

CCRI Pilot Solutions: Insights, Impacts, and Replication Paths

December 2025



CCRI Pilot Solutions: Insights, Impacts, and Replication Paths

European Commission
Directorate-General for Research and Innovation
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December 2025



Circular
Cities & Regions
Initiative



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About this Booklet

Over the past two years, the CCRI has supported 12 European cities and regions to test what it really takes to turn circular economy ambition into practical, local, and systemic solutions. Their examples in developing Circular Systemic Solutions (CSS) across various sectors and focus priorities, form the foundation of this booklet.

This compilation brings together the insights and solutions developed through the CCRI Pilot programme between January 2023 and October 2025. It highlights not only what the Pilots achieved, but how they did it: the partnerships they built, the barriers they faced, the tools they used and developed, and the lessons that can help others accelerate their own transitions.

Across all booklets, you will find a consistent set of elements to inspire and assist replication:

- The challenge and context the Pilot aimed to address
- A clear description of the circular solution developed and tested
- Key facts and figures, showing baseline data and achieved impacts

- Progress through the CCRI Methodology (Map–Design–Implement)
- Stakeholders and governance models involved
- Results, impacts, and success stories
- Challenges and enablers, based on on-the-ground experience
- Actionable lessons and tips for replication

Before presenting the 12 individual solutions, this compilation provides:

- Key impacts across all Pilots at a glance, aggregating figures and insights
- A synthesis of common success factors, barriers, and operational lessons, identifying patterns that emerged across geographies, themes, and solution types.

Together, these elements offer a practical, evidence-based resource for cities and regions in various stages of identifying, designing and implementing their own circular solutions.

How the CCRI supported Pilot Regions and Cities

The CCRI's *raison d'être* is to provide hands-on support and guidance, to help our community navigate the transition to a more circular way of doing things. From the moment they joined, each of the 12 selected Pilots was paired with a dedicated Pilot Companion from the CCRI team. These matches were carefully made, considering beneficiary needs, expert experience, geographic context, and the types of circular solutions being developed. The goal was simple: to ensure every Pilot received the most relevant, practical, and effective support for its project.

The journey began with Companions working with Pilots to gain a deep understanding of their ambitions, the challenges they faced, and where efforts could deliver the greatest impact. From this foundation, CCRI's role evolved into a tailored programme of guidance and collaboration. Companions worked side by side with Pilots to develop and refine their CSSs and strengthen governance models, ensuring strategies were not only visionary but also actionable.

Acting as connectors, Companions opened doors to good practice examples and facilitated opportunities for shared learning with, and inspiration from, similar projects across Europe. Peer learning became a cornerstone of the approach. This enabled Pilots to explore practical solutions together and build confidence in applying circular principles and implementing their CSS.

Technical and policy expertise was another critical element of the support. Companions shared up-to-date insights on regulatory developments, equipping Pilots with the knowledge needed to navigate complexity and seize opportunities.

Recognising that ambition must be matched by resources, Companions also helped Pilots identify potential funding streams and technical assistance opportunities, such as those available through the [European Investment Bank Circular City Centre](#) and the [Green Assist](#) programme. In seven cases, this went further, with CCRI providing direct funding for specialised local technical support, accelerating implementation and unlocking solutions that might otherwise have remained out of reach.

While supporting Pilots, the CCRI team was also developing two key tools: [CCRI – Methodology](#) and the [Self-Assessment Tool](#). The Methodology serves as a guidance framework for policy and decision-makers in local and regional government. It describes key activities and milestones in the successful development of a CSS, divided into three phases: Map, Design, and Implement. Pilot Companions worked with their Pilots to guide them through these stages in a tailored, systemic way, with all 12 making significant progress towards the defined outputs.

The Self-Assessment Tool enables users to identify and monitor the most relevant KPIs, tailored to the unique attributes of local projects and contextual conditions. This facilitates systematic tracking of progress towards circular economy targets. Companions collaborated with Pilots to define meaningful KPIs, ensuring that success could be measured and communicated clearly.

Most importantly, the CCRI helped cities and regions stay focused, confident, and creative, so that each Pilot could move from inspiration to implementation at its own pace, with support that truly matched its context.

Key impacts at a glance

The circular solutions supported through the CCRI Pilot programme cover a range of themes and types of activity, from the development and operation of strategic initiatives

to embed a local circular economy ecosystem, to specific tactical interventions in target sectors. The solutions developed cover are summarised in the following table:

Pilot	Themes	Solution Types
Asker	<ul style="list-style-type: none"> • Construction & Built Environment 	<ul style="list-style-type: none"> • Procurement • Business models • Behaviour change
Capannori	<ul style="list-style-type: none"> • Circular Resource Management • Construction & Built Environment 	<ul style="list-style-type: none"> • Industrial symbiosis • Business models • Ecosystem coordination
Castilla y León	<ul style="list-style-type: none"> • Bioeconomy & Nutrient Recovery 	<ul style="list-style-type: none"> • Industrial symbiosis • Business models • Procurement
Flanders	<ul style="list-style-type: none"> • Construction & Built Environment • Governance & Systemic Transition Platforms 	<ul style="list-style-type: none"> • Procurement • Governance tools • Behaviour change
Gothenburg	<ul style="list-style-type: none"> • Governance & Systemic Transition Platforms 	<ul style="list-style-type: none"> • Procurement, governance tools, behaviour change
Guimarães	<ul style="list-style-type: none"> • Bioeconomy & Nutrient Recovery 	<ul style="list-style-type: none"> • Behaviour change • Business models • Ecosystem coordination
Helsinki-Uusimaa	<ul style="list-style-type: none"> • Governance & Systemic Transition Platforms 	<ul style="list-style-type: none"> • Ecosystem coordination • Procurement • Business models
Munich	<ul style="list-style-type: none"> • Consumer Goods & Packaging 	<ul style="list-style-type: none"> • Behaviour change • Procurement • Business models

Pilot	Themes	Solution Types
Podravje-Maribor	<ul style="list-style-type: none"> Bioeconomy & Nutrient Recovery 	<ul style="list-style-type: none"> Industrial symbiosis Business models
Roubaix	<ul style="list-style-type: none"> Construction & Built Environment 	<ul style="list-style-type: none"> Behaviour change Business models Ecosystem coordination
Tampere Region	<ul style="list-style-type: none"> Circular Resource Management Construction & Built Environment 	<ul style="list-style-type: none"> Industrial symbiosis Ecosystem coordination Procurement
Uppsala	<ul style="list-style-type: none"> Construction & Built Environment 	<ul style="list-style-type: none"> Procurement Business models Behaviour change

All of the Pilots have progressed through the activities and stages of the CCRI Methodology, with the majority now firmly in the conclusion of Planning, or early-mid Implementation stages. The following diagram shows an overall aggregation of some the key results across the 12 Pilots.



Key Results and Impacts

Across all 12 Pilots

Ecosystem Building & Participation



2700+

people directly engaged



69+

organisations



220+

stakeholders mobilised

Waste Prevention, Reuse & Materials Circulation



21 000+

tonnes of materials reused/recycled/diverted



35 000

t/yr biofertiliser produced



1 175

t/yr packaging waste avoided

Economic & Social Impacts



54-71

jobs created



€568 000

landfill cost savings

Key takeaways

Common success factors across the Pilots



High-level commitment and effective governance are vital

Across all twelve pilots, one imperative message stands out: **ensure clear political commitment and strategic anchoring as bedrock of success.** Regions that embedded circular economy goals into formal strategies created a strong mandate for action. This clarity gave stakeholders confidence and ensured continuity beyond individual projects. Another recurring success factor was importance for cities and regions to **establish the presence of dedicated orchestrator**, such as the [Circular Transition Arena in Gothenburg](#). These entities can act as conveners, breaking silos and sustaining momentum. They provide a focal point for collaboration, can help to align diverse actors around shared objectives, and can drive the development circularity with their clarity of purpose.



Evidence-based planning is critical

Invest early in data-driven baselines, such as urban metabolism studies or Material Flow Analyses, as used by the [Helsinki-Uusimaa Circular Hub](#). Pilots that did this were able to prioritise high-impact sectors and set measurable targets. This analytical foundation accelerated decision-making and avoided wasted effort.



Co-creation is a universal enabler

Take the time to carry out iterative multi-stakeholder engagement. Successful pilots didn't just consult stakeholders, they co-created solutions. Across all Pilots, public authorities, businesses, academia, and civil society worked together in structured formats, from thematic workshops to living labs. This inclusive approach built trust and unlocked innovation, while **targeted demonstration projects**, such as the [circular library building in Zoersel, Flanders](#), provided tangible proof that circular solutions are feasible and beneficial.

Challenges and barriers to progress

Despite strong ambition and commitment, Pilots faced a number of common hurdles, that slowed implementation or increased complexity. These barriers tended to fall into four broad categories:



Market and economic barriers

Market immaturity is a persistent challenge. Circular construction, for example, often carries higher upfront costs, while reuse systems can struggle to compete commercially with linear models. Without financial incentives or stable demand for secondary materials, scaling remained difficult.



Regulatory and legal complexity

Regulatory complexity compounded these market issues. Several pilots encountered **legal and liability barriers**, such as unclear end-of-waste criteria for digestate or restrictions on reused building materials. These gaps can slow implementation and deter private investment.



Governance and capacity constraints

In a mirror to the discussion of success factors above, governance fragmentation was another obstacle. In some cases, responsibilities were spread across multiple departments or projects, creating **coordination challenges** and slowing decision-making. Limited technical capacity within municipalities and local supply-chains added to the strain, while **data and monitoring gaps** made it hard to track progress or demonstrate impact convincingly.



Behavioural and social challenges

As a final point, the challenges around societal behavioural change cannot be underestimated. **Citizen acceptance and sustained stakeholder engagement** proved harder than expected. Even where awareness campaigns were strong, converting interest into long-term participation required continuous effort and practical incentives.



Lessons learnt: insights for future action

Several key lessons emerge when considering all Pilots.

- **Start small and visible.** Early wins can build confidence and create momentum. Pairing these with a clear multi-year roadmap to signal long-term intent lays a strong foundation for future success.
- **Make regulations workable.** Mandates alone do not drive uptake; they must be backed by user-friendly systems, financial models, and technical support. Pilots that combined policy with hands-on tools and incentives saw faster adoption.
- **Plan financing early and creatively.** Successful cases explored blended funding, reinvestment of deposits, and specific advisory support to mature business models. This proactive approach reduced dependency on short-term grants and improved resilience.

- **Use data to anchor decisions.** Monitoring frameworks and specialised, targeted analyses helped Pilots justify investments and refine strategies. Evidence builds credibility, and credibility attracts partners.
- **Co-create solutions with stakeholders.** Engaging stakeholders from the outset, listening to their concerns and constraints, and designing solutions together fosters ownership and buy-in, and can reduce resistance. And where social inclusion was integrated as part of the plan, not treated as an afterthought, Pilots delivered broader benefits, from job creation to community engagement.

In short, the Pilots discussed in detail below show that circular economy transformation is achievable, but it demands **clarity of vision, collaboration, and persistence**. When these elements align, cities and regions can move from isolated initiatives to systemic change, delivering environmental, economic, and social benefits that endure.

Circular Solution: **Asker, Norway**

Circular Building & Construction Transformation: Reusing Furniture, Streamlining Materials, and Efficient Storage Solutions

Source: Pilot's own image



Size:

98 000
inhabitants



GDP:

More Developed Region



Geographical information:

Northern Europe



Urban-rural predominance:

Intermediate



Innovation ranking:

Strong



Sectors:

Construction and buildings



Time frame:

October 2021 – December 2025



Circular strategies:

reduce

reuse

recover

Contact Person:

[Marie Nokken](#)

More information:

[Pilot Profile](#)

Key facts and figures Nedre Sem Låve Pilot Project:

400 tonnes

of reused material, **23%** of the total weight of materials in the new building.

4 tonnes of reclaimed materials.

500 tonnes

of recycled materials.

850 tonnes

59% of the materials in the building, are reusable in the future.

Concrete with **100%** recycled aggregate;

saved 50 tonnes

of co2-emissions compared to industry reference, **over 60% reduction.**



Solution overview

The pilot project in Uppsala aimed to establish a comprehensive system to enhance circularity in building and construction (B&C) materials. Focused on municipal projects, it combined internal innovation with collaboration with key stakeholders.

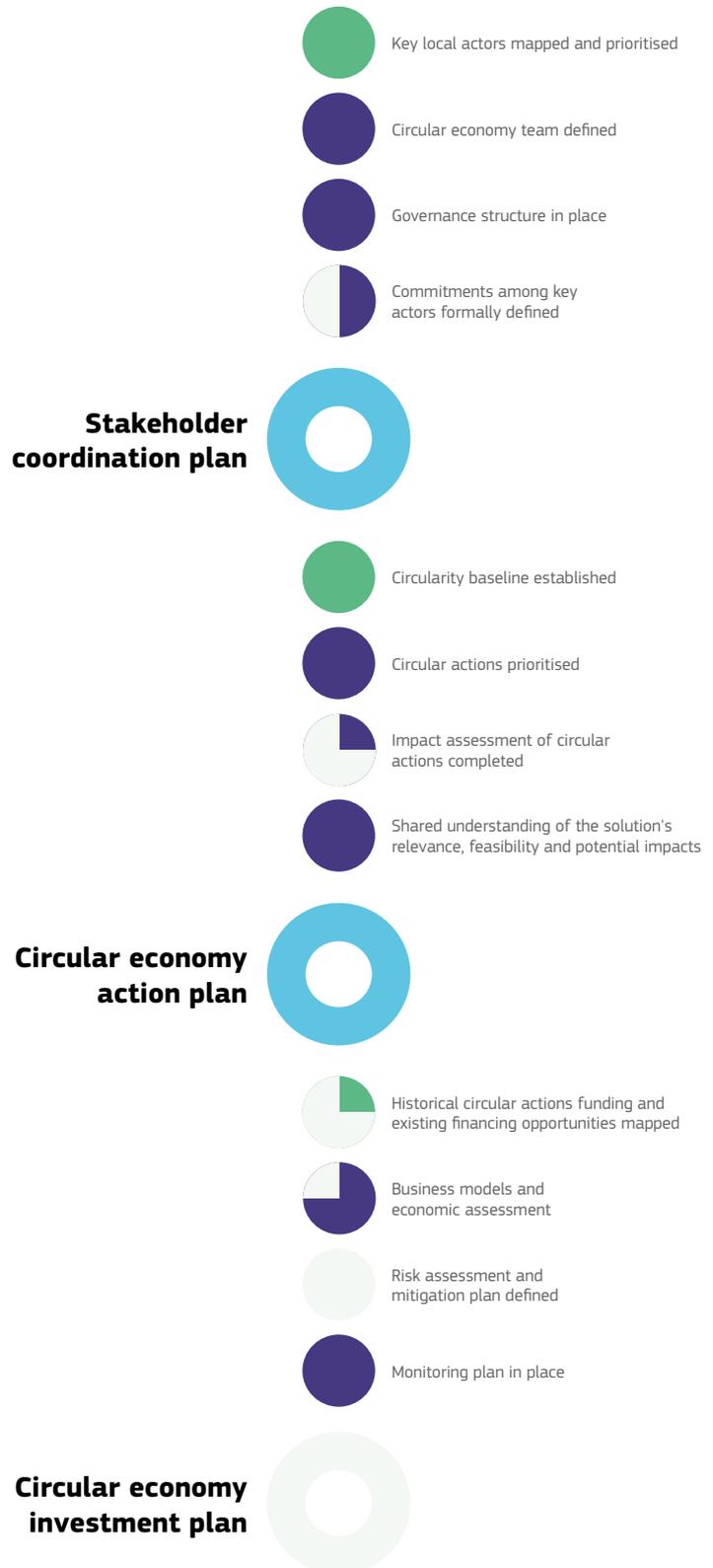
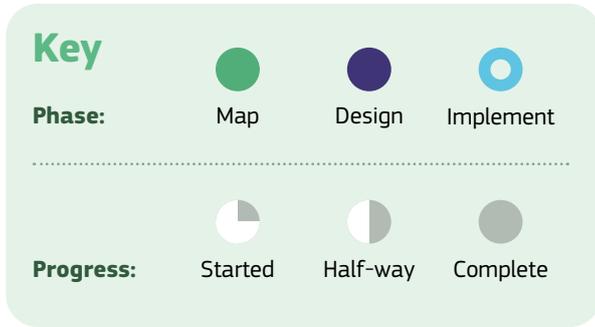
For loose inventory, furniture, and fixtures, a digital system was introduced to make reused items like chairs, tables, and shelves easily accessible to municipal employees. In construction materials, the city worked with external partners and drew lessons from the Nedre Sem Låve project to define standardised categories, certification requirements, and data collection.

Strategies for outdoor materials addressed storage, personnel, and zoning needs, while excavation masses were managed in partnership with experienced external actors, enabling efficient reuse.

Overall, the pilot demonstrates a holistic, replicable approach to circularity, integrating internal solutions with external expertise to maximize the reuse of B&C materials.

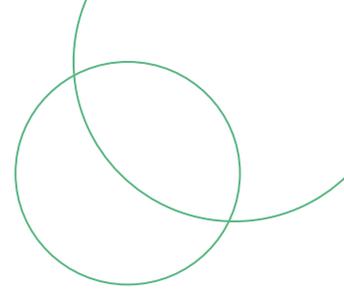
✓ CCRI Methodology Step Completion Status:

The [CCRI Methodology](#) is a guidance tool for policy and decision-makers in local and regional government. It describes key activities and milestones in the successful development of a Circular Solution, divided into three phases – Map, Design, and Implement. The visual checklist provides an at-a-glance view of how Asker's circular solution is progressing towards these outputs.





Background and objectives



i Policy context:

Asker's circular economy approach is guided by a coherent policy framework connecting municipal ambition with national direction. The municipality's [Thematic Plan: Action Against Climate Change](#) positions Asker as a frontrunner in circular transformation, driving systemic change across consumption, construction, food systems, and mobility to reduce reliance on virgin resources and minimize climate impact. At the national level, Norway's [National Strategy for a Green, Circular Economy](#) identifies construction and buildings as priority sectors, emphasizing material reuse, circular design, and state leadership through public building projects. This is reinforced by [Technical Building Regulation TEK17](#), which sets performance and documentation requirements that enable recycling and the use of secondary materials. Finally, the [Action Plan for a Circular Economy 2024–2025](#) advances 39 measures, including regulatory reviews, incentives, and waste requirements, many targeting the construction sector through improved material reuse, better sorting, and sustainable product design.

× Problem:

The circular solution was developed to tackle systemic inefficiencies in Asker municipality's management of building and construction (B&C) materials. It aims to move beyond isolated pilots, establish structured practices, enhance collaboration, and strengthen circular value chains across municipal operations.

🎯 Objectives:

- Develop and implement a holistic strategy for the circular use of B&C materials across Asker municipality.
- Pilot and scale solutions in municipal projects to strengthen circular value chains for multiple material categories.
- Foster collaboration across departments and stakeholders to create innovative, resource-efficient practices.





Stakeholders

Asker's circular reuse initiatives are driven by a diverse network of public and private actors working collaboratively to test and scale solutions.



Public Authorities

Within the municipality, public administration departments coordinate internally to strengthen synergies that promote increased material reuse, while neighbouring municipalities engage in joint initiatives with broader regional impact and the potential replication of successful models.



Private Sector



Public Authorities

The Private Business Cluster in Asker contributes by identifying needs and new areas for cooperation, ensuring that local businesses are integral to the transition. In the construction sector, Veidekke AS tests circular practices through the Nedre Sem Låve project, demonstrating reuse solutions in real settings.

Collaboration also extends beyond municipal borders. Ombygg Oslo and Grønn Vekst Drammen, both operating reuse centres, share practical experience and offer opportunities for partnership and service integration.

Finally, FutureBuilt supports implementation through expertise in documentation and system development, ensuring that reuse efforts are embedded within broader frameworks for sustainable building and urban development.



Results and Impact



Main results

Asker's circular solution demonstrates how a municipality can move from isolated reuse initiatives to a **systemic framework for circular construction**. The Nedre Sem Låve project, Asker's first circular building project, transformed an 1890s barn at Semsvannet into a modern, low-carbon municipal work centre and community hub using **extensive material reuse and sustainable construction principles**. The project tested and documented the reuse of timber, roof tiles, bricks, and other materials, including strength tests and certification processes. Findings were shared nationally, contributing to Norway's knowledge base for circular construction.

Key results in Asker's CSS include:

- Strengthened **cooperation with private external partners** for reuse and market access, including Circular Resource Central (Oslo), SirkEn AS, and Regional Green Growth Drammen.
- **Increased cross-sector collaboration:** Over 60 stakeholders from the construction value chain participated in workshops, resulting in eight actionable recommendations for scaling reuse, covering procurement, responsibility allocation, storage and logistics, competence building, and interdisciplinary collaboration.

- **Strengthened municipal capacity:** A dedicated reuse team was established, and clearer mandates were defined across municipal departments.

- **Material reuse and environmental impact (Nedre Sem Låve project):**

400 tonnes

of reused material, **23%** of the total weight of materials in the new building.

4 tonnes of reclaimed materials.

500 tonnes of recycled materials.

850 tonnes

59% of the materials in the building, are reusable in the future.

Concrete with **100%** recycled aggregate;

saved 50 tonnes

of co2-emissions compared to industry reference, **over 60% reduction.**

These results demonstrate how the Nedre Sem Låve pilot has significantly strengthened Asker's practical capacity to implement circular construction. The municipality has gained hands-on experience with large-scale material reuse, supported by the Circular Index, which now enables it to set requirements for minimum percentages of reused materials in future building projects. The pilot also built new skills and confidence within both municipal teams and contractors, establishing routines, competencies, and shared understanding that make circular practices more familiar, less complex, and easier to replicate in subsequent projects.

Impact Analysis

Figure 1 illustrates three high-level environmental impact indicators linked to circular-economy performance. Indicator 1 shows greenhouse-gas emissions from waste, beginning at 66 million tonnes in 2022 and trending downward, reflecting efforts to reduce waste volumes and improve material circulation on the path to a 2030 target of 10 million tonnes. Indicator 2 tracks the carbon footprint of construction activities, which starts at 400 kg in 2022 and shows reductions aligned with increased reuse, low-carbon materials, and improved design practices, aiming for a substantial drop to 25 kg by 2050. Indicator 3 presents the recycling rate of construction and demolition waste, progressing from a

baseline of 0.21 in 2020 toward a target of 0.6 by 2030, supported by better material sorting, reuse systems, and industry collaboration. It should be noted that:

- Apparent fluctuations in ‘GHG emission from waste’ is related to the types of projects completed in the given year. The figures and related graph represent a snapshot of completed projects per year. Years in which a complex healthcare building with many interior walls and a complicated structure is completed will have higher emissions and waste volumes than years in which buildings with greater potential for emissions reductions are finalised.

On average, the municipality completes 1–3 buildings per year.

- The ‘recycling rate of construction and demolition waste’ is particularly dependent on the types of materials used in the completed building. The figures from 2022 are based on a single project, which reported a very high recycling rate. The materials used were largely timber.
- The graph for ‘carbon footprint of construction’ is based on metrics related to 3 projects in 2021, and 4 projects that began in 2024.

Figure 2 Impact Analysis

Indicator 1:

GHG-emissions from Waste

Base Year:

2022

Base Level:

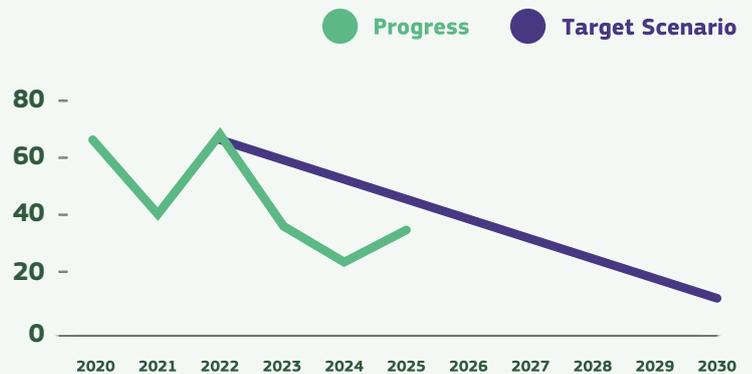
66 million tonnes

Target Year:

2030

Target Level:

10 million tonnes



Indicator 2:

Carbon footprint of construction

Base Year:

2022

Base Level:

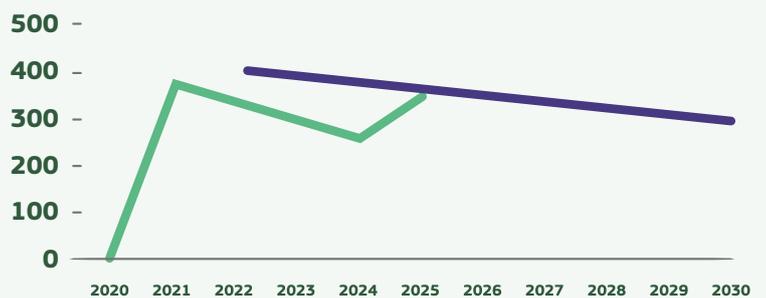
400 kg

Target Year:

2030

Target Level:

25 kg



Indicator 3:

Recycling rate of construction & demolition waste

Base Year:

2020

Base Level:

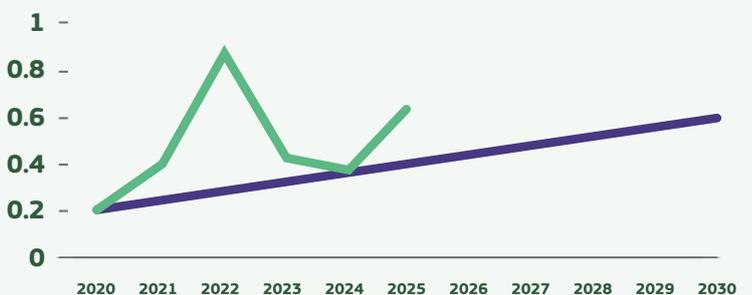
0.21 kg CO² square

Target Year:

2030

Target Level:

0.6 kg CO² square



Market readiness/business model:

Though still under development, the municipality is developing a business model that involves several steps, including logistics and storage solutions as well as digital tools. By 2027 the goal is to combine established commercial models and initiatives with internal public

facilitation and support, primarily based on expected cost savings from reduced waste handling and reduced need for new material purchases. The planned next step in the process is to start preparing the political process for funds and resources needed for a reuse centre in Asker.

Challenges and Lessons Learnt

Enablers to implementation

- **Governance:** Strong political commitment to circular economy under Asker's Climate Action Plan, and cross-departmental coordination through the dedicated Reuse Team, provided clear mandates and accountability.
- **Economic:** National and regional funding schemes (e.g. [DFØ](#) support, the CCRI Expert Support Scheme, and [Klimasats](#)) enabled feasibility studies, pilot activities, and early business model development.
- **Technical:** Use of digital tools such as [Loopfront](#) and collaboration with private reuse actors (e.g. [Sirken](#), [Circular Resource Centre Oslo](#)) accelerated the establishment of data-driven reuse logistics and marketplace systems.
- **Social:** Stakeholder engagement workshops involving a significant number of value-chain actors built shared ownership and strengthened local and intermunicipal collaboration.
- **Legal/Institutional:** Integration of circular requirements into procurement processes and alignment with national regulations facilitated adoption of reuse practices in public projects.

Barriers to implementation

- **Certification and testing costs:** Ensuring quality and safety of reused materials proved resource-intensive and created a barrier for wider adoption.
- **Fragmentation within the municipality:** Different departments initially operated in silos, complicating coordination of logistics, procurement, and reporting.
- **Market immaturity:** Local contractors reported financial disadvantages when offering reuse-based solutions, underlining the need for new incentives and procurement criteria.
- **Capacity limitations:** Establishing logistics and storage solutions required more resources and staff than initially allocated. The municipality lacks access to suitable areas and facilities for storage.
- **Lack of long-term goals and measurement systems:** Clear targets for reuse rates and embedded carbon savings are not yet fully defined.



Lessons learnt

- **Build on existing initiatives and market actors:** Rather than developing everything internally, aligning with established actors and ongoing initiatives accelerates progress, reduces risk, and ensures solutions are relevant to the market.
- **Take small, concrete steps:** While a holistic long-term vision is important, businesses often find it difficult and risky to commit to large and complex projects. Shorter pilots and targeted initiatives make participation more manageable and practical, lowering barriers to engagement.
- **Assemble the bigger picture over time:** Step-by-step projects may seem fragmented at first, but if carefully planned, they will gradually fit together into a comprehensive and systemic approach to circular construction.



Tips for replication

What to replicate?

- Demonstration projects (e.g. Nedre Sem Låve) as testing grounds for certification, documentation and communication of reuse.
- Innovative procurement for digital reuse platforms, integrating marketplace, logistics, and sustainability reporting.
- Engagement of the full construction value chain through co-creation workshops to define solutions collectively.



Who can replicate this?

- Municipalities with active building and demolition portfolios, looking to scale from pilots to systemic solutions.
- Cities and regions where public procurement can influence markets and where partnerships with private reuse actors exist.



What ingredients are needed to replicate it?

- Clear political mandate and allocation of resources for logistics, storage, and coordination.
- Early involvement of procurement departments to embed reuse requirements in tenders and contracts.
- Access to certification and testing facilities, with funding to cover costs.
- Platforms for knowledge exchange and competence development across stakeholders.
- Inter-municipal collaboration to expand marketplaces and ensure interoperability between digital systems.
- Committed contractors willing to engage in reuse practices and take calculated risks to test new solutions.



Resources or contacts available to help?

Circularity Criteria: <https://www.futurebuilt.no/content/download/37011/201575>

Circularity Index: [Download: FutureBuilt Circularity Index](#)

Circular Solution: **Capannori, Italy**

Pioneering Next-Generation Recycling and Territorial Circular Economy

Source: Centro di Ricerca Rifiuti Zero



Size:

46 356

inhabitants



GDP:

Less developed region



Geographical information:

Southern Europe (Tuscany, IT)



Urban-rural predominance:

Intermediate



Innovation ranking:

Moderate Innovator



Sectors:

Circular resource management

Advanced recycling infrastructure

Reuse systems

Sustainable food systems

Green skills development



Time frame:

January 2023 – September 2025

Contact Person:

[Alessandro Pensa](#) | Office for Territorial Promotion - Economic Development - Food Policy and Technology Hub - Circular and Civil Economy and Sustainability department.

More information:

[Capannori | Circular Cities and Regions Initiative](#)



Circular strategies:

reduce

reuse

recover

rethink

recycle

Key facts and figures

Between 2020 and 2024, Capannori reduced residual waste per capita by **24%** (from 67.34 kg to 51.65 kg), preventing approximately

720 tonnes

annually from entering the waste stream.

In its

15-year Zero Waste journey

(2007-2024), the municipality achieved **88.8%** separate collection - maintaining position as Italy's top performer and demonstrating that excellence can be sustained and improved over time.

The municipality is investing

€15 million

in two next-generation recycling platforms for absorbent

**products (10,000 t/year)
and textiles (6,500 t/year),**

targeting completion by **2026**
to close critical material loops.



Solution overview

Capannori is tackling complex waste streams that lack Italian processing capacity, particularly absorbent hygiene products and textiles, which make up significant portions of residual waste—through a €15 million investment in recycling infrastructure funded through Italy's National Recovery and Resilience Plan. Two state-of-the-art platforms, capable of handling 10,000 tonnes per year of absorbent products and 6,500 tonnes per year of textiles, use emission-free technology and automated sorting to close material loops and turn waste into valuable resources.

The circular solution goes beyond infrastructure. It supports SMEs through [Open Circular Living Labs](#), certifies green skills with EXTRAVERT, expands reuse networks for electronic waste, and fosters sustainable food systems via the [Piana del Cibo](#) intercommunal partnership. Coordinated under the [Circular Economy District framework](#), this multi-stakeholder approach demonstrates how territorial circular economy integration can extend far beyond waste management, creating a replicable model for sustainable innovation, resource efficiency, and community engagement.

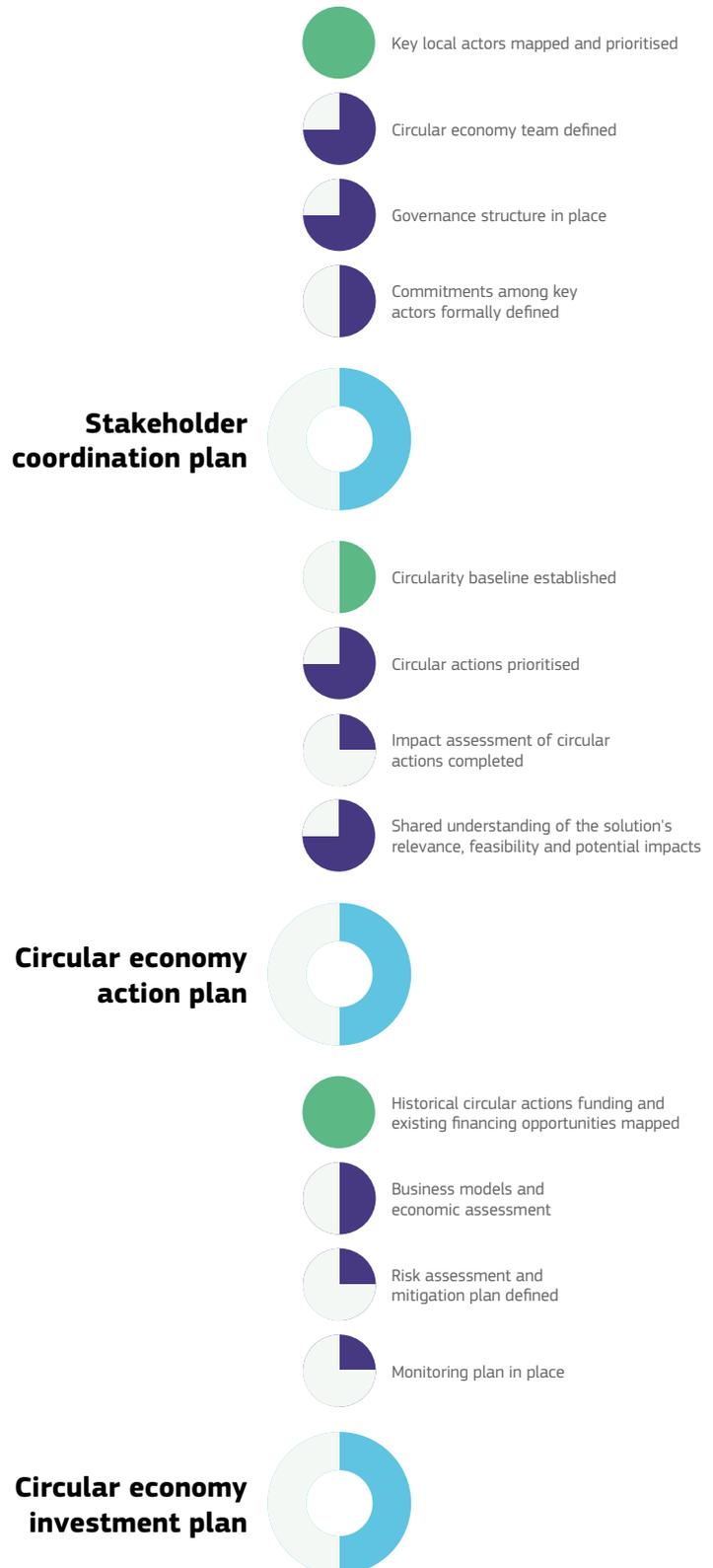
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Key

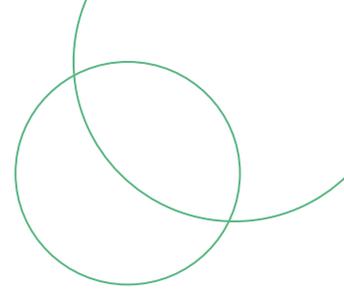
			
Phase:	Map	Design	Implement

			
Progress:	Started	Half-way	Complete





Background and objectives



i Policy context:

Capannori's circular transition is deeply embedded within a multi-level policy framework that aligns local innovation with regional, national, and European ambitions. The municipality adopted its [Zero Waste Strategy in 2007](#) (Delibera n. 44/2007), becoming the first Italian municipality to commit to waste elimination rather than management. This pioneering approach positioned Capannori as both national leader and the third certified Zero Waste city in Europe under [Mission Zero Academy recognition](#).

The "Capannori Circolare 2030" strategy represents an evolution from waste-focused policies to holistic circular economy planning. It establishes ambitious targets: reaching 95% separate collection, significant per capita waste reduction, complete closure of material loops through advanced recycling, systematic integration of reuse centres, and development of innovative markets for circular products. The strategy explicitly connects circular economy principles to climate objectives, recognising resource efficiency as fundamental to decarbonisation.

In January 2025, the Tuscany [Region approved the Regional Plan for Waste Management and Remediation of Contaminated Sites - Regional Circular Economy Plan \(PREC\)](#), providing essential regional framework alignment. Capannori contributes directly to PREC implementation by hosting critical infrastructures identified in the regional plan and piloting governance models designed for territorial scaling across Tuscany. The recent establishment of the [Circular Economy District](#) operationalises this regional-local synergy through dedicated coordination mechanisms.

At the territorial level, the Piana del Cibo intercommunal food policy framework represents innovative multi-municipal cooperation. This partnership with Altopascio, Lucca, Porcari, and Villa Basilica applies circular thinking to food systems, explicitly incorporating the principle "Food is Circularity" into the Intercommunal Food Plan.

× Problem:

Despite strong performance in waste management, Capannori confronts structural challenges that require solutions extending beyond collection optimisation. The most significant challenge involves closing material loops for waste fractions currently without effective valorisation pathways. Absorbent hygiene products (nappies,

sanitary towels, adult incontinence products) represent approximately 3-4% of total urban waste, but constitute a substantial portion of residual waste due to their complex multi-material composition and limited processing infrastructure. Similarly, textile waste accounts for 10-15% of residual waste, with existing reuse networks managing only about 50% of collected clothing effectively.

A second critical challenge concerns territorial economic transformation. [The paper district surrounding Capannori](#), encompassing 12 municipalities and controlling 80% of national tissue production and 40% of corrugated board output, faces simultaneously the pressures of global competition, the opportunities of circular material flows, and the imperative of decarbonisation. While pioneering examples like the [ASCIT-Smurfit Kappa closed-loop partnership](#) demonstrate industrial symbiosis potential, systematic approaches supporting SME circular transition remain underdeveloped.

Skills and competency gaps represent a third structural barrier. The circular economy requires cross-cutting professional capabilities combining technical knowledge, regulatory expertise, and strategic skills.

The fragmentation of circular economy initiatives across multiple administrative levels and sectoral domains creates fourth-order challenges. Despite Capannori's municipal leadership, and the Province's coordinating efforts, comprehensive regional circular economy strategy integration remains incomplete. Different projects operate with distinct timelines, funding sources, governance structures, and stakeholder networks, risking duplication and missed synergies.

🎯 Objectives:

- Establish a separate collection system for bio-waste at the source, targeting a 60% collection rate by the end of 2026, in line with the Municipal Strategy.
- Explore and implement valorisation pathways for bio-waste, reinforcing its contribution to soil health and circular practices.
- Enhance public awareness and stakeholder engagement, strengthening programs with key groups (e.g., HoReCa, schools), fostering collaborations with local businesses, and promoting sustainable agricultural practices among farmers.



Stakeholders

Capannori's Circular Systemic Solution operates through a multi-stakeholder ecosystem coordinated within the Circular Economy District framework.

Solution Leader(s):



Public Authorities

The Municipality of Capannori provides strategic coordination through the Mayor's Cabinet, with the Mayor's second role as President of Lucca Province (until 2024) enabling critical synergies between municipal and provincial levels. The Tuscany Region provides regulatory framework through the PREC (Piano Regionale dell'Economia Circolare).

Supported by:



Private Sector



Public Authorities



Research & Academia



Funding & Advisory Bodies

[RetiAmbiente SpA](#) leads development of the €15 million recycling platforms while [ASCIT SpA](#) manages separate collection services and pay-as-you-throw tariff systems. Ten SMEs participate in Open Circular Living Labs representing cosmetics, woodworking, tourism, footwear, construction, agriculture, and design sectors, with the paper district's major companies exemplified by the ASCIT-Smurfit Kappa partnership demonstrating industrial symbiosis potential.

The Zero Waste Research Centre conducts waste analysis, awards innovation prizes, and delivers training programmes.

[Sant'Anna School of Advanced Studies](#) and [University of Pisa](#) provide circular economy expertise and food system research.

[Caritas Diocesana di Lucca](#) manages food surplus recovery while "Ascolta la mia Voce" ONLUS coordinates the [DaCCaPo reuse centre network](#) providing social inclusion pathways. Primary schools participate in educational programmes while the EXTRAVERT consortium delivers Green Manager certification. The Piana del Cibo network coordinates food policy across five municipalities (Capannori, Altopascio, Lucca, Porcari, Villa Basilica).

The CCRI provides methodology support and peer learning while Interreg Marittimo projects enable cross-border cooperation. While stakeholders are clearly identified and benefit from strong mutual knowledge developed through fifteen years of Zero Waste collaboration, governance mechanisms connecting these diverse actors remain fragmented, with multiple projects operating separate steering committees and parallel coordination meetings. The Circular Economy District framework aims to streamline these mechanisms through integrated coordination structures and shared monitoring systems, though operationalising effective district governance represents an ongoing challenge.



Results and Impact

Despite already ranking among Italy's waste management leaders, Capannori sustained continuous improvement (2020-2024) while simultaneously addressing gaps that collection optimization alone cannot solve. The municipality demonstrated that territorial circular economy requires integrating infrastructure investment, business innovation, and social inclusion—moving beyond waste management to systemic transformation.

1. Infrastructure investment closes material loops

The €15 million PNRR-funded recycling platforms represent Capannori's approach to market readiness: developing infrastructure to close material loops for fractions currently insufficient effective Italian processing capacity. The absorbent product platform will process nappies, sanitary towels, and adult incontinence products, recovering plastic and cellulose as secondary raw materials. The textile platform will combine automated sorting with manual

selection, directing materials toward either mechanical recycling or reuse pathways. Both facilities integrate photovoltaic systems (6,800 m² warehouse) and employ emission-free processing technologies. Market readiness will depend on developing stable demand for recovered secondary materials. The platforms' success requires coordinating separate collection systems to ensuring feedstock quality, maximising recovery processing efficiency, and off-take agreements to secure revenue streams.

2. Waste prevention and separated collection: high-performing systems can still improve systematically

The primary achievement during the 2020-2024 period has been the sustained improvement in waste management performance despite already high baseline levels. Separate collection increased from 82.4% to 88.8%, demonstrating that strong performance can be continuously enhanced through targeted interventions. More significantly, residual

Performance improvement

(2020-2024)

Seperate Collection

86.5% → 88.8%

+2.3 percentage points

Residual Waste per Capita

67.34_{kg} → 51.65_{kg}

-24% reduction

Waste Prevented

~720 tonnes/year

Material Quality

Indicators

Glass Purity

99%

Among highest in Italy

Organic Waste Contamination

2%

Very low contamination

Multi-material Contamination

15% vs 30%
typical

waste per capita decreased by 24%, from 67.34 kg to 51.65 kg, preventing approximately 720 tonnes annually from entering the waste stream. This performance places Capannori substantially below the Italian average (60% reduction) and maintains its position among national leaders in waste prevention and separate collection.

Material quality metrics reveal the effectiveness of the door-to-door collection system and citizen engagement. Glass purity reaches 99%, among the highest rates in Italy, while organic waste contamination remains at only 2%, enabling high-quality compost production. Multi-material contamination stands at 15%, significantly better than the 30% typical in other territories. These quality indicators demonstrate that quantity and quality improvements can be pursued simultaneously through sustained community participation and operational performance.

3. Living Labs translate circular economy into competitive business models

Enterprises across sectors participated in Open Circular Living Labs, moving beyond circular economy workshops to concrete business model development. Five enterprises advanced to intensive coaching, developing implementation plans for circular procurement, waste-as-resource strategies, and new revenue models. EXTRAVERT Green Manager certification creates parallel professional competencies, ensuring territorial capacity for circular economy implementation across enterprises and institutions. The Living Labs methodology offers not prescriptive models but facilitated self-discovery of circular opportunities specific to each enterprise's operations, resources, and markets—demonstrating circular economy as business opportunity, not just environmental compliance.

4. Intercommunal food policy integrates waste prevention with local supply chains

Food system integration through the Piana del Cibo framework has advanced intercommunal cooperation. The Caritas food surplus recovery protocol enables redistribution from school canteens serving over 2,000 meals daily, while educational programmes reach all primary schools within the five-municipality network (Capannori, Altopascio, Lucca, Porcari, Villa Basilica). Local supply chain development for bread and other products demonstrates circular public procurement integration, though quantified surplus recovery volumes and economic impact data require systematic collection mechanisms currently being established through the District monitoring framework.

5. Social enterprises combine environmental outcomes with employment creation

Reuse network ([NaNiNa ONLUS partnership](#)) closes reuse loops while creating employment pathways for disadvantaged populations through repair, refurbishment, and retail operations. In October 2023, the Municipal Reuse System expanded to include DueVolt, a specialized WEEE center managed by Hacking Labs that recovers and repairs electrical and electronic equipment—adding technical infrastructure funded through the EU ReuseMed project (ENI CBC Med program). Designing social economy integration from the start rather than treating social inclusion as project add-on means environmental and social objectives reinforce rather than compete.



Challenges and Lessons Learnt

Enablers to implementation

- **Political:** The Municipality of Capannori views circular economy as fundamental to climate neutrality and territorial competitiveness. The municipality's sustained political commitment across multiple administrations demonstrates institutional continuity that transcends electoral cycles.
- **Governance:** The Circular Economy District coordinates multiple stakeholders. The Zero Waste Research Centre provides continuous monitoring and innovation support, while the Scientific Park hosts circular economy actors enabling knowledge exchange and collaborative project development.

Barriers to implementation

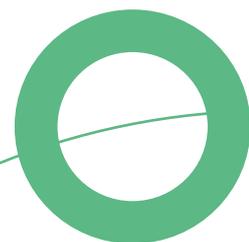
- **Social:** Fifteen years of Zero Waste success creates a challenge in maintaining citizen engagement. It requires continuous innovation in communication and participation mechanisms to avoid complacency.
- **Technical:** Complex waste streams like absorbent products and textiles lack processing infrastructure, requiring substantial capital investment and multi-year authorisation processes. The platforms' 2026 completion timeline reflects authorisation complexity rather than technical constraints.
- **Governance:** Multiple European projects operate with separate coordination mechanisms, reporting requirements, and stakeholder networks. The District framework aims to integrate these initiatives, but operationalising unified governance while respecting project-specific requirements remains challenging.
- **Economic:** SMEs face difficulty accessing circular economy business model innovation support and financing, particularly in the paper district where global competition pressures require simultaneous investment in productivity and sustainability. Limited regional circular product supply chains constrain municipal circular public procurement ambitions.



Success story

In Capannori, the DaCCaPo reuse network is demonstrating that circular economy and social inclusion can advance together through systematic partnership development. Launched in 2011 through collaboration between the Municipalities of Capannori and Lucca, Caritas Diocesana, "Ascolta la mia Voce" ONLUS, and waste management operators ASCIT and Sistema Ambiente, the network has grown from a single pilot centre to three operational facilities managing over 250 tonnes annually of textiles, furniture, and household goods.

This partnership-based methodology enables DaCCaPo to act simultaneously on multiple fronts. Already, 84 tonnes/year of textiles and 80-100 tonnes/year of furniture are diverted from disposal, disadvantaged populations gain employment through repair and refurbishment activities, and citizens can access affordable reused goods near collection centers. The 2024 expansion to WEEE reuse demonstrates continued growth. By combining waste prevention, social enterprise development, and community engagement, Capannori is proving that reuse networks can deliver environmental results while creating inclusive economic opportunities, a model now being scaled toward the planned municipal "Cittadella del riuso" by 2030.





Lessons learnt

- **Sustaining performance improvement after achieving national leadership required moving beyond waste management to systemic circular economy thinking.** The municipality responded by establishing the Circular Economy District to coordinate infrastructure development, SME innovation, skills training, and food policy within integrated governance. Complementing the Zero Waste Research Centre's technical analysis with Living Labs methodology, Green Manager certification, and intercommunal cooperation through Piana del Cibo created multiple entry points for continued innovation. This experience shows that transitioning from sector-specific excellence to territorial circular economy requires institutional frameworks connecting diverse actors and initiatives that previously operated independently.
- Textile waste remaining at 10-15% of residual waste despite strong separate **collection rates, demonstrating that collection optimisation alone cannot solve complex material challenges.** The existing reuse network manages only 50% of collected textiles effectively, with the remainder becoming difficult waste. The municipality addressed this through data-driven infrastructure planning: analysing residual waste composition, quantifying reuse network limitations, and securing funding for a new textile sorting platform integrating automated and manual sorting to maximise both recycling and reuse pathways. This demonstrates that closing material loops for complex waste streams requires combining separate collection, reuse networks, and appropriate processing infrastructure, with performance gaps in existing systems justifying targeted.
- **The Mayor's dual role as President of Lucca Province (until July 2024) proved essential for advancing the recycling platforms through complex regional authorisation procedures.** This institutional positioning enabled coordination between municipal, provincial and regional priorities and requirements. However, authorisation processes extending beyond initial timelines revealed that even favourable political conditions cannot fully overcome procedural complexity when multiple administrative levels and surrounding municipalities require consultation. The experience highlights that multi-level institutional coordination accelerates but does not eliminate governance complexity, requiring realistic timeline planning and continuous stakeholder dialogue throughout.
- **Coordinating multiple European projects created both opportunity and fragmentation.** Each project brought essential resources, methodologies, and transnational learning, yet operated with distinct steering committees, reporting cycles, and stakeholder engagement processes. The Circular Economy District framework addresses this by creating shared coordination mechanisms, integrated communication platforms, and unified performance monitoring systems connecting project outputs to territorial circular economy objectives. Ongoing implementation reveals that systematic monitoring frameworks enabling cross-project synthesis and learning require dedicated resources and institutional commitment beyond project-specific requirements, representing an investment in territorial coordination capacity rather than administrative burden.



Tips for replication

What to replicate?

1. The systematic methodology for sustaining and improving already-strong waste management performance through continuous innovation, demonstrating that leadership positions require ongoing commitment rather than one-time achievements.
2. The Circular Economy District governance model as an approach to coordinate infrastructure investments, SME innovation support, skills development, and social inclusion within integrated territorial framework.
3. The DaCCaPo reuse network approach combining environmental outcomes with social economy development through structured partnerships between municipalities, waste operators, social enterprises, and civil society organisations.
4. The data-driven infrastructure planning methodology: analysing residual waste composition, quantifying existing system gaps, and designing targeted facilities responsive to documented material flow challenges.



Who can replicate this?

Regional and local authorities with established waste systems seeking to transition from collection optimisation to comprehensive circular economy integration, especially territories with industrial districts offering industrial symbiosis potential and municipalities willing to coordinate multi-stakeholder initiatives across environmental, economic, and social dimensions.



What ingredients are needed to replicate it?



1. **Sustained political commitment and institutional continuity:** Establish circular economy strategies with multi-year horizons that transcend electoral cycles. Create institutional frameworks to provide continuity mechanisms independent of political leadership changes.
2. **Multi-stakeholder coordination infrastructure** (recognising this as ongoing work): While stakeholder identification and mutual knowledge may exist through years of collaboration, effective governance requires deliberate investment in coordination mechanisms. Plan for dedicated resources to integrate separate project steering committees, align reporting requirements, create shared monitoring systems, and establish unified communication platforms. This coordination capacity development represents essential infrastructure often underestimated in project planning and budgeting.
3. **Integrated financing approach:** Combine European, national, regional, and municipal funds and budgets within coherent investment strategies. Plan for long authorisation timelines (2-3 years) when developing advanced recycling infrastructure, ensuring financial sustainability throughout extended development periods.
4. **Systematic monitoring and adaptive management:** Implement continuous waste composition analysis identifying material flows lacking valorisation pathways. Use performance data to justify targeted interventions and demonstrate results. Develop monitoring frameworks connecting multiple projects and initiatives to territorial circular economy objectives, recognising that this synthesis work requires dedicated capacity beyond individual project requirements.
5. **Social economy integration from design phase:** Build reuse networks, repair services, and surplus recovery systems through partnerships with social enterprises and civil society organisations rather than treating social inclusion as add-on. Design employment pathways, training programmes, and inclusive participation mechanisms as core circular economy components.

Circular Solution: **Castilla y León, Spain**

Championing the transition towards bio-based fertilisers

Source – Pilot's own image



Size:

~ **2.4 million**
inhabitants



GDP:

Eurostat classification:
Less developed region,



Geographical information:

Southern Europe



Urban-rural predominance:

Intermediate



Innovation ranking:

Moderate



Industry presence

Agriculture, agri-food



Sectors:

Bioeconomy

Food systems

Water

Nutrients



Time frame:

January 2023 – September 2025



Circular strategies:

reduce

rethink

recover

regenerate

Contact Person:

[Jesús Ángel Díez Vázquez](#), Head of Programs at
Fundación Patrimonio Natural+

More information:

[Castilla y León | Circular Cities and Regions Initiative](#)

Key facts and figures

220+

stakeholders mobilised through the Circular Economy Pact by **2025**

complemented by the Bioeconomy Stakeholders' Group (14 members) and regional CE/bioeconomy stakeholder mapping.

1

financial modelling tool delivered (Excel-based CAPEX/OPEX sensitivity tool for nutrient recovery).

Nutrient recovery integrated into **CEAP 2024–2026**, supported by Recovery and Resilience Facility (RRF) **investments in biowaste management.**

Pilot composting conditions suggested as feasible by Green Assist expert report but not yet validated in real conditions.



Solution overview

Castilla y León faces a heavy reliance on imported fertilisers, while vast amounts of digestate, pruning residues, and wood ash remain underutilised or are sent to landfill. To address this challenge, the region is pioneering a circular approach that transforms these organic and mineral residues into high-quality biofertilisers through composting and co-processing.

Key achievements include demonstrating technical feasibility under regional conditions, developing a financial modelling tool to assess business viability, and engaging over 220 stakeholders through a Circular

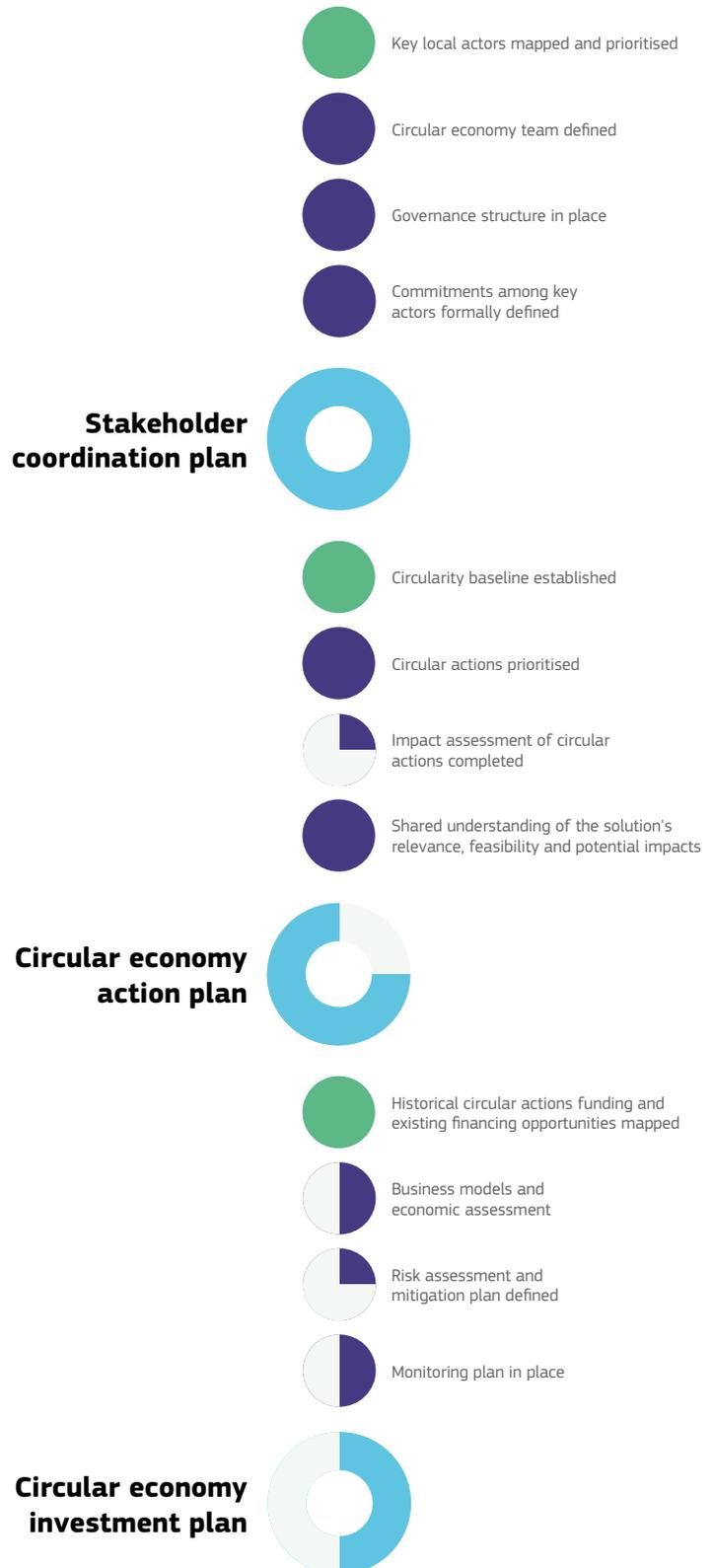
Economy Pact, supported by targeted bioeconomy working groups. Pilot projects are underway in Salamanca under the Horizon “United Circles” project, with additional activities in Valladolid.

While legal restrictions still limit the use of digestate and ash as biofertiliser feedstock, the solution is driving measurable progress toward regenerative agriculture and a stronger regional bioeconomy. By turning waste into valuable resources, Castilla y León is creating a model for sustainable nutrient management and circular growth.

✓ CCRI Methodology Step Completion Status:

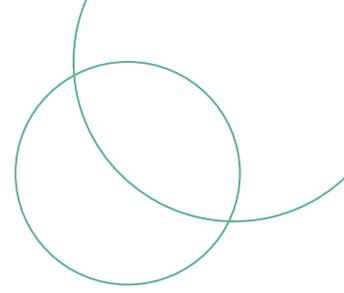
The [CCRI Methodology](#) is a guidance tool for policy and decision-makers in local and regional government. It describes key activities and milestones in the successful development of a Circular Solution, divided into three phases – Map, Design, and Implement. The visual checklist provides an at-a-glance view of how Castilla y León's circular solution is progressing towards these outputs.

Key			
Phase:	 Map	 Design	 Implement
Progress:	 Started	 Half-way	 Complete





Background and objectives



i Policy context:

Castilla y León's circular solution is anchored in a multi-level policy framework. At EU level, the [2019 Fertilisers Regulation](#) provides the reference for nutrient recovery and potential ash use, guiding compliance pathways for biofertilisers. At regional level, the [Circular Economy Strategy 2021–2030](#) and its [Action Plan 2024–2026](#) prioritise nutrient valorisation and biowaste management, with RRF investments accelerating separate collection and composting capacity.

The [RIS3 2021–2027](#) positions the bioeconomy as a strategic field, aligning R&I with market uptake, while the [2025 Circular Economy Pact](#) mobilises more than 220 stakeholders to coordinate implementation. Together, these instruments enable pilots on digestate composting, co-processing with pruning residues and wood ash, and business-case testing via a financial modelling tool.

However, current national classifications, i.e. digestate as waste and restrictions on the use of ash, still limit product marketability, underscoring the need for regulatory clarification to scale impact.

× Problem:

The initial problem in Castilla y León was the region's dependence on imported mineral fertilisers combined with the underutilisation of local biomass resources. Large quantities of manure and slurry were not well managed, without development of cascade uses such as anaerobic digestion to produce biogas and digestate. Also, a growing quantity of fly ash from biomass boilers use in urban district heating was either landfilled or stored with no added value, creating environmental burdens and costs. At the same time, farmers needed affordable and sustainable alternatives to chemical fertilisers, but there was no system in place to transform local residues into safe products. **The circular solution developed with CCRI support directly tackles this by testing nutrient recovery pathways, combining technical feasibility studies, financial modelling, and stakeholder mobilisation to turn waste streams into marketable biofertilisers.** Expected impacts include the avoidance of landfilling of residues, improved waste management, reduced reliance on mineral fertilisers, improved soil fertility and lower emissions.

🎯 Objectives:

- Valorise digestate, pruning residues, and ash into biofertilisers.
- Reduce landfill rates and recover nutrients from local waste streams.
- Support regenerative agriculture and strengthen the regional bioeconomy.



Stakeholders

Solution Leader(s):



Public Authorities

The Castilla y León CSS is coordinated by [Fundación Patrimonio Natural](#), under the [Regional Ministry for Environment, Housing and Territorial Planning](#), which also steers the alignment of the CSS with the CEAP. Municipal partners—[Valladolid](#) and [Salamanca](#) city councils and provincial household-waste plants—bridge local biowaste streams with pilots, complemented by the [Ávila waste consortium](#).

Supported by:



Private Sector



Research & Academia



Funding & Advisory Bodies



Public Authorities

Market uptake is channelled through fertiliser producer [Mirat \(HORIZON United Circles Partner\)](#) and major agricultural cooperatives ([Copiso Soria](#), [AGROPAL](#), [COBADU](#)) as end-users.

Public-Private operators ([SOMACYL](#), [Aqualia](#), [FCC](#), [Urbaser](#), [Valora Group](#)) contribute treatment capacity and logistics across waste and wastewater systems.

R&I is led by [CARTIF](#), [ITACyL](#), and the Universities of Burgos and Salamanca, while engineering SMEs ([Kerbest](#), [1A Ingenieros](#)) and bioresource SMEs ([Biogasnalía](#)) translate designs into operational pilots. Cross-sector clusters ([Vitartis](#), [AEICE](#)) and the [Bioeconomy Stakeholders' Group](#) provide coordination platforms. External enablers—Green Assist experts and [Horizon "United Circles"](#)—add technical/financial modelling and demonstration pilots, ensuring coherence between policy, operations, and market uptake.



Results and Impact

As part of Castilla y León's solution, a set of monitoring indicators has been established to capture results and measure impact, as shown in the table below. These indicators highlight key areas where the solution drives

progress, building on historically positive trends and offering a framework to track the continued enhancement of the region's bioeconomy and regenerative agriculture.

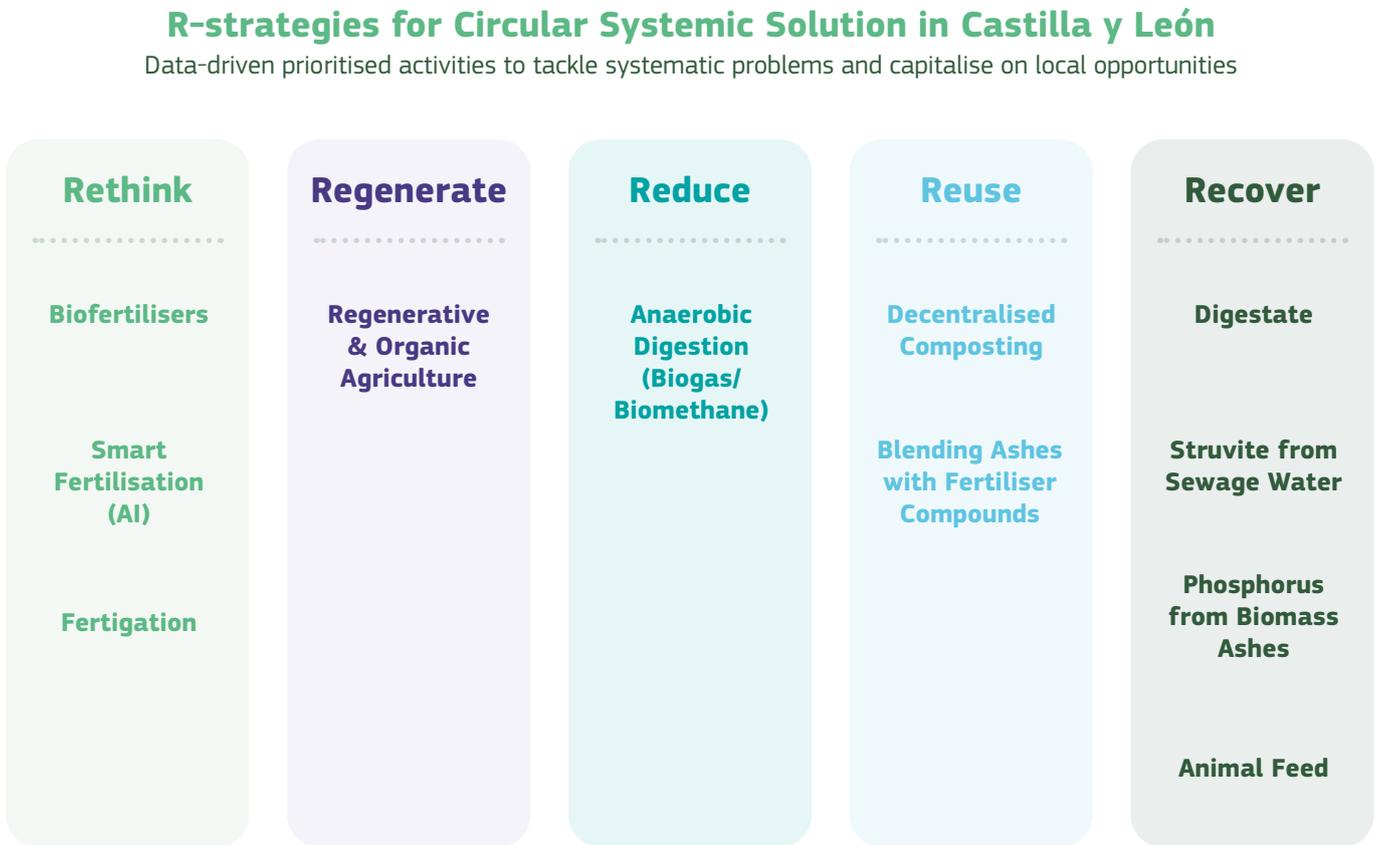
Table 1: indicator set suggested to monitor CSS impact over time

Indicator Category	Indicator	Unit
Implementation (Output Indicators)	Organic crop production	ha
Implementation (Output Indicators)	Composting plants (number of facilities)	No.
Implementation (Output Indicators)	Pesticide use in agriculture	Metric tonnes (Mt)
Implementation (Output Indicators)	Inorganic fertilisers consumption	Metric tonnes (Mt)
Implementation (Output Indicators)	Biogas plants (number of facilities)	No.
Impact Analysis	Greenhouse gas emissions from Agriculture	kt CO ₂ -eq
Impact Analysis	Agricultural waste	Metric tonnes (Mt)
Impact Analysis	Food waste	Metric tonnes (Mt)
Impact Analysis	Gross nutrient balance: Nitrogen	kg/ha
Impact Analysis	Gross nutrient balance: Phosphorus	kg/ha

Considering recent data trends, the circular solution in Castilla y León has identified and prioritised a range of strategies to enhance regional circularity, based on technology readiness,

costs, and funding potential. **Figure 1** illustrates these solutions and the circular R-strategies they represent.

Figure 1: R-strategies options for enhancing circularity in the regional context



These circular solutions are being implemented across the region through a mix of public and public/private efforts, at varying maturity levels. Tools such as SATIVUM, linked to the European Commission’s Farm Advisory Tool for nutrients (FaST), are helping farmers reduce fertiliser use and prevent overfertilisation. Organic farming and regenerative agriculture are on the rise, contributing to progress toward circularity targets.

Anaerobic digestion is emerging as a key driver for biofertiliser production and cascading use of organic residues. Currently, 15 new biogas/biomethane plants have received environmental permits, with five now operational. Developing digestate-based, well-balanced biofertilisers is a major regional challenge for the coming years.

The forest biomass combustion industry is expanding, supporting urban district heating and generating a new ash stream. These ashes present potential as a resource for phosphorus recovery or blending with digestate to produce biofertilisers, further advancing circular nutrient management.

Technical feasibility studies by Green Assist have confirmed that digestate composting with bulking and aeration is viable, while fly ash can be incorporated up to ~20% under tested conditions. The Excel-based business model tool developed under Green Assist enables investment-ready analyses of CAPEX, OPEX, logistics, and price sensitivity, supporting concrete decision-making.

Governance for regional circularity has also strengthened: over 220 stakeholders are actively engaged through the Circular Economy regional Commitment, complemented by a

14-member Bioeconomy Stakeholders' Group and regional mapping initiatives. The CEAP 2024–2026 marks the first triennial plan to implement the Circular Economy Strategy (2021–2030), with major RRF-backed investments planned for biowaste collection and composting infrastructure.

Pilot projects are translating these strategies into action. Under Horizon “United Circles” project, a circularity hub in Salamanca is developing biofertilisers from household waste and industrial/sewage streams. The INTERREG SUDOE “Endorse” project is advancing phosphorus recovery from wastewater, showcasing the region’s commitment to innovative, circular nutrient management.



Market readiness/ business model:

Composting processes have been successfully validated under local conditions, demonstrating a viable technical pathway for producing biofertilisers from digestate and other residues. Current regulatory restrictions on digestate and ash use limit market availability, highlighting opportunities for policy support and increased farmer engagement to enable commercial uptake. The solution provides a strong foundation for scalable business models, with proven processes and tools ready to support investment and future market expansion.



Challenges and Lessons Learnt



Enablers to implementation

- **Political:** Strong commitment under the CEAP 2021–2030 and CEAP 2024–2026 has provided a clear framework for nutrient recovery.
- **Technical:** Composting trials demonstrated technical feasibility of nutrient recovery from digestate and ash.
- **Economic/Financial:** The Excel-based financial tool offers a concrete basis for investment analysis, while funding from the Just Transition Fund and Horizon Europe enabled the first pilots to start and build momentum.



Barriers to implementation

- **Regulatory:** Digestate is still legally a waste in Spain, preventing its use as a recognised fertiliser. Ash is classified under EWC 10 01 03, which excludes it from composting and fertiliser markets.
- **Economic/Technical:** Logistical costs for digestate handling remain high without solid–liquid separation.
- **Social:** Concerns around biogas and digestate facilities, together with scepticism from farmers, make uptake more difficult.



Success story

A major achievement of CCRI support was the delivery of an Excel-based financial modelling tool for nutrient recovery, developed in collaboration with **Green Assist**. Prior to 2023, Castilla y León had primarily focused on technical feasibility, without a clear way to assess business viability. The tool changed this by enabling users to test CAPEX, OPEX, logistics, and nutrient pricing scenarios, providing the first quantitative insight into economic opportunities and risks.

While a full investment plan is still in development, the tool represents a **step-change for the region**. It equips **Fundación Patrimonio Natural, SMEs, and cooperatives** with a practical instrument to understand financial implications, and offers policymakers a solid foundation for future decision-making. What began as a technical project has evolved into a resource that makes the circular solution **economically tangible and actionable**, supporting investment readiness and strengthening the case for scaling nutrient recovery initiatives.



Lessons learnt

- **Regulatory clarity is essential.** The pilot showed that technical feasibility alone is insufficient. Without reforms on digestate and ash status, scaling is blocked. CCRI support helped Castilla y León clarify these barriers and highlight them through European-level exchanges.
- **Financial modelling enables better planning.** The Excel tool from Green Assist allowed stakeholders to test different CAPEX, OPEX, and pricing scenarios. Combined with the CCRI Self-Assessment Tool, this gave the region a clearer picture of risks and opportunities, supporting more credible investment planning.
- **Engagement of local actors is crucial.** Farmers remain hesitant, but their involvement is key for market uptake. Evidence from stakeholder mobilisation under the Circular Economy Pact (>220 signatories) and the Bioeconomy Stakeholders' Group (14 members) showed the value of building trust and involving agricultural cooperatives early in solution design. However, acceptance issues around biogas and digestate facilities persist, underlining that engagement cannot be a one-off exercise but must be continuous.
- **Participation in CCRI strengthened governance capacity.** For Castilla y León, the structured steps of the CCRI Methodology and peer exchanges helped consolidate their systemic approach.



Tips for replication

What to replicate?

- **Integrating technical validation with economic assessment:** In the Castilla y León region, composting and ash trials were combined with a financial modelling tool to evaluate CAPEX, OPEX, logistics, and pricing scenarios, ensuring both technical feasibility and business viability.
- **Establishing strong governance through public–private collaboration:** Mechanisms such as the Circular Economy Pact effectively mobilise and align diverse stakeholders, creating a supportive ecosystem for circular initiatives.
- **Adopting a stepwise deployment strategy:** Begin with decentralised pilots, then scale to regional coordination hubs to maximise efficiency, policy alignment, and impact.



Who can replicate this?

Regions with a strong agricultural base, dependence on imported fertilisers, and underused biomass residues are best positioned. Replication is most suitable for medium or large regions with strong policy frameworks and fertiliser or waste treatment industries. Regions with active bioeconomy strategies or supportive political backing are especially likely to succeed.



What ingredients are needed to replicate it?

- **Resource mapping:** A detailed inventory of biowaste and ash flows is needed to design effective systems and treatment plants properly.
- **Digestate separation infrastructure:** Investments in solid–liquid separation can reduce logistical costs and improve process efficiency.
- **Legal clarity:** Clear end-of-waste criteria for digestate and ash are essential to allow market uptake of biofertilisers.
- **Blended funding mix:** Early stages may rely on EU and regional grants, while scale-up will require blended finance and possibly PPP arrangements.
- **Governance and coordination:** Cross-ministerial governance (environment, agriculture, economy) together with local cooperatives and SMEs ensures balanced decision-making and stronger buy-in.



Resources or contacts available to help?

[Green Assist](#) deliverables (technical feasibility studies, business model tool).

Circular Solution: Flanders Region, Belgium

Making Circular Buildings A Reality - The Zoersel Library Pilot

Plan for the Zoersel Library renovation
Source: Pilot's own image



Size:

6.9 million

Zoersel municipality 22,500 inhabitants



GDP:

Flanders: per capita Euro 47 300



Geographical information:

Northern Europe



Urban-rural predominance:

Flanders has both urban and rural municipalities; the focus of this pilot was on small to medium-sized municipalities (up to 50,000)



Innovation ranking:

Leader



Sectors:

Construction and buildings



Time frame:

September 2022 – October 2025



Circular strategies:

reduce

reuse

recycle

rethink

regenerate

Contact Person:

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More information:

[Flanders | Circular Cities and Regions Initiative](#)



Solution overview

Circular Flanders is a leader in circular economy action, initially aiming to embed circular principles into the Flemish Local Energy and Climate Pact, a climate framework adopted by most municipalities. When policy updates stalled, Flanders shifted focus to collaboration with the Association of Flemish Cities and Municipalities, creating and sharing circular construction guidelines and tools, and testing them through a demonstration project in Zoersel. Under a Horizon Europe project, a public library in Zoersel is being renovated, transforming the building into a circular, energy-efficient, and socially engaging space. Acting as a learning laboratory, the project demonstrates how circular design, procurement, and material reuse can be applied in practice, offering a replicable model for other municipalities across the region.

Interreg
Europe



Co-funded by
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KARMA



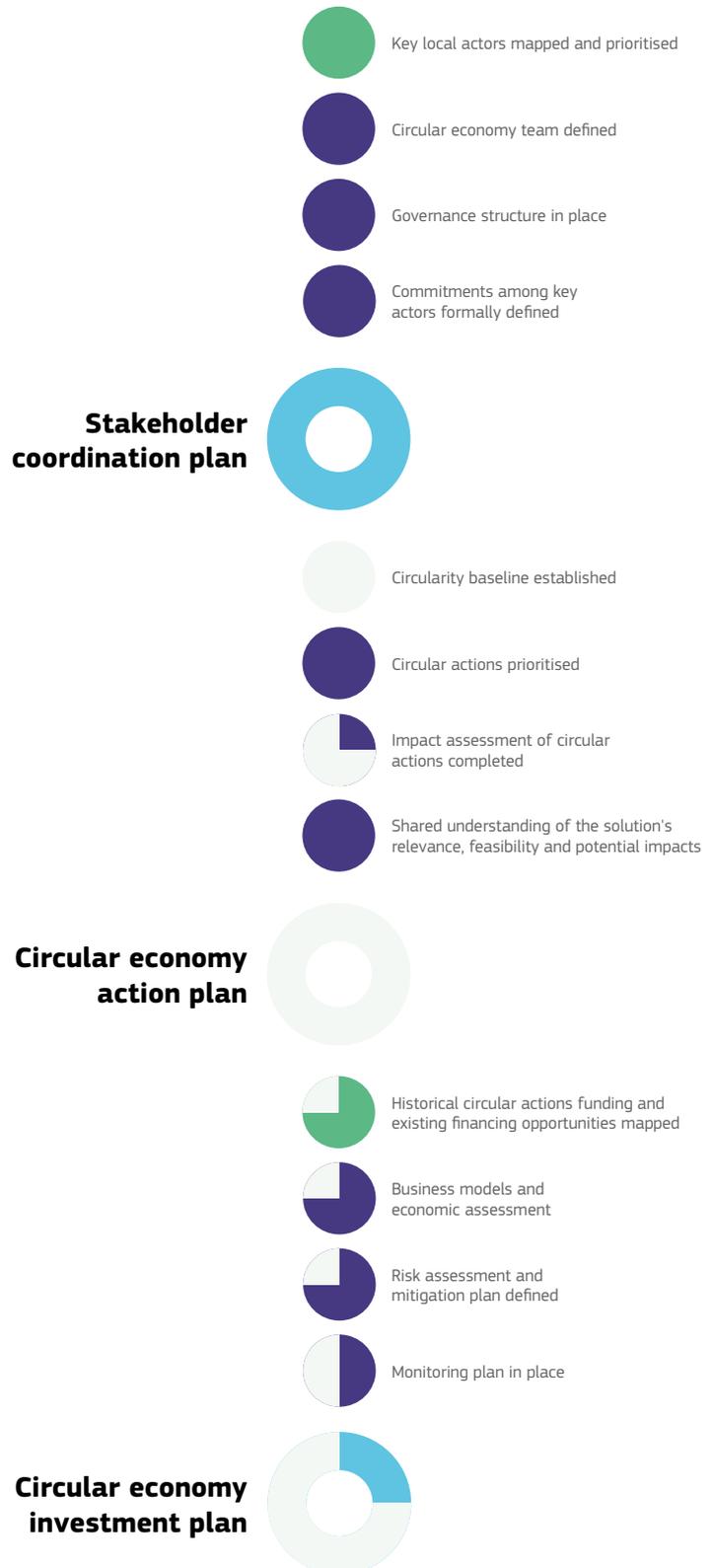
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✓ CCRI Methodology Step Completion Status:

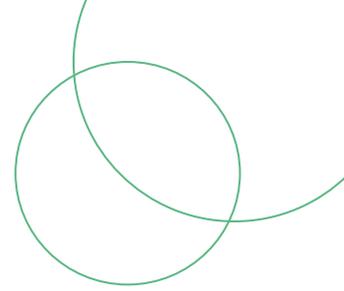
The [CCRI Methodology](#) is a guidance tool for policy and decision-makers in local and regional government. It describes key activities and milestones in the successful development of a Circular Solution, divided into three phases – Map, Design, and Implement. The visual checklist provides an at-a-glance view of how the Zoersel Library demonstration project is progressing towards these outputs.

Key			
Phase:	 Map	 Design	 Implement
Progress:	 Started	 Half-way	 Complete





Background and objectives



i Policy context:

Flanders is a leader in climate and circular economy policies. The platform [Circular Flanders](#), hosted by the Public Flemish Waste Agency, embodies the joint ambitions and actions of a broad range of stakeholders. One key policy instrument in Flanders is the [Flemish Local Energy and Climate Pact](#) (LECP), which brings together nearly 300 municipalities in local but regionally coordinated action.

Throughout the duration of the CCRI support, the Flemish policy context evolved. The initial focus on the contribution of circular economy (applied to building and construction) to the LECP looked very promising, with strong political support, financial schemes and additional priorities for the need to be prudent with the use of critical raw materials and the importance of the role of social economy enterprises (see e.g. [social-circular hubs](#)). The support period also coincided with the Belgian Presidency of the EU, providing Flanders even more visibility in demonstrating its leadership role.

After the 2024 elections, regional priorities shifted. Albeit circular economy remains high on the agenda and local authorities continue to play a pivotal role, the LECP as the guiding supportive framework deemed less relevant and budget constraints led to both less investments in CE and in less climate mitigation and adaptation support schemes.

× Problem:

Circular building and renovation still tends to be more expensive in terms of upfront investment costs ([typically 10-15% - but sometimes up to 70%](#)). Even though such costs can be partially recouped in the maintenance and running phase, this is difficult to justify for municipalities operating with annual budget cycles. Circular building and renovation are also still quite uncommon in smaller municipalities, which do not necessarily have the capacity, technical experience and/or funds to do so. At the same time, the smaller communities constitute the majority of the Flemish population (up to three quarters) and receive 60% of the regionally distributed allowances and subsidies by the Flemish government. For the implementation of circular and climate action we thus need to consider the daily experiences and structures of smaller-sized cities.

🎯 Objectives:

- Maintain political momentum for circular economy in Flanders (framing circularity, climate action and circular-social economy as enablers for a thriving and resilient region), despite the change in political priorities.
- Apply these principles through a demonstration project, with an aim to create conditions and insights that make circular buildings (e.g. a library and the wider municipal building stock) feasible and more concrete.





Stakeholders

Solution Leader(s):



Public Authorities

Different stakeholders were involved in the implementation of this solution. [Circular Flanders \(CCRI Pilot\)](#) is a part of the Public Flemish Waste Agency, a regional governmental body who formally applied to the CCRI, providing an interface between policy and practice, fostering action agenda's, finance, communication and research and more. The Association of Flemish Cities and Municipalities acted as a multiplier and knowledge broker, instrumental to the preparation and dissemination of the publication and follow-up workshops.

Supported by:



Public Authorities



Funding & Advisory Bodies



Private Sector



Research & Academia

They helped in the identification and onboarding of the Municipality of Zoersel ("Gemeente Zoersel") as a key beneficiary of the CCRI Technical Assistance (provided by [VITO](#), the Flemish Institute for Technological Research).

Before collaborating with the CCRI, Zoersel was collaborating with [Kamp C](#) who provided advice on the circular public procurement of a library, which was being contracted by [Cuypers & Q](#) (Architects) and [Beneens](#) (Building company).

Additional stakeholders have been involved in the debate on the merits and potential of combining circular building principles and climate policies during the CCRI Pilot years. Most importantly, the Flemish Agency on Energy and Climate, the Department of Home Affairs, the department of Environment and the Agency for Entrepreneurship and Innovation.



Results and Impact

Results

WHAT

Flanders and the Association of Flemish Cities and Municipalities have successfully built a lasting framework to promote circularity in the built environment across municipalities. Their joint efforts have increased awareness, provided practical guidance for local governments, and supported a concrete demonstration project showcasing how circular principles (depicted in Figure 2 below) can be applied in public construction.

Figure 2: Five principles for circular construction



Source: Based on the [Brochure](#) 'Local circular construction: starting with circularity in your municipal construction and renovation projects' developed by Flanders, Association of Flemish Cities and Municipalities and CCRI.

WHY

Demonstrating that a small municipality such as Zoersel can successfully implement circular principles sends a powerful message: if they can do it, so can we. Renovating a public building like a library to showcase circular principles not only creates visibility and social value but also inspires younger generations who frequent these spaces. Libraries themselves embody circularity through the sharing economy, reinforcing the concept. Overall, these efforts strengthen regional capacity for circular construction and provide a replicable model for other municipalities.

HOW

The joint efforts of Flanders, the Association of Flemish Cities and Municipalities, and Zoersel have strengthened regional capacity for circular construction, produced practical guidance, and generated replicable lessons for cost-efficient circular public buildings.

- **Translate circularity for local realities: Circular Construction Guidance.** A key output was the '[Local circular construction](#)' brochure developed by Flanders, the Association of Flemish Cities and Municipalities and the CCRI. It provided accessible and practical guidance on circular buildings, bringing the circular economy dimension into the mainstream of local climate policies. Its publication and dissemination in both Dutch and English have extended its reach across the region to cities such as Kortrijk, Diest and Mechelen.
- **Demonstrate circular principles: Public procurement of library renovation in Zoersel.** The demonstration project turned the brochure's principles into practice, generating key insights (detailed in Section 1.5). A public procurement tender was launched, with the winning and retained bid was awarded due to its strong technical scores on circular economy and energy efficiency, however the upfront investment costs were substantially above those budgeted by the municipality. The project provided valuable insights on balancing circular design quality with cost constraints and the process helped identify cost optimisation strategies and circular procurement solutions applicable to future projects.
- **Replicate and upscale: design a Digital Building Logbook.** To manage future circular buildings, Zoersel explored the use of a Digital Building Logbook (DBL). The approach demonstrates how digital tools can support data-driven decisions on maintenance, renovation, and material reuse. A tailored report was prepared, providing a framework that Zoersel and other municipalities can adapt to integrate circular principles into asset management systems. A simplified format and set of parameters and integration steps was proposed for testing by a regional group of property managers.

Impact:

Sustaining circular progress in Flanders

- Flanders and the Association of Flemish Cities and Municipalities have continued to champion circular economy practices among local authorities. Through dedicated sessions and national events, over **10 Flemish municipalities and 60 local community representatives** engaged directly with CCRI principles, reinforcing regional commitment to circularity.
- Flemish partners also shared their experiences in key European and international events — including the '[Translating the European Green Deal into Local Action](#)' Conference (March 2024) and the [World Circular Economy Forum](#) (April 2024) — showcasing how regional coordination can accelerate local action.

Engagement at a glance:

10

**Flemish municipalities
actively engaged**

1

**demonstration
project implemented**

60+

**participants reached via events of
Flanders and the Association of
Flemish Cities and Municipalities**

2

**published resources
(ambitions map and brochure)**

Demonstrating Circularity in Practice: The Zoersel Library

- Demonstration of how circular principles can deliver tangible environmental and social value, even within tight municipal budgets. The project improved functional space, reduced energy use, and preserved the building's long-term asset value.
- A Digital Building Logbook was also developed to professionalise building management and enable data-driven decisions on maintenance, reuse, and investment planning.

Circular renovation of the public library in numbers:

Improved functional
space:

500 m²

(expanded library, toy library,
workspaces, winter garden)

Estimated reduction
in GHG emissions:

~250 tons

CO₂/year avoided in total

Annual energy savings:

**~200,000
kWh/year**

saved through (roof/floor)
insulation & relighting

Reduced

**construction and
demolition waste**

and enabled reuse of
building materials

(incl. furniture, wooden flooring,
panelling, and staircase elements).

Long-term benefit:

maintained asset value of the
public library, improved user
experience and renewed appeal
of Zoersel's town centre.

Together, these results confirm that circular construction can be both practical and scalable. Flanders' experience shows how coordinated regional action, accessible guidance, and hands-on demonstration can accelerate the circular transition across Europe's municipalities.



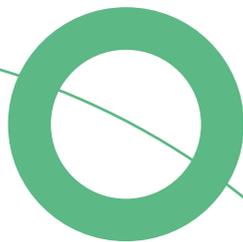
Challenges and Lessons Learnt

Enablers to implementation

- **Local political ambition as a foundation:** Broad and cross-party political buy-in is essential for initiating and realising circular building projects.
- **Social momentum:** The visibility and central location of the demonstration building/site made it a social project. Citizen and stakeholder preferences were actively integrated throughout the process.
- **European initiatives as catalysts:** Connection to EU-wide initiatives/networks/projects (e.g. [EHHUR](#) project) helped to break silos and gain visibility, which can lead to snowballing support.

Barriers to implementation

- **Immature circular market:** The market for circular products and materials remains underdeveloped, leading to quality, supply, and pricing challenges. Funding gaps are often bridged through ad-hoc grants or subsidies.
- **Time-related cost increases:** Complex circular projects are prone to delays, which can account for up to 50% of cost increases, often more than the added cost of circular specifications themselves.
- **Limited local capacity:** Availability of knowledgeable staff at municipal level is key – but not evident for smaller and medium-sized municipalities.
- **Rising construction costs:** Stricter standards and market conditions have increased building costs (estimated at ~20% more expensive over 5 years). Municipalities need to plan financing mechanisms accordingly.





Lessons learnt

- **Capacity can be built through partnerships:** The Zoersel experience shows that even smaller municipalities with little capacity/experience can implement circular projects by temporarily engaging external expertise. Hiring a knowledge broker (Kamp C) proved effective in guiding procurement and connecting with suppliers.
- **Start with existing public buildings:** Renovating existing buildings is an effective entry point for circular practice because it:
 - Builds on sites with local heritage and emotional values.
 - Enables public authorities to set an example, to 'lead-by-doing'
 - Offers opportunities for community participation and education (e.g. site visits).
- **Timing matters for political commitment:** Two years of preparation were needed to approve renovation specifications – early alignment with decision-makers is critical.
- **Frame circularity as an enabler of decarbonisation and of social wellbeing:** Circular projects – such as the one of Zoersel – should be presented as projects with multi-benefits (environmental, social and economic), and drivers of decarbonisation, social wellbeing, and economic resilience.
- **Adopt a whole-life perspective:** Circular building/renovation of public buildings is much more than just focusing on reduction of construction and demolition waste; it addresses multi-functionality, lifespan and flexibility. The costs are more than the initial investment cost, it is important to consider management and maintenance to demonstrate the benefits of circular building. Including specific reference to Life Cycle Costs (LCC) in tender dossiers and as part of award criteria helps capture the full value of circular design.
- **Integrate cost control early:** Cost optimisation is most effective in the *pre-award* stage of procurement; once a tender is awarded, major cost reductions are difficult to achieve.
- **Ensure long-term financial viability:** Circular building renovation remains relatively costly due to its 'pilot' nature; these additional costs are difficult to be borne for smaller and medium-sized municipalities which face challenges in funding; a need to look for structural funding, e.g. through dedicated support programmes and/or earmarking of European funds (e.g. ERDF).
- **Use digital tools to manage performance:** Digital Building Logbooks (DBL) help track maintenance, energy use, and renovation history, enabling benchmarking and cost control. This shifts the focus from one-off investments to lifecycle-based management, supporting more efficient, data-driven decision-making.

The project offers a replicable model for small and medium-sized municipalities aiming to make circular renovation both affordable and measurable.



Tips for replication

What to replicate?

- Develop circular principles into tendering for public buildings:
- Striking a balance between circular/sustainability considerations and affordability in award criteria.
- Including flexibility in tender specifications (e.g. work with a broker, with certain tools as well as with risk mitigation).
- Secure strong social buy-in for the project:
- Encouraging participation of local communities through surveys, advisory municipal service consultations, and participatory sessions with professional stakeholders, residents, schools, and social organisations:
- Developing a Working Group with representatives of key stakeholders meets monthly to discuss the project
- Use of digital tools (e.g. [GRO](#)) to compare the buildings teams' proposals, and visualise options for discussion within the Working Group.



Who can replicate this?

- Municipalities seeking to implement circular principles into construction works, while balancing environmental, economic and social priorities.
- Dedicated regional multipliers and knowledge brokers specifically active in their location (e.g. intermediary organisations, innovation hubs) that can guide municipalities and connect them to relevant expertise.



How to replicate it?



- Plan ambitiously but stay flexible: The end goal is clear, adapt again and again when setbacks occur.
- Build cross-party political support: Link circularity to broader policy priorities such as decarbonisation, well-being and social inclusion.
- Start with visible public buildings (low hanging fruit): focus on public buildings which gives places an identity and can act as demonstrators of circular renovation.
- Use existing guidance: Leverage the [Brochure](#) and [Ambitions map](#) to develop a common understanding of circular principles across the value chain.
- Collaborate with experienced partners: Work with contractors and architects who already have cutting-edge circularity knowledge and expertise.
- Address capacity gaps: Smaller municipalities can look to outsource capacity. For example, consider temporary involvement of a knowledge broker who specialises in circular public procurement.
- Map and manage materials: Identify existing material flows and potential for reuse. In the medium term, develop a Digital Building Logbook (DBL) to enable efficient and effective building management.
- Ensure regulatory clarity: Align with safety standards and building codes to facilitate the reuse of materials.
- Verify quality early: Establish third-party verification of secondary material early, avoiding a lack of trust in quality.
- Analyse costs proactively: Conduct a hotspot analysis after the contract award (and pre-empt this in the tender documents) in order to identify additional cost-saving opportunities.

Resources and contacts

- [Brochure](#) **'Local circular construction: starting with circularity in your municipal construction and renovation projects'**
- [Ambition map for local authorities](#): Framework to determine your priorities and circular strategies for design and construction and to choose the matching actions that local governments can implement accordingly.
- **Additional tools** available on the [Circular Flanders](#) website.

Circular Solution: **Gothenburg, Sweden**

The Circular Transition Arena: A collaborative platform for co-creating circular solutions

Image Source



Size:

608 993

inhabitants



GDP:

More developed region



Geographical information:

Northern Europe



Urban-rural predominance:

Predominantly urban



Innovation ranking:

Leader



Sectors:

Circular Resource Management



Time frame:

January 2023 – December 2025



Circular strategies:

reduce

reuse

recover

rethink

Contact Person:

Nina Wolf Circular Strategy Coordinator of the City of Gothenburg

More information:

[Gothenburg | Circular Cities and Regions Initiative](#)

Key facts and figures

Circa 10 new positions

have been created to **directly support circular practices** in the city organisation.

New routines

for **circular operations** have been **developed** in several municipal departments and companies.

Training programmes

for purchasers are being developed to **strengthen circular competencies** in city departments and companies.



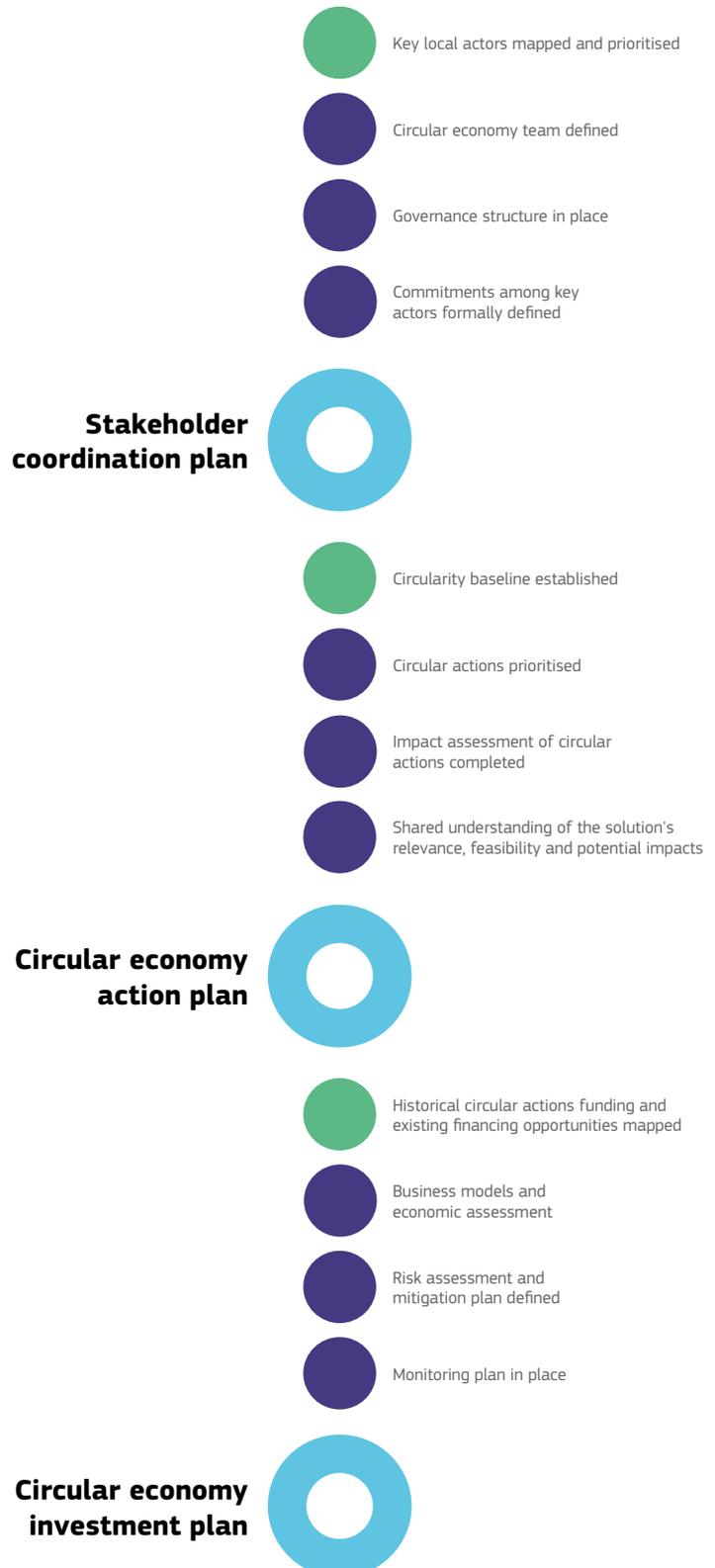
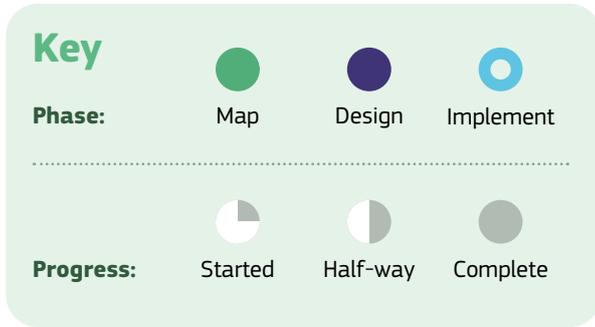
Solution overview

The City of Gothenburg faces operational challenges that limit its ability to implement circular practices at scale. The Circular Transition Arena (CTA) addresses this by providing a collaborative, hands-on platform where city departments, municipal companies, and experts work together to develop practical circular solutions. Through structured workshops and practical support targeting material flows such as furniture, workwear, and IT, the CTA helps participants develop measures that extend product lifespans, increase reuse, and embed

circularity into procurement and operational routines. The CTA also fosters cross-departmental collaboration and organisational capacity-building, helping the city accelerate its circular transition.

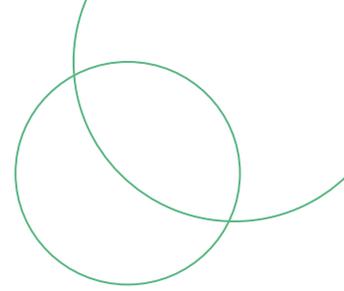
✓ CCRI Methodology Step Completion Status:

The [CCRI Methodology](#) is a guidance tool for policy and decision-makers in local and regional government. It describes key activities and milestones in the successful development of a Circular Solution, divided into three phases – Map, Design, and Implement. The visual checklist provides an at-a-glance view of how Gotherburg’s circular solution is progressing towards these outputs.





Background and objectives



i Policy context:

Sweden's [Circular Economy – Action Plan for Sweden's Transition](#) provides the national framework guiding the country's shift to a circular economy. Building on this, the [City of Gothenburg Environmental and Climate Programme 2021–2030](#) sets out Gothenburg's circular strategy and its overarching goal of becoming ecologically sustainable by 2030. The programme includes a target to reduce greenhouse gas emissions from municipal purchases by at least 90 per cent compared to 2020 levels. These ambitions are reinforced by the [Waste Management Plan 2021–2030](#), which targets a 40 per cent reduction in waste from city operations relative to 2019, as well as the [Business Strategy Programme 2023–2035](#), and the [City Budget 2025](#), which integrate circular principles across business development and city-wide operations. Practical guidelines and reports translate these plans and strategies into action: the [Final Report: Preconditions for Transition to the Circular Customer](#) outlines the necessary preconditions for the city to act as a circular procurer, while the [Final Report: How Circular Economy Can Help Reduce Climate Impact by 90%](#) clarifies circularity's role in reaching emission goals. Complementary guidance on procurement, circular IT, and the [reuse or donation of moveable property and materials](#) provides operational frameworks that help embed circular practices across the organisation.

x Problem:

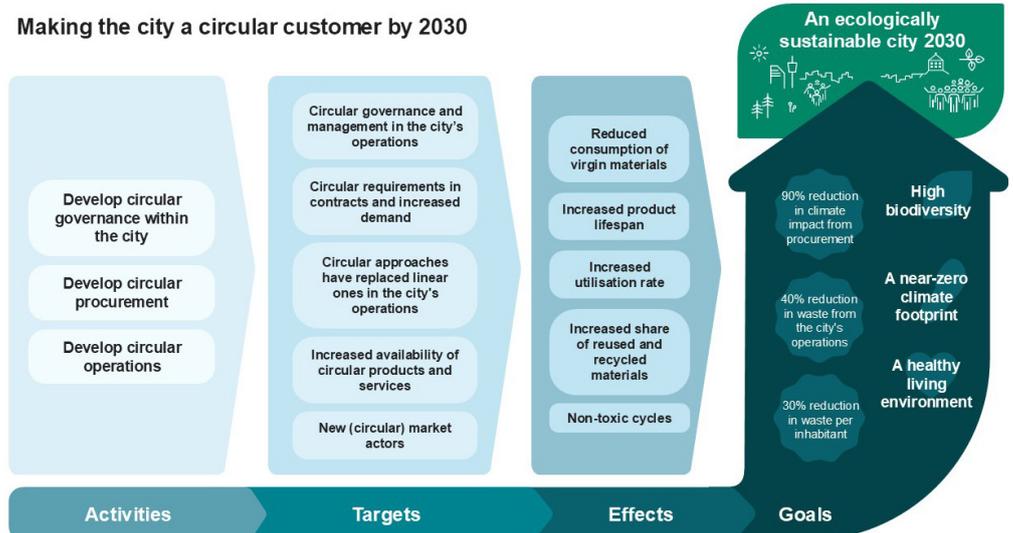
Shifting to circular operations presents significant challenges for municipal departments and companies in Gothenburg. Necessary preconditions such as coherent routines and organisational support are largely missing, while short-term budgeting and a continued reliance on linear practices hinder long-term thinking. Environmental considerations are often deprioritised in favour of immediate operational needs, and overall awareness of how circular operations contribute to the city's climate and sustainability goals remains limited. At the same time, managers of city departments and companies face growing responsibilities without sufficient guidance or support, making it difficult to translate circular ambitions into action.

g Objectives:

Through digital and physical meetings and workshops, the Circular Transition Arena helps participating employees to:

- Understand what the circular transition encompasses and how it relates to the city's climate and environmental targets.
- Assess their organisations' current state, identify needs, and define concrete measures to address them.
- Begin implementing actions that advance the shift towards circular operations in their departments or organisations.

Figure 1. Visualisation of the City of Gothenburg's strategy to become a circular customer by 2030. The CTA is part of the third activity group, Develop circular operations.





Stakeholders

Solution Leader(s):



Public Authorities

The Circular Transition Arena is coordinated by Gothenburg City Leasing AB (GSL), a municipal company that serves as the city’s expert function for leasing and circular asset management.

GSL is responsible for leading and coordinating the city’s circular strategy and manages both the overall work of the CTA and its steering group. Several key municipal departments participate in and support the initiative, including the Administration for Sustainable Waste and Water, the Administration for Purchasing and Procurement, the Environment Administration, and Intraservice, which provides internal services such as IT, communications, HR, and finance to the City of Gothenburg. Together, these departments form the steering group and contribute strategic and operational support to the CTA.

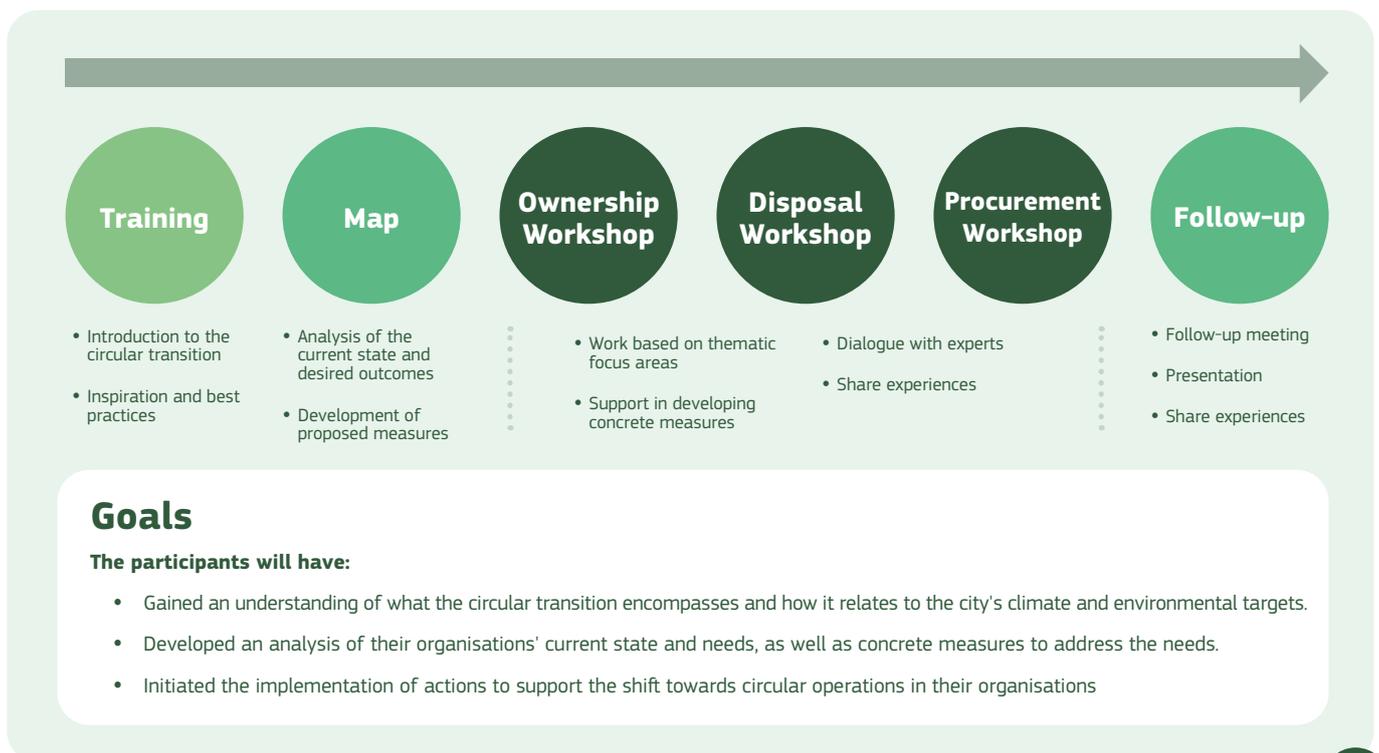
Supported by:



Funding & Advisory Bodies

The CCRI has provided funding for a feasibility study on circular IT, mapping the purchasing process for mobile phones, computers, and tablets, and developing an action plan for the circular handling of IT devices. Insights from this study have shaped the CTA’s thematic focus on circular IT in autumn 2025.

Figure 2. Visualisation of the CTA process.



Goals

The participants will have:

- Gained an understanding of what the circular transition encompasses and how it relates to the city’s climate and environmental targets.
- Developed an analysis of their organisations’ current state and needs, as well as concrete measures to address the needs.
- Initiated the implementation of actions to support the shift towards circular operations in their organisations



Results and Impact

Since its inception in 2024, the Circular Transition Arena has demonstrated significant progress in promoting circular practices across the city. Three thematic areas have so far been covered: furniture, workwear, and IT. Semi-annual workshops and occasional mini-sessions allow participants to explore high-demand topics, while new themes continue to emerge in response to city needs.

CTA initiatives are expected to contribute to delivering significant environmental benefits across the City of Gothenburg's operations, including higher utilisation rates and extended lifespans for products within the city's departments and companies. The initiative will also create the conditions needed for greater reuse of products across municipal operations. Together, these efforts support Gothenburg's overarching climate and environmental targets.

Beyond environmental gains, the CTA is shaping procurement and purchasing practices, as well as the product and service requirements within the city. This, in turn, is anticipated to affect external market actors and their business models in the long term.



Main results and impact

Participation in the CTA has grown steadily—from six organisations in the first round to fourteen between September 2024 and December 2025 – including the Preschool Administration, Rescue Services, City Properties Department, and the Elderly Care and Health Administration, with several organisations participating in multiple rounds.

The CTA has also led to **new job creation directly supporting circular practices**, including citywide reuse coordinators, a Preschool Administration reuse manager, and new positions linked to the city's furniture reuse platform, [TAGE](#). These roles strengthen circular operations across departments and municipal companies.

New routines and processes are now being implemented in several departments. Intraservice has developed procedures for circular furniture flows, while Social Services is introducing QR-tagging of furniture and creating circular pattern offices. The Department of Disability Support, which manages around 400 properties, has centralised its purchasing and now provides units with procurement templates that combine reused and new items. To support knowledge sharing, the CTA team has also created a citywide knowledge bank collecting best practices for circularity.

Training and pilot projects are driving further progress. Social Services Centrum is developing a training programme to strengthen circular competence among purchasers. Pilot initiatives have demonstrated concrete results—for example, the Elderly Care and Health Administration has worked with two of its nearly fifty care homes as frontrunners, successfully reusing available items and donating surplus equipment through established reuse channels.

Finally, the CTA has **laid the foundation for new circular requirements** across departments and municipal companies. In the 2026 budget, all companies and boards have been tasked with introducing circular management of workwear and furnishings. With successful examples already in place from CTA pilots, the city is well-positioned to broaden these requirements and embed circular practices more deeply into its governance and operations.



Challenges and Lessons Learnt

Enablers to implementation

- **Governance:** Strategic responsibilities are clearly designated, and goals are aligned with central policy instruments, including, for example, the Waste Management Plan.
- **Political:** The City of Gothenburg's circular strategy (part of the Environment and Climate Programme 2021-2030) and circular principles embedded in local policy instruments provide strong political support.
- **Economic:** The city's size and financial capacity offer potential for systemic circular-economy efforts. Positive relationships with the local business sector provide the right preconditions for innovation.
- **Technical:** Existing technical structures help drive the transition forward by showcasing successful examples. Since 2013, the city has had an internal reuse and sharing system, [TAGE](#), for furniture and furnishings. Since 2021, the digital reuse site has been supplemented with a physical intermediate warehouse and free transport of related items for the City of Gothenburg's administrations and companies.
- **Social:** A broad alliance within the city organisation and motivated frontrunners create momentum and help scale potential.
- **Legal:** Several regulatory instruments, such as repair agreements and furniture reuse contracts, support the circular transition.

Barriers to implementation

- **Governance:** Organisational silos and assignment-driven budgets hinder cross-departmental collaboration. The level of ambition still often depends on personal commitment rather than on responsibility based on central policy instruments. All operations are measured by their core activities, and large core operations compete for financial resources.
- **Political:** There is an unclear division of responsibility for the circular transition between regional and

local authorities, and not much collaboration across government levels. A lack of understanding of what needs to be done differently, how to do it, and the necessary level of ambition complicates prioritisation and resource allocation for both the development and implementation of new roles and ways of working.

- **Economic:** Linear solutions remain operationally attractive due to lower upfront costs and simpler implementation. For instance, purchasing high-quality workwear entails higher upfront costs, but since such garments last longer, they result in lower expenses over time. The annual budgeting structure further reinforces short-term decision-making, as many administrations and municipal companies tend to spend remaining funds at the end of the fiscal year. Securing continuous funding for staff involved in development, implementation, and scaling efforts is also difficult, whereas temporary funding, for example, for feasibility studies, is more readily available. To enable a circular transition, business and financing models must be circularly adapted, and additional external financial support is needed.
- **Technical:** Ambitious goals may not align with technology development, materials research, or the market's maturity. The city is requesting services and products that do not yet exist on the market. Early engagement with suppliers is necessary to align products and services with city needs.
- **Social:** Broader citywide engagement and collaboration with the market are needed to stimulate circular business models. The city needs to increasingly challenge, support, and collaborate with the market to stimulate circular business models. Still, there is insufficient city-wide support for transition work related to strategic and operational implementation. Support for circular initiatives varies across and within different administrations and municipal companies
- **Legal:** Legislative incentives are limited, and the interpretation of existing rules is often unclear. Certain requirements—for instance, IT security standards or mandatory branding on clothing—can conflict with reuse objectives.



Lessons learnt

- **Collaboration with participants and flexibility:** Developing the transition arena together with participants has been crucial for success. Involving them, staying flexible, and basing support on real needs, while continually listening and strengthening development, has proven a key strength.
- **Political backing and governance:** Strong political support underpins the CTA, with Gothenburg's circular strategy, goals, and guidelines providing direction. When clearer governance or expectations are needed, there is an opportunity to bring challenging matters to a political steering group comprising representatives from both the governing and opposition parties.
- **Organisational engagement:** Gothenburg's size and complex governance structure make implementation and engagement at the management level difficult. Not all Heads of Department and company managers are willing to engage in the transition. To address this, dedicated manager dialogues are being conducted to understand challenges and offer tailored support. The CTA also helps build understanding of circular economy concepts and encourages cross-departmental collaboration.
- **Norms and motivation:** A key insight is the importance of bringing different organisations together to create visibility and cultivate a culture where circular practices are recognised and scaled. The CTA fosters a shift in norms as participants see that others are working on the same topic, motivating each other to move forward.



Tips for replication

What to replicate?

- The CTA format, which encompasses a mix of online and in-person sessions, with interactive exercises:
- Online kick-off: introducing the circular transition concepts, with inspiration and best practices.
- In-person analysis: identifying current material flows, needs, and desired outcomes; and developing proposed measures.
- In-person thematic workshops on procurement, ownership, and disposal: co-developing concrete measures with experts.
- Follow-up: assess results and plan next steps.
- Knowledge repository, including good practice examples, timelines for new procurements, etc., to support ongoing implementation.



Who can replicate this?

The CTA model is well-suited for replication by large or mid-sized cities and regions that, like Gothenburg, have complex organisational structures, strong sustainability ambitions, as well as financial or institutional support, yet face challenges in coordinating across departments. The CTA can be scaled and adapted to different local realities, for example, embedded within existing innovation platforms, or adjusted to include external facilitation or stronger educational components, depending on local capacities and needs.



What ingredients are needed to replicate it?



- **Appoint a dedicated team:** This team should lead the work and further develop the format strategically based on evolving needs.
- **Target key stakeholders within local/regional administrations and companies:** Include relevant staff such as IT strategists, environmental coordinators, and administrators, depending on the topic being discussed.
- **Anchor the CTA work within the participating organisations:** Ensure participants secure management support and commit to attending all planned sessions.
- **Focus on high-impact material flows:** Begin with significant material flows, then refine work to specific processes like circular procurement.
- **Progress from internal to external:** Start with an internal focus targeting employees within your own organisation, then assess potential collaborations with external organisations, e.g. the city together with the region.

Resources or contacts available to help?

- PPT presentation/PDF explaining the CTA in more detail (in English)
- Current state analysis checklist used in the second in-person meeting (in Swedish)
- Capabilities and responsibilities for circular handling of IT devices (in Swedish). The content of this PPT is adjusted depending on the current theme (e.g. IT, workwear, furniture).
- All Available here: [Gothenburg | Circular Cities and Regions Initiative](#)

Circular Solution: **Guimarães, Portugal**

Fuelling sustainability through biowaste prevention, collection and valorisation.

Source: Landscape Laboratory



Size:

156 830
inhabitants



GDP:

Less developed region



Geographical information:

Southern Europe



Urban-rural predominance:

Intermediate



Sectors:

Circular resource management

Bioeconomy

Food



Time frame:

January 2023 – September 2025



Circular strategies:

rethink

regenerate

reduce

reuse

recover

Contact Person:

[Dalila Sepúlveda](#), Head of the Environmental and Sustainability department.

More information:

[Guimarães | Circular Cities and Regions Initiative](#)

Key facts and figures

Between
January 2022 and **August 2025**

19 489 tonnes

of biowaste were directly diverted from landfill and **converted into compost.**

In the same period,
the municipality avoided

€568 404.90

in landfill tariff costs.



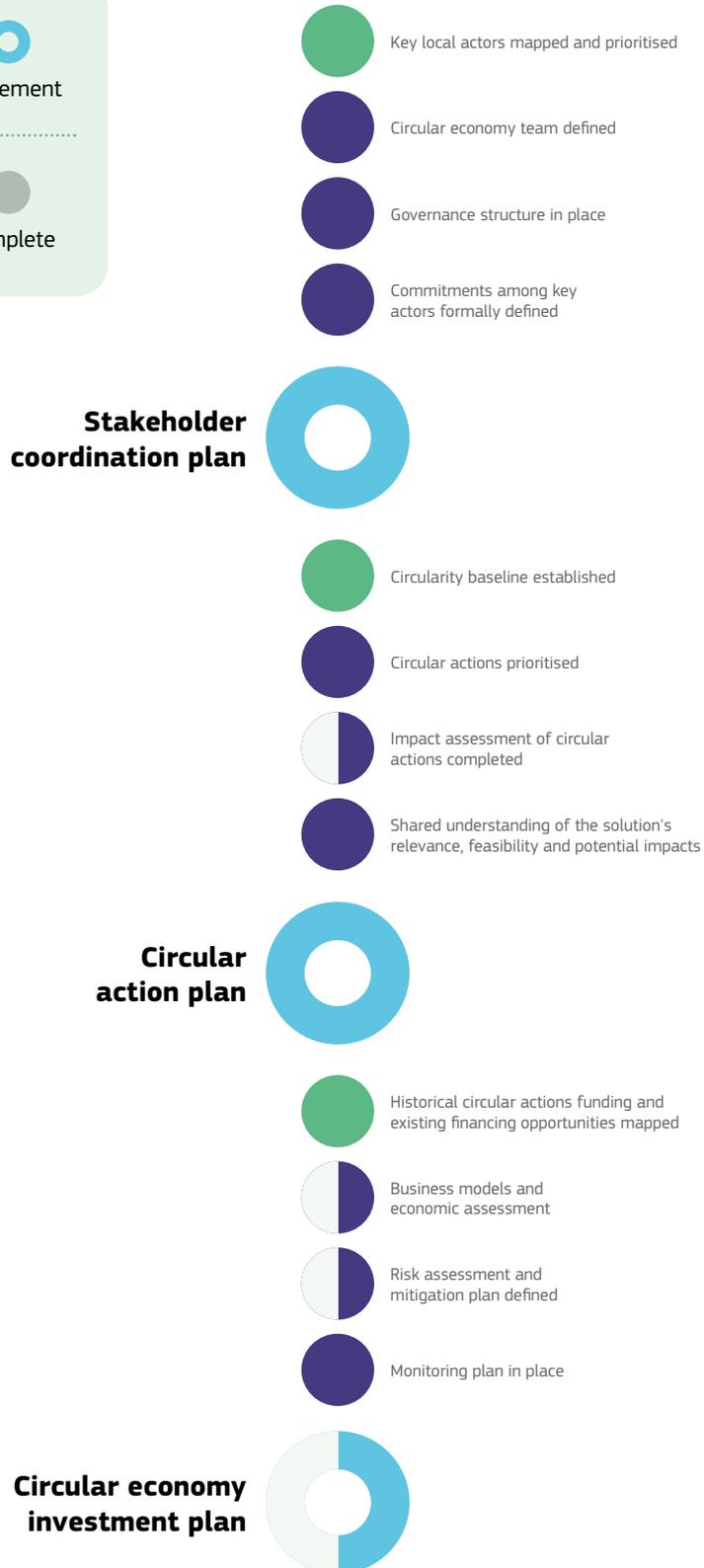
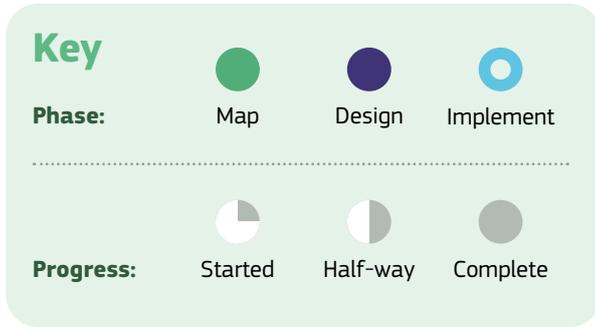
Solution overview

Guimarães is on a mission to make waste management more sustainable through the gradual introduction of a system for separate biowaste collection. This effort is a part of the BioWaste Action Plan, which is integrated into the RRRCICLO strategy, a circular economy roadmap. It targets various sources of biowaste, ranging from households and restaurants to schools, hospitals, parks and local farms. The pilot does not just collect waste; it transforms waste into valuable resources through initiatives like home or

community composting, organic fertiliser production, and even converting waste into energy. Guimarães is also taking proactive steps to spread awareness about the importance of preventing food waste among public schools, universities and citizens.

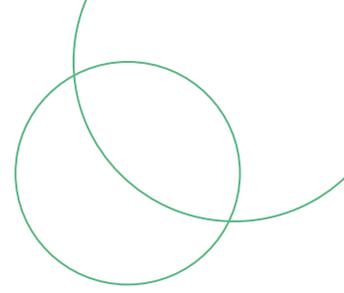
✓ CCRI Methodology Step Completion Status:

The [CCRI Methodology](#) is a guidance tool for policy and decision-makers in local and regional government. It describes key activities and milestones in the successful development of a Circular Solution, divided into three phases – Map, Design, and Implement. The visual checklist provides an at-a-glance view of how Guimaraes circular solution is progressing towards these outputs.





Background and objectives



i Policy context:

Guimarães' circular and climate strategies are deeply interconnected. The [RRRCICLO programme \(2021\)](#) drives this shift through sectoral plans promoting reduction, reuse, recycling, and recovery, supported by its [Biowaste Management Plan 2030](#), which establishes a municipal network for organic waste collection and promotes home and community composting. [PAPERSU Guimarães 2030](#) complements this by translating Portugal's national waste strategy into local measures, aiming to achieve comprehensive biowaste collection across the entire population by 2028. These efforts align with the city's [Climate City Contract](#) under the EU's "[100 Climate-Neutral and Smart Cities](#)" mission, which integrates circularity into carbon-neutrality goals. The [Guimarães Climate Pact](#) further mobilizes citizens and institutions for collective decarbonisation, while the [Municipal Climate Action Plan](#) operationalises these ambitions through complete organic waste valorisation and circular value chain development.

× Problem:

The municipality of Guimarães has been intrinsically motivated to advance the integration of circular economy principles across sectors as a means to reduce environmental impact and foster sustainable resource use. To tackle the challenge of organic waste management, it has been working since 2021 on introducing mandatory separate biowaste collection, already reaching 38,5% of the population in early 2023 – well ahead of the EU's 1 January 2024 deadline. This effort is also driven by the city's broader ambition to use circular economy as a key tool for achieving climate neutrality and creating economic opportunities.

🎯 Objectives:

- To establish a separate collection system of biowaste at the source with an expected increase to 60% by the end of 2026, aligning with the current Biowaste Municipal Strategy.
- To explore and identify most appropriate pathways for biowaste valorisation, reinforcing its role in soil health improvement and circular practices.
- To enhance public awareness and stakeholder engagement by strengthening programs with key groups (e.g., hotels, restaurants and catering (HoReCa) and schools), fostering collaborations with local businesses and industries, and promoting sustainable agricultural practices among farmers.





Stakeholders

Solution Leader(s):



Public Authorities



Research & Academia

The City Council of Guimarães, as public administration, leads the implementation, supported by the Landscape Laboratory as co-lead from academia.

Supported by:



Private Sector



Civil Society & NGOs



Funding & Advisory Bodies

[Virus Ambiente](#), the municipal waste company, provides bins for separate biowaste collection, while [Resinorte](#), a multi-municipal company, manages the selective collection, sorting, valorisation, and disposal of biowaste.

The HoReCA sector and households actively participate in biowaste collection, food waste prevention, reuse programmes, and pilot initiatives. Households also compost individually or collectively. Likewise, schools, universities, and sports facilities participate in biowaste collection and composting, while being engaged in food waste prevention and reuse efforts.

NGOs such as [ReFood](#), [Zero](#), [Quercus](#), and [Ave Associations](#) contribute to defining biowaste valorisation pathways, alongside technological organisations including [CVR](#) – Centre for Waste Valorisation, the [3B's Research Group](#), and [The Fibrenamics Association](#).

Finally, [CETENMA](#), through the CCRI External Expert Support Scheme, developed the Material Flow Analysis for agricultural biowaste in Guimarães and provided recommendations for potential local valorisation pathways.



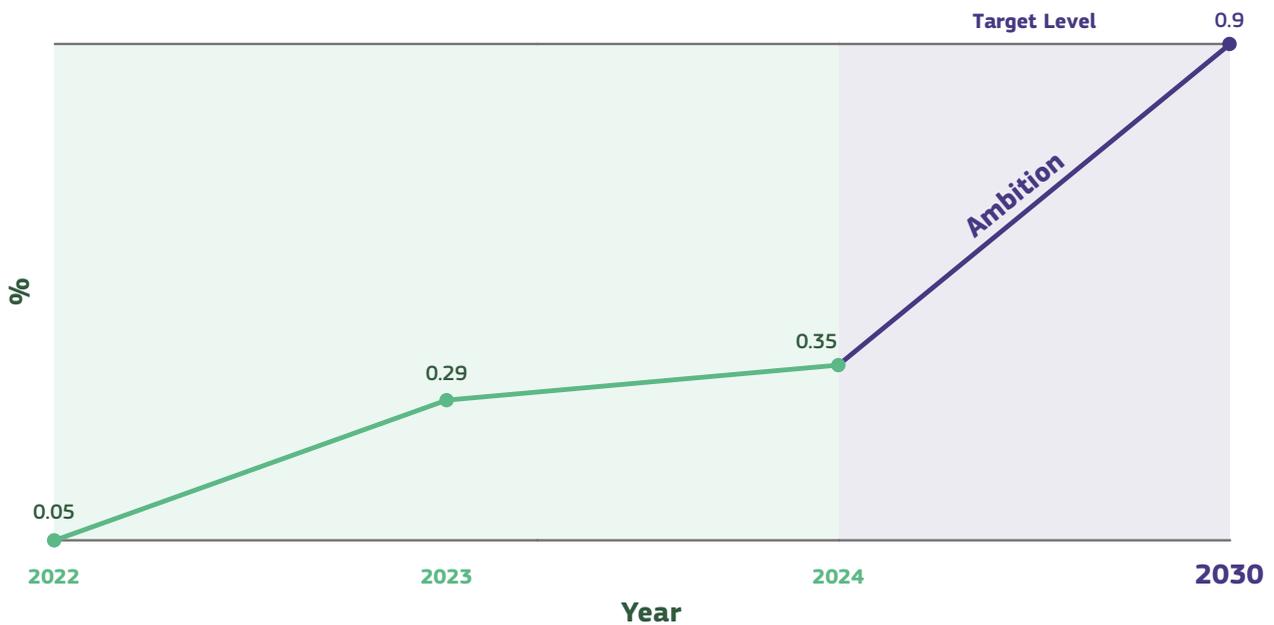
Results and Impact

Guimarães has advanced the Biowaste Action Plan (within RRRICLO) through a structured three-phase rollout across households, HoReCa, schools, hospitals, and public areas – successfully expanding separate biowaste collection to cover **40% of the population by 2023 and 48% by 2024**, and positioning the municipality on track to reach **60% by 2026** and full coverage by 2028, in line with the Biowaste Municipal Strategy.

With support from the CCRI, the city has strengthened biowaste valorisation by mapping agricultural waste flows and identifying new circular pathways that have potential to lead to a development of high value bio-based products. Existing valorisation routes (home and community composting, organic fertiliser production, and energy recovery from green waste) continue to expand.

Public engagement has also grown through education programmes (e.g., [360.come](#)), HoReCa initiatives ([Ecobox](#)), and partnerships with schools, businesses, and farmers, fostering shared responsibility and accelerating Guimarães' transition toward a circular, zero-waste city.

Figure 1: Bio-waste collected through Guimaraes' system, as a percentage of total produced



Main results and impacts

The main result is the increase in the separate collection rate of biowaste, measured as the ratio between the amount of biowaste collected and the total amount of biowaste produced annually (estimated at 21 643 tonnes).

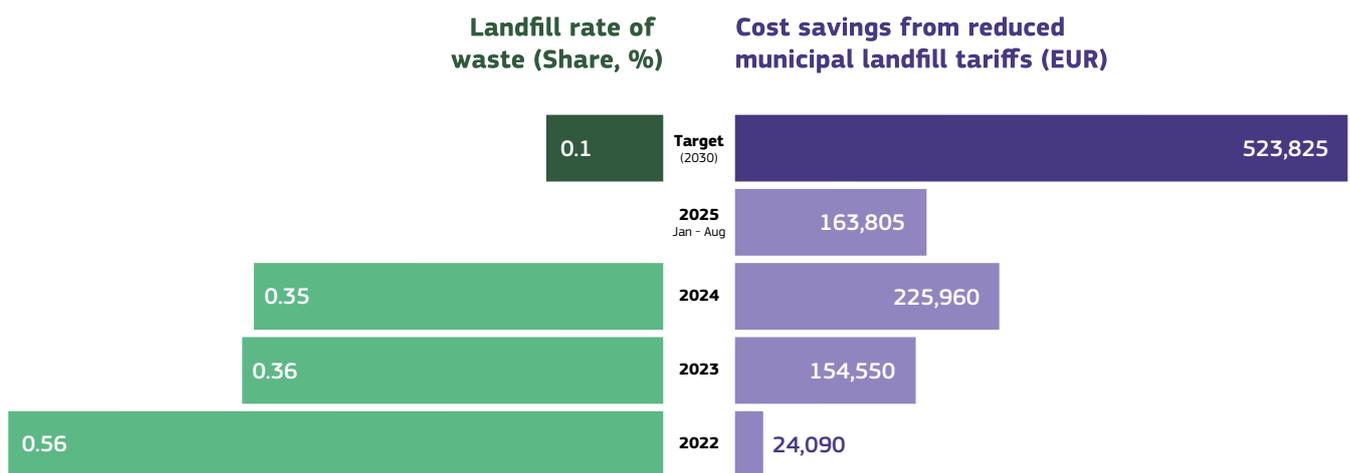
This rate reached 35% in 2024 (See figure1).

A significant environmental achievement has been the substantial reduction in landfill use, evidenced by key impacts. **The decreasing landfill rate of waste** - that is, the ratio between the amount of waste sent to landfill and the total amount of urban waste generated - reflects the municipality's progress toward more sustainable waste management.

This environmental improvement directly translates into a **reduction in municipal expenses**, as less waste sent to landfill results in lower payments of landfill tariff. As of August 2025, savings for the year had already reached €163 804.90. (See figure2)

This positive trend is reinforced by the growing amount of biowaste diverted from landfill and **converted into compost**, increasing from 1 095 tonnes in 2022 to 6 182 tonnes in 2023, and reaching 7 532 tonnes in 2024, with 4 680 tonnes already recorded by August 2025. The municipality aims to achieve 20 953 tonnes by 2030.

Figure 2: Impacts of increased separate bio-waste collection



Awareness-raising activities also generated notable results. From 2022 to 2024, 728 awareness-raising actions and campaigns were carried out, involving 1 416 participants. A total of 41 schools took part in environmental education projects, and 1 838 children were reached through pedagogical activities. An example of a waste reduction scheme implemented in this period

in Guimarães is the [Ecobox initiative](#), where restaurants offer customers free sustainable containers to take home leftovers and reduce food waste. To date, 19 restaurants have joined and 11 000 Ecoboxes have been delivered. At the policy level, Guimarães integrated a total of 2 legislative incentives in this period: Pay-as-you-throw (PAYT) scheme and Save-as-you-recycle (SAYR) scheme.



Market readiness/business model:

A business model in this context would centre on the valorisation of waste, turning what is regarded as an environmental and economic burden into a valuable product and revenue opportunity. Several business model approaches could be envisioned. For example, one option is the conversion of biowaste into organic fertiliser through mechanical-biological treatment and composting. The resulting fertiliser is then commercialised and distributed to both large-scale farms and local farmers. The revenue is collected by RESINORTE, the multi-municipal company, which receives the fertiliser free of charge, commercialises it, and retains the annual profit.

Success story

In Guimarães, the City Council is setting a benchmark in biowaste management by applying a clear, phased methodology that ensures steady yet ambitious progress. Through a structured 3-phase approach (covering 40% of the population by 2023, 48% by 2024, and full coverage by 2028), the municipality is rapidly rolling out separate biowaste collection across households, schools, HoReCa, and even the agricultural sector.

This methodology enables Guimarães to act progressively, while maintaining a remarkable pace of achievement. Already, compost from households and green waste is being reused locally, organic fertiliser is valorised for agriculture, and energy recovery from waste is heating schools. By combining prevention, valorisation, and awareness-raising campaigns, the city is transforming waste into high-value resources while engaging citizens and businesses alike.



Challenges and Lessons Learnt



Enablers to implementation

- **Political:** The Municipality of Guimarães views the transition from a linear to a circular economy as key to decarbonisation and operating within planetary boundaries. To this end, it developed the RRRICLO circular economy strategy, which prioritises biowaste through the principles of refuse, rethink, reduce, reuse, repair, recycle, and recover.
- **Governance:** The Guimarães 2030 Governance Ecosystem links the City Council, academia, citizens, and private businesses. A municipal-led task force integrates innovation, waste and resources, citizen awareness, and mobilisation. Within this framework, a bioeconomy focus group highlights circular waste management technologies, especially for biowaste.



Barriers to implementation

- **Social:** Variations in socio-demographic characteristics and waste generation habits across different area typologies create disparities in biowaste collection and increase its complexity.
- **Technical:** The diffuse territory and mixed land uses lead to challenges in optimising collection routes, timing, and adapting solutions for both urban and rural contexts.
- **Legal:** Insufficient legislation and regulations to incentivise circular practices, such as rewarding citizens or fostering private sector adoption, create barriers to wider implementation.
- **Economic:** Insufficient support for the private sector in developing innovative circular products, combined with the absence of regulations encouraging the adoption of circular principles, results in a limited supply of circular products available for municipal procurement.



Lessons learnt

- In Guimarães, the political diversity across 48 parishes initially made it difficult to secure broad support and define an effective biowaste collection strategy. Establishing annual meetings with parish councils proved essential for building alignment, sharing progress, and addressing operational challenges. Complementing this with training, communication materials for citizens, pilot schemes in selected parishes, and operational support created stronger collaboration and smoother rollout. This experience shows that **structured dialogue and tangible support tools are critical to foster collaboration and ensure effective implementation in politically fragmented contexts.**
- In Guimarães, a key challenge was the lack of citizen awareness and engagement, making it necessary to continuously develop strategies that reach all 156 830 inhabitants. The municipality responded with recurring communication campaigns (via social media, notice boards, and public transport), targeted household booklets with reminders for correct practices, and direct outreach to residents with underused composting containers. In parallel, educational programs in schools, initiatives in disadvantaged areas, local workshops on home and community composting, and continuous collaboration with local farmers to share and map best practices were introduced. This demonstrates that **sustained, diversified, and tailored communication, adapted to different population groups, is essential to mobilise citizens and secure their active participation throughout all stages of the separate biowaste collection roll-out.**
- In Guimarães, the diffuse territory with diverse land uses and socio-demographic profiles created variations in biowaste generation, practices, and complex collection routes. This challenge was addressed through a tailored collection approach adapted to each area's specific characteristics, optimising efficiency and adaptability. By considering factors such as street dimensions, building types, and local context, the municipality was able to determine whether proximity collection points or door-to-door collection were more suitable. The experience shows that **flexible, context-specific collection strategies are essential when operating in heterogeneous urban and territorial settings.**
- Mapping the agricultural sector, mobilising farmers, and identifying suitable valorisation pathways for organic waste proved a significant challenge in Guimarães. The 360.come project addressed this by mapping local farmers and developing a visualisation platform to start to engage stakeholders. Building on this, supported through the CCRI External Expert Scheme, Guimarães carried out a material-flow analysis to assess crops, production volumes, residue management practices, and opportunities for valorisation in local industries. The experience highlights that **combining data-driven analysis with stakeholder engagement is key to unlocking circular approaches in the agricultural sector.** Ongoing activities continue to strengthen farmer involvement and support with identifying best valorisation routes.



Tips for replication

What to replicate?

1. The methodology developed and applied for the roll-out of separate biowaste collection across all parishes (with the integrated application of PAYT and SAYR incentive schemes).
2. The methodology for raising awareness and engaging different population groups.



Who can replicate this?

Regional and local authorities with established waste systems, especially in areas of diffuse, mixed urban-rural, or diverse land use patterns.



What ingredients are needed to replicate it?

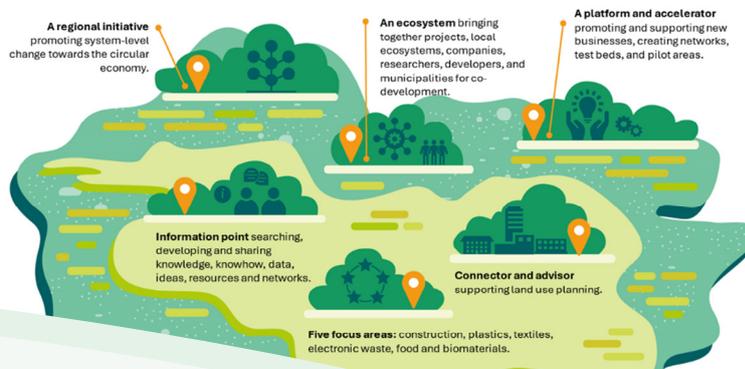
- **Clear governance and coordination:** Define a clear governance structure to coordinate responsibilities between local authorities, waste operators, and community stakeholders. Establish clear roles, accountability, and monitoring mechanisms early.
- **Regulatory and policy alignment:** Ensure alignment with relevant national and EU regulations and adapt local bylaws where needed.
- **Solid financing framework, at minimum for the pilot stage:** Secure investment in waste collection infrastructure, logistics, and communication campaigns required for the initial roll-out phase. Continue mobilising funding progressively, in parallel with implementation activities.
- **Local adaptation and engagement:** Develop context-specific collection strategies based on local waste streams, territorial characteristics, and socio-demographic profiles. Design inclusive awareness and engagement campaigns to foster participation and trust across diverse communities.



Circular Solution: Helsinki-Uusimaa Region, Finland

Helsinki-Uusimaa Circular Hub: Orchestrating a Regional Circular Economy Ecosystem

The Uusimaa Circular Hub, Source : [Uusimaa Circular Economy Valley - Uusimaa Circular Economy Valley](#)



Size:

1.76 million
inhabitants



GDP:

More developed region



Geographical information:

Northern Europe



Urban-rural predominance:

Mostly urban, but surrounded by small towns and rural areas outside of the Metropolitan Area



Innovation ranking:

Leader



Industry presence

Strong industrial presence



Sectors:

construction and buildings

food

plastics

textile

e-waste



Time frame:

2023-2025



Circular strategies:

reuse

rethink

regenerate

More information:

[Helsinki | Circular Cities and Regions Initiative](#)

Key facts and figures

Circular Hub has engaged

with more than

+ **1000**

people

and organised

20 Events

in **collaboration** with prominent business actors.



Solution overview

Helsinki-Uusimaa Circular Hub (CH) is an initiative of the Helsinki-Uusimaa Regional Council which covers 26 municipalities. Circular Hub's mission is to make the region a pioneer in circular economy innovation. It is an innovation ecosystem acting as an accelerator for circular solutions within its target sectors: construction, food systems, textiles, plastics, and e-waste. It brings

together local experts, companies, municipalities and regional innovation actors. By doing so, it responds to the lack of an overarching orchestrator in a diverse landscape of isolated initiatives. In three years since its formation, Circular Hub has successfully created a vision backed by policy, and become the 'go-to' place for innovative circular businesses.

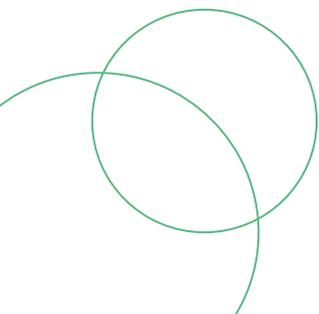
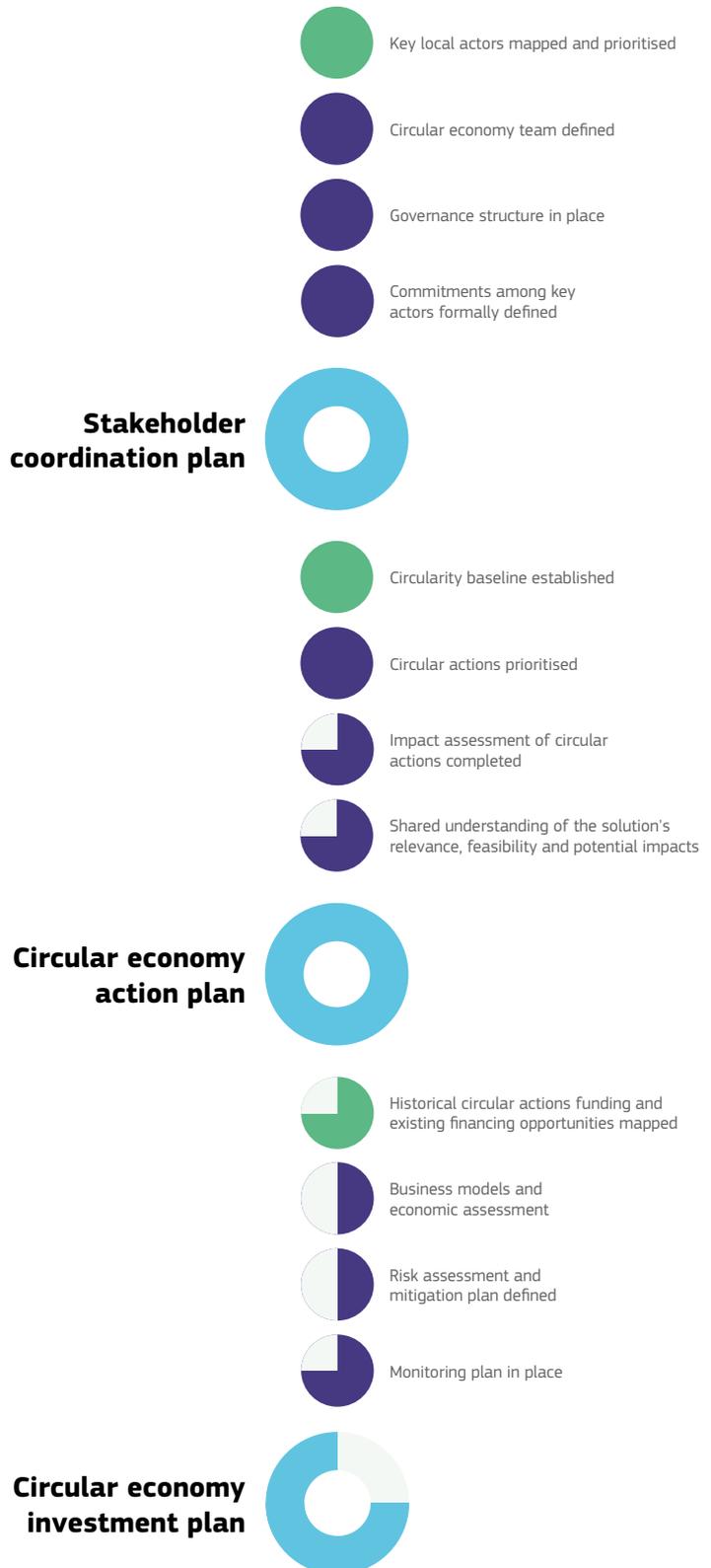
✓ CCRI Methodology Step Completion Status:

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Key

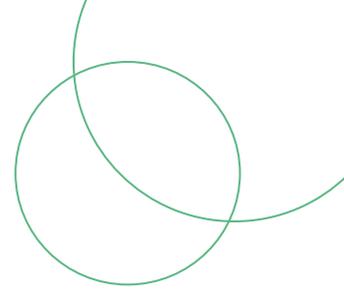
	●	●	○
Phase:	Map	Design	Implement

	◐	◑	●
Progress:	Started	Half-way	Complete





Background and objectives



i Policy context:

Helsinki-Uusimaa region is one of the [leading innovative regions](#) in the EU, with varied economic activity, largely dominated by the services sector. It is the principal region in Finland in terms of population, material flows and GDP. Various policies aim at preserving and enhancing this frontrunner position. The Circular Hub was specifically created to contribute to the implementation of one such policy, namely the [Carbon Neutral Uusimaa 2030 Roadmap](#). It also actively engages with other policy processes including the [National Green Deal](#) process. The latter includes commitments of different actors within the region to climate and circular economy objectives. Circular Hub has an important role in the Green Deal process as an enabler and a regional partner and further linking the national process to the municipalities.

× Problem:

Despite the region's innovative potential and numerous ongoing initiatives, these efforts remain largely isolated, preventing the creation of real momentum for systemic change. The lack of strategic coordination limits their ability to fully contribute to a circular economy.

🎯 Objectives:

- Build and orchestrate a circular innovation ecosystem that is able to tackle the multiple sustainability challenges and to support the innovative potential of the region while offering benefits to the citizens.
- Enhance existing networks and collaborations in the region, support innovative potential of SMEs and other actors to achieve circularity, accelerate the transition and to develop pilot projects and scale up the solutions.
- Accelerate transition in five priority value chains
- Help creating possibilities for green businesses through targeted projects in the focus sectors.





Stakeholders

Solution Leader(s):



Public Authorities



Research & Academia

[Helsinki-Uusimaa Regional Council](#) is leading as the public entity in charge of the overall initiative and coordinator but it is supported by [CLIC Innovation](#), an open innovation cluster which also provides studies, research and tools where needed. Other research entities, mainly public also support the process such as the [VTT](#) (Finnish state owned research organisation) and [University of Helsinki](#).

Supported by:



Private Sector



Public Authorities



Funding & Advisory Bodies

Companies are involved in different roles, mainly as business ecosystem drivers, spearheading change. These include, but are not limited to, large companies such as Borealis Group, Mirka, Valmet and Kiilto, each of which have their own sector oriented innovation activities. They develop projects, provide funds, and collaborate with the Circular Hub during and after the workshops.

[Business Finland](#) is involved as an umbrella organisation, providing funding for initiatives and collaborating with Circular Hub (e.g. [SPIRIT: Sustainable Plastics Industry Transformation](#)). Various projects also collaborate with Circular Hub such as the [SerKut Project](#) for e-waste, [KoPPI project](#) for construction and [Circelec Project](#) focusing on WEEE.

Finally, public authorities are actively involved as partners in projects, enablers, funding providers and strategic decision makers. Municipalities can join in the Green Deal process with their own commitments, especially in the construction and food sectors. The Ministry of the Environment and the Ministry of Employment and the Economy are also important since they are leading the Green Deal process in which Circular Hub is embedded.



Results and Impact

In just three years, Circular Hub has evolved into **the region's central platform for circular innovation**, trusted by over 50 companies and embedded across Finland's major green transition strategies. It has directly contributed to the innovation ecosystem development, creating connections and trust among more than 1,000 stakeholders, from researchers to pioneering companies.

The hub co-created a clearer vision for the future

by identifying high-impact value chains and sectors through a Material Flow Analysis (focusing on construction materials and electronic waste) and by gaining an in-depth understanding of the needs and challenges in each value chain.

It successfully brought together diverse stakeholders

and facilitated synergies through numerous face-to-face meetings, over 20 events, and 16 thematic workshops, directly engaging 50 companies. The Hub also collaborated with 10 regional projects, with the indirect impact on companies and projects being significantly higher. These connections are laying the groundwork for future targeted actions, including EU-funded projects.

Circular Hub has strategically integrated its operations within Finnish policy processes

and regional initiatives, such as the Green Deal Commitments. It is actively supporting municipalities in making their own commitments and developing pilot projects that advance circular economy and climate-neutral goals, ensuring an inclusive transition.

The hub has communicated its achievements effectively at both national and international levels.

Regionally, it has established itself as the go-to platform for circular economy initiatives. Internationally, it has enhanced the region's pioneering role in circular innovation, participating in events such as the World Circular Economy Forum. Its work has been documented through [concrete cases](#), pilot projects and established networks. Other publications include the results of the [Material Flow Analyses](#) and [Project Portfolios](#) in focus sectors. These communications reinforce momentum and attract additional actors to the Hub.

The economic impact of Circular Hub is emerging through the momentum it creates. By strengthening networks and catalysing collaboration, the Hub has contributed to new circular jobs in the region and enabled the development of at least fourteen new operating models and methods. These early signs point to a growing pipeline of circular business opportunities as the ecosystem matures.



Market readiness/business model:

Circular Hub is already functional. Having successfully built the foundation of the ecosystem development, it will now orient its efforts to the main two areas, namely construction and food sectors. Currently, its financing relies primarily on project-based funding. For instance, through [KOPPI project](#), in collaboration with another CCRI Pilot, Tampere region, it will work with municipalities to develop pilot projects to achieve circularity in construction. Building on the existing Green Deal commitments, it aims to expand participation among municipalities by developing concrete, regionally applicable circular solutions – with a strong focus on the construction sector.

For long-term sustainability, Circular Hub requires stable and predictable financing. Multi-year funding programs (e.g., spanning 10 years) would be particularly suitable. The Hub's functions could be integrated into the regional budget and linked to policy actions derived from the strategies mentioned above. EU funds, such as Cohesion Funds, could also play a valuable role in supporting the Hub while integrating regional innovation ecosystems.



Challenges and Lessons Learnt

Enablers to implementation

- **Political:** Consensus on the importance of climate neutrality and innovation to tackle future challenges. Political will to progress with the Green Deal process and consideration of Circular Hub has been an essential part of the process.
- **Technical:** The Circular Economy strategy is science-based and works with extensive scenario modelling by research organisations.
- **Governance & Social:** There is a fair degree of trust in relations among private companies and between private companies and the public entities, which helps with ecosystem development. There is a highly developed cooperation culture between the universities and companies.

Barriers to implementation

Structural barriers

- **Market context:** The regional export-oriented economy is vulnerable to cyclical fluctuations, both in economic terms and supply. These uncertainties make companies more cautious about investing in innovation and reduce their appetite for risk-taking in circular initiatives.
- **Social / workforce shortages:** Lack of educated workforce suited to the transformation that circular economy requires, and competition from the other cities across the EU for the existing skilled workforce.

Implementation barriers

- **Financial model:** Currently Circular Hub is dependent on EU-funded projects and lacks its own long-term, secure financing.
- **Technical / data and monitoring gaps:** Lack of monitoring framework to measure the impact of the Hub and lack of data at regional level.
- **Stakeholder engagement:** Maintaining long-term engagement is difficult. Varied planning cycles between public authorities and private companies, competing initiatives, and time limitations all reduce companies' ability to participate consistently. This can limit momentum and continuity in the ecosystem-building process.



Lessons learnt

- **Ensure early and sustained stakeholder engagement with as many actors as possible.** Although networking efforts reached to many people, an earlier start networking while putting the emphasis on the benefits of participation would lead to bigger impact.
- **Think about integrating circular economy expertise to the team actively working on ecosystem creation.** Such expertise helps to accelerate the 'discussion' and ensures a more dynamic and efficient process.
- **Anchor the strategic vision with evidence early on,** for instance by conducting a regional Material Flow Analysis for all relevant value chains. This sets a clear direction and helps to shape discussions with stakeholders, accelerating overall implementation. By setting clear priorities, the process becomes more effective, avoiding losing valuable resources and time.



Tips for replication

What to replicate?

- **Adopt the Green Deal approach to build shared ownership:**

The **Green Deal concept** is easily replicable. It creates a common vision through co-ownership, bottom-up engagement, and clear commitments from all stakeholders. It can be initiated with relatively modest resources.

- **Use workshops, networking events, and strategic communication to mobilise stakeholders:**

Continuous stakeholder engagement – such as through workshops, after-work sessions and targeted communication – helps build trust, create opportunities, and maintain momentum across sectors.



Who can replicate this?

- Regions with a **critical mass of companies and actors** across several value chains are best positioned to adopt this model.
- It is particularly suitable for regions aiming to combine circular economy with **innovation-driven approaches** such as digitalisation, industrial symbiosis, or smart specialisation.



What ingredients are needed to replicate it?

- **Start with an evidence-based, such as a Material Flow analysis.** This helps set clear objectives, prioritise activities, and anchor a common vision around which everything else can be built.
- **Identify the most impactful and/or high potential areas to focus on.** Focusing on the most important sectors enables quick wins and visible progress - both of which encourage others to join the initiative.
- **Understand the relevant legislative and regulatory framework.** Mapping regulatory barriers at the outset helps shape realistic plans and avoids delays. Involving sector-specific technical experts can greatly support this process.
- **Plan ahead.** Building such an eco-system takes time. Regions should secure medium- to long-term funding and human resources to ensure continuity.



Circular Solution: **City of Munich, Germany**

Creating a cross-system take-back infrastructure for reusable packaging

Luftaufnahme von Stadtgebäuden bei
Sonnenuntergang Foto – Kostenloses Bild
zum Thema Stadt auf Unsplash ;
Credits: @iankellsall1



Size:

1.6 million
inhabitants



GDP:

More developed region



Geographical information:

Western Europe



Urban-rural predominance:

Predominantly urban



Innovation ranking:

Strong



Industry presence

Strong industrial history/presence



Sectors:

Circular resource management

Food (chain/systems)



Time frame:

Beginning of 2023 – September 2025



Circular strategies:

reduce

rethink

reduce

Contact Person:

Circular economy coordination office; email:
circular-economy.rku@muenchen.de

More information:

<https://circular-cities-and-regions.ec.europa.eu/pilots/munich> & <https://stadt.muenchen.de/infos/kreislaufwirtschaft.html>

Key facts and figures

Participation in approximately

20

events and workshops on the topic of reusable products.

Approximately

15-20

discussions with stakeholders to engage them in a return infrastructure project in Munich.

Approximately

10-15

preliminary discussions with potential partners for a return infrastructure.



Solution overview

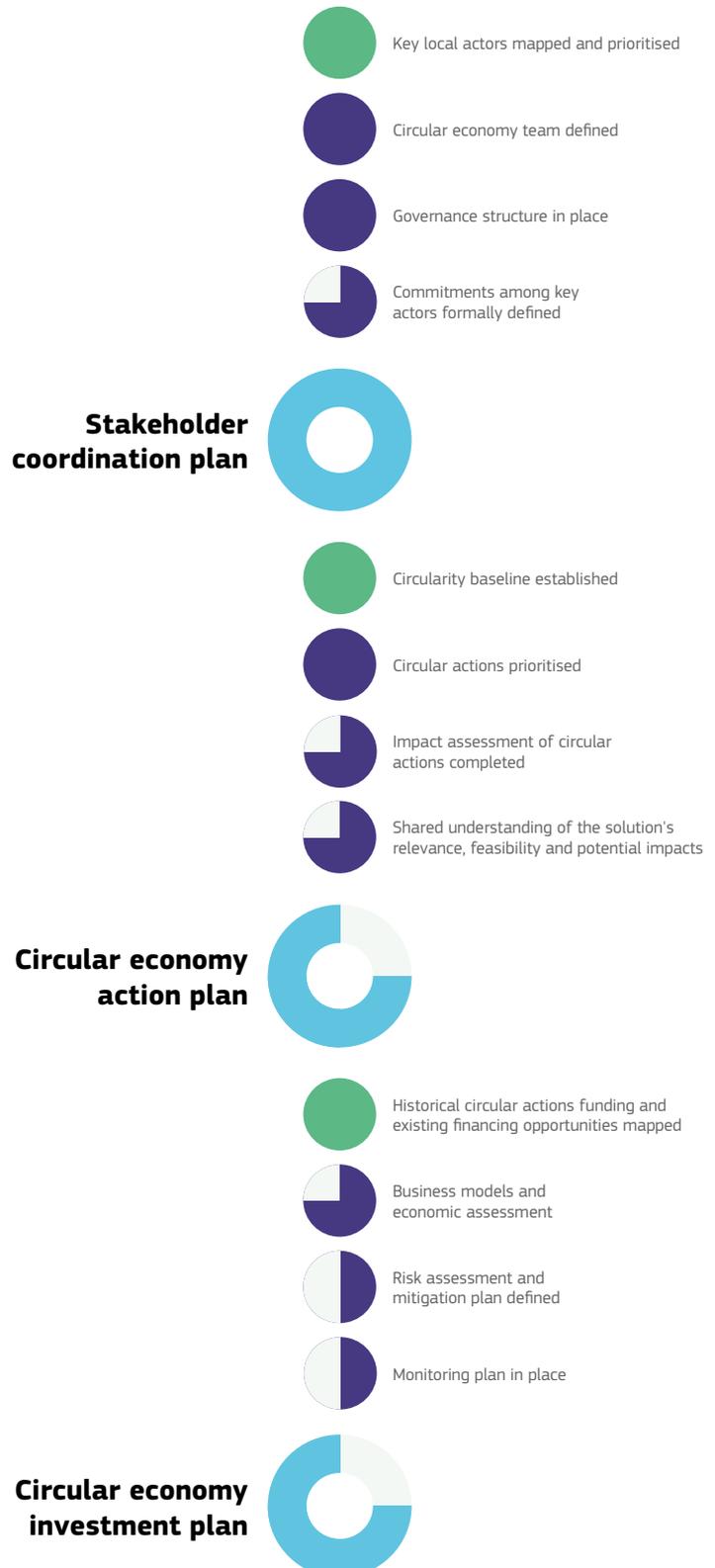
Single-use packaging from the food service sector is a major environmental challenge in Munich. Driven by a dense network of restaurants and high foot traffic from residents, commuters, and tourists. This contributes significantly to waste generation, litter, and resource consumption. To tackle the problem, the city is promoting reusable alternatives and improving accessibility for both businesses and consumers.

Munich is developing a cross-system take-back infrastructure for reusable packaging, aiming to create a city-wide network of return points in public spaces. This infrastructure will make it easier for consumers to return items, encouraging widespread adoption of reusable packaging and reducing single-use waste across the city.

✓ CCRI Methodology Step Completion Status:

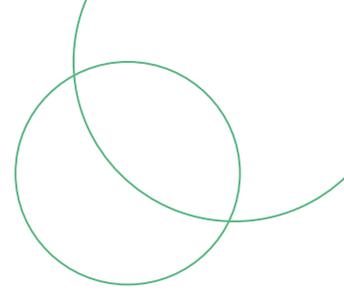
The [CCRI Methodology](#) is a guidance tool for policy and decision-makers in local and regional government. It describes key activities and milestones in the successful development of a Circular Solution, divided into three phases – Map, Design, and Implement. The visual checklist provides an at-a-glance view of how Munich's circular solution is progressing towards these outputs.

Key			
Phase:	 Map	 Design	 Implement
Progress:	 Started	 Half-way	 Complete





Background and objectives



i Policy context:

Munich's circular transition is strongly anchored in its local climate and waste strategies, with reusable packaging emerging as a central focus. The Action Plan for [Climate Neutrality Munich](#) promotes packaging-free shopping and sustainable take-away practices, while the [Zero Waste City programme](#) actively supports local businesses in adopting reusable systems. Building on these initiatives, Munich's [Circular Economy Strategy](#) will integrate concrete measures on packaging reduction, giving the topic stronger visibility and political momentum within the city's sustainability agenda. At the regional level, the [Bavarian Circular Economy Strategy](#) (BayKWS) (expected by early 2026) reinforces this direction by identifying plastics and packaging as key action areas for waste prevention and resource efficiency.

These local and regional efforts are complemented by a robust national and European policy framework that strengthens the relevance of Munich's approach. Germany's [Packaging Act](#) (Verpackungsgesetz) requires food service providers to offer reusable alternatives, while the German [Circular Economy Act](#) (KrWG) and the [National Circular Economy Strategy](#) (NKWS) promote waste prevention and set long-term goals for reusable systems by 2045.

× Problem:

Every year, several billion items of disposable packaging are used for food and drinks in Europe, which are disposed of after a short time. Switching from disposable to reusable packaging is therefore essential to promote the circular economy in Munich, with its high density of food service businesses and commuter and tourist footfall. Providing an infrastructure for reusable packaging will help to facilitate its increased usage but faces challenges in economic viability. Munich is currently addressing this challenge and developing a financing concept that is economically viable for all parties involved, and creates incentives for the use of reusable containers in the to-go sector.

🎯 Objectives:

- Reduce single-use packaging in the catering sector to prevent litter and decrease resource consumption.
- Increase social acceptance and adoption of reusable packaging by providing an easy-to-use, city-wide take-back infrastructure for citizens and businesses.





Stakeholders

Solution Leader(s):



Public Authorities

The City of Munich drives its reusable packaging initiatives through close cooperation between municipal departments, civil society, businesses, and external partners. Within the administration, the [Circular Economy Coordination Office](#) provides strategic direction, supported by the [Zero Waste Competence Centre](#), which focuses on waste prevention. The [Lower Waste Management Authority](#) ensures compliance with national regulations, while the [Munich Waste Management Company \(AWM\)](#) acts as a key operational partner in reducing single-use waste and improving collection logistics.

Supported by:



Civil Society & NGOs



Funding & Advisory Bodies



Private Sector

Civil society plays a vital role in fostering acceptance and behavioural change. The NGO [Rehab Republic](#) partners with the city on communication campaigns promoting reusable packaging, while [Reusable To-Go](#) and [Project Together](#) collaborate on funding proposals, pilot projects, and knowledge exchange through platforms such as Tacheles.

Engagement with the private sector brings valuable market insights, companies like [Recup](#), [Tomra](#), and [DEHOGA](#) contribute to discussions on the feasibility and design of reusable systems, helping align environmental goals with business needs.

Through the CCRI External Expert Support Scheme, Munich also benefited from technical expertise to explore viable financing models for a city-wide take-back infrastructure.



Results and Impact

Munich has positioned reusable packaging as a central focus of its circular economy agenda, responding to the environmental and resource impacts of single-use packaging in public spaces. While logistical, economic, and behavioural barriers to adoption persist, the city has succeeded in building a coordinated approach to advance practical solutions.

A city-wide take-back system for reusable packaging has been identified as a promising solution. An initial pilot project, though discontinued due to financial challenges, laid important groundwork and provided valuable lessons for future implementation. To build on this, a feasibility study under the CCRI External Expert Support Scheme has assessed viable financing and operational models, while a funding proposal has been submitted for financial support from the German Federal Ministry of Research, Technology and Space, to support a new pilot that will test practical solutions under real-world conditions.



Main results and impacts:

Through the **establishment of the Circular Economy Coordination Office** in 2023, Munich has successfully consolidated previously fragmented initiatives, strengthened political support, and elevated the visibility of circular economy within the city administration. Building on this foundation, **Munich's Circular Economy Strategy**, which includes six dedicated measures on packaging, has further reinforced the topic as a municipal priority, providing a clear framework for coordinated action. The circular economy strategy not only guides the city's internal efforts but also signals strong political commitment, enabling more effective collaboration with businesses, civil society, and other stakeholders, and laying the groundwork for scalable, impactful circular solutions.

Broad **stakeholder engagement is essential for success**. Within the city administration, an internal exchange takes place every six weeks to coordinate activities and ensure alignment across departments. In addition, Munich helps organise and participates regularly in the biannual "Round Table on Reuse," bringing together different stakeholders such as the city administration, politics, NGOs, gastronomy, and system providers.

This dialogue platform helps align perspectives, identify barriers, and foster collaboration across sectors. Munich also takes part in the exchange format "Tacheles", where cities and municipalities from across Germany meet every eight weeks to share practical experiences and insights on reusable packaging, with the aim of advancing circular solutions and scaling reuse systems.

In parallel, **social acceptance and citizen engagement** have become key priorities. Together with its implementation partner Rehab Republic, the city has supported several awareness-raising and communication initiatives. These include campaigns in Munich's S- and U-Bahn networks, local information activities in different neighbourhoods (e.g. clean up events and "Müllfrei-Meile", a zero-waste street festival), and educational materials clarifying customer rights and promoting the benefits of reusable systems.

Another key success is that Munich has **explored different financing models** for a city-wide reusable packaging system and identified promising approaches for further development. The city successfully assessed models that combine financial sustainability, practicality, and environmental impact. A report produced in the frame of the CCRI External Expert Scheme highlights a not-for-profit Design-Build-Operate model as a strong option, where unredeemed deposits are reinvested, enabling cost parity with single-use packaging at high participation levels.

Modelled Impact potential

The expert modelling shows that if implemented at scale, such a system **could**

replace up to
146,000
single-use
servings
per day

eliminate around
1,175
tonnes
of packaging
waste

reduce
1,300
tonnes
of CO₂ emissions
annually

and create
approximately
100-120
local jobs

while saving the
municipality up to
€4.1
million
per year through
reduced collection
and disposal costs



Market readiness/ business model:

The business model in this case is built around a city-wide infrastructure that enables the collection and reuse of packaging in the catering sector. Munich can implement reusable packaging through different models with varying cost structures and operational approaches.

- **Not-for-profit model:** The City commissions an operator to run a combined cups-and-bowls system. Unredeemed deposits are reinvested, and costs are spread across the network. Early participation and high throughput influence overall financial performance.

- **For-profit or open-market model:** Operated by private companies, this model relies on commercial margins and does not reinvest deposits. Costs remain higher than the not-for-profit model, and operational scale affects financial outcomes.
- **Funded research project:** The project aims to develop, test, and evaluate a city-wide, open return infrastructure for reusable containers in Munich's to-go sector. By analysing local packaging and container flows, the project will assess economic and ecological potentials and differences between single-use and multi-use approaches. It will also study how a unified infrastructure impacts consumer behaviour, including acceptance and return rates.



Challenges and Lessons Learnt



Enablers to implementation

- **Governance:** Establishment of a Circular Economy Coordination Office within the city administration, with a team of seven employees, including one specifically dedicated to the topic of packaging.
- **Political:** The City of Munich has made the circular economy a strategic priority and is developing a dedicated Circular Economy Strategy. By embedding concrete measures within this strategy, the city strengthens its commitment to reducing single-use plastics and highlights the importance of transitioning towards reusable and sustainable solutions.
- **Economic:** Munich is a leading business centre with a strong culture of innovation and favourable conditions for the circular economy. The city actively fosters collaboration between public institutions, businesses, and start-ups. Its dynamic start-up scene in circular and reusable solutions, provides a strong starting point for partnerships and collaborative initiatives to drive sustainable urban transformation.
- **Social:** Munich's municipal administration demonstrates strong commitment to the circular economy, with multiple departments actively supporting the transition.



Barriers to implementation

- **Political:** Maintaining high-level political support for reusable packaging initiatives over time, especially in light of competing municipal priorities, can be difficult.
- **Economic:** Securing funding for a city-wide take-back system for reusable packaging, remains a key challenge. In addition to the initial investment costs, ongoing operational expenses must also be covered, making the development of financially sustainable models essential for long-term success.
- **Technical:** In Munich, several providers offer reusable packaging solutions, but systems differ in types, sizes, and return processes. Restaurants and canteens either use those external solutions or operate their own, creating a fragmented landscape that complicates consumer use. This highlights the technical need for a city-wide, cross-system infrastructure to simplify returns and encourage broader adoption of reusables.
- **Social:** Engaging citizens and encouraging acceptance of choosing reusable over single-use items, remains a significant challenge. Beyond simply raising awareness, sustained behavioural change requires clear communication, motivation, and convenient systems that make the transition easy for everyday use.
- **Legal:** The lack of effective incentives (such as e.g., a packaging tax) to drive adoption of reusable packaging remains a barrier. While national legislation requires businesses to offer reusable options, it has so far had limited impact on actual implementation and uptake.



Success story

Since 2023, Munich has advanced its transition toward a circular city through its Circular Economy Coordination Office. Leading a broad participatory process with over 100 stakeholders, the city developed a comprehensive circular economy strategy. This included mapping the city's urban metabolism and identifying focus areas in packaging and reusables, construction, bioeconomy, and products and retail.

The strategy established clear priorities and has already guided the development of over 80 circular measures, including six measures that structurally embed reusables into city administration. Concrete goals and indicators ensure that progress toward circularity can be systematically monitored.

Implementation will begin in 2026, with 15 prioritized measures as the next milestone, including two pioneering projects on reusables. Munich thus becomes the largest German city with its own circular economy strategy, positioning itself as a national leader in sustainable urban transformation.



Lessons learnt

- **Strategic coordination is essential:** The establishment of the Circular Economy Coordination Office has helped to consolidate fragmented initiatives on reusable packaging, align stakeholders, and actively advance the topic within the city administration.
- **Cost-effective solutions support adoption:** Ensuring the financial viability of reusable systems is key to their adoption. Long-term municipal commitment and reliable funding, including investment that go beyond project initial durations, are critical to build a city-wide return infrastructure in collaboration with local businesses.
- **Complementing legislation with practical support:** National laws mandating reusable options are not enough. Practical uptake requires convenient, easy-to-use systems and the engagement of all stakeholders, including citizens, businesses, and service providers. The city can play a key role by providing infrastructure, incentives, and support to make reusable packaging economically viable and widely adopted.



Tips for replication

What to replicate?

- Appoint a dedicated coordinator or staff member to drive circular initiatives within city administration.
- Explore and test financing models for take-back systems through feasibility studies.
- Organise campaigns and events to engage citizens and raise awareness of reusable packaging.



Who can replicate this?

The solution is most relevant for urban areas with dense networks of restaurants, canteens, and other food service points, as well as high foot traffic from residents, commuters, and tourists, where demand can support a functioning reusable infrastructure.



What ingredients are needed to replicate it?

Key considerations and activities needed to replicate are:

- **Targeted site selection:** Map areas with a high density of cafés, restaurants, and food service points to ensure take-back machines and collection points are installed where demand is highest.
- **Infrastructure setup:** Establish collection, cleaning, and redistribution systems, in collaboration with dedicated partners or service providers experienced in reusable packaging logistics.
- **Policy and financial support:** Secure funding and political backing to cover initial investment costs as well as ongoing operational costs, including collection, cleaning, and maintenance.
- **Public awareness and engagement:** Design and run campaigns to inform and motivate citizens about the benefits of the system and how to use it.



Resources or contacts available to help?

- [Overview pilot project.](#)
- [Further information on the Circular Economy Coordination Office and Munich's Circular Economy Strategy.](#)

Circular Solution: Podravje – Maribor, Slovenia

Bio-based Fertiliser for Regeneration of Intensive Farmlands

Spodnja and Zgornja Hajdina
Source: Pilot's own image



Size:

325 994

inhabitants



GDP:

Less developed region



Geographical information:

Eastern and Central Europe



Urban-rural predominance:

Predominantly rural



Innovation ranking:

Moderate



Sectors:

Circular Resource Management

Nutrients

Bioeconomy

Food chain and systems



Time frame:

January 2023 – September 2025



Circular strategies:

reduce

reuse

recover

rethink

Contact Person:

Matjaž Gerl – Consultant at E-Institute (Institute for Comprehensive Development Solutions) and Bio-Based Fertiliser Implementation Lead; Matjaž Fras – Head of Research, Development and Innovation Sector at RRA Podravje Maribor and CCRI regional coordinator.

More information:

[Podravje – Maribor | Circular Cities and Regions Initiative](#)

Key facts and figures

Using pyrolysis, converting
1 tonne of wood
into biochar can sequester
approximately

**1.015 tonnes
of CO₂.**

It is expected that, for
Podravje, processing

44,000 tonnes of wood

into biochar via pyrolysis
could generate between

€982,520 and €3,561,653

annually in revenues from
CO₂ certificates, depending
on the CO₂ market price.



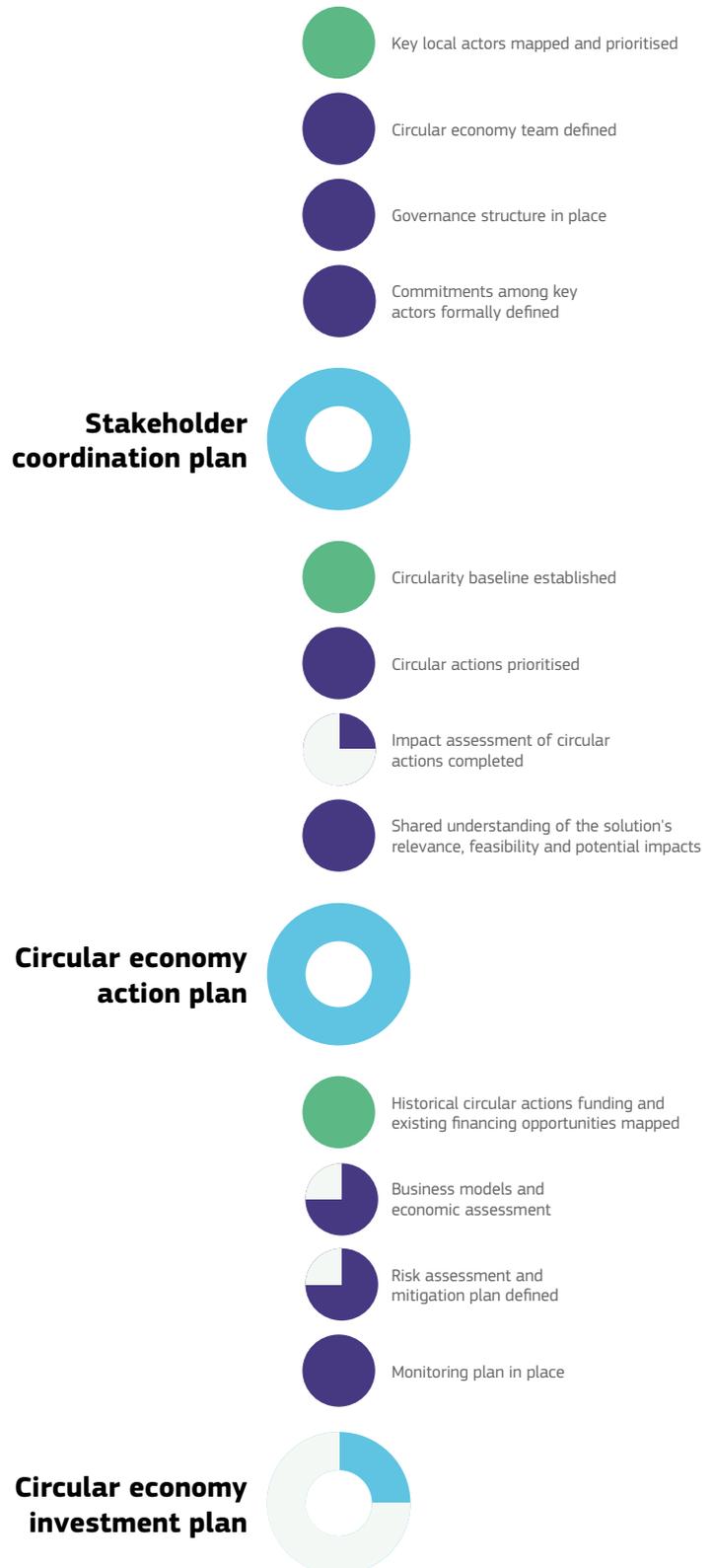
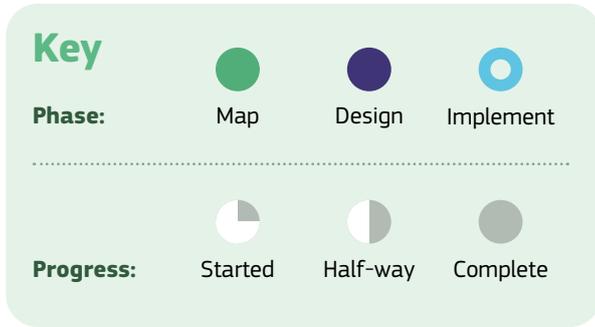
Solution overview

Decades of intensive farming have left agricultural soils in Podravje severely degraded. To tackle this challenge, the region is activating new circular value chains that transform local biodegradable materials into high-value products. The first is a bio-based fertiliser that restores soil health and replenishes nutrients lost through intensive agriculture.

The second is an innovative soil substitute for farmland remediation and raised-bed cultivation. Together, these solutions regenerate soil while closing resource loops by valorising locally sourced materials such as forest biomass, collected biowaste, and sediments from the Drava River.

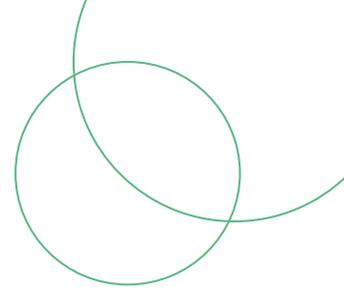
✓ CCRI Methodology Step Completion Status:

The [CCRI Methodology](#) is a guidance tool for policy and decision-makers in local and regional government. It describes key activities and milestones in the successful development of a Circular Solution, divided into three phases – Map, Design, and Implement. The visual checklist provides an at-a-glance view of how Podravje circular solution is progressing towards these outputs.





Background and objectives



i Policy context:

The [Regional Strategy for the Transition to a Circular Bioeconomy](#) defines key priority areas for advancing the circular bioeconomy in the region by 2030. Its objective is to foster a climate-resilient and circular regional bioeconomy by leveraging endogenous resources and developing value chains based on available biodegradable materials. Furthermore, it introduces the Circular Systemic Solutions (CSS) portfolio, which serves as the strategic foundation for implementing bio-based fertilisers at a regional scale. Building on this strategy, the [Action Plan for Implementation of the CCRI Regional Strategy for the Transition to a Circular Bioeconomy](#) outlines ten Circular Systemic Solutions, each addressing one of the four identified priority areas. It further details the objectives, stakeholders, timelines, and implementation aspects for each CSS, including the one supported under the CCRI initiative: “*Processing and Circular Use of Municipal and Industrial Biowaste*” in Podravje.

× Problem:

The region of Podravje faces low food self-sufficiency, soil degradation, and groundwater pollution resulting from decades of intensive farming. Meanwhile, valuable resources such as organic waste, forest biomass, waste heat, and river sediments remain underused or poorly managed. The transition to a circular bioeconomy is further hindered by limited stakeholder awareness and a lack of suitable finance mechanisms to support the scaling of innovative circular solutions.

🎯 Objectives:

- Support the development of a climate resilient, circular regional bioeconomy by leveraging endogenous bio-based resources and initiating value chains from locally available biodegradable materials..
- Close the material loop for biowaste and other biodegradable materials (including wood biomass and river sediments) in the Podravje region by establishing a production centre for organic fertiliser aimed at regenerating intensively farmed soils.





Stakeholders

Solution Leader(s):



Public Authorities

The [Regional Development Agency for Podravje – Maribor](#), a public agency, acts as the formal coordinator of activities under the CCRI supported work at the regional level. The [E-Institute \(E-Zavod\)](#), a private non-profit organisation driving decarbonisation and climate resilience, leads the implementation of the described circular solution and serves as a biofertiliser producer. The [Communal Company Ptuj Jsc](#), responsible for water supply and wastewater treatment services, functions as a public infrastructure manager. [Public Utility Ptuj Ltd](#), providing waste management public services, oversees the collection of communal waste, wood biomass, and biological waste.

Supported by:



Private Sector



Research & Academia



Funding & Advisory Bodies

The [Regional Chamber of Agriculture and Forestry](#), an association of farmers and producers, represents the interests of farmers. [VGP Drava Ptuj](#), the water management company responsible for maintaining lowland watercourses in the Drava river basin, collects river sediments and provides expert assessments of sediment quality and its potential for valorisation. [Dravske elektrarne Maribor](#), an energy provider owning hydro power plants along the Drava river, supports the circular solution and explores ways to process river sediments into products aligned with circular economy principles.

The [Agricultural Institute of Slovenia](#), a national research organisation, serves as a knowledge provider.

[Green Assist](#), an advisory support scheme offered by CINEA, supported Podravje with developing the techno-economic feasibility analysis for the circular solution, including assessments of technological design for full-scale regional deployment, financial feasibility with cost-benefit analysis, and formulation of a business model. Finally, the [Circular City Centre \(C3\)](#), a competence and resource centre at the [European Investment Bank \(EIB\)](#), provides advisory support to Podravje to enhance access to financing for the developed circular solution.



Results and Impact

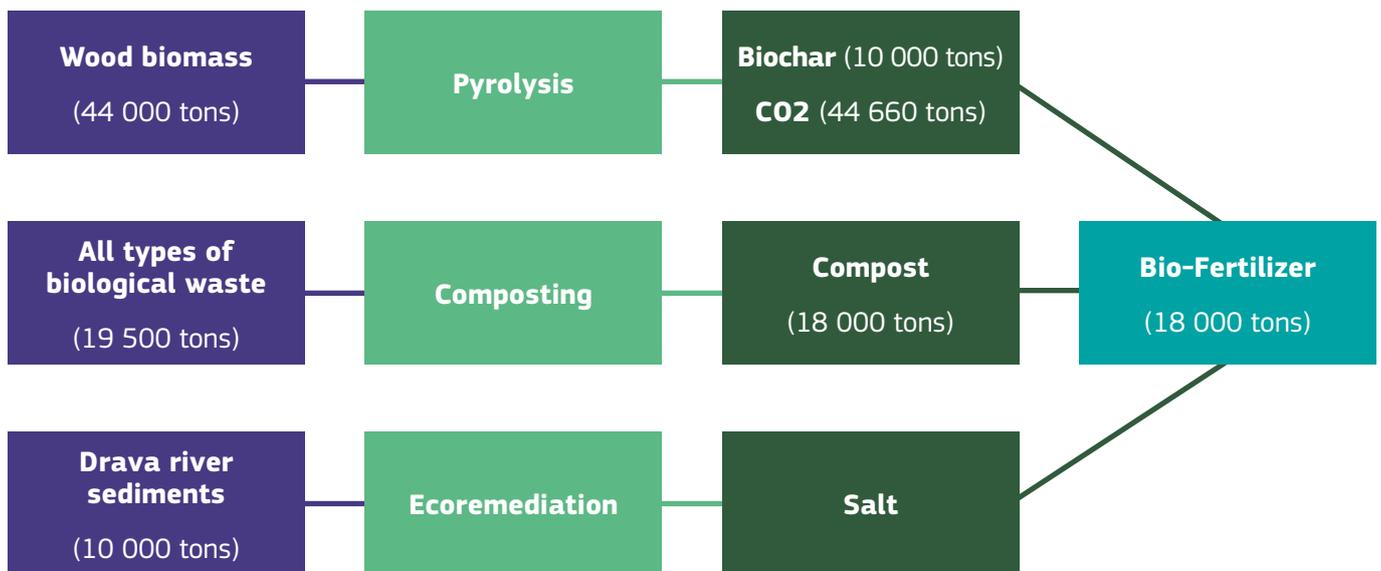
Policy and Strategic Foundations

In line with its **first objective** (see above), the region, previously lacking a guiding framework, developed its first Regional Strategy for Circular Bioeconomy, providing a solid policy foundation for sustainable growth. Complementing this, an Action Plan was created, outlining concrete, region-specific projects that reflect local priorities and opportunities within the bioeconomy.

Biofertiliser Production and Material Loops

Aligned with its **second objective**, significant progress has been made toward closing the material cycle of biowaste and biodegradable materials by preparing the ground for a Centre for Biofertiliser Production. The following diagram presents the material flows supporting this production process, together with the estimated quantities of collected inputs and resulting biofertiliser output.

Figure 1. Materials' flows for the production of bio-fertilizers.



This work was supported by active stakeholder engagement, clear role alignment, and technical support from Green Assist, which conducted a comprehensive techno-economic feasibility study. This included a financial analysis covering value chain assessment, cost-benefit evaluation, economic constraints, and EU funding opportunities, as well as a technological design assessing material and energy processing, circular integration, and “Do No Significant Harm” (DNSH) compliance.

Financing and Investment Readiness

To explore funding options, Podravje applied to several Horizon Europe calls and engaged in exploratory discussions with multiple financial institutions. In spring 2025, the region partnered with the European Investment Bank (EIB) through the [Circular City Advisory Programme](#). This collaboration is helping Podravje region mature the solution toward financing while building regional capacity to replicate the investment-readiness process for future circular solutions.

Stakeholder Engagement

A total of **104 stakeholders** were mobilised across diverse engagement formats, including representatives from the Regional Council of Podravje, industry actors, and businesses. Additional outreach took place through events such as the Assembly of European Regions and EIB-C3 support activities.

For the biofertiliser solution, stakeholder collaboration resulted in a shared strategic vision, aligned technical and financial approaches, and a clear roadmap for implementation. These outcomes have strengthened regional commitment, clarified investment priorities, and laid the groundwork for effective scaling of the biofertiliser initiative.

Environmental and Economic Impact

The implementation of the described solution is expected to deliver substantial environmental benefits. In terms of biochar production, each tonne of dry wood biomass processed for biochar and biofertiliser production is estimated to fix approximately **1.015 tonnes of CO₂**. Processing 44,000 tonnes of wood through pyrolysis could potentially generate annual revenues of between €982,520 and €3,561,653 from CO₂ certificates, depending on market prices¹.

Targets:

- **By 2030:** regenerate 20% of intensive farming areas using circular biofertilisers.
- **By 2032:** reduce the use of artificial fertilisers in these areas by 20%.



Market readiness/business model:

This project provides a sustainable waste management solution by converting local bio-waste streams (wood biomass, organic waste, and river sediments) into high-quality agricultural fertiliser, reducing pollution and supporting the circular economy. Target customers include farmers, agricultural cooperatives, municipalities and public waste management bodies, as well as retailers and e-commerce platforms. Revenues are expected to be generated through fertiliser sales, carbon credits from CO₂ emission reductions achieved via biomass processing, and waste processing fees paid by producers to treatment facilities.



Challenges and Lessons Learnt

Enablers to implementation

- **Political:** In 2023, the Regional Council of Podravje endorsed the Regional Strategy for the Transition to a Circular Bioeconomy, developed by RDA Podravje-Maribor and the E-Institute in cooperation with regional actors and networks. Building on this, the Council adopted the Action Plan for its implementation in 2024, outlining 10 circular bioeconomy solutions to be developed by 2030. These steps confirm the circular bioeconomy as a key pathway to addressing the region's economic, social, and environmental challenges.

Barriers to implementation

- **Economic:** Below-average economic activity is reflected in a GDP per capita of just 80% of the Slovenian average. The region faces high unemployment, particularly among its youth, limited job opportunities compared to central Slovenia, and significant outmigration of skilled workers to Austria.
- **Economic:** There is a lack of funding and financing instruments to support the implementation of the circular economy at the national and regional level, coupled with limited knowledge on how to design and operationalise such instruments for concrete circular actions.
- **Economic/Technical:** Insufficient data to conduct comprehensive material flow analyses, as well as limited knowledge of the region's resource potential.
- **Legal:** High regional fragmentation stems from limited systemic cooperation among municipalities and other actors, while the current legal and financial framework further restricts opportunities for collaboration.
- **Social:** Low awareness and understanding of circular economy principles among regional stakeholders and citizens.



Success story

In 2024–2025, the Podravje region, with support from CCRI and Green Assist experts, took a decisive step toward a circular bioeconomy by developing a techno-economic feasibility study for biofertiliser production. The study integrated advanced processes, including pyrolysis, composting, and eco-remediation, to convert local biowaste streams (wood biomass, municipal organic waste, and river sediments) into high-quality products such as biochar, compost, soil amendments, and biofertiliser.

Results indicate that the new facility could produce 35,000 tonnes of biofertiliser annually, regenerating over 7,000 hectares of intensive farmland. The proposed business model shows strong profitability, supported by carbon credit opportunities and EU green funding. Successful implementation will position Podravje as a regional leader in sustainable agriculture, demonstrating how waste challenges can be transformed into climate, economic, and circular economy opportunities.



Lessons learnt

- **Building Regional Collaboration:** At the start, fragmentation and limited cooperation among municipalities and regional actors hindered the coordinated development of Podravje's circular bioeconomy strategy. To address this, RDA Podravje-Maribor and the E-Institute conducted a stakeholder analysis and launched an inclusive engagement process, including sub-regional workshops and targeted bilateral discussions. These activities raised awareness of circular bioeconomy benefits, fostered co-creation, identified ongoing initiatives, and mapped relevant policies. As a result, regional stakeholders actively shaped the bioeconomy strategy and subsequent action plan. Newly established territorial partnerships are now jointly driving the implementation of this circular solution, alongside nine others in the action plan. This demonstrates that early, inclusive, and structured stakeholder engagement is essential to overcome institutional fragmentation and build a shared regional vision.
- **Securing Financing and Investment Readiness:** Limited financing opportunities at national and regional levels presented a major challenge. To address this, Podravje developed a comprehensive techno-economic feasibility analysis, outlining the technical processes, technologies, and economic viability needed for a sustainable model to reuse bio-based materials and regenerate intensive agricultural land. Parallel exchanges with public and private financing institutions provided insights into selection criteria and funding pathways. Building on this foundation, the region is now collaborating with the EIB Circular City Centre (C3) to further mature the project toward investment. This experience highlights the value of proactive financial planning, early engagement with funders, and robust feasibility analysis in advancing circular economy projects from concept to investment-ready solutions.



Tips for replication

What to replicate?

- Methodology for the development and application of a design approach to transform regional centres of waste management into regional centres of circular bioeconomy.
- Methodology for developing a regional bioeconomy strategy and action plan, which served as the country's first such strategy and action plan, and is now recognised as a pioneering model for shaping the national bioeconomy strategy and guiding replication in other regions.



Who can replicate this?

- **Design approach to transform regional centres:** Regional authorities and waste management companies aiming to maximise the use of diverse biowaste streams to produce high-value biofertilisers and other regional products. This creates shared value among actors not typically linked in a traditional linear economy. The approach is particularly relevant for European regions with strong agricultural and forestry sectors, where abundant biomass resources can support local circular value chains.
- **Methodology for developing a regional bioeconomy strategy and action plan:** Regional authorities seeking to transition to a circular bioeconomy through the application of a holistic and systemic approach.



What ingredients are needed to replicate it?



Design approach to transform regional centres:

- **Ensure a collaborative and stakeholder-driven design approach:** Engage regional stakeholders through workshops, bilateral meetings, and surveys to identify local needs and map potential high-value products from regional biowaste streams. Use stakeholder insights to make a preliminary estimate of regional demand for these products.
- **Obtain stakeholder commitment and set up a clear governance framework:** Define a clear governance structure outlining roles, investment requirements, timelines, and monitoring mechanisms. Secure the endorsement of key decision-makers and ensure continuous stakeholder involvement through transparent coordination and communication.
- **Perform technological and economic validation:** Conduct a techno-economic feasibility study to assess the potential for converting existing bio-based waste stream (e.g., organic biowaste, wood, river sediments) into marketable products. Identify opportunities for regional valorisation, define the portfolio of viable products, and determine the level of investment required.
- **Continuously work on project maturation and financing readiness:** Work systematically on enhancing project maturity, as it is a prerequisite for securing financing. Where in-house expertise is limited, leverage Project Development Assistance (PDA) and advisory services available at EU, national, and regional levels. Begin exploring available support schemes and integrating feedback from financing institutions early in the project development process.

Methodology for developing a regional bioeconomy strategy and action plan:

- **Conduct a comprehensive baseline assessment:** Assess available natural and bio-based resources and their material flows across the region, and map relevant local and national policies to establish a robust foundation for circular bioeconomy development.
- **Ensure an inclusive and structured stakeholder engagement:** Organise structured workshops and engagement activities with all relevant regional actors, ensuring continuous stakeholder participation to co-create strategic priorities and validate the resulting action plans.
- **Formulate and operationalise the strategy:** Define intervention areas, set objectives, prepare a draft strategy, and finalise it with approval from regional governance bodies. Translate the strategy into a concrete action plan, including a concrete pipeline of circular bioeconomy projects, responsibilities, and timelines.
- **Advance project development and financing readiness:** For each circular economy project, prepare comprehensive technical, legal, and economic feasibility studies, ensuring projects are investment-ready, while also identifying suitable financial instruments and funding opportunities to support their implementation.

Circular Solution: **Roubaix, France**

TISSEL: Low-Tech Circular Approaches for Regenerating Industrial Assets.

Source: [Post](#) | [LinkedIn](#)



Size:

99 507
inhabitants (2022)



GDP:

More developed region



Geographical information:

Western Europe



Urban-rural predominance:

Predominantly urban



Sectors:

Construction and buildings

Circular resource management

Industrial symbiosis



Time frame:

2023 – 2025



Circular strategies:

reduce

reuse

repair

refurbish

remanufacture

recover

Contact Person:

[Hugo Delahaye](#), Project Manager – Circular Economy & European Projects Direction Transition Écologique / Department of Ecological Transition

More information:

[Roubaix | Circular Cities and Regions Initiative](#)

Key facts and figures

Under-used space

9,000 m²

reactivated in a site the size of

11,000 m²

7 companies
operating on site

2 apprenticeship/
training centres

Jobs supported:

44 - 61

Essential upgrades delivered (2023–2024):

- ✓ electrical and smoke-extraction works;
- ✓ coworking and canteen opened;
- ✓ incubator/LivingLab in preparation.

Yearly rent baseline:

€140k

with **2,000 m²** still to lease to reach full operation

- ✓ Cross-department mobilisation in place;
- ✓ Structured investor dialogue initiated (June 2025)

Advisory in motion:

EIB-C3 workshops and Green Assist diagnostic to consolidate the plan and KPIs;

DEFINITE-CCRI delivered FIB (Financial Investment Baseline) /TIP (Technical Impact Potential) baselines and due-diligence materials to structure the investment

Service catalogue launched:

events

shared services

logistics



Solution overview

Roubaix is tackling vacancy in post-industrial buildings and persistent unemployment through circular urban regeneration driven by asset reuse. The approach focuses on low-tech, frugal upgrades that quickly transform under-used sites into affordable spaces for circular SMEs, skills training, and community activities. TISSEL, a former textile factory, serves as the flagship test bed. Through phased, light-touch renovation, the site was reactivated rapidly and now hosts businesses, training centres, coworking spaces, and a community restaurant that together anchor a growing circular ecosystem. This has supported early job creation, strengthened local partnerships, and mobilised departments across the city. Investor dialogue is now progressing to secure a long-term business model.

In parallel, Roubaix is developing Industrial Symbiosis to boost collaboration between local companies and communities, generating non-delocalisable jobs and increasing economic resilience through circular practices.

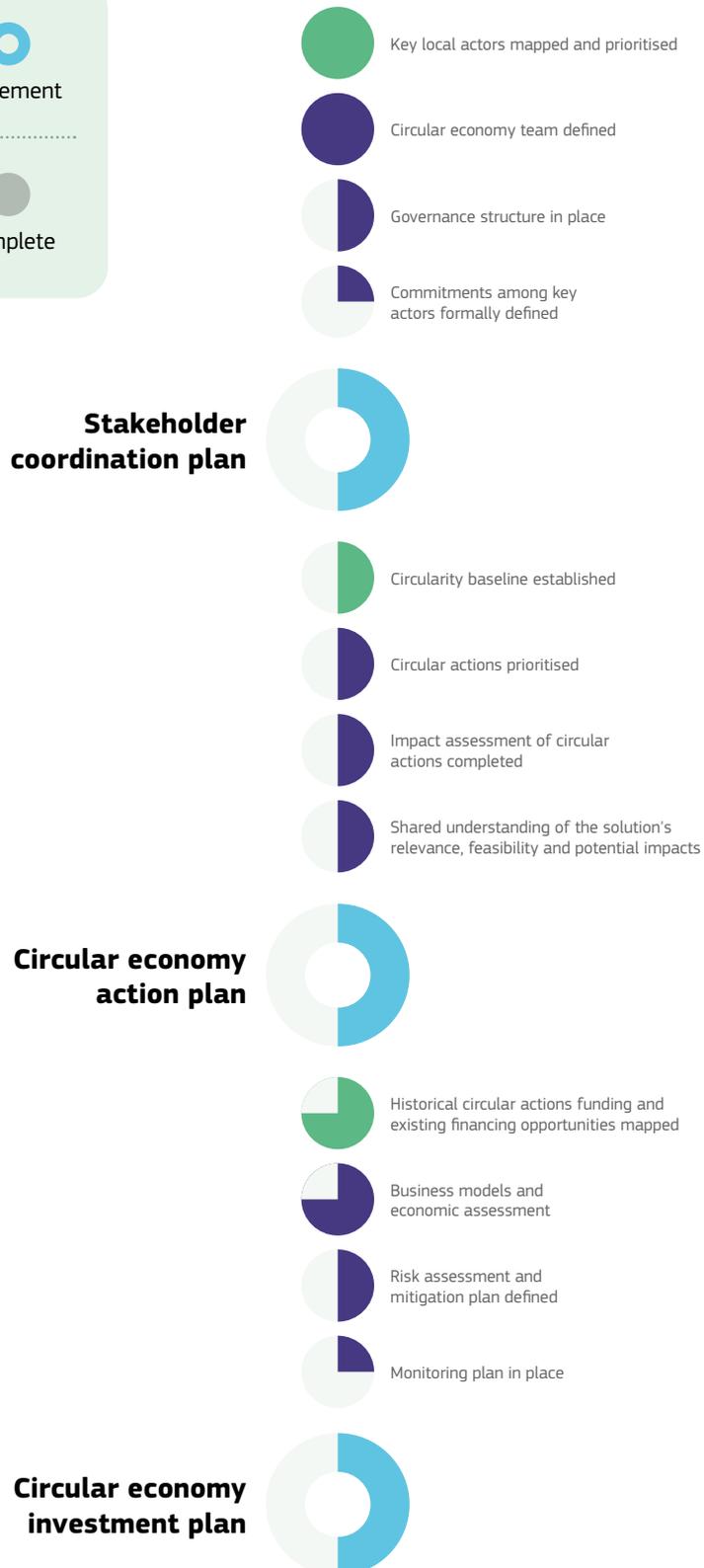
tives like home or community composting, organic fertiliser production, and even converting waste into energy. Guimarães is also taking proactive steps to spread awareness about the importance of preventing food waste among public schools, universities and citizens.

✓ CCRI Methodology Step Completion Status:

The [CCRI Methodology](#) is a guidance tool for policy and decision-makers in local and regional government. It describes key activities and milestones in the successful development of a Circular Solution, divided into three phases – Map, Design, and Implement. The visual checklist provides an at-a-glance view of how Roubaix’s circular solution is progressing towards these outputs.

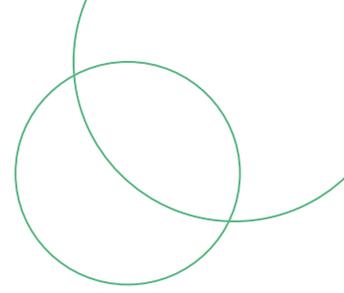
Key			
Phase:	 Map	 Design	 Implement

Progress:	 Started	 Half-way	 Complete





Background and objectives



i Policy context:

Roubaix's circular regeneration is anchored in a clear policy framework. Locally, the [Circular Economy Strategy 2022–2026](#) sets objectives on awareness, business support and municipal leadership; the TISSEL site operationalises these by providing affordable space and visible demonstration.

This builds on the city's long-running [Zero-Waste policy](#), active since 2014, which underpins the reuse and repair culture, and the community engagement vital to low-tech, frugal upgrades.

Regionally, [Rev3 – the “Third Industrial Revolution”](#) programme in Hauts-de-France – promotes circular production and green jobs, while the [Communauté d'Écologie Industrielle et Territoriale \(COM'EIT\)](#) network advances industrial and territorial ecology; both are reflected in Roubaix's clustering of circular small and medium-sized enterprises and materials-reuse efforts.

National levers complement this: ADEME – Agence de la transition écologique – supports circular renovation and energy actions, and [Territoires Zéro Chômeur de Longue Durée](#) aligns with the solution's inclusive employment pathways.

× Problem:

TISSEL

Roubaix carries a large stock of vacant or under-used post-industrial buildings that are energy-inefficient and require costly safety and accessibility upgrades. This makes reuse financially challenging, particularly as the city cannot fund renovations alone and current rental income falls far short of the investment needed. At the same time, circular SMEs struggle to access affordable, long-term spaces to establish and grow their activities, slowing the growth of a local circular economy ecosystem.

Industrial Symbiosis

Roubaix continues to face high unemployment, requiring new models for local economic development. While its industrial heritage offers strong circular potential, businesses and communities lack structured mechanisms to collaborate and share resources. Without coordinated support for industrial symbiosis, opportunities to create non-delocalisable jobs and preserve materials remain largely unrealised — limiting both economic resilience and value creation in the region.

🎯 Objectives:

- Activate and reuse existing buildings through staged, low-tech upgrades that make space safe and affordable for immediate use.
- Build local circular jobs and skills by hosting SMEs, training and community activities with clear inclusion goals.
- Integrate the circular economy hot spots into the local economic ecosystem to foster the economic regeneration of deprived neighbourhoods.
- Establish a long-term business model (fair rents and other viable options) to cover costs, attract co-funding, and enable replication at other suitable sites.





Stakeholders

TISSEL stakeholders:



Public Authorities



Private Sector

The City of Roubaix is owner of the TISSEL site and lead project authority. It drives the circular regeneration strategy and oversees cross-department coordination and replication through a dedicated Steering Committee. *Manufactures de Tissel* (site association) is the interim operator and animator of the **TISSEL hub** until 2027.

Advisory and technical partners include EU-level advisory such as Green Assist, and PDA-DEFINITE CCRI (Deal Engine).

Tenant enterprises anchor operations and inclusion: **La Vie est Belt**, **Recycle-Moi**, **Dagoma 3D**, **Les 3 Tricoteurs**, **Juin fait le Lin**, **Anti fashion Project** and **Le Parpaing**; PRESRV (a construction-reuse platform) is considered as a future partner. Training and skills partners: **BTP-CFA (on-site apprenticeship training)** & *L'école de la Réparation*, strengthening local skills, employability and inclusion through hands-on learning.

Figure 1: tenants of the TISSEL hub. source: <https://tissel.org/nos-habitants/>



Industrial Symbiosis stakeholders:



Public Authorities



Private Sector



Funding & Advisory Bodies

ADEME, Région Hauts-de-France and Métropole Européenne de Lille co-finance **ECOPAL**, the local structure dedicated to industrial symbiosis in Roubaix. APESA acts as the technical and advisory partner, supporting the set-up and operational model. The Roubaix Employment Bureau (*Mission de l'Initiative et de l'Emploi*) connects long-term unemployed and disabled residents with circular-economy job opportunities emerging through industrial symbiosis.

The European Investment Bank's Circular City Centre (EIB-C3) facilitates cross-departmental workshops and supports the integration of circular economy practices across Roubaix's municipal administration (with support continuing beyond 2025).



Results and Impact

TISSEL

TISSEL has activated approximately 10,000 m² of formerly vacant industrial space since 2022, creating 60 jobs through seven companies and two apprenticeship centres. The phased light-renovation approach enabled rapid reactivation while keeping costs manageable, generating roughly €140k/year in rent with potential for growth as remaining floor area is leased and revenue diversification options (events, training, shared logistics) are developed. The hub provides inclusive employment pathways through partnerships with local employment services and free training offered by some tenants.

Investment readiness and governance structures have been strengthened to support replicability: PDA-DEFINITE CCRI delivered investment-readiness assessments (FIB and TIP) and due-diligence workshops, while Green Assist conducted SWOT analysis and facilitated investor dialogue. The association Manufactures de Tissel manages interim operations as the long-term model is being finalized. Environmental improvements are underway, with planned building-envelope upgrades, district-heating connection, and potential rooftop photovoltaics expected to significantly reduce operational energy use and emissions.

TISSELS's impact since 2022

60

Jobs Created

Employment opportunities across multiple sectors

- ✓ Logistics
- ✓ Circular manufacturing
- ✓ Material reuse

9 000m²

Space Reactivated

Industrial building refurbishment transforming infrastructure into a thriving circular hub

5 000+

Visitors Engaged

People reached through organised events, seminars and guided tours promoting circular practices

9

Circular Economy Actors

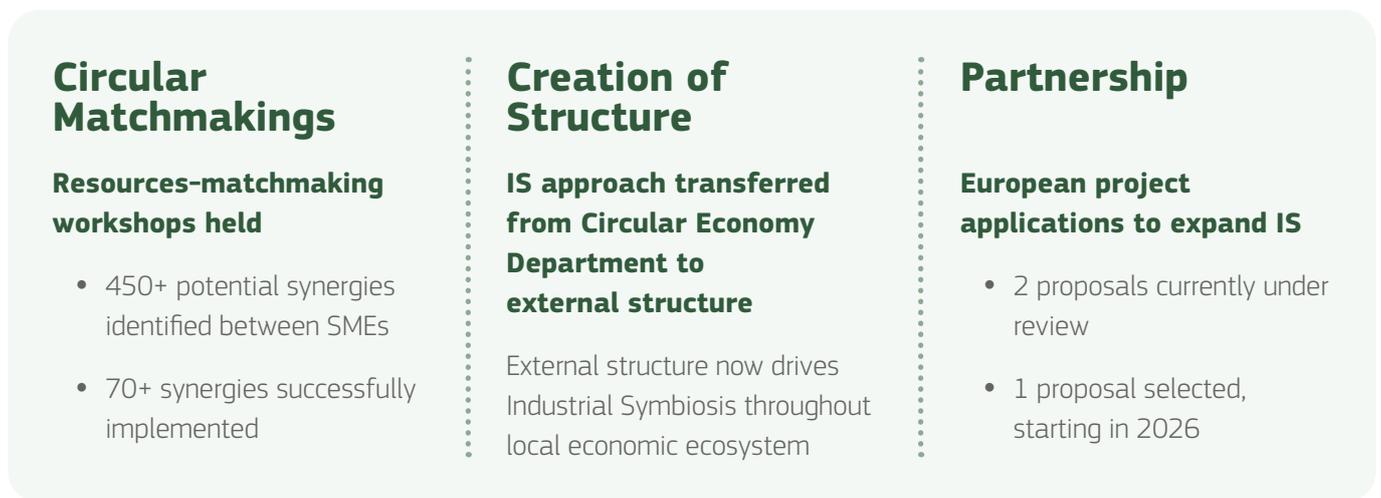
On-site stakeholders collaborating as part of a vibrant circular economy community

Industrial Symbiosis

Since 2022, Roubaix has built an engaged community of stakeholders around circular economy and industrial symbiosis, achieving tangible outcomes in networking, project development, and cross-border collaboration. Participation in the CCRI Thematic Working Group on Industrial Symbiosis increased the city's visibility at European level and enabled new partnerships, including collaborative applications for Horizon Europe funding. Building on lessons from the Interreg project [Upcycle Your Waste](#), the city successfully

secured the [SyMBIOTe](#) micro-project (Interreg France-Wallonie-Vlaanderen, 2025), which will develop concrete cross-border circular economy synergies and business matchmaking with Belgian partners. These achievements demonstrate Roubaix's capacity to translate local industrial symbiosis efforts into systemic, lasting partnerships that extend beyond municipal boundaries.

Figure 2: example of resources-matchmaking synergy implemented



Market readiness/business model:

TISSEL

Today, the hub relies mainly on tenant rents, with small-scale tests of venue hire, training and shared services. For the long term, Roubaix could consider the following possibilities:

- **Co-operative operation:** the City, tenants, and partners co-own the site, with any surplus reinvested in operations.
- **Semi-public operation:** a Publicly-led company runs the site, with SME involvement.
- **Managed-lease / management contract:** the City retains ownership while an operator runs the site according to agreed service targets.
- **Private/public initial major investor:** an investor takes over ownership, partially or fully, with a memorandum of understanding to preserve the circular economy approaches and support for circular SMEs embedded in the Tissel project.

A 3-5-year plan (works, rent policy, scenarios and cash-flow) is being compiled by the City, using the Green Assist business-plan template and KPI set, and drawing on DEFINITE-CCRI (FIB/TIP) baselines and inputs to guide funder discussions.

★ Success story

To transform TISSEL from a promising pilot into a bankable circular-regeneration project, Roubaix received tailored project-development support from **DEFINITE-CCRI**. The team produced a concise, evidence-based investment pack including: a clear **financial baseline** (income and expenditure), an **impact brief** (jobs created, materials reused, energy performance), and a one-page summary capturing the project's value and business case.

The pack also outlined practical options for **ownership and operations**, a phased refurbishment plan with associated costs, and an early risk analysis with proposed mitigation measures – delivering a strong, coherent story to engage funders.

During an on-site meeting, a major public investor progressed from general interest to concrete discussions on co-funding terms, expected returns and revenue models to explore. The presence of a single cross-disciplinary advisory team – legal, financial and technical – helped **sharpen the investment case and accelerate decision-making**.



Challenges and Lessons Learnt

🔑 Enablers to implementation

- **Political:** Clear mandate for circular, low-tech regeneration embedded in the City's Circular Systemic Solution, giving projects top-level backing.
- **Governance:** A dedicated Ecological Transition Department coordinates departments and partners on various projects, reinforced by support from EU advisers (CCRI, EIB-C3, DEFINITE CCRI, Green Assist) and national bodies (ADEME, Region Hauts-de-France, MEL).
- **Economic/Financial:** A first capital planning overview and active dialogue with a public initial major investor open pathway for co-funding of TISSEL.
- **Technical:** Phased, low-tech compliance works unlocked early occupation and learning for TISSEL, while preparing building envelope and energy upgrades.
- **Legal/Structuring:** Defined routes give actionable options to select a long-term operator and allocate responsibilities for TISSEL, and to establish governance for the IS dedicated structure.

🔒 Barriers to implementation

- **Governance:** Projects with diverse stakeholders can suffer from unclear responsibilities, weakening partners commitment. For industrial symbiosis structures, attracting a sufficient number of members can be challenging.
- **Organisational:** Starting without a single coordinator and shared action log fosters siloed work and duplication. Naming one lead team early keeps pace, coherence, and accountability.
- **Economic/Financial:** Investors hesitate without clear medium- to long-term plans, visible public co-funders, and simple proof of demand (e.g., short letters from tenants). SMEs and neighbouring local authorities need reassurance of tangible benefits from joining industrial symbiosis structures.
- **Technical:** Old industrial buildings can hide compliance issues and retrofit surprises. Early audits and phased planning around occupants are vital to avoid costly stoppages.
- **Data & Evidence:** Launching without a simple baseline and KPIs weakens the investment story. A minimal set of indicators, established on day one and updated regularly, helps build credibility.
- **Market/Service:** Untested service lines (such as events, training, shared logistics for TISSEL; support on specific waste streams for industrial symbiosis) create revenue uncertainty. Testing pilot services, tracking uptake, and scaling only when demand is proven provides a way forward.



Lessons learnt

- **Early Action & Momentum:** Opening space with light, low-tech works builds confidence and demonstrates progress early. Momentum is maintained when long-term choices about ownership, operation, and a simple 3-5 year plan are defined early.
- **Clear, Concrete Communication:** Conversations with partners and funders move faster with concise, tangible narratives covering what will be fixed, how it will be financed, and what success looks like. This should be backed by costed works, fair rent policies, basic cash-flow scenarios, risk assessments, and short letters from tenants and public co-funders. For industrial symbiosis, communicating benefits clearly to potential members, supported by concrete examples, KPIs, and feasibility studies, helps reassure partners about the business model.
- **Tangible Evidence:** Opening spaces early and organizing short, focused site visits with tenants, accompanied by summaries of what works, indicative costs, simple indicators, makes the case concrete and provides evidence for replication on other sites.
- **Coordination & Institutional Support:** Mobilizing multiple municipal departments on a regular rhythm, with a coordination team and shared action list, unlocks faster decisions than siloed exchanges and build shared ownership. Strong backing from institutional partners and elected representatives is highly needed, adding value in engaging new partners for industrial symbiosis initiatives.



Tips for replication

What to replicate?

1. The combined use of **phased, compliance-first activation** with a **simple 3-5 year plan** (costed works, scenarios, rent policy) and **impact/finance baselines** to test technical feasibility and funding together.
2. A clear **governance structure** anchored in an early choice of long-term operator (co-operative or semi-public company), an **appointed municipal coordinator**, and a one-page **“who-does-what”** note to align departments and partners.
3. A **stepwise deployment path**: open part of the building, organize **short site visits** with tenants, and provide a **one-page brief** (what works, indicative costs, 3–4 KPIs) to lay the ground for replication on other under-used sites.
4. An **investor-ready pack from day one**: consolidate all key material into a single bundle (executive summary note, **10-year plan** with 2–3 scenarios, fair rent policy, basic KPIs, short letters of interest) and review it **on site** with public co-funders and mission-driven investors to agree conditions and next steps.



Who can replicate this?

TISSEL

- Medium-sized, post-industrial towns with **empty factories or warehouses** and a goal to create **local jobs** in the circular economy.
- Cities that can **secure a building** and do **basic, low-cost safety fixes first**, then plan more substantial upgrades over time while **keeping rents affordable**.
- Places with **active small businesses and training providers** that can quickly use shared space for **repair, reuse and upcycling**.
- Local authorities which are able to **bring several departments around one table** and prepare a **clear multi-year roadmap** (works, budget, timeline) plus a **one-page funder brief** to engage public and impact investors.
- Private stakeholders with financial and technical means can be highly inspired by this type of project. For example, Tissel Carihem (PRESVR) got inspired by Tissel, a city-led project.

Industrial Symbiosis

- Local authorities willing to work closely with institutional partners and neighbouring local authorities and higher-level administrative authorities (regional, national and EU).



What ingredients are needed to replicate it?



TISSEL

- **Secure control of a suitable building**, conduct early safety/condition checks (fire, electrical, accessibility, asbestos), and reopen part of the site with phased low-tech works while detailed upgrades are designed.
- **Decide early who owns and who operates** the hub (co-operative, semi-public company, or management contract), appoint a **single municipal coordinator**, and align roles with a short **“who-does-what”** note before procurement.
- **Prepare a clear multi-year roadmap** (works, budget, timeline) and a one-page funder brief with a few simple indicators and short letters of interest, use focused site visits to present, test and refine the offer.
- **Set a basic monitoring baseline from day one** (space in use, jobs/inclusion, reuse and energy measures), check permits and reuse rules early with regulators, and match available funds to needs using a simple mix of grants for studies and loans for works.

Industrial Symbiosis

- **Prepare a clear multi-year roadmap** (works, budget, timeline) and a one-page funder brief with a few simple indicators.
- **Ensure strong political and higher-level administrative support** to unlock technical, governance and financial challenges.

Resources or contacts available to help?

- [Green Assist](#) deliverables for replication potential.
- [Overview Roubaix's DEFINITE CCRI profile](#)
- [DEFINITE CCRI Circularity Tool](#)

Circular Solution: Tampere Region (Pirkanmaa), Finland

Driving Systemic Change Through Public-Private Cooperation.

The Orivesi project site
Source: Pilot's own image.



Size:

518 000
inhabitants



GDP:

Transition region



Urban-rural predominance:

Intermediate



Geographical information:

Northern Europe



Innovation ranking:

Leader



Sectors:

Construction and buildings

Circular resource management

Industrial symbiosis



Time frame:

2022 – 2025



Circular strategies:

reduce

reuse

recover

Contact Person:

[Liisa Hyttinen](#), Council of Tampere Region and
Karoliina Tuukkanen, EcoFellows Ltd / Circular
Pirkanmaa.

More information:

[Pilot Profile](#)



Solution overview

The circular solution focuses on developing the operational model of the Tampere Region Circular Economy Development Centre (Circular Pirkanmaa). Established under EcoFellows Ltd, Circular Pirkanmaa, serves as a regional hub supporting municipalities, public companies, and businesses in accelerating the circular economy transition through guidance, coordination, and practical services. Circular Pirkanmaa partners with the Council of Tampere Region as one of the CCRI Pilots. Additionally, the

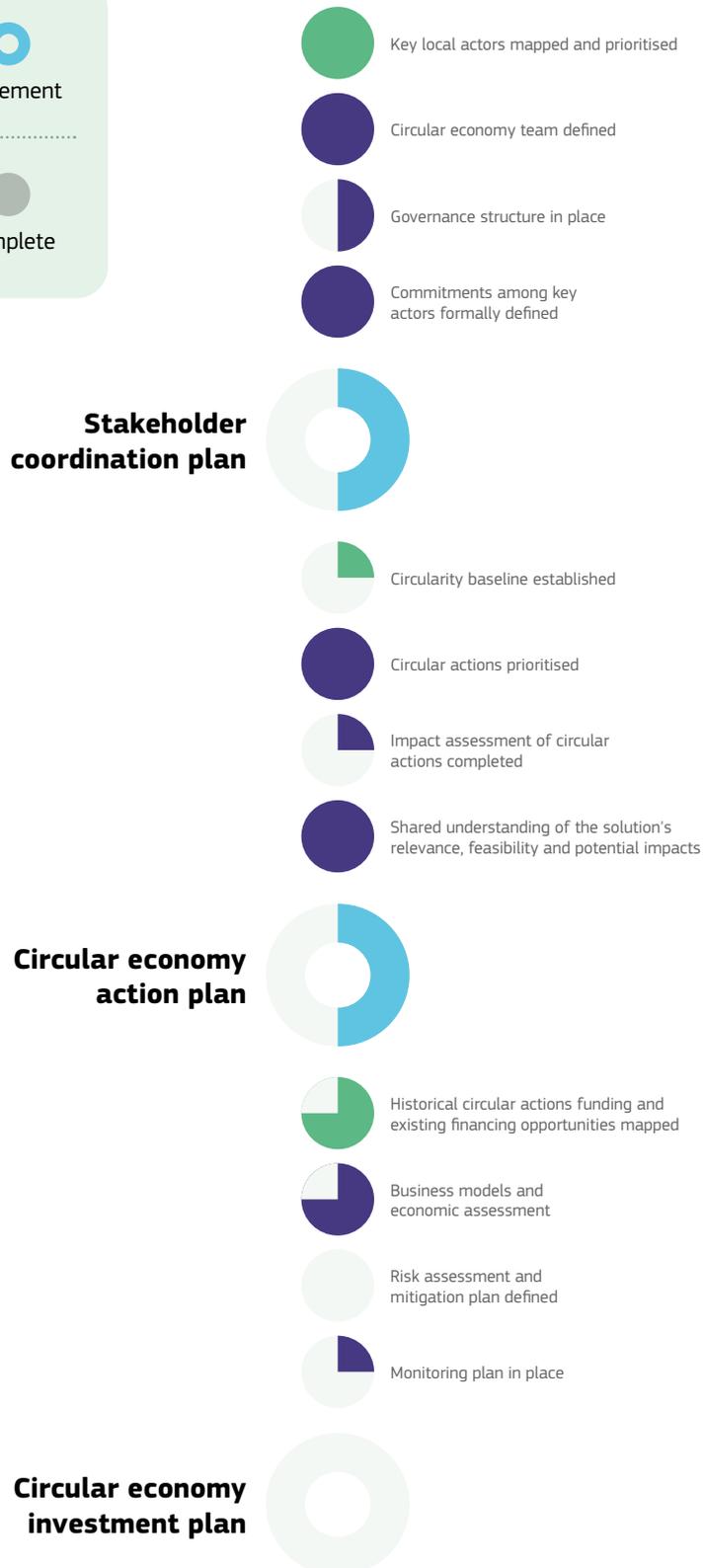
solution seeks to strengthen the regional strategic operating environment, meaning the policies, structures, networks, and practical conditions that enable circular solutions to develop and scale. Its goal is to build a more coherent and supportive ecosystem for circular activities, testing how public actors and municipality-owned companies can drive market uptake. The centre provides services under three key areas: housebuilding, infrastructure development and industrial material flows.

✓ CCRI Methodology Step Completion Status:

The [CCRI Methodology](#) is a guidance tool for policy and decision-makers in local and regional government. It describes key activities and milestones in the successful development of a Circular Solution, divided into three phases – Map, Design, and Implement. The visual checklist provides an at-a-glance view of how Tampere’s circular solution is progressing towards these outputs.

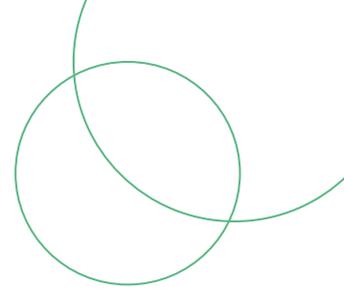
Key			
			
Phase:	Map	Design	Implement

			
Progress:	Started	Half-way	Complete





Background and objectives



i Policy context:

The circular economy vision in the Council of Tampere Region is anchored in a strong hierarchy of policy and strategy. At the national level, the Finnish government's [‘New directions – Strategic programme to promote a circular economy’](#) sets the goal of a carbon-neutral, resource-efficient society by 2035 through material reuse and industrial symbiosis. Its accompanying [‘National Circular Economy Green Deal – Playbook’](#) provides a voluntary framework for regional collaboration and business engagement.

This national ambition translates into concrete commitments in the Tampere Region, including pilot initiatives such as Circular Pirkanmaa. The Council of Tampere Region has formalised a [Regional Circular Economy Green Deal commitment](#), aligning municipalities and setting measurable targets for circular-economy processes. Locally, cities such as Tampere and Nokia have adopted municipal Green Deal commitments, embedding circular construction, material reuse and urban-infrastructure innovation into their operations. Supporting these is the city of Tampere's [‘Carbon-Neutral Tampere 2030 Roadmap’](#), which prioritises circular economy solutions within urban planning and resource-efficient municipal operations. Additionally, the [Pirkanmaa Regional Development Programme & Smart Specialisation Strategy 2022-25](#) position the circular economy as a growth area focused on innovation, digital tools and new business models.

Together, these national-to-local frameworks create a layered yet coherent policy architecture that empowers Circular Pirkanmaa to translate strategy into action, connecting Finnish national objectives to region-wide cooperation and city-level implementation of circular economy in infrastructure, construction, industry, and public procurement.

✕ Problem:

Municipalities in the Tampere Region seek to reduce CO₂ emissions and create value from local material streams, but face high costs, weak material markets, and limited expertise. While the policy framework for circular economy is coherent and well aligned across governance levels, only one municipality has a CE plan in place, while only two, out of 23, have adopted the green deal commitment. Therefore, there exists a challenge of implementation of key policies at municipal level.

Additionally, public bodies often lack resources to lead this transition alone, yet have untapped potential to shape sustainable operating environments. The Tampere Region's 23 municipalities and public companies manage vast material flows and assets that could drive circular markets if better coordinated. Circular Pirkanmaa has shown that public bodies can act not only as regulators but as market enablers, shaping demand through procurement, land use, and pilot projects. Circular Pirkanmaa officially launched in October 2023 to catalyse systemic change by enabling cooperation between municipalities, public actors, and businesses.

🎯 Objectives:

- Identify and secure (project) funding.
- Engage in co-development and cooperation with a variety of new and existing actors in the value chain.
- Provide consistent advocacy for the development of harmonious strategies, policies and commitments, via engagement with expert organisations and policy makers and influencers at municipal, regional, national and EU levels.
- Develop and deliver new pilots, produce and share information resources, and hold circular economy events to increase skills and commitment to circularity across the region.





Stakeholders

Circular Pirkanmaa brings together a broad coalition of regional, national, and international actors to advance circular economy implementation across the Tampere Region.

Solution Leader(s):



Public Authorities

Regional and municipal actors such as the City of Tampere, City of Nokia, City of Kangasala, City of Ylöjärvi, the Tampere City Region Joint Municipal Authority, Pirkanmaan Jätehuolto Oy, and Verte Oy lead on-the-ground implementation of reuse and construction pilots.

Supported by:



Private Sector



Research & Academia



Public Authorities



Funding & Advisory Bodies

Around them, companies operating in key circular themes, such as those in the Taraste and ECO3 industrial areas, along with regional SMEs and consultancies like Ethica Oy, co-develop and commercialise circular solutions, logistics systems, and reuse services in collaboration with the initiative.

Academic and research institutions, Tampere University, Tampere University of Applied Sciences, VTT, and the Finnish Environment Institute (SYKE), provide data, research, and innovation support, particularly in developing circular-economy metrics and material-flow analysis.

National expert and policy bodies, including Motiva, the Ministry of the Environment, the Ministry of Economic Affairs and Employment, and the regional ELY Centre, ensure alignment with Finland's national circular economy and climate frameworks while funding and permitting regional pilots. At the regional level, the Council of Tampere Region, in cooperation with the Helsinki-Uusimaa Regional Council, drives policy integration and inter-regional collaboration.

Meanwhile, industry and business networks such as Business Tampere and the Tampere Chamber of Commerce promote SME participation and circular market development. Internationally, networks like ICLEI Europe, Circular Flanders, and Circular Friesland support benchmarking and peer learning, while peer municipalities and waste utilities from Mikkeli, Turku, Oulu, Lahti, Rovaniemi, Espoo, and Helsinki share best practices on reuse, waste management, and industrial symbiosis, ensuring that Circular Pirkanmaa remains both locally grounded and globally connected.



Results and Impact

The main objective of the Tampere Region pilot was to develop and stabilise a completely new regional circular economy development centre (Circular Pirkanmaa). The delivery partners successfully developed an operational model for the centre and advanced its three core themes: housebuilding, infrastructure development and industrial material flows. Circular Pirkanmaa has reshaped collaboration between public and private organisations in the region and accelerated systemic change, making circular economy goals more achievable.

Before its establishment, the Council of Tampere Region (CTR) implemented several initiatives to promote systemic change by sharing knowledge, supporting municipalities with best practices, and connecting regional actors. These efforts, along with the long-term engagement of numerous stakeholders, laid a strong foundation for Circular Pirkanmaa's success.

Through its innovative methods and dedicated approach, the centre has brought to previously fragmented regional circular economy efforts. Its success lies in enabling key regional actors to take on clear roles within the ecosystem, while providing concrete and tangible knowledge, tools, and pilots in three main themes. In doing so, Circular Pirkanmaa has built trusted relationships with both public and private stakeholders, establishing itself as a driving force in advancing the circular economy across the Tampere Region.

The centre's position has been stabilised as a trusted and experienced regional partner, capable of orchestrating and implementing concrete circular economy solutions with both the public and private sectors. The following indicators are best suited for measuring this success.

Indicator and results

4

Number of municipalities cooperating or piloting with Circular Pirkanmaa

2

Number of circular economy green deals made by Tampere region municipalities and regional actors

6

Number of market dialogues to catalyse public private cooperation

8

Number of new circular economy tools published

964 020 €

Euros of funding acquired for Circular Pirkanmaa operations

Implementation Progress Tracking results

Timeline: 2022 – 2025

4

Indicator 1:

Cooperation with Circular Pirkanmaa

6

Indicator 2:

Market Dialogues

1 000 000

Indicator 3:

Acquired Funding



Market readiness/business model:

Circular Pirkanmaa will optimise its cost structure through a combination of historical data and zero-based budgeting, meaning that all expenses will be reviewed and justified from the ground up rather than based on previous years' budgets. This approach ensures resources are directed only toward activities that create measurable impact and align with strategic priorities. At the same time, the organisation will explore options for securing core funding, long-term, stable financing that covers essential operational costs such as staffing, coordination, and knowledge management. Core funding would complement project-based grants, enabling steady service delivery, stronger partnerships, and continuity between funding cycles.

Success story

The cities of Nokia and Orivesi: Nokia and Orivesi are pioneering circular construction through the SÄILÖ project, funded by the Finnish Ministry of Environment. By carefully demolishing old buildings, reusable materials like bricks are salvaged for new construction, reducing the carbon footprint and the use of virgin resources. Circular Pirkanmaa and the University of Tampere contribute by developing and researching new municipal construction models.



Challenges and Lessons Learnt

Enablers to implementation

- **Economic:** Circular Pirkanmaa's activities rely on external funding, such as the SÄILÖ project, which allowed cities to test material reuse. Between 2021–2025, the Council of Tampere Region allocated approximately €1 million from the European Regional Development Fund (ERDF) to five circular economy projects.
- **Technical:** Pilots and tool development have strengthened regional capacity, producing practical criteria for land allocation, infrastructure procurement, and the reuse of building materials.
- **Social:** Capacity building efforts, including tools, training, advocacy, and strategic commitments (e.g., CCRI pilot status and regional green deal) has equipped stakeholders with the skills needed to implement circular economy actions.
- **Political:** National and regional circular economy green deals, supported by strong engagement from the Council of Tampere Region, have secured political endorsement of circular economy goals at the local level.

Barriers to implementation

- **Governance:** There is a lack of centralized governance models and policy tools for circular economy, and too few stakeholders with sufficient authority to drive implementation.
- **Political:** Awareness of circular economy benefits among politicians remains low. Regional strategies or joint commitments are limited, and new initiatives often require strict economic justification.
- **Economic:** Most circular economy actions are still at the pilot stage, with few operational models for large-scale implementation. Weak markets make circular solutions difficult to scale, and coordinating material flows alongside carbon-neutral objectives remains challenging.
- **Social/Collaboration:** Effective market dialogues are still developing, yet they are essential for fostering cooperation, co-development, and ensuring circular economy initiatives remain relevant for both municipalities and companies.



Lessons learnt

- Resource-efficient construction and reuse. Municipalities and companies must prioritise resource-efficient construction by integrating reuse and urban mining principles into planning. Clear planning tools and land allocation policies proved effective in guiding circular economy practices. Future efforts could focus on expanding knowledge-sharing and standardising best practices to accelerate adoption.
- Infrastructure and material flow management. Effective procurement and monitoring of material flows are essential for implementing circular economy actions. Knowledge gaps and resistant attitudes were addressed through hands-on support, credible examples, and training sessions. Scaling these efforts regionally could further strengthen adoption and ensure more data-driven decisions.
- Governance and stakeholder engagement. Circular Pirkanmaa's role in convening stakeholders, supporting Green Deal commitments, and developing practical tools strengthened regional CE governance. Engaging municipalities and regional actors built trust and enabled concrete actions with measurable KPIs. Future initiatives could focus on sustaining these commitments and expanding collaborative networks.



Tips for replication

What to replicate?

To advance systemic change in the circular economy at the regional level and replicate the Regional Circular Economy Development Centre model, the following transferable elements have been identified:



- **Defining clear roles for regional circular economy actors**, for example:
 - Operational-level responsibilities (e.g., engagement with businesses and public sector entities).
 - Strategic-level responsibilities.
 - Participation in national and international networks.
 - Advocacy and influence work.
- **Facilitating public-private collaboration**, for example through structured market dialogues, the use of concrete and tangible tools, and the implementation of pilots to test and validate circular solutions.
- **Building a regional circular economy ecosystem** around a shared process or the implementation of a common vision and strategy. This collaborative approach enables alignment across stakeholders and fosters long-term commitment.

Tools and operational models were developed to support the work streams across the three main operational areas: housebuilding, infrastructure development and industrial material flows (see relevant section below).

Who can replicate this?

Successful implementation requires a region with:

- Recognition of the **value and power of collaboration**, and low barriers to.
- **Development-oriented organisations** committed to shared goals.
- **Circular economy or climate targets**, aligned with national or EU-level strategies.
- **Sufficient material flows**, making circular economy initiatives meaningful and feasible.
- **A culture that supports experimentation** and pilot implementation.



What ingredients are needed to replicate it?

To replicate the model and drive systemic change, the following elements are essential:

- **Clearly defined orchestrator(s) and driving force(s)** with well-understood responsibilities.
- **Strong professional competence** and the ability to build trust-based relationships with various stakeholders to ensure commitment and long-term collaboration.
- **Clear understanding of the regional operating environment changes** and the focus areas to maintain a structured and effective approach.
- **Utilisation of networks and impactful communication** to develop the ecosystem and enhance societal influence.



Resources or contacts available to help?

- Circular Economy criteria for land allocation: [Circular economy criteria for land allocation - Kiertotalouspirkanmaa.fi](#)
- Circular Economy procurement criteria for infra projects (in Finnish only): [Infrahankintojen kiertotalouspisteytys - Kiertotalouspirkanmaa.fi](#)
- Environmental checklist for infrastructure projects (in Finnish only): [Infrahankkeen ympäristöasioiden tarkistuslista - Kiertotalouspirkanmaa.fi](#)
- Housebuilding CO2 calculation tool for municipalities (in Finnish only): [Rakentamisen päästötiedon hyödyntäminen kaupungeissa - Kiertotalouspirkanmaa.fi](#)
- €/CO2 benefit analysis of regional mass coordination, Pirkanmaa (only in Finnish): [Alueellisen massakoordinaation €/CO2 hyötytarkastelu, Pirkanmaa - Kiertotalouspirkanmaa.fi](#)
- Reuse specification tool: [Reuse specification - Kiertotalouspirkanmaa.fi](#)

Circular Solution: **City of Uppsala, Sweden**

Closing the loop: Uppsala's marketplace for reusable construction materials

Verket testbed inauguration (September 2025)
Source: Pilot's own image



Size:

248 192
inhabitants



GDP:

More developed region



Urban-rural predominance:

Intermediate



Geographical information:

Northern Europe



Innovation ranking:

[Leader](#)



Sectors:

Construction and buildings



Time frame:

January 2023 – September 2025



Circular strategies:

rethink

reduce

reuse

Contact Person:

[Lovisa Lingfors](#), Executive office, Uppsala City Council

More information:

[Uppsala | Circular Cities and Regions Initiative](#)

Key facts and figures

2023 - 2025

Uppsala expanded its first marketplace from a **single site focused on surplus materials** to a **network of four sites**, broadening its capacity for circular resource management.

Modelling indicates that over the next decade, the marketplace could:

Recycle or reuse

6,700 tonnes
building materials
annually

Avoid more than

1,500 tonnes
of CO₂ emissions

Generate up to

€1 million
in annual revenue¹.



Solution overview

Uppsala has developed a **marketplace for secondary construction materials**, reducing waste and fostering circular resource use. The pilot, initially focused on surplus materials, has successfully expanded to include **construction and demolition waste (C&DW)**. A main municipal site, complemented by a privately managed reuse hub and two internal municipal facilities, now enables the **storage, testing, and redistribution** of materials, creating tangible pathways for circular flows.

Through the **coordination of public and private actors** under the [Uppsala Climate Protocol²](#), the marketplace has effectively connected supply and demand for secondary materials and explored sustainable ownership models. These efforts have laid the foundation for a **mid-term goal of establishing a commercially viable local market** with minimal public support, demonstrating how circular resource management can deliver measurable environmental and economic benefits.

¹ According to the feasibility study conducted by the Uppsala Climate Protocol. Source (in Swedish): Uppsala Climate Protocol (2021). *A survey of local conditions and choices for establishing a local marketplace for recycled building materials in Uppsala*

² Professional network gathering local actors from the private and public sector, Uppsala university, Swedish University of Agricultural Sciences and environmental NGOs. For 15 years, it has fostered collaboration to cut GHG emissions. Since 2021, its construction network has focused on advancing circular construction, leading to the creation of a privately managed reuse hub and supporting the creation of a municipal testbed.

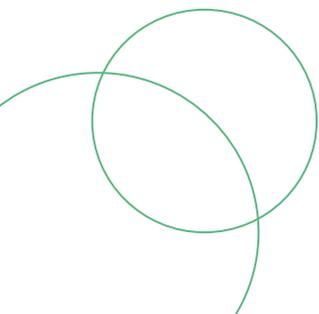
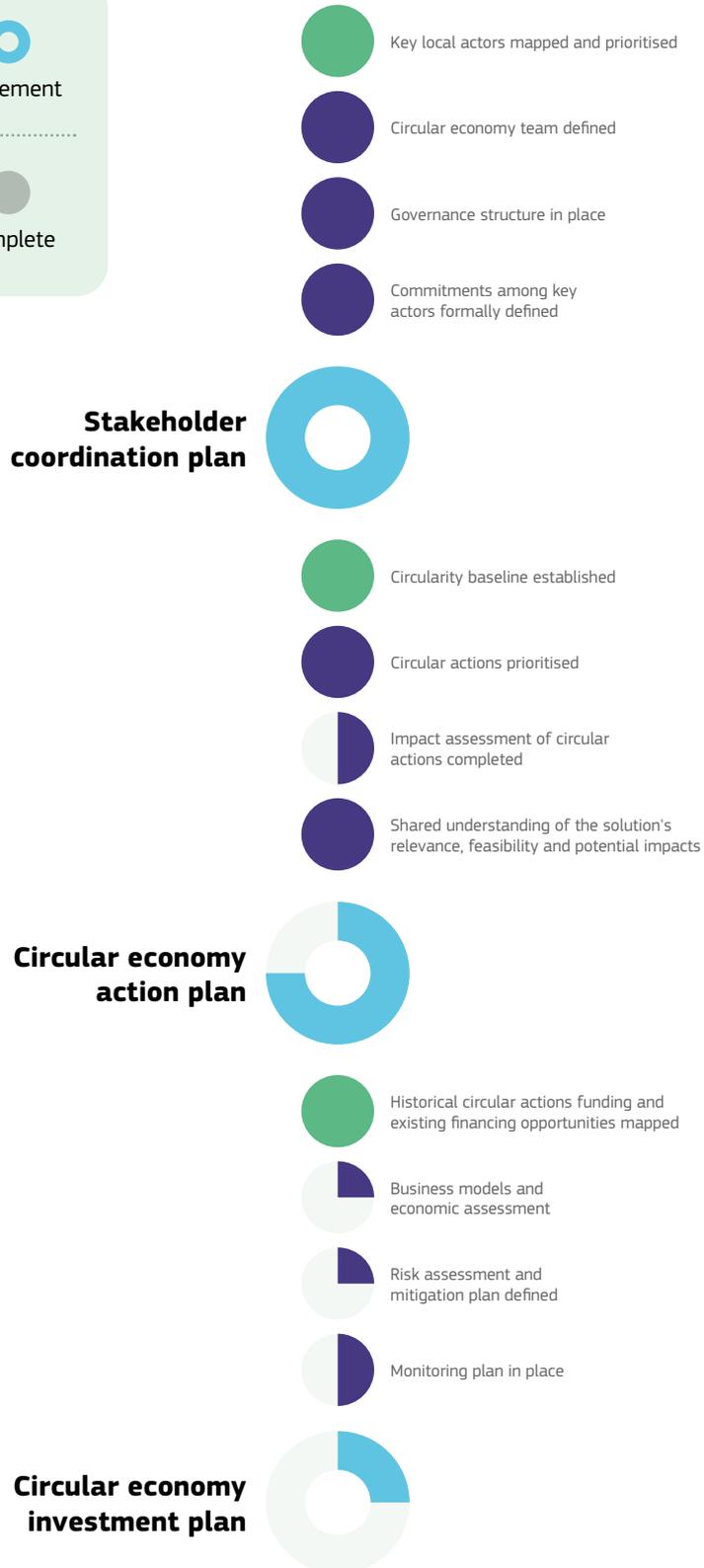
✓ CCRI Methodology Step Completion Status:

The [CCRI Methodology](#) is a guidance tool for policy and decision-makers in local and regional government. It describes key activities and milestones in the successful development of a Circular Solution, divided into three phases – Map, Design, and Implement. The visual checklist provides an at-a-glance view of how Uppsala’s circular solution is progressing towards these outputs.

Key

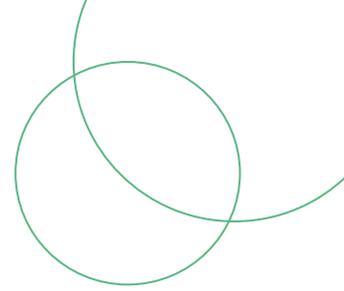
	●	●	○
Phase:	Map	Design	Implement

	◐	◑	●
Progress:	Started	Half-way	Complete





Background and objectives



i Policy context:

The marketplace builds on Uppsala's [Action Plan for Waste](#) (2022), which mandates the establishment of a local marketplace by 2026. Complementing this, the [Programme for a Circular Uppsala with No Waste](#) (2022) defines the city's ambition to transform waste into a resource, creating favourable conditions for local re-use markets. The [Uppsala Climate Protocol](#) further strengthens collaboration by bringing together public and private construction actors to make circular material flows a reality.

At national level, the [Roadmap for Fossil-Free Competitiveness in the Construction Sector](#) (2018) reinforces these local ambitions by promoting a transition towards fossil-free and resource-efficient construction. At EU level, the [Waste Framework Directive](#) (2008) provides the regulatory basis by setting recovery targets for construction and demolition waste and classifying it as industrial waste. Under the revised [Construction Products Regulation](#) (2024), the EU is paving the way for the development harmonised technical specifications and interoperable digital product passports, providing reliable environmental and performance data for trading and reusing construction materials across the single market.

x Problem:

Uppsala is experiencing rapid growth, with its population expected to reach 325,000 by 2050, and the city is committed to climate-neutral, sustainable expansion. The construction sector, responsible for over one-third of global GHG emissions, presents a key challenge for decarbonisation. At the same time, large volumes of reusable construction and demolition materials are still discarded due to limited local infrastructure for storage, testing, and trading and insufficient coordination among market actors.

target Objectives:

- Develop and test operational and ownership models for local marketplaces, enabling large-scale reuse and recycling of construction and demolition materials through 2027.
- Strengthen coordination among public and private actors under the Uppsala Climate Protocol to establish shared governance and streamlined material management systems.
- Create a self-sustaining, commercially viable marketplace that supports climate-neutral, resource-efficient urban growth with minimal public support.





Stakeholders

Solution Leader(s):



Public Authorities

The **City Council of Uppsala** leads the circular solution as project owner of the ERDF-funded [Uppsidan](#) project³, providing financing and personnel, and managing dismantling works to recover reusable building parts. It coordinates the pilot activities and oversees the development of the marketplace. Two key municipal public companies support municipal circular construction policy: [Uppsala Water and Waste AB](#), responsible for implementing the Action Plan for Waste and monitoring material flows; and [Uppsalahem AB](#), which operates one of the two internal municipal sites.

Supported by:



Private Sector



Funding & Advisory Bodies

The *Uppsidan* project's [Verket site](#) functions as the **main municipal test bed** for the marketplace, complemented by a [privately managed reuse hub](#) created by five major real estate and construction companies of the [Uppsala Climate Protocol](#) – [Vasakronan](#), [Wiklunds](#), [Alecta](#), [Akademiska Hus](#), and [Castellum](#). This hub focuses on materials from tenant adaptations in commercial buildings. *Wiklunds*, which operated the initial pilot site handling surplus materials, now manages its logistics and serves as the main material supplier for this hub.

As an advisory service provider, [ROTOR](#), a Brussels-based NGO, supported the City Council with CCRI funding. It has conducted targeted confidential research on marketplace models across Europe and developed a decision tree to guide the City Council's selection of a long-term operational and ownership model for the marketplace.

³ The City Council secured funding for this project through the ERDF programme for Eastern Central Sweden



Results and Impact

By 2026, Uppsala has made significant strides in establishing a marketplace for secondary construction materials, in line with its Action Plan for Waste (2022). The City Council has consolidated local reuse initiatives under the Uppsala Climate Protocol, enabling members to set up a privately managed reuse hub.

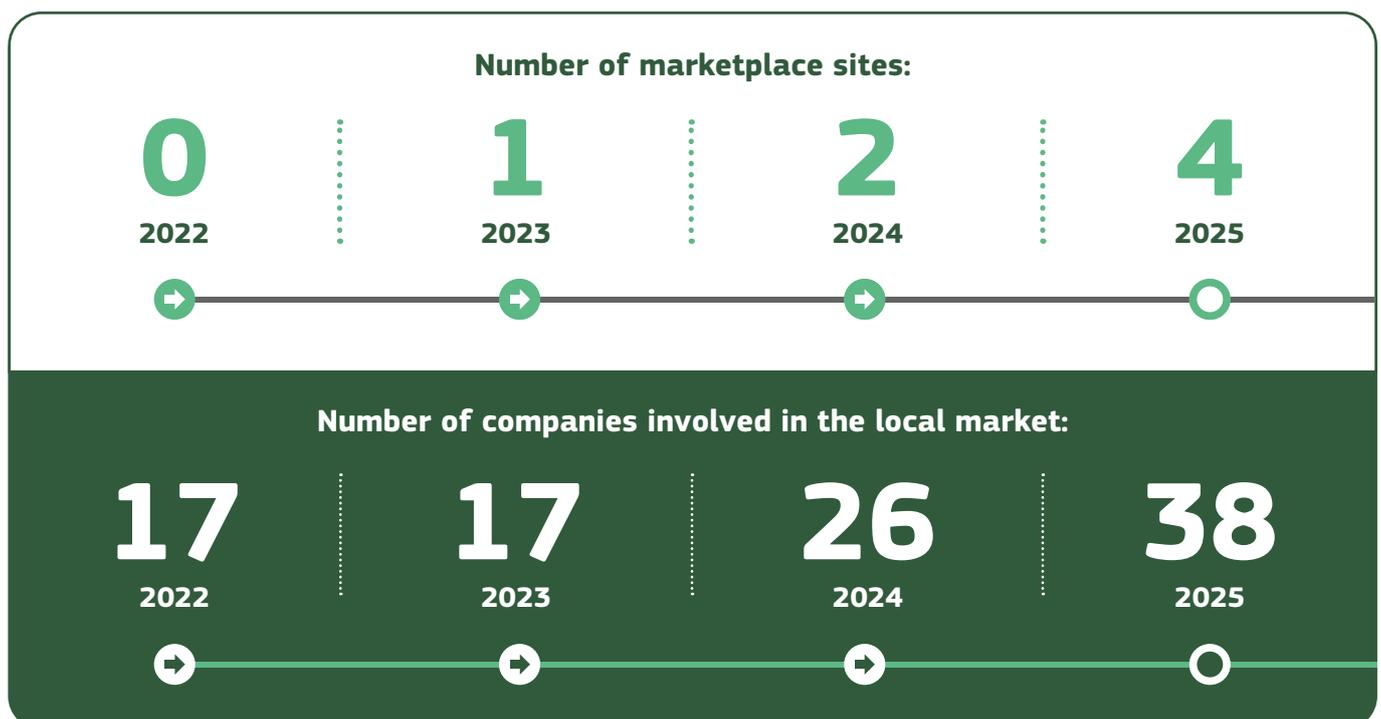
Through the CCRI Pilot support scheme, the city conducted targeted research on five operational and ownership models across Europe, resulting in a decision tree that defined a preliminary use case for testing business models. This work has provided practical evidence to inform the next testing phase and supports Uppsala in identifying viable pathways toward a self-sustaining and scalable marketplace, reducing reliance on public funding.

The marketplace has expanded from a pilot limited to surplus materials into an integrated system capable of handling construction and demolition waste (C&DW), enabling reuse at professional project level and delivering stronger economic and environmental benefits. Ongoing testing activities through 2027 will generate further insights to refine operational and ownership models, financing, and market mechanisms, ensuring the long-term sustainability of construction material reuse and recycling in the city.

✓ Main results:

Uppsala's marketplace initiative has rapidly expanded, growing from no sites in 2022 to four operational sites by 2025. The first pilot for surplus materials launched in 2023, followed in 2024 by two internal municipal sites (Uppsalahem's site and a furniture reuse site), and in 2025 by the Verket test bed and a privately managed reuse

hub. This growth, along with an increase in participating companies from 17 in 2022 to 38 in 2025, reflects the City Council's effective coordination and activation of reuse actors through the Uppsala Climate Protocol, marking the city's first steps toward a functioning local market.



⁴ Data for 2022 is an estimation based on [A survey of local conditions and choices for establishing a local marketplace for recycled building materials in Uppsala](#) (Uppsala Climate Protocol, 2021)

Support from the CCRI office, including targeted interviews with the initial pilot project manager and contractor, revealed that resale of surplus materials was constrained by lost guarantees and circular economy marking requirements. These limitations restricted trade to small-scale consumers and hindered profitability. Insights from this research guided the City Council to expand the marketplace to include construction and demolition waste (C&DW), enabling broader reuse and recycling in professional projects and delivering clearer climate benefits.

Looking to the medium term (approximately 3–10 years), the marketplace is projected to recycle 1,679–6,670 tonnes of building materials annually, corresponding to a reduction of 386–1,534 tonnes of CO₂ equivalents per year. Expected annual sales revenues of €200,000–1 million demonstrate strong commercial potential, supporting a credible pathway toward a self-sustaining marketplace that promotes climate-neutral, resource-efficient urban growth. The initiative also offers a replicable model for other cities seeking to scale circular construction material markets⁵.

Market readiness/business model:

Following the closure of the first pilot for surplus materials, Uppsala is testing new operational and ownership models through the Verket test bed, launched in September 2025. Focused on business-to-business exchanges, Verket places no restrictions on material types or intended use, allowing the city to explore different business models and material streams until 2027. The test bed has already begun circulating materials recovered from the demolition of public buildings linked to the development of a new tram service.

Complementing the municipal site, the privately managed reuse hub provides a market-driven, membership-based offer, enabling companies to both supply and purchase materials. Building on lessons from the first pilot, the hub concentrates on circulating material streams that have proven feasible to reuse, including textile carpets, ceiling tiles, internal doors, cabinet frames, glass partitions, steel doors, and stone materials.

Together, these initiatives demonstrate practical pathways toward a self-sustaining, commercially viable marketplace, linking public and private actors and expanding the reuse of construction and demolition materials at professional project level.

Success story

A key milestone for Uppsala came in 2025 with the opening of the privately managed reuse hub, complementing the city's municipal Verket test bed and creating a more integrated marketplace for secondary construction materials.

Insights from ROTOR's decision tree and analysis of five operational and ownership models under the CCRI Pilot support scheme enabled the city to realise that multiple governance models can operate in parallel, rather than relying on a single structure. This flexibility allowed Uppsala to adapt its approach to local conditions and advance toward its goal of a commercially viable, low-subsidy marketplace, demonstrating a practical pathway for scaling circular material management.

⁵ According to the feasibility study conducted by the Uppsala Climate Protocol. Source (in Swedish): Uppsala Climate Protocol (2021). [A survey of local conditions and choices for establishing a local marketplace for recycled building materials in Uppsala](#)



Challenges and Lessons Learnt



Enablers to implementation

- **Governance:** Uppsala's active involvement in trusted networks at different levels – the Uppsala Climate Protocol locally, [CCBuild](#) nationally, and the CCRI at EU level – has enabled effective coordination and knowledge exchange among construction professionals, public authorities and advisors. This multi-level collaboration has been key to shaping and refining the city's marketplace models.
- **Technical & economic:** The municipality played a crucial role by **providing access to a publicly operated site** at a building logistics centre, where lorries were already supplying materials for local construction projects. The contractor, Wikilunds, rented a section of this centre to operate the first pilot marketplace for surplus materials, using the existing logistics infrastructure to avoid extra transport costs and minimise vehicle movements.
- **Economic:** Capacity Funding from targeted regional Swedish [ERDF calls](#) aimed at securing the buy-in of the private sector and can be used to test and develop marketplace business models.



Barriers to implementation

- **Technical & legal:** Liability and risk-sharing are critical issues for reusing materials in practice. Circular construction often pushes actors into unfamiliar territory, as products need to be tested on a case-by-case basis and no EU-wide common or standardised methodologies or product regulations have been rolled out yet. Therefore, local authorities cannot carry the risk alone.
- **Economic:** Although progress has been made, market maturity remains limited. Experience from the first pilot showed that lost guarantees and CE marking restrictions forced resale prices down to 15–20 % of market value, restricting trade mainly to small consumers and preventing profitability. These barriers underline the need for continued testing and development of business models before a self-sustaining market can emerge.



Lessons learnt

- **Focus matters:** Specialising in specific material streams can increase circulation rates and efficiency. This raises strategic decisions on public involvement in the mid and long-term – for example, the privately managed hub could target office buildings, while the *Verket* test bed might focus on public buildings or consumers (C2C) rather than B2B markets.
- **Rethink the public role:** The City Council can contribute more effectively by providing equipment or infrastructure rather than simply procuring a private operator or relying on grant-based funding.
- **Diverse actor roles:** Reuse systems can be driven by different actors. In Sweden, constructors usually lead reuse services, purchasing work from craftsmen. Yet examples studied elsewhere through the CCRI's support scheme⁶ showed that craftsmen and wood manufacturers can take the lead themselves, an insight Uppsala can share with local partners through the Climate Protocol, especially given Sweden's strong wood construction sector.
- **Economic barriers must be addressed:** Profitability depends on addressing lost guarantees and CE marking barriers, which limited resale value and market reach, reinforcing the need to develop clearer risk-sharing and certification frameworks for reused materials.



Tips for replication

What to replicate?

- **For publicly owned marketplaces**, city councils should appoint not only a logistics contractor but also a specialised partner with research and innovation expertise to test business models and assess the degree of public involvement.
- B2B marketplaces where companies participate through a **membership model** that allows them to both supply and purchase secondary materials.
- **Marketplaces targeted at specific material streams** to test feasibility and market demand before scaling up.



Who can replicate this?

Fast-growing cities striving to combine urban expansion with climate neutrality:

- **Publicly owned marketplaces** are suitable for cities with access to space, a steady flow of materials, secured funding, and who can steer supply and demand through procurement.
- Privately managed B2B hubs with **membership models** fit cities which lack access to space, materials, and funding and have limited influence through procurement.



What ingredients are needed to replicate it?



To replicate the model and drive systemic change, the following elements are essential:

- **For publicly owned marketplaces:** set up a dedicated procurement for an R&I contractor to engage local innovation actors and develop service offers and circular construction partnerships. The public authority and contractor should jointly quantify costs and revenue potential through a targeted cost–benefit and tariff analysis, and define a long-term governance model specifying ownership, roles and site use beyond the testing phase. These elements should be brought together in circular business model canvas⁷ forming a joint business case.
- **Membership model:** Establish a trusted public–private collaboration platform involving academia, public authorities and businesses to demonstrate through, for example, feasibility studies, the economic, social and environmental benefits of a B2B marketplace and secure private sector buy-in. This B2B marketplace can primarily target commercial actors, with the flexibility to sell to citizens as a last resort before materials become waste. The membership approach helps ensure continuous material inflow and user commitment, but requires clear rules on pricing, quality assurance and liability. Early investment should focus on digital inventory management and transparent pricing mechanisms to maintain trust among members.
- **Marketplaces focused on specific material streams:** Start with a focused pilot around one material stream to manage risk and gain practical insights. If the pilot targets surplus materials, focus on small consumers rather than professional buyers. Experience from Uppsala’s first surplus material marketplace showed that lost guarantees and CE marking restrictions reduced resale prices to 15–20 % of market value, limiting B2B interest and profitability. Testing with a clearly defined material stream allows cities to adjust pricing, logistics, and quality assurance models before expanding to C&DW.

⁷ Some examples of relevant circular business model canvas:

- [TU Delft Circular Business Model Canvas](#) (Bocken et al., 2018) – *widely used for circular economy pilots in the built environment*
- [Circular Buildings Toolkit](#). Ellen MacArthur Foundation & Arup (2020) – *Provides business model and design canvases specifically for circular construction projects*
- [Business Models in a Circular Economy](#). European Environment Agency & Circle Economy (2018) – *Conceptual framework outlining five circular business model types and examples across sectors.*

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This Solution Booklet collates and summarises the results of 12 Pilots funded by the CCRI between January 2023 and October 2025, which supported cities and regions across Europe to test what it really takes to turn circular economy ambition into practical, local, and systemic solutions. It highlights not only what the Pilots achieved, but how they did it: the partnerships they built, the barriers they faced, the tools they used and developed, and the lessons that can help others accelerate their own transitions. The solutions developed cover themes such as governance & systemic transition platforms, circular resource management, construction & built environment, consumer goods and packaging, and bioeconomy and nutrient recovery. The Booklet details key impacts across all Pilots and provides a synthesis of common success factors, barriers, and operational lessons, identifying patterns that emerged across geographies, themes, and solution types.

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