

# LET'S GO CIRCULAR!

Paving the way for a circular transition of cities

Thematic Article 1

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## FROM WASTE TO WONDER THE SUCCESSFUL CASE OF GUIMARAES IN SHAPING A CIRCULAR CITY



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# From Waste to Wonder: The Successful Case of Guimaraes in Shaping a Circular City

## Abstract

This thematic article delves into the transformative journey of Guimarães, Portugal, towards establishing a sustainable, circular economy, framed within the broader context of the European Union's ambitious environmental initiatives, notably the European Green Deal and the Circular Economy Action Plan (CEAP). Guimarães, with its combination of rich cultural heritage, notable industrial activity and densely populated historical center, represents a compelling case study of how medium-sized cities can lead the transition towards sustainability through innovative governance, strategic collaborations, and active citizen engagement.

The thematic article unfolds Guimarães' approach to embrace a circular economy model by establishing a Mission Oriented Governance system initiated in response to the city's participation in the Green Capital Awards. This system has fostered multidisciplinary collaboration and the adoption of a polycentric development model, engaging a wide range of stakeholders in the pursuit of climate neutrality and resilience.

A number of projects are presented that exemplify the city's commitment to circularity, such as PAYT (Pay As You Throw) for effective waste separation in the historic centre, the innovative valorization of cigarette butts and chewing gums through the EcoPontas & PapaChicletes project, as well as holistic approaches to managing textile waste, a key residue of local industrial activity. All projects are transversed by a strong commitment of the city to enhance social integration, inclusion and to boost the use of digital tools.

## Background Information

The [European Green Deal](#) includes the [Circular Economy Action Plan \(CEAP\)](#), launched on March 11, 2020, aiming to reduce the EU's consumption footprint and double its circular material use rate in the coming decade while boosting economic growth. The plan (CEAP) proposes measures to make sustainable products the norm in the EU, empower consumers, ensure less waste, and reward manufacturers based on sustainability performance. It encompasses actions across various sectors, including electronics, ICT, packaging, plastics, and textiles, and seeks to promote the Circular Economy on an international level, including the launch of a [Global Alliance on Circular Economy and Resource Efficiency \(GACERE\)](#).

Cities have a significant impact in Climate Change, both as major consumers of energy but also as major producers of emissions. Climate change impacts are becoming more and more obvious asking for both rapid reaction and action on behalf of cities administrations to put efforts on mitigation and achieve fast adaptation. If this situation is seen in combination with the tremendously fast urbanization process that takes place around the globe, one can easily understand that a new model of sustainable living, producing, and consuming is imperative to ensure resilience of urban settings and citizens' wellbeing.

Circular economy acts as a pathway to sustainability, which itself rests on three core pillars within any urban setting: social, economic, and environmental factors. The interplay between these elements is influenced by community acceptance, the governance frameworks in place, and the level of innovation. Transitioning to a circular economic model for our cities does not happen using a magic wand!!! Change in the way cities operate is a hard process requiring an integrated approach, gradually changing the way that the parts of the urban ecosystem interact with each other. Circular economy is **a concept that mimics living systems**<sup>1</sup>, in the sense that nature produces no waste but instead outputs of any process are the input for another, creating closed loops. To do so, nature involves multiple “players” who all benefit from transformation processes. Similarly to natural systems, circular economy requires the involvement of multiple stakeholders who will get involved within a win – win process for them as well as the environment, identifying new profitable business models which keep the resources in the production-consumption loop for as long as possible. This idea prerequisites that people understand that a new way of producing and consuming has to be adopted, respecting the planet's boundaries. From industry to citizens and administration, a new mindset of circularity needs to be established across all involved parties. Change happens at the **bottom** when the **leaders pave the way ...**

EU has supported several initiatives to trigger competition among European cities towards a race for sustainability. Examples of such initiatives are the [Green City Accord](#) and the [Green Capital](#) and [Green Leaf Awards](#). The aim is to encourage cities to address environmental challenges and showcase their environmental performance.

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<sup>1</sup> [Explaining the Circular Economy and How Society Can Re-think Progress | Animated Video Essay \(youtube.com\)](#)

In 2014 it was the first time that Guimaraes took part in the Green Capital Awards, a decision that triggered the broadening of the circular economy ecosystem of the city and the creation of a more mission-oriented governance mechanism.



## Guimaraes – the case of a Mission Oriented Governance system

Guimarães, a Portuguese city of medium size, is home to 156,830 people. This results in a population density of 651 inhabitants per square kilometer, considerably surpassing the mainland's average density of 112 inhabitants per square kilometer and highlighting the city's substantial urbanization. The city employs a polycentric development approach, overseeing 48 parishes (local administrative units, each with its elected leader) under the governance of the mayor, in addition to nine larger parishes known as villas. Guimarães ranks as one of Portugal's most industrialized municipalities, with key sectors including textiles, footwear, and metal mechanics. While it continues to preserve its traditional secondary sector industries like textiles, shoemaking, and cutlery manufacturing, the emergence of creative industries within the city's core is becoming increasingly significant. In 2019, the sector reported a turnover of approximately €5700 million, with the manufacturing industry alone accounting for about €2400 million. The total area of the functional urban region extends to 240,955 square kilometers.



The journey of the city towards climate resilience starts in 2011 when a political commitment for transition became present. However, the turning point was the period between 2013 and 2014, when Guimarães administration decided to take part in Green Capital Awards for the first time. Following the directions of the initiative for mapping the existing situation and planning the future actions, the Mayor asked for a diagnosis of the environmental situation in the city. In addition, the Green Capital Initiative recommended for 12 indicator areas to be regularly monitored. **Precisely, Mitigation, Adaptation, Sustainable Mobility, Green Areas and Sustainable Land Use, Nature and Biodiversity, Air Quality, Noise, Waste, Water, Green Growth and Eco-Innovation, Energy Performance and Governance** have been the primary focused areas. That was actually the starting point for the transition. The need for mapping and planning for all the

above indicator areas required for an intensive knowledge-sharing between the city's administration and academic experts. Consequently, a cooperation between the Local Authority and the University of Minho was established with the Mayor and the Rector of the University having active role in supervising the process of mapping and planning. Then, in 2014, the **Mission Structure (MS)** was established, composed by three teams: a) the Landscape Laboratory b) the Mission Structure and c) the Climate Team, together with the Municipality, interacting with citizens, private sector, and Universities. This was the **transition** phase.

Between 2014 and 2022, the **transformation** phase was initiated. The Mission Structure evolved to be more multidisciplinary and to include more thematic areas. This evolution resulted also to the involvement of additional Universities and the establishment of a Monitoring Committee.

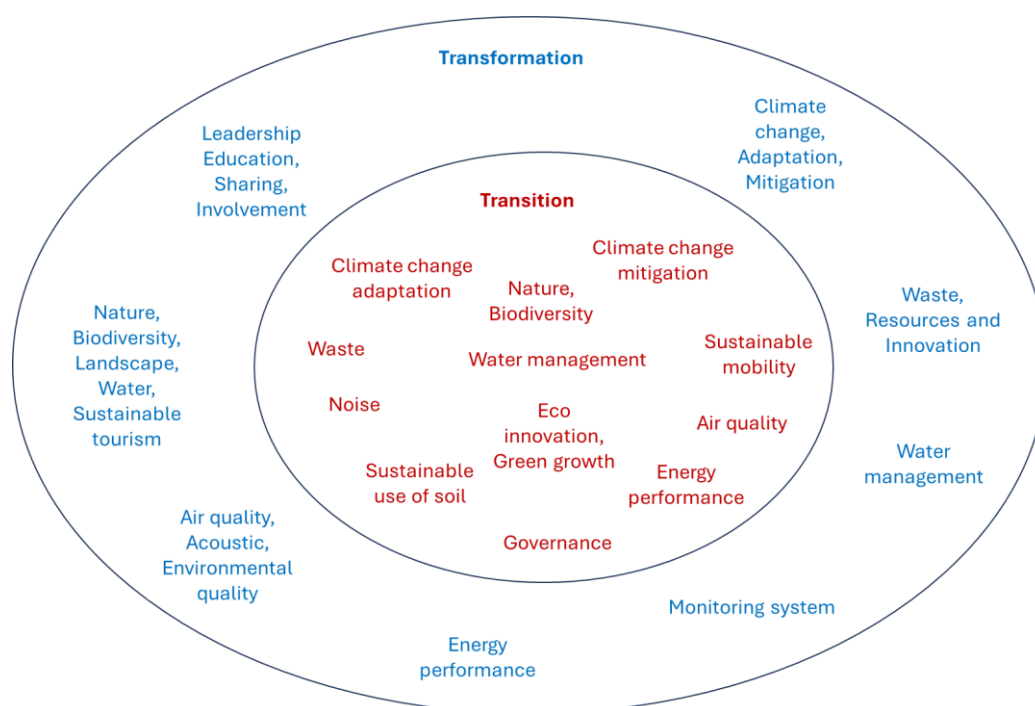


Figure 1: Indicators Areas to be monitored in the frames of Green Capital Initiative methodology

Since 2022 the city is in **the accelerating transition phase**. The city has adopted targets in the frame of the climate neutrality 2030 mission. The Mission's Structure has evolved once again and has strengthened even more the multidisciplinary character, by replacing the Climate Team with the Transition Team. The private sector including the **textile** sector was brought on board. More than 100 companies have signed the climate pact and they contributed to actions of the action plan.

Today, the city has set a series of plans and takes part to EU Initiatives all targeting to Climate neutrality and resilience. Guimaraes has been selected for the Mission of 100 smart and climate-neutral cities by 2030, the so-called "Cities Mission" of the European Union. In parallel, the city of Guimaraes, is one of the cities of Portugal, that actively participates in the Circular Cities and Regions Initiative (CCRI). This initiative, launched



and funded by the EU as part of the Circular Economy Action Plan, aims to promote circular economy practices across Europe's cities and regions.

To do so the City of Guimaraes has set a series of targets focusing on the improvement of waste management.

**By 2030 Guimarães' goal is to achieve:**

- an 80% reduction of CO<sub>2</sub> emissions
- a 20% sequestration of CO<sub>2</sub> (process of capturing and storing atmospheric carbon dioxide - it is one method of reducing the amount of carbon dioxide in the atmosphere with the goal of reducing global climate change)

The municipality's **commitments** can be summarized as follows:

- Reducing the total amount of waste generated to 362 kg per person / year by 2030
- Establishment of a proficient separate collection system by 2030
- Reducing the unsorted waste stream to reach a target value of 120 kg per person / year by 2030
- Extending the separate collection of bio-waste to the 100% of its territory
- Reduction of bio-waste and recyclables found in the unsorted waste stream (residual waste)
- Collecting 75% of recyclables and extending the PAYT system to the whole territory
- Reduce landfill to 10% by 2035

As described in [CCRI Guimaraes pilot presentation on the website of EC](#) :

**Guimarães is on a Mission to make Waste Management more sustainable, emphasizing circular practices and resource optimization.**

To this direction Guimaraes has a dedicated circular economy programme Guimaraes for Circular Economy (G4CE), which fosters innovation, research, and development to foster

circular practices. The City has developed an integrated waste management strategy and in parallel it applies numerous pilots following a quintuple helix approach to adopt the best waste management solutions. Throughout the years the City has put in place a set of **strategic documents** and **action plans** all complementary to each other heading towards the City's Mission. At the same time, Guimaraes launches Initiatives with the close cooperation of key city actors, to engage citizens and stakeholders to its goals and achieve tangible results. As an example, [RRRCICLO](#) – Circular Economy in Guimarães Initiative has been developed by the Municipality of Guimaraes in cooperation with Laboratório da Paisagem (Landscape Laboratory) and Vitrus Ambiente. RRRICLO *aims to change the linear models of production and consumption, by circular models of sharing, reuse, repair, reintegration and recycling of materials, reducing waste to a minimum* (RRRICLO). RRRICLO works with the active participation of local stakeholders and the involvement of citizens. A dedicated web platform has been created to facilitate the citizens' access RRRICLO and related projects.

**Other local waste related policies** that are linked to the municipal waste management strategy:

- PAYT System
- Zero Waste Plan
- Textile Waste action plan financed by URBACT
- Agenda 2030 and created a shared vision of 'A greener Guimarães', encouraging public involvement and establishing a climate ambition through a new Governance model: Governance Ecosystem Guimarães 2030 (GEG)
- Diagnosis and Action Plan for Environmental 2030
- Circular Economy field of action is firmly anchored in the overall policy for a climate-neutral Guimarães by 2030
- Zero Waste Guimarães
- Climate neutrality measures in the frame of the EU Mission "100 Climate-Neutral and Smart Cities by 2030"
- Commitment to become Zero Waste Certified, process provided by Mission Zero Academy
- Action plan for Biowaste

The number of Guimarae's strategic documents and action plans shows that the transition to a circular model of economy is a dynamic process, which requires the definition of specific goals, both in short and long term as well. However, it is important to stress at this point that the goal setting of Guimaraes has happened in tandem with both national and European goals as these are presented in EU directives and strategies.

Heading towards the direction that EU suggests for a circular economic model, the City carefully selects the development of pilot projects that on the one side provide innovative solutions to everyday waste-related problems of the City and on the other side takes all urban players on board. The projects are initially deployed in small scale, and after pilot testing, they are upscaled to cover a wider territory. The strong point is the political consensus with the parishes and that all Mayors feel part of the climate journey.

The following sections depict the efforts of Guimaraes' administration to engage citizens with the City's Mission, as well as examples of inclusive, integrated circular approach in waste valorization.



## In Guimaraes, citizens are the main actors of transformation.

**What makes Guimaraes' circular economy transition pathway so unique is its focus on citizens engagement since the initial phase. The RRRICICLO Initiative (Circular Economy in Guimarães) that is focused on stakeholder engagement and education giving special attention to schools, plays a pivotal role towards citizens inclusion and active participation. The initiative is led by the Municipality providing more than 100 activities dedicated to schools at all education levels. The ultimate aim of the initiative is to achieve sustainability goals sought by the European Union by 2030<sup>2</sup>.**

It is noteworthy to mention that schools are one of the main target groups of pilot projects applied by key actors, such as the Landscape Laboratory. For instance, a project is being developed with the schools together with the general community intending to reduce waste and increase circularity in public and private canteens, map local producers and identification of good agricultural practices. The ultimate aim is to enable behavioural change, promote more sustainable production and consumption, **reduce food waste** and promote healthier and more sustainable food.

## Separate biowaste collection

**The target is to recover 73% of biowaste by 2030.**

As part of the BioWaste Action Plan, integrated into the – RRRICICLO Initiative, Guimarães is gradually **introducing separate biowaste collection**. This effort targets various sources of biowaste, including those deriving from **households, restaurants, schools, hospitals, parks, and local farms**. The pilot action not only collects waste but also transforms it into valuable resources, through initiatives such as home or community composting, organic fertilizer production, and waste-to-energy conversion.

More than 6.000 community gardens exist, where fertilisers out of biowaste are used.



<sup>2</sup> ([https://www.oecd.org/cfe/regionaldevelopment/CE\\_5th\\_RT\\_Highlights.pdf](https://www.oecd.org/cfe/regionaldevelopment/CE_5th_RT_Highlights.pdf))

## PAYT for effective WASTE SEPARATION at source in the historic centre

**Pay As You Throw system (PAYT)** has been a catalyst for the reinforcement of the biowaste collection system deployment, especially in the historic centre. The system is applied with the compulsory use of special bags bought by the citizens. The less waste one throws the less bags they must purchase!

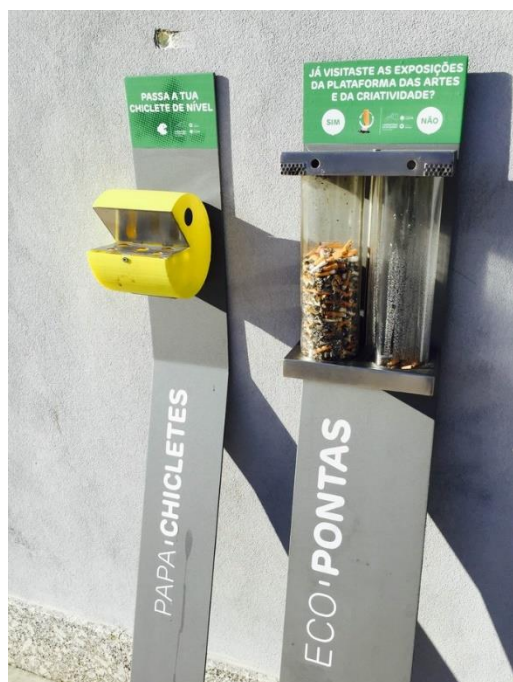
The municipality uses the PAYT system since 2016 and today it is embraced both by the residents and the companies of the historic centre. Guimaraes is being an urbanized municipality with inhabitants reaching approx. 450-470 kg of waste per person per year. The PAYT system currently encompasses more than 4.000 users. This system presupposes the purchase of pre-paid bags that correspond to waste tariff and includes a continuous monitoring, establishing a close relation with citizens. Since its commencement in 2016, through the use of PAYT system, the selective collection increased by 34%, leading to reduced amount of end-of life waste.

The PAYT system has been expanded and the organic waste collection has been applied to 50.000 inhabitants with a door-to-door collection, benefiting those who sort waste, through a biowaste participatory strategy. It aims to set up a sustainable, local, and cost-efficient management system for bio-waste by building a decentralized composting system in the parishes and home composters for households. The Municipality offers a composter free of charge and a guide for citizens that want to participate. The entire process is monitored with on-site visits and online follow-up, counting the capture rates and then, the results are published and communicated.



## Giving value to cigarette butts and chewing gums

Smoking is definitely a bad habit. Also, chewing gums are definitely an annoying waste on the streets and pavements and need a lot of water to be washed off. However, the Landscape Laboratory in partnership with CVR - Centre for Waste Valorization have developed an innovative solution for the valorisation of cigarette butts and chewing gums. EcoPontas&PapaChicletes project is a great example of public and private sector collaboration to give innovative solution to an existing problem. The project seeks to reduce the cigarette butts and chewing gum waste in public places, as well as to protect aquifer that is the final destination for a large part of this kind of waste. The origin of collected waste and its biological contamination requires microbiological stabilization. After collection, and with the support of a technological-transfer Institution (CVR), cigarette butts are successfully incorporated into ceramic bricks (E-tijolo) while complying with standard requirements and enables sustainable/green construction as well as other integrations. Through a scientific and technological process, and with the support of a product-design process, the chewing gums are transformed into new products for community use.



In 2016, the Green Project Awards awarded this project with the Social Innovation Prize for its strong research nature, valuing waste and raising awareness of the importance of circular economy. The EcoPontas and PapaChicletes infrastructure have already crossed the borders of the municipality, being present in several municipalities from north to south of Portugal. Up to 200 cigarette butts' containers have been sold, avoiding thousands of cigarette butts in streets and oceans. In Guimarães and after 4 years of the implementation of the pilot city, six EcoPontas containers collected more than 450,000 cigarette butts.

The E-Tijolo production procedure in the lab scale has been designed in a simple way to be easily replicable in an industrial context and not compromising the existent production line. It requires small investment mostly related with a handling unit of the cigarette butts. The incorporation of cigarette butts gives improved properties to the brick, as it leads to a reduction of the porosity of the material and to the normalization of the produced bricks .



Involved stakeholders: City Council, CVR - Centre for Waste Valorization, ISQ - Welding and Quality Institute, citizens.

## Disposal Medical Masks Recycling

An innovative project was deployed by Landscape Laboratory in close collaboration with the City Council, Vitrus Ambiente, CVR - Centre for Waste Valorization, ToBeGreen, schools, and citizens regarding the collection and recycling of Disposal Medical Masks during the pandemic of COVID 19. The project was initiated in 2021, during the European Week for Waste Reduction under the motto “Collect and Valorise”. The so called “Aqualastic – Educate, Reduce and Value” project focused on the collection and valorisation of masks at schools of Guimaraes. Following the Governance Ecosystem: Guimarães 2030 implemented in Guimarães and Circular economy principles, the Landscape Laboratory, the leader of the project, developed a container for the collection of disposable masks and distributed them to several schools of the municipality. As a result, more than 25,000 disposable masks were collected. The masks were transformed into 5,000 hangers which were offered to owners of shops and hotels in Guimarães, and 2,000 mobile phone holders which were distributed to students who contributed the most to the mask collection.



## A holistic integrated approach having as a starting point the vision to decrease waste from the textile industry

The [EU Strategy for Sustainable and Circular Textiles](#) addresses the production and consumption of textiles, whilst recognizing the importance of the textile sector. It implements the commitments of the [European Green Deal](#), the [Circular Economy Action Plan](#) and the European [industrial strategy](#). According to the document of EC (2020) **A new Circular Economy Action Plan - For a cleaner and more competitive Europe<sup>3</sup>**, the Textiles are the fourth highest-pressure category for the use of primary raw materials and water, after food, housing and transport, and fifth for GHG emissions. The document also mentions that *“It is estimated that less than 1% of all textiles worldwide are recycled into new textiles”*.



Local and Regional Authorities as those ones closer to the consumers and SMEs using textiles are the ones who can intermediate with several interventions in order to affect consumption behavior and management of textile residuals.

Given the fact that Guimarães' industrial sector consists of 25% textile production and 14% clothing production, the City has a special focus on textile. An insightful waste mapping exercise that took place, revealed the difficulties faced by the small industries located in the rural areas of the territory, to perform proper management of their remaining textile products and byproducts. For this reason, a series of innovative projects incorporating social as well digital dimensions were deployed in cooperation, with local key stakeholders and strategic partners, which are indicatively described hereafter.

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<sup>3</sup> [EUR-Lex - 52020DC0098 - EN - EUR-Lex \(europa.eu\)](#)



## Citizens' Engagement in Textile circularity

Guimaraes has put a lot of effort in citizens' engagement in all kind of initiatives addressing the topic of resource management and circular economy, including textile.

- Separate textile collection bins haven placed in 4 secondary schools

Separate textile collection bins have been placed in 4 secondary schools contributing to the collection of 20 tons of post consumer textile during 2022. The material was converted into 1000 carrier bags which complemented the Plastic-Free Market initiative and were distributed among traders. Another part of the material was converted into blankets distributed to terrace cafes of the historic centres.

- Second-Hand Market Initiative

Second-Hand Market is an initiative of the municipality to provide residents with the opportunity to participate in the achievement of a circular economy by selling items they no longer use, thereby extending their life cycle. The second-hand market takes place on the first and third Sunday of every month in the premises of the municipal market of Guimarães. Along with the Second-Hand Market, the municipality holds the Antique Market every month, which aims to ensure contact with the past and constitutes an element of animation and attractiveness of the historic centre.

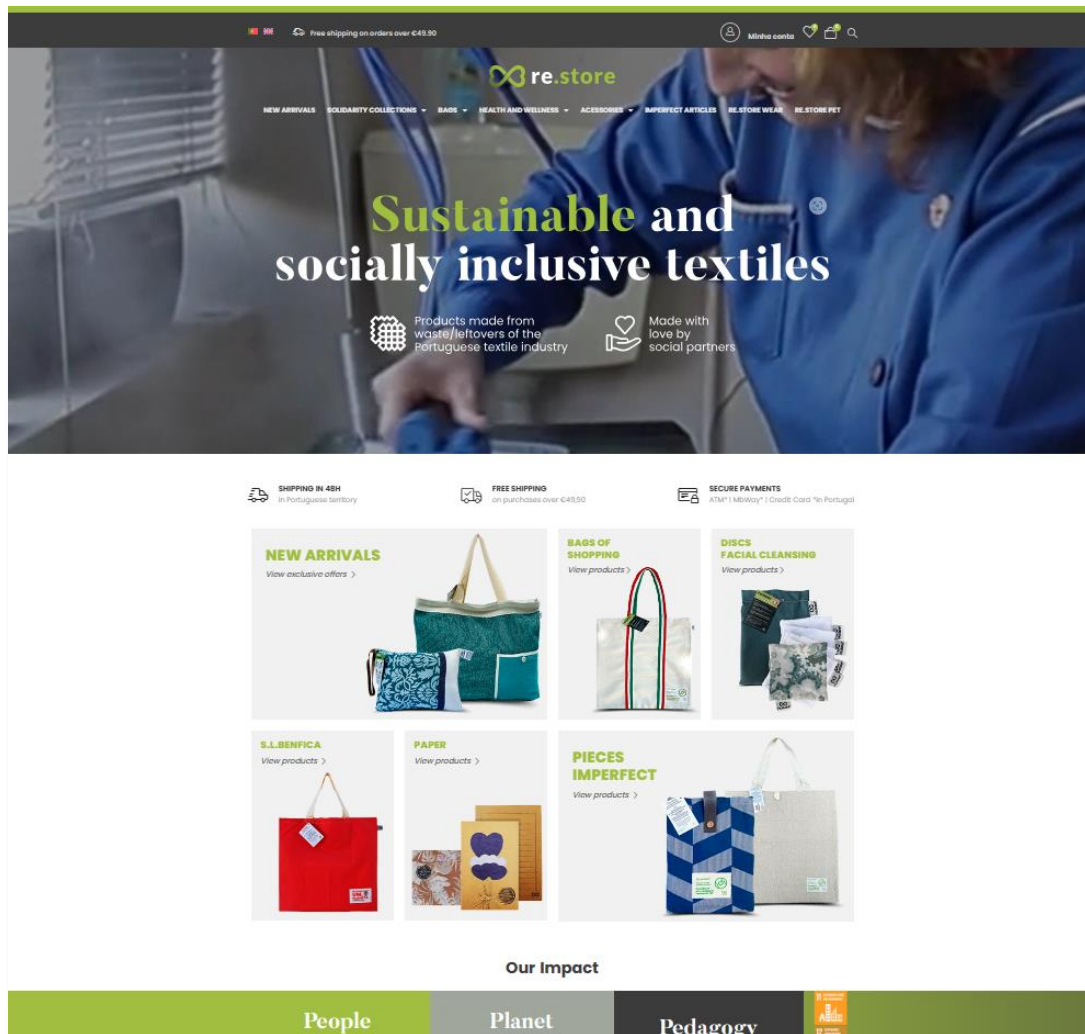


*Used items for the Second-Hand Market:*

- ✓ *crocery and decorative items*
- ✓ *craftsmanship*
- ✓ *clothing*
- ✓ *shoe*
- ✓ *toys*
- ✓ *electrical and electronic equipment*

## Social Inclusion powered by Circular Economy

The impact that a circular economic model may bring to a city's social fabric by giving opportunities for better integration of vulnerable groups, is huge. In Guimaraes, the case of **re.store**, shows how a planet-friendly textile brand has been created, transforming textile leftovers to useful accessories and at the same time providing jobs and developing skills of socially vulnerable groups. This initiative was founded in 2020 and since then it has made remarkable strides, demonstrating the potential for circular economy principles to foster economic, social, and environmental benefits.



### The impact of re.store

Within the last 36 months, 6.1 tons of fabrics and accessories from the Portuguese textile industry has been upcycled in re.store. Products out of reused fabrics and accessories are: shopping bags, beach bags, backpacks, ipad/ tablet bags, glasses, cell phone bags, tote bags, necessaire bags, aprons, door hangers, beach pillows and most recently, beds for dogs and cats. The products of re.store use zero lt of water, zero energy, produce zero CO<sub>2</sub> and use no chemical agents. B2C – through the online store and B2B (through corporate clients and turnkey customised solutions) are used as distribution channels.

Re.store has more than 2200 clients from different countries, collaborates with more than 20 companies and with public sector, as well as with schools and universities.

## Digital Transformation

With the Municipality applying the PAYT system to encourage proper textile disposal and the integration of this practice also into schools, the amount of textiles available for reuse and upcycling including also the process of sorting, increased significantly enough to inspire the launch of “ToBeGreen” application (app). The application encourages clothing swaps and the transformation of unsuitable garments into tote bags and blankets for local use.

“ToBeGreen” is not only an app, it comprises a recycling program and has created its own community. ToBeGreen foresees three levels<sup>4</sup> of action:



- *the exchange of clothing by citizens using the ToBeGreen application, whereby for each item delivered for sharing, users receive points to purchase second-hand items in the application*
- *the cataloguing of clothing deposited in the system, which allows the Division of Education and Social Action of the City Council to provide a more efficient service to those who need this type of support;*
- *the recycling of textiles at the end of their life, as well as all their residues, allowing the creation of textile threads or acoustic insulation boards, among other products.*

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<sup>4</sup> [https://environment.ec.europa.eu/topics/circular-economy/reset-trend/get-inspired-stories-change/recycling-and-exchanging-clothes-portugal-ToBeGreen-albergaria-velha-store\\_en](https://environment.ec.europa.eu/topics/circular-economy/reset-trend/get-inspired-stories-change/recycling-and-exchanging-clothes-portugal-ToBeGreen-albergaria-velha-store_en)

## Closing remarks

Guimarães, is a medium size city located in the North of Portugal. Since 2015 a program was launched challenging the City to establish a roadmap for the sustainable development of the territory. One of the goals was to establish a concept for Circular Economy based on the City context and vision. The strong political will to foster circularity as a “way of living” and the stable political system were catalytic and led to a series of successful projects aiming to establish a suitable governance structure that enhances multidisciplinary participation, raises citizens’ awareness, educates, engages and empowers research to valorise waste. A strong methodological framework with an eye on analysing flows and making informed decisions, were also catalytic. At the same time, projects were always focusing on the promotion and improvement of social affairs, enhancing social inclusion and impacting at the end on citizens’ quality of life, leaving none behind. The use of digital tools have also been taken onboard to support in an integral way the transition to a circular economy. Guimaraes is an example that justifies the rule, that there is no need for a magic wand to enhance circular economy. Change happens at the bottom when the leaders pave the way and that has materialised environmental, social and economic benefits out of the implementation of the circular economy concept across the territory, in close collaboration with strategic players, representing the quadruple helix.

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