

## **2** Towards the circular economy in Granada, Spain

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This chapter analyses existing initiatives across levels of government related to the circular economy. Applying the 3Ps framework, *people, policies and places*, the chapter also identifies actors, policies and co-operation tools across urban and rural areas that can foster the circular economy.

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## The circular economy agenda at the national and subnational levels

The transition towards the circular economy in Spain takes place under the framework of the National Circular Economy Strategy (*España Circular 2030*), which sets goals for 2030. In June 2020, the Council of Ministers approved the Spanish Circular Economy Strategy (*España Circular 2030*), which lays the foundations for overcoming the linear economy and promoting a new production and consumption model in Spain. The strategy sets targets for 2030 including, among others, the reduction of national consumption of materials by 30%, the improvement of water use efficiency by 10% and a 15% cut in waste generation compared to 2010 levels, which would keep greenhouse gas (GHG) emissions from the waste sector below 10 million tonnes in 2030. The strategy highlights the importance of taking advantage of the opportunities offered by the circular economy to develop a Spanish industry focused on recycling. It identifies six priority sectors: construction; agri-food, fisheries and forestry; industry; consumer goods; tourism; and textiles and clothing. The implementation of the strategy in Spain is co-ordinated by three main bodies: i) an inter-ministerial commission with the ministries involved; ii) a Working Group of the Coordination Commission on Waste with the autonomous communities and local entities; and iii) a Circular Economy Council with economic and social agents. The adoption of the Spanish Circular Economy Strategy was foreseen in the Declaration of Climate and Environmental Emergency approved in January 2020 and is consistent with the draft Climate Change and Energy Transition Act (Box 2.1) (Government of Spain, 2020<sup>[1]</sup>).

### Box 2.1. Towards a new Law on Climate Change and Energy Transition of Spain

The first draft of the Law on Climate Change and Energy Transition, aiming for Spain to achieve emission neutrality by 2050, was approved by the Congress of Deputies on 8 April 2021. Its adoption by the Senate is pending. The law is the result of a public participation and review process by key national and subnational institutions, initiated in February 2019. It is expected to be supplemented by national energy and climate plans (NECP) that will determine precise climate objectives and targets. The first of these plans is expected to cover the period 2021-30 and design a trajectory to reduce emissions by 23% compared to 1990, increasing the percentage of renewables in gross final energy consumption to at least 42% by 2030. Regarding energy efficiency, the 2030 primary energy consumption target represents a 39.6% reduction compared to the baseline projections.

The text comprises a series of actions in relation to the promotion of energy efficiency and sustainable mobility, amongst others. It recognises the role of cities, in achieving climate objectives, thereby favouring the creation of more liveable and healthier spaces, with improved air quality. In this regard, it establishes that municipalities with more than 50 000 inhabitants will introduce mitigation measures in urban planning to reduce emissions from mobility, including the implementation of low-emission zones no later than 2023 (Article 12 of the draft law).

The draft law establishes that a percentage of the general state budget will be earmarked to contribute to climate change and energy transition objectives. Revenues from the auctioning of GHG emission allowances (at least 450 million) will also be used to meet climate change targets. Finally, the law will foresee an independent Committee of Experts on Climate Change and Energy Transition, responsible for evaluating and making recommendations on energy and climate change policies and measures.

Source: Congress of Deputies (2021<sup>[2]</sup>), *Spanish Draft Law on Climate Change and Energy Transition*, [https://www.congreso.es/backoffice\\_doc/prensa/notas\\_prensa/81345\\_1617867418184.pdf](https://www.congreso.es/backoffice_doc/prensa/notas_prensa/81345_1617867418184.pdf).

In response to the COVID-19 crisis, Spain's Recovery, Transformation and Resilience Plan includes the ecological transition as one of the four pillars for recovery. The plan contains a total of 30 measures, including the Plan to Support the Implementation of the Spanish Circular Economy Strategy and waste regulations. The National Circular Economy Strategy (*España Circular 2030*) is one of the key elements of the Circular Economy Framework (*Marco de Economía Circular*), included amongst the government projects as a lever for economic recovery from the COVID-19 crisis.

At the regional level, the Government of Andalusia developed its circular economy strategy combined with a series of initiatives related to the transition:

- The 2018 Andalusian Circular Bioeconomy Strategy (*Estrategia Andaluza de Bioeconomía Circular*) focuses on the production of renewable biological resources and processes (Box 2.2).
- The 2018 Strategy for Sustainable Development 2030 (*Estrategia Andaluza de Desarrollo Sostenible 2030*) conceives the circular economy as an opportunity to achieve sustainable goals at the regional level and as a key element of the green economy (Government of Andalusia, 2018<sup>[3]</sup>).
- The 2019 Integrated Waste Plan of Andalusia: Towards a Circular Economy by 2030 (*Plan Integral de Residuos de Andalucía. Hacia una Economía Circular en el Horizonte 2030*, PIRec 2030) seeks to: i) encourage industrial symbiosis for the reuse of generated by-products; ii) analyse the efficiency of current collection systems, optimise treatment processes and carry out an evaluation of the management processes; and iii) promote the construction of recovery and disposal facilities to make Andalusia self-sufficient in the management of all of its waste (Government of Andalusia, 2019<sup>[4]</sup>).
- The 2020 Draft Circular Economy Law (*Anteproyecto de Ley de Economía Circular de Andalucía*) aims to create an appropriate regulatory framework to promote the rational use of resources, extend the useful life of products and minimise waste generation. The law is expected to be approved by 2022. Other relevant characteristics of the draft law are the implementation of a circular model to so-called “key products” (i.e. electronics and information and communication technology [ICT]; batteries and vehicles; packaging; plastics; textiles; construction and buildings; and food, water and nutrients) and of the blue circular economy to promote integrated management of the water cycle. The Andalusian Office of Circular Economy will be the administrative body in charge of implementing the law, as well as co-ordinating, advising and providing support to companies and local administrations (Government of Andalusia, 2020<sup>[5]</sup>).

Clearly communicating around the achievements and environmental, economic and social impacts of these initiatives to stakeholders and citizens will be key to their effective implementation. The monitoring framework of the Andalusian Circular Bioeconomy Strategy is not yet in place. However, one of the concrete actions of the strategy involves the design of a set of specific indicators for monitoring and evaluating the progress of the strategy.

### Box 2.2. Andalusian Circular Bioeconomy Strategy

Launched in 2018 with the contribution of many regional ministries and institutions,<sup>1</sup> the main objective of the Andalusian Circular Bioeconomy Strategy is to foster the production of renewable biological resources and processes. In particular, it aims to:

- Improve the sustainability and competitiveness of the agri-food, fisheries and forestry sectors, encouraging the use of innovative practices to promote and implement a circular economy.
- Boost the competitiveness of industries working with biological resources by promoting innovation, knowledge generation and technology transfer.

- Promote the reuse of resources, water, gases, nutrients and the use of waste to obtain other products or energy.
- Promote research, innovation and skills related to the bioeconomy.
- Strengthen inter-administrative co-ordination and synergies with other work plans and programmes in different fields.

The strategy sets out four pillars:

- Sustainable generation of biomass resource availability.
- Infrastructure and logistics management.
- Industrial processes for the transformation of biomass resources and industrial production capacity for bioproducts and bioenergy.
- Market development for bioproducts and bioenergy.

The strategy identifies four cross-cutting instrumental programmes for its implementation:

- Communication and public awareness of the bioeconomy.
- Promotion of research and development (R&D) for the development and expansion of the bioeconomy in Andalusia.
- Access to finance to facilitate the development of the bioeconomy.
- Co-operation, co-ordination and monitoring of the bioeconomy.

Source: Government of Andalusia (2018<sub>[6]</sub>), *Andalusian Strategy for the Circular Bioeconomy*, <https://www.juntadeandalucia.es/organismos/sobre-junta/planes/detalle/155202.html>.

The Provincial Council of Granada has set up awareness-raising initiatives on the circular economy but planning documents still focus on waste rather than on natural resources management. In 2020, the council organised a series of seminars on the circular economy within the framework of the European Color Circle project,<sup>2</sup> providing a forum for learning and exchanging successful circular practices to companies and other organisations from the province of Granada. The workshops welcomed good practices from several sectors, including agricultural production, food innovation and wastewater management. The Color Circle project foresees co-operation with other European partners from the Czech Republic, France, the Netherlands and Romania to empower local authorities, connecting them with research teams, towards the full development of the circular economy (Provincial Council of Granada, 2020<sub>[7]</sub>). Moreover, the Municipal Waste Management Programme for the Province of Granada 2014-24 includes the selective collection (mainly organic and inorganic recyclables), recovery and the establishment of mechanisms for the identification and management of other waste categories (e.g. electronic waste, used oils and batteries) (Provincial Council of Granada, 2014<sub>[8]</sub>). However, there is no mention of the transition to the circular economy in the programme.

The Provincial Council of Granada finances sustainable initiatives in the metropolitan area of Granada, which may have impacts on the circular economy in terms of waste management. The council co-ordinates the Integrated Sustainable Urban Development Strategies (EDUSI) for a total investment of EUR 31.5 million. In 2020, the municipality of Granada adhered to the strategy, aiming at implementing the EDUSI programme by 2022. Some actions included in the plan concern the extension of the network of underground containers that already exists in the city, placing two selective waste containers (glass, paper and packaging) at two points in the historic centre of Granada. This initiative aims to promote the selective collection of waste, introducing aesthetic and environmental improvements in the historic centre, while taking care of the heritage surroundings (Granada City Council, 2020<sub>[9]</sub>).

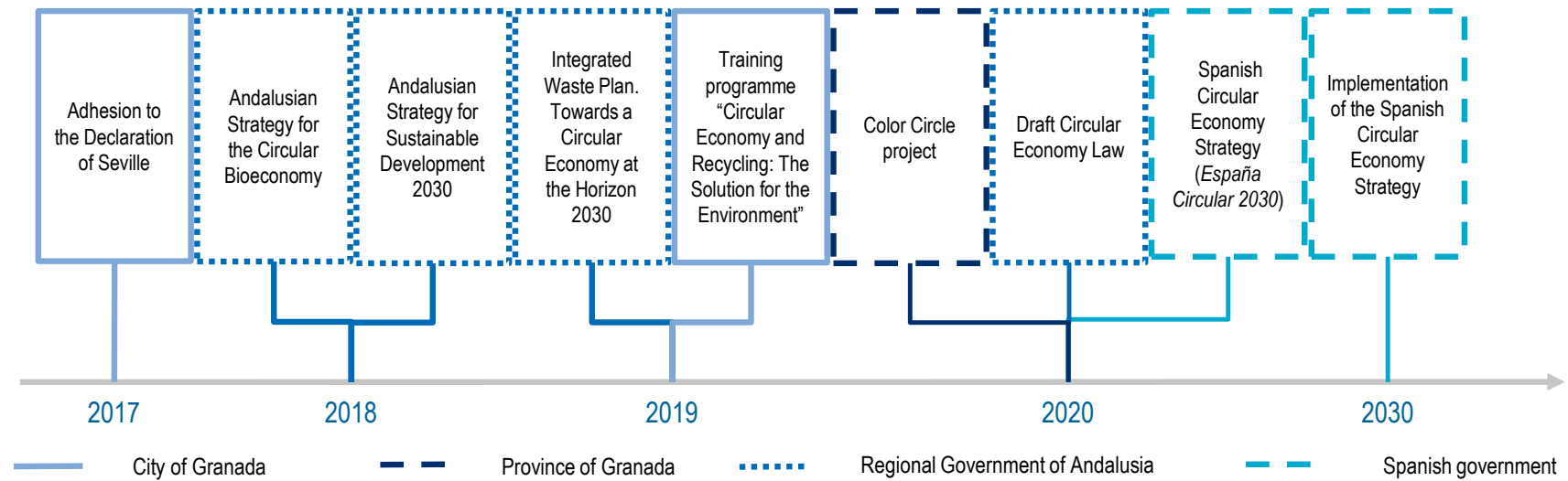
## Circular economy initiatives in Granada, Spain

Granada is taking the first steps towards the circular and low-carbon economy. In 2017, the city of Granada adhered to the Declaration of Seville, which aims to promote the circular economy in signatory cities (300 Spanish municipalities), in particular by fostering recycling (especially biowaste), preventing waste (particularly food waste), promoting eco-design and the public procurement of green products. Although not binding, the declaration represents a starting point for Spanish municipalities to take action towards the circular economy. Moreover, the city of Granada joined the Global Covenant of Mayors for Climate and Energy Europe in 2009, the world's largest alliance of cities and local governments seeking to promote and support voluntary actions to tackle climate change. For signatory cities, this commitment implies achieving a share of energy consumption from renewable sources and energy savings of at least 27%, as well as a 40% reduction in CO<sub>2</sub> emissions by 2030 (Covenant of Mayors, 2020<sup>[10]</sup>).

The water sector represented the entry point for a wider debate on the circular economy in the city. The transformation of the wastewater treatment plant into a biofactory initiated in 2015, managed by the mixed ownership company Emasagra (the Municipal Water Supply and Sanitation Company), allowed the increasing reuse of water and its transformation into energy. Compared to the previous model, the biofactory represents a new way to achieve circularity through energy generation, water reuse and recovery of waste resulting from the purification process of water. According to Emasagra, the innovation consists in: i) moving from being a big consumer of energy to producer; ii) reusing treated water rather than only purifying it and returning to the natural environment; and iii) transforming waste into resources, rather than dumping it into the landfill (see section on policies).

The most recent initiatives led by the city concern raising awareness on the circular economy. The Health, Education and Youth Municipal Department of the municipality designed in 2019 the training programme "Circular Economy and Recycling: The Solution for the Environment" for students from primary school, secondary school, and higher education (Granada City Council, 2020<sup>[11]</sup>). During the 2020/21 academic year, a total of 1 200 students from 24 educational institutions are expected to attend the programme. Moreover, by 2021, the city of Granada foresees to issue a monthly newsletter *Circular Granada* in Granada's two main newspapers, which will include the major circular economy initiatives taking place in the city. Also, the municipality provides a daily list of furniture to be deposited on the public streets for removal, so that citizens can make a reservation and collect them for reuse (Inagra, 2020<sup>[12]</sup>).

Figure 2.1. Timeline of circular economy initiatives in the city of Granada, the province of Granada, Andalusia and Spain



## The 3Ps analytical framework

The below section identifies opportunities for the circular economy in Granada based on the 3Ps framework “people, policies and places”, set out in *The Circular Economy in Cities and Regions: Synthesis Report* (OECD, 2020<sup>[13]</sup>) on the basis of *Water Governance in Cities* (OECD, 2016<sup>[14]</sup>):

- **People:** The circular economy is a shared responsibility across levels of government and stakeholders. As such, it is key to identify the actors that can play a role in the transition and allow the needed cultural shift towards different production and consumption pathways, new business and governance models. For example, the business sector can determine the shift towards new business models (e.g. renting, reusing, sharing, etc.). Citizens, on the other hand, make constant consumption choices and can influence production.
- **Policies:** The circular economy requires a holistic and systemic approach that cuts across sectoral policies, from environmental, regional development, agricultural and industrial ones. As somebody’s waste can be a resource for somebody else, the circular economy provides the opportunity to foster complementarities across policies. The variety of actors, sectors and goals makes the circular economy systemic by nature. Identifying the key sectors and possible synergies is the first step to avoid the implementation of fragmented projects over the short-medium run, due to the lack of a systemic approach.
- **Places:** Cities and regions are not isolated ecosystems but spaces for inflows and outflows of materials, resources and products, in connection with surrounding areas. Therefore, adopting a functional approach going beyond the administrative boundaries of cities is important for resource management and economic development. Linkages across urban and rural areas (e.g. related to agriculture and forest) are key to promote local production and recycling of organic residuals to be used in proximity of where they are produced, to avoid negative externalities due to transport. At the regional level, loops related to a series of economic activities (e.g. to the bioeconomy) can be closed and slowed.

This section draws from the input provided during the OECD mission to Granada on 25-28 March 2019, when more than 70 stakeholders from the private, public and not-for-profit sectors were interviewed.

### People

The below section identifies stakeholders that amongst others can contribute to the transition from a linear to a circular economy, such as universities, technological clusters, the Granada Chamber of Commerce and Industry and sectoral and consumer associations. The Cotec Foundation identified key actors for the circular economy transition in Spain, which are reported in Box 2.3.

#### Box 2.3. Selected circular economy actors in Spain by Cotec

The Cotec Foundation is a non-profit organisation aiming at promoting innovation for social and economic development. In 2017, the foundation carried out a mapping of actors and practices of public and private entities. It identified large companies, small- and medium-sized enterprises (SMEs), non-profit and -governmental organisations that have implemented circular economy good practices and processes in different sectors, such as:

- **Waste**

- Anfevi: The National Association of Automatic Glass Container Manufacturing Companies has invested in R&D on sustainability and promoted the recycling of glass containers since 1980. The recent campaign “#YoElijoVidrio” aims at raising awareness of the importance of the reuse of glass containers in Spain.
- Ecoembes is a non-profit organisation (NPO) that manages the collection, sorting and recycling process of plastic packaging, cans, paper and cardboard packaging all over Spain. In 2017, Ecoembes launched the CircularLab: an innovation centre on the circular economy, which provides support to innovations in the fields of packaging and subsequent recycling.
- Ecotic is a non-profit organisation whose main activity is the sustainable and compliant management of waste electrical and electronic equipment (WEEE) from companies and entities, which contributes to its Collective System of Extended Producer Responsibility (SCRAP).

- **Water**

- CETaqua, the Water Technology Center, is a national and international non-profit foundation in charge of research, technological development and innovation in relation to the water cycle, especially the urban cycle. The founding partners of CETaqua are Aigües de Barcelona (Agbar), the Polytechnic University of Catalonia (UPC) and the Spanish National Research Council (CSIC).

- **Food and agriculture**

- Desarrollo Rural Cataluña Central is a co-operative dealing with agricultural practices and focusing on the creation, expansion and improvement of agri-food companies of local and organic products and on the implementation of projects that promote the green economy and especially the circular economy (e.g.: EnFoCC Project).
- Mercadona is Spain’s largest supermarket group, with more than 1 600 shops nationwide. It will invest more than EUR 140 million by 2025 to reduce plastic by 25%, make all packaging recyclable and recycle all plastic waste.
- Espigoladors is a social enterprise preventing food waste and empowering people who are vulnerable to social exclusion.

- **Energy**

- Neoelectra is a power generation company that has been using efficient and environmentally friendly technologies such as cogeneration, biomass and biogas since 1999.

- **Health**

- SOLUTEX is a private organisation providing technological solutions to the pharmaceutical sector. Since its creation in 2004, Solutex has based all its operations on the circular economy model. The company has a zero-waste policy and reuses all by-products derived from the manufacturing processes. Solutex is a member of the European Technology Platform for Sustainable Chemistry and actively participates in the European public-private partnership SPIRE (Sustainable Process Industry through Resource and Energy Efficiency).
- TECNALIA is a private foundation focusing on innovation and technological development and providing advice to private companies to encourage sustainable and circular business models in the fields of energy, industry, transportation, construction, health and ICT.

Source: Cotec Foundation (2017<sup>[15]</sup>), *The Situation and Development of the Circular Economy in Spain*.



The University of Granada (UGR) leads several initiatives and projects addressing the circular economy or related subjects:

- Technologies for the circular economy: In 2018, the Higher School of Engineering of Roads, Canals and Ports (*Escuela Técnica Superior de Ingeniería de Caminos, Canales y Puertos*) launched a research group on “Technologies for the circular economy”. The group aims to map all ongoing courses and initiatives related to the circular economy within the UGR in order to promote interdisciplinary synergies and addresses five main areas of research: i) eco-friendly construction, focusing on new sustainable materials; ii) management and modelling of air and noise pollution; iii) planning and management for the resilient city; iv) emerging technologies for water and waste management; and v) technologies for the analysis and management of occupational hazards (University of Granada, 2019<sup>[16]</sup>).
- Circular economy and plastics: In 2019, the Faculty of Sciences of the University of Granada organised a 20-hour introductory course on the circular economy and plastics (University of Granada, 2019<sup>[17]</sup>).
- Circular economy and inclusiveness: In 2020, the University of Granada launched a project for the collection of urban waste through the installation of collection points in its facilities. The project was carried out in collaboration with a local association (ASPROGRADES), promoting the full employment of people with intellectual disabilities (UGR, 2020<sup>[18]</sup>).
- SDG Debates (*Ciclo de Debates ODS*): Launched by the University of Granada in 2020, the debates seek to reflect on the implementation of the United Nations 2030 Agenda. These debates included a specific session on the circular economy (UGR, 2020<sup>[19]</sup>).
- “Debates of Granada” (*Debates de Granada*) on urban planning: In 2018, the Department of Urban Planning and Land Management and the Area of Architectural Composition of the University of Granada launched “Debates of Granada” to discuss urban planning strategies adopted in different Spanish cities and how to achieve a green future for Granada, among other topics. The debates involve actors such as the university, the private sector, especially the tourism and hospitality sectors, and the municipality of Granada (Debates de Granada, 2018<sup>[20]</sup>). “Debates of Granada” raised the need for a pact for sustainability that involves public and private institutions, employers, professional associations and social groups. Some inspirational models for the group are superblocs (*Supermanza*)<sup>1</sup> implemented in the Spanish cities of Barcelona and Vitoria<sup>2</sup> (Box 2.4). Existing initiatives contributing to making Granada a smart and green city can be further developed to create collaboration across universities and stakeholders on the circular economy. For example, the programme Granada Collaborates (*Granada Colabora*) supports collaborations across businesses based in the province of Granada and the University of Granada. In 2018, *Granada Colabora* identified 35 companies in the province to establish collaborations with the university (University of Granada, 2018<sup>[21]</sup>). There is potential to develop future collaborations around the circular economy.

### Box 2.4. The Superblocks system in Barcelona and Vitoria, Spain

Superblocks are urban cells of approximately 400 by 400 meters that allow vehicles to circulate along the perimeter roads, while internal streets are reserved for pedestrians and, under special conditions, for resident vehicles, services, emergencies as well as loading and unloading activities. The is to limit the presence of private vehicles in the public space and return it to the citizen.

The city of Vitoria was the first Spanish city to apply this concept. Eight years into the project, the number of private car users decreased from 36.6% in 2006 to 24% in 2014; bicycle use increased by 10%, accounting for 13% of total mobility in 2014, and public transport experienced a 100% increase in the number of users. This change in transport patterns led to a 14.7% reduction in GHGs generated by mobility.

Barcelona, Spain, launched in 2013 a pilot programme of superblocks in five areas of the city, located in the districts of Camp d'en Grassot, Eixample, Horta, Les Corts and Sant Martí. The model seeks to respond to the scarcity of green spaces, the high levels of pollution, the high rate of environmental noise, accidents and sedentary lifestyles. The design of these car-free spaces led to the creation of a network of green hubs and squares where pedestrians have priority. Following the successful implementation of these experimental small-scale initiatives, the superblock programme is set to become the street transformation model for the entire city. Following Barcelona City Council's analysis of the impacts on the city in terms of citizen flows and mobility, neighbourhood facilities and green spaces, the extension of the superblock programme to the whole of the city has been estimated as having the potential to prevent around 667 premature deaths from air pollution annually (Mueller et al., 2020). Superblocks have already been approved or designed in other Spanish cities, such as A Coruña, El Prat, Ferrol and Viladecans.

Source: Spanish Environment Congress, (2016<sup>[22]</sup>), "La supermanzana viaja desde Vitoria y Barcelona hasta Nueva York", <http://www.conama2016.org/web/es/prensa/noticias/la-supermanzana-viaja-desde-vitoria-y-barcelona-hasta-nueva-york.html>; Barcelona Urban Ecology Agency (2021<sup>[23]</sup>), *Superblocks*, <http://www.bcnecologia.net/es/modelo-conceptual/supermanzana>; Barcelona City Council (2021<sup>[24]</sup>), *Barcelona Superblock: New Stage*, <https://ajuntament.barcelona.cat/superilles/en/>; Mueller et al. (2020<sup>[25]</sup>), Changing the urban design of cities for health: The superblock model, <https://www.sciencedirect.com/science/article/pii/S0160412019315223>.

Granada's technological and sector-specific clusters support innovation and circular business. As business networks, these clusters allow cross-fertilisation across companies towards circular business models, promote practice exchanges and capacity building and contribute to technical innovation in different sectors, including water, waste and bioeconomy, among others. Some examples are:

- OnGranada technological cluster: Created in 2014, as an initiative of the Granada Business Confederation, the cluster is formed by private and public sector members (municipal, provincial and regional governments) alongside the University of Granada, the Granada Chamber of Commerce and Industry, and ICT business associations and unions. Businesses within the cluster apply measures aiming to reuse waste and increase resource efficiency, such as: reintroducing purified water from cancer medical care procedures into the water network; optimising the use of water in plant cultivation and drip irrigation; or seeking to recover waste from olive cultivation to convert it into biofuel. OnGranada fosters collaboration between large companies and start-ups in its network. In 2020, the cluster, in collaboration with the International Urban Cooperation (IUC) programme,<sup>3</sup> organised webinars on the circular economy, focusing on blockchains (IUC, 2020<sup>[26]</sup>).

- The Granada Health Technology Park (PTS) is another key actor driving Granada's technology and innovation. The PTS provides teaching, research and business development services to companies working in the pharmaceutical, health sciences, healthcare and food industries. The Andalusian Biotechnology Cluster, through its specialised unit Andalusia BioRegion operates in the PTS. It promotes biotechnology as a catalyst for social welfare and the development of the Andalusian economy, focusing on agro-biotechnology, environmental science and renewable energy. Some examples of the products developed in the cluster are the production of bioethanol and biodiesel, bioherbicides and organic nutrient products (PTS Granada, 2021<sup>[27]</sup>). The PTS, alongside the municipality, the University of Granada, the five centres of the Higher Council for Scientific Research, the Granada Business Confederation and the Delegation of Economy and Innovation of Andalusia (*Delegación de Economía e Innovación de la Junta de Andalucía*) are part of the Bureau of Science (*Mesa por la Ciencia*), created in 2017 after the Spanish Ministry of Economy, Industry and Competitiveness recognised Granada as a City of Science and Innovation. The group fosters the promotion of scientific, technological and innovation culture in the city, through the organisation of seminars and the representation of the city in international fora. One of the latest seminars of 2019, "Nutrition Made in Granada", focused on food and sustainable packing (Granada Ciudad de la Ciencia y la Innovación, 2019<sup>[28]</sup>). Considering the goals of this group, which include raising awareness on the scientific progress made in the city of Granada, the Bureau of Science can have a role in promoting future circular economy activities in Granada.
- The Sustainable Construction Cluster of Andalusia (CSA), promoted by the Provincial Council of Granada in 2014, gathers associations of constructors, banks, the UGR, construction material producers and members of the municipal, provincial and regional governments. The cluster meets four times a year and offers educational activities to its members. Construction companies based in Granada are increasingly recovering material from construction and demolition waste (CSA, 2021<sup>[29]</sup>).

The Granada Chamber of Commerce and Industry promotes awareness-raising activities on the circular economy. Breakfasts on the circular economy transition have been organised to raise awareness amongst companies. The chamber is also managing the European Regional Development Fund (ERDF) to improve business competitiveness and the green economy. It is also promoting the creation of a platform for secondary products (including waste) and mapping the location of the different participating companies to create new synergies.

Sectoral and consumer associations and some private sector stakeholders are taking steps towards pro-environmental actions that can be relevant for the transition towards the circular economy. The Confederation of Tourism and Hospitality of Granada, representing 800 businesses at the local and provincial levels, is planning to grant certificates for companies aiming to improve and evidence their commitment to sustainable development. The association is working on the development of a series of indicators to evaluate companies' performance, addressing different topics such as CO<sub>2</sub> emission reduction, the use of renewable energy sources, energy efficiency, water and waste management and the purchase of local products, among others (La Huella Verde Granada, 2021<sup>[30]</sup>). The Consumers' Union of Granada (UCA-UCE), in collaboration with NPO Ecoembes, has been developing municipal workshops on recycling. The workshops address several themes, such as the reduction of waste generated or the reuse and exploration of new uses of materials once they have lost their properties (Ecoembes, 2015<sup>[31]</sup>).

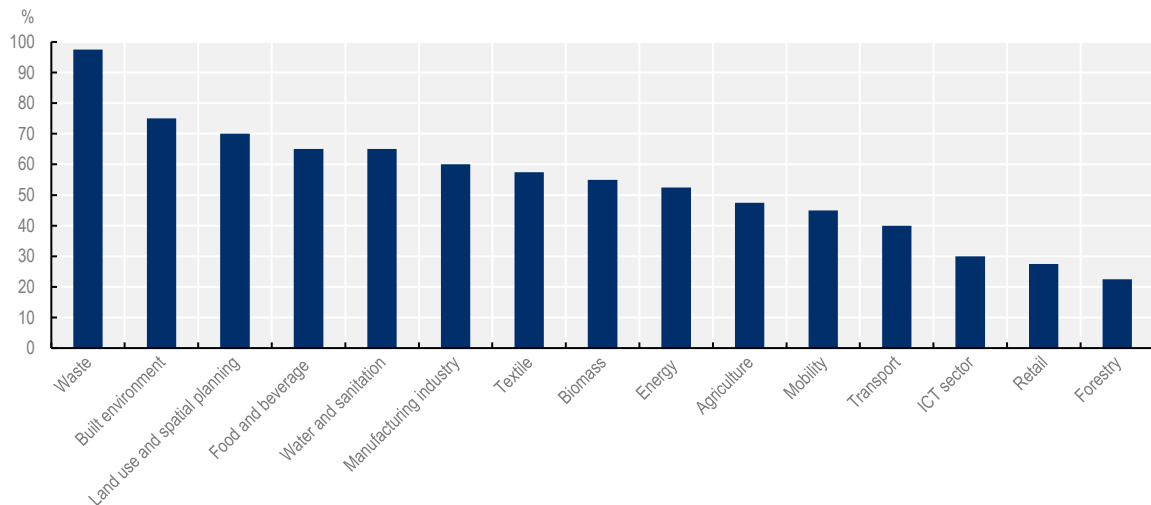
## **Policies**

All sectors are concerned in a circular economy but some have higher potential. Often, the circular economy in cities and regions is understood as synonymous with waste recycling but it goes beyond that. Making a sector "circular" implies rethinking value chains and production and consumption processes. According to OECD (2020<sup>[13]</sup>), for 40 surveyed cities and regions, the waste sector is key to their transition towards a circular economy (98%), followed by the built environment (75%), land use and spatial planning

(70%), food and beverages and water and sanitation (65%) (Figure 2.2). Below, specific attention will be given to those sectors more prominently highlighted in discussions with various stakeholders in the city of Granada, such as waste, water, urban mobility, tourism and the built environment (Table 2.1). This description does not aim to be exhaustive of the sectors that can contribute to the circular economy transition. However, it provides an overview of those activities that hold high potential in the city. This is key to signal an existing interest from “do-ers” to transition from a linear to a circular economy, in shared responsibility with the local governments, and to foresee coherent policies in the future.

For cities and regions, the circular economy can be defined as a guiding framework whereby: services (e.g. from water to waste and energy) are provided making efficient use of natural resources as primary materials and optimising their reuse; economic activities are planned and carried out in a way to close, slow and narrow loops across value chains; and infrastructures are designed and built to avoid linear lock-in (e.g. district heating, smart grid, etc.) (OECD, 2020<sup>[13]</sup>). “Circularity” implies that any output can be an input for something else within and across sectors. It aims to: make products and goods last longer through better design; produce goods using secondary and reusable materials, and renewable energy, while reducing atmospheric emissions; produce and distribute products locally and consume them in a conscious and sustainable manner; and transform waste into a resource. According to the OECD Principles on Urban Policy (OECD, 2019<sup>[32]</sup>), the circular economy is a means to encourage more efficient use of resources and more sustainable consumption and production patterns in large, intermediary and small cities, including at the neighbourhood level. This will require a combination of national and local urban policies.

**Figure 2.2. Share of sectors included in circular economy initiatives in 40 cities**



Note: Results based on a sample of 40 respondents that selected sectors responding to the question: “Which sectors are included in your city/region circular economy initiative?”.

Source: OECD (2020<sup>[13]</sup>), *The Circular Economy in Cities and Regions: Synthesis Report*, <https://doi.org/10.1787/10ac6ae4-en>.

**Table 2.1. The potential of the circular economy in Granada per sector**

Scope	Sector	Objectives	Activities
Services	Waste	Applying circular economy principles to waste management consists of making the most of resource use to avoid waste production and transform waste into resource.	<ul style="list-style-type: none"> <li>• Prevent waste generation</li> <li>• Promote separate collection.</li> <li>• Apply discounts on waste taxes.</li> <li>• Use digital tools and data for waste tracking.</li> </ul>
	Water	The water cycle is circular by nature. It allows for efficient water use, water reuse and transformation of waste water into energy and materials.	<ul style="list-style-type: none"> <li>• Reduce water use in the production cycles (e.g. freeing up quality resources for necessary uses and minimising water demand).</li> <li>• Reuse of wastewater for energy production/biogas.</li> <li>• Ensure more sustainable water flows (e.g. reducing the net discharge to natural systems).</li> <li>• Recover materials from wastewater treatment (e.g. facilitating the recycling of nutrients for agricultural use).</li> <li>• Use of rain and grey water.</li> <li>• Use of regenerated water for irrigation.</li> </ul>
	Urban mobility	Circularity in urban mobility aims at reducing energy consumption and limit pollution, cause of negative effects on environment, health and quality of life.	<ul style="list-style-type: none"> <li>• Promote active mobility.</li> <li>• Boost the attractiveness of public transport.</li> <li>• Widen sustainable transportation options.</li> <li>• Promote shared mobility options and electric vehicles.</li> </ul>
Economic activities	Tourism	The tourism sector can benefit from the circular economy by closing loops in the food and hospitality sector, and by making an efficient use of water, energy and land.	<ul style="list-style-type: none"> <li>• Reduce single-use furniture and especially plastic, packaging, disposable cutlery, plates and glasses.</li> <li>• Apply circular principles in the business models of hotels (e.g. repair and reuse of beds, “product-as-a-service” schemes).</li> <li>• Contract rental services (e.g. for specific types of furniture and laundry).</li> <li>• Practice joint purchase and bundle of waste streams for useful applications.</li> <li>• Use replaceable items and refurbish them by using recycled material.</li> <li>• Prevent food waste (e.g. replacing buffet by <i>a la carte</i> schemes, selling food at a low price on platforms and donating it to food banks).</li> <li>• Support of local food production chains.</li> </ul>
Infrastructures	Built environment	Infrastructure following circular economy principles avoids linear lock-in, by making efficient use of resources, reusing material, and repurposing buildings if need be.	<ul style="list-style-type: none"> <li>• Planning: Consider the entire life cycle of the building to reuse materials.</li> <li>• Design: Take into account the material choice, reduce water and energy consumption in buildings and minimise waste.</li> <li>• Construction: Identify sustainable and reusable materials for constructions.</li> <li>• Operation: Use alternative energy sources and embedded technologies in buildings to enhance resource efficiency.</li> <li>• End life: Reuse waste material produced and repurpose buildings, if need be.</li> </ul>

Source: Europe Direct, *European Funding in the Circular Economy*, [www.europadirectogranada.eu/financiacion-europea/](http://www.europadirectogranada.eu/financiacion-europea/); and own elaboration based on OECD (2020<sup>[13]</sup>), *The Circular Economy in Cities and Regions: Synthesis Report*, <https://doi.org/10.1787/10ac6ae4-en>.

## Waste

In Granada, waste management performance has scarcely changed over the last few years in terms of household waste generation, reflecting the need for further efforts to improve outcomes in terms of preventing waste generation, as well as a separate collection. The city set up measures to favour separate collection, for instance by increasing the accessibility and the number of bins for different types of materials.

The number of these bins for packaging (798 bins), glass (708) and paper (688) increased by over 70% between 2012 and 2017 (Granada City Council, 2021<sup>[33]</sup>). There are also collection points for clothes, batteries and oil (181, 80 and 45 respectively). However, separate waste collection has only increased by 4% between 2004 and 2019, reaching 12% in 2019. The municipality is responsible for the collection, transport and treatment of organic waste, which is carried out through a concession agreement by the local waste company Inagra (20% municipal, 80% privately owned). The management of other categories of waste is carried out by different companies: Ecoembes for packaging; Recisur for paper and cardboard; and Ecovidrio for glass (Granada City Council, 2021<sup>[34]</sup>). The collection of unsorted waste is transferred daily by Inagra to the Alhendín treatment plant managed by the Provincial Council of Granada. Plastic paper and cardboard waste and glass waste are collected by Inagra and transported directly to authorised companies dedicated to their treatment. Once the different waste streams are treated, they are transformed into new products: plastics are used to produce swings in public spaces; construction pallets are being transformed into garden furniture; oil is used for biodiesel; glass and cardboard go to the integrated management system (Granada City Council, 2021<sup>[34]</sup>).

The city of Granada is working on the design of the future collection system. Thanks to the two underground compactors installed in the historical centre by the municipality of Granada in 2019, waste collector trucks have reduced their number of trips to two weekly. The municipality of Granada will issue a call for the cleaning and waste collection contract for the next 15 years (Granada City Council, 2021<sup>[35]</sup>). The new contract will include the following components: i) the implementation of a new line for the selective collection of organic and residual waste, which will require an investment of EUR 2 million; ii) the purchase of more than 9 000 containers for the implementation of selective collection in the Albaicín and city centre areas; and iii) a comprehensive renewal of machinery under sustainability criteria with electric or gas-powered equipment and trucks. The current contract with Inagra, in force since 1970, expired at the end of 2020 and has been exceptionally extended (Granada City Council, 2021<sup>[34]</sup>). To ensure the efficient management of waste separation and the quality of organic waste, Granada plans to provide users with a key or an application to unlock the container and create incentives (e.g. exemptions or benefits for municipal activities) to increase separation in the city (Granada City Council, 2020<sup>[36]</sup>).

The current waste fee does not cover the full cost of the service, nor does it help further prevent waste production. The waste collection fee in Granada, which does not cover the full cost of the service, consists of a fixed amount that is determined according to the nature and location of the household or business premises.<sup>4</sup> The city foresees the design of a fee that would reflect the actual waste produced per household. It will take into account other considerations such as the nature of the household, the quantity and the specific characteristics of the waste and the system required for its collection and treatment. In addition, the municipality of Granada exempts categories of households below a threshold of minimum income from paying the waste fee. Businesses in sectors such as hospitality, hotels or food and beverage pay according to the size of the premises (Granada City Council, 2019<sup>[37]</sup>).

While the waste sector is key to the transition from a linear to a circular economy, many cities, including Granada, focus on the downstream processes based on recycling and less on the upstream processes in relation to preventing waste. For this to happen, a series of incentives, economic instruments and adequate regulation should be put in place for private operators and individuals. These include removing harmful subsidies, providing risk-sharing financial instruments (European Union, 2019<sup>[38]</sup>) but also applying incentivising schemes for separate collection, such as the pay-as-you-throw system or differentiated tariffs. Many stakeholders (OECD, 2020<sup>[13]</sup>) flag uncertainty around the concept of waste and how materials can be reinserted into production processes when they are still reusable but, by law, qualified as “waste”. In addition, roles and responsibility in the sector are highly fragmented, creating overlaps, gaps and mismanagement.

## Water

In Granada, the emerging focus on the transition to the circular economy has been led by the water sector. The city of Granada, through the public-private water utility company, Emasagra, transformed the concept of a wastewater treatment plant into a biofactory by producing energy and new materials. The biofactory has three main objectives: i) reducing the consumption of materials to reuse water in order to recover materials (e.g. cellulose, etc.); ii) achieving 0% waste to landfill by recovering materials with high added value; and iii) producing green energy for the plant, both through self-consumption and renewable energy. In 2019, the biofactory almost reached its 100% energy self-sufficiency goal and 99% of waste valorisation. A total of 18.91 million m<sup>3</sup> of treated water had been reused for irrigation and the maintenance of the minimum ecological flow of the local Genil River. In addition, of the 16 525 metric tonnes of fresh sludge material produced in the biofactory in 2019, 14.3% was reused for compost and 85.7% for direct application in the agricultural sector (OECD, 2020<sup>[13]</sup>). In recognition of the efforts made to reduce its GHG emissions, in 2021, the Ministry for the Ecological Transition and Demographic Challenge awarded Emasagra the environmental label Calculate + Reduce + Compensate (*Calculo + Reduzco + Compenso*) (Hidralia, 2021<sup>[39]</sup>).

The city of Granada can further explore the potential of the circular economy in the water sector, coherently with the national framework (Box 2.5). According to the results of the OECD (2020<sup>[13]</sup>), a total of 66% of circular economy initiatives reported from surveyed cities and regions, focus on the water and sanitation sector, after the waste sector (78%). In the water sector, circular economy practices can help improve environmental quality, while generating business opportunities and enhancing social well-being (Cotec Foundation, 2017<sup>[15]</sup>). Managing water in a circular way implies:

- Reducing the use of water in the production cycles, freeing up quality resources for necessary uses (supply) and minimising net water demand, reducing pressure on natural systems.
- Ensuring more sustainable water flows, reducing the net discharge to natural systems, thus decreasing pollution load and its effects on natural ecosystems.
- Reusing water for specific purposes taking into account the effects on health and the environment and making available resources that generally require less energy than other sources such as marine desalination or inter-basin transfers.
- Generating energy and recovering a wide variety of materials from wastewater treatment, such as facilitating the recycling of nutrients for agricultural use, with consequent economic benefits (reduced need for agricultural fertilisers, reduced need for tertiary treatment in wastewater management) and environmental benefits (reduced ecological footprint associated with agricultural fertilisers).

Communication around water reuse is fundamental to optimise this practice. For example, in Valladolid, Spain, together with the public service provider AQUAVALL, the city has reduced citizen use in the last decades from 450 to 230 l/day, mostly as a result of awareness-raising campaigns. The city has also upgraded water infrastructure to control losses and recover waste resources, such as fertilisers from sewage sludge, and to extend the life cycle of assets. The Public Utilities Board (PUB), Singapore's national water agency, designed an initiative to transform Singapore's waterways and waterbodies beyond their traditional functions of drainage, flood control and water storage into scenic waterscapes and focal community points. To encourage the co-creation of ABC Waters projects, PUB engaged the community from the early stages of project development to ensure that the sites were designed based on the preferences of the community, kept them updated about project progress, and worked with them to make the sites more meaningful to the community (OECD, 2016<sup>[14]</sup>).

Improving the circularity of water through reuse can have positive effects to tackle urban flooding. The city of Granada is the third most exposed area to flooding in the Guadalquivir Basin with the Granada Health Technology Park (PTS) the area with the highest flooding risk in the city. Therefore, Granada could explore

opportunities for the implementation of sustainable urban drainage systems (SUDS). The application of such systems allows the use of drainage water for other purposes, keeping the water in the urban space longer than traditional drainage systems and minimising impacts such as flooding. For example, building flood parks might result in increased reuse rates, greater urban or peri-urban water use and more efficient flood management.

The generation of water resources could be used for irrigation of agricultural areas in the surrounding area or to refill the Vega de Granada aquifer (Transecto, 2020<sup>[40]</sup>; Granada City Council, 2019<sup>[41]</sup>). The use of wastewater through secondary treatment is a common practice in Granada but the necessity and the economic feasibility of advancing into tertiary water treatment processes to irrigate green crops is under debate. Accordingly to the literature, tertiary treatment contains more chemicals than secondary processing; however, it can make the water suitable for agricultural, industrial and drinking water supply needs. Nevertheless, considering the high energy consumption and the lack of economic feasibility of tertiary treatment, an alternative could be the use of groundwater, which may be cheaper and easily accessible (Sahuquillo Herráiz, 2009<sup>[42]</sup>).

### **Box 2.5. The key role of water reuse in the transition to the circular economy in Spain**

Water reuse and increased efficiency are crucial in a country like Spain, one of the driest in Europe and projected to be one of the driest in the world by 2040. Climate change will further reduce water availability: by 2030, it is expected that water inputs will decrease on average between 5% and 14% in Spain. By 2060, under a scenario of a 2.5 °C temperature increase and an 8% decrease in rainfall, a global reduction in water resources of 17% is expected on average for the peninsula, together with an increase in their inter-annual variability. These changes will be more extreme in the southern half of Spain (Iglesias, Estrela and Gallart, 2005<sup>[43]</sup>).

Currently, reused water can only serve agricultural purposes, so strengthening legislative frameworks to expand allowed uses is required. In parallel, opportunities for greater water efficiency include agricultural efficiency measures, reducing the number of illegal wells and investing in infrastructure maintenance to limit leaks. However, important financial, capacity and regulatory gaps stand in the way of achieving greater water use efficiency and dealing with climate change adaptation.

Water reuse is one of the main lines of action of Spain's Circular Economy Strategy (España Circular 2030), approved by the Council of Ministers in June 2020. The Spanish government aims to increase water efficiency by 10% by 2030 and is looking for ways to measure progress by monitoring the targets and actions included in the Action Plan 2022. Four main water reuse-related actions are planned:

- Update the regulatory frameworks on wastewater and sewage sludge reuse to guarantee that all sludge is treated in an appropriate and safe way.
- Support irrigation projects including wastewater reuse.
- Include water reuse actions in river basin management plans.
- Promote research to establish the minimum quality criteria required for water reuse.

However, in the context of significant technological development, a number of legal and social perception barriers might limit the widespread adoption of wastewater reuse. In particular, the regulatory framework needs to be adapted to the available technological innovations; and communication around the socio-economic and environmental benefits of water reuse is needed, to overcome the negative social perception of reused water. Finally, a more integrated approach to the circular water economy is needed. Isolated application of reclaimed water reuse actions may lead to unintended effects as the potential benefits of reuse could be neutralised by an overall increase in water demand. As such, reclaimed water should be incorporated into the framework of integrated and sustainable planning and



management of all water resources. To this end, basin-scale planning should establish the objectives and destinations of reused flows, taking into account all available uses and resources, in order to avoid generating expectations in terms of demand and to guarantee ecological flows.

In short, it is essential to apply both efficiency criteria (water savings per unit of unit product or service generated) and effectiveness criteria (reduction of total gross abstraction of water from natural systems, such as rivers and aquifers).

The Cotec Foundation proposes the following set of indicators for measuring “circularity” in the water sector:

- Share of treated water reused (%).
- Share of agricultural demand satisfied by reused water (%).
- Share of urban and industrial non-potable uses covered by reused water (%).
- Share of losses in water distribution networks (%).
- The volume of wastewater incorporating material recovery processes (%).
- Net energy consumption per unit of reused water (KW/m<sup>3</sup>).
- Share of citizens supporting wastewater reuse (%).

Source: Cotec Foundation (2017<sup>[15]</sup>), *The Situation and Development of the Circular Economy in Spain*; Spain's Official State Gazette (2007<sup>[44]</sup>), *Royal Decree 1620/2007 of 7 December 2007 Establishing the Legal Regime for the Reuse of Treated Water*; Iglesias, A., T. Estrela and F. Gallart (2005<sup>[43]</sup>), “Impactos sobre los recursos hídricos”, *Evaluación Preliminar de los Impactos en España for Efecto del Cambio Climático*.

### *Urban mobility*

Promoting sustainable mobility is amongst the city's objectives and can be further implemented through circular economy approaches, based on material and resource efficiency. The Integrated Sustainable Urban Development Strategy Granada 2014-20 and the Strategy Granada 2020, Making the Urban Human (EG 2020) document the challenges that the city faces in terms of urban mobility. The city faces morphological challenges due to small streets and pronounced slopes in the historical centre. Moreover, intense fluxes of people enter Granada every day from neighbouring municipalities for work. Around 400 000 daily trips originate in Granada's metropolitan area and have the city as the final destination (Granada City Council, 2013<sup>[45]</sup>). Transport is the largest source of energy consumption, accounting for more than 60% of total consumption and 51% of the city's CO<sub>2</sub> emissions (Granada City Council, 2020<sup>[9]</sup>). Some actions undertaken by the city are the following:

- Promotion of shared mobility schemes: The municipality reduces 50% of the tax on economic activity (*Impuesto a la Actividad Económica*) for those companies that presents a plan to promote shared mobility among their employers (e.g. the beer company Alhambra is offering benefits to employees sharing their cars with other co-workers).
- Increasing infrastructure supply to reduce traffic: In 2017, the city opened the “Metropolitano of Granada” light rail line, with a single line crossing the city from north to south and also connecting with the surrounding municipalities of Albolote, Armilla and Maracena. In addition to reducing commuting time for citizens, the Metropolitano should help avoid the circulation of nearly 8 000 vehicles per day, which would result in an annual saving of 3 232 tonnes of CO<sub>2</sub> emissions (Government of Andalusia/Granada City Council, 2020<sup>[46]</sup>).
- Air quality plan: The municipality of Granada promoted a declaration to improve air quality in the metropolitan area. A total of 23 municipalities committed to approving air quality plans in their

jurisdictions and called for the autonomous government of Andalusia to elaborate its own regional air quality plan.

Circular urban mobility in cities is based on the effective adaptation of people's mobility needs using different means of transport, which impacts quality of life, local environment and consumption of resources. The main advantages of circular mobility are the reduction of: the consumption of virgin materials linked to the transport sector as, thanks to the increased efficiency of infrastructure and mobility, less infrastructure needs to be built to supply the same number of users; waste and pollution; the use of infrastructures (e.g. roads) and vehicles; and operating costs (Ellen MacArthur Foundation, 2019<sup>[47]</sup>).

Land use and urban mobility have a key role in the building of more sustainable cities and this is also the case for Granada. Transport is one of the sectors with the highest impact in terms of carbon emissions and energy consumption, and there are many opportunities for Granada to design urban mobility structures based on more renewable energies and with lower emissions. This would be particularly beneficial to tackle the city's poor air quality standard. For instance, Granada could focus on shared municipal fleets of cars and bicycles, as well as on developing urban logistic spaces, increasing the attractiveness of the use of public transport, widening sustainable transportation options and building additional bicycle lanes.

### *Tourism*

The tourism sector in the city of Granada, with more than 1 700 000 visitors per year, provides an opportunity for job creation and holds potential for applying circular economy principles. The tourism industry is a vast and complex one, covering a variety of sectors and connecting with multiple other industries and value chains – from agriculture to food, to the built environment and transport. Tourism also entails negative effects on the environment, such as high resource consumption and waste production, for example, due to the high energy demand of air conditioning and the deterioration of natural heritage. As such, in Granada, the city and stakeholders have implemented initiatives to reduce the negative environmental impacts of tourism, namely, the Green Footprint project and the Provincial Plan for Adaptation to Climate Change (Box 2.6). However, these initiatives consider circular economy approaches in silos rather than based on collaborations across value chains and stakeholders. Other planning tools focus on competitiveness and quality services, such as the Andalusian Major Cities Tourism Plan for the city of Granada, approved in 2020.

#### **Box 2.6. Initiatives for a sustainable tourism sector in the province of Granada, Spain**

In 2019, the Provincial Federation of Hospitality and Tourism Companies of Granada (La Huella Verde Granada) launched the Green Footprint project (*La Huella Verde*) to: i) educate and raise awareness in the tourism sector in Granada about the degradation of the environment; ii) engage with the private sector to operate on the basis of energy efficiency, good practices and the principles of the circular economy; and iii) transform the city and the province with a view to well-being and quality of life.

The Provincial Plan for Adaptation to Climate Change in Granada (Adapta Granada), launched in 2019, proposes five specific actions which seek to promote tourism models based on sustainable resources and the sustainable seasonal adjustment of the sector: i) creation of greenways and natural itineraries for tourism use; ii) measures to promote tourism based on the territory's resources and with an environmental commitment; iii) seasonal adjustment of tourism activity on the coast; iv) adaptation of municipal budgets to cater for longer summer seasons; and v) adaptation of municipalities to improve the comfort of tourists in the face of heat waves.

Source: La Huella Verde Granada (2019<sup>[48]</sup>), Homepage, <https://www.lahuellaverdegranada.org/> (accessed on 8 January 2021); Provincial Council of Granada (2019<sup>[49]</sup>), *Climate Change Adaptation Plan*, <https://www.dipgra.es/contenidos/plan-adaptacion-al-cambio-climatico/> (accessed on 15 January 2021).

Promoting circularity in tourism notably requires incorporating circularity principles in accommodation and food services, through new forms of collaboration and partnerships along the value chain. For example, hotels and other types of accommodation services can: contract rental services (e.g. for specific types of furniture and laundry); implement joint procurement and bundling of waste streams for useful applications; use reusable items and refurbish with recycled materials, wherever possible. An example of this type of collaboration is provided by the Circular Hotels Leaders Group (*Kloplopergroep*) launched in the city of Amsterdam, the Netherlands, in 2018. Regarding food services in restaurants, the first step is to prevent food waste (e.g. replacing buffet with a la carte schemes). Food that is set to go to waste can be sold at a low price on platforms (e.g. Too Good To Go) or donated to food banks. In the longer term, food service managers can seek to foster and support local food production chains, minimising the environmental impact of food production and transport and favouring the longer conservation of raw materials. London in the United Kingdom created the Sustainable Food Places, supporting public authorities and private companies that procure catering contracts promoting the food waste hierarchy, strengthening policies for dedicated space for food waste (and all other recyclables) in all new housing developments. There is currently no food waste legislation in place in Spain. However, the Spanish government announced in 2020 that a new law on food waste (*Ley sobre las Pérdidas y el Desperdicio Alimentario*) will be released in 2021, in line with SDG 12.3 on reduction of global food waste (Government of Spain, 2020<sub>[50]</sub>).

The COVID-19 pandemic, which stopped travel and tourism, also represents an opportunity to reflect on more sustainable business models for the tourism and hospitality sector. Tourism is the third-largest socio-economic activity in the EU, accounting for 21% of people employed within the services sector. However, since the beginning of the COVID-19 pandemic, the global travel and tourism industry is facing unprecedented economic and existential challenges. Several long-term socio-economic trends will affect the industry in the years to come on both the supply and demand sides (e.g. increasing demand for clear and strict hygiene measures, the pursuit of healthier and more sustainable lifestyles, etc.). To build back better, a new framing of tourism activities is needed, which represents an opportunity for circular economy business models to thrive. Examples of initiatives supporting the green transition and sustainable tourism development as part of the COVID-19 responses include: Corsica, France, which is implementing a roadmap for tourism sustainability; the city of Posio, Finland, which is promoting and investing in sustainability to restore demand; and the Kyoto Destination Management Organisation in Japan, repositioning its recovery strategy to reorient toward local needs and support sustainable growth (OECD, 2020<sub>[51]</sub>).

### *The built environment*

Granada can further explore opportunities to apply circular economy principles to the built environment sector. In 2020, Granada joined the European network URGE – Circular Building Cities of the EC URBACT III Action Planning Networks programme, to design, together with eight other European cities,<sup>5</sup> a common strategy aimed at establishing a circular economy system in the built environment sector. Circular practices in the construction sector consist of building using recyclable construction materials, designing buildings that can enhance water and energy efficiency and respond to population shrinking in the city through modular construction and circular building. Examples are reported in Box 2.7.

The national legal framework encourages sustainable water management of buildings during the construction phase. However, there is room for improvement in terms of material management. In Spain, Royal Decree 105/2008 regulates the production and management of construction and demolition waste. Every construction project must include a waste management study, including an estimate of the quantity of construction and demolition waste that would be generated onsite; the measures adopted to prevent waste generation; and the reuse, recovery or disposal operations to be applied for the generated waste during the work (Spain's Official State Gazette, 2008<sub>[52]</sub>). Designers and constructors can take this practice to the next level and go beyond waste management and focus on material management. The Cluster for Sustainable Construction of Andalusia (CSA) created by the Provincial Council of Granada in 2014 can

support this endeavour through collaboration across stakeholders from the private sector (e.g. architects, engineers, developers, builders, installers, material manufacturers, window manufacturers, photovoltaic panel manufacturers), sectoral and educational institutions, including the University of Granada (CSA, 2021<sup>[29]</sup>).

### Box 2.7. Circular economy principles applied to the built environment

The circular way of building consists of rethinking upstream and downstream processes to minimise waste production and maximise resource use. It also implies new forms of collaborations amongst designers, constructors, contractors, real estate investors, suppliers of low- and high-tech building materials and owners, while looking at the life cycle from construction to end of life. According to the OECD (2020<sup>[13]</sup>), there are some key phases to stimulate circular building: planning, design, construction, operation and end of current life.

- **Planning** in a circular manner means considering the entire life cycle of the asset, including alternative use through repurposing and reassembly. Examples are modular approaches so that materials and building blocks can be easily dismantled and reused. The city of Amsterdam, the Netherlands, applies smart design for buildings more suitable for the repurposing and reuse of materials and improves efficiency in the dismantling and separation of waste streams to enable high-value reuse and to create a resource bank and marketplace where materials can be exchanged between market players.
- **Design** in the project phase takes into account the material choice, the consumption of water and energy in buildings to reduce consumption and minimise waste and possible reuse of buildings. In Belgium, the Public Waste Agency of Flanders (OVAM) in collaboration with the Walloon Public Service (SPW) and environment agency Brussels Environment developed an online open-access calculation tool called Tool to Optimise the Total Environmental Impact of Materials (TOTEM). TOTEM helps architects, designers and builders to assess the environmental impact of building materials to increase the material and energy performance of buildings.
- The **choice of materials for the construction** phase entails identifying more sustainable materials and minimising the variety of materials used. The use of certifications to ensure the minimum circular standards, material passports and material banks can foster reuse of construction materials and provide constructors and clients with reused materials. In the city of Paris, France, besides meeting all mandatory requirements established in the NF Habitat HQE Base standards, a certification for the building sector, construction projects must reach at least 40% of the points established in a “circular economy profile” to be considered circular (e.g. inclusion of a waste management plan, use of recycled materials, development of life-analysis calculations, eco-certification of wood, considering deconstruction processes, establishing synergies with local actors in the surrounding areas, among others).
- The **operation** phase concerns the use of energy sources and embedded technologies in buildings to enhance resource efficiency. The operation also includes the use of data and innovative technologies as enablers to extending the life assets, which delay the shift towards a second life or end of life. For example, the city of Paris recovers heat from wastewater to heat and cool public buildings and has also developed a network of non-potable water users to optimise water consumption. Maribor, Slovenia, has deployed a spatial analysis of the use and production of heat in the city to optimise energy use.
- The **end life** of a building could create a new life for the waste material produced. Three levels of circularity can be identified: repurposing an existing asset, components and materials with no

major transformations and in the same location; reusing an existing asset for the same purpose but in a different location; reusing components and materials of existing assets, in the same and different location. Particular attention is paid to spatial planning, given the city's relatively strong role as commissioning authority for public spaces and in the realisation of its own accommodation and granting of permits for construction and demolition.

Source: OECD (2020<sup>[13]</sup>), *The Circular Economy in Cities and Regions: Synthesis Report*, <https://doi.org/10.1787/10ac6ae4-en>.

## Places

The circular economy can be applied at various scales, from the neighbourhood to the regional level and create linkages across urban and rural areas. In Granada, further links can be exploited between the urban core and the surrounding rural area home of agricultural production, accounting for 8.6% of total employment in the province in 2018, double the level in Spain (4.2%) (Unicaja, 2020<sup>[53]</sup>). The pact to protect the Vega of Granada, an agricultural and livestock farming area comprising 41 municipalities including the city of Granada, foresees the adoption of 10 principles, from updating land use norms to protecting agricultural land and promoting local food production (Pacto por la Vega de Granada, 2015<sup>[54]</sup>).

One of the fields with potential for improvement in the city of Granada and the province is the search for solutions for the reuse of agro-food waste. There are examples of companies at the national level that are promoting the conversion of agri-food waste into raw materials and powdered ingredients (AgroSingularity, 2021<sup>[55]</sup>). This system would allow farmers to market their by-products while generating environmental, social and economic benefits (Box 2.8).

Local food can be used in hospitals, schools and universities as a way to reduce transport costs and related GHG emissions and to minimise the risk of shortages in case of shock or blocked transport. Many cities have implemented systems to promote local food. For example, the city of Paris is planning to relocate part of its food production to reduce transport costs and related GHG emissions. In Maribor, Slovenia, a digital platform (INNO RURAL) connects local food producers and customers to shorten delivery routes and share information on the type of products that are sold and where they are sold (OECD, 2020<sup>[13]</sup>).

### Box 2.8. Spanish regulatory framework for by-products

Directive 2008/98/EC on waste and its transposition to the Spanish state through Law 22/2011 on waste and contaminated soils defines the conditions for a substance or object, resulting from a production process and whose purpose is not the production of that substance or object, to be considered as a by-product and not as waste, when the following conditions are met:

- There is a certainty that the substance or object will be used at a later date.
- The substance or object can be used directly without further processing except by common industrial practice.
- The substance or object is produced as an integral part of a production process.
- Further use meets all relevant requirements relating to products and the protection of human health and the environment.

In order to consider a substance or object as a by-product, these four conditions must be fulfilled simultaneously. Otherwise, it will be classified as waste.

The process to regulate the declaration of production waste as a by-product is sequenced in two main phases. First, for the general application for a by-product declaration, the Working Group of the Waste

Coordination Committee of the Ministry for the Ecological Transition and the Demographic Challenge of Spain assesses the compliance with the conditions for the specific use of the production waste concerned. In the second phase, the intention to use the relevant production waste as a by-product needs to be notified to the autonomous community where the production waste is generated, as well as to the autonomous community of destination.

In June 2020, the Spanish government initiated the public information process for the draft bill on waste and contaminated soil, repealing Law 22/2011. The draft bill determines when waste can be reused and establishes two categories: waste that is in fact a resource for remanufacturing the same product; or a by-product, a secondary product derived from industrial processes.

One of the main modifications of the draft bill is the obligation to keep a chronological register of the entities or companies that generate by-products and those that use them. The text empowers the autonomous communities to implement it in their territories, which is expected to facilitate the existence of a market or demand for such substances or objects.

Source: Government of Spain (2021<sup>[56]</sup>), *Working Group on By-products and End-of-Waste Status*, <https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/prevencion-y-gestion-residuos/comision-coordinacion/Procedimiento-Evaluacion-Subproducto.aspx>; Government of Spain (2017<sup>[57]</sup>), *By-product Evaluation Procedure*.

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## Notes

<sup>1</sup> A number of regional ministries of Andalusia and institutions contributed to the strategy, such as: the Regional Ministry of Economy and Knowledge (*Consejería de Economía y Conocimiento*); the Andalusian Knowledge Agency (*Agencia Andaluza del Conocimiento*); the Institute of Statistics and Cartography of Andalusia (*Instituto Estadística y Cartografía de Andalucía*); the Regional Ministry of Employment, Enterprise and Trade (*Consejería de Empleo, Empresa y Comercio*); the Andalusian Energy Agency (*Agencia Andaluza de la Energía*); the Innovation and Development Agency of Andalusia (*Agencia de Innovación y Desarrollo de Andalucía*); the Regional Ministry for Environment and Territorial Planning (*Consejería de Medio Ambiente y Ordenación del Territorio*); the Andalusian Institute of Agricultural and Fisheries Research and Training (*Instituto de Investigación y Formación Agraria y Pesquera*); the Andalusian Agricultural and Fisheries Management Agency (*Agencia de Gestión Agraria y Pesquera de Andalucía*); the Regional Ministry of Agriculture, Fisheries and Rural Development (*Consejería de Agricultura, Pesca y Desarrollo Rural*).

<sup>2</sup> The Delegation of Employment and Sustainable Development of the Granada Provincial Council is participating in the Color Circle project on the circular economy, committing to inter-regional co-operation with European partners from the Czech Republic, France, the Netherlands and Romania. The aim is to empower local entities, connecting them with research teams, towards the full development of the circular

economy. This action is carried out within the framework of the European programme Interreg Europe, financed by the European Regional Development Fund (ERDF).

<sup>1</sup> See <http://www.bcnecologia.net/es/modelo-conceptual/supermanzana>.

<sup>2</sup> See <https://ec.europa.eu/environment/europeangreencapital/winning-cities/2012-vitoria-gasteiz/>.

<sup>3</sup> The IUC is an EU Foreign Policy Instrument (FPI) programme that boosts international urban co-operation with EU partners in Asia and the Americas.

<sup>4</sup> Emasagra issues bimonthly receipts for the waste collection charge to every household, whether or not they receive the water service.

<sup>5</sup> The participating cities are: Copenhagen (Denmark), Intermunicipal Community of the West (Portugal), Kavala (Greece), Munich (Germany), Nigrad (Slovenia), Prato (Italy), Riga (Latvia) and Utrecht (Netherlands).



**From:**  
**The Circular Economy in Granada, Spain**

**Access the complete publication at:**

<https://doi.org/10.1787/5f8bd827-en>

**Please cite this chapter as:**

OECD (2021), "Towards the circular economy in Granada, Spain", in *The Circular Economy in Granada, Spain*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/cd045404-en>

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