



# CIRCSYST

## Circular Systemic Solutions



Water



Bio-Waste



Plastic,  
Packaging

**2024-2027**

## **DELIVERABLE 6.4 CIRCSYST POLICY BRIEFS AND RECOMMENDATIONS 1ST**



Circular  
Cities & Regions  
Initiative



UK Research  
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## D6.4: CircSyst Policy Briefs and Recommendations

### Deliverable **6.4** (Version 1.2)

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## EXECUTIVE SUMMARY

This report presents **four policy briefs and recommendations** covering water management, bio-waste valorisation, plastics and packaging, and general circular systemic solutions, designed to serve policymakers in accelerating the implementation of circular solutions across Europe. The deliverable D6.4 applies a three-step iterative methodology that connects with the CCRI-CSO office approach, systematically **developing policy statements, barriers identification, and evidence-based recommendations** through initial assessment, co-creation workshops, and systematic validation processes.

Each policy brief includes problem statements examining current **European regulatory frameworks** and identifying **critical implementation gaps**. The analysis identifies common implementation barriers spanning **regulatory complexity, technological validation challenges, stakeholder acceptance issues, economic viability concerns, and knowledge transfer gaps** across different circular sectors. Based on comprehensive stakeholder consultation and cross-sectoral analysis, the report provides targeted policy recommendations including regulatory **framework harmonisation, validation and certification systems, sector-specific financial mechanisms, stakeholder confidence building, and strengthened knowledge networks**. These outcomes support the effective scaling of Circular Systemic Solutions (CSS), contributing to EU sustainability objectives and preparing the foundation for the expanded second publication (D6.5) at M36.



## LIST OF ACRONYMS AND ABBREVIATIONS

<b>ACR+</b>	<b>Association of Cities and Regions for Sustainable Resource Management</b>
<b>AI</b>	<b>Artificial Intelligence</b>
<b>CBE-JU</b>	<b>Circular Bio-based Europe Joint Undertaking</b>
<b>CCRI</b>	<b>Circular Cities and Region Initiatives</b>
<b>CSO</b>	<b>Coordination and Support Office</b>
<b>CSS</b>	<b>Circular Systemic Solution</b>
<b>C3</b>	<b>Circular City Centre</b>
<b>ECESP</b>	<b>European Circular Economy Stakeholder Platform</b>
<b>EIB</b>	<b>European Investment Bank</b>
<b>EU</b>	<b>European Union</b>
<b>M</b>	<b>Month</b>
<b>PPWR</b>	<b>Packaging and Packaging Waste Regulation</b>
<b>SECAPs</b>	<b>Sustainable Energy and Climate Action Plans</b>
<b>SMEs</b>	<b>Small and medium-sized enterprises</b>
<b>SUMPs</b>	<b>Sustainable Urban Mobility Plans</b>
<b>WFD</b>	<b>Water Framework Directive</b>
<b>WHO</b>	<b>World Health Organization</b>
<b>WP</b>	<b>Work Package</b>



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## 1. INTRODUCTION

### About the project

CircSyst contributes to catalysing the transition toward a sustainable, circular economy through **nine Demonstration Experiences** of new technological and societal adaptation to a Circular Economy in eight regions of seven European countries. This deliverable is part of Work Package 6 (WP6) - System Analysis, Knowledge Transfer and Replication, focused on creating systemic knowledge about the CircSyst solutions to **support knowledge transfer and replication efforts**, establishing a joint understanding of the demonstrators' systemic embedding and pathways for scaling within local and regional socio-technical systems configurations. Task 6.4 specifically mobilises the CircSyst Community through regional co-creation workshops, synergy identification activities, and interregional replication workshops to collaboratively draft **policy recommendations and identify opportunities** for Circular Systemic Solutions (CSS).

### Scope and Objectives of the Deliverable

This document, D6.4 - CircSyst Policy Briefs and Recommendations 1st Publication, aims to **develop concrete policy recommendations** for scaling CircSyst solutions across European regions. It identifies technological, knowledge-based, social/attitudinal, policy, regulatory, and business barriers alongside actionable recommendations for CSS implementation. The scope encompasses the analysis of nine demonstrators, translating technical innovations into strategic policy guidance aligned with Circular Cities and Region Initiative (CCRI) Methodology and EU sustainability objectives.

The proposed **methodology** follows an iterative process that systematically develops evidence-based policy recommendations through stakeholder engagement and expert validation. This approach combines initial data collection from demonstration leaders, collaborative workshops with regional stakeholders, internal research, and comprehensive validation phases to ensure robust and actionable policy guidance for scaling circular systemic solutions.

The deliverable is organised into **four main sections**. The document begins with the methodological framework that underpins the three-step iterative approach, followed by four standalone policy briefs and recommendations covering Water Management, Bio-waste Valorisation, Plastic and Packaging, and General Circular Systemic Solutions. Each policy brief is structured as an independent and synthetic document, beginning with a schematic overview and concrete recommendations, followed by a detailed problem statement, identified barriers, and developed policy recommendations. The last Policy Brief and recommendations, the General Circular Systemic Solutions, incorporate cross-cutting themes and conclude with a dedicated Circular Systemic Solutions Synergies section developed in collaboration with the Coordination and Support Office (CSO).



## 2. METHODOLOGY

To ensure a comprehensive and robust understanding of each Circular Systemic Solution within the CircSyst project, the methodological approach for Deliverable 6.4 was structured around a **three-step iterative process**. This process supported the development of accurate policy briefs and recommendations based on evidence collected through the previous deliverables, workshops, and internal research, ensuring information adequacy, robustness, and empirical grounding. This methodological framework will be replicated and expanded for the second and final publication of the Policy Briefs and Recommendations (D6.5), incorporating additional data from demo leaders, new stakeholder workshops, potential feedback from the CCRI-CSO, deliverables, and findings scheduled for execution after the D6.4 timeline.

This approach was developed **in line with CircSyst methodology for assessing CSS** and represents a tailored application of the broader **CCRI Methodology's guiding phases**. The methodology and data collection process are presented synthetically in **Figure 1** and explained in the following text. As illustrated in the figure, each step is described in the first column, while the data collection process is detailed in the corresponding second column, indicating the specific sources of information.

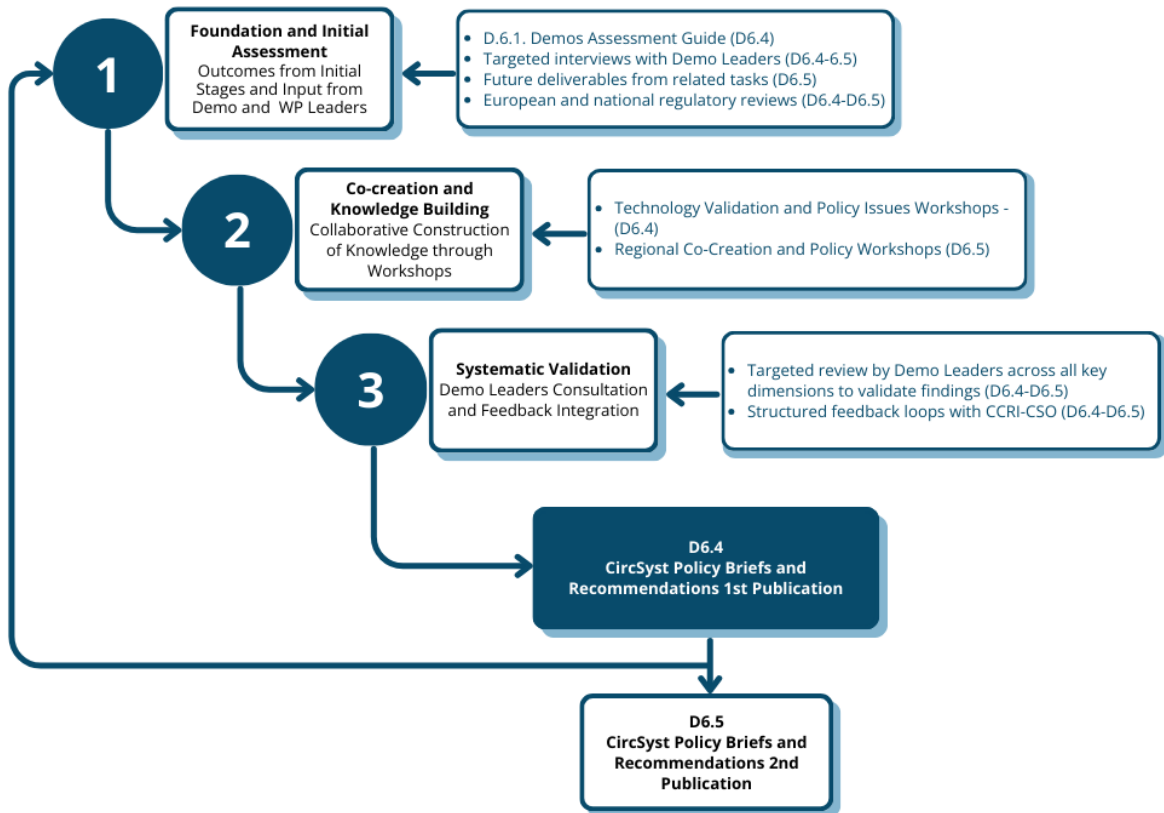


Figure 1. Schematic representation of the methodological approach for developing CircSyst policy briefs and recommendations.

## Step 1: Foundation and Initial Assessment.

### Outcomes from Initial Stages and Input from Demo and WP Leaders

This initial step established the **foundational understanding of each Circular Systemic Solution** through the systematic collection of baseline information from Demo Leaders. The process encompassed value chain mapping, stakeholder identification, and preliminary assessment of regulatory and technical frameworks, building upon the groundwork established in Task 6.1 and documented in D6.1 (M3), which served as the primary data source for this deliverable. From D6.1, relevant content was selected and analysed with a specific focus on social aspects applicable to this deliverable.

Beyond the baseline content from D6.1, this step incorporated additional insights obtained through targeted interviews and direct consultations with Demo and Work Package Leaders, which contributed to the current deliverable D6.4 and the second publication (D6.5). This enriched approach facilitated early identification of synergies, implementation barriers, and scaling opportunities for CSS, including available national funding mechanisms, established networks, and emerging start-up communities that can support scaling-up processes. Additionally, this step provided a comprehensive analysis of the European legislative framework, examining relevant directives, regulations, and policy initiatives that impact circular solutions across the four thematic areas for D6.4, which will be further expanded to include national-level regulatory frameworks of the countries involved in the project for D6.5.

Furthermore, future deliverables from related tasks T2.1, T2.2, T3.1, T3.2, T4.1, T4.2, T4.3, and WP6 advancements will be systematically incorporated exclusively in the second publication (D6.5), ensuring comprehensive data integration across the project timeline. In coordination with Task 1.1, this step both drew upon existing work conducted by the CCRI Coordination and Support Office (CCRI-CSO) within that task and simultaneously contributed timely policy feedback to the CCRI-CSO regarding relevant EU policies, while supporting the identification of critical research and innovation gaps that will inform Deliverable 1.1.

## Step 2: Co-creation and Knowledge Building

### Collaborative Construction of Knowledge through Workshops

Workshops served as **key moments for collective knowledge-building and transfer**, validation of assumptions, and cross-demonstrator exchange. These sessions were organised in alignment with the roadmap defined in the CircSyst methodology “Technology Validation and Policy Issues” (M12) and Regional Co-Creation and Policy Workshops (M18). They provided a collaborative platform for refining CSS implementation strategies, understanding socio-environmental impacts, and enhancing scalability.

For this deliverable, valuable information was extracted from the *Technology Validation and Policy Issues* workshops, although not exclusively focused on this report, provided essential insights for policy briefs development. The workshops followed a structured three-part methodology (**Vision, Backcasting, and Uptake**), engaging diverse participants from the

quintuple helix (government, industry, academia, and civil society). The Vision phase captured stakeholder perspectives on circular economy futures and regional aspirations for 10–15-year horizons. The Backcasting phase explored necessary implementation steps and associated barriers to achieve these visions. The Uptake phase identified specific adoption and replication challenges. To ensure consistency and quality in data collection, **methodological guidelines** and a **standardised reporting structure** were developed and compiled to support demo leaders in effectively capturing and integrating workshop results. This *Concept and Report* document will be included in Deliverable D6.6.

For policy recommendation development purposes, workshop discussions were analysed to identify recurring barriers, opportunities, and strategic interventions, complemented by backcasting insights regarding regulatory frameworks, knowledge gaps, mindset barriers, and strategic enablers. Through systematic text analysis of workshop outputs, recurring and relevant barriers and recommendations were extracted, ensuring methodological consistency while reflecting regional diversity. CircSyst partners carried out a total of nine regional workshops, reaching 163 participants. **Table 1** below summarises their dates, locations, and number of participants of these workshops, while D6.6 will include Workshop Results and Supporting Materials, compiling the results and documentation received from each demo case in their respective formats (reports, feedback summaries, and photographs), evidencing the extensive collaborative effort supporting this deliverable. Although the Slovenian workshop (Demo2) is included in Table 1, its data could not be incorporated in this analysis due to timing constraints and will be included in D6.5.

Demo / Topic – WP	Date	Country	No. of participants
Demo 1 – Water (WP2)	29/05/2025	Spain	13
Demo 3 – Water (WP2)	24/06/2025	Belgium	40
Demo 4 – Water (WP2)	29/01/2025	Sweden	14
Demo 5 – BioWaste (WP3)	27/05/2025	Finland	19
Demo 6 – BioWaste (WP3)	29/05/2025	Spain	7
Demo 7 – PlasticPack (WP4)	29/05/2025	Spain	12
Demo 8 – PlasticPack (WP4)	12/06/2025	Greece	30
Demo 9 – PlasticPack (WP4)	28/05/2025	Hungary	18

Demo 2 - Water (WP2)	14/10/2025	Slovenia	10
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Table 1. Summary of CircSyst Regional Workshops and Co-Creation Sessions

### Step 3: Systematic Validation

#### Demo Leaders Consultation and Feedback Integration

This systematic validation process involved consulting Demo Leaders to **verify and expand information** gathered from previous steps through targeted reviews on key dimensions: technological, knowledge-based, social/attitudinal, policy, regulatory, and business aspects, plus other enabling conditions and CSS synergies. This process validated findings and, where applicable, incorporated additional relevant information about barriers and recommendations not previously reported, contributing to both the current deliverable (D6.4) and the forthcoming D6.5.

This validation phase was crucial for **cross-checking** workshop findings and gathering detailed, practical insights from those directly implementing CSS through demonstrators. Beyond improving information quality, this process ensured that co-creation interpretations accurately reflect Demo Leaders' experiences while fostering deeper engagement with their work and contributions to the project's policy development objectives. The process ensured coherence with D6.1 findings while deepening understanding of specific challenges and opportunities. Structured feedback loops included CCRI-CSO consultation, ensuring alignment with broader European circular economy frameworks and initiatives.



### 3. POLICY BRIEFS AND RECOMMENDATIONS

Below are the **four policy briefs and recommendations**. The first three address the specific areas of the CircSyst project —water management, bio-waste, and plastics and packaging waste— with a special focus on the legislative framework for each sector. The fourth policy brief addresses strategies for Europe's circular transformation, focused on general recommendations and CSS synergies. Additionally, beyond this deliverable, each policy brief will be formatted as a standalone document to support targeted dissemination. To provide a concise overview, **Table 2** below compiles all policy recommendations across the four thematic areas, offering a synthetic view of the main actions proposed. The following sections then expand on each thematic area, detailing the corresponding problem statements, policy contexts, and recommendations.






<p><b>Technological</b></p> 	<p><b>Strengthen validation and monitoring mechanisms</b> to ensure the reliability, quality, and upscaling potential of circular technologies through robust certification and performance assessment systems.</p>
	<p><b>Foster knowledge networks, technical training, and cross-sectoral learning</b> to enhance capacity building and the exchange of best practices.</p>
	<p><b>Promote stakeholder trust and social acceptance</b> via demonstration programmes, awareness campaigns, and transparent communication strategies.</p>
<p><b>Regulatory</b></p> 	<p><b>Harmonise and streamline regulatory frameworks</b> across governance levels and sectors to reduce administrative barriers and enable implementation.</p>
	<p><b>Develop coherent financial instruments and incentive schemes</b> adapted to sector-specific investment needs and market conditions.</p>

Table 2. Summary of CircSyst key cross-sectoral recommendations

### 3.1 Enabling Circular Water Solutions: Policy Actions For Sustainable Water Management

#### Executive Summary of Water Management

The circular management of water resources presents significant opportunities for advancing EU sustainability goals, yet its implementation faces multiple challenges. Through four innovative demonstrations (demos 1 to 4, from Spain, Slovenia, Belgium, and Sweden) integrating industrial, urban, and agricultural water systems, the CircSyst project has

identified key barriers and potential solutions for accelerating the adoption of circular water systems. Primary challenges include **technological integration complexities**, **knowledge gaps** in managing advanced systems, **unclear regulatory** frameworks and excessive bureaucracy, and **business confidence issues**. These policy recommendations are systematically presented in Figure 2. On the other hand, findings from demonstrators-related consultation processes resulted in the following policy recommendations:



<p><b>Establishing comprehensive validation and monitoring systems for water treatment technologies.</b></p>	<p><b>Strengthening knowledge networks and technical capacity for circular water management.</b></p>	<p><b>Building stakeholder confidence through demonstration programs and quality assurance frameworks.</b></p>	<p><b>Harmonising regulatory frameworks and reducing administrative complexity.</b></p>	<p><b>Creating targeted financial support mechanisms and infrastructure development incentives.</b></p>
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Figure 2. Policy recommendations for Sustainable Water Management.

This policy brief provides evidence-based recommendations for decision-makers to enable wider implementation of circular water solutions, emphasising integrated approaches that address both technical and institutional challenges.

### Problem Statement of Water Management

As the World Health Organization (WHO) has stated, *“The use of wastewater in agriculture and aquaculture can help communities to grow more food and make use of precious water and nutrient resources. However, it should be done safely to maximize public health gains and environmental benefits.”*<sup>1</sup> In line with this objective, the transition towards circular water management represents a crucial opportunity for achieving EU sustainability goals, including resource efficiency, sustainable growth, and the 2050 climate neutrality target set out in the **European Green Deal**. Building on the most recent **European Water Resilience Strategy**<sup>2</sup>, which aims to enhance water efficiency by at least 10% by 2030 and secure clean water access for all (European Commission, 2025), Europe’s water management systems face

<sup>1</sup> [WHO Guidelines for the safe use of wastewater, excreta and greywater - volume I policy and regulatory aspects ISBN 92 4 154682 4 \(v. 1\)](#)

<sup>2</sup> [European Commission: European Water Resilience Strategy - Brussels, 4.6.2025, COM\(2025\) 280 final](#)

unprecedented challenges, including water scarcity<sup>3</sup> affecting an increasing number of regions, growing water demand due to tourism, and climate change intensifying variability in precipitation patterns and seasonal availability.

When considering water-related activities and demonstrators, it is clear that the **Water Framework Directive (WFD<sup>4</sup>)** is the most important EU-level regulatory instrument. It establishes the fundamental framework for water management, defining key objectives and concepts, environmental protection goals, and rules for permitting water abstraction and use. It is important to note that existing regulatory frameworks can create additional barriers to the implementation of circular water solutions: current EU<sup>5</sup> and national legislation often imposes **very high (drinking) water quality standards<sup>6</sup>** for most applications, significantly limiting reuse options even in cases where lower-quality water would be suitable. This regulatory rigidity hinders the optimization of water resources and constrains the development of flexible circular water systems in some regions.

For the water-related demonstrators (demos 1–4), another critical regulatory reference is the **Urban Waste Water Treatment Directive<sup>7</sup>**, as its primary aim is to improve the efficiency of water treatment and promote best practices. A key challenge is that this Directive introduces **strict requirements for nutrient removal and micropollutant elimination<sup>8</sup>**, which impose significant additional financial, administrative, and technological burdens on the industrial sector. The agricultural sector faces particularly acute challenges, given that the **Nitrates Directive<sup>9</sup>** establishes explicit rules on nitrate (fertilizer) use, forcing farmers to balance crop yields against compliance with water quality limits.

Furthermore, all demonstrators—and the wider circular economy sectors—are affected by overlapping permitting, administrative, and monitoring obligations. These burdens could be alleviated through regulatory harmonisation and the establishment of a single, cross-member-state portal for approvals and administration.

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<sup>3</sup> [European Commission: establishing a framework for Community action in the field of water policy - Brussels, 28.5.2018, COM\(2018\) 337 final](#)

<sup>4</sup> [Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy](#)

<sup>5</sup> [Regulation \(EU\) 2020/741 of the European Parliament and of the Council of 25 May 2020 on minimum requirements for water reuse - Art 4.](#)

<sup>6</sup> [Directive \(EU\) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption](#)

<sup>7</sup> [Directive \(EU\) 2024/3019 of the European Parliament and of the Council of 27 November 2024 concerning urban wastewater treatment \(UWWTD\)](#)

<sup>8</sup> UWWTD Annex I - Requirements For Urban Wastewater - Part B Discharge from urban wastewater treatment plants to receiving waters and Part C Table 1 and Table 2

<sup>9</sup> [COUNCIL DIRECTIVE of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources](#)

Looking ahead, the anticipated widespread adoption of **artificial intelligence**—and its application in the demonstrators for process optimization—makes the provisions of the **AI Act**<sup>10</sup> highly relevant. Under this regulation, all AI systems must be categorized according to risk and continuously monitored. Given the novelty of this regulatory framework and the absence of established practice, additional resources will be required in the water circularity sector to ensure the (cyber)security of these critical infrastructures.

These regulatory challenges, along with the barriers identified by the demo cases, point to the need for coordinated policy intervention to unleash the full potential of circular water solutions.

### **Identified Barriers on Water Management**

Analysing implementation challenges for circular water solutions provides the foundation for developing targeted policy interventions. Key challenges identified through demonstrator-related activities include:

#### Technological Integration and Performance Validation

Advanced **treatment technologies** face validation challenges, particularly regarding reverse osmosis concentrate composition and seasonal performance variability. Workshop findings highlight substrate saturation affecting long-term efficiency and difficulties scaling pilot systems while maintaining quality standards. Integration of AI-powered monitoring systems requires specialised calibration and maintenance expertise.

#### Administrative Fragmentation and Regulatory Complexity

Excessive **bureaucracy** and fragmented local administrations create implementation obstacles through poor intercommunication and cooperation between local and regional authorities with overlapping competences (e.g. water and spatial planning). Current legislation inadequately addresses small producer needs (such as simplified administrative procedures or affordable access to reclaimed water), while spatial planning regulations favour traditional centralised solutions over innovative approaches like constructed wetlands. Administrative procedures often prove overly complex for water reuse initiatives.

#### Stakeholder Trust and Knowledge Deficits

Persistent **mistrust** toward reclaimed water resources limits adoption across civil, industrial, and agricultural applications. Limited understanding exists among stakeholders about treatment processes, quality controls, and safety standards. Workshop participants emphasize insufficient **awareness** of circular economy principles and a lack of trust in constructed wetlands among enforcers and implementers.

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<sup>10</sup> [Regulation \(EU\) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence](#)

### Economic Barriers and Infrastructure Dependencies

High reclaimed water **costs** compared to conventional sources present major economic obstacles, with technical feasibility often dependent on economic factors. Infrastructure requirements create geographical constraints, requiring proximity between treatment facilities and end-users. Investment uncertainty affects both industrial and agricultural sectors in considering water reuse adoption.

### **Policy Recommendations for Sustainable Water Management**

Based on problem statement analysis and insights from CircSyst water-demonstrators and consultation processes, the following policy strategies are recommended:



#### ESTABLISHING COMPREHENSIVE VALIDATION AND MONITORING SYSTEMS

*Technical validation frameworks for emerging water treatment technologies*

Create specialised validation programs for innovative water treatment approaches, including performance assessment protocols for constructed wetlands and smart management systems. Establish **continuous monitoring campaigns** and develop standardised performance metrics, building specialized stakeholder confidence. Support research and development for enhanced treatment methods and improved integration of AI-based monitoring systems.



#### STRENGTHENING KNOWLEDGE NETWORKS AND CAPACITY

*Technical expertise development and awareness raising*

Establish comprehensive **training programs** in circular economy principles and water reclamation technologies. Create knowledge-sharing platforms connecting research institutions, industry, and regulatory bodies. Support professional development for water management expertise and develop decision-support tools for stakeholder assessment of water reuse opportunities and business models.



#### BUILDING STAKEHOLDER CONFIDENCE THROUGH DEMONSTRATION

*Evidence-based trust-building mechanisms and quality assurance*

Implement systematic **demonstration programs** showcasing successful water reuse applications with documented economic and environmental benefits. Develop transparent quality assurance frameworks and independent verification systems. Create targeted

**education programs** addressing general stakeholder concerns and improving understanding of treatment processes, safety controls, and circular economy benefits.



#### HARMONISING REGULATORY FRAMEWORKS AND REDUCING BUREAUCRACY

*Unified water management approaches across administrative levels*

Develop **unified regulatory frameworks** addressing fragmentation across local administrations and reducing bureaucratic complexity. Create supra-local water resource management systems with a comprehensive vision rather than problem-specific approaches. Establish flexible regulatory pathways accommodating innovative technologies while maintaining safety standards, with particular support for small-scale producers and decentralised solutions.



#### CREATING TARGETED FINANCIAL SUPPORT MECHANISMS

*Investment incentives and infrastructure development support*

Design **financial instruments** to improve the economic competitiveness of reclaimed water compared to conventional sources. Implement coordinated support for infrastructure development, including distribution networks and end-user connection systems. Create risk-sharing mechanisms for early-stage deployment and establish regional funds supporting water reuse projects with suitable demand profiles.

## 3.2. Maximising Bio-Waste Value: Policy Approaches For Circular Transformation

### Executive Summary of Bio-Waste Value

Europe's transition to a circular economy through bio-waste valorisation represents a cornerstone opportunity, directly contributing to resource efficiency targets, sustainable innovation, and the European Green Deal's climate neutrality objectives by 2050. Two pioneering demonstrations (demos 5 and 6, from Finland and Spain) within the CircSyst project showcase innovative approaches to bio-waste transformation: flexible biorefinery systems for comprehensive bio-waste processing and beer bagasse valorisation for high-value applications in the plastics and healthcare industries. These initiatives have uncovered important **implementation challenges**, including **regulatory disparities** between EU and national frameworks, **technological scaling complexities**, **insufficient social acceptance**, and **economic viability concerns**. In order to surpass these challenges and to enable the adoption of bio-waste circular solutions, policy interventions, synthesised in Figure 3, include:



Figure 3. Policy recommendations for Sustainable Bio-Waste

Therefore, this policy brief aims to deliver actionable guidance for decision-makers to overcome systemic barriers and unlock Europe's bio-waste circular potential.

### Problem Statement of Bio-Waste Value

Europe generates substantial volumes of bio-waste, yet current utilisation rates fall significantly short of circular economy ambitions. Bio-waste streams, ranging from agricultural residues to industrial by-products, represent untapped resources that could contribute meaningfully to sustainable material production and energy generation, as stated

in the **Bioeconomy Strategy of the EU**<sup>11</sup>. However, fragmented regulatory approaches, gaps in technological readiness, and market acceptance challenges keep limiting bio-waste potential.

In the case of bio-waste, the overarching regulatory framework is provided by the **Waste Framework Directive**<sup>12</sup>, which sets out the fundamental definitions and objectives concerning waste, as well as the conditions required for its reclassification. A major challenge arises when a former product acquires waste status: following processing/recycling, the administrative burden of requalifying it as a product (e.g., bioplastic) or as a secondary raw material is extremely high under the existing End-of-waste criteria (see also: end-of-waste status<sup>13</sup>). This creates a barrier to circular solutions. Introducing an intermediate category (e.g., “intermediate raw material”) could ease this transition.

Another significant difficulty lies in the confusion of terminology related to bioplastics (bio-based vs. compostable), despite the fact that the **EU policy framework on biobased, biodegradable and compostable plastics**<sup>14</sup> explicitly aims to distinguish between these categories. Such conceptual uncertainty leads to mis-sorting in selective waste collection by consumers, unintentionally contaminating waste streams. This, in turn, reduces recycling efficiency and increases costs for recyclers. Moreover, terminological ambiguities leave space for **greenwashing**<sup>15</sup> by raw material producers: as long as it remains unclear even for experts which materials may be labelled and recycled in which way, companies operating in the “environmental grey zone” may obtain unjustified competitive advantage.

When new biobased raw materials (including those derived from wastewater/sludge) are developed, their authorisation is a particularly lengthy process. In addition, the fees for registering new substances under the **Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) Regulation**<sup>16</sup> further increase costs, which must ultimately be incorporated into the producers’ pricing. Given that among the new biomass-derived materials to be developed within Demos 5–6 there is also a fertiliser product, prior to its market placement, the producer must complete the mandatory **conformity assessment procedure** as required by **EU Fertilising Products Regulation**<sup>17</sup>.

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<sup>11</sup> European Commission: Directorate-General for Research and Innovation, Bioeconomy – The European way to use our natural resources – Action plan 2018, Publications Office, 2018, <https://data.europa.eu/doi/10.2777/79401> page: 8-10

<sup>12</sup> [Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives](#)

<sup>13</sup> Waste Framework Directive Art 6.

<sup>14</sup> [European Commission: Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions: EU policy framework on biobased, biodegradable and compostable plastics, Brussels, 30.11.2022 COM\(2022\) 682 final](#)

<sup>15</sup> [Substantiation and communication of explicit environmental claims \(Green Claims Directive\), 2023/0085\(COD\) – not yet adopted](#)

<sup>16</sup> [Regulation \(EC\) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals \(REACH\), establishing a European Chemicals Agency](#)

<sup>17</sup> [Regulation \(EU\) 2019/1009 of the European Parliament and of the Council of 5 June 2019 laying down rules on](#)

As stated above, the EU's Waste Framework Directive and Circular Economy Action Plan establish clear valorisation targets, yet implementation requires coordinated policy intervention. CircSyst's bio-waste demonstrations reveal the need for integrated approaches combining technological innovation, regulatory clarity, and stakeholder engagement.

### Identified Barriers

Understanding implementation challenges for bio-waste circular solutions establishes the groundwork for targeted policy interventions that can convert obstacles into strategic opportunities. Primary challenges identified through demonstrators-related activities include:

#### Regulatory Complexity and Legislative Inconsistencies

Critical **disparities** exist between EU and national bio-waste legislation, with Finnish legislation allowing wastewater sludge utilisation for bioplastic production and having less stringent sludge-based fertiliser regulations, while the EU Fertilising Products Regulation excludes sludge from permitted raw materials for CE-marked fertilising products, creating EU market access barriers. Additionally, administrative procedures for bio-waste valorisation plant permits require **extensive timeframes**, while excessive safety regulations for food-contact products create implementation uncertainty.

#### Technological Scaling and Industrial Readiness

**Scaling** from pilot to industrial level presents specific technical challenges, such as maintaining fiber mechanical properties at processing temperatures (200°C limitations identified). Demonstrations reveal **difficulties extrapolating pilot** results to commercial scales and adapting technologies to different bio-waste streams while ensuring consistent output quality.

#### Market Acceptance and Social Perception Barriers

Social acceptance challenges centre on wastewater sludge-based products, with farmers and consumers expressing **safety concerns** and grain industry companies fearing image disadvantages. For bio-waste-derived materials entering established markets (such as bioplastics), conservative industry attitudes often prioritise price over ecological considerations, while greenwashing concerns affect market credibility for bio-based products.

#### Economic Viability and Investment Challenges

Bio-waste valorisation requires minimum bio-waste quantities to **achieve cost-efficiency**, while securing suitable industrial land in optimal locations presents challenges. Large

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[the making available on the market of EU fertilising products and amending Regulations \(EC\) No 1069/2009 and \(EC\) No 1107/2009 and repealing Regulation \(EC\) No 2003/2003](#)

upfront investments for full-scale facilities face uncertain returns due to production cost reduction needs and companies relocating from regions, affecting workforce availability.

#### Knowledge Gaps and Technical Expertise Limitations

Limited characterisation of bio-waste materials and volumes for bioplastic production creates planning difficulties. **Insufficient information** about specific raw material availability, an inadequate skilled workforce, and gaps in understanding final application criteria limit sector development potential.

### **Policy Recommendations for Maximising Bio-Waste Value**

Drawing from CircSyst bio-waste demonstrations and comprehensive stakeholder consultation, the following policy strategies are recommended to accelerate bio-waste circular transformation:



#### ESTABLISHING COMPREHENSIVE SCALE-UP SUPPORT SYSTEMS

*Integrated technical and financial assistance for industrial bio-waste processing development*

Create **specialised support programs** for transitioning bio-waste technologies from pilot to commercial scale, including technical validation assistance and risk mitigation mechanisms. Establish centres of excellence for bio-waste processing that provide technical expertise, testing facilities, and scale-up guidance. Develop public-private partnership models that share scaling risks and facilitate technology transfer from research institutions to industrial applications. Support infrastructure development for bio-waste collection, processing, and distribution networks.



#### DEVELOPING SPECIALISED KNOWLEDGE NETWORKS

*Comprehensive information systems and expertise development for bio-waste sectors*

Establish **centralised information platforms** that provide detailed data on bio-waste availability, characteristics, and processing requirements across European regions. Create professional development programs for bio-waste processing expertise, including technical training and certification systems. Support research networks that advance bio-waste valorisation technologies and share innovation outcomes. Develop decision-support tools that help stakeholders assess bio-waste valorisation opportunities and business models.

## BUILDING MARKET CONFIDENCE AND SOCIAL ACCEPTANCE



*Strategic communication and quality assurance frameworks for bio-waste products*

Implement comprehensive quality assurance and certification systems for bio-waste-derived products that build consumer and industry confidence. Develop **transparent communication strategies** that address safety concerns and highlight the environmental benefits of bio-waste valorisation. Create demonstration programs that showcase successful bio-waste applications and their positive impacts. Establish industry collaboration platforms that facilitate knowledge sharing and **best practice dissemination** across bio-waste value chains.



## HARMONISING REGULATORY FRAMEWORKS

*Coordinated approaches to eliminate EU and national legislative disparities and streamline approval processes*

**Address regulatory inconsistencies** between EU and national bio-waste legislation through coordinated harmonisation efforts, particularly for wastewater sludge utilisation in fertilizer applications. Streamline administrative procedures and reduce bureaucratic complexity for bio-waste processing facility approvals. Develop clear, science-based safety **standards** that provide regulatory certainty while ensuring environmental and health protection. Create flexible regulatory pathways that can accommodate innovative bio-waste valorisation technologies while maintaining appropriate oversight mechanisms.



## CREATING TARGETED FINANCIAL SUPPORT MECHANISMS

*Specialised investment instruments for bio-waste circular economy development*

Design **financial instruments specifically** tailored to bio-waste valorisation projects, including risk-sharing mechanisms for early-stage commercial deployment. Implement tax incentives and subsidies that improve the economic competitiveness of bio-waste-derived products compared to conventional alternatives. Create regional development funds that support bio-waste processing infrastructure in areas with suitable feedstock availability. Establish guarantee schemes that reduce investment risks for bio-waste valorisation facilities.

### 3.3. Transforming Plastics and Packaging: Policy Pathways to Circularity

#### Executive Summary on Plastics and Packaging

The transformation of plastic packaging waste into circular systems presents significant opportunities for advancing EU sustainability goals, including resource efficiency, circularity increase, sustainable growth, and the 2050 climate neutrality target set out in the European Green Deal. Through three innovative demonstrations contexts (demos 7, 8 and 9, from Spain, Greece and Hungary) that explore packaging circularity through multilayer PET recycling as secondary raw materials, enhanced packaging recycling processes involving consumers, and sustainable packaging solutions through ecodesign, the CircSyst project has identified key barriers **spanning technological scalability, regulatory inconsistencies, knowledge gaps, social resistance, and economic viability concerns**. To facilitate the implementation of circular solutions for packaging waste, key policy recommendations, compiled in Figure 4 and explained in detail further below, include:






 <p><b>Strengthening technical innovation support and digital infrastructure development.</b></p>	 <p><b>Building centralised knowledge networks and comprehensive training programs.</b></p>	 <p><b>Promoting social acceptance through targeted awareness campaigns and educational initiatives.</b></p>	 <p><b>Harmonising regulatory frameworks and implementing standardised recyclability marking systems.</b></p>	 <p><b>Enhancing market conditions through coordinated financial incentives and stable procurement policies.</b></p>
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Figure 4. Policy recommendations for Plastics and Packaging

This policy brief provides evidence-based pathways to systematically address identified barriers and accelerate the transition towards circular plastic packaging systems in Europe.

#### Problem Statement on Plastics and Packaging

Plastic packaging waste represents one of Europe's most pressing environmental challenges, with millions of tons generated annually and recycling rates remaining insufficient to meet circular economy targets.

Although the **Packaging and Packaging Waste Regulation (PPWR)**<sup>18</sup> sets out ambitious objectives, it does not address how the currently limited recycling capacity can be scaled up within a short time frame to serve the growing European market demand. At present, no dedicated funding is available for such investments, despite the fact that many new provisions apply from August 2026 to market operators. While the EU typically allocates funding for R&D activities, financial resources for infrastructure investments remain far more limited, even though investors must plan 20–30 years in advance for facilities whose technology might become obsolete in as little as 10–15 years, not to mention the complex and burdensome administrative requirements for permitting new recycling plants. At the same time, **since 2022 the EU has been a net importer of plastic raw materials**<sup>19</sup>, meaning that domestic recycled materials are currently unable to compete on price with cheaper imports from Asia. A significant risk factor in this regard is the single-use food packaging made out of plastics. The regulations for these are more complex due to their major public health implications. Therefore, in addition to the transition to a circular economy, the provisions of the **Food Contact Material Regulation**<sup>20</sup>, the **Hygiene of Foodstuffs Regulation**<sup>21</sup>, and the **Single-Use Plastics Directive**<sup>22</sup> all play a key role here. If companies are unable to fully meet the PPWR's requirements, they may feel forced to present their products as more “green” than they actually are — thus increasing the potential incidence of greenwashing in the packaging sector in direct contradiction to the PPWR's objectives and in breach of the proposed **Green Claims Directive**<sup>23</sup> (which has not yet been adopted, but is expected to establish stricter rules on environmental claims), not to mention that this could also be considered an unfair practice towards consumers under the **Unfair Commercial Practices Directive**<sup>24</sup>). A practical solution, also targeted in Demo 9, is to apply

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<sup>18</sup> [Regulation \(EU\) 2025/40 of the European Parliament and of the Council of 19 December 2024 on packaging and packaging waste, amending Regulation \(EU\) 2019/1020 and Directive \(EU\) 2019/904, and repealing Directive 94/62/EC](#)

<sup>19</sup> Plastics Europe: Falling EU competitiveness threatens circular plastics transition (2024)  
<https://plasticseurope.org/media/falling-eu-competitiveness-threatens-circular-plastics-transition/>

<sup>20</sup> [Regulation \(EC\) No 1935/2004 of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with food and repealing Directives 80/590/EEC and 89/109/EEC](#)

<sup>21</sup> [Regulation \(EC\) No 853/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs](#)

<sup>22</sup> [Directive \(EU\) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment](#)

<sup>23</sup> [Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on substantiation and communication of explicit environmental claims \(Green Claims Directive\)](#)

<sup>24</sup> [Directive 2005/29/EC of the European Parliament and of the Council of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market and amending Council Directive 84/450/EEC, Directives 97/7/EC, 98/27/EC and 2002/65/EC of the European Parliament and of the Council and Regulation \(EC\) No 2006/2004 of the European Parliament and of the Council \('Unfair Commercial Practices Directive'\)](#)

See also: [Directive \(EU\) 2024/825 of the European Parliament and of the Council of 28 February 2024 amending Directives 2005/29/EC and 2011/83/EU as regards empowering consumers for the green transition through better protection against unfair practices and through better information](#)



the **Ecodesign Directive**<sup>25</sup> to (food) packaging design, though good practices in this field remain limited despite its high potential.

The three innovative demonstrations within CircSyst have revealed that successful implementation of circular packaging solutions requires more than technological readiness. It demands appropriate policy frameworks, regulatory clarity, and institutional support mechanisms to address the growing challenges of packaging waste and the urgent need for sustainable packaging management in Europe.

### Identified Barriers

Mapping specific barriers for the implementation of circular plastic and packaging solutions provides the foundation for developing policy responses that can transform identified challenges into actionable pathways for circular plastic and packaging implementation. Key challenges identified through the demonstrations encompass:

#### Challenges in Technological Integration and Scalability

**Material compatibility** presents significant challenges in adapting new formulations to existing processes and machinery. Demonstrations highlight persistent issues with multimaterial packaging, material degradation, temperature constraints, and scaling complexity from pilot to industrial level, as well as the widely applied principle in the industry: “design over recyclability”. Critical needs include **efficient collection, sorting, processing technologies**, and **predictable material** availability and supply for various plastic waste types, with particular challenges in achieving high-quality outputs and integrating innovative technologies like 3D printing with recycled plastics.

#### Insufficient Regulatory Frameworks and Standards

Inconsistent laws across European regions create complex compliance requirements and conflicting obligations that hinder business stability, scalability and replication. **Lack of mandatory recyclability** marking creates uncertainty, while multiple costly certification schemes burden adoption. Workshop discussions emphasise excessive bureaucracy, impractical regulations like PPWR, and urgent needs for waste collection standardisation and clearer recycled materials certification.

#### Limited Knowledge and Technical Expertise

Significant **gaps exist across the packaging value chain**, including varying knowledge among regulatory bodies, limited understanding of material composition, and insufficient recycling process know-how. Key challenges include consumer education about product classification and accessible information about investment opportunities in circular packaging.

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<sup>25</sup> [Regulation \(EU\) 2024/1781 of the European Parliament and of the Council of 13 June 2024 establishing a framework for the setting of ecodesign requirements for sustainable products, amending Directive \(EU\) 2020/1828 and Regulation \(EU\) 2023/1542 and repealing Directive 2009/125/EC](#)

### Social Resistance and Market Acceptance Challenges

Persistent **negative consumer perceptions** of recycled materials and preferences for multilayer packaging create acceptance barriers. Workshop findings reveal difficulties in engaging older demographics and resistance to changing consumption patterns, while the conservative plastics sector prioritises price over ecological considerations, hindering market transformation.

### Limited Business Viability and Economic Barriers

High recycled **material costs, supply chain issues, and economic feasibility** concerns present significant barriers. SMEs face particular challenges accessing sustainable materials, while questionable cost competitiveness and large-scale investment risks compound difficulties. Additionally, securing cooperation from food producer companies remains challenging, as it requires significant time and voluntary engagement.

## **Policy Recommendations for Transforming Plastics and Packaging**

Based on insights from CircSyst plastics and packaging demonstrations and related consultation processes, including both identified barriers and enabling drivers, the following policy recommendations are proposed to accelerate the adoption of circular solutions:



### STRENGTHENING TECHNICAL INNOVATION AND INFRASTRUCTURE

*Comprehensive support mechanisms for scaling innovative packaging technologies*

Establish **comprehensive support mechanisms for scaling innovative packaging technologies** from pilot to industrial level. Invest in advanced separation and processing technologies while developing digital infrastructure for product traceability and return systems. Support research and development in material characterisation techniques and create validation frameworks that ensure quality standards while promoting technological innovation in circular packaging solutions.



### BUILDING KNOWLEDGE NETWORKS AND CAPACITY

*Centralised platforms and training programs for circular packaging expertise*

Create **centralised knowledge platforms** that provide accessible information about circular packaging opportunities, investment strategies, and technical best practices. Develop comprehensive training programs for industry professionals and establish networks of certified consultants to support SMEs in their transition to circular practices.

Implement targeted educational initiatives that address knowledge gaps across the value chain, from regulatory bodies to end consumers.



#### PROMOTING SOCIAL ACCEPTANCE AND BEHAVIOURAL CHANGE

*Comprehensive awareness campaigns to transform consumer perceptions*

Launch **comprehensive public awareness campaigns** that address negative perceptions of recycled materials and promote understanding of circular packaging benefits. Leverage the **mere exposure effect** by increasing the visibility and availability of these products in mainstream retail channels, so that repeated exposure normalizes sustainable choices and enhances consumer acceptance. Encourage “sustainable consumption” culture using influencers, digital tools, and reward methods to promote citizen knowledge on separation, reuse, and deposit systems. Implement educational programs targeting different demographic groups and focus on changing established consumption patterns. Create transparent communication frameworks that provide clear, accessible information about packaging recyclability and environmental benefits. Promote **behavioural change** towards reduction at source, encouraging the consumption of minimally processed, healthier products that also require less packaging (e.g. fresh produce, bulk goods), while fostering consumer preference for sustainable alternatives.



#### HARMONISING REGULATORY FRAMEWORKS AND STANDARDS

*Unified approaches across European regions to eliminate inconsistencies and reduce compliance complexity*

Develop **unified regulatory approaches** across European regions to eliminate inconsistencies and reduce compliance complexity. Implement mandatory and standardised packaging recyclability marking systems to improve transparency and market reliability. Establish **regulatory frameworks that ensure recycled materials are economically advantaged compared to virgin materials**, promoting their competitive use. Create balanced regulatory mechanisms that address both material simplification goals and recycling efficiency needs, while establishing clear certification frameworks for recycled materials that reduce bureaucratic burden and provide industry certainty. Building on successful examples where EU regulations have created markets for circular packaging products, policy frameworks should be designed to actively stimulate demand for recycled materials and circular solutions.



### ENHANCING MARKET CONDITIONS AND ECONOMIC VIABILITY

*Coordinated financial support mechanisms for competitive circular solutions*

Implement coordinated **financial support mechanisms, including tax incentives, subsidies, and innovative financing schemes** specifically designed to improve the economic competitiveness of circular packaging solutions. Create stable market conditions for recycled materials through strategic procurement policies and support mechanisms that address supply chain challenges. Develop frameworks that facilitate industry collaboration and data sharing while recognising the time and resource investments required from companies.

### 3.4. Accelerating Circular Systemic Solutions: Policy Strategies For Europe's Circular Transformation.

#### Executive Summary

Circular Systemic Solutions represent a transformative approach to achieving Europe's sustainability ambitions, offering integrated pathways that simultaneously address resource efficiency, waste reduction, and climate neutrality objectives outlined in the European Green Deal. Through nine innovative demonstrations across water management, bio-waste valorisation, and plastics and packaging transformation, the CircSyst project reveals common implementation patterns transcending individual sectors and requiring coordinated policy intervention.

Cross-sectoral analysis identifies recurring barriers spanning regulatory complexity, technological validation needs, stakeholder acceptance challenges, economic viability concerns, and knowledge transfer gaps. These patterns demonstrate that while each sector requires tailored solutions, common approaches can be adapted across different circular applications. To enable widespread CSS adoption across European regions, essential policy strategies, summarised in Figure 5, include:






 <p><b>Creating validation and certification systems for emerging circular technologies.</b></p>	 <p><b>Strengthening knowledge networks that facilitate cross-sectoral learning, capacity development and best practice transfer.</b></p>	 <p><b>Building stakeholder confidence through demonstration programs and quality assurance systems.</b></p>	 <p><b>Developing sector-adapted regulatory frameworks that address common implementation challenges.</b></p>	 <p><b>Establishing financial mechanisms adapted to sector-specific needs and investment patterns.</b></p>
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Figure 5. Policy recommendations for Circular Systemic Solutions

This policy brief provides strategic guidance for decision-makers at the EU and national levels to implement coordinated approaches that leverage common patterns and accelerate Europe's transition towards comprehensive circular economy models.

## Problem Statement

Europe's transition towards a circular economy reveals common challenges that appear across different sectors, requiring coordinated policy responses that can address recurring patterns while respecting sectoral specificities. Current linear economic models generate similar types of environmental pressures across water resources, organic waste streams, and material consumption patterns, with climate change intensifying resource scarcity and environmental degradation across European regions.

Analysis of circular initiatives across water management, bio-waste and plastic-packaging reveals that while each sector operates under **different technical and regulatory conditions**, they face remarkably similar implementation challenges, suggesting that coordinated policy approaches could address these common patterns more effectively.

The **European Green Deal**<sup>26</sup> and its **Circular Economy Action Plan**<sup>27</sup> establish ambitious targets for resource efficiency and waste reduction, yet current policy frameworks often address sectors in isolation, missing opportunities to learn from common patterns and respond to recurring cross-sectoral challenges. Without a broader perspective, Europe risks implementing fragmented approaches that fail to leverage valuable cross-sectoral learning opportunities and, therefore, realise their full transformative potential.

## Identified Barriers

Examining implementation challenges across CircSyst's circular solutions reveals systemic patterns that appear consistently across demonstrators in the three thematic areas:

### Regulatory Complexity and Administrative Challenges

Complex and time-consuming **administrative procedures** create implementation obstacles across all circular sectors. Bureaucratic fragmentation hinders project development, while regulatory uncertainty affects investment decisions. Each sector faces lengthy approval processes and compliance requirements, limiting scalability and replication potential.

### Technological Validation and Scaling Difficulties

Emerging circular technologies face similar validation challenges when transitioning from pilot to industrial implementation. **Limited standardised assessment protocols** affect performance evaluation across water treatment, bio-waste processing, and packaging recycling. Maintaining quality standards while scaling presents recurring technical challenges across different circular applications.

### Stakeholder Acceptance and Trust Deficit

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<sup>26</sup> [The European Green Deal](#)

<sup>27</sup> [Circular Economy Action Plan](#)

**Persistent scepticism** towards circular solutions appears consistently across water reuse, bio-waste products, and recycled packaging materials. Limited stakeholder understanding about circular processes, quality controls, and safety standards creates acceptance barriers. Conservative attitudes prioritising conventional approaches represent a common challenge requiring systematic confidence-building.

#### Economic Viability and Investment Barriers

**High implementation costs** compared to conventional alternatives present major obstacles across circular sectors. Uncertain returns affect investment decisions, SMEs face particular challenges accessing sustainable technologies and financing mechanisms, and infrastructure requirements create similar geographical and economic constraints across applications.

#### Knowledge Transfer and Capacity Limitations

**Significant expertise gaps** exist across the three circular value chains, with limited technical knowledge among regulatory bodies and insufficient understanding among end-users. Cross-sectoral knowledge sharing remains limited, restricting the transfer of successful implementation approaches between different circular applications.

### **Policy Recommendations for Accelerating Circular Systemic Solutions**

Based on cross-sectoral analysis revealing common patterns across circular systemic solutions and comprehensive stakeholder engagement and consultation, the following coordinated policy strategies are recommended:



#### CREATING TAILORED VALIDATION AND CERTIFICATION SYSTEMS

*Standardised assessment approaches adapted to different circular technologies*

**Implement validation programs** that address common technology assessment challenges across sectors while accommodating different technical requirements. Establish certification systems that build stakeholder confidence through transparent quality assurance adapted to water treatment, bio-waste processing, and packaging recycling applications. Create knowledge-sharing mechanisms that enable the transfer of validation approaches between different circular technologies.



### STRENGTHENING CROSS-SECTORAL KNOWLEDGE AND COLLABORATION NETWORKS

*Expertise development enabling learning transfer between different circular applications*

**Establish knowledge and collaboration platforms** that not only provide accessible information about circular opportunities, implementation strategies, and best practices across sectors, but also function as **marketplaces for synergies along the value chain**. These platforms should, for example, facilitate connections between actors generating residual streams, technical stakeholders with the capacity to valorise them, and potential end-users of the derived products. Create professional development programs, building circular economy expertise while enabling cross-sectoral learning about common challenges. Support research networks advancing circular technologies and knowledge transfer between applications, while developing decision-support tools for stakeholder assessment.



### BUILDING STAKEHOLDER CONFIDENCE

*Trust-building approaches adapted to different circular applications*

**Develop demonstration programs** that address common stakeholder acceptance challenges while showcasing sector-specific benefits and applications. Implement communication strategies that address recurring concerns about circular processes while providing sector-appropriate information about quality controls and safety standards. Create industry **collaboration platforms** that facilitate knowledge sharing about successful stakeholder engagement approaches across different circular sectors.



### DEVELOPING SECTOR-ADAPTED REGULATORY FRAMEWORKS

*Coordinated approaches addressing common regulatory challenges across different sectors*

Establish **streamlined regulatory approaches** that address common administrative challenges while respecting sectoral specificities. Create coordinated approval processes that reduce bureaucratic complexity across different circular applications. Develop regulatory learning mechanisms that enable knowledge transfer about successful regulatory approaches between water, bio-waste, and packaging sectors, while maintaining appropriate sector-specific standards.



## ESTABLISHING SECTOR-SPECIFIC FINANCIAL MECHANISMS

*Investment support addressing common economic barriers across circular applications*

**Design financial instruments** that address common economic challenges while accommodating different sector investment patterns. Implement support mechanisms, including tax incentives, subsidies, and financing schemes adapted to each sector's needs. Create risk-sharing mechanisms that address common investment uncertainties and return expectations.

### **Circular Systemic Solutions Synergies**

Following the comprehensive analysis of the problem statements and policy briefs, and recommendations across the three sectors, as well as the general circularity recommendations, it is essential to identify and highlight the synergies and additional opportunities for Circular Systemic Solutions that can be leveraged during the scaling process. This analysis already points to significant cross-sectoral potential, including funding mechanisms, networks, and start-up communities that can accelerate CSS implementation and scaling. In line with the methodology, efforts have been dedicated to building a feedback loop with the CCRI Coordination and Support Office. Input collected during the Valencia workshops and public available CCRI information have been integrated into this first version, while the loop will be further expanded in the next deliverable D6.5 to deepen the analysis of national mechanisms and include additional input from CCRI.

#### CSS Synergies

Circular Systemic Solutions achieve enhanced impact through coordinate approaches that leverage common implementation patterns across sectors. The CCRI highlights that **Synergetic Local Policy Plans** such as Sustainable Energy and Climate Action Plans (SECAPs), Sustainable Urban Mobility Plans (SUMPs), and Smart Specialisation Strategies provide ready-made frameworks for scaling circular systemic solutions. These plans ensure interoperability across energy, mobility, waste and water, by combining inventories, monitoring, co-creation processes and investment priorities, while CCRI communities of practice, mentoring and twinning offer peer-to-peer knowledge transfer and visibility (CCRI – Synergetic Local Policy Plans).

Additional support structures include the **Circular City Centre (C3)**<sup>28</sup>, set up by the European Investment Bank to provide advisory and project development assistance for cities (EIB Circular City Centre), and the **European Circular Economy Stakeholder Platform**<sup>29</sup>

<sup>28</sup> [EIB: Circular City Centre \(C3\), competence and resource centre at the European Investment Bank.](#)

<sup>29</sup> [European Circular Economy Stakeholder Platform \(ECESP\) – “network of networks”, a joint initiative by the](#)

(**ECESP**), a “network of networks” that connects stakeholders across Europe and collaborates closely with CCRI. Moreover, **ACR+<sup>30</sup> (Association of Cities and Regions for Sustainable Resource Management)** provides a long-standing international network of local authorities working on circularity, while **Interreg<sup>31</sup> programmes** enable cross-border cooperation projects for circular cities. These networks amplify the systemic scaling of CSS by creating access to expertise, peer-learning, and shared funding opportunities.

#### Water CSS Synergies

Water circularity initiatives benefit from integrated approaches connecting water management with complementary circular sectors through industrial symbiosis networks. Strategic opportunities for scaling include **European Investment Bank (EIB) framework loans**, which support large municipal and regional programmes with co-financing intensities up to 90% in transition regions. CCRI also provides a **Technology Evidence Base** showcasing 24 technologies across 10 European cases, offering practical examples for water-related circular systemic solutions (CCRI – Funding and Financing<sup>32</sup>).

The CCRI is also supported by networks that connect water-related circularity to broader systemic initiatives. For example, the **Circular City Centre (C3)** develops advisory services that explicitly include water and urban resource flows, while networks like **ACR+** and **ECESP** facilitate the exchange of case studies and replication pathways.

#### Bio-waste CSS Synergies

Bio-waste valorisation benefits from integrated circular economy approaches connecting different waste streams and sectors, creating substantial opportunities for cross-sectorial synergies. Scaling opportunities include the **Circular Bio-based Europe Joint Undertaking (CBE-JU, €2 billion EU–industry partnership)** supporting competitive bio-based industries, and the **European Circular Bioeconomy Fund (ECBF)** investing 2.5–10m€ in TRL 6–9 bioeconomy solutions across agriculture, food, packaging and textiles. Horizon Europe calls, such as **CIRCBIO-12 on optimising composting plants in Europe**, directly support biowaste management and valorisation. These mechanisms can be combined with SECAPs, SUMP and S3 to align investment priorities with local circular transition strategies (CCRI – Funding and Financing).

In addition, **innovation hubs and start-up incubators** such as *BlueCity Rotterdam*<sup>33</sup> showcase how urban ecosystems can host dozens of circular start-ups reusing organic side-

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[European Commission and the EESC.](#)

<sup>30</sup> [Association of Cities and Regions for Sustainable Resource Management, international network of local authorities working on circularity \(ACR+\)](#)

<sup>31</sup> [EU funding programmes for cross-border cooperation and regional development \(Interreg\)](#)

<sup>32</sup> [Circular Cities and Regions Initiative: Funding and Financing, Brussels, European Commission, 2023.](#)

<sup>33</sup> [BlueCity – Rotterdam innovation hub and circular start-ups showcase \(BlueCity\)](#)

streams (BlueCity). Together with venture funds like the ECBF, such start-up communities offer a living lab for scaling bio-waste systemic solutions.

#### Plastics and Packaging CSS Synergies

The scale of plastics and packaging production across Europe presents opportunities for circular transformation through cross-sectoral collaboration and coordinated transition toward circular packaging models. CCRI points to the **EU Strategy for Plastics in a Circular Economy**, which addresses design, production, use and recycling. Funding opportunities include **Horizon Europe calls** (e.g., CIRC BIO-06 and CIRC BIO-28) on indicators for circular transition and circular models for fibrous packaging, as well as projects addressing plastic pollution in soils, sediments and water. Demonstrator projects such as **PlastiCity** illustrate urban plastic recycling solutions with rates above 50%. These initiatives are supported by EIB loans and CCRI networks that enable knowledge sharing between cities and regions (CCRI – Funding and Financing).

Complementary networks such as **ECESP** and **Interreg projects** (cross-border pilots on waste and recycling) provide additional collaboration frameworks. Moreover, start-up ecosystems connected through the **Enterprise Europe Network (EEN<sup>34</sup>)** also act as enablers for SMEs innovating in circular packaging.

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<sup>34</sup> [European Commission: Enterprise Europe Network \(EEN\), European Commission](#)



## 4. CONCLUSION

The development of **CircSyst Policy Briefs and Recommendations** contributes to advancing Europe's circular economy objectives through evidence-based policy guidance. This deliverable applies a three-step iterative methodology that translates technical innovations from nine demonstrations into policy recommendations across water management, bio-waste valorisation, plastics and packaging, and general circular systemic solutions.

The methodological framework integrates **stakeholder consultation involving 153 participants across 8 regional workshops** (excluding the Slovenian workshop as mentioned) with systematic validation from demonstration leaders. The analysis of European legislative frameworks, examining directives including the Water Framework Directive, Waste Framework Directive, PPWR, and REACH Regulation, provides a foundation for policy recommendations grounded in regulatory reality. This approach helps ensure that recommendations emerge from collaborative research processes with stakeholders rather than isolated perspectives, enhancing their potential applicability.

The analysis identifies **implementation barriers** spanning **regulatory complexity, technological validation challenges, stakeholder acceptance issues, economic viability concerns, and knowledge transfer gaps across circular sectors**. These patterns suggest that while sectors require tailored solutions, certain policy approaches can address common challenges while respecting sectoral specificities. Identifying these patterns offers insights for developing policy responses that may benefit from cross-sectoral learning.

The deliverable outlines **policy strategies, including regulatory framework harmonisation, validation systems, financial mechanisms, stakeholder engagement approaches, and knowledge networks**. These recommendations draw on evidence from demonstrations and stakeholder consultation to enhance their practical relevance. The connection between problem statements, identified barriers, and recommendations aims to create coherent pathways for potential policy consideration. In addition, the deliverable includes a review of concrete proposals developed within the CCRI CSO, providing a solid basis and point of departure for designing structural and policy solutions that can accelerate the transition towards a circular economy.

The framework developed in D6.4 **will be expanded in the second publication (D6.5)**, incorporating additional data from future workshops, deliverables, enhanced national-level regulatory analysis, and further exploration of synergies with CCRI-CSO initiatives. This iterative approach supports continuous refinement as the project progresses. This deliverable offers policy guidance that **contributes to supporting Europe's ongoing transition toward circular economy** practices, adding to the broader efforts toward achieving the European Green Deal's sustainability objectives.



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