, recycling, recovery and, as a last resort, disposal, with Member States giving priority to measures that encourage the most environmentally friendly options.

Another information that this directive gives us is the extended producer responsibility, about which it tells us that the member states of the European Union can make certain laws to make the producer, seller, importer, etc. responsible for the waste management and financially liable for the products they have put on the market at the end of their useful life. Apart from that, the directive gives the option to the member states of encouraging the design of products in ways that reduce their environmental impact and waste generation.

As these are EU directives, the objectives described above are a guide to what all EU countries should achieve, but each nation will have to develop its own laws to achieve them. The laws that apply in the Spanish state to achieve the objectives we have just described will be shown in the following section "4.1.2. Spain, the Spanish government and Spanish legislation".

Another important directive found on the **EUR-lex** website is Directive (EU) 2019/904, on the reduction of the impact of certain plastic products on the environment, which "aims to prevent and reduce the impact of certain plastic products on the environment and to promote the transition to a circular economy". This directive is not closely related to the issue at hand, as its scope of application is utensils such as plastic straws, plastic plates and cutlery, single-use cotton buds, among others. Even so, knowledge of the existence of this European directive can show us that the European Union is making many efforts to legislate in favour of the circular economy, so we can foresee that, in the future, European legislative bodies will continue to make laws to promote the circular economy.

From the website of the **European Environment Agency**, we have obtained information on the quantities of packaging waste that are recycled in the different countries of Europe.

The increasing demand for primary materials in the European Union makes recycling one of the main ways to reduce the consumption of primary resources by replacing them with secondary products made from recycled waste.

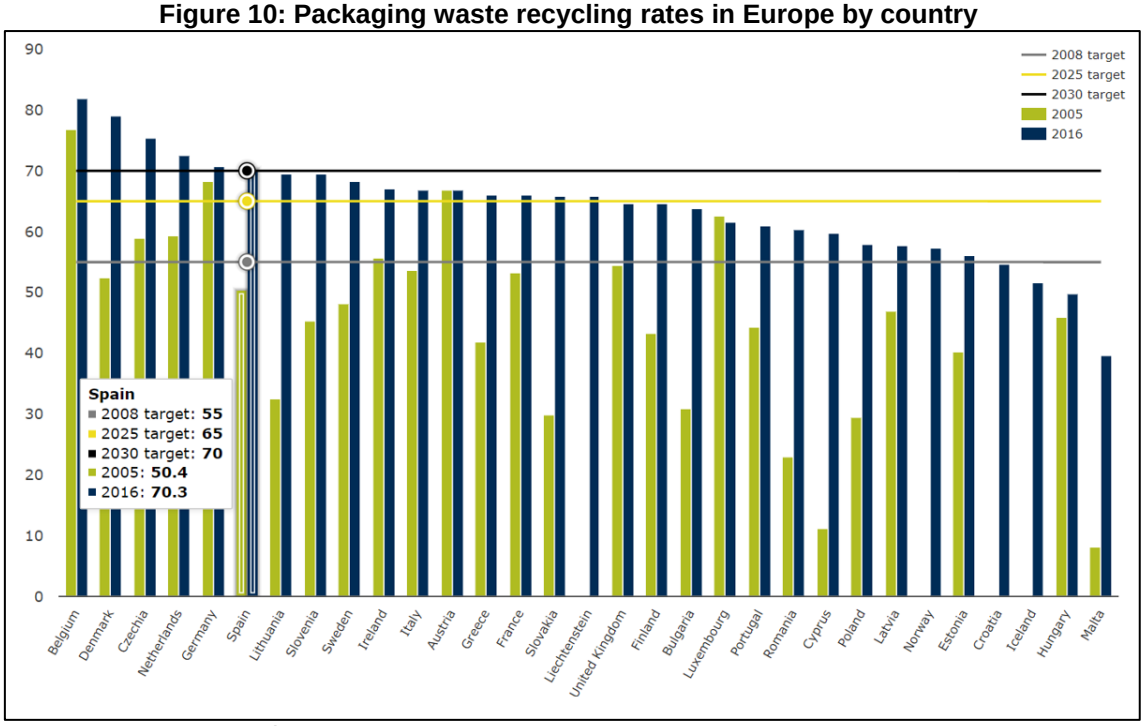
As we can see in the bar chart below (Figure 10) progress in the area of packaging waste is significant for some countries. The packaging waste recycling rate increased from 54% in 2005 to 67% in 2016, by 13 percentage points in the EU-28. At country level, 28 countries recycled 55% or more of their packaging waste in 2016. Recycling

rates in 2016 varied between 40% and 82%, but on average, recycling rates across countries have increased since 2005.

The recycling target of 55% by 2008 was reached by 28 countries in 2016. Fifteen countries had already reached the 65% target by 2025 in 2016, and as many have already reached the 70% target by 2030 in 2016.

Among the countries that have reached the target of recycling 70% of packaging by 2030 is Spain, although this should come as no surprise since, as we saw in the Eurostat data analysed in this section, Spain was ahead of many of the most environmentally lauded countries in recycling plastic packaging.

Figure 10: Packaging waste recycling rates in Europe by country



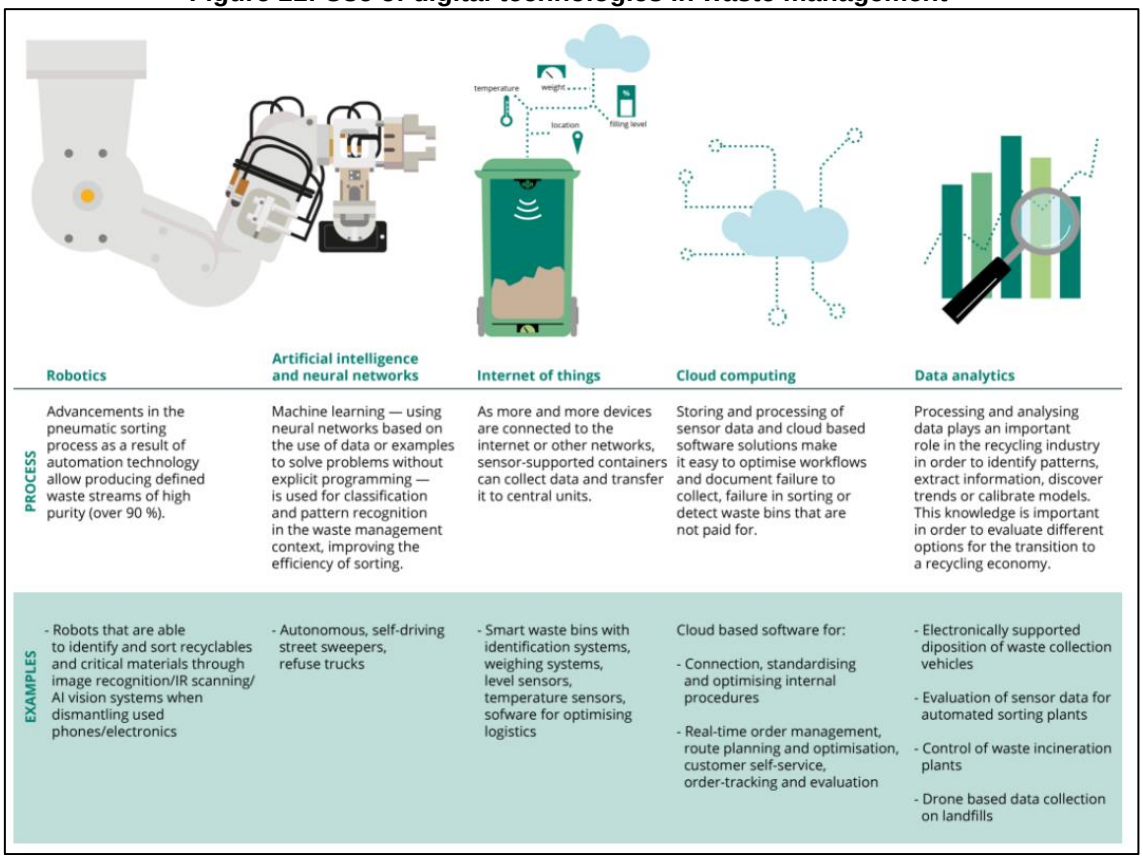
Source: European Environment Agency

On the other hand, from the website of the **Europe Environment Agency** we found a piece of news item on the role of advanced digital technologies, such as robotics, cloud computing and artificial intelligence, in making Europe's waste management and treatment systems more circular and sustainable.

At the present time, advanced digitisation projects for waste management and treatment processes in the European Union are in the innovation phase, in which new business models with these technologies as protagonists are beginning to emerge.

In the illustration below (Figure 11), we can see a very visual example of how some of the most developed advanced digital technologies could be used to improve the efficiency of the waste industry at the waste management stage.

Figure 11: Use of digital technologies in waste management



Source: Europe Environment Agency

4.1.2. Spain, Spanish Government, and Spanish Legislation

From the official website of the **Ministry of Social Rights and Agenda 2030** we have obtained information on Goal 12 of the Sustainable Development Goals (SDGs), Responsible Consumption and Production. This goal is the framework for all actions to "promote sustainable management and efficient use of natural resources, reduce waste and food waste, promote environmentally sound management of chemicals, and encourage the implementation of sustainable business practices and universal access to information on lifestyles in harmony with nature".

On this official website we can find, within Goal 12 of the SDGs, different specific targets to be achieved by 2030. Specifically, target "12.5 PREVENTION, REDUCTION, RECYCLING AND REUSE OF WASTE" aims to "significantly reduce waste generation

through prevention, reduction, recycling and reuse activities". As we can see, this objective is in line with the Directive 2008/98/EC of the European Parliament and of the Council, which spoke to us about the hierarchy in which waste has to be treated.

On the other hand, by accessing the "Action Plan for the implementation of the 2030 Agenda" on this same website we have access to more information related to SDG 12.

SDG 12 involves 11 ministries, with the Ministry of Agriculture, Fisheries and Food being primarily responsible for this goal. However, within the section corresponding to Goal 12, we see that the information provided is limited to giving data on the current situation and does not provide any specific policy to achieve this goal, since, as we have seen above, the laws and actions to achieve these goals must be specified by each country on its own.

In this same document we find, in the section on leveraging policies to promote the SDGs, nine areas called "Priority Areas for Action", which are the areas in which the different SDGs can be framed and in which it is intended to carry out a series of initial actions to pave the way, in order to facilitate the implementation of laws and measures before initiating actions on the specific goals, and to progressively achieve all the SDGs.

One of these areas of action is "Area IV. The circular economy", an area that is mainly involved in objective 12, but which also covers objectives 7, 8, 13, 14, 15 and 5. The objectives of this area of action are to move from a linear economy model towards a sustainable model that maximises the available resources, both material and energy, so that they remain in the production cycle for as long as possible and minimise the generation of waste.

The action carried out in this area is the creation of the Spanish Circular Economy Strategy (EEEC in Spanish), Spain Circular 2030, which has a series of quantitative objectives to be achieved by 2030:

- To reduce by 30% the national consumption of materials in relation to GDP, taking 2010 as a reference year.
- Reduce waste generation by 15% compared to 2010.

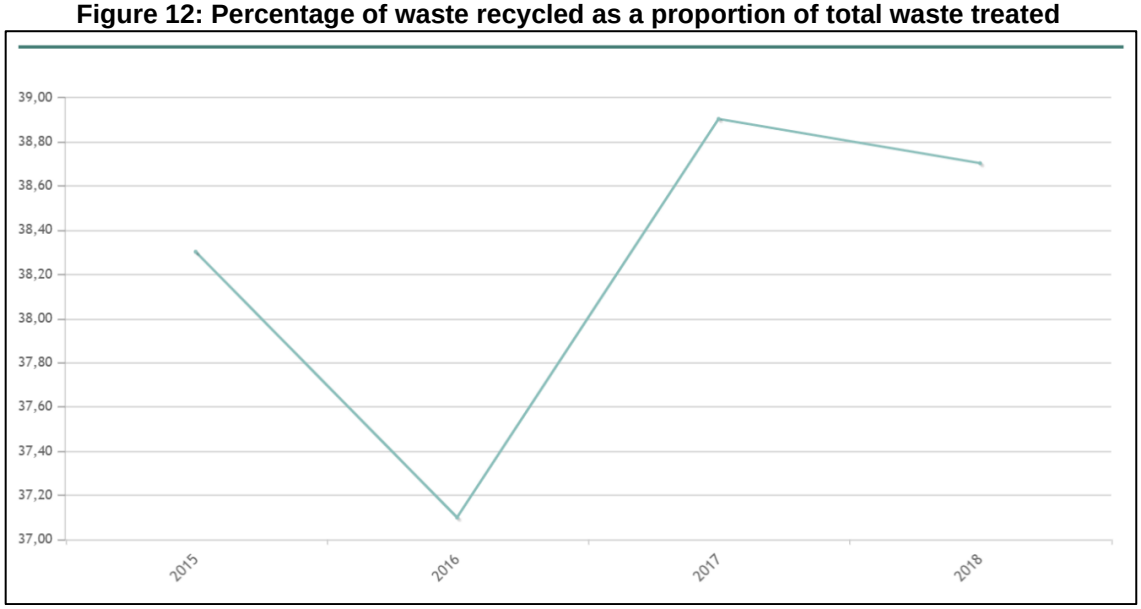
- Reduce food waste generation throughout the food chain: 50% reduction per capita at household and retail level and 20% reduction in production and supply chains from 2020 onwards.
- Increase reuse and preparation for reuse to 10% of municipal waste generated.
- Improve water efficiency by 10%.
- Reduce greenhouse gas emissions to below 10 million tonnes of CO2 equivalent.

The **Action Plan for the Implementation of the 2030 Agenda** indicates that the monitoring of compliance with the SDGs can be carried out through the indicators enabled in the Agenda 2030 section of the INE's National Statistical Plan and in Eurostat's Sustainable Development Indicators.

From the **INE** database we find different indicators for each SDG and for each specific sub-target within each of them. In our case, the Goal we are interested in is Goal 12.5, for which only the indicator "National total recycling, in tonnes of recycled material" is linked.

This indicator shows us, as we can see in the graph below (Figure 12), that the percentage of waste recycled in Spain has varied between 37,10% and 38,90% in recent years, and that in 2018, the year in which we have the latest data, this percentage stood at 38,70%.

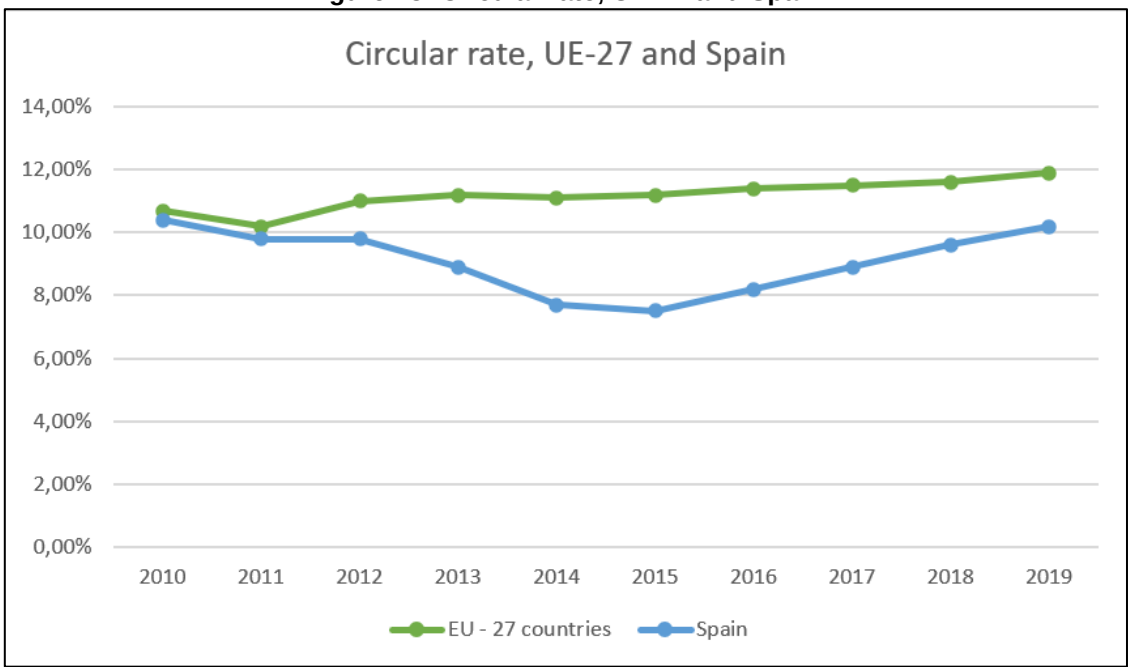
Figure 12: Percentage of waste recycled as a proportion of total waste treated



Source: INE

On the other hand, in the **Eurostat** database you can also look up the indicators for each of the SDGs, although the only interesting indicator linked to this goal is the "Circular material use rate", which we discussed in section "4.1.1. Europe, European Union, and European Union Legislation", Figure 5, although now we also obtain the data for Spain in order to compare them with those of the European Union, as we can see in the following graph (Figure 13). This graph shows how Spain's circularity rate is slightly lower than that of the European Union in all the years that this indicator has been observed in our country.

Figure 13: Circular rate, UE-27 and Spain



Source: Own elaboration based on Eurostat data

From the website of the **Ministry of Finance** we have been able to obtain the "Report on the alignment of the General State Budget with the Sustainable Development Goals of the 2030 Agenda", where we can find a breakdown of the SDGs considering the different measures and actions of spending policies.

Among the actions planned to finance Objective 12 is the promotion of the circular economy at company level, where a minimum of 10 projects aimed at making the company and the sector as a whole more efficient will be financed. As we can find on the website of the Ministry of Ecological Transition and the Demographic Challenge, some examples of projects of this type would be investments to encourage cleaner and circular business models, develop the design of safe circular products, and projects between companies related to industrial symbiosis, among others.

Furthermore, there are different actions related to waste treatment, such as the construction of new facilities for the preparation for reuse and recycling of separately collected waste streams, investments in collection, sorting and classification facilities and mechanical-biological treatment plants, and the development of instruments for the improvement of digital waste records. These three actions are closely related to the treatment of packaging and packaging waste and are therefore market opportunities for packaging waste management and treatment companies.

The Spanish law on packaging and packaging waste can be found in the **Official State Gazette** (**BOE** in Spanish), which is Law 11/1997 of 24 April 1997 on Packaging and Packaging Waste. This law transposes Directive 94/62/EC, of 20 December, into Spanish legislation and aims to reduce the environmental impact of packaging and waste management throughout its life cycle.

The most important aspects of this law are:

- Obligation for packaging to reduce its weight and volume.
- The priority waste treatment hierarchy is repeated, as we saw in Directive 2008/98/EC of the European Parliament and of the Council, and in the description of Goal 12 of the SDGs.
- Local authorities are responsible for the collection of packaging waste from private households.
- Packagers are obliged to charge the consumer a fee per package, and to return it when it is returned to them, although this obligation can be replaced by participation in an integrated packaging waste management system, in which they are responsible for the collection, transport, storage and recycling of packaging waste.

On the other hand, in June 2020, the **Presidency of the Government**, together with the **Ministry of Ecological Transition and the Demographic Challenge**, promoted a Draft Bill on Waste and Contaminated Land to promote a circular economy, improve waste management in Spain and fight against pollution. This Draft Bill aims to transpose the following EU Directives:

- Directive (EU) 2018/851 of 30 May 2018 amending Directive 2008/98/EC on waste.

- Directive (EU) 2019/904 of 5 June 2019 on reducing the impact of certain plastic products on the environment.

This legislative proposal includes, for the first time in the history of our country, the limitation of single-use plastics, and in order to reduce single-use plastic packaging, a tax on them is established, with the aim of complying with the waste hierarchy and encouraging the prevention and reduction of plastic waste.

One of the objectives of this law is to reduce the consumption of bottled water, promoting drinking water sources and supplying water in reusable containers, and, from 2024, only PET bottles may be marketed and with a minimum amount of reused plastic of 25%. In addition, the list of waste fractions to be collected by local authorities includes bio-waste, textile waste and used cooking oils, among others, before the end of 2024.

This law specifies different targets for reuse, recycling and recovery, including:

- By 2020, a minimum of 50% by weight of household and commercial waste (paper, metal, glass, plastic, bio-waste, or other recyclable fractions).
- By 2025, the preparation for re-use and recycling of municipal waste is increased to a minimum of 55% by weight.
- By 2030, the preparation for re-use and recycling of municipal waste is increased to at least 60 % by weight.
- By 2035, the preparation for re-use and recycling of municipal waste is increased to a minimum of 65% by weight.

The use of compost will also be promoted, making compostable materials a useful and real option as a substitute for plastic packaging in the food sector. In addition to passing on to producers the obligation to design products and product components that reduce environmental impact and that these products contain recycled materials, among other obligations.

The following reduction schedule is established for ready-to-eat food containers, such as fruit and vegetable packaging:

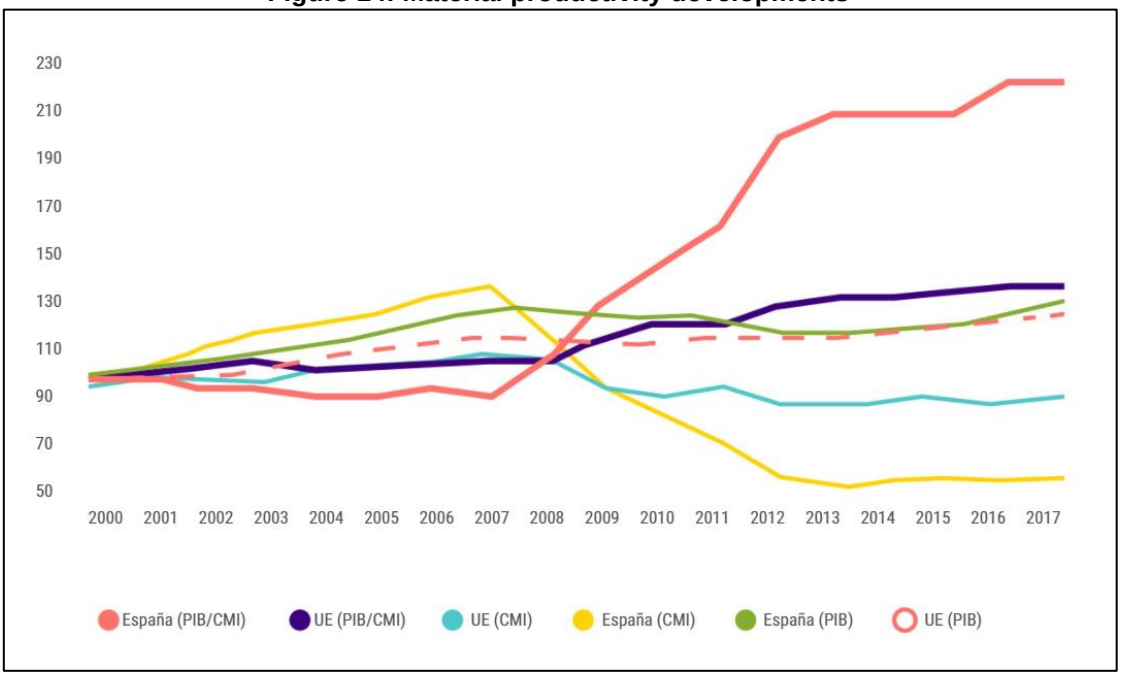
- By 2026 a 50% reduction, compared to 2022.
- By 2030 a reduction of 70% compared to 2022 is targeted.

In addition, from 2023 the free distribution of plastic containers and packaging will be banned, and alternative materials (such as compostable plastic, wood, paper or cardboard) will have to be sought or a charge will have to be levied for each delivery of a plastic item to the consumer, with a tax rate of 0,45 euros per kilogramme of plastic, with an estimated revenue of around 724 million euros.

A ban on single-use cutlery, plates and straws, and food and drink containers made of expanded polystyrene or oxo-degradable plastic will also be introduced by 2023.

From the **Cotec** database we have extracted data on a circularity indicator called resource productivity or material productivity, which compares Gross Domestic Product (GDP) with Inland Material Consumption (IMC), thus measuring efficiency in the use of material resources. Below (Figure 14) we can observe the evolution of resource productivity in Spain and the European Union. As we can see, from 2007 onwards, in Spain, the IMC falls, which favours the country's resource productivity, although this was only an "illusion", since the increase in the indicator is due to the intense reduction of the IMC with respect to GDP variations, so that the drastic increase in this indicator is only a reflection of favourable circumstances, and not of a profound structural change that could mark the beginning of a new productive and material consumption dynamic.

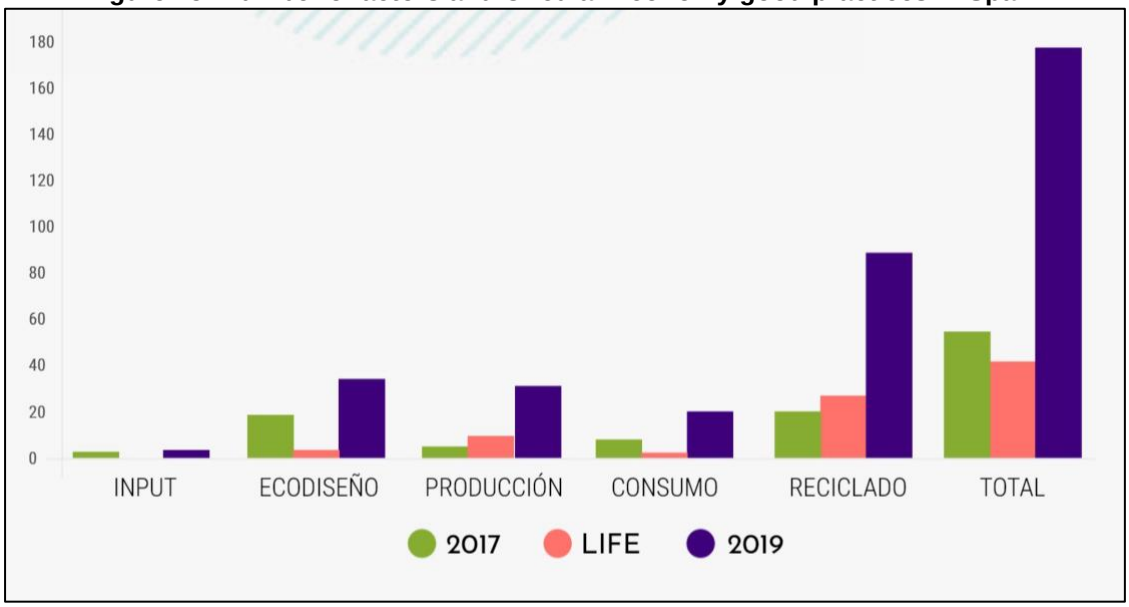
Figure 14: Material productivity developments



Source: Cotec Circular Economy Report 2019

Also, in the Cotec Circular Economy 2019 report, we find a compilation of actors and good practices focused on Circular Economy in Spain, distributed among the main categories. As we can see in the following figure (Figure 15), the cases of good practices in 2019 have tripled compared to 2017, from 46 to 167.

Figure 15: Number of actors and Circular Economy good practices in Spain



Source: Cotec Circular Economy Report 2019

In the following sections, we will see some of the different good practices shown in this report, distributed according to the agents involved.

From the website of the **Ministry of Agriculture, Fisheries and Food** we have obtained information on different programmes carried out by this ministry, among which is the State Programme for Waste Prevention 2014-2020, which develops the waste prevention policy to achieve the objective of reducing waste generated in 2020 by 10% compared to the weight of waste generated in 2010.

This programme is configured around four strategic lines:

- Reduction of the amount of waste,
- Re-use and extension of the useful life of products,
- Reduction of the content of harmful substances in materials and products, and
- Reduction of adverse impacts on human health and the environment of the waste generated.

In addition to the actions around these four objectives, the State Waste Prevention Programme 2014-2020 includes, among the transversal actions it intends to carry out, the labelling of packaging whose manufacture or recycling entails a lower impact on the environment.

On the other hand, this same document proposes different actions aimed at reducing the amount of waste, boosting reuse and reducing the impact of the waste generated, such as reviewing packaging regulations to reinforce prevention, dealing with over-packaging and promoting reusable packaging and packaging that is easier to recycle. It will also seek to promote R&D&I projects focused on the eco-design of packaging and the development of new materials to facilitate the recycling of such packaging.

We can see in the following summary table (Figure 16), some of the measures proposed for the packaging area mentioned above, indicating the strategic lines followed by each of the actions. These are framed within the following strategic lines:

3) Reduction of the amount of waste.
4) Promotion of reuse.
5) Reduction of the content of harmful substances in materials and products.
6) Reduction of the adverse impacts on health and the environment of the waste generated.

And the agents involved:

- AGE: General State Administration
- CCAA: Autonomous Communities
- EELL: Local Entities
- Industry and services

Figure 16: Summary table of proposed measures in the packaging area

ÁREAS PRIORITARIAS	MEDIDAS PROPUESTAS	LÍNEAS ESTRATÉGICAS				AGENTES				
		1	2	3	4	AGE	CCAA	EELL	Industria y servicios	Consumidores y EESS
Envases	Revisión de la normativa para reforzar los aspectos de prevención, por ejemplo los relativos al sobreenvasado, uso de envases reutilizables y los relativos a la puesta en el mercado de envases fácilmente reciclables, pudiendo establecerse en su caso criterios de tarificación diferenciados.	x	x			x				
	Impulso de la I+D+i de ecodiseño de envases y uso de nuevos materiales para mejorar su reciclabilidad	x	x	x	x	x	x		x	
	Puesta en el mercado de productos en envases reutilizables y recargables	x	x						x	
	Acuerdos voluntarios para incrementar la venta de productos a granel, para el uso de envases industriales reutilizables, para promover la reducción del consumo de bolsas y para promover la reducción de envases de un solo uso en las cadenas de restauración y en el sector hotelero, etc	x	x			x	x	x	x	
	Desarrollo e implantación de herramientas de benchmarking que permitan evaluar comparativamente los diferentes envases disponibles en el mercado y ayudar a las empresas a tomar decisiones en materia de prevención de los envases	x				x	x		x	
	Campañas de educación y sensibilización para enfatizar el papel que consumidores y usuarios juegan en la reducción de los residuos de envases y en la reutilización por ejemplo mediante el uso de bolsas duraderas	x	x			x	x	x	x	
	Acuerdos voluntarios para el uso de envases comerciales reutilizables en el sector HORECA y similares	x	x			x	x		x	
	Inclusión de condicionantes en las compras públicas que impulsen la reducción de envases y el uso de envases reutilizables	x	x			x	x	x		

Source: State Waste Prevention Programme 2014-2020, Ministry of Agriculture, Fisheries and Food

These waste prevention measures are covered by Annex IV of Law 22/2011, of 28 July, on waste and contaminated soils, so the timing of their application depends on the initiative of those responsible. And regarding the result of these actions in 2020 at the end of the established action period, we can find, at the end of the report, a summary table (Figure 17), with the assessment of the effectiveness of the actions that we have seen above.

In this table we can see the result of these measures at four levels: Degree of adaptation and coherence of the measure with the regulations and synergies with other actions developed; Level of acceptance and participation by the agents involved; Level of complexity of the action and difficulty of implementation; Degree of achievement of the prevention results obtained from the application of the action; and a final evaluation considering the rest of the criteria.

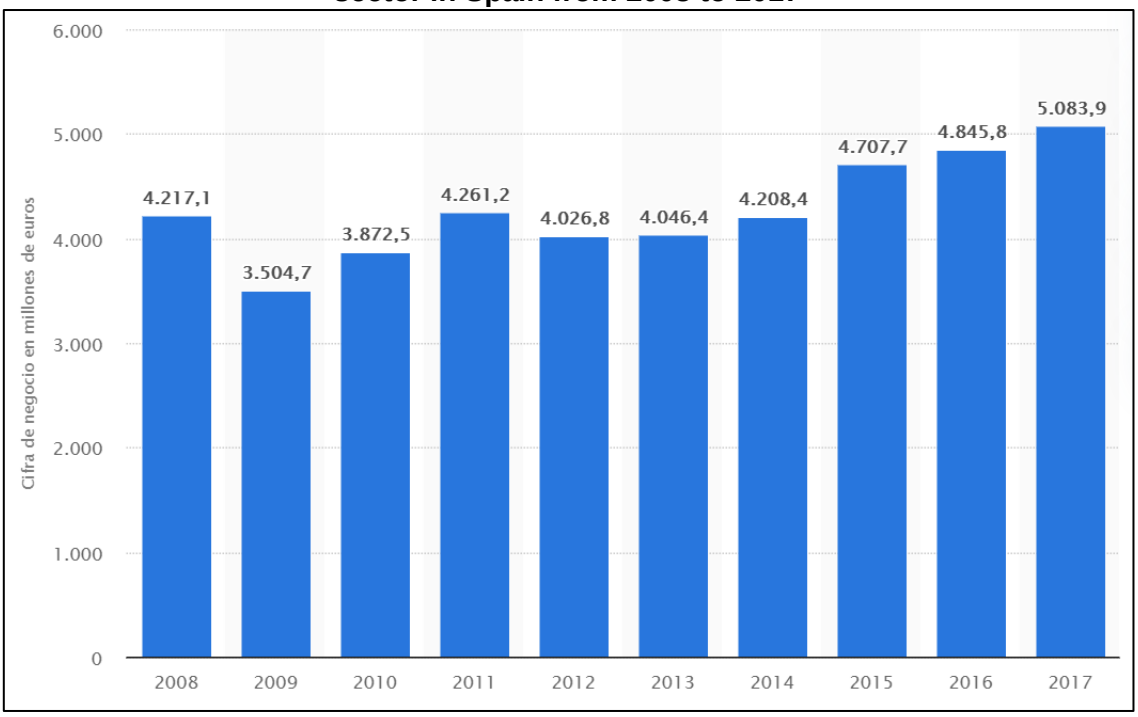
Figure 17. Results of the assessment of the effectiveness of preventive measures

Actuaciones a nivel nacional	C1. Coherencia normativa/ sinergias	C2.Participación/ aceptación	C3.Complejidad/dificultad	C4. Resultados	Valoración final
Ley de Residuos y Suelos Contaminados				NV	
Plan Nacional Integrado de Residuos					
Promoción de proyectos I+D+i					
Desarrollo y seguimiento de planes de prevención de envases ligeros					
Desarrollo y seguimiento de planes de prevención de envases de vidrio					
Fomento de la prevención de residuos en la industria alimentaria (MTD y certificaciones)					
Desarrollo y seguimiento de los Observatorios industriales sectoriales				NV	
Desarrollo de programas educativos con contenidos sobre prevención					
Desarrollo de jornadas de prevención de residuos					
Aplicación y seguimiento de la Etiqueta Ecológica Europea (EEE)					

Source: State Waste Prevention Programme 2014-2020, Ministry of Agriculture, Fisheries and Food

From the **Statista database** we have obtained the following graph (Figure 18) concerning the value of plastic packaging sales in Spain. As we can see, the trend is positive, which is related to the increasing amount of packaging produced. Furthermore, we could extrapolate the data obtained from 2008-2017 and conclude that in 2020 this figure should be around 5,370 million euros, although the figure for this year has probably increased due to the SARS-CoV-2 pandemic (Covid-19), during which hygiene and packaging, especially of food products, has become very important, and this over-packaging is generally produced with plastic products.

Figure 18. Sales value of the plastic containers and packaging manufacturing sector in Spain from 2008 to 2017



Source: Statista

4.1.3. Valencian Community and province actions

Regarding the **Circular Economy Law**, it should be noted that the Valencian Community does not yet have an official text, unlike many other Spanish autonomous communities. However, as we have been able to access different information in press releases and newspaper articles. We can see in a press release published on the website of the Generalitat Valenciana, the councillor for Agriculture, Rural Development, Climate Emergency and Ecological Transition, Mireia Mollà, announces that it is already in the processing phase, and about which she tells us that "the Valencian Law on Circular Economy will propose to implement before 2023 a system of incentive return of plastic bottles".

This Non-Law Proposition (NLP), which has been underway since December 2020, began to be processed at the end of the previous legislature (2015-2019), but, as we can read in ElDiario.es, it was paralysed due to a lack of agreements between the parties of the Valencian government.

The NLP envisages a Deposit, Return and Refund System for packaging (DRRS). This system provides that each establishment, depending on its surface area, will have to offer a minimum quantity of brands in reusable packaging, and these reusable containers will be those that can be introduced into the DRS system in exchange for financial compensation for consumers.

An alternative to the DRRS system is the RRS system (Economic Incentive Return and Refund System), which works for single-use packaging. In this case, the Generalitat Valenciana is considering the possibility of implementing it for plastic bottles of less than 3 litres.

Se pretende implantar un total de 3000 dispositivos automáticos de compensación económica por toda la Comunidad Valenciana, entre los sistemas SDDR para envases reutilizables, los SDR para botellas de plástico y los contenedores inteligentes para el resto de los envases.

Another of the measures proposed is a ban on the introduction of non-recyclable packaging and materials in Valencian markets, and packaging must be made of a minimum of 50% recycled plastic, increasing this minimum percentage to 70% from 2024.

On the other hand, in the newspapers Europa Press and La Vanguardia we can read that the Valencian circular economy NLP complies with European objectives with the obligation of free water in bars and restaurants, which discourages the purchase of plastic water bottles; and the prohibition of manufacturing products with programmed obsolescence.

In addition to these and many other measures, the regulation also makes the collection of bio-waste mandatory for all municipalities and the creation of new composting plants where this is required, thus encouraging innovation in packaging design with compostable materials.

At the end of March of this year, 2021, the processing of this law began, about which the deputy for Valencia, Graciela Ferrer, highlights in the newspaper Levante, among other things, the innovation linked to the circular economy, the packaging return system and the importance of environmental education.

The Generalitat Valenciana has published a document called "The 2030 Agenda. The roadmap for cities and towns in the Valencian Community", in which we can find information on the current situation in our autonomous community with regard to the SDGs, specifically for Goal 12. In the Valencian Community, 230.000 tonnes of light packaging are introduced every year, but only 100.000 tonnes are collected, and the recycling rates of the most involved municipalities are barely 30%.

Within this objective 12, different goals are framed, one of which is to achieve a reduction in the amount of waste by 2030 through policies of prevention, reduction, recycling and reuse. To this end, it is proposed to promote campaigns to minimise consumption and increase recycling and reuse at municipal level in order to achieve the goal of recycling and separating 70% of municipal waste by 2030.

Also, on the website of the **Generalitat Valenciana** we can find the regional regulations on waste management, which regulate this aspect through different laws, decrees and orders.

The first law that appears is Law 10/2000, of 12 December 2000, on Waste in the Valencian Community (DOGV nº 3898, of 15/12/00). In this law it is mentioned that neither the Generalitat nor the provincial councils are responsible for the treatment of packaging and packaging waste, but that this responsibility lies with the waste organisations.

The Order of 5 December 2002, of the Regional Ministry of the Environment, which regulates the model of the Annual Declaration of Packaging and Packaging Waste (DOGV nº. 4401, of 18/12/02) establishes the obligation for economic agents to make an annual declaration of packaging, detailing the number of packaging units by type of material and quantity in tonnes of packaging manufactured in the Valencian Community and that which enters the autonomous community for ordinary use and consumption.

And, Order 18/2018, of 15 May, of the Regional Ministry of Agriculture, Environment, Climate Change and Rural Development, which regulates community composting facilities in the territorial scope of the Valencian Community (DOGV nº 8300, 22/05/18) indicates the intention to promote community composting in educational centres, civic centres, communities, etc. as a way of managing the biodegradable organic fraction, since centralised composting (at municipal or supra-municipal level) requires considerably more administrative procedures and authorisations than community composting, in addition to the fact that, in non-community composting, as it is not an industrialised process, it is a less polluting process than community composting, which is carried out in an industrialised manner.

The support from administrations makes the option of community composting more attractive than it was initially, which could again provide an opportunity for packaging companies to develop new eco-designs and innovate to make their packaging materials compostable.

In the **Integral Waste Plan of the Valencian Community**, we find information on the three ways in which economic agents can comply with the obligation of Law 11/1997, of 24 April, on Packaging and Packaging Waste (LPPW). These three ways are:

- Through Deposit, Return and Return Systems (DRRS), which, as we have already seen, is a system in which producers charge an economic amount per package to purchasers up to the final consumer, and the latter can return the packages in exchange for this amount.

- Through the application of Integrated Management Systems (IMS). This system is based on the separate collection of packaging waste in specific containers. The managing bodies of the IMS will charge the packagers an amount that will depend on the type and material of the packaging and the units placed on the market. In the Valencian Community there are 3 authorised IMS:
    - ECOEMBES: takes care of light packaging and paper-cardboard waste.
    - ECOVIDRIO: responsible for glass packaging waste.
    - SIGRE: management entity for medicine packaging waste.

- Using the Transfer of Ownership. Packagers/traders of packaged products who make use of the 1st additional provision of Law 11/1997, on Packaging and Packaging Waste. This exception establishes that industrial and commercial

packaging waste passes from being the responsibility of the packagers and traders of packaged products to the final holder, and this final holder, the client or consumer, must manage it by handing it over to an authorised manager under appropriate conditions of separation by materials.

Moreover, various measures are indicated to fulfil the proposed objectives, one of which is to maintain the level of compliance with the objectives of recycling and recovery of packaging waste in the Valencian Community, for which a recompilation and comparison of the data on packaging waste management supplied by the economic agents involved (producers, GIS and packaging waste managers) will be carried out.

Through the website of the **Regional Ministry of Participation, Transparency, Cooperation and Democratic Quality** of the Generalitat Valenciana, we can access a monitoring map of the SDGs, as shown in "Figure 19". This monitoring map specifies the reference indicators for the fulfilment of this goal and at what level they are at, although it does not indicate what the starting point of each one of them was or what the numerical target that the Generalitat Valenciana intends to meet is.

Figure 19. Map of SDG 12.5 monitoring in the Valencian Community

ODS 12. PRODUCCIÓN Y CONSUMO RESPONSABLE			
Meta	**Indicador de Referencia C.V.**	**Dato más reciente**	**Fuente**
12.5 De aquí a 2030, reducir considerablemente la generación de desechos mediante actividades de prevención, reducción, reciclado y reutilización	Residuos mezclados (kg/hab/año) (2014)	331,6	INE: Estadística sobre recogida y tratamiento de residuos (Indicadores sobre residuos urbanos)
	Residuos de papel y cartón (kg/hab/año) (2014)	11,7	INE: Estadística sobre recogida y tratamiento de residuos (Indicadores sobre residuos urbanos)
	Residuos de vidrio (kg/hab/año) (2014)	16,0	INE: Estadística sobre recogida y tratamiento de residuos (Indicadores sobre residuos urbanos)
	Ratio de reciclaje de residuos de envases de vidrio (Kg/hab/año) (2016)	16,5 kg/hab.	Ecovidrio: Datos de reciclado
	Ratio de contenerización de vidrio para facilitar el reciclaje	1 cont./215 hab.	Ecovidrio: Datos de reciclado
	Envases mixtos y embalajes mezclados (kg/hab/año) (2014)	8,2	INE: Estadística sobre recogida y tratamiento de residuos (Indicadores sobre residuos urbanos)
	Volumen total de residuos en masa recogidos (2012)	2,1 millones de toneladas	CaixaBank Research: La economía de la Comunitat Valenciana: Diagnóstrico Estratégico (colección Comunidades Autónomas)
	Generación de residuos en masa *per cápita* (2012)	419 kgs/año	CaixaBank Research: La economía de la Comunitat Valenciana: Diagnóstrico Estratégico (colección Comunidades Autónomas)

Source: Regional Ministry of Participation, Transparency, Cooperation and Democratic Quality, Generalitat Valenciana

On the other hand, we have available on this website the cartography of the SDGs in the administration of the Generalitat Valenciana, where we can see the ministries responsible for goal 12, and more specifically goal 12.5, which, as we can see in "Figure 20", only involves the Regional Ministry of Agriculture, Environment, Climate Change and Rural Development, so we will now investigate within this ministry.

Figure 20. Cartography of the SDGs in the Generalitat Valenciana's administration

12	Garantizar modalidades de consumo y producción sostenibles	Presidencia GVA	Vicepresidencia y C. de Igualdad y Políticas Inclusivas	C. de Hacienda y Modelo Económico	C. de Justicia, Administración Pública, Reformas Democráticas y Libertades Públicas	C. de Educación, Investigación, Cultura y Deporte	C.de Sanidad Universal y Salud Pública.	C. de Economía Sostenible, Sectores Productivos, Comercio y Trabajo.	C. de Agricultura, Medio Ambiente, Cambio Climático y Desarrollo Rural.	C. de Vivienda, Obras Públicas y Vertebración del Territorio.	C. de Transparencia, Responsabilidad Social, Participación y Cooperación.
12.1	Planes de consumo y producción sostenibles							■			
12.2	Gestión y uso eficiente de recursos naturales								■		
12.3	Desperdicio de alimentos								■		
12.4	Gestión ecológica de desechos y productos químicos								■		
12.5	Prevención, reducción, reciclado y reutilización de desechos								■		
12.6	Empresas y sostenibilidad							■			
12.7	Adquisiciones públicas sostenibles							■			
12.8	Educación para el Desarrollo Sostenible					■					■
12a	Ciencia y tecnología para sostenibilidad	■				■		■			
12b	Turismo sostenible	■									
12c	Regulación de subsidios a combustibles fósiles								■		

Source: Regional Ministry of Participation, Transparency, Cooperation and Democratic Quality, Generalitat Valenciana

We went deep into the website of the **Regional Ministry of Agriculture, Environment, Climate Change and Rural Development** of the Valencian Community and found various press releases related to the actions of this ministry in the area of waste, although we did not find any policy linked to this ministry that implies changes or restrictions on the production of packaging in the autonomous community.

On the other hand, we have searched the websites of the **Regional Ministry of Sustainable Economy, Productive Sectors, Trade and Labour** and the **Regional Ministry of Innovation, Universities, Science and Digital Society**, looking for information on grants or subsidies to promote the use of other materials for the manufacture of food packaging or for companies to introduce DRS systems, but we have not found any subsidy linked to these departments, although we have found the following two grants on the generic websites of the Generalitat Valenciana.

In this context, we have found a call for subsidies for 2020, which aims to support sustainable industrial investments that contribute to the growth and consolidation of industrial SMEs linked to different sectors of the Valencian Community, including the packaging sector, for which a global contribution of 2.132.000 euros has been earmarked. This subsidy can be used to finance the R&D of companies producing packaging in order to make their products more sustainable.

Another aid granted by the Generalitat Valenciana in 2021 is the call for investments by INDUSTRIAL SMEs in the Valencian Community to improve the competitiveness and sustainability of certain sectors. These grants are aimed at subsidising the creation of

new production lines or improving those already in operation, one of the sectors to be subsidised being packaging and packing.

On the other hand, the Generalitat Valenciana, together with the Instituto Valenciano de la Competitividad Empresarial (IVACE), has published a report called **Investing in the plastics sector**, which provides information on the plastics sector in the Valencian Community.

As we can see in Figure 21 with data extracted from the Regional Ministry of Sustainable Economy, Productive Sectors, Trade and Labour, the rubber and plastic production branch is above the regional average, and with a positive variation with respect to the previous year. Furthermore, according to the report "Investing in the plastics sector", the main destination market of the plastics industry is the manufacture of containers and packaging, so we can say that the packaging subsector is one of the sectors of great economic and productive value in the Valencian Community.

Figure 21. Indices by branch of activity: Valencian Community

		% de variació	
	Índex	anual	de la mitjana en el que va d'any	anual corregida d'efectes estacionals i de calendari
ÍNDEX GENERAL	**119,5**	**19,5**	**3,2**	**15,7**
Extractives i refinació; energia i aigua	98,2	4,3	5,2	3,6
Alimentació, begudes i tabac	116,9	1,3	-1,7	-3,2
Indústria tèxtil i de la confecció	117,0	64,2	16,5	57,4
Indústria del cuiro i del calçat	71,1	6,8	-18,7	-1,1
Fusta	109,1	28,3	9,7	24,5
Paper i cartó; arts gràfiques	98,2	4,8	-1,4	1,6
Química	125,8	7,6	2,2	5,7
Cautxú i plàstic	123,2	27,3	5,7	23,2
Productes minerals no metàl·lics, excepte taulells	117,8	41,7	18,9	37,7
Taulells	126,8	13,6	14,8	12,9
Metal·lúrgia i fabricació de productes metàl·lics	142,5	44,2	12,1	44,1
Material i equip elèctric, electrònic, informàtic i òptic	360,2	19,6	-16,2	16,9
Maquinària i equip	234,3	76,3	14,8	76,1
Material de transport	84,7	31,6	-2,8	23,5
Manufactures diverses; reparació i instal·lació de maquinària i equip	112,5	30,6	1,6	24,0

Source: Regional Ministry of Sustainable Economy, Productive Sectors, Trade and Employment

4.1.4. Food distributors enterprises

In this section we are going to study and analyse the actions carried out by some of the main food distribution companies such as the Valencian supermarkets Consum, Mercadona and Masymas, as well as a small Spanish supermarket called Linverd.

As we can read in an article in the digital newspaper El Salto, the three Valencian supermarket chains, as members of the Valencian Business Association (AVE in Spanish) are against the implementation of the DRRS that the Generalitat Valenciana wants to carry out.

Consum:

We have been able to extract the following information from the Consum website based on various press releases that the company itself publishes on its website.

On the one hand, there is a news item that states that Consum has eliminated more than 1.300 tonnes of plastic from its production chain and is looking at replacing all its packaging with compostable materials by 2030.

The company has changed the plastic bags used for bulk and cut products (fruit, vegetables, butchers, delicatessen and fish) for compostable ones. This measure, together with the incorporation of reusable jute and polypropylene bags, will mean that 592 tonnes of plastic will no longer be placed on the market each year.

In other news, Consum has obtained Aenor's 'Zero Waste' certification for its six logistics platforms and its head office. The cooperative company has a waste traceability system from waste production to final management.

In 2019, Consum managed a total of 27.395 tonnes of waste in its logistics platforms, the aim of which was to recover practically all of it, more than 99% on average, thus preventing it from being sent to landfills.

Consum also has a specific website for its social and environmental policies called DecirHaciendo, which reflects its objective of applying a waste management model consistent with the principles of the circular economy. Some of the actions carried out by the cooperative include using 100% recycled paper and cardboard for the packaging

of its products, as well as having set up the Zero Landfill project for waste recovery, to prevent its waste from ending up in landfill sites.

Another line of Consum's work is its commitment to recycling and offering real alternatives to plastic in its own brand, with the incorporation of between 40% and 60% recycled plastic in the packaging of dishwashers, household cleaners, refrigerated juices, ice cream tubs, water carafes and crisp packaging, among others. These measures have removed 46,5 tonnes of plastic from the market.

Consum has opted for cardboard to reduce secondary packaging elements. Although this material is not as polluting as plastic and FSC cardboard is often used, it is still an unsustainable alternative, as it pollutes at the beginning and end of its useful life if it is not 100% recycled and recyclable. The recyclability of brick packaging has also been improved by eliminating the metal in between.

As part of this sustainability policy, it also has biodegradable trays in the sliced meat section, which is another area historically dominated by plastic that is addressed by the company's sustainability policy.

In another section of this website, we find that Consum spent 19,4 million euros on R&D in 2020, 44% more than the previous year, although the main innovations carried out were the digitalisation of the purchase receipt and the self-service boxes for small purchases with cards, part of this budget was allocated to research into the yucca bags it has on sale for transporting fruit in bulk.

Mercadona:

In December 2019 Greenpeace published the following article with the ranking at that time according to the plastic footprint of different supermarkets operating in Spain.

Figure 22. Ranking of supermarkets by plastic footprint

#	Marca	Puntuación final sobre 10	Plan para eliminar plásticos de un solo uso (2025)	Fomenta los envases reutilizables	No fomenta las falsas soluciones	Fruta y verdura a granel	Fomenta la venta a granel en otros productos	Elimina bolsas de un solo uso	Elimina otros plásticos de un solo uso (no envases)	Transparente sobre su huella plástica	Trabaja con proveedores para eliminar plásticos	Fomenta envases 100% reciclables
1	EROSKI Más info...	7,0	7,0	6,7	5,5	7,0	7,0	6,6	4,5	7,5	6,8	8,5
2	LIDL Más info...	6,5	7,0	5,8	6,0	5,8	5,9	6,6	9,0	5,5	7,5	8,5
3	Alcampo Más info...	6,2	7,5	6,2	6,1	4,8	6,0	6,6	6,0	4,9	5,0	7,5
4	ALDI Más info...	6,1	6,9	5,0	5,9	4,8	5,0	6,5	9,0	4,9	7,5	8,5
5	El Corte Inglés Más info...	4,6	4,5	5,5	3,0	3,0	5,5	6,5	3,5	4,9	5,0	7,0
6	DIA Más info...	4,0	4,0	3,0	5,0	7,0	1,0	5,0	3,5	4,9	5,0	7,0
7	MERCADONA Más info...	3,2	4,5	3,0	1,0	3,9	1,0	3,0	3,5	4,9	6,0	7,0
8	Carrefour Más info...	2,3	5,0	5,5	4,0	4,5	5,5	6,5	3,5	0,0	0,0	7,0

Source: Greenpeace

Mercadona was very badly affected by this comparative analysis with some of its competitors, so we can think that this was one of the reasons why it started a repositioning process to be recognised as a company committed to the environment.

From then on, the supermarket chain Mercadona publicly displays a series of very ambitious plastic reduction policies framed in a programme called Strategy 6.25, which is based on 6 actions to be carried out related to plastic packaging before 2025. Information about its objectives and targets for packaging reduction can be found both on its website and in its supermarkets.

The objectives of the 6.25 strategy are to reduce plastic by 25%, to make all plastic packaging recyclable and to recycle all its plastic waste. To this end, the following six actions are planned:

1- Eliminate single-use plastic bags, replacing them with compostable bags.
2- Eliminate single-use plastic disposable products, replacing them with reusable products or products made from other materials.
3- Reduce the amount of plastic in packaging. This is being achieved by eliminating plastic that does not add value to the product.
4- Make all packaging recyclables.
5- Recycle all plastic waste produced in their shops by incorporating recycling bins for each type of waste in all their supermarkets.
6- Provide training and information on how to recycle at home, showing clearly on all packaging in which container it should be deposited, as well as giving

customers fridge magnets with information on where to deposit each type of waste.

Mercadona, as well as Consum, has a section on its website where it publishes all the company's news. In this section we can find a press release from November 2020, when it started with the 6.25 Strategy. At that time, Mercadona invested more than 140 million euros to initiate the paradigm shift in all its establishments. This action demonstrates the company's commitment, as other companies would have implemented the changes very slowly, while Mercadona implemented them relatively quickly thanks to this investment.

Masymas:

The Masymas company has historically been aware of society, especially those most in need, as well as food waste, but this has not always been the case with regard to environmental problems.

It was in 2019 that it initiated a series of actions to reduce its environmental impact, including allowing customers to bring their own packaging to supermarkets to bring in cut or bulk food, and the purchase of new shrink-wrapping machines that reduce the plastic waste from packaging manufacture by 40%.

In addition to this, in 2020, Masymas eliminated its plastic bags from all fresh produce sections, replacing them with biodegradable and biocompostable bags, and the replacement of single-use plastic products with compostable ones.

Linverd:

The family barcelonian business, Linverd, encourages, through its website and its social networks, its customers to lead a zero-waste lifestyle in their homes and when they go shopping. Some of the proposals are:

- Carry their own reusable bags or eco-friendly baskets.
- Buy in boxes rather than bottles, as cardboard is more recyclable than plastic.
- Reuse the containers (usually glass) provided in the supermarket to store leftovers or buy in bulk.

As published in La Vanguardia, this supermarket's novelty is that it completely and totally dispenses with plastics in all types of containers and packaging, which are replaced by paper, glass or organic derivatives.

Another novelty offered by Linverd is the possibility of acquiring lettuces or edible plants grown in situ in a vertical plantation within the shop itself, where the ideal conditions of heat and humidity have been created for their growth, thus taking the concept of "0-kilometre products" to the extreme.

The existence of this supermarket shows us that an environmentally friendly and plastic-free food industry is possible if you firmly believe in it and if you work with all your senses focused on this goal.

4.1.5. Packaging companies

In this section we will investigate different cases of companies and projects in which innovative products and materials are being developed that can be applied in the world of food packaging.

From the **Cotec** database we have obtained, from the report "Fact sheets of actors and good practices of Circular Economy in Spain", a list of Spanish companies with concrete ideas to promote and carry out an effective circular economy in different sectors related to food, each one from their perspective as an involved agent. Some examples of eco-innovations can be found below.

The **ECOLAC project** started in 2014 with the co-financing of the LIFE programme of the European Union, which aims to prevent and reduce the environmental impact associated with the manufacture of dairy products by favouring the Ecodesign of foodstuffs through the design and use of software adapted to the peculiarities of the sector. The result of this project was the development of a software tool for the evaluation of environmental impacts based on the Life Cycle Assessment (LCA) methodology. With the help of this new tool, a prototype of a new yoghurt using a plastic with a smaller environmental footprint has been designed and produced.

The company **Seijaenvases** has also developed a new packaging design characterised by the fact that it is made from PLA (polylactic acid) obtained from corn

and other renewable organic crops. These containers, after a composting process, decompose in 60 days.

The general objective of the **Multibiosol project** is to demonstrate that sustainability and efficiency in agricultural practices can be achieved through the introduction of an innovative, economically viable and fully biodegradable plastic that completely eliminates waste. This product is initially intended to replace plastics in agriculture, such as protective bags for fruit, although it could be an equally valid material for the manufacture of packaging for fruit and other fresh food in supermarkets.

Examples such as the ones we have just seen show the key role of packaging companies, which are often the suppliers of supermarket chains. These packaging companies are responsible for most of the innovations in the sector, as consumers' growing concern about plastic packaging is being passed on to them for innovation.

On the other hand, we have accessed the website of **AINIA**, a private non-profit technology institute that functions as an outsourced R&D department for packaging companies.

At this technological institute, they are looking for alternatives to conventional packaging, which include more sustainable ones such as those made from recycled materials, from renewable sources, or compostable. The challenge is to ensure that these more sustainable packages maintain their barrier properties and other functionalities that satisfy the needs of conservation, quality, safety and logistics required in the food industry, as well as the practicality of use and waste management demanded by the public.

AINIA shows, on its website, a technical guide to containers and packaging in which different news of interest in the world of packaging are shown chronologically and updated daily, among which we can find, for example, a news item from 22 April, which tells us that Recon Polymers and Tetra Pak are exploring the possibilities of total recycling of Brik materials. The two companies are looking at different uses for caps, LDPE film and aluminium, which are now recycled as a single composite and could have high-value applications.

Companies such as Cacaolat, Dulcesol or Calvo tuna are part of AINIA's network of collaborators, which have achieved 100% recyclable packaging with 50% recycled

plastic and biodegradable cardboard straws, packaging made from 100% biodegradable polymers, and easy-tip packaging that reduces their environmental impact by 35%, respectively.

Another benchmark company in the plastic packaging R&D sector is **AIMPLAS**, a plastics technology institute located in Valencia, which serves more than 250 regular users and more than 2.600 customers.

AIMPLAS has developed packaging design and development projects such as the **GO-OLIVA project**, which aims to recover the stone from olives used to make olive oil so that bioplastic containers can be made from this waste for the olive oil itself, which can then be composted. In this way, the olive stone, which is approximately 15% of each olive, is used to produce a 100% ecological and sustainable sub-product.

Another AIMPLAS project is **BIO ADDITIVES**, which is researching different environmentally sustainable and food-safe additives. These additives are introduced into the manufacturing process of bioplastics to give them antioxidant and antimicrobial properties, and the resulting packaging can be composted at the end of its useful life. Until now, biopolymers have been manufactured using the same additives as conventional polymers (plastic) without taking into account their toxicity as they become part of the environment, as plastic polymers are not compostable. Now, with biopolymers, as they are compostable, we must take this into account, and, thanks to these more sustainable additives, we are studying the possibility of making a compost that is free of toxicity.

4.1.6. Waste treatment enterprises

First of all, we will begin this section by providing a brief explanation of the recycling processes of the materials traditionally used for the manufacture of food packaging, extracted from the UNED library, in order to better understand what these processes consist of.

Plastic packaging: can be subjected to three different types of processes.

1- Mechanical recycling: this consists of cutting up the material and then introducing it into an extruder-granulating machine to be moulded using traditional methods. It can only be applied to thermoplastics and has two main problems. The first is that the

plastic already used loses part of its properties, which means that it must be used in the manufacture of other types of products with fewer requirements, and the second is the difficulty in separating the different types of plastics.

2- Chemical recycling: this is used when the plastic is very degraded, or it is impossible to isolate it from the mixture in which it is found. It is defined as the reversible reaction of polymerisation towards the recovery of raw materials.

3- Energy recovery: this is a suitable treatment for highly degraded plastics. It is a variant of incineration in which the energy associated with the combustion process is recovered to generate energy.

Glass containers: they can be recycled without the material losing any of its properties. Once collected, they are crushed into a coarse powder called calcine, which, when subjected to high temperatures in a furnace, is melted and remoulded into bottles, jars, pots, etc., which have exactly the same qualities as the objects from which they came. The process saves a considerable amount of raw materials and energy.

Paper and cardboard packaging: this consists of the recovery of the cellulose fibres by separation in aqueous solutions to which surfactants are added in order to remove the ink. The ink remains on the surface of the bath and can be easily separated.

Once the ink has been removed, the fibre suspension is dried on a flat surface to recover the fibres. The fibres are then passed through rollers that flatten and compact them, resulting in a sheet of recycled paper.

Therefore, as we can deduce, we must give priority to glass packaging, as it is the only material with which we can achieve a full circular economy.

From the website of the Generalitat Valenciana we have extracted the following table (Figure 23) from the report Packaging and Packaging Waste, in the Valencian Community there are 5 plants for the selection and classification of light packaging, which manage approximately 37,800 tonnes of light packaging per year, most of which are managed by the company VAERSA, which we will discuss below.

Figure 23. Selection plants for light packaging in the Valencia Community

Provincia	Nº	Municipio	Residuos	Gestor	Capacidad (t/año)
Alicante	2	Elche	RU y Envases ligeros	Consorcio para la Gestión de los RU del Baix Vinalopó	800
		Benidorm	Envases ligeros	VAERSA	10.000
Castellón	1	Castellón	Envases ligeros	VAERSA	10.000
Valencia	2	Alzira	Envases ligeros	VAERSA	7.000
		Picassent	Envases ligeros	VAERSA	10.000
Total	5				37.800

Source: Generalitat Valenciana

The **VAERSA Group** is the company licensed by the Generalitat Valenciana to be in charge of selecting and classifying urban and recyclable waste in the Valencian Community. This company is responsible for the management of urban waste, and the separated waste (plastic, glass, paper and cardboard) is handed over to ECOEMBES for treatment.

VAERSA currently has only one composting plant in the Valencian Community. This plant is located in Villena, Alicante, and has an ecological garden of herbaceous and woody products that is fertilised with the resulting compost.

At the selection and classification plants for light packaging, it is separated into the following fractions: ferrous packaging, non-ferrous packaging, PET, HDPE, film, brick and mixed plastics that cannot be separated. The mixing of plastics means that not all plastic packaging can be recycled, so it will be material that goes directly out of the production cycle.

From the **Cotec** database we have obtained, from the report "Technical files of actors and good practices of Circular Economy in Spain" in which we found a list of Spanish companies with eco-innovation ideas, the following DRRS project of different waste fractions in isolated areas can also be found.

The **CARTIF** foundation has developed the LIFE PAVEtheWAySTE project, financed by the European Union's LIFE programme, which proposes the implementation of a series of points for the collection of different fractions of municipal waste, in which the user is responsible for separating them correctly and is given a series of points for his

or her waste that can be accumulated and exchanged for local services. In principle, this project is aimed at rural areas and islands, as in these kiosks the waste goes through a compaction process, so that the collection services have to travel to the area a smaller number of times to empty it.

Furthermore, the **AIMPLAS** technology institute mentioned in the previous point is also working on several projects related to waste management.

ESVANREC project for the recycling of biodegradable plastics. Initially, biodegradable plastics (PPBB) were thought of as a single-use material that would decompose after use and contribute to the circular economy, as their raw materials come from renewable sources. However, with the attempt to eliminate the single-use concept, the recovery and recycling of these plastics is now being seriously considered.

Another project entirely owned by AMIPLAS in this field is the **RECICLAT project**, which has as its general objective the development of new environmentally sustainable alternative technologies for the recycling of plastic materials based on chemical recycling. The aim is to develop this technology as a solution to three current recycling technologies, aiming to obtain from all of them chemical substances that can be used in the chemical industry again.

4.1.7. Consumers

In this section we will look at the consumer's point of view on food packaging in supermarkets. Consumers are the most important stakeholder, as the actions and measures taken by companies and public bodies will be determined to a large extent by public opinion and the consumption habits of the population.

According to a study by the **Organisation of Consumers and Users (OCU)** carried out in June 2020, 56% of consumers would be willing to buy more sustainable plastic packaging, although only 30% would pay more for it.

Furthermore, this study shows that 51% of Spanish survey respondents would prefer to buy products without packaging, but if this is not possible, they would prefer materials such as bioplastic.

Another relevant aspect of this study is where bioplastic packaging should be disposed of. In this regard, 39% of those surveyed would prefer to do so in return machines that allow a direct reward to the consumer (DRRS), compared to 35% who would opt to throw it in the packaging container from which it would then be separated for specific treatment, while 18% consider that it should be done in the organic container for composting and only 8% in the rest container.

Another study carried out by the **OCU** in 2018 in different European countries gives the following conclusions:

- Consumers are aware that 30% of the products in our shopping trolley do not need packaging and 57% of them do not allow reuse. Even so, only 60% of Spanish respondents avoid buying them only occasionally and 8% of them always do so.
- Spanish consumers accurately separate packaging in 70% of cases, which, as we saw earlier in this paper, is among the most advanced positions in Europe.

On the other hand, as we can read in several articles, for example in Eldiario.es[1], a large majority of the population would be in favour of the implementation of the DRRS.

In this particular article which shows data from a 2016 survey of one thousand people in the Valencian capital, it is said that 95% of Valencian consumers would welcome the implementation of this system, in which they would have to pay an extra 10 cents for each container they buy, which they would get back when returning them in the return machines. 80% of respondents said that they would personally contribute to this initiative, while only 50% of respondents thought that all other citizens would contribute.

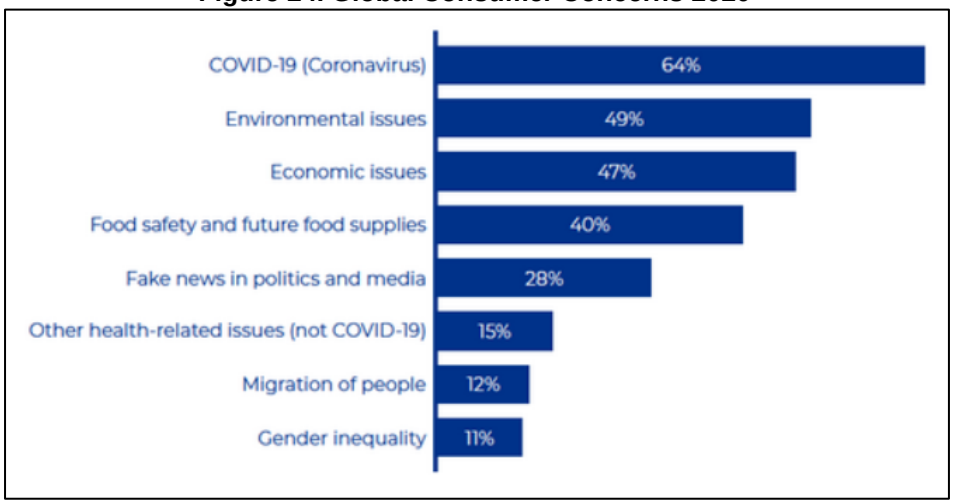
In addition, we find information on the issues of most concern to consumers in an article in **Foodretail**[2], which tells us that with COVID-19, consumer concern about food safety has increased considerably, by 10% compared to a year earlier.

[1] https://www.eldiario.es/comunitat-valenciana/consumidores-sistema-retorno-envases-consell_1_3708739.html

[2] https://www.foodretail.es/shoppers/seguridad-alimentaria-preocupacion-consumidor-estudio-tetra-pak_0_1493850616.html

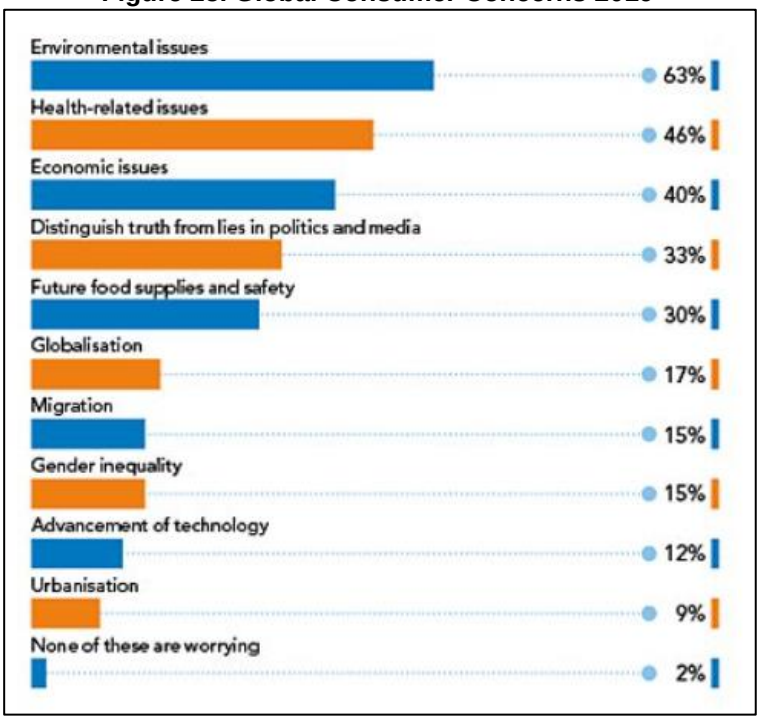
According to this article showing the results of Tetra Pak's 2020 study, consumers are currently in a dilemma between the importance of safe food and the sustainability of the planet we live on. As we can see in the following figures (Figure 24 and 25), the number of consumers concerned about the environment remains high, although it has fallen by 14% in the last year, but the level of concern about food safety, although still lower than that of the environment, has grown, as we said before, by 10% in the same period.

Figure 24. Global Consumer Concerns 2020



Source: Tetra Pak Index 2020

Figure 25. Global Consumer Concerns 2019



Source: Tetra Pak Index 2019

5. CONCLUSIONS

As we have seen throughout this analysis of the actors involved in the use of packaging in the food industry, there are different options when planning a strategy to establish a circular economy in this sector. Below, we are going to show the different alternatives that we have extracted from the previous analysis and the different recommendations that we would give at an individual level to tackle this problem.

First of all, recycling, as we know it, is not an effective alternative in the fight against plastic waste and other non-degradable materials, since, as we have seen in this work, its possibilities are very limited, and there is no possibility of recycling these materials in an unlimited way, since this is only possible in the case of glass packaging. Furthermore, although companies such as Ecoembes and other institutions try to make us believe that in our country all types of packaging are recycled, as we have also seen above, only part of the packaging is still recycled, leaving out of the material recovery cycle a large part of the packaging that is most commercialised, so that recycling is no longer a sustainable option in these cases.

For glass packaging, on the other hand, the current recycling mechanism is adequate, as 100% of the material collected is reintroduced into the manufacture of new packaging.

Although the recovery of glass packaging is, both in Spain and in Europe, much higher than that of other types of material, we have seen that encouraging its return by means of RDS is a very effective measure in different countries of the European Union, so we could consider its implementation in our waste collection system as a recommendation to national and regional governments.

Moreover, we believe that the implementation of the DRRS for plastic packaging could encourage the purchase of plastic packaging and discourage the purchase of glass packaging, which is why we do not believe that it is an adequate solution to solve the problem of the lack of circularity in the food distribution sector, although we do believe that it would be positive for reducing the amount of plastics that reach the natural environment, so its implementation for packaging of products that do not have a glass version could be a double ecological improvement.

Another possible alternative to more polluting packaging is eco-design, which aims to design sustainable products and services that minimise environmental impacts throughout the product life cycle from design through production, use and disposal.

As we have seen previously in different examples of eco-design projects, this is currently a line of research in which many resources are being allocated, both at public and private level, as the possible solutions for each of the lines of research are very diverse.

As we have seen in the examples extracted, most of the eco-innovations being worked on are related to bioplastics and compostable materials. In this regard, it should be made clear that not all bioplastics are biodegradable, so they cannot be composted and end up in landfills again. These bioplastic materials are less polluting than traditional plastics because of the way they are manufactured, but they are equally polluting at the end of their useful life, so they are not a valid alternative to traditional plastic packaging.

Although biodegradable bioplastics and other compostable materials are a real and effective alternative to the linearity of packaging, their introduction in this and other industries will not be useful if public administrations, from local councils to the national government, do not provide incentives and create composting centres, which, as we saw in the section on waste treatment, community composting is the most sustainable and simplest option.

Nevertheless, even if we were to implement these measures from now on, there are already many tons of plastic accumulated in landfills and natural spaces, so one line of research that should be encouraged should be that of microorganisms capable of degrading plastics, as this would be the only way to make the plastics manufactured up to now disappear.

Although these microorganisms seem to be the solution to everything, if any of the lines of research into this type of microorganisms were to become a reality we would have an even greater dilemma, and that is that it could be the basis for the perpetuation of linear economies, as with this technology plastic materials would be manufactured constantly knowing that at the end of their useful life they do not harm the environment, which would lead to their mass consumption.

All these options for improving the sustainability of the food industry have one point in common, and that is that none of them can be realised unless we change our mindset and become more aware of the supply chain from research of new products to waste management companies, giving more importance and taking into account how the latter works in order to implement reverse logistics systems in the sector.

6. BIBLIOGRAPHY

AINIA. (2018). Guía técnica AINIA de envase y embalaje. May 26, 2021, from AINIA. Website: http://www.guiaenvase.com/bases/guiaenvase.nsf/

AINIA. (2016). Quiénes somos. May 25, 2021, from AINIA. Website: https://www.ainia.es/ainia/sobre-ainia/quienes-somos-ainia-tecnologico/

AMIPLAS. (2021). Conócenos. May 27, 2021, from AMIPLAS. Website: https://www.aimplas.es/aimplas/

Aditivos BIO. (2021. Proyecto Aditivos BIO, May 27, 2021, from AMIPLAS. Website: https://aditivosbio.com/

Álvarez, Y. (2021). Mercadona, el mejor aliado de Ecoembes frente al sistema de retorno de envases. May 12, 2021, from El salto. Website: https://www.elsaltodiario.com/ecoembes/mecardona-aliado-ecoembes-frente-sddr-sistema-retorno-envases?fbclid=IwAR0_63LnmsEgsx5JVuYmMdHSHK_cdTQT7AgffuQoGgDV1LCV5qhB68Lmmts

AMIPLAS. (2021). Proyecto ESVANREC. May 30, 2021, from AMIPLAS. Website: https://www.aimplas.es/proyectos-desarrollados/estrategias-avanzadas-para-la-mejora-del-reciclado-en-plasticos-biodegradables/

AMIPLAS. (2021.) Proyecto RECICLAT. May 30, 2021, from AMIPLAS. Website: https://www.aimplas.es/proyectos-desarrollados/desarrollo-de-procesos-de-reciclado-sostenibles-para-la-industria-del-plastico/

Carrillo, A. (2021). El primer supermercado libre de plásticos CONSUMO RESPONSABLE. May 17, 2021, from La Vanguardia. Website: https://www.lavanguardia.com/natural/20210213/6244344/libre-de-plasticos-supermercado-linverd.html

Circular material use rate (2021). Eurostat. May 10, 2021. Website: https://ec.europa.eu/eurostat/databrowser/view/sdg_12_41/default/table?lang=en

Consum. (2020). Consum elimina más de 1.300 toneladas de plástico al año con su Plan de Reducción de Envases y Embalajes. May 15, 2021, from Consum. Website: https://www.consum.es/consum-elimina-mas-1300-toneladas-de-plastico

Consum. (2020). Consum obtiene el certificado de Aenor 'Residuo Cero' en todas sus plataformas logísticas. May 15, 2021, from Consum. Website: https://www.consum.es/consum-certificado-aenor-residuo-cero-todas-plataformas-logisticas

Consum. (2020). Compromiso con el reciclaje y una alternativa real al plástico. May 13, 2021, from DecirHaciendo Consum. Website: https://decirhaciendo.consum.es/compromisos/alternativa-al-plastico/

Consum. (2020). Nuestro compromiso con un modelo de negocio sostenible. May 13, 2021, from DecirHaciendo Consum. Website: https://decirhaciendo.consum.es/nuestro-compromiso-con-un-modelo-de-negocio-sostenible/

Consum. (2018). Políticas ambientales. May 13, 2021, from DecirHaciendo Consum. Website: https://decirhaciendo.consum.es/politicas-ambientales/

Cotec report. (2019). ANEXOS Fichas técnicas de actores y buenas prácticas de Economía Circular en España. May 20, 2021, from Cotec report 2019. Website: https://content.gnoss.ws/cotec/doclinks/ca/cae0/cae0d505-d3f4-4a51-a9b0-a8c071f01839/anexos-fichas-tecnicas-de-buenas-practicas-ec.pdf

Díaz, A. (2020). Facturación de los fabricantes de envases y embalajes de plástico España. April 16, 2021, from Statista. Website: https://es.statista.com/estadisticas/1134855/facturacion-de-los-fabricantes-de-envases-y-embalajes-de-plastico-espana/

ECOLAC. (2017). Resultados. May 25, 2021, from ECOLAC. Website: http://www.lifeecolac.es/es-es/Proyecto/Resultados

elDiario.es editorial office. (2016). El 95% de los consumidores ve con buenos ojos el sistema de retorno de envases del Consell. June 7, 2021, from elDiario.es. Website: https://www.eldiario.es/comunitat-valenciana/consumidores-sistema-retorno-envases-consell_1_3708739.html

Ellen MacArthur Foundation (2013). Towards the circular economy. United Kingdom: Seacourt

Estrategia Española de Economía Circular y Planes de Acción. May 6, 2021. Website: https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/economia-circular/estrategia/

ESVANREC. (2021). Proyecto ESVANREC Estrategias avanzadas para la mejora del reciclado en plásticos biodegradables. May 30, 2021, from AMIPLAS. Website: https://esvanrec.es/index.php

Europa Press editorial office. (2021, March 26). La Ley de Economía Circular empieza su tramitación con críticas. Levante-EM.

European Commission. (2021). LIFE Programme. March 6, 2021, from European Commission. Sitio web: https://cinea.ec.europa.eu/life_en

European Commission. (2020). LIFE Programme 2014-2020 data hub. March 6, 2021, from European Commission. Website: https://life.easme-web.eu/#

European Commission. (2015). Packaging waste. March 7, 2021, from European Commission. Website: https://ec.europa.eu/environment/topics/waste-and-recycling/packaging-waste_en

European Environment Agency. (2021). Advanced digital technologies can play a crucial role in making Europe's waste management systems more circular and sustainable. March 10, 2021, from European Environment Agency. Website: https://www.eea.europa.eu/highlights/advanced-digital-tech-can-play

European Environment Agency. (2021). Digital technologies will deliver more efficient waste management in Europe. March 10, 2021, from European Environment Agency. Website: https://www.eea.europa.eu/themes/waste/waste-management/digital-technologies-will-deliver-more

European Environment Agency. (2015). Waste recycling. March 10, 2021, from European Environment Agency. Website: https://www.eea.europa.eu/data-and-maps/indicators/waste-recycling-1/assessment-1

European Union. Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on reducing the impact of certain plastic products on the environment. Official Journal of the European Union L 155/1, 12 June 2019.

European Union. Directive (EU) 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. Official Journal of the European Union L 312/3, 22 November 2008.

European Union. Directive (EU) 94/62/EC of the European Parliament and of the Council of 20 December 1994 on packaging and packaging waste. Official Journal of the European Communities L 365/10, 31 December 1994.

Eurostat (2020). Circular rate. Material flows in the circular economy. March 5, from Eurostat statistics. Website: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Material_flows_in_the_circular_economy#Circularity_rate

Financial Food editorial office. (2020). Masymas elimina las bolsas de plástico en todas las secciones de frescos. May 17, 2021, from Financial food. Website: https://financialfood.es/masymas-elimina-las-bolsas-de-plastico-en-todas-las-secciones-de-frescos/

Food Retail & Shoppers editorial office. (2020). 4 de cada 10 consumidores están preocupados por la seguridad alimentaria. June 8, 2021, from Food Retail & Shoppers. Website: https://www.foodretail.es/shoppers/seguridad-alimentaria-preocupacion-consumidor-estudio-tetra-pak_0_1493850616.html

Generalitat Valenciana. (2018). Mapa de seguimiento de la consecución de los objetivos de desarrollo sostenible en la Comunidad Valenciana. Spain: Valencian Courts. Website: https://cooperaciovalenciana.gva.es/documents/164015995/165162558/MAPA+LINEA+DE+BASE.pdf/eb20f08e-b58a-4497-b883-cd29ad273b6a

Generalitat Valenciana. (2018). Cartografía de los ODS en la administración de la Generalitat Valenciana. Spain: Valencian Courts. Website: https://cooperaciovalenciana.gva.es/documents/164015995/167235970/CARTOGRAF%C3%8DA+DE+LOS+ODS_25_02_19.pdf/7ad38ee6-ced3-42d5-a665-f9a967f263c4

Generalitat Valenciana. (2007). 11. Residuos de envases y envases usados. May 25, 2021, from Generalitat Valenciana. Website: https://agroambient.gva.es/documents/20549779/161513659/11.+Residuos+de+envases+y+de+envases+usados/67826a83-7f4d-46f6-a875-ef7c8e4c14f3

Greenpeace. (2020). Ranking de supermercados según su huella plástica. May 14, 2021, from Greenpeace. Website: https://es.greenpeace.org/es/trabajamos-en/consumismo/plasticos/ranking-de-supermercados-contra-el-plastico/

GoOliva. (2021). Proyecto GoOliva. May 27, 2021, from AMIPLAS & GoOliva. Website: https://gooliva.com/

Government presidency. (2020). Anteproyecto de Ley de Residuos para impulsar una economía circular, mejorar la gestión de residuos en España y luchar contra la contaminación. March 23, 2021, from Spanish Government. Website: https://www.lamoncloa.gob.es/consejodeministros/Paginas/enlaces/020620-enlace-proyecto.aspx

Generalitat Valenciana. (2021). La Agenda 2030, Hoja de ruta para ciudades y pueblos de la Comunitat Valenciana (pp. 87.88). Spain: Valencian Courts. Website: https://participacio.gva.es/documents/162282364/163926803/ODS_+versi%C3%B3n+web_CAST.pdf/6ba878ab-fd5a-48d1-94fc-d92f467412bd

Generalitat Valenciana editorial Office. (2020). Mollà anuncia que la Ley Valenciana de Economía Circular propondrá implantar antes de 2023 un sistema de devolución por incentivo de botellas de plástico. April 27, 2021, from Generalitat Valenciana. Website: https://www.gva.es/es/inicio/area_de_prensa/not_detalle_area_prensa?id=905297

Generalitat Valenciana & IVACE. (2013). Comunitat Valenciana, Invertir en el sector del plástico. April 15, 2021, from Generalitat Valenciana. Website: https://invest-cv.es/images/articles/pdf/monograficos/Castellano/Invertir%20en%20el%20sector%20Plstico.pdf

Indicador 12.5.1. Total Nacional de reciclado, en toneladas de material reciclado. (2018). Instituto Nacional de Estadística. May 10, 2021. Website: https://www.ine.es/dyngs/ODS/es/indicador.htm?id=5115

INE. (2020). PIB y PIB per cápita por comunidades autónomas. March 5, 2021, from INE. Website: https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736167628&menu=resultados&idp=1254735576581

La Vanguardia editorial office. (2020, december 30). El Botànic sortea las discrepancias y presenta su ley de economía circular. La Vanguardia.

Linverd. (2021). Tiendas libres de plástico. May 18, 2021, from Linverd. Website: https://linverd.com/es/tiendas-libres-de-plastico/

Masymas. (2019). Estado de información no financiera 2019. May 16, 2021, from Hijos de Luis Rodríguez. Website: https://www.supermasymas.com/estado-informacion-no-financiera-2019

Mercadona. (2021). Cuidemos el planeta. May 14, 2021, from Mercadona. Website: https://info.mercadona.es/es/cuidemos-el-planeta

Mercadona. (2020). Mercadona acelera su estrategia para reducir el plástico con una inversión de más de 140 millones de euros. May 15, 2021, from Mercadona. Website: https://info.mercadona.es/es/cuidemos-el-planeta/nuestros-hechos/72-tiendas-625-visibilizan-nuestra-estrategia-de-reduccion-de-plastico-/news?idCategoriaSeleccionada=1470731340250

Ministry of Agriculture, Fisheries and Food. (2013). Programa estatal de prevención de residuos. May 2, 2021, from Spanish government. Website: https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/planes-y-estrategias/Programa%20de%20prevencion%20aprobado%20actualizado%20ANFABRA%2011%2002%202014_tcm30-192127.pdf

Ministry of Ecological Transition and the Demographic Challenge. (2021). El MITECO lanza una expresión de interés para fomentar la economía circular en el ámbito de la empresa como instrumento para la recuperación. March 22, 2021, from Spanish Government. Website: https://www.miteco.gob.es/es/prensa/ultimas-noticias/el-miteco-lanza-una-expresi%C3%B3n-de-inter%C3%A9s-para-fomentar-la-econom%C3%ADa-circular-en-el-%C3%A1mbito-de-la-empresa-como-instrumento-para-la-recuperaci%C3%B3n/tcm:30-522143

Ministry of Ecological Transition and the Demographic Challenge. (2020). Borrador de anteproyecto de ley de residuos y suelos contaminados. March 30, 2021, from Spanish Government. Website: https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/participacion-publica/200602aplresiduosysc_informacionpublica_tcm30-509526.pdf

Ministry of Finance & Ministry of Social Rights and Agenda 2030. (2021). Proyecto Presupuestos generales del estado 2021, Informe de Alineamiento con los Objetivos de Desarrollo Sostenible, Tomo 2 (pp. 200-202). Spain: Moncloa. Website: https://www.sepg.pap.hacienda.gob.es/Presup/PGE2021Proyecto/MaestroTomos/PGE-ROM/doc/L_21_A_Z4.PDF

Ministry of Social Rights and Agenda 2030. (2020). Agenda 2030 - Objetivo 12. Producción y consumo responsables. March 12, 2021, from Spanish Government. Website: https://www.agenda2030.gob.es/objetivos/objetivo12.htm

Ministry of Sustainable Economy, Productive Sectors, Commerce and Labour. (2021). Índices de producción industrial. April 16, 2021, from Generalitat Valenciana. Website: https://pegv.gva.es/va/temas/industriaenergiamineriayconstruccion/industria/indicesdeproduccionindustrial/-/asset_publisher/XupXO3rLMaP7/content/resultados-para-la-comunitat-valencia-2

Morató, J., Jiménez, L.M. & Tollin, N. (2019). Indicadores de la productividad de los recursos. From Situación y evolución de la economía circular en España (pp.88-95). Spain: Informe Cotec.

Morató, J., Jiménez, L.M. & Tollin, N. (2019). Casos y buenas prácticas en economía circular. En Situación y evolución de la economía circular en España (pp.110-113). Spain: Cotec report.

Navarro, C. (2020, October 28). La ley valenciana de economía circular obligará a los supermercados y tiendas a recuperar los envases reutilizables. elDiario.es.

OCU. (2020). La mayoría de los consumidores compraría envases plásticos más sostenibles. June 5, 2021, from Organización de Consumidores y Usuarios (OCU). Website: https://www.ocu.org/organizacion/prensa/notas-de-prensa/2020/circpack110620

OCU. (2018). ¿Qué pensamos de los plásticos?. June 5, 2021, from Organización de Consumidores y Usuarios (OCU). Website: https://www.ocu.org/consumo-familia/consumo-colaborativo/noticias/residuos-envases-de-plastico

RECICLAT. (2021). Proyecto RECICLAT Desarrollo de procesos de reciclado sostenible para la industria del plástico. May 30, 2021, from AMIPLAS. Website: https://reciclat.es/

Regional Ministry of Agriculture, Rural Development, Climate Emergency and Ecological Transition. May 10, 2021. Website: https://agroambient.gva.es/es

Regional ministry of Agriculture, Rural Development, Climate Emergency and Ecological Transition. (2021). Legislació GVA sobre qualitat ambiental. April 23, 2021, from Generalitat Valenciana. Website: https://agroambient.gva.es/va/web/calidad-ambiental/gva

Regional ministry of Agriculture, Rural Development, Climate Emergency and Ecological Transition. (2021). Plan integral de residuos de la Comunidad Valenciana. April 23, 2021, from Generalitat Valenciana. Website: https://agroambient.gva.es/es/web/calidad-ambiental/plan-integral-de-residuos-de-la-comunitat-valenciana-pircv-

Regional Ministry of Innovation, Universities, Science and the Digital Society. May 10, 2021. Website: https://innova.gva.es/es

Regional ministry of Sustainable Economy, Productive Sectors, Trade and Employment. May 10, 2021. Website: https://cindi.gva.es/va/inicio

Sánchez, E. (2021). Empresas AINIA Network en el camino hacia la sostenibilidad. May 27, 2021, from AINIA. Website: https://www.ainia.es/noticias/asociados/empresas-ainia-network-camino-sostenibilidad/

Sariatli, F. (2013). Linear Economy versus Circular Economy: A comparative and analyzer study for Optimization of Economy for Sustainability. February 20, 2021, from Visegrad Journal. Website: https://content.sciendo.com/configurable/contentpage/journals$002fvjbsd$002f6$002f1$002farticle-p31.xml

Serrano, A. & Zubiaur, J. (2019). Economía Lineal vs. Economía Circular. ¡Vuélvete circular!. March 3, 2021, from Antonio Serrano Acitorres. Website: https://www.antonioserranoacitores.com/economia-lineal/

Solsona, R. (2020, December 30). El Botànic presenta una ley de economía circular "ambiciosa" con agua gratis en bares y restaurantes. Europa Press.

Spain. Law 11/1997, of 24 April 1997, on Packaging and Packaging Waste, of the Head of State. Boletín Oficial del Estado, 25 April 1997, nº 99.

Spanish Government. (2020). Garantizar modalidades de consumo y producción sostenibles. From Plan de acción para la implementación de la agenda 2030 (pp.50-52). Spain: Moncloa.

Spanish Government. (2020). Las políticas palanca en el Plan de Acción: áreas prioritarias, La Economía Circular. From Plan de acción para la implementación de la agenda 2030 (p.136). Spain: Moncloa.

VAERSA GRUPO. (2021). Gestión de plantas de compostaje. May 28, 2021, from Generalitat Valenciana. Website: https://www.vaersa.com/val/Conozcanos/Servicios/InfraYGestResiduos/GestionPlantasCompostaje

VAERSA GRUPO. (2021). Gestión de plantas de selección de envases ligeros. May 28, 2021, from Generalitat Valenciana. Website: https://www.vaersa.com/val/Conozcanos/Servicios/InfraYGestResiduos/GestionPlantasSeleccionEnvases

Valencian Community. Order 18/2018, of 15 May, of the Conselleria d'Agricultura, Medi Ambient, Canvi Climàtic i Desenvolupament Rural, regulating community composting facilities in the territorial scope of the Valencian Community. Diari Oficial de la Generalitat Valenciana, 22 May 2018, nº 8300.

Valencian Community. Order 22/2016, of 27 October, of the Regional Ministry of Sustainable Economy, Productive Sectors, Trade and Labour, establishing the regulatory bases for

the granting of subsidies in the field of industrialisation. Diari Oficial de la Generalitat Valenciana, 28 October 2016, nº 7906.

Valencian Community. Correction of errors of Decree 201/2002, of 10 December, of the Consell de la Generalitat, establishing special measures in the face of the appearance of community outbreaks of legionellosis of environmental origin. Diari Oficial de la Generalitat Valenciana, 18 December 2002, nº 4401.

Valencian Community. Law 10/2000, of 12 December 2000, on Waste in the Valencian Community. Diari Oficial de la Generalitat Valenciana, 15 December 2000, nº 3898.

WWF. (2012). La Tierra ha sobregirado sus recursos – Informe Planeta Vivo de WWF 2012. March 3, 2021, from WWF. Website: https://wwf.panda.org/wwf_news/?204872/la-tierra-ha-sobregirado-sus-recursos---informe-planeta-vivo-de-wwf-2012