

# **Digital innovation and circular economy ecosystems analysis**

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# CEI BOOST – Boosting Circular Economy Innovation through emerging technologies application

The CEI BOOST – Boosting Circular Economy Innovation through emerging technologies application project aims to increase the use of digital innovations to support the circular economy. The goal is to enhance the development and implementation of sustainable digital solutions in the circular economy, especially in relation to new technologies, and to ensure that the solutions are used to accelerate the transition to a sustainable circular economy. The countries participating in the project are Bulgaria, Finland, France, Greece, Lithuania, Portugal, Romania, Spain and Sweden.

Digitalization is a wide spectrum, and most people and companies use digital solutions to some extent. However, the degree of use and purpose varies. Digitalization should be looked at as a whole, when

e.g., developing the level of digitalization in the businesses. It would also be beneficial to have a strategic approach.

Common everyday solutions which combine circular economy and digitalization we use are applications and platforms. We have city bikes, online flea markets and apps to purchase surplus lunch. On the bigger scale, our waste goes through a massive waste separation plant, that separates recyclable items from the waste stream with the help of separators, magnets and optical sorters using the state-of-art technology.

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While policymakers are yet to actively link digitalization with wider sustainability efforts when developing policies and financing projects, there is a growing need to align the circular and digital agendas. The Green Deal recognises that circular economy and strong involvement from industry is central to making the EU's economy sustainable.

The CEI Boost project aims at improving policies for easing and speeding up the twin transition to ensure that Green Growth and Digital Transformation go hand in hand to drive regions' recovery and prosperity. The project focuses at enhancing policies conditions in 9 countries for boosting the application of emerging digital innovations to support the growth of circular economy at regional, local or national level, gathering expertise from different regions, different levels' policymakers and leading innovation ecosystems' actors. (CEI Boost 2023)

One of the first activities of the project has been to identify the actors and stakeholders related to both digitalization and the circular economy, and to analyse the current state and maturity of the regions in digitalization and circular economy.

The analyses by the regions highlight potential projects and approaches that have already exploited the potential of digitalization to boost sustainable development and the circular economy in particular.

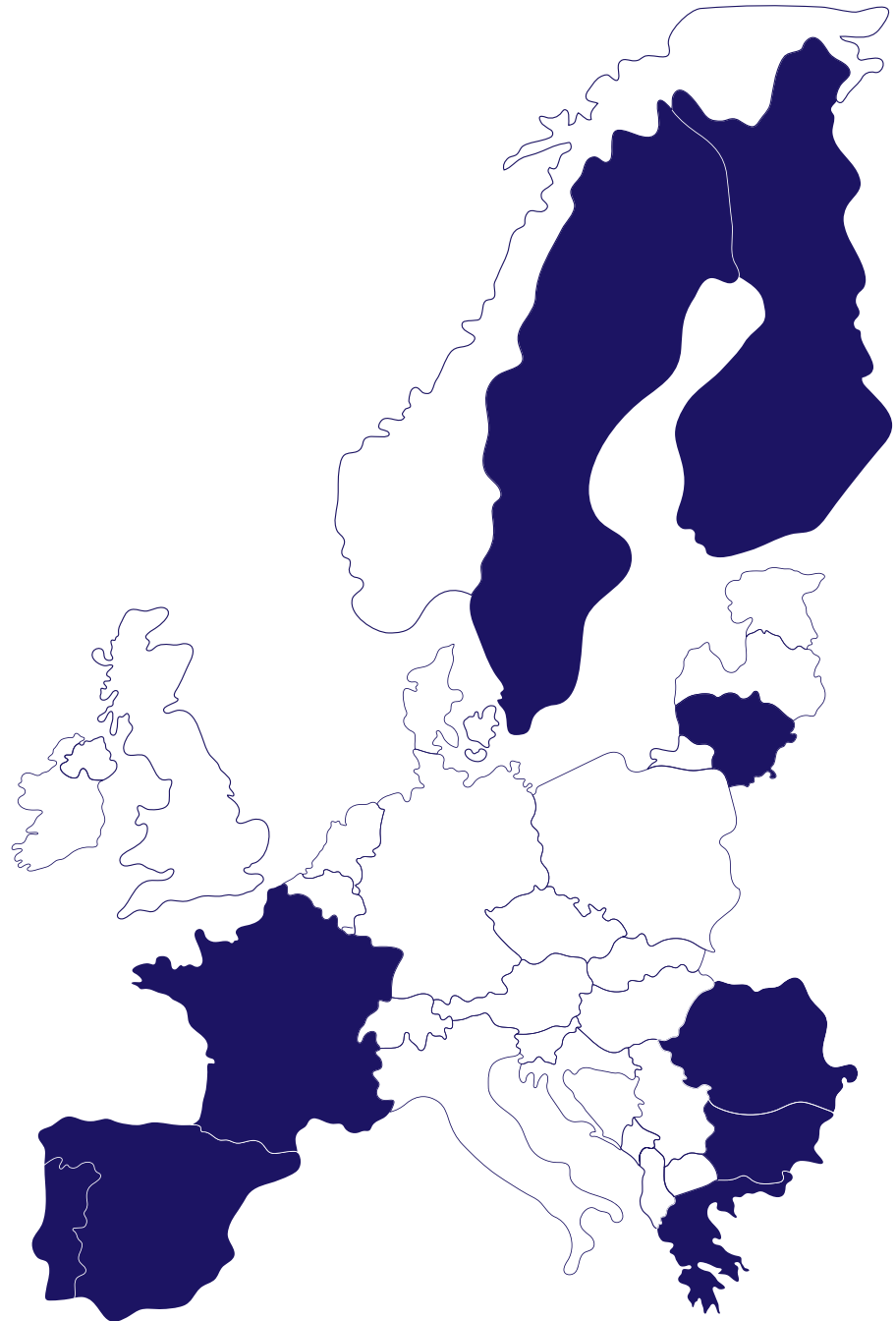
The analysis shows that the level of maturity of the regions in the field of digitalization and circular economy varies, but the general observation is that all the regions included in the analysis have made recent progress and many policies and potential projects are underway and recently initiated. On the other hand, the full potential of digitalization to promote and boost the circular economy has not been exploited.

In conclusion, the analysis carried out confirms the need for policies and development work that uses digitalization in an intelligent, user-driven and justified way to boost the circular economy.

This document analyses the current state of Digital Innovation and Circular Economy in Madeira, Portugal. The analyses of each partner region and more information of the CEI Boost can be found on the project website: [interregeurope.eu/cei-boost](https://interregeurope.eu/cei-boost)

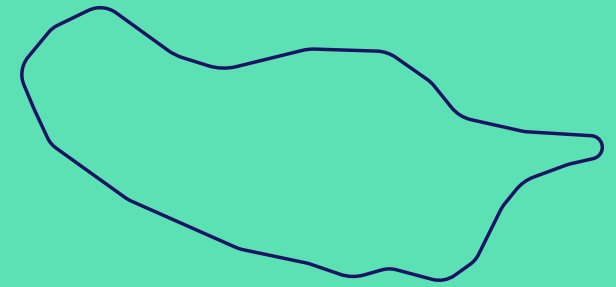
# CEI Boost Partners

- Sweden**    Region Västerbotten
- Finland**    Regional Council of Päijät-Häme  
LAB University of Applied Sciences
- Lithuania**    Public Institution Lithuanian Innovation Centre  
Innovation agency
- Bulgaria**    Business Agency Association
- Romania**    Institute for Research in Circular Economy  
and Environment “Ernest Lupan”  
West Regional Development Agency
- Greece**    Industrial Systems Institute
- Spain**    Tarragona Provincial Council
- Portugal**    Business Development Institute of  
the Autonomous Region of Madeira
- France**    Laval Mayenne Technopole



## Madeira

Madeira Island is a Portuguese archipelago with approximately 250,000 inhabitants, eleven municipalities and 57 parishes. Most of the population is concentrated in Funchal City, Madeira's capital. Although it is an integral part of Portugal and subsequently of the European Union, Madeira is an Autonomous Region with its own government and parliament. The tourism sector, especially its high-end component, is the region's main economic activity (25% of GDP). Most companies are micro-enterprises with fewer than 10 employees.



## Digital innovations and digitalization in Madeira

The Autonomous Region of Madeira (RAM) is actively implementing a strategy to bridge the gap between technological research and the market through digital innovation. This initiative includes the establishment of the *Smart Islands Hub (SIH)*, a Digital Innovation Hub (DIH) designed to digitally empower and include the Madeiran population while promoting the adoption of advanced digital technologies by SMEs and public sector organizations. The Madeira Agency for the Development of Research Technology and Innovation (ARDITI) leads a consortium of 8 partners to drive this transformative effort.

The Smart Islands Hub will support the creation of new Business Models for Digital, i.e. it will help SMEs to redefine their Business Models to implement strategies leveraged by digital. Another point is the link between the SIH and the Circular Economy, this being one of the sectors of the Digital Innovation Hub, which will also include support for the creation of business models for the Circular Economy, leveraged by digital.

The region's current level of digitalization maturity is challenging

to ascertain due to limited data. To address this, the SIH's primary mission is to conduct digital maturity analyses for participating organizations using a methodology developed by the European Commission. This analysis will provide a more accurate understanding of the region's overall digital maturity and contribute to its enhancement.

The digital transition of companies is a challenge that could significantly change the way in which various sectors of activity operate, with the emergence of new areas of knowledge, business or professions, as well as the relocation of various productive activities, generating a potential opportunity, especially in an ultra-peripheral region. Digital technologies, such as 5G, Blockchain, cloud computing, the Internet of Things, Big Data or robotization and artificial intelligence (AI), are associated with increased efficiency and productivity, and appear to be of decisive relevance to the ongoing economic recovery and, above all, to the transversal structural challenges inherent in the knowledge society and the fight against climate change.

Although the SIH project does not directly fund companies, it will receive support through the National Recovery and Resilience Plan (RRP) to offer complimentary services that accelerate digital transitions. Additionally, the Operational

Programme *Madeira 2030* supports Digital Transformation, focusing on Digital Technologies and Economy 4.0 through Policy Objective 1: Madeira + Smart and Competitive, Specific Objective 1.2. The *Regional Smart Specialisation Strategy Madeira (EREI RAM 2030)* also highlights Digital Technologies and Economy 4.0 as one of its Areas of Specialization.

Digitalization profoundly impacts all economic sectors, cutting across industries. However, to fully capitalize on its benefits, it is crucial to develop digital skills to boost employment opportunities and productivity. By equipping citizens with digital proficiency, the region can enhance organizational capacity and foster a tech-savvy workforce. Embracing new business models driven by digital innovation is imperative in the face of disruptive technologies. By aligning digital strategies with the digital maturity of individuals and organizations, active participation in diverse value chains becomes attainable, benefitting all economic sectors in the Autonomous Region of Madeira.

## Circular economy in Madeira

In 2021, the Autonomous Region of Madeira developed the Regional Agenda for the Circular Economy and the Madeira Waste Strategy to accelerate the transition to a more efficient economy in resource use and materials recycling. The implementation of these strategies is overseen by the Regional Secretariat for Agriculture and the Environment (SRAA), through Madeira's Regional Directorate of Environment and Climate Change (DRAAC)

Madeira's *Regional Agenda for the Circular Economy* aims to create a resource-efficient economy with reduced environmental and health impacts, fostering sustained, resilient and inclusive economic growth. The strategic documents align with European and national policies for the circular economy and waste management, such as the European Plan for the Circular Economy, the New European Action Plan for the Circular Economy, the National Action Plan for the Circular Economy, and waste management directives.

The preparation phase included characterising the main economic activities and consulting 60 stakeholders from public administration, business, academia, and civil society. The transition to a circular economy is promoted through the *Madeira 2030* Operational Programme, specifically Policy Objective 2: Madeira + Green, which aims to promote the transition to a circular and resource-efficient economy.

The Madeira Circular Agenda emphasizes three strategic objectives: 1) reducing material consumption by reducing imports and domestic resource extraction; 2) increasing economic productivity to reduce material costs, improve resource efficiency, energy efficiency, and water efficiency; 3) increasing waste valorisation and incorporation into production processes to enhance regional self-sufficiency. Circular economy messages are integrated into various sectoral policies to boost resource efficiency and generate material, environmental, and economic gains.

On the other hand, the Madeira Waste Strategy covers urban and non-urban waste, aiming to increase the Region's self-sufficiency in waste management through prevention strategies and high-value technical solutions.

Key economic sectors with potential for circular economy practices in Madeira include Tourism, Construction, Agri-food, Sea, Distribution and Retail, and Social Institutions. The *Madeira Circular Platform* showcases regional examples of circular economy practices adopted by companies, such as Madeira Beer Company's returnable glass bottles and Panáribloco's use of construction waste for concrete blocks.

- **Madeira Beer Company's:**  
<https://www.madeiracircular.pt/casos-estudo/empresa-de-cervejas-da-madeira>
- **Panáribloco - Fábrica de Blocos, Lda.:**  
<https://www.madeiracircular.pt/casos-estudo/panaribloco-ou-fabrica-de-blocos>
- **Biovalor | Organic corrective produced from biodegradable municipal waste – Águas e Resíduos da Madeira, S.A.:**  
<https://www.madeiracircular.pt/casos-estudo/biovalor-ou-corretivo-organico-produzido-a-partir-de-residuos-urbanos-biodegradaveis>

Madeira's companies lead in circular economy practices, enhancing competitiveness and sustainability. They form networks of industrial symbiosis, valuing surplus resources like materials, energy, and water. The circular economy models contributing most to the region's vitality are found in Tourism, Construction, Agri-food, Sea, Distribution and Retail, and Social Institutions.

The integration of regional examples on the Madeira Circular Platform has significantly evolved, with 48 examples by 2021, a 60% increase from June 2021. These examples demonstrate the region's efforts in adopting circular economy principles, driving a regenerative economy.

## Digitalization & Circular economy in Madeira

Digitalization is empowering the circular economy in Madeira, accelerated by the pandemic-induced shift towards remote-working and the adoption of new technologies by the public administration, companies, and organizations. Circular economy models, digitization initiatives, and capacity building are on the rise, boosting technologies like IoT, 5G, and Cybersecurity.

Agri-food industry is at the forefront of this transformation, with *Madeira Beer Company (ECM)* serving as a prime example. ECM exhibits circularity through various practices, including the use of returnable bottles, installation of automated



equipment for glass bottle recovery, and adoption of reusable glasses at large events. Eco-design efforts, such as reducing plastic in bottles, complement their circular approach.

ECM contributes to agricultural recovery by forwarding the by-products of beer production for animal feed. Additionally, they harness photovoltaic panels for energy generation and recover CO2 from the brewing process for carbonated drinks.

The introduction of automatic bottle collection systems exemplifies ECM's commitment to circularity. This innovative method reduces resource consumption and waste production, supporting the circular economy. Customers receive their deposit back when using this system, incentivizing its use.

ECM's sustainability efforts have led to the collection of three million bottles from supermarkets, reducing carbon dioxide emissions by 240 tons. Their facilities boast sophisticated systems for checking and washing returned bottles, further reducing their environmental impact.

Another noteworthy step taken by ECM is the reduction of PET bottle weight, effectively minimizing plastic waste. Furthermore, their pioneering use of reusable cups at events, such as Funchal Market Night, resulted in a substantial reduction of 600 kg of plastic waste.

Overall, Madeira Beer Company exemplifies how digitalization and circular economy solutions can drive sustainability and innovation across sectors in the Autonomous Region of Madeira.

## Stakeholders of digitalization

### Companies

- [StartUp Madeira](#)
- [MadeBiotech](#)

### Policy makers

- [Regional Secretariat for the Economy, Sea and Fisheries \(SREMP\)](#)
- [Regional Secretariat for Education \(SRE\)](#)

### Academia

- [University of Madeira \(UMa\)](#)

### Associations

- [Madeira Agency for the Development of Research Technology and Innovation \(ARDITI\)](#)
- [Chamber of Commerce and Industry of Madeira \(ACIF-CCIM\)](#)

## Stakeholders of circular economy

### Companies

- [Madeira Beer Company \(ECM\)](#)
- [Panáribloco - Fábrica de Blocos, Lda.](#)
- [Mwr - Madeira Waste Recycling, Lda](#)
- [Águas e Resíduos da Madeira, S.A](#)
- [The Tomorrow Company, Lda.](#)

### Policy makers

- [Regional Secretariat for Agriculture and the Environment \(SRAA\)](#)
- [Regional Directorate of Environment and Climate Change \(DRAAC\)](#)
- [Regional Secretariat for Agriculture and Rural Development \(SRA\)](#)
- [Rural Development Programme for the Autonomous Region of Madeira \(PRODERAM\)](#)

### Academia

- [University of Madeira \(UMa\)](#)

### Associations

- [Regional Agency for Energy and Environment of the Autonomous Region of Madeira \(AREAM\)](#)

## Stakeholders boosting circular economy with digitalization

### Companies

- [PortoBay Hotéis & Resorts](#)
- [Hotel Galomar](#)
- [Madeira Beer Company \(ECM\)](#)
- [Electricity Company of Madeira S.A.](#)
- [MadeBiotech](#)

### Policy makers

- [Regional Secretariat for the Economy, Sea and Fisheries \(SREMP\)](#)
- [Funchal City Hall](#)

### Academia

- [University of Madeira \(UMa\)](#)

### Associations

- [Madeira Agency for the Development of Research Technology and Innovation \(ARDITI\)](#)

## Summary

The Circular Economy holds significant importance for both the European Union and its Member States due to the pressing need to address resource scarcity and energy limitations within their territories. To reduce dependence on external supply chains and ensure resource circulation, innovative approaches are required. Island regions, like Madeira, face similar challenges, with vulnerabilities to shocks like natural disasters or armed conflicts, and limited economic diversification due to scale constraints.

Despite these challenges, islands' physical borders and close-knit communities offer unique opportunities for circular economy experimentation. Viewing islands and archipelagos as living laboratories for circular solutions opens avenues for sustainable development. The concept of a circular island or archipelago might seem utopian, but existing data shows promising potential for increased circularity in Madeira.

The Autonomous Region of Madeira possesses essential strengths, including scale and administrative autonomy, providing a strong foundation for the Circular Madeira vision. By leveraging these advantages and embracing circular economy principles, Madeira can set the way for a more sustainable and resilient future, not only for the region but also as an inspiring model for other island communities facing similar challenges.

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