

COLOR CIRCLE
MAPPING CIRCULAR
ECONOMY IN GRANADA
PROVINCE
EXECUTIVE REPORT



MANAGEMENT

Development Service

Delegation of Employment and Sustainable Development - Diputación de Granada

COORDINATION

Manuel Pérez Soto

Development Technician

manuelperezsoto@dipgra.es

EDITORS

University of Granada:

Lead Researcher

Valentín Molina Moreno

Catedrático de Universidad

vmolina2@ugr.es

Collaborator Researcher

Montserrat Zamorano Toro

Catedrática de Universidad

Researcher

Cathaysa Martín Blanco

In the framework of the COLOR
CIRCLE Interreg Europe project,
financed by ERDF funds.



CONTENT

| | |
|--|----|
| • I. SUMMARY | 4 |
| • II. INTRODUCTION | 5 |
| • III. OBJECTIVES | 6 |
| • IV. BACKGROUND | 7 |
| A. CONTEXT..... | 7 |
| B. SCIENTIFIC FRAMEWORK..... | 12 |
| C. LEGAL FRAMEWORK..... | 15 |
| • V. CIRCULAR ECONOMY DIAGNOSIS | 17 |
| A. IDENTIFICATION OF KEY ACTORS IN THE TERRITORY..... | 17 |
| B. IDENTIFICATION OF GOOD PRACTICES IN CIRCULAR ECONOMY . | 24 |
| C. PUBLIC OPINION ON THE IMPLEMENTATION OF THE CIRCULAR ECONOMY | 26 |
| D. IDENTIFICATION OF STRENGTHS AND WEAKNESSES | 30 |
| • VI. RECOMMENDATIONS TO BOOST THE CIRCULAR ECONOMY | 41 |
| A. STRATEGIES | 41 |
| B. DEFINITION OF CIRCULARITY INDICATORS | 54 |
| C. NETWORKING..... | 59 |
| • VII. CONCLUSIONS | 60 |

I. SUMMARY

The Circular Economy Model (CE) is fully aligned with the United Nations 2030 Agenda, being a key lever for the achievement of the Sustainable Development Goals (SDGs). The transition towards this new economic model requires investing in innovation, as well as adapting to the economic, environmental and social reality of each territory.

In this framework, the "Color Circle" project, in which the Diputación de Granada participates and financed by the European Regional Development Fund - ERDF, through the INTERREG EUROPE programme, aims to implement governance actions that facilitate the transfer of knowledge, promoting the supply of raw materials for industry, the efficient use of resources and environmental protection, generating business opportunities and job creation in the province.

This work presents an analysis of the province of Granada that will serve to establish the state of the art in this field in different areas and at different levels. It includes a detailed analysis of the situation at the provincial level of the local public administration, the productive sectors and other key agents in the province, paying special attention to research centres. This has made it possible to establish a set of strategies aimed at designing a roadmap to facilitate their implementation, as well as to lay the foundations for the establishment of collaboration and transfer networks and alliances that will make it possible to overcome the shortcomings and difficulties encountered by the local administrations.

II. INTRODUCTION

The implementation of strategies that promote the Circular Economy is essential to comply with the policies promoted by the European Union in the Circular Economy Plan, approved in 2015. This concept has become the backbone of the design of production systems, but also for administrations and consumers, with the aim of reducing pressure on the environment and being an important source of job creation and new business opportunities. Moreover, the transition towards a more circular economic model is fully aligned with the United Nations 2030 Agenda, being a key lever to achieve the SDGs related to energy, industry, innovation and infrastructure, as well as responsible production and consumption. Its implementation requires investment in innovation and support so that industry, organisations and administrations are committed to making the transition to the circular economy a reality, and that it is adapted to the economic, environmental and social reality of each territory. In this sense, the Andalusian Strategy for the Circular Bioeconomy foresees the formation of a cluster to connect demands and opportunities, as well as to promote services linked to this concept. In addition, the draft Circular Economy Bill of Andalusia aims to create an appropriate regulatory framework for the transition towards a model of environmental protection that promotes the rational use of resources, extends the useful life of products and minimises waste generation.

In this context, the "Color Circle" project, in which the Diputación de Granada participates and financed by the European Regional Development Fund - ERDF, through the INTERREG EUROPE programme, aims to unlock the potential of the Circular Economy by strengthening the role and capacities of local authorities through their close cooperation with local groups or institutions dedicated to research. It consists of establishing collaboration and transfer networks and alliances to overcome the shortcomings and difficulties encountered by local authorities. These networks will not only facilitate the supply of raw materials for industry and promote the efficient use of resources and the protection of the environment, but will also enable the implementation of actions in the governance of institutions, as well as the transfer of knowledge that will facilitate the generation of business opportunities and the creation of jobs.

III. OBJECTIVES

GENERAL

Generate knowledge of the current situation of the Circular Economy (CE) in the province of Granada, i.e. a regional mapping that establishes the state of the art of the matter in different areas and levels, which facilitates the establishment of a roadmap to promote the necessary progressive paradigm shift.

SPECIFIC

Analyse the general context on circular economy, legal and scientific framework.

Diagnose the circular economy in the province, including the identification of the key agents in the territory that will be the driving force for change and the existing good practices.

Identify strengths and weaknesses for the implementation of the CE in the province, including a SWOT analysis by key agents, as well as the opinion of citizens.

Generate recommendations for the establishment of a roadmap for the circular economy in the province, including strategies, networking, as well as a proposal for circularity indicators applicable to the territorial scope.

METHODS

Recommendations:
Focus Groups, CAME analysis, ECOMAPA in Kumu, indicators

Identification of strong and weak points:
Focus Group, SWOT analysis, online Survey

Identification of Good Practice: Online survey and y documentary review

Identification of key agents: Secondary statistical data

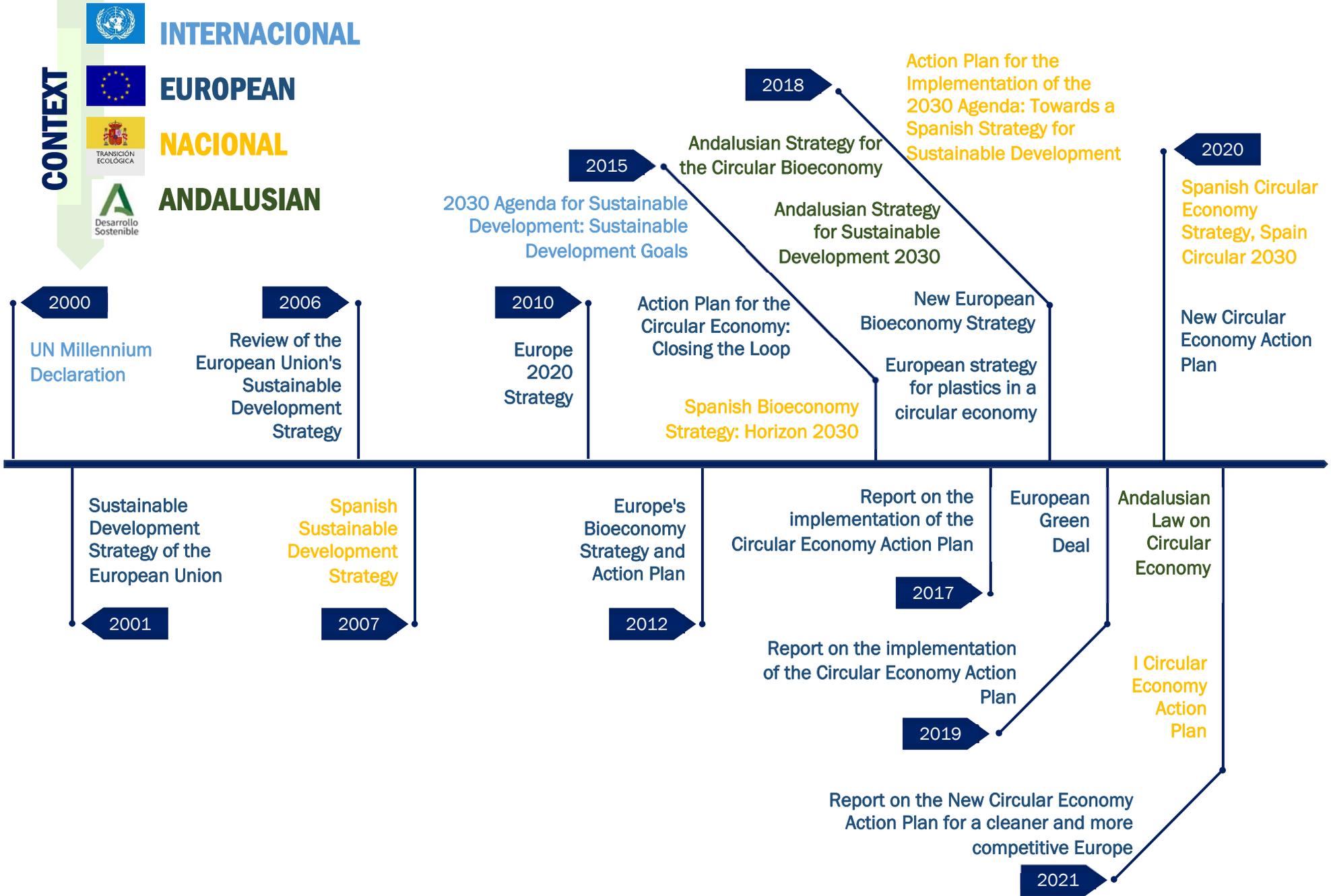
Legal and Scientific framework:
Bibliometric review

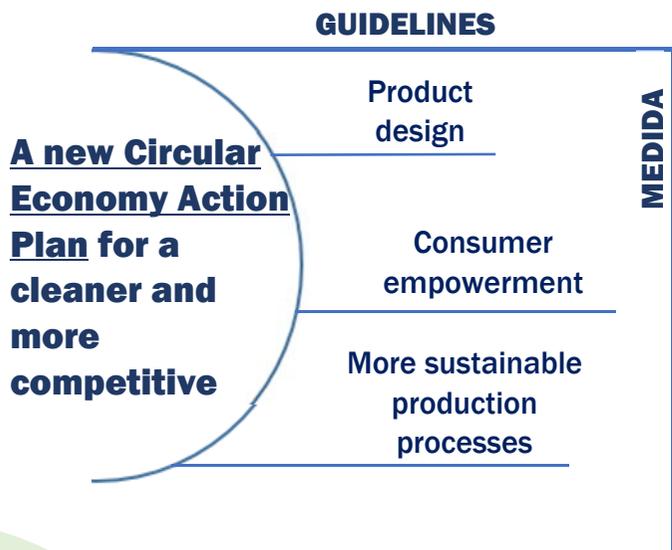
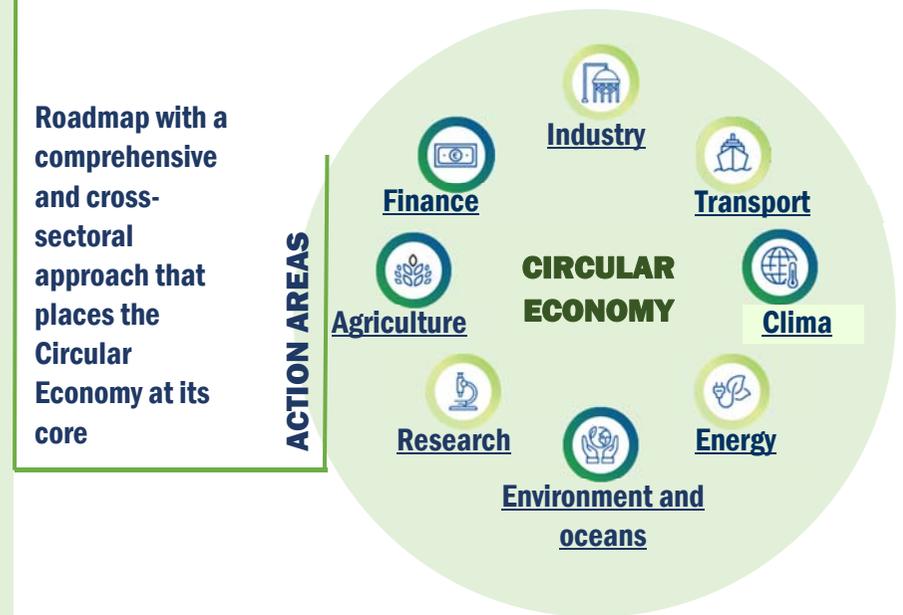
IV. BACKGROUND

A. CONTEXT

In order to continue advancing along the lines opened at the Millennium Summit in 2000, the [2030 Agenda for Sustainable Development](#) was signed in 2015 by the member countries of the United Nations and represents the international commitment that will enable progress towards societies with inclusive economic growth and greater cohesion and social justice, in peace and with a sustainable environmental horizon. To this end, it includes 17 Sustainable Development Goals (SDGs) that cover all public policies, external action and development cooperation, and which include a total of 169 targets. The achievement of these is linked to the goals that are intended to be achieved through the implementation of measures that promote the circular economy, with which its direct relationship has been demonstrated in goals such as SDG6. Clean water and sanitation, SDG7. Affordable and clean energy, SDG8. Decent work and economic growth, SDG12. Responsible production and consumption, and SDG15. Life of terrestrial ecosystems; and indirectly with others such as SDG1. End poverty, SDG2. Zero hunger and SDG14. Underwater Life.

As a result, the concept of circular economy has been gaining prominence in political agendas and, at European, national and regional level, a legal framework has been developed that aims to mark a roadmap towards the transition from a linear to a circular model. The result has been a set of strategies and action plans that have culminated in the [European Green Deal](#) that seeks to make the EU climate neutral by 2050. To achieve this, it is essential to decouple economic growth from the use of resources and move towards circular systems in production and consumption, which is why the circular economy has become a fundamental axis included in the [New Action Plan for the Circular Economy](#), approved in 2020, and which has been reflected in documents in our country such as the [Spanish Strategy for the Circular Economy, Spain Circular 2030](#) or [the draft Andalusian Law on Circular Economy](#). All of them have the firm purpose of contributing to economic recovery after the pandemic caused by COVID19 through a new economic model that develops more environmentally friendly consumption models. To this end, the development of an economic activity that streamlines the management of by-products and end-of-waste, especially in the case of bio-products related to services associated with rural environments, as well as industrial ones, will be promoted, which will enable a more efficient use of resources and a reduction in waste and GHG emissions, which will have an impact on improving the quality of life, the sustainability of the territory, the progress of economic activity and employment.





- Concrete measures in resource-intensive sectors with high circularity potential:
- Electronics and ICT
 - Batteries and vehicles
 - Packaging
 - Plastics
 - Construction and housing
 - Textiles
 - Food

- Making sustainable products the norm in the EU
- Sustainability principles: durability, reparability, upgradability and reusability;
 - Hazardous chemicals
 - + Recycled materials
- Restricting single-use plastics, curbing premature obsolescence and banning destruction of unsold durable goods
- European data space for circular applications: digitisation of product information
- Right to repair products
- Provide reliable product information: lifespan, environmental performance, avoid greenwashing
- Establish minimum mandatory green public procurement
- Ensure less waste
- Harmonise separate waste collection and labelling systems
- Minimising waste exports from the EU and tackling illegal shipments
- Transforming waste into high quality secondary resources to be integrated into an efficient secondary raw materials market
- Improve existing requirements on Extended Producer Responsibility (EPR) schemes.

OBJECTIVES

Reduce domestic material consumption in relation to GDP by 30% (baseline year 2010).



Reduce waste generation by 15% compared to 2010.

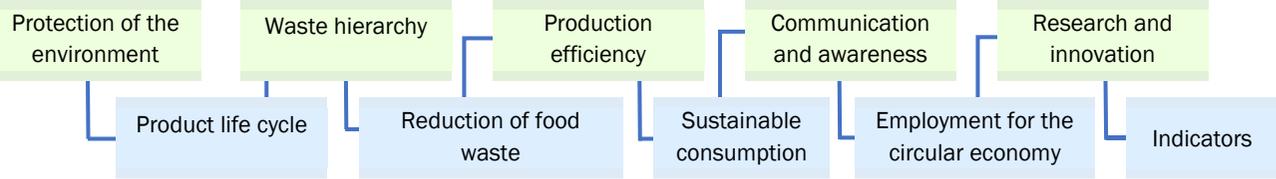
Reduce food waste generation throughout the food chain: 50% reduction per capita at household and retail level and 20% reduction in production and supply chains from 2020, thus contributing to the SDGs.

Increase reuse and preparation for reuse to 10% of municipal waste generated.

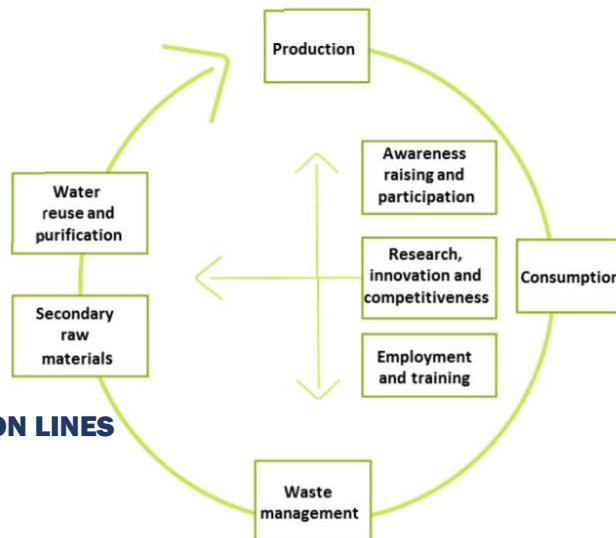
Improve water use efficiency by 10%.

Reduce greenhouse gas emissions to below 10 million tonnes of CO2 equivalent.

GUIDELINES



ACTION LINES



CONSTRUCTION



6.5% GDP 40% resources 40% waste 45% GHG

Move towards the separation and classification of waste materials used in construction and demolition activities, allowing the use and increasing the demand for recycled materials, closing the life cycle.

[Construction and Demolition Waste Management Protocol](#)

FARMING, FISHING AND FORESTRY



10,62% GVA 88 million tons of food throughout the EU

Enabling the production of better quality food at affordable prices, ensuring the sustainable use of natural resources, the conservation of biodiversity, the reduction and valorisation of waste and the development of sustainable food models.

KEY SECTORS

INDUSTRY



17,7% GDP Globalisation and competitiveness

Activating the digital transformation process by changing the business model and the processes and dynamics of industrial companies. Reinforcing [the Connected Industry 4.0](#) initiative that promotes the best use of resources, as it implies a higher level of control and monitoring over them.

CONSUMER GOODS



Offer a wider range of products with [eco-design](#), durability, more recycled materials and reduce single-use goods and planned obsolescence. Develop new models based on servitisation, combined with IoT.

TOURISM



11,2% GDP

Challenges: Intensive use of water resources, high waste generation, difficult waste management due to low separation at source and growing nature-based tourism. Moving towards sustainable and intelligent tourism

TEXTILE AND GARMENT



2,9% GDP -1% recycled

Challenges: Reduce the intensive use of water and energy, improve recycling, durability and the supply chain. In 2025 it will be mandatory to implement a Plan for the selective collection and management of textile waste. Advance in the waste hierarchy, innovate in design and integrate slow fashion.

Economic model based on the production and use of renewable biological resources and their sustainable and efficient transformation into biological products, bioenergy and services for society.

Aligned with the EU Bioeconomy Strategy, it includes the following sectors: agriculture, forestry, fisheries, food and pulp and paper production, as well as parts of the chemical, biotechnology and energy industries.

STRATEGIC OBJECTIVES



Increasing the availability of sustainable biomass for its use through innovative treatments.

Increase the number of bio-industries and biorefineries in Andalusia.



Increase markets and the consumption of bioproducts and bioenergy in Andalusia.

ANDALUSIAN CIRCULAR BIOECONOMY STRATEGY

STRATEGIC LINES

- L1. Promote production and availability of biomass.
- L2. Improve Infrastructures and logistics of biomass.
- L3. Facilitate industrial transformation processes of biomass resources and industrial production capacities of bioproducts and bioenergy.
- L4. Development of markets for bioproducts and bioenergy.

PROGRAMAS INSTRUMENTALES



Communication and awareness



Promotion of R+D+i and education



Access to financing



Cooperation and collaboration

DRAFT BILL ON THE CIRCULAR ECONOMY IN ANDALUSIA

Renewing the reuse and recycling targets

Update extended producer responsibility

Consolidating some key concepts such as by-products

Establish common measurement and control instruments

Increase restrictions on the landfilling of certain polluting products and substances.

Improve the treatment and management of the waste produced.

Contribute to sustainable development, making economic growth compatible with an adequate use of natural resources.

To create an appropriate regulatory framework for the development of the CE

LIMITATIONS

These are not mandatory measures. Lack of attention to waste prevention measures.

INTEGRAL WASTE PLAN FOR ANDALUSIA. TOWARDS A CIRCULAR ECONOMY IN THE 2030 HORIZON (PIRec2030)

B. SCIENTIFIC FRAMEWORK

The concept of circular economy has been gaining prominence in political agendas, which has motivated the promotion of research lines that are the driving force for change. In order to evaluate the emergence and development of the activities of knowledge and scientific activity in the field of circular economy, an analysis of the scientific production related to this concept was proposed by means of bibliometric studies. To this end, once the search criteria had been established, 5007 documents were selected from the Scopus database published in the 2005-2020 time horizon, and the VOSviewer tool was applied for their analysis.

The results have shown how interest in the subject has been increasing since 2005, although it is from 2015 when the growth in the number of publications and citations is exponential, coinciding with the Paris Climate Conference (COP21) in which the first universal and legally binding agreement was reached, adopted by the European Union and its member states.

THEMATIC AREAS

- Environmental sciences
- Energy
- Engineering
- Social Sciences

The thematic areas incorporating the highest number of publications are those related to environmental sciences, energy, engineering and social sciences, which shows the transversality of the circular economy as a paradigm that encompasses environmental needs and technological development, but also social and economic needs.

MAINSTREAMING OF CE

European institutions lead the scientific production, both in terms of the number of publications, with Delft University (Netherlands) and Aalto University (Finland) standing out, and in terms of the number of citations, with the University of Bologna (Italy) leading the way. In addition, there is strong international cooperation in circular economy research with a powerful network with productive links in which European institutions predominate with Swedish and Finnish universities at the forefront, followed by another led by China and the USA and mainly made up of Asian countries (Figure 1).

SDG AND CE RELATIONSHIP



Six main lines of research are identified within the field of the circular economy, including those related to recuperative technologies, sustainability in a transversal approach, waste management, Industry 4.0, critical raw materials and the treatment of by-products and waste.

The hottest current lines of research are the development of recuperative technologies, supply chain management, economic aspects derived from the Circular Economy and Industry 4.0.

The keyword analysis shows how the theoretical concept of the circular economy derives from the combination of ideas from previous schools of thought whose main objective was to reduce the consumption of natural capital, cleaner production and the reuse of inputs (Figura 2).

Six main lines of research within the field of the circular economy are identified, including those related to recuperative technologies, sustainability in a cross-cutting orientation, waste management, Industry 4.0, critical raw materials and the treatment of by-products and waste. Moreover, the temporal analysis shows that all the keywords are relatively recent, which shows that this is still a very active field of research in which new concepts, techniques, tools and methodologies continue to emerge. Specifically, the hottest lines of research at present are the development of recuperative technologies, supply chain management, economic aspects derived from

the circular economy and Industry 4.0. In this regard, the keyword "recycling" currently appears in 20.9% of the research articles published on the circular economy. This principle is very attractive from an environmental point of view, as it requires less use of natural resources, less energy and less labour, while the principles of reuse and recycling aim to extend the life cycle of the product and reintroduce it into the production cycle at the end.

Finally to add that, with the theoretical development of the circular economy, its principles have gradually expanded and there are now 10 (discard, rethink, reduce, reuse, repair, recondition, remanufacture, redesign, recycle and recover). This has led to a broader dimension that includes important economic and social implications; in fact, redistribution represents a rethinking of the economy by giving a more important role to use than to ownership. This undoubtedly strengthens the social base and creates a "safer and more equitable space for society". Together with redesign, companies can offer products and services with high social and environmental implications to their customers, generating shared value.

C. LEGAL FRAMEWORK

Since the publication in 2010 of the Europe 2020 Strategy, until March 2020 when the [New Action Plan for the Circular Economy "for a cleaner and more competitive Europe"](#) was approved, the European Union has maintained and deepened the objectives set out, has followed up on them and has expressly introduced the circular economy among its objectives and priorities, assuming the commitment, also the legislative commitment that this entails. In fact, the new action plan is one of the main elements of the European Green Pact, Europe's programme for sustainable growth, which includes in its agenda the construction of a climate-neutral, ecological, fair and social Europe and the creation of an efficient circular economy.

As a result, it is not difficult to find communications, recommendations, plans and strategies that expressly mention the circular economy and include commitments that bind its institutions and the countries that make it up. In fact, entering the term "circular economy" in the search engine for legislation on the European Union's website returns more than twelve hundred results, with the first results dating back to 1994 but showing a progressive growth, especially since 2015, in which numerous Regulations and Directives stand out as the most important and transcendental legislative acts of EU secondary legislation and because of their binding nature for all the countries that make up the European Union. As a result, the reality of the circular economy and the awareness of the need for a transition towards it is being implemented as a "guiding principle" that informs the positive legislation, judicial practice and action of the European Union and its institutions, as well as the positive legislation, judicial practice and action of its member countries.

In the case of Spain, the implementation and regulatory development of the circular economy depends largely on the implementation and regulatory development carried out on the right to the environment as set out in Article 45 of the Spanish Constitution. The debate on the need for a transition from a linear economy to a circular economy highlights that all these years of regulation have been insufficient to achieve a real effectiveness of the intended rational use of all natural resources, which is essential in the transition towards a more sustainable and inclusive economy. In fact, if a search is carried out that directly collects results of regulations containing the term "Circular Economy" in their title, a scarce result is still returned and it can be seen how recent its appearance in our country's legislation is. Therefore, the transition towards the circular economy requires the defence and, of course, the legal treatment given to environmental sustainability within the framework of the exclusive competences of the State, as well as those assumed by the Autonomous Communities in environmental matters.

At the national level, it is worth highlighting the reform of the current [Waste Law](#), which aims to replace the 2011 regulation. It seeks to generate new Spanish legislation that is consistent with the latest EU directives and enable instruments for both public and private entities to comply with the EU Action Plan for the circular economy, as well as being in line with [Spain's Circular Economy strategy](#) (Spain

Circular 2030), in which it aspires to be an emission-neutral country by the year 2050. This draft bill aims to take into account the concept of industrial symbiosis so that, based on this production paradigm, it can be a catalyst for the transition. To this end, it seeks to establish limitations on single-use plastics by means of restrictions on their presence and access to the market, as well as the creation of a tax to prevent the generation of waste. With regard to recycling, the most noteworthy aspect is that it establishes parameters for the recycling of municipal waste, different collection flows for domestic or textile bio-waste, and also applies the extended responsibility of the waste producer with a tax on the dumping or incineration of waste. Preference for non-packaged water will also be established and economic instruments and incentives such as a green tax for each kg of single-use plastic packaging produced, the promotion of pay-as-you-throw systems and the use of public procurement to promote the use of reusable and repairable products and easily recyclable materials. Finally, it is worth highlighting the proposal for the implementation of deposit, refund and return systems as a mechanism for compliance with extended producer responsibility in sectors such as packaging, textiles, furniture, household goods and agricultural plastics, among others.

At the Andalusian level, the [draft Circular Economy Bill](#) is seen as the driving force to initiate a green revolution based on the pillars of the circular economy and the improving of waste management. It aims to promote cooperation between different sectors of activity to achieve mutual benefit through the use of by-products, materials, energy and logistics, optimising the use of resources and reducing the generation of waste. In this sense, it is necessary for the different sectors to generate industrial symbiosis processes that would contribute to closing the circle of industrial processes. In this sense, the business fabric of Granada must take advantage of this new legal framework to design strategies under the paradigm of the circular economy, create synergies between the different actors involved (public, private and consumer sectors) and generate innovative and sustainable solutions based on maximum efficiency in the use of endogenous resources.

V. CIRCULAR ECONOMY DIAGNOSIS

A. IDENTIFICATION OF KEY ACTORS IN THE TERRITORY

The first step in the diagnosis of the situation of CE in the province consists of identifying the key agents in the territory. Following the quadruple helix model for open innovation, four groups have been created: economic sectors, public institutions, citizens and research groups (Figure 3).

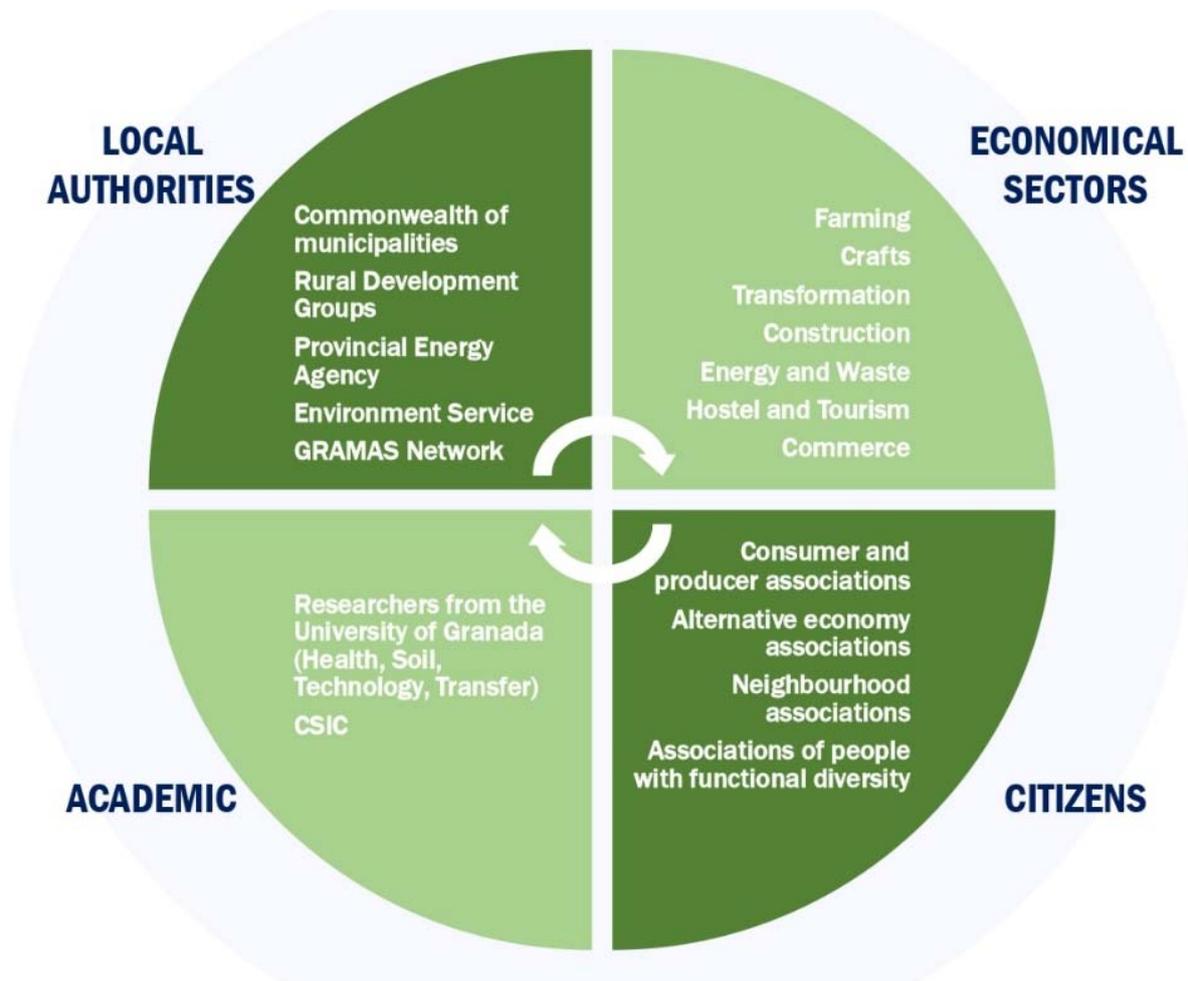


Figure 3. Quadruple helix model with the actors identified in the province.

a. Economical sectors

Objective: To select a representative sample of the different economic sectors of the province that allows us to visualise the productive sectors within which the most relevant and powerful activities in the province are found. The primary, secondary and tertiary sectors are analysed.

Sources: Statistical data collected from the Andalusian Institute of Statistics (IAE) and Ranking of Companies of elEconomista.

Metodología

1. The three sectors are divided according to the activity sections of the CNAE.
2. **Primary sector:** Only agriculture and livestock farming (Group A of activities) are taken into account, as they are the predominant ones. In the case of agriculture, the unit of measurement to quantify the importance of the activities is their production in tonnes/year by type of crop, considering the average of the data between 2010 and 2017. In this way, it was observed which were the most productive types of crops in the province of Granada and, therefore, those that should be studied as they exceed 75% of the total production of the region. In the case of livestock, the unit of measurement was the number of heads of cattle raised/year by type of livestock. Once the most productive and representative types of crops and livestock are available, the CNAE codes corresponding to the production of each of them are obtained.
3. **Secondary sector:** We proceeded in a similar way, but using as a unit of measurement the number of companies that during the last ten years have been dedicated to the activity in question. By means of an average of this unit of measurement and its percentage in the total of the section studied, the divisions were selected which, within each section, accounted for more than 75% of representativeness. The sections with the highest percentage of representativeness were added up to the sum of 75% as a whole.
4. **Tertiary sector:** predominant in the province in terms of the number of companies, the selection of the most relevant categories was made following the same procedure as for the secondary sector. Once selected, instead of identifying specific companies, it was decided to use associations that represent them.
5. Finally, from the selected divisions in each sector, the most relevant companies were selected from the elEconomista ranking.

b. Local Authorities

The group of institutions included Commonwealth of municipalities, Consortiums and Rural Development Groups existing in the province of Granada, which were invited to participate according to geographical criteria, size of municipality and the functionality of the entity, trying to form an equitable representation of the territory. In addition, the Geopark of Granada, the Gramas Network, the Provincial Energy Agency, the FEMP and the Andalusian Association of Tourist Caves were invited due to the organisational relevance of these entities and their direct relationship with the development of the province.

c. Society

The associative field was one of the most difficult to complete. The initial selection was based on criteria of strategic interest and membership, but it was not possible to include the main consumer and environmental associations. It was therefore decided to opt for a more local composition made up of the main producer and consumer associations in the province and to include collaborative social economy projects.

d. Academic/Research

The Andalusian Knowledge System (AKS) is made up of a set of entities that support, collaborate and project the Community's research work within and beyond Andalusia's borders. In the case of the province of Granada, as shown in the register of AKS agents, the entities listed in Figure 4 are classified as knowledge generation agents, networks and structures that transfer, adapt and apply knowledge for the production of innovation and management entities, respectively.

In this system, the University of Granada (UGR) plays a fundamental role. Its leadership is reflected in its recognition as one of the best educational institutions according to various rankings. It is ranked among the 300 best universities in the world and second in Spain, according to the Shanghai Academic Ranking of World Universities. Furthermore, it contributes to regional, national and international socio-economic development through universal education, high-level research, providing high quality services and collaborating closely with the administration and local businesses.

Within the structure of the UGR, the Research Groups have been identified, as well as the Institutes and Research Centres attached to it. A total of 534 groups have been identified, classified according to 9 categories (Figure 5). It can be seen that the largest number of groups fall into the category of humanities and artistic creation, followed by health sciences and social, economic and legal sciences. These three areas account for 63.2% of the groups. On the other hand, those with the least representation are agro-industry and food as well as production and construction technologies, which account for only 5.2% of the total. As for Research Institutes and Centres, Figure 6 shows the existence of 17 and 14, respectively.

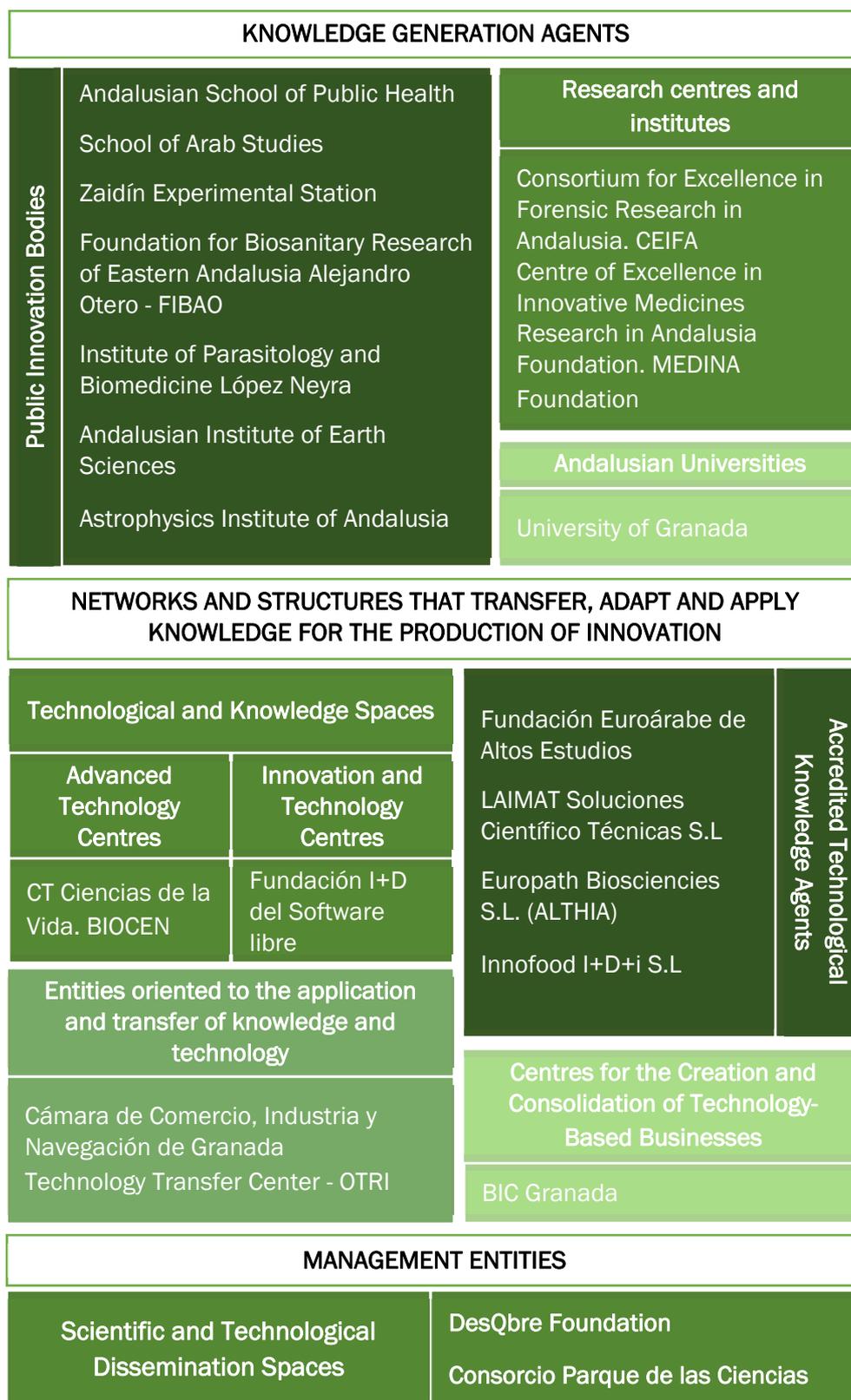


Figure 4. Andalusian Knowledge System (AKS).

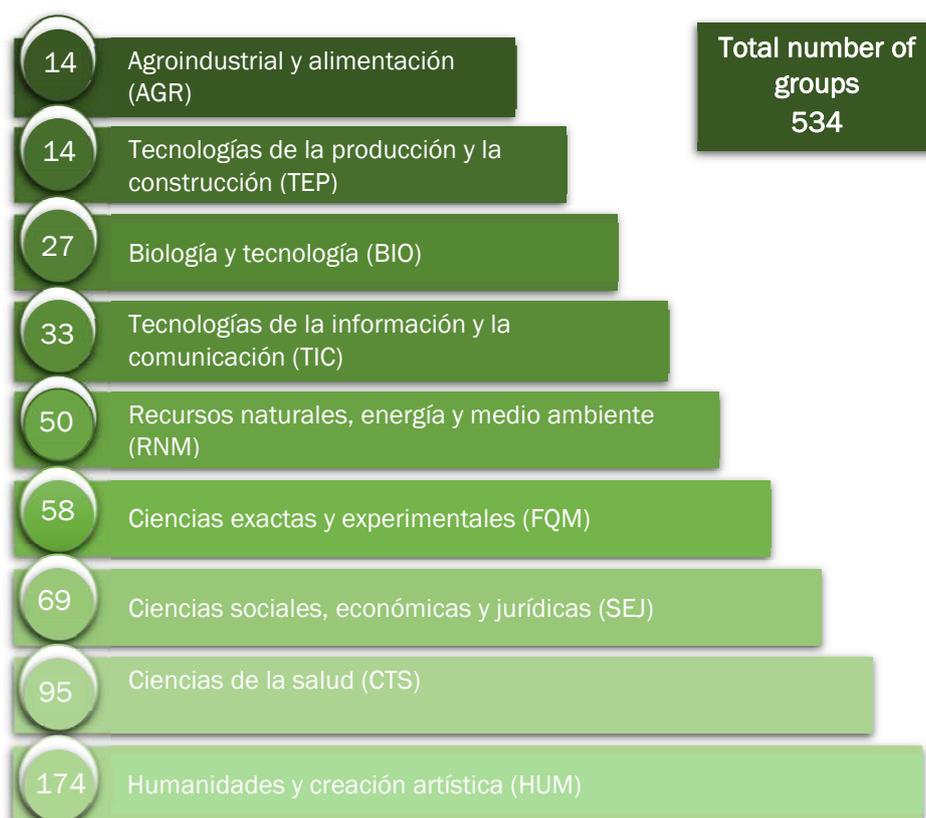


Figure 5. Research groups of UGR.

| | Research Institutes | Research Centers |
|--|--|--|
| | <ul style="list-style-type: none"> I. del Agua I. de Biopatología y Medicina Regenerativa I. de Biotecnología I. "Carlos I" de Física Teórica y Computacional I. Andaluz de Ciencias de la Tierra I. Confucio I. Andaluz Interuniversitario de Criminología I. Mixto de Deporte y Salud I. Universitario de Investigación de Desarrollo Regional I. de Investigación de Estudios de las Mujeres y de Género I. Andaluz de Geofísica y Prevención Desastres Sísmicos I. de Migraciones I. de Neurociencias "Federico Olóriz" I. de Nutrición y Tecnología de Alimentos "José Mataix Verdú" I. Universitario de Matemáticas (Iemath-Ugr) I. Universitario de la Paz y los Conflictos I. Inter de Inv. del Sistema Tierra en Andalucía (Ceama) | <ul style="list-style-type: none"> C. de Documentación Europea C. de Iniciativas de Cooperación al Desarrollo C. de Instrumentación Científica C. de Investigación Mente, Cerebro y Comportamiento C. de Investigación Tecnologías de Infor. y Comunicaciones C. de Lenguas Modernas C. de Promoción de Empleo y Prácticas C. Investigación Biomédica C. Mediterráneo C. Mixto Universidad Granada-Madoc C. de Cultura Contemporánea C. de Documentación Científica C. Tecnológico de Investigación y Desarrollo del Alimento Funcional (CIDAF) C. Pfizer - Universidad de Granada - Junta de Andalucía de Genómica e Investigación Oncológica (GENYO) |

Figure 6. Research institutes and centers of UGR.

A bibliometric analysis of the circular economy paradigm showed that research on CE began in Spain in 2012, but did not gain momentum until 2020. It is therefore an incipient multidisciplinary field of knowledge in the country. This analysis yielded 89 key topics classified into three clusters from which, in order to obtain a map of circular economy research in the province of Granada, a list of 37 lines of research was drawn up and sent to the research groups, institutes and centres of the UGR, as well as to the PRIs of the province. Once the survey was sent out, 57 research groups responded, out of the 534 invited to participate; no response was obtained from the PRIs, Institutes and Research Centres. In addition to the 57 groups that responded, 26.32% of them indicated that they do not study/research, or do not consider that they do, the circular economy or its relationship with any other aspect. The lines of research most developed by the groups are those listed in Table 1.

CLUSTERS

Cluster 1: oriented towards industry and scientific research on options for the utilisation of by-products and resources;

Cluster 2: oriented towards the concept of circular economy, environmental protection and its economic and political dimension;

Cluster 3: the more urban and local development-related part of the analysis.

See Figure 7.

Table 1. Lines of research most developed by the research groups of the UGR.

| <i>Lines of research</i> | <i>Nº groups that develop it</i> |
|--|----------------------------------|
| Environmental impact assessment and environmental protection | 12 |
| Environmental management and its social and economic effects | 9 |
| Implementation and review of the SDGs | 8 |
| Environmental civic engagement | 8 |
| Rural development and local development | 8 |
| Socially responsible territory | 8 |
| Social inclusion of workers | 7 |
| Waste recovery and disposal | 7 |
| Sustainable tourism | 7 |

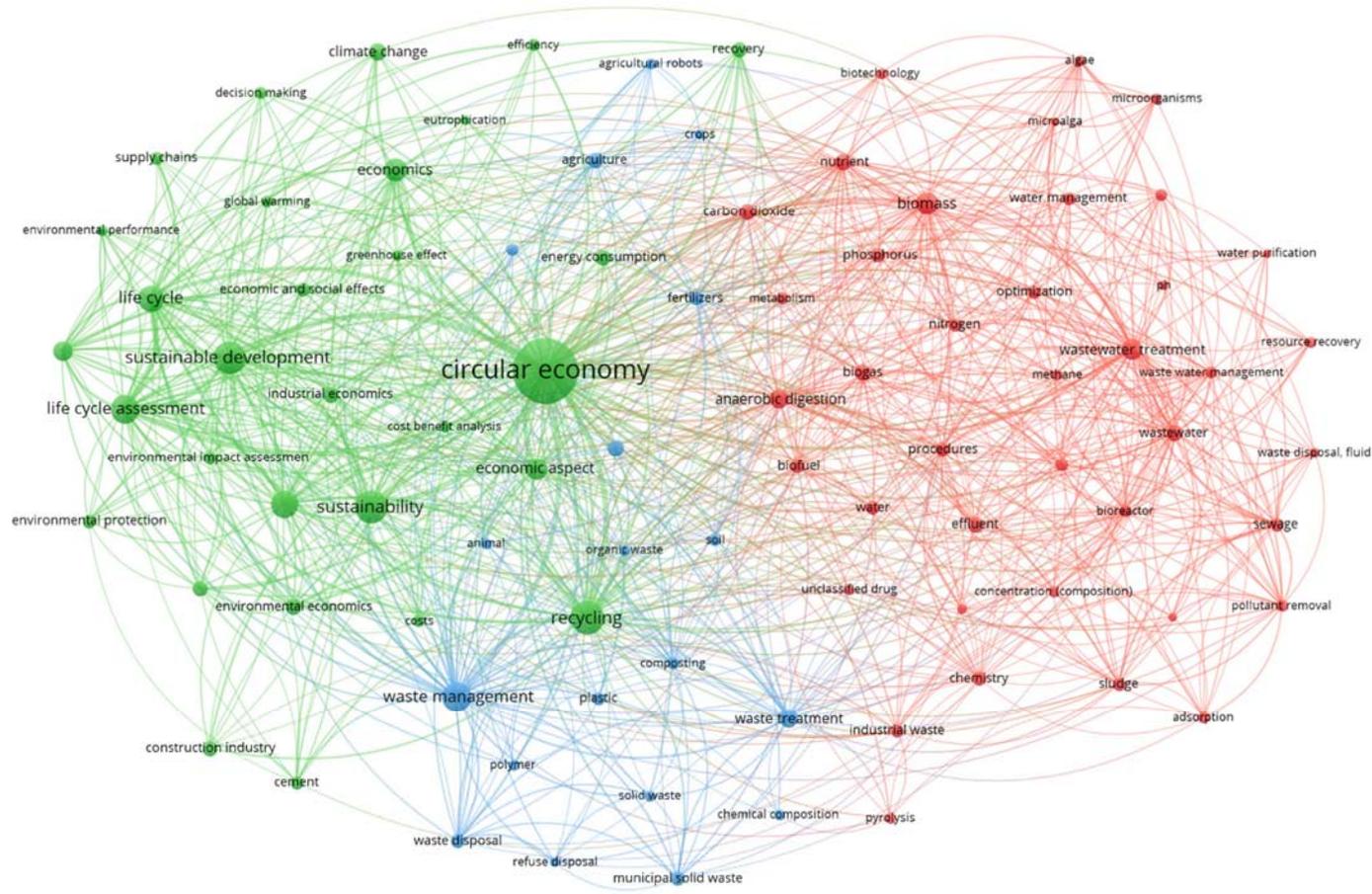


Figure 7. Concepts related to Circular Economy in scientific cluster publications.

B. IDENTIFICATION OF GOOD PRACTICES IN CIRCULAR ECONOMY

The **Catalogue of Good Practices of the Province of Granada (GPCE)** aims to compile the different actions identified so that other interested parties can benefit from these experiences, thus joining the transition. The aim is to promote the exchange of good practices between the main agents involved, in order to create synergies that favour the transition. In order to align the efforts of the different levels of government, the example of the [I Catalogue of Good Practices in Circular Economy](#) of the Ministry for Ecological Transition and the Demographic Challenge has been followed. Therefore, the Granada Catalogue is inspired by the national one, which follows the lines of action determined from the European framework and, especially, the lines of action defined in the "Spain Circular 2030" Strategy. The concepts of this catalogue are the same as those used in the national one.

The GPCE have been classified by economic sector and must follow some of the principles of the CE. Their admission also depended on the fulfilment of minimum circularity criteria in one of the action areas (Design and production, Consumption, use and business, Waste management and Educational, social and R&D&I policies). In the end, 33 BPECs from 11 different economic sectors were identified (Table 2). An example of a BPEC is shown in Figure 8.

Reutilización de maderas para la manufactura de contenedores de cultivo premium para huerto urbano

Granada Privada 01/01/2021-actualidad

Ámbito de acción y relevancia de la BPEC en EC

- El diseño del producto se basa en alargar su vida útil y que no sea de un solo uso. El diseño del producto y su fabricación incluye materiales que provienen de otros productos reciclados.
- Fomenta productos o servicios con diseño y producción ecológica. Rehabilitación de espacios y/o edificios abandonados.
- Medidas que fomenten el reciclado, incluyendo actuaciones de reprocesamiento de material orgánico en forma de compost o pienso.
- Campañas o talleres de sensibilización y divulgación sobre prevención de residuos o concienciación. Creación de empleo verde y políticas de empleo verde vinculadas.

Objetivos

- Reducir la huella de CO2 de la empresa y otras entidades en la línea de suministro.
- Crear puestos de trabajo para personas en riesgo de exclusión social.
- Fomentar la ecología entre consumidores y empresas colaboradoras.

Descripción

Diseño y manufactura de huertos urbanos premium con madera reacondicionada.

Resultados Clave



Ahorro de costes
Competitividad
Innovación



Empleo
Sensibilización
Cooperación
Desarrollo sostenible



Materiales
Emisiones
Energía
Residuos



Principios de EC

1 2 3 4 5 6 7 8

Objetivos ODS



Dificultades o retos identificados

- Ausencia de estándares y definiciones legales.
- Carga administrativa.
- Cooperación con las autoridades.
- Falta de infraestructura circular/barreras técnicas o logísticas.
- Acceso a financiación.

Entidad: Asociación Juvenil Urban Green Club

Más información: www.urbangreenclub.es
Nicolás Gemio Ruiz (Presidente, Gestor de proyectos)
nico@urbangreenclub.es
617 01 06 81

Figure 8. Example of Good Practice in Circular Economy.

Table 2. Distribution of the total number of Good Practices in Circular Economy according to CNAE sector.

| Sector | Entity | GPCE |
|--|--|--|
| A. Agriculture, livestock, forestry and fisheries | Red Agroecológica de Granada | Local organic production and marketing |
| | Grupo Empresarial La Caña S.L. | Revaluation of by-products/co-products |
| B. Extractive industries | Minera de Órgiva, S.L | Lujar Mine |
| C. Manufacturing industry | Asociación Juvenil Urban Green Club | Reuse of wood for the manufacture of premium growing containers for urban gardens |
| | La Retornable | Container return system |
| | Sulayr Global Service | PET recycling |
| D. Electricity, gas, steam and air-conditioning supply | GREENING-E | Sorting and recovery of waste |
| E. Water supply, sanitation, waste management and decontamination activities | Ayuntamiento de Armilla | Public-private agreement for the provision of the public service for the collection and reuse of used clothes |
| | Ayuntamiento de Armilla | Public-private agreement for the provision of the public service for the collection and reuse of used oil. |
| | Ayuntamiento de Armilla | Agreement for the provision of the selective collection service for waste and lighting equipment |
| | Ayuntamiento de Armilla | Agreement for the provision of the door-to-door collection service and selective collection of single-material cardboard/paper. |
| | Ayuntamiento de Alhendín | Alhendín Solid Urban Waste Plant |
| | EMASAGRA | Biofactoría Sur Granada |
| | ASPROGRADES-ECOPARQUE | The Ecopark, an environmental and inclusive reference point |
| F. Construction | EMASAGRA | Smart City Charger |
| | Investigación y desarrollo consultores SL | Use of recycled bio-insulation as cellulose fibres |
| G. Wholesale trade and repair of motor vehicles and motorbikes | Terra Market | Sustainable trade. The Eco-Shop |
| | COVIRÁN | FEICASE-COVIRÁN |
| | COVIRÁN | Responsible waste management Point of Sale |
| M. Professional, scientific and technical activities | ACTISA SL | Advanced application of esparto and hemp fibre |
| | Asociación Proyecto ECOPUERTOS | Study of the marine litter on the seabed of the Alboran Sea, as well as the waste deposited in the coastal area of the coast of Granada. |
| | FEMP | Seville Declaration |
| O. Public Administration; Compulsory Social Security | Junta de Andalucía | Andalusian Bioeconomy Strategy |
| | Agencia Andaluza de la Energía | Economic incentives for the energy development in Andalusia |
| | Agencia Andaluza de la Energía | Public web tools: Biomass Potential in Andalusia and Map of biomass facilities in Andalusia |
| | Red Gramas | Good practice guide on Smart City for small and medium-sized municipalities |
| | Junta de Andalucía | Creation of the Bioeconomy Cluster |
| P. Education | Ayto. Peligros | Social and agro-ecological gardens "The caresses of the earth". |
| | Investigadores de la UGR | Benefits of the poplar bioeconomy in the province of Granada |
| | Dpto. Edafología y Química Agrícola UGR | Organic carbon sequestration in the soil |
| S. Other services | Gaialab - cosmética sólida certificada | Sustainable packaging of natural cosmetics |
| | Grupo de Desarrollo Rural del Poniente Granadino | Salto del Diablillo mini-hydroelectric power plant |
| | ALQUIMIA | Ethical and sustainable fashion |

C. PUBLIC OPINION ON THE IMPLEMENTATION OF THE CIRCULAR ECONOMY "TOWARDS A CIRCULAR ECONOMY MODEL"

The urgency to mitigate the effects of climate change caused by human action has prompted a change in the production and consumption model. Such a change requires not only the involvement of companies and governments but also, and fundamentally, of consumers. For this reason, the survey Towards a Circular Economy model aims to gather information on the consumption habits of the citizens of the province of Granada and their opinion on the initiatives that could be implemented and the difficulties faced by the region in terms of the transition towards the circular model. The survey was carried out by means of a structured online questionnaire on the over-age population of the province of Granada, with a total of 656 responses, resulting in a confidence level of 95% and an error of $\pm 3.82\%$ for the sample as a whole and assuming simple random sampling, with a total universe of 756,786 people. The most important conclusions obtained are summarised below.

As regards the citizen's contribution to **waste management**, waste separation at source is a consolidated habit, covering a wide range of waste (Figure 9). The main problem in doing so is the difficulty in finding a container for a specific fraction near the home. This consolidated habit, together with the willingness to incorporate the fifth fraction (organic waste only) (Figure 10), indicates a positive trend towards improved separation and recycling if optimal systems are put in place.

P8. Please indicate what type of waste you separate or recycle at home.

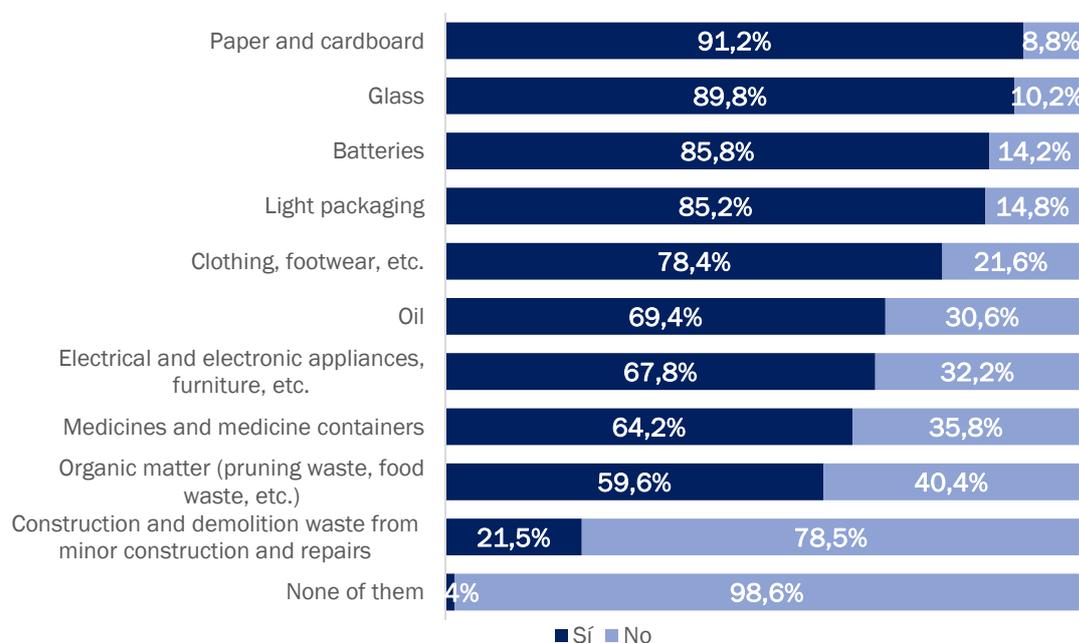


Figure 9. Type of waste separated at household level.

P10. There are cities that are already implementing the selective collection of organic matter. This would mean the implementation of a fifth container and, therefore, a fifth fraction that we would have to separate in our homes. Would you like to have su

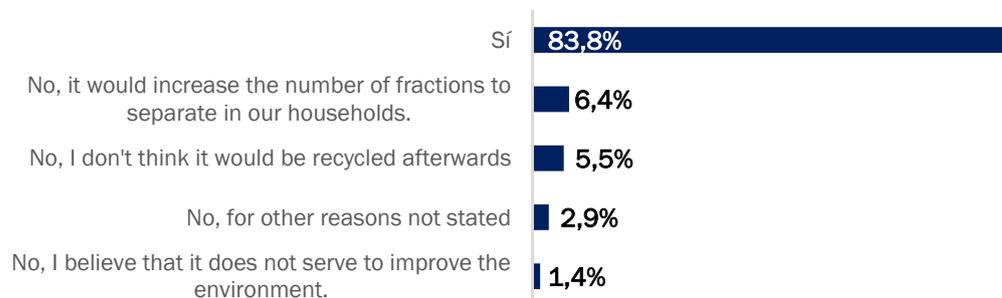


Figure 10. Opinion on implementation of the fifth fraction.

In terms of **consumer habits**, a high degree of willingness to repair is detected, since, if a good breaks down, respondents tend to repair it (Figure 11), and if they stop using it, they try to find another way to reuse it. In addition, the knowledge and use of repair services for goods, especially electrical and electronic appliances, is also evident, although this type of goods is precisely the one that is least purchased, together with clothing and footwear, in second-hand markets, mainly due to the lack of guarantees (Figure 12). The consumption of local products is also shown to be low in packaging or in bulk, although there is not always a supply available nearby to do so. Consequently, the promotion of business models that encourage these habits, together with second-hand markets in sectors such as electronics and electrical appliances and clothing and footwear, could be one of the pillars for the generation of green jobs due to their capacity to reduce the amount of waste and consumption of resources and to promote the local economy and the shortening of the consumption chain..

P11. When something breaks down at home (shoes, clothes, electrical appliances, mobile phone, furniture, etc.) what do you usually do? Multiple choice

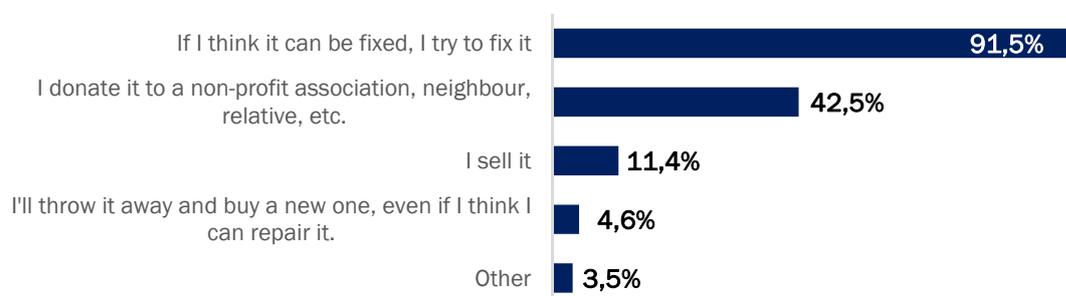


Figure 11. Behaviour when a household good breaks down.

P14. Do you usually acquire any of these goods second-hand?

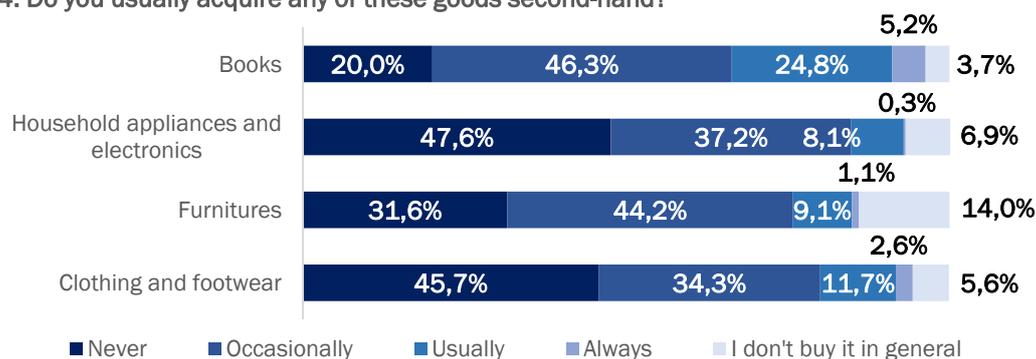


Figure 12. Frequency for the acquisition of second-hand goods.

The sample has a self-perception of their **energy consumption** as responsible, although they generally do not have clean energy sources. Therefore, the promotion of actions aimed at fostering renewable energies should be strategic in order to promote the circular economy. In the case of **water consumption**, although a responsible self-perception is also observed, there is a need to improve awareness of the importance of responsible water consumption.

In general terms, the **management of services** receives a generally positive evaluation, although a high percentage of lack of knowledge is evident. The most notable aspect is the reiteration of the lack of promotion of renewable energies and the sustainability of spaces. The creation of green spaces for citizens to meet and places for activities such as urban agriculture could be welcome initiatives.

In terms of **initiatives** for the implementation of the circular economy, the need to promote clean energy sources and energy efficiency measures, as well as the implementation of packaging return systems, are the most demanded (Figure 13). The promotion of these measures will make it possible to increase recycling rates, as well as to address the high energy dependence, price volatility and insecurity of supply, in addition to taking advantage of the territory's endogenous resources. Furthermore, the promotion of the use of renewable energy based on strategies that maximise the collaborative use of the energy generated translates into an environmental opportunity, but also into employment and cost savings for the user.

P28. From the list of circular economy initiatives that could be implemented in your locality, choose the three that you consider most important:

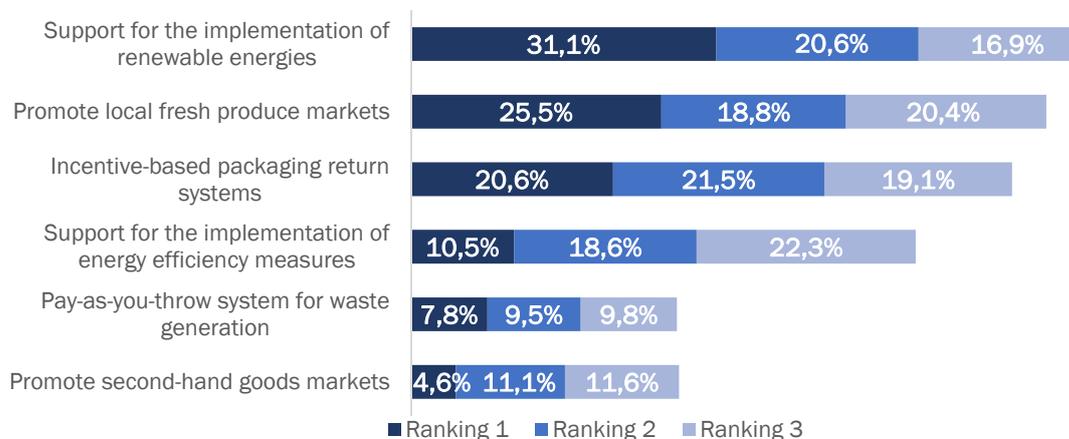


Figure 13. Prioritisation of Circular Economy initiatives to be implemented.

Finally, with regard to **barriers** to the implementation of the circular economy, it is necessary to increase awareness of the benefits of the change of model, provide training and empower the consumer to carry out an effective and efficient implementation of the circular economy (Figure 14).

P29. Select the three most important barriers/difficulties that you consider to be preventing or hindering the transition to a circular economy model

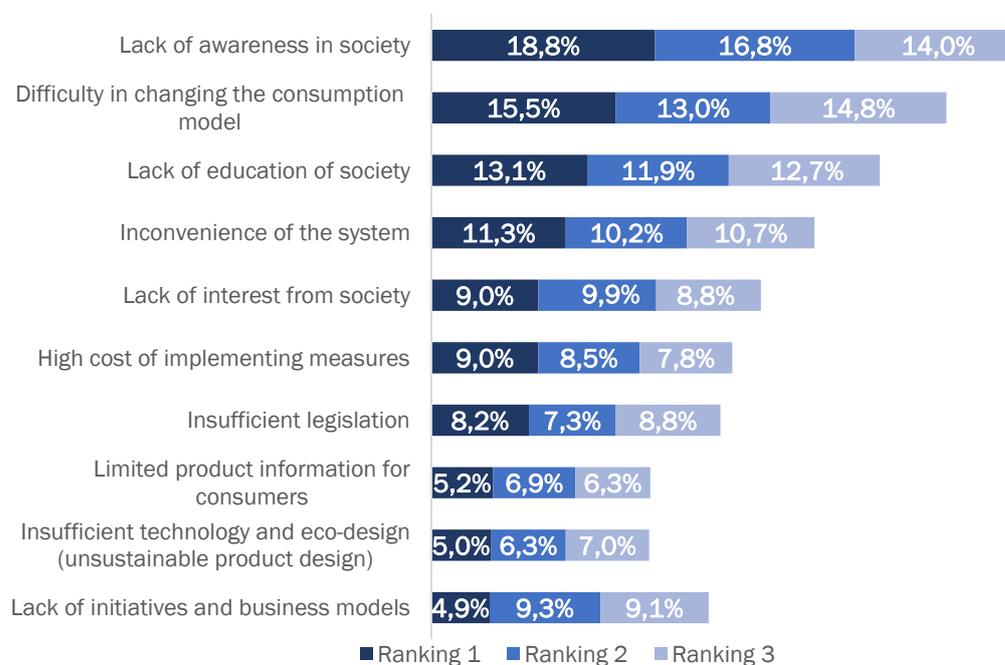


Figure 14. Prioritisation of barriers in the implementation of the Circular Economy.

D. IDENTIFICATION OF STRENGTHS AND WEAKNESSES

The diagnosis of the circular economy has required the detection of the strong points on which to support the strategies and the weak points on which efforts must be united in order to achieve an effective implementation of the new model. To this end, the key agents classified into 5 categories comprising 8 focus groups (Figure 15) were involved, for the identification of which the "snowball" method was applied in some cases, which facilitated the location of less accessible agents. A total of 46 participants were involved (Figure 16), which made it possible to generate a SWOT matrix for each key sector detected.

Focus groups are a qualitative research method that allows different participants to come together to express their opinions.

It has been applied with the aim of, firstly, detecting the strengths and weaknesses of the territory and, secondly, integrating the vision of the different key actors of the territory in the generation of the strategy for the promotion of the CE.

The SWOT analysis is an evaluation tool that allows for the detection of factors classified as Weaknesses, Threats, Strengths and Opportunities. In this way, strengths and weaknesses are detected and decision-making is improved.



Figure 15. Classification of focal groups.



Figure 16. Composition of the focus groups.

G1. AGRICULTURE AND LIVESTOCK



STRENGTHS

- Successful projects in co-product revaluation.
- Increase in the number of responsible consumers.
- Wide possibilities for participation in collaborative projects and pre-industrial validation of innovative ingredients and products.
- Success of some companies in associating their brand with the CE concept.
- Some companies have already digitised their supply chains.
- [ICT-BIOCHAIN](#) project that positions Andalusia as a pilot region for developing digital innovation centres to boost the bioeconomy.

WEAKNESSES

- Resistance to change and lack of internalisation of negative externalities.
- Low capacity to establish synergies with processes, products and services of other companies and organisations.
- Lack of specialised technical knowledge.
- Difficulties in protecting organic farming from cross-contamination.
- Chemical footprint of crops, especially olives due to the use of pesticides.
- Difficulty in transferring knowledge due to the gap between scientific production and business capacity, mainly due to lack of capital.
- Many projects only have a pilot capacity, which does not give a real vision of the market or the scale of the product.
- Weakening of the Vega de Granada due to fragmentation.

OPPORTUNITIES

- Tools and strategies of agriculture 4.0.
- Capacity to generate new products with added value.
- Wide variety of secondary raw materials available.
- There are centres of reference and scientific capital with which to collaborate in the modernisation of the sector.
- New opportunities for collaborative eco-design.
- Inevitable promotion of CE through the implementation of public policies.
- Opportunity to differentiate and gain competitiveness by linking sustainability to the brand.
- Increase in the responsible consumer market niche.
- Trend in intensive agriculture to introduce autochthonous plants and recover the richness of the soil.
- Provincial Council as a dynamising and promoting element for the CE.
- The creation of clusters and the visibility of the different agents could overcome the problems of scalability of the sustainable product.
- The creation of a critical fluids plant in the northern area could help to reverse this trend towards green employment.
- Linking the education and business sector by addressing real needs.

THREATS

- Abstract and not very dynamic legislation.
- Difficulty in incorporating more sustainable production practices due to international price competitiveness.
- The globalised agri-food model is difficult to fit into the CE model.
- Bureaucracy: Processing of aid and complex platforms. Economic incentives are needed, especially linked to sustainable agriculture.
- Difficulties in creating reverse logistics chains.
- Lack of a farmer support network and capacity building in the transition.
- High costs for modernisation of the sector.
- Increasing soil erosion and destruction of the bacteria necessary for the richness of the land as a result of the current tillage system.
- Sustainable products are not competitive because they are not affordable for consumers.

G2. CONSTRUCTION



STRENGTHS

- Lower cost of extraction of products of recycled origin, generally.
- Availability of means and recuperative technologies for the creation of technically viable products with less impact, such as prefabricated concrete made from pruning waste or the application of calcinate to construction materials.
- Capacity for innovation in the sector and application of eco-design throughout the chain.
- Economic segment with a large production capacity in economy of scale.
- The sector is a driving force for the development of the local economy.
- The province has great endogenous resources that can be considered new productive inputs for the sector.

WEAKNESSES

- Absence of a technologically/economically viable operation in certain waste treatment operations.
- Limited productive capacity.
- The construction sector relies heavily on a non-professionalised workforce and needs specific training for all professionals in CE principles.
- Lack of investment in innovation.
- Difficulty in disseminating their work and positioning themselves in the market with more sustainable products.
- Lack of internalisation of environmental costs.

OPPORTUNITIES

- The European regulatory framework as a driver for developing new industrial materials to address the emerging shortage of raw materials.
- Future prospects for increasing the volume of business related to the management and use of waste as new products. Glocalisation of materials.
- Success in knowledge transfer projects with the UGR in the field of circular economy.
- Dissemination of Granada's heritage through the recovery of traditional manufacturing techniques with minimal impact.
- The sustainable construction cluster in Granada as a reference for sustainable development and generation of synergies.
- New technologies (3D printing and polymer-based materials) as important accompanying variables to generate new patents and product development in the sector.
- Greater environmental awareness in society, which asks the sector for new forms and methods of more sustainable construction.
- Crafts can be a sector where pilot projects for sustainable materials can be proposed from an economic, social and environmental point of view and where Granada has important references.

THREATS

- Difficulty in incorporating more sustainable production practices due to international price competitiveness.
- There is no legislation that obliges the use of recycled and local products or aid to promote these products.
- Waste regulations: Barriers to the concept of by-product and the end of waste status, which makes it difficult to recycle and use as a secondary raw material.
- Tax burden too high for small workshops.
- Consumers' reluctance to use recycled material because they think that the quality is always inferior or insufficient despite complying with the regulations.

G3. PROCESSING AND CRAFTSMANSHIP



STRENGTHS

- There are human-scale projects developed according to human needs and the principle of self-sufficiency.
- New lines of business such as sustainable cosmetics based on the recovery of by-products.
- Some traditional crafts survive, such as the manufacture of Jarapa, with heterogeneous locations in the province.
- There are several channels of communication with the UGR and local councils to develop projects.
- Availability of recuperative technologies that can be used to create more sustainable and durable products.
- Increased social awareness of the importance of sustainable products and those that preserve cultural heritage.

WEAKNESSES

- Lack of investment and support for new products which paralyses their applicability.
- Lack of research into the use of by-products.
- Insufficient environmental awareness in companies.
- Lack of consolidation of suppliers, manufacturers and distributors adapted to the CE model.
- Long supply chains. Environmental costs of transport are not considered.
- Need to redesign products: durability and repairability.
- Lack of training and capacity building plans in the use of new recovery technologies and in the management of organisations in dynamic environments.
- Higher initial production costs: incorporating LCA, redesign or specialised personnel.
- The price of the final product is conditioned by the size of the project, which is a handicap for small-scale and artisan production.

OPPORTUNITIES

- Opportunity to establish networks to co-finance new technologies or to create a cluster with technology companies to reduce technology costs.
- European calls for proposals (Next Generation funds) that can provide financial resources to establish new, more sustainable production models.
- New market niches for sustainable products at national and international level.
- Possible new secondary raw materials from local by-products (The surplus of textile companies can be connected with the Jarapa sector that feeds on the recycling of fabrics and its surplus can be used for packaging or packaging of other products).
- Socio-labour inclusion programmes linked to incipient productive processes.
- Offer ageing and care culture studies to explore the potential of welfare and care products.
- Advancing in the separation of fractions could make the production of by-products much cheaper.
- RRREMAKER project of the UGR: artificial intelligence to produce handmade objects from recycled materials.

THREATS

- Greenwashing practices that mislead consumers.
- Cost of technological innovation.
- Lack of social recognition of the added value and benefits of sustainable products.
- Lack of support and visibility of projects and companies that carry out good practices.
- Difficulty in transferring knowledge between university and business due to long administrative deadlines.
- Imbalance in implementation between SMEs and large companies: risk of large companies monopolising the sector due to their greater capacity to adapt to the new model.
- Lack of harmonisation and definition of standards.
- Difficult to use local waste as a product due to the lack of homogeneity in its composition.
- Difficult price competitiveness with non-sustainable products.

G4. COMMERCE, HOTELS AND RESTAURANTS



STRENGTHS

- The number of responsible consumers is increasing, characterised by their loyalty, their high level of demand for the good purchased and their support for local trade.
- Sustainable local businesses are practising good habits of use and recycling of goods, such as selling in bulk, and are raising awareness on the reuse of products.
- Synergies and collaborations are being created between local businesses based on social justice and fair trade values.
- There are provincial business initiatives to offset environmental impacts as a sign of embedding sustainability in the business mindset.
- [La Huella Verde](#). Achievements: a number of companies have changed their conventional energy supplier to one offering energy from more sustainable sources; creation of a label to measure companies' CO2 emissions; creation of the first CO2 sink in Andalusia in collaboration with the Granada City Council to offset emissions.

WEAKNESSES

- Difficulty in obtaining eco-certified suppliers because of the
- administrative difficulties for small businesses to obtain it.
- Lack of visibility of companies working under the sustainability paradigm, especially in the case of small businesses.
- Reduced procurement capacity in small organic businesses with small market niches.
- Lack of support for the acquisition and innovation of recuperative and/or sustainable technologies.
- Difficulties in raising awareness among users of the benefits of good practices in CE and responsible consumption. Need to involve citizens and make them participants in actions.
- Difficulties in public-private collaboration in good CE practices.

OPPORTUNITIES

- The inclusion of some sustainable practices in large companies is raising awareness in society about CE and is therefore an opportunity to make visible and expand the change of economic model.
- Opportunity for the economic development of Granada through its positioning as a sustainable tourist destination.
- Aid for the digitalisation and automation of processes that can reduce costs for businesses.
- Opportunity to develop new market niches based on reuse and repair.
- The University of Granada, as a knowledge centre, can help in the diagnosis of problems in the sector.
- University graduates and final year students as personnel trained in new technologies that can help companies to incorporate knowledge.

THREATS

- It is difficult to promote responsible consumption due to the lack of interest of a large part of society with regard to CE, added to the high cost (relative price) of sustainable products and goods given the limited purchasing power of part of society.
- Lack of social and environmental aids focused on sustainability and of public awareness programmes to promote good practices.
- Local commerce detects unfair competition from companies not committed to CE that take advantage of the rise in responsible consumption.
- Local businesses demand more institutional attention in terms of visibility, improved access to shops and financial aid.
- Perception of institutional greenwashing: Public institutions appear to be in the sustainability paradigm, but are ambiguous, do not devote the necessary resources and do not implement effective policies to promote CE.
- The lack of control of bad practices in CE is a threat to businesses that do comply with CE principles.

G5. ENERGY AND WASTE



STRENGTHS

- Regulatory trends at all levels of government towards sustainable solutions and away from more polluting goods and services.
- Know-how exists, and it is possible to establish synergies around CE. Progress is being made in professionalisation, strengthening the productive and innovative fabric.
- Entrepreneurship capacity motivated by local research and technical talent and knowledge centres.
- Support from the Provincial Council for energy efficiency in the municipalities of the province.
- Green employment: Waste recovery is creating rural employment and fixing population in the territory.
- Willingness to multi-sectoral cooperation in waste treatment. Although it needs to increase demand and price competitiveness.

WEAKNESSES

- Market underdeveloped and with difficulties in accessing information related to production sites, logistics, companies and prices of this resource.
- Lack of knowledge about the short and long term profitability of waste.
- Low economic capacity to invest in innovation, coupled with the high price of the necessary equipment and technologies.
- Low consumption of renewable energies by public institutions.
- Projects are thought at a macro level and it is necessary to delve deeper into local projects and the creation of networks that provide economic benefits to the whole chain.
- Lack of collaboration between the different waste treatment plants in the province.
- Lack of monetisation of waste and incentives for correct separation.
- The space of the recycling plant is not adapted to the regulations, preventing a more appropriate waste fragmentation.

OPPORTUNITIES

- The generation of medium-scale projects could promote the use of agricultural waste (such as poplar or almond), identifying production sites to reduce distances and make collection and stockpiling profitable.
- Biomass as an opportunity for green employment in depressed areas and a tool to fix population.
- The new waste regulations and the increase in the sale price of energy as a boost to eco-design.
- Opportunity to generate a network for the treatment of WEEE in view of its increase.
- Eco-schemes as a key intervention in the environmental architecture of the new CAP.
- Potential for the inclusion of groups at risk of social exclusion. Creation of an inclusive CE Eco Lab.
- Possibility of establishing a network of local waste management companies.
- The inclusion of the fifth fraction, the waste management calendar, the selective collection and differentiated treatment required is an opportunity to improve waste management and develop projects to recover this waste. It is an economic opportunity for local spin-offs.
- Biomass combustion ashes could be used for the manufacture of fertilisers or building materials and thus close the loop, but it needs research on proper segregation to reduce the presence of heavy materials and heterogeneity. It also faces regulatory constraints.
- Increase in recycling and in the number of people making use of recycling points.
- Opportunity to advance in the wet/dry waste segregation model and for the reuse of wastewater.

THREATS

- Lack of social awareness of the benefits of the circular economy.
- Little concreteness in the Plans and delay in the implementation of CE policies. Greater inter-administrative coordination is needed. Lack of regulations on eco-design.
- Authorisations and qualifications require lengthy procedures.
- Lack of coordination of local authorities with clean points and lack of financial resources on the part of municipalities. Lack of involvement in the adaptation of these points, both to avoid "cannibalism" of waste (illegal management) and to ensure correct separation.
- Lack of official certification of the activity carried out by the collective working at the clean points.
- Lack of a unifying element for CE in Granada. Difficulty of communication with collaborating entities and networking.
- Insecurity in the supply of raw materials and excessive dependence on the foreign market, coupled with price volatility.
- Lack of funding for demonstration projects coupled with economic uncertainty.
- Reduced commitment to local agricultural biomass as a renewable energy source.
- Stagnation in the reduction of controlled waste disposal.



STRENGTHS

- Increased environmental awareness and the number of consumers willing to pay more for products with lower environmental impact.
- Citizens are more aware of the impediments of possession, which is an opportunity for a shift to servitisation; the frugal movement is expanding.
- Social networks as a space for young people to connect, disseminate and share responsible consumption habits and knowledge to select companies that carry out good practices.
- There are many consumer and self-consumption associations in the province that develop projects based on sustainability and social justice.
- Some consumers are using the wide range of affordable technologies to improve energy efficiency and water consumption in the home.

WEAKNESSES

- Lack of accessibility to updated information and dissemination of information about the mobile recycling centre, which makes it difficult for citizens to deposit their waste.
- Lack of monetisation of waste and incentives for correct separation.
- Consumers need training in separation and identification of waste at source.
- There is a mental pattern of undervaluing public space, as exemplified by the transfer of public space, which is detrimental to neighbourhood life.
- In the face of large infrastructures, it is necessary to recover space for pedestrians and promote multimodal transport, as well as to update Urban Mobility Plans.
- The need to promote a change of mentality in consumption. Especially among the over 30s.
- Lack of knowledge of the technologies available for responsible consumption at home.
- Reduced connection between associations and research groups.

OPPORTUNITIES

- Future implementation of the Communifynow platform: Collaborative space that promotes local trade and the interconnection of people through an ethical currency.
- Interconnection between agriculture and local commerce to promote sustainable and responsible behaviour.
- Opportunity to generate meeting spaces in neighbourhoods through their rehabilitation.
- Take advantage of the tendency to empty cities of vehicles and occupy parking areas to place clean points or urban furniture without sacrificing pedestrian spaces.
- Social networks as a support structure for neighbourhood development initiatives.
- The paradigm of sustainable architecture linked to ethics and aesthetics: A trend that designs spaces to meet needs without compromising future resources, in a flexible way and "closing the circle" of materials, being environmentally friendly.
- Slow mobility as a style that enhances the value of spaces. It requires the implementation of multimodal mobility nodes and the enhancement of infrastructures. Recovering sustainable mobility in the metropolitan area.
- Take advantage of public and private space for the dissemination of good practices. Involve local businesses as dissemination agents.
- Boycott and buycott strategies as an element of consumer pressure and empowerment.

THREATS

- The current business model is difficult to change due to its interdependence and fragility in the global system, with many cases of greenwashing appearing.
- Problem of accessibility in the recycling of less common fractions.
- Resistance to change: Social frustration with change due to the threat to established ways of life, consumption and work.
- Lack of information and training for citizens on proper recycling and product traceability.
- The cost associated with sustainable products or the lack of knowledge of other simpler and more affordable consumption options are an impediment to responsible and active consumption.
- Risk of green gentrification: threat to the slum and possible expulsion of residents,
- Difficulty in implementing time and ethical currencies, lack of collaboration between actors.



G7. POLITICAL-ADMINISTRATIVE

WEAKNESSES

- There has not been a move to tertiary treatment of wastewater, which would allow for discharge into natural watercourses and reuse as an alternative water resource.
- which would allow it to be discharged into natural watercourses and reused as an alternative water resource.
- Inability of wastewater treatment plant managers to adapt to the speed of regulatory changes.
- Municipalities are not prepared to meet the costs of selective MSW collection. In areas where agriculture is predominant, the management of agricultural and livestock waste is a problem.
- Little progress in the construction of wastewater treatment plants prevents the extension of coverage to other municipalities.
- Lack of information on territorial needs in waste management.
- Deficient institutional development of CE in a cross-cutting manner and of the role of CE promoter.
- Need to establish collaborative governance models and generate networks that enable planning and coordination for the management of common territorial problems. Little development of the quadruple helix model (PA-Business-Academia-People).
- Under-utilisation of the Gramas Network to cooperate on aspects beyond purely environmental issues.
- Need for local entities to integrate into larger projects financed by European funds and demanded in the CE strategies.
- Difficulties on the part of local councils (with reduced economic capacity) to take advantage of subsidies when they are not 100% due to the fact that they must advance important sums.
- Lack of technical staff specialised in CE who can apply the necessary criteria included in the subsidies to implement and develop initiatives.
- Lack of assistance in the implementation of strategies and plans to promote CE at the local level.
- Loss of local economy due to the non-existence of local companies or the lack of technological capacity that implies contracting external companies for waste management.
- Need for institutional audit on energy inefficiency in public infrastructures. Demand for technical support to develop energy plans.
- Need to make economic compensation circles (services, infrastructures) for rural areas in relation to urban areas so that food sovereignty can be sustainable and the population can settle.
- Problems in the planning and management of mobility that increase the problem of territorial isolation of rural areas, which has a negative impact on access to services. Geographical barriers and centralised planning of services make access difficult and lengthen consumption chains.
- The lack of electric charging points hinders the promotion of electric vehicles. The current low demand implies very high maintenance costs for these points.

THREATS

- Need for strategic planning for sludge treatment and local use, avoiding transport to composting plants and the associated risks and costs. In addition, there is no public option that can reduce sludge treatment costs.
- Loss of use of raw materials such as esparto grass, being necessary to offer innovative technological solutions to apply them to new ecological needs.
- CE does not advance if it does not generate economy and employment, it is necessary to promote the business model.
- The general ideas of CE are not grounded at the local level as they follow a top-down planning model that ignores the specificity of the territory.
- There is no clear territorial legislation to help assimilate legislation from higher levels, nor technical assistance. Municipalities are small and do not have the capacity to manage issues such as carbon footprints.
- Regulatory limitations on transhumance is an impediment to CE in livestock farming.
- Environmental threat from electric vehicle batteries. Deficient management and treatment.

STRENGTHS

- Extensive experience of the mancomunidades in wastewater treatment in collaboration with the integral water service of the Diputación.
- The Diputación is offering training courses in agrovoltaic energy; it seeks to generate synergies between agriculture and green energy sources.
- There are initiatives to promote sustainable mobility such as the safe school routes and the rural connection initiative with shared vehicle on demand (taxibus).
- The Provincial Energy Office offers energy audits and applies energy efficiency measures in its infrastructures, although at a low level.
- Gramas Network of more than 100 municipalities already has working groups to jointly develop campaigns and projects, while sharing best practices.
- Some RDGs are integrated in the Red integral de Vegas as a platform that is trying to bring out regulations on soil recovery and non-toxic food, as well as to promote food sovereignty.
- Participatory local development strategies are being applied in territories such as the Altiplano, which are part of the Leader programme, with which stakeholders are consulted on the application of economic resources in the territory.
- Several RDGs participate in the "Segureño Lamb Sustainability and Production Control Project", which seeks to revitalise and modernise the production of Segureño lamb, laying the foundations for the sustainability of its production and minimising the environmental impact throughout the production process while promoting green employment.
- Wealth of endogenous resources such as the fertile plain and heritage resources with the possibility of sustainable exploitation, as well as the existence of a great potential for renewable energies due to the province's climate.
- River Contract: a collaborative and participatory governance tool for water resource management that seeks to protect and guarantee access to water for all stakeholders while working on the resilience of the territory. Pioneer project in Spain and developed in the Altiplano.

OPPORTUNITIES

- Possible installation of waste pre-treatment plants, with strategic location, as a tool to optimise sludge treatment.
- Development of talent attraction plans to exploit innovation needs, especially knowledge in CE practices that add value to the territory.
- Energy communities. Incipient action by the Provincial Council called the Solearse Campaign, which promotes the creation of energy communities.
- Foreseeable increase in the use of electric panels in public buildings as a result of a European drive and taking advantage of the fact that peak consumption coincides with production hours.
- Red Gramas as a platform for awareness, dissemination and implementation laboratory.
- UGR as an institution for the study of needs and the establishment of priorities.
- Opportunity to develop sustainable tourism. Many demands with new active tourism projects.
- Valorisation of caves as a tourist attraction and promotion of good living.
- The Andalusian Climate Change Plan will oblige municipalities to have a municipal climate change plan. The Provincial Council already has a provincial plan to help municipalities and is awaiting funds to promote adaptation through green infrastructures.
- Future App at Andalusian level for mobility on demand as a response to the mobility problems of low density populations. Together with other initiatives such as mobility on demand and servitisation.
- Next Generation as an economic tool for the integration of needs and strategies. It allows to land the idea with more resources.



STRENGTHS

- The UGR is one of the best positioned internationally in Artificial Intelligence and the acquisition of the BioRegion gives it the capacity to become the Spanish capital of AI.
- The University's transfer strategy is reflected in the increase in University-business collaboration projects.
- The Social Council has brought the University closer to city councils and companies.
- There are many multidisciplinary research groups. In addition, high participation of researchers in state projects and with application to the needs of the EELL.
- PTS and Campus of International Excellence of the Sea together with the future DONES-UGR research centre and the centre for innovation in sustainability and ecological transition of the sugar factory as development assets. As well as the EEZ-CSIC.
- Icaro platform to offer extracurricular and paid internships and the UGR Emprendedora platform for the promotion of entrepreneurship. Use of students final projects in solving real sustainability problems.

WEAKNESSES

- There is a certain weakness in technological capacity compared to the polytechnic universities.
- Resistance to change, especially in transfer management. It requires agility in the procedures and requires highly qualified staff, which clashes with the current mentality of the PAS/PDI. Transfer is seen as a result, not as an objective.
- Lack of human resources. Too much workload for current staff and under-utilisation of infrastructures.
- Lack of institutional initiative to modernise the degrees. Teachers also need to adapt to the new landscape.
- Different pace between the research and business worlds, making collaboration difficult.
- Low funding of the Operational Groups. Lack of specific agents receiving information from the Operative Groups and of mediating agents.

OPPORTUNITIES

- Possibilities of offering technical-scientific assistance to local entities.
- Industrial doctorates as a boost to business innovation.
- Increased awareness of different actors that can increase the acceptance of knowledge.
- New knowledge centres and innovative ecosystems.
- Permanent networks between researchers and knowledge application sectors. Operational groups as a nexus.
- Training in waste management, waste treatment and recovery.
- Marketplace of needs and knowledge.
- Growing interest of farmers in new technologies to improve waste treatment and cultivation that represent a transfer opportunity.

THREATS

- Visibility, communication and connection: Lack of knowledge of other local actors about the capacities of the knowledge generated at the University.
- Few exchange forums between society, productive sectors, academia and institutions.
- Dependence on political will: The degree to which the authorities are aware of the challenges of CE determines the pace of implementation of the knowledge generated by the university.
- Weak productive fabric: The productive fabric is not very oriented towards the technology industry and productive sectors that are not very intensive, making transfer difficult.
- Loss of talent: PhD students are neither employed nor in demand and the productive fabric of the province does not take on graduates, nor does it offer sufficient opportunities for training placements.
- Lack of confidence in CE practices when there are no certificates of waste quality. Toxicity studies are alarming in terms of the valorisation of certain wastes.
- Conservation paradigm: sustainability is underestimated as an act of generosity towards the planet and not as an act of protection of our own species.

VI. RECOMMENDATIONS TO BOOST THE CIRCULAR ECONOMY

The promotion of measures to foster the Circular Economy will be supported by: (i) a set of strategies designed by key agents in the territory, in addition to others of a territorial nature; (ii) the generation of a panel of indicators to facilitate monitoring; and (iii) the establishment of networks between agents that benefit the generation of short consumption chains and improve the flow of secondary raw materials in the territory.

A. STRATEGIES

The CAME analysis tool enables the design of strategies based on the factors identified in the SWOT analysis (Figure 17). Its initials stand for Correcting Weaknesses, Addressing Threats, Sustaining Strengths and Exploring Opportunities. This tool has been used to generate strategies for the eight focus groups. The strategies are classified into four categories:

- **Defensive Strategies** (Strength + Threat). Aim to protect against potential threats using strengths.
- **Offensive Strategies** (Strength + Opportunity). Aim to gain maximum benefit from an opportunity by using a strength.
- **Survival Strategies** (Weakness + Threat). They seek to survive the storm, to withstand the possible adverse effects of threats in the best possible way in order to minimise damage.
- **Reorientation Strategies** (Weakness + Opportunity). They aim to correct a weakness or deficiency by taking advantage of an opportunity.



Figure 17. Relationship between the SWOT analysis and the CAME analysis.

G1. AGRICULTURE AND LIVESTOCK



CORRECTING

- Support and assistance in the search for strategic objectives for the reuse of [operational groups](#) and sectoral consortia in a transversal manner, as well as the clusters that are generated, in order to correct the scarce capacity to generate synergies and improve the scalability of the products.
- Institutional channelling of [Next Generation funds](#) to facilitate access to them and use them to bridge the gap between scientific production and business application.
- Dissemination, awareness-raising and training on the benefits of the application of [agribusiness 4.0](#) to reduce resistance to the change of production model.
- Training in the calculation of the carbon footprint and dissemination of good practices and compensation actions carried out by the private sector in the face of the negative externalities it produces.

ADDRESSING

- Development of awareness campaigns on the benefits of sustainable agriculture and the importance of eco-labelling. Educate citizens to make up for the sector's communication shortcomings, the lack of incentives to change to a circular production model and the lack of price competitiveness of sustainable products.
- Making available the existing regulations in the sector in a simplified manner and clear transposition of regulations in relation to the territorial reality in order to tackle the abstraction characteristic of the legislation.
- Assistance and simplification of the procedures for accessing aid for the change of production model.
- Promote a multi-sectoral collaborative framework and the generation of regional reverse logistics chains through the dissemination of good practices and information to create a joint strategy and protect the product in international marketing.
- Promote the accessibility of agricultural data to improve the predictive capacity and technology applied to the sector, reducing the costs of modernising the sector and the lack of scalability of pilot projects.

SUSTAINING

- Visibilisation of the region's sustainable products and practices, promoting short consumption chains.
- Offering a support network for farmers that trains them in sustainable production and helps them to digitise the supply chain.
- Establishment of collaborative networks: Generation of exchange forums for the agricultural sub-sectors that lead to participation in collaborative and innovative projects and improve access to aid to develop them.
- Rewarding and recognising responsible final consumption as opposed to those who continue to consume under the globalised agro-ecological model.

EXPLORING

- Strengthening the connection between students and companies (such as the pilot initiative known as the [Programa Puentes](#)) in terms of knowledge transfer, through the application of final projects and internships linked to real business needs, improving opportunities for graduates and taking advantage of the technical-scientific capital available to the sector.
- Promotion and recognition of projects for the revaluation of co-products that include a new portfolio of products ranging from fresh products to new inputs under the quality seal of the Provincial Council.
- Facilitate know-how on how to position oneself in the market by associating the brand with the concept of CE without falling into greenwashing and based on success stories in the region.
- Adopt a proactive role from the County Council to channel the needs and opportunities of the regional productive sectors and link them to the region's innovative ecosystem.

G2. CONSTRUCTION



CORRECTING

- Promotion of the use of recycled building materials for end consumers as a lever against the sector's lack of innovation in waste recovery.
- Valorisation of ecological materials and the recovery of traditional manufacturing practices in the region.
- Encouragement of the creation of new production centres and Construction and Demolition Waste Management Companies (CDWMs) based on the expected increase in demand for co-products and by-products from construction and demolition waste.
- Promotion of collaborative work through the offer of exchange forums for the joint application of new technologies to eco-design.

ADDRESSING

- Boosting sustainable public procurement with the use of materials from CDW, as well as updating the database of materials for public tenders.
- Generation of inclusive green employment and assistance to small workshops through financial support for the training period conditional on local hiring in small businesses that practice sustainability.
- Implementation of green taxation in relation to the waste hierarchy system: application of landfill fees as a persuasive measure towards the use of CDW; application of economic incentives related to waste management costs that reduce the cost of waste transformation.

SUSTAINING

- Promotion of the use of endogenous resources, both primary and secondary, in the region to increase competitiveness in the face of raw material imports. Mapping of the province of Granada with respect to the Circular Economy.
- Facilitate the acquisition of eco-design technologies to increase the competitiveness of small enterprises.
- Raise awareness of the cost reduction and long-term savings of recycled products among all actors involved in the production process of the construction sector.

EXPLORING

- Facilitate the creation of spin-offs between the University and the private sector to develop the potential of the sector in the technological world.
- Boosting knowledge transfer: Facilitating and channelling the reception of research needs from the private sector, improving the dissemination of channels and communication. Improve the permeability of the UGR.
- Link the development of the sustainable construction sector to the existence of a construction cluster. Generate a favourable environment for sustainable construction. Accompany and make visible the clusters and initiatives to promote synergies.
- Generation of exchange channels that promote collaborative networks that serve to create a regional supply chain and reduce dependence on the outside world.

G3. PROCESSING AND CRAFTSMANSHIP



CORRECTIN

- Promotion of the generation of operational groups in the secondary sector for innovation, reducing the implicit costs and linking it to the scientific capital of the University.
- Socio-labour insertion and training programmes linked to traditional arts that reduce the costs of labour incorporation and the acquisition of technical knowledge.
- Channelling the technological needs of companies around eco-design to link them to projects such as the University's RRREMAKER, reducing innovation costs.

ADDRESSING

- Favour collaboration channels between companies of different sizes to reduce inequalities and improve the scalability of production.
- Offer training and education plans in the use of recuperative technologies and in the management of organisations in dynamic environments.
- Visibilisation and awareness-raising of the added value of goods made with a traditional and artisan base.
- Favour the creation of new companies that cover the needs in the supply chain, especially from the valorisation of secondary raw materials of the territory, and that have an impact on the generation of synergies. Mapping of the province of Granada with regard to the Circular Economy.
- Collection of initiatives and needs in the supply chain to speed up the implementation of the CE and favour short consumption chains.

MANTAINING

- Promotion of visits and exchanges between specific groups (entrepreneurs, technicians) to make good practices visible.
- Dissemination campaign on sustainable regional consumption options that reduce the preeminence of unsustainable products in the basket.
- Promotion of human-scale projects and regional self-sufficiency vis-à-vis greenwashing companies.
- Facilitating the connection between research centres and companies to share technologies (laboratories) and technical tests needed to improve products at more affordable costs.
- To speed up the provision of knowledge according to the needs of the economic sectors, taking advantage of the existing communication channels with the University. Knowledge on demand-applied.

EXPLORING

- Assistance to municipalities to improve separation by fractions and advice on the separation of fractions at business and final consumer level, to enable better use of technological nutrients for inclusion in new products.
- Creation of a marketplace that makes visible the practices, goods and consumption and production centres that comply with CE criteria. At the same time, it allows to collect initiatives and needs of any citizen of the province in CE.
- Promotion of traditional legacies and cultural valuation of traditional arts, linking them to sustainable tourism.

G4. COMMERCE, HOTELS AND RESTAURANTS



CORRECTING

- Promote eco-tourism through eco-labelling and the visibility of good practices in the sector.
- Encourage the inclusion of eco-design in the content of training programmes in the sector. Assistance and awareness-raising in eco-design. If the product makes it clear how to separate each component, it improves the perception of the product and recycling/reuse.
- Awareness raising and dissemination in the sector on reuse and repair together with demystification of erroneous separation.
- Supporting the digitalisation of shops to increase visibility and accessibility to consumers. Reducing the gap between SMEs and large companies.
- Aid for hiring in small businesses in the development of their modernisation plans, making platforms such as Ícaro or technical assistance visible, which also encourages university graduates to gain experience.
- Raising awareness through the three major ecosystems that are now stronger to reach the end consumer: web, app, and social networks, specifically for retail trade.

ADDRESSING

- Incentive to recycling linked to local commerce and implementation of compensation systems.
- Promoting sustainable public procurement and the application of eco-efficient measures that can then serve as an example to the public.
- Promoting consumer awareness of ethical and local products. Disseminate the added value of sustainable products in terms of health, economic, social and environmental well-being.
- Aid to improve reverse logistics chains in small businesses.

MAINTAINING

- Encourage labelling that gives or brings recognition and visibility to companies that comply with CE and fair trade.
- Enhance the multiplier effect of the responsible consumer that currently exists.
- Adopt a proactive and exemplary role in institutional consumption, promoting green public procurement.

EXPLORING

- Identification of measures to support consumer recycling and reverse logistics chains.
- Implement measures to support sustainable trade, tax reductions or deductions for sustainable local businesses. Recognition for the implementation of good practices.
- Strengthen the ecosystem for creating synergies between companies and networking.
- Raise awareness of the externalities and consequences of irresponsible consumption, especially when greenwashing is practised.
- Facilitate access to the calculation of the carbon footprint and decision-making in logistics strategies to decide between reusable or recyclable.

G5. ENERGY AND WASTE



CORRECTING

- Generation of a map of bio-waste. Creation and study of a map of energy needs and consumption in public centres for biomass linked to the nearest production centres for these resources, reducing supply chains.
- Incentives for the correct separation of waste and its reuse.
- Stimulation of the final demand for revalued products and biomass energy sources.
- Generate opportunities to develop medium-scale demonstration projects that demonstrate the technical feasibility of waste reuse.
- Facilitate access to and collaborative use of technologies that reduce optimisation costs.

ADDRESSING

- Facilitating access to financing for CI projects, acting as a guarantor or advisor to financial institutions. Promote ethical banking.
- Facilitate the creation of selective collection points at local level and stimulate coordination between waste treatment plants, avoiding landfills.
- Provide more space for differentiated waste management in plants and reduce landfill space.
- Positive measures for waste treatment through green taxation from the Provincial Council to the rest of the local authorities.
- Council as a unifying element of the CE, which is able to focus efforts for collaboration in waste management and treatment, as well as in efficient energy consumption.
- Compilation of the type of waste that is not being treated according to the collection and treatment points in order to make the information available to interested parties who can monitor it.
- Provide information on management alternatives to pruning waste that avoid permission to burn prunings for phytosanitary reasons.
- Action plan to tackle “waste cannibalism” that hinders proper waste management.

MANTAINING

- Expedite processing and offer advice to meet waste management requirements in the shortest possible time. Regulations that allow for reasonable implementation periods.
- Link the generation of green jobs to the implementation of demonstration projects that can strengthen the productive fabric.
- Promote entrepreneurship in rural areas and employment in CE activities linked to the endogenous resources of the land.
- Favour multi-sectoral cooperation that allows closing the circle, taking advantage of synergies and rationalising the demand for green goods.

EXPLORING

- Facilitating access to mobile clean points and incentives for selective recycling.
- Assistance in the implementation of the fifth fraction in municipalities and treatment systems. Development of a regional bioeconomy policy in relation to the 2030 agenda.
- Promotion of social inclusion in the generation of green jobs in relation to waste treatment.
- Calls for public-private funding for entrepreneurship in innovation and technologies for energy generation and use of resources that count on the University for development.
- Specific area of Agenda 2030 and CE in the organisational framework of the Provincial Council that has visibility and generates specific policies and coordination between the areas involved.

G6. SOCIAL



CORREGIR

- Promotion and dissemination of local consumption communities on the streets.
- Provision of “citizen kiosks” or reference facilities in neighbourhoods for the dissemination of consumption networks.
- Raise the profile of online responsible consumption platforms and facilitate the dissemination of their applicability.
- Creation of physical and virtual spaces for the optimisation of resources and social exchange.
- Promote compensation systems and green taxes for selective collection at source. Improve the separation and reuse of organic matter.

AFRONTAR

- Training and dissemination actions on clean points and product traceability.
- Improve accessibility to the clean points and offer rewards in the form of discounts or rewards for good separation practices.
- Maintenance and preservation of public spaces and enabling their use by residents. Link improvements to residents, avoiding green gentrification.
- Strengthen relations between associations and city councils and the role of associations as social agents, remedying the weaknesses of the citizen-institution link. Reformulate citizen participation.
- Bring the principles of eco-responsible citizenship to the classroom: participation, recycling, mobility, consumer habits, etc., through non-formal education.

MANTENER

- Visibilise good practices in consumption and responsible consumption by citizens (awards and recognition, provision of spaces). Rewarding awareness-raising and influence-generating actions.
- Promote the digitalisation of participation in local entities.
- Creation of catalogues and information in ordinary language showing examples of sustainable consumption and servitisation.

EXPLORAR

- Design of days or festivals of local businesses together with consumer associations. Tasting of products that give visibility and life to the neighbourhood.
- Encouraging sustainable mobility. Offer information on the reduction in pollution produced by strategically choosing where to live.
- Provincial Council's mobility plan: set an example by changing the mobility of its own employees.
- Promoting the use of the sustainable mobility App with emissions reduction certificate in the UGR.

G7. POLITICAL - ADMINISTRATIVE



CORRECTING

- Assistance and promotion of local Climate Change plans based on the Andalusian Climate Action Plan (2021-2030).
- Apply European recovery funds to generate talent attraction plans in the rural world that favour economic circles of compensation towards the rural world, especially linked to green employment and conservation of ecosystem services.
- Extend the functionality of the Gramas Network as an instrument of supra-departmental and transversal coordination. Obligation of all departments to participate and increase their budget allocation.
- Municipal assistance from the Provincial Council to implement optimal systems of selective collection of fractions at the local level and promotion of supra-municipal waste management to reduce the implicit costs. Possible installation of waste pre-treatment plants.
- Diagnosis of municipal waste management: Mapping of resources, distances and difficulties for the optimisation of waste management and treatment. Diagnosis of the different levels involved in the whole process.
- Valorisation of the caves as an ecotourism and housing opportunity.
- Advancing in the digitalisation of rural areas to reduce mobility needs and geographical barriers. Access to public services and security in internet access to promote the settlement of digital nomads.

AFRONTAR

- Promote the collaborative governance model for multi-stakeholder actions linked to the SDGs.
- Promote tertiary water treatment: Strategic planning, rethinking of tariffs and resources allocated to sludge treatment.
- Encourage the creation of business lines that make use of by-products from waste generated and well collected by municipal selective collection systems.
- Improve collective and intermodal sustainable mobility plans and management, instead of mainly promoting individual electric mobility.

MANTENER

- Promotion and incentive to the repair and eco-design sector to facilitate the repair of products. Facilitate entrepreneurship in the repair sector.
- Budget allocation to maintain a technical staff to dynamise the associative sphere that connects the quadruple helix in participatory projects and keeps the projects active.
- Providing resources to the associative network to enable the acquisition of personnel and access to economic resources, as well as to participate in conferences and campaigns as a link with civil society.
- Positioning the Gramas Network as a space for connection between local and supra-municipal entities for collaborative decision-making in CE.

EXPLORING

- Promote self-consumption through the creation of energy communities and disseminate the ASOLEARSE campaign.
- Online marketplace to raise the profile of rural products and thus attract people to the area.

G8. RESEARCH



CORRECTING

- Facilitate training in waste management, treatment and recovery at three levels: citizens, institutional technicians and the university community.
- To offer opportunities for entrepreneurship in the waste sector.
- Promote the dissemination of what the University can offer in terms of technical assistance and industrial doctorates.
- Raise awareness of the actors involved in CE through the figure of teachers to reach more students in the acquisition of skills in the field of sustainability. Training researchers in dissemination so that they can pass on knowledge.

ADDRESSING

- Change in political sensitivity towards the problems of the CE that is reflected in specific actions to promote a change of model.
- Making the competitive advantages of innovation visible and linking it to the value of the knowledge generated at the University.
- Improving access to knowledge in CE to reduce social reluctance to change. Development of a tool to show the knowledge produced in a more digestible way and the instrumentalisation of a member of the research group as a disseminator, improving the attraction of the business community.

MANTAINING

- Make transfer success stories visible in order to motivate the generation of more collaborations.
- Enable a form of recognition for researchers for their transfer work.

EXPLORAR

- Financial support for the creation of a CE Chair that brings together and channels territorial needs and opportunities, developing the quadruple helix model.
- Strengthening environmental volunteering as an awareness-raising element.
- Periodic progress report on SDGs based on environmental profile. Visibilise the UGR's SDG strategy and the indicators that will be proposed in the University's next strategic plan.
- Support to strengthen the UGR Entrepreneurial and Disseminating UGR to show the opportunities for connection with the productive fabric and entrepreneurship associated with sustainability.
- Promote the linking of the participation in national research projects to the attention to the needs of the productive sectors of the territory.

A complementary exercise for the design of strategies has been carried out, based on the expert knowledge of the work team, with the aim of generating specific strategies according to the specificities of the territory. The following is a brief diagnosis of the strengths and weaknesses of eleven comarcas and proposals for action.

| REGION OF HUÉSCAR | |
|-------------------|--|
| Diagnosis | <ul style="list-style-type: none"> • Ageing population, due to emigration and low birth rate. • Main sources of wealth: primary sector, construction and services. • It has 107,089 ha. of UAA (Useful Agricultural Area). Main crops: Barley, oats, soft wheat, almond trees, olive groves, open-air vegetables. Also noteworthy is the breeding of Segureña sheep. |
| Proposal | <p>Due to the enormous crop production, all the vegetable waste could be used in biomass plants, creating a clean fuel from the remains and husks of the crop. At the same time, there are sustainable development initiatives in the region, such as the oil produced by the Ntra. Señora de la Soledad agro-olive cooperative or the existence of sustainable cultivation farms such as "Los Morales".</p> |
| REGION OF BAZA | |
| Diagnosis | <ul style="list-style-type: none"> • Negratín reservoir: a wetland that is home to endangered fauna and endemisms endemic Iberian species. In addition, at its tail, there are geological formations of badlands (wastelands) of lean clays. of lean clays. • Economy based on the service sector, with a large number of shops and restaurants or catering establishments. • Arable crops 15,972 occupy most of its land ha. • Agriculture accounts for the largest share of energy consumption (48%). • It is worth highlighting the cultivation of barley and almond trees. As well as the growing number of meat companies. |
| Proposal | <p>As the Negratín reservoir is the largest in the province and the third largest in Andalusia with a capacity of 567 hm³, a study could be carried out to evaluate the creation of a power station which, in addition to its obvious sustainability, would allow for an adjustment of energy needs, with its demand being able to be adjusted to the needs of the moment.</p> |
| REGION OF GUADIX | |
| Diagnosis | <ul style="list-style-type: none"> • It has a very old population. • The region has one of the richest natural and cultural heritages in Spain. • Outstanding craft activity. • Climatology with great potential for renewable energies (thermosolar, wind, photovoltaic). • Potential business niches associated with the introduction of alternative crops and the use of forest resources or biomass. |

Proposal

Apart from the possible introduction of new crop species with biomass projection, there is a wind energy project being developed by ENERGÍA EÓLICA ACCITANA. The installations would be based on a 3.4 MW wind turbine and its corresponding transformation centre and would be installed to the south of the municipality of Guadix. With an average wind speed of 16 km/h, it maintains a stable speed that increases to 20 km/h in the months from January to April.

REGION OF LOS MONTES

Diagnosis

- Main activities: Agriculture, hunting and livestock farming.
- Strengths: Hunting activities and rural activities.
- In the 2017 business opportunity plan of the Provincial Council of Granada, the availability of the sector to implement renewable energy measures and take advantage of the possible by-products generated is mentioned.
- The aim is to position itself in a complex agri-food market, identifying new crops and processes that provide greater added value to production, new products in IV and V Range and their possible applications in other sectors (antioxidants, cosmetics, biomass, etc.).

Proposal

Implement actions to facilitate positioning in the agri-food market.

REGION OF LA VEGA DE GRANADA

Diagnosis

- It has the highest population density of all the comarcas.
- The western part is a plain, the rest is mountainous.
- It has large areas of poplar groves and its main crops are irrigated (beetroot, tobacco, potatoes, maize, plums, cherries, apricots) although there is also dry farming (wheat, barley, oats, chickpeas, lentils) being one of the regions with the most natural resources in Spain.
- It has several green economy initiatives focused on waste management and renewable energies (COMPOP project, Granada toda solar, Biofactoría...).

Proposal

Promotion of the development of the biofactory model to become a benchmark for change in wastewater treatment plants throughout the province, as well as improvement of the sludge recovery process.

Exploitation of the potential of asparagus applied to cellulose due to its great commercial interest.

Recovery of the veguero paths accompanied by actions that favour sustainable mobility (mainly non-motorised) and tackle the high levels of air pollution in the region. A detailed and updated diagnosis of the Vega and various proposals can be found in the book "Por un desarrollo sostenible de la Vega de Granada (Spain)"¹.

¹ Maroto, Juan & Pinos, Aida. (2021). Por un desarrollo sostenible de la Vega de Granada (España).

REGION OF LA ALPUJARRA GRANADINA

Diagnosis

- Great economic destructuring as a result of the crisis in the last century on the agrarian and livestock model at the same time as there is a low level of industrialisation.
- It subsists on tourism. As a result, its business fabric is based on hotels and rural houses.
- The irrigation channels and the technique of canalisation as key instruments to ensure access to water, allowing a development model that links the maintenance of ecosystems with the settlement of the population.

Proposal

Boosting the blue economy through the renewal of human resources in charge of maintaining traditional water channelling techniques, linked to the expansion of the organic farming model. Thus taking advantage of the region's potential in organic production and the development of inclusive agricultural models.

REGION OF EL VALLE DE LECRÍN

Diagnosis

- Its economy is a mix of livestock, agriculture and tourism.
- Little innovation in the existing industries in the RDG's sphere of action. Only a few large aggregate extraction and construction derivative companies have developed important innovations.
- Existence of some minor industrial activities, especially those related to construction, wood and clothing.
- It is worth mentioning the existence of several wind farms.

Proposal

The existence of the Lecrín wind farm, with its 12,000 MW of nominal power, proves that wind farms are a reliable option for sustainable energy development in the province of Granada. In addition, with an average of 112 hours of sunshine per month, the consideration of installing a solar farm is considerable.

REGION OF EL VALLE DE LOJA

Diagnosis

- High production of olive trees and green asparagus.
- Existence of fish farms on the river Frio, both for trout and sturgeon.

Proposal

Area with sustainable agricultural and tourism potential associated with the fixed assets, landscape landscape, cultural and natural heritage, as well as water tourism.

REGION OF ALHAMA DE GRANADA

Diagnosis

- Its main crops are oats, barley and olive groves, although almond trees are also important (55,184 ha UAA).
- There is some movement in the industrial sector with a total of 33 agro-industrial facilities.
- It has a higher percentage of organic farming than the rest of the comarcas.

Proposal

For Alhama de Granada, the best possible initiative, since it is eclipsed in other aspects that could stand out (wind energy, solar energy or biomass) is the dedication to the cultivation of organic agriculture. It is surrounded by mountain ranges and has important water resources, such as the Los Bermejales reservoir. Its scarce urbanisation, as well as its large extension of hectares available for cultivation (55,000 ha of UAA), higher than in Andalusia, has a large percentage of pasture and fallow land (34.1 %) that can be exploited in the introduction of sustainable agriculture.

REGION OF LA COSTA GRANADINA
Diagnosis

- It is the second most populated region.
- It has a tropical microclimate, with 320 days of sunshine a year and an average temperature of 20°C.
- It has a great variety of crops, such as avocado, which occupies some 2,600 hectares, or the custard apple with denomination of origin of the tropical coast, which occupies some 3,100 hectares, although its main activity is in the service sector in the form of hotels and lodging or in the construction sector.

Proposal

With the 30,000 tonnes produced last year, estimating a weight of 200-400 gr. per avocado, of which 170-200 gr. corresponds to the stone, this leaves us with around 14,000-15,000 tonnes of avocado pits. As the stone has a higher percentage of caloric value than almond skin or olive pits, it is a perfect fuel for biomass due to its high caloric value.

B. DEFINITION OF CIRCULARITY INDICATORS

The European Union (EU) is trying to build a joint sustainable growth path, hence the creation of the EU Action Plan for the Circular Economy which points to the need to assess and monitor progress in the transition through the use of comparable official data. The main tool that has been put in place is the creation of monitoring dashboards that allow the progress of the transition to be assessed through meaningful, comparable, updatable and time-series available indicators.

The main benchmark is the [Circular Economy Monitoring Framework](#), which provides ten indicators to assess four key areas: production and consumption, waste management, secondary raw materials and competitiveness and innovation. This information will also allow to assess the success of existing policy initiatives in meeting the targets set and to identify areas of shortcomings, improving decision making. At the national level, the Spain Circular 2030 Strategy follows this scheme. Furthermore, these panels allow for the incorporation of auxiliary indicators that reflect the specificity of a territory, as in the case of [Andalusia](#), the [Basque Country](#) or [Madrid](#), whose strategies and plans incorporate indicators that are decisive for the territory.

“While it will take some time before the results of the actions on the circular economy are visible in the statistics, it is meaningful to start by establishing baselines. This will help to monitor future developments and inform policy making processes.”

[COM \(2018\)29 Final](#)

Therefore, the COLOR CIRCLE project, which aims to unlock and accelerate the potential of the circular economy in the province of Granada, cannot neglect the creation of a scorecard including a dashboard of indicators. However, due to the scarcity of information available at the provincial level, only data from the area of waste management is shown, one of the key areas within the circular economy paradigm.

The most recent accessible data for the four areas for the Member States of the European Union (EU-27), Spain and Andalusia are presented below (Table 3 to Table 6). The only data available for the province of Granada is for indicator 3a. Municipal waste generation: In 2018, it was 525kg/inhabitant.

Production and consumption

The monitoring of the production and consumption phase comprises six indicators. The monitoring of the level of self-sufficiency in raw materials helps to show the overall state of the transition to the Circular Economy. The indicator on Green Public Procurement provides information on the contribution of public authorities to the new model as an exemplar and driver of change. The indicators on waste management show information on the amount generated and the efficiency of material consumption and economic activity.

Table 3. Production and consumption.

| Production and consumption | | EU-27 | SPAIN | ANDALUSIA |
|----------------------------|---|-------------|-------------|-------------|
| 1 | Self-sufficiency of raw materials for production in the EU (%) | No data | No data | No data |
| 2 | Green public procurement (% over total) | No data | 8 (2015) | No data |
| 3 | Waste generation | | | |
| 3a | Generation of municipal waste per capita (Kg per capita) | 502 (2019) | 476 (2019) | 557 (2019) |
| 3b | Generation of waste excluding major mineral wastes per GDP unit (Kg per thousand euro, chain linked volumes (2010)) | 67 (2016) | 62 (2016) | 76,4 (2016) |
| 3c | Generation of waste excluding major mineral wastes per domestic material consumption (%) | 12,9 (2018) | 16,4 (2018) | No data |
| 4 | Food waste (million tonnes) | 69 (2018) | No data | No data |

Source: [Eurostat](#): Eurostat. Monitoring framework; [Junta de Andalucía](#). Diagnosis of the Circular Economy. Analysis of the reality of Andalusia; [Junta de Andalucía](#). Statistics on municipal waste production and management in Andalusia.

Waste management

This set of indicators focuses on the proportion of waste that is recycled, as it allows for the return of discarded materials into the economic cycle and thus for further value creation. The most appropriate indicators to monitor the overall targets are the recycling of municipal waste and the recycling of all waste excluding large mineral waste because they allow for greater comparability. In addition, it focuses on a number of specific materials (packaging, biomass, e-waste and construction and demolition waste) as these represent a significant challenge for the economy and the environment.

Table 4. Waste management.

| Waste management | | EU-27 | SPAIN | ANDALUSIA |
|------------------|---|-------------|-------------|-------------|
| 5 | Recycling rates | | | |
| 5a | Recycling rate of municipal waste (%) | 47,7 (2019) | 34,7 (2019) | No data |
| 5b | Recycling rate of all waste excluding major mineral waste (%) | 55 (2018) | 47 (2018) | No data |
| 6 | Recycling / recovery for specific waste streams | | | |
| 6a | Recycling rate of overall packaging(%) | 64,8 (2019) | 69,6 (2019) | 55,7 (2016) |
| 6b | Recycling rate of plastic packaging (%) | 41 (2019) | 51,5 (2019) | 60,9 (2016) |
| 6c | Recycling rate of wooden packaging (%) | 31,1 (2019) | 66,9 (2019) | No data |
| 6d | Recycling rate of e-waste (%) | 38,9 (2018) | 43 (2018) | No data |
| 6e | Recycling of biowaste (kg/capita) | 87 (2019) | 80 (2019) | No data |
| 6f | Recovery rate of construction and demolition waste (%) | 88 (2018) | 75 (2018) | No data |

Source: [Eurostat](#). Monitoring framework ([ENV_WASTRD](#))

Secondary raw materials

The Circular Economy follows a non-linear model, so recycled materials must be reinserted into the production cycle. The indicators in this section look at the proportion of recycled materials replacing the extraction of raw materials. In addition, the stability of markets is taken into account and this is expressed in the trade indicators.

Table 5. Secondary raw materials.

| Secondary raw materials, year 2020 | | EU-27 | SPAIN |
|------------------------------------|--|------------|-----------|
| 7 | Contribution of recycled materials to raw materials demand | | |
| 7a | End-of-life recycling input rates (EOL-RIR), aluminium (%) | 12,3 | No data |
| 7b | Circular material use rate (%) | 12,8 | 11,2 |
| 8 | Trade in recyclable raw materials | | |
| 8a | Intra EU trade (tonnes) | 46.850.227 | 4.292.568 |
| 8b | Imports from non-EU countries (tonnes) | 8.282.207 | 1.107.917 |
| 8c | Exports to non-EU countries (tonnes) | 27.490.340 | 1.020.422 |

Source: [Eurostat](#). Monitoring framework ([ENV_WASTRD](#))

Competitiveness and innovation

A fundamental part of the Circular Economy is eco-design, a design of products and services to increase their durability, reusability, repairability and upgradability. This requires innovative industrial processes and innovative forms of consumption. The indicators in this section measure investment, the generation of green jobs and innovation through patents.

Table 6. Competitiveness and innovation.

| Competitiveness and innovation | | EU-27 | SPAIN |
|--------------------------------|--|---------------|--------------|
| 9 | Private investment, jobs and gross value added related to circular economy sectors | | |
| 9a | Gross investment in tangible goods (% of GDP at current prices) | 0,12 (2018) | 0,1 (2018) |
| 9b | Persons employed (% of total employment) | 1,71 (2018) | 2,01 (2018) |
| 9c | Value added at factor cost (% of GDP at current prices) | 0,97 (2018) | 1,08 (2018) |
| 10 | Number of patents related to recycling and secondary raw materials | 264.14 (2016) | 29.09 (2016) |

Source: [Eurostat](#). Monitoring framework (CEI_CIE010, CEI_CIE020)

Auxiliary indicators

In order to complement the circular economy indicators and in accordance with the Diagnosis of the Circular Economy in Andalusia, data on organic farming and energy consumption are presented (Table 7). Granada is the province with the fifth largest number of hectares of organic farming in Andalusia, but in general, the area devoted to organic farming has increased in all provinces. This figure indicates that the agricultural sector is becoming increasingly aware of the need to change the production model to make it more sustainable and to move towards the new paradigm. In terms of final energy consumption in the residential sector, Granada

consumes six percentage points more renewable energy than Andalusia when compared to total consumption.

Table 7. Auxiliary indicators, year 2020.

| Auxiliary indicators, year 2020 | ANDALUSIA | GRANADA |
|--|-----------|---------|
| Organic agricultural area (hectares) | 1.08.812 | 145.513 |
| Final energy consumed in households with respect to type of energy (Percentage of consumption with respect to total) | | |
| Electricity | 65 | 52 |
| Renewable energy | 14 | 20 |
| Energy from petroleum products | 16 | 20 |
| Energy from natural gas | 5 | 7 |

Source: [IECA](#). Andalusia and Provinces Indicators: Environment; [Agencia andaluza de la energía](#). Final energy consumption residential sector by source

In order to make progress in monitoring the implementation of the circular economy, it is necessary to increase the availability of open, reliable and time-series data for efficient and effective monitoring of the economic transition in the region, while understanding the limitations of collecting certain information from public entities.

In relation to the **production and consumption indicators**, there is no data for **indicator 1 Level of self-sufficiency for raw materials** for which it is necessary to generate a list of fundamental raw materials at provincial level, as detailed in Annex 1 of [COM \(2020\) 474](#). It is recommended to carry out a study of critical materials for the province, taking into account consumption by sectors and the existing and potential level of self-sufficiency, and that this study be carried out in collaboration with the materials research groups of the universities of Andalusia and the various companies in the territory. This will improve decision-making on measures to reduce external dependence.

For **indicator 2. Green Public Procurement**, it is necessary to perform an accounting of the GPP carried out at provincial level with respect to the total number of service and product procurement contracts carried out annually, in addition to indicating the value, i.e. the economic volume. It would also be interesting to carry out a study on the clauses that have been included in public calls for tender related to GPP and other initiatives to promote sustainability.

Regarding **indicator 3.a. Generation of municipal waste per capita** and, according to the data on municipal waste collection in the province of [Granada](#), in 2018, 525 kg per inhabitant were generated, showing an increase compared to previous years. On the other hand, since 2015, the container where most waste is deposited is the organic-waste container, but its weight has been decreasing with respect to the total, which implies a slight improvement in the separation of waste by the consumer. Both data indicate that, although waste generation is increasing, separation seems to be improving slightly.

The rest of the sub-indicators of *indicator 3. Waste generation*, require the generation of a database with information from these indicators and disaggregated data in order to advance comparability and obtain a measure of Grenada's "eco-efficiency". The same problem occurs with *indicator 4. Food waste*. Regulatory steps are beginning to be taken, such as the Draft Bill to combat food waste in Spain, approved in 2021, but its measurement is complex and data is scarce.

The remaining three areas of the panel suffer from this lack of available data for the province of Granada, and even for the Autonomous Community of Andalusia, which is why we do not go into detail. However, this situation is normal considering the novelty of these indicators and should only serve to highlight the need to make up for this lack of information.

C. NETWORKING

Unlocking the potential of the circular economy requires the establishment of networks and partnerships for collaboration and transfer to overcome the shortcomings and difficulties encountered by local authorities. These networks will not only facilitate the sourcing of raw materials for industry and boost resource efficiency and environmental protection, but will also enable the implementation of actions in the governance of institutions, as well as the transfer of knowledge to facilitate the generation of business opportunities and job creation. Consequently, in order to meet the networking objective, a pilot visualisation test has been generated that seeks to:

- To represent the network of agents related, actually or potentially, to the circular economy.
- To represent the nature and intensity of their relationships in this circular productive logic.
- Detect and graphically represent uncovered functions or "gaps" to promote the development of the circular economy in the province and, therefore, a specific potential for business/satisfaction of needs in this circular logic of interaction between companies.
- In general, generate a hybrid map that combines a stakeholder scheme and an ecosystem.

This mapping is conceived as an open and permanent process, which will be fed little by little and some of its fields will be refined and expanded. A contact is enabled on the mapping website so that interested parties can register and expand the amount of data and relationships available.

As a pilot initiative intended to be useful and not just a scientific output, time is needed to establish the terminology of the programme and the quantitative and qualitative information required. Therefore, as progress is made in the integration of agents and more detailed information is gathered on technological nutrients and material flows, a more complex and richer tool can be offered.

The mapping platform is [kumu](#), a platform that offers mapping visualisation tools. Figure 18 shows the visualisation of the website with the map.

VII. CONCLUSIONS

Europe's efforts to promote the CE are being reflected in the rest of the levels of government, although the positioning of the CE as a fundamental axis of development in the region is very recent. As a result, the field of research in this area is very active and promotes lines of research that should be a driving force for change in various thematic areas, which highlights the cross-cutting nature of the circular economy as a paradigm that encompasses environmental needs and technological development, but also social and economic needs. Research on recuperative technologies, sustainability in a cross-cutting orientation, waste management, Industry 4.0, critical raw materials and the treatment of by-products and waste stand out.

Efforts in this area are concentrated almost at the end of the timeframe set by the SDGs, continuing with the structural problem in decision-making: adopting a reactive rather than a proactive role. In this regard, it is essential to: (i) improve the detection of key actors to enable qualitative monitoring of the evolution of the CE and detect needs and opportunities more quickly; (ii) promote entrepreneurship so that it becomes an opportunity in recovery and development plans; (iii) promote shared forms of energy consumption; (iv) make a quantitative leap in the recycling and recovery of waste. All of this requires the involvement of the different key agents: local governments, productive fabric, research groups and citizens.

In this sense, local governments have a fundamental role to play, as they are the bodies closest to the citizens, although they require both financial and human resources, as well as efforts to make coordination and inter-administrative and inter-administrative cooperation spaces operational, which are essential to improve the technical and economic viability of the processes of change.

Granada's productive fabric, weak and not very diversified, can rely on the University of Granada in order to produce a quantitative and qualitative leap in the configuration of the economic sectors. This is an immeasurable opportunity to settle the population in the province of Granada, to become a reference point for innovation and to improve the capacity to generate short consumption circles. However, attention must be paid to the problems of gentrification and centralised planning, as new development plans may further neglect rural development and ignore the richness of traditional arts. In addition, there is a major opportunity for the construction industry in the redevelopment of the province's housing stock, linked to the concept of reparability and reduction of material consumption, not only to focus on the construction of efficient new housing, but the existing housing stock needs urgent attention. Both public and private buildings need renovation methods that are affordable but improve their energy efficiency.

Finally, the generation of synergy networks, short supply and consumption chains, product diversification, digitalisation, inclusion of IoT, servitisation and quality,

differentiated and modern craftsmanship are necessities and opportunities. In fact, the generation of synergies is one of the concepts most demanded by key players. They are aware of the multiple benefits it entails and that it would solve the problems of lack of meeting spaces, strategic thinking and the ability to analyse future scenarios, as well as materialising secondary raw material flow networks based on the willingness to cooperate and share.