European
Circular
Innovation
Valley

D2.10 ECIV Regional Action Plans

Regional building blocks for completing Part 2 of the ECIV Transformative Innovation Programme (TIP)

Region of North Middle Sweden (DAL/NMS, Lead)

Version 1 - final

31/03/2026

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CONSORTIUM PARTNERS

	Name of the Entity	Acronym	Role	Country	ORG Type
1	Government of Navarra	GN	C	ES	PB
2	Society for the Development of Navarra	SODENA	B	ES	SME
3	Northern Netherlands Alliance	SNN	B	NL	PB
4	Province of Groningen	GRO	B	NL	PB
5	Province of Friesland (Fryslan)	FRY	B	NL	PB
6	Province of Drenthe	DTH	B	NL	PB
7	University of Groningen	UGRO	B	NL	UNI
8	Friesland Innovation Foundation	IPF	B	NL	NGO
9	Region of Dalarna	DAL	B	SE	PB
10	Region of Värmland	VÄR	B	SE	PB
11	Region of Gävleborg	GÄV	B	SE	PB
12	Region of Normandy	NOR	B	FR	PB
13	Public Service of Wallonia	SPW	B	BE	PB
14	Innovation Agency Lithuania	IAL	B	LT	PB
15	Helsinki-Uusimaa Regional Council	HURC	B	FI	PB
16	Scottish Enterprise	SE	B	UK	PB
17	Industrial Biotechnology Innovation Centre – University of Strathclyde	IBioIC	B	UK	UNI
18	Association of Cities and Regions for Sustainable Resource Management	ACR+	B	BE	OTH
*Legend = Role in the Project: C – Coordinator // B – Beneficiary // AP – Associated Partner // Organization Type: RTD – Research and Technological Development // UNI - Higher or secondary education establishment // SME – Small and medium-sized enterprises. // NGO – Non-Governmental Org // PB – Public Body // OTH - Other					

WORK PACKAGES AND LEADERS

Work Packages Name		WP Leader
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LIST OF ACRONYMS AND ABBREVIATIONS

Abbreviation	**Description**
EC	European Commission
EU	European Union
ECIV	European Circular Innovation Valley
OECD	Organisation for Economic Co-operation and Development
OPSI	Observatory of Public Sector Innovation (OECD)
TIP	Transformative Innovation Programme, ECIV's interregional innovation strategy
RAP	Regional Action Plan(s)
KPIs	Key Performance Indicators
MS	Member State
NGO	Non-governmental organization
RIV	Regional Innovation Valleys
SDG	Sustainable Development Goals
SMEs	Small and Medium-sized enterprises
WP	Work Package
MoI	Missions oriented Innovation
JRC	Joint Research Centre
CE	Circular economy

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The European Circular Innovation Valley - ECIV

ECIV represents both a five-year project and the vision of a lasting interregional ecosystem.

As a project (2024–2029), ECIV focuses on creating the structures, tools, and partnerships needed to enable long-term collaboration on circular innovation.

As a valley, ECIV aspires to evolve into a self-sustaining ecosystem — a connected space where regions, businesses, and research actors continuously collaborate to design, test, and scale circular solutions across Europe.

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1 - Introduction to ECIV’s Regional Action Plans (RAPs)

ECIV Regional Action Plans

ECIV Regional Action Plans (RAPs) are project-bound, operational documents that capture each region's concrete commitments to ECIV submissions.

The Regional Action Plans were developed within the framework of the ECIV Transformative Innovation Programme (TIP), which applies a mission-oriented innovation approach to support systemic circular economy transitions and collaborative, inclusive innovation processes across participating regions.

At the core of each RAP are the Theories of Change for the prioritized submissions. These articulate pathways for change based on transformed system variables and identify the key actions and resources needed to drive system change.

Eight Regional Action Plans have been developed within ECIV, one by each of the following partner territories: Navarra (Government of Navarra, Society for the Development of Navarra); Northern Netherlands Alliance (Province of Groningen, Province of Friesland, Province of Drenthe); North Middle Sweden (Region of Dalarna, Region of Värmland, Region of Gävleborg); Region of Normandy; Public Service of Wallonia; Innovation Agency Lithuania; Helsinki-Uusimaa Regional Council; and Scotland (Scottish Enterprise, IBioC).

The Regional Action Plans provide the regional building blocks for completing **Part 2 – Transition to a Circular Economy** of the ECIV Transformative Innovation Programme (TIP).

They enable the co-creation of an interregional action plan on the ECIV *Dance Floor* (WP3).

2 – ECIV Submissions

ECIV submissions

The six ECIV submissions that form the basis for the Regional Action Plans originate from the design process of the ECIV Transformative Innovation Programme (TIP), described under *Directing and Designing* in the TIP. The initial draft of the submissions was presented during the ECIV consortium meeting in March 2025 and the current set of six submissions was subsequently agreed within WP3.

During autumn 2025, several WP3 meetings and discussions were organised to revisit and refine the submissions.
The aim was to ensure that they were sufficiently focused, relevant to the participating regions, and achievable within the timeframe of the ECIV project.

The reformulated submissions were presented to the regional partners at the beginning of December as the starting point for the development of the Regional Action Plans.
Each region then identified the submissions most relevant to its context and developed corresponding Theories of Change.

Regions were also given the possibility to include additional areas of strategic relevance in their Regional Action Plans if they considered that important topics were not sufficiently covered by the chosen submissions. This was intended to allow continued discussion and possible future iteration of the submission structure and collaboration within ECIV. At this stage, however, such additions do not affect the ongoing work within WP3.

Finalised ECIV submissions (dated 2025-12-08)

Reduce waste	We will have (by the end of 2029) proven Innovative circular solutions for waste elimination in industrial processes *Note: connect all solutions to other Sub-missions = proof ;*
Packaging	By 2029, develop innovative solutions that accelerate packaging circularity to significantly reduce the use of virgin oil-based raw materials.
Agrifood	We accelerate the transition toward regenerative and circular agrifood systems that minimise waste & losses, close nutrient loops, and strengthen regional food resilience and value creation.
Construction	We accelerate the use of sustainable, circular biobased materials in construction, to show how circular principles create more sustainable, healthy, and regenerative built environments.
Wool/textile/ fibres	By the end of 2029 the role of wool and other natural fibres and recycled synthetic fibres is increased in clothing and other regional value chains.
Metals	Accelerate the use of circular steel and other base metals, and increase circular use of materials covered by the Critical Raw Materials Act.

3 - Methodology for Developing the Theories of Change

Methodology for Developing the Theories of Change

The development of the Theories of Change took place between November 2025 and February 2026 through a structured and iterative process guiding the preparation of the Regional Action Plans.

The approach was inspired by the System Mapping Toolkit presented in the JRC ACTIONbook, which served as a starting point and was adapted to the needs and timeframe of the ECIV Regional Action Plan process. While the methodology provided a common framework for developing the Theories of Change, regions applied the steps with varying emphasis and sequence depending on their starting points, existing initiatives and regional contexts.

The approach can be summarised in four main steps:

Step 1 – Mapping influencing variables across five system dimensions

Regions explored their selected submission through a socio-technical systems lens, structured around five dimensions:

- Technology, products and processes
- Business models
- Infrastructure and production systems
- Policy, laws and regulation
- Culture and values

Through workshops, stakeholder dialogues and desk research, regions identified influencing variables shaping the current system.

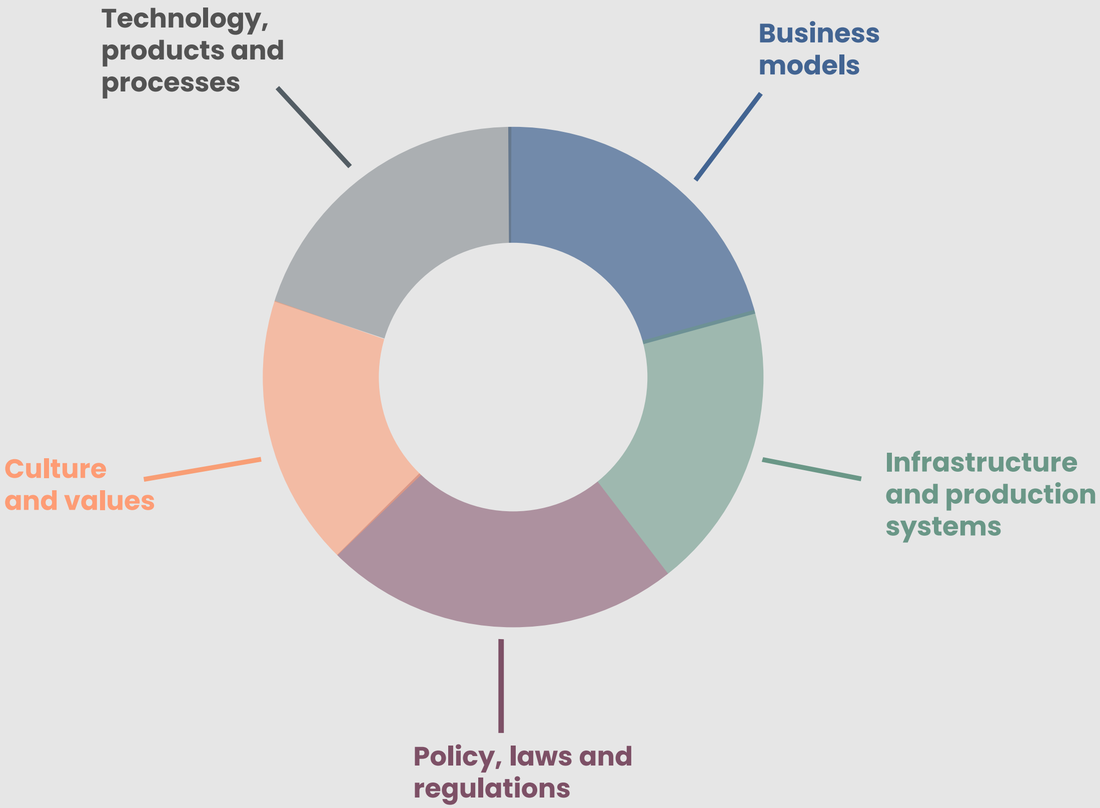

Figure 1. Model describing Socio-technical systems

Submission: Circular packaging

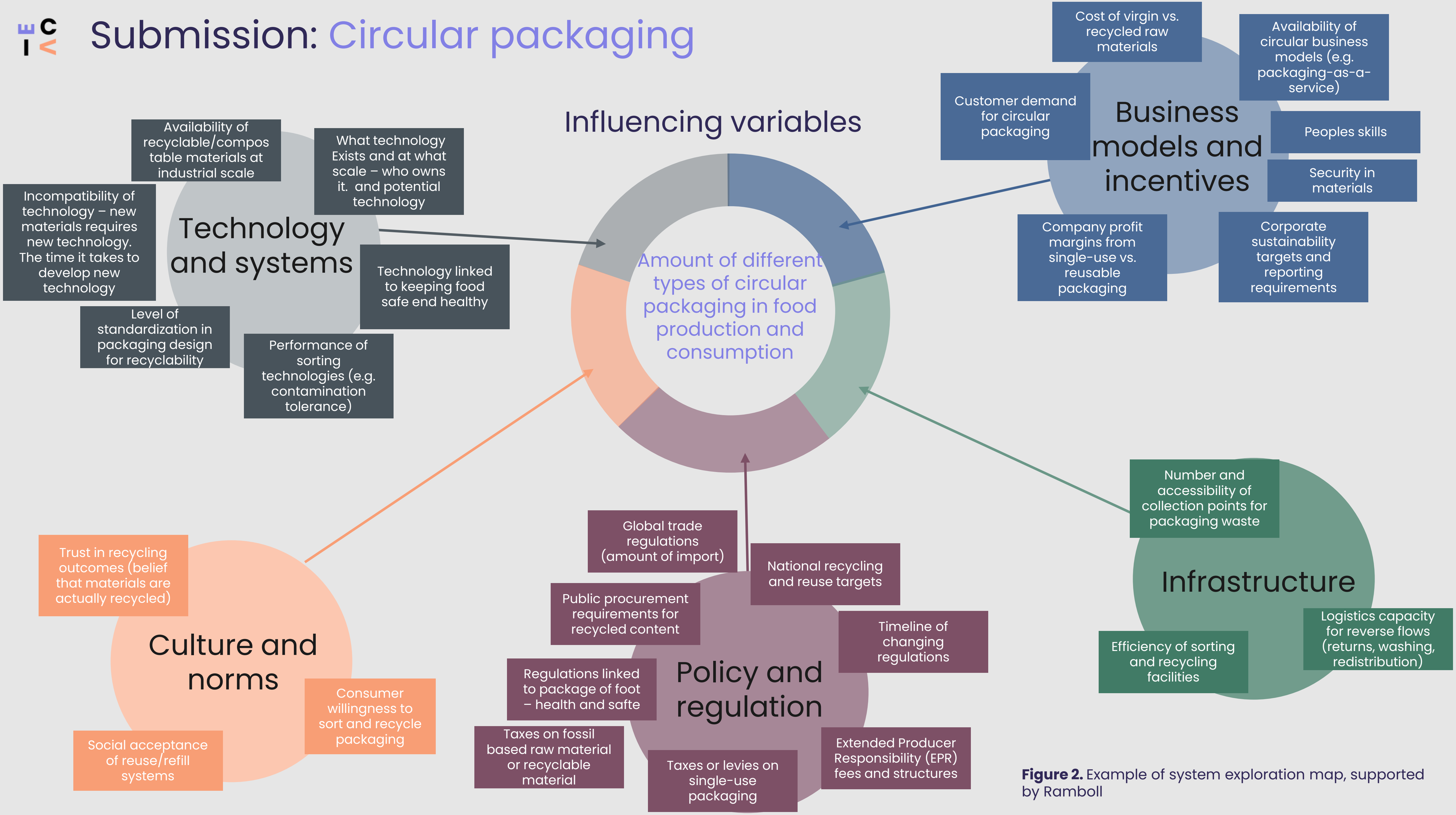

Figure 2. Example of system exploration map, supported by Ramboll

Methodology for Developing the Theories of Change

Step 2 – Creating a simplified system map

Regions visualised the interactions between variables to better understand system dynamics.

A simplified system mapping approach was used. Rather than modelling the strength or type of interactions in detail, the mapping focused on identifying whether variables influence one another.

This step supported:

- Developing a shared understanding of system dynamics
- Identifying connections between different system dimensions
- Highlighting areas where change in one variable could influence others

The aim was not to create complex system models, but to build a shared understanding of the system.

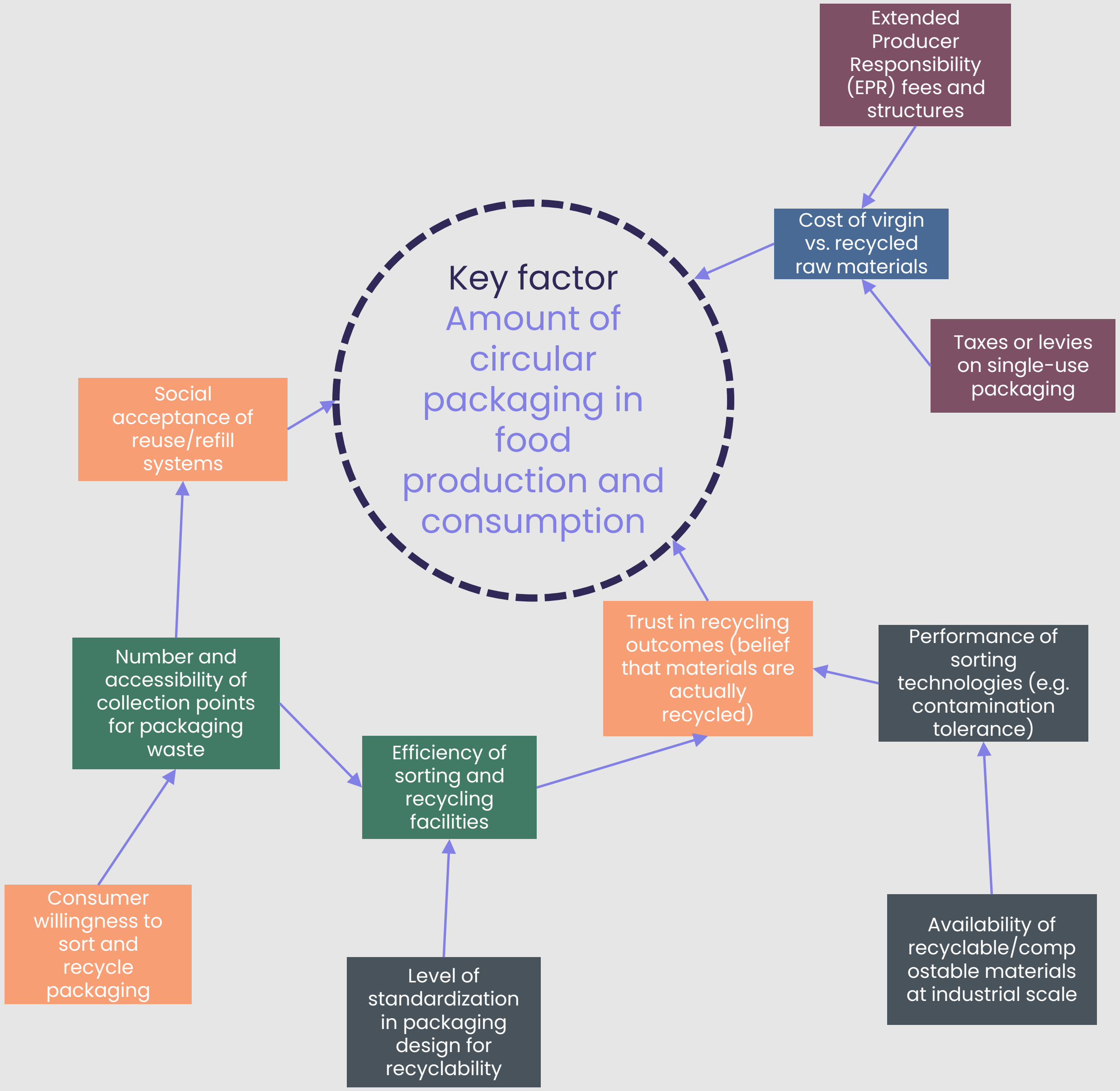

Figure 3. Example of simplified system map

Methodology for Developing the Theories of Change

Step 3 – Identifying key variables and leverage points

Based on the system maps, regions identified:

- Variables with strong ripple effects
- Areas resistant to change ("frozen areas")
- Areas with high transformation potential
- Existing positive developments

Identifying leverage points helps clarify which results regions aim to achieve and how these may influence the wider system. It also helps identify the types of activities needed to reach these results, for example funded projects, policy innovation platforms, or capacity-building initiatives.

This step translated the system exploration into key variables representing strategic focus areas for the region within ECIV.

Potential for Change
Where in the map you see high potential for change?

Ripple effects
Which variables or loops have a strong effect on the entire system?

Positive change happening
Where in the map you see positive change already happening?

Frozen areas
Which parts of the map are quite hard to change?

Methodology for Developing the Theories of Change

Step 4 – Developing a Theory of Change per submission

For each submission committed to, regions developed a structured Theory of Change including:

- Starting point (current system variables)
- Actions and required resources
- Desired results by August 2029
- Expected longer-term effects and impacts

The Theory of Change links regional interventions to transformed system variables and longer-term circular transition outcomes.

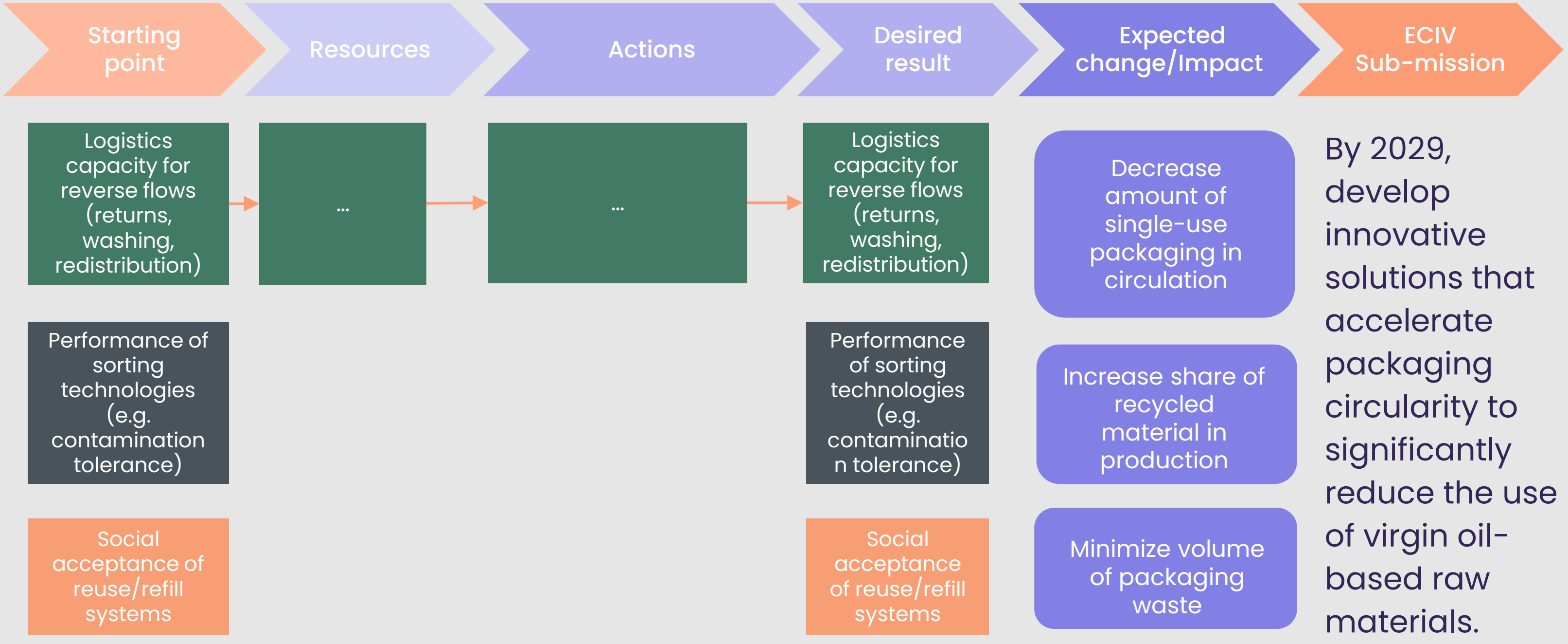

Figure 4. Illustration of an example of an impact target map / Theory of Change

4 – Regional Action Plans

Structure & Content of an ECIV Regional Action Plan

Content & readability

- Focus on clarity and shared understanding
- Use concise text, visuals, and diagrams where helpful
- Avoid long paragraphs and region-specific jargon
- Assume that all ECIV partners should be able to easily follow and discuss your RAP in joint workshops

Scope

- The RAP covers regional situation, regional resources, and regional ECIV actions only
- The RAP should reflect what the region commits to delivering within ECIV (until Aug 2029)
- Interregional activities and concrete Dance Floor connections are not required at this stage

Structure:

1. Submission commitment

2. Regional system context and starting point

3. Theory of Change (core of the RAP)
(one Theory of Change per submission)

4. Regional ECIV actions and initiatives

5. Timeline and responsibilities

6. Monitoring, learning, and adaptation (TIP-aligned)

Diversity of ECIV Regional Action Plans and submission commitments

While all RAPs are linked to the common ECIV framework, the number of submissions and the pathways for reaching them vary across regions depending on available resources, regional agency*, and the starting conditions of their innovation ecosystems.

Not all regions followed the methodological steps described in Section 3 in exactly the same sequence, reflecting their different starting points, existing initiatives, and levels of maturity in circular transition activities.

In addition, the ECIV partnership includes actors operating at different governance levels. This multi-level perspective, including participation from a national-level innovation agency, creates additional opportunities for dialogue, coordination, and learning between regional and national approaches as collaboration evolves through the ECIV "Dance Floor" activities.

**Regional agency refers to the capacity of regions to mobilise actors, coordinate activities, and advance circular transition initiatives, for example through existing policy frameworks, circular economy strategies, innovation ecosystems, and ongoing implementation efforts.*

The Regional Action Plans reflect the diversity of innovation ecosystems, industrial structures and policy priorities across the ECIV partner territories. While all RAPs were developed using a common methodological framework and submission structure, the scope, level of detail and focus areas vary between regions.

In several cases the submissions are closely aligned with prioritised regional industries or existing policy, while in others they reflect emerging areas of innovation or experimentation.

This diversity is expected and reflects the place-based nature of the ECIV approach, where regions build on their specific strengths and transition pathways.

This approach is consistent with the place-based innovation perspective promoted by the European Commission's Joint Research Centre, which emphasises that systemic transitions emerge from regional experimentation, learning and collaboration rooted in local contexts.

ECIV submission commitments overview

Region	Submissions / sub-missions addressed
Helsinki-Uusimaa	Circular agrifood systems; circular biobased materials in construction
Lithuania	Critical Raw Materials; Industrial Decarbonisation (not an ECIV submission); Circular Bioeconomy
Navarra	Circular agrifood industry / bioeconomy; circular packaging; circular water management
Normandy	Agrifood; packaging; textiles; construction; metals
Northern Netherlands	Agrifood; packaging; textiles; construction
North Middle Sweden	Construction, metals, packaging
Wallonia	Biobased construction; metals; agrifood
Scotland	The RAP is structured around priority sectors and strategic missions rather than the ECIV submission structure. It addresses areas including food and agriculture, bioeconomy, textiles, plastics, construction and manufacturing systems.

ECIV submission overlaps across RAPs

Agrifood:
- Helsinki-Uusimaa
- Navarra
- Normandy
- Northern Netherlands
- Wallonia
- Scotland
- Lithuania also includes Circular Bioeconomy, framed more broadly

Construction:
- Helsinki-Uusimaa
- Normandy
- Northern Netherlands
- North Middle Sweden
- Wallonia
- Scotland’s construction and built environment section

Packaging:
- Navarra
- Normandy
- Northern Netherlands
- North Middle Sweden
- Scotland also addresses plastics and packaging-related issues through sector actions, but not in the same RAP format as the others

Metals:
- Lithuania
- Normandy
- North Middle Sweden
- Wallonia
- Scotland also addresses metals and material recovery through energy, manufacturing, and electronics sections.

Wool / textile / fibres:
- Normandy,
- Northern Netherlands
- Scotland

Water (not currently included in WP3, ECIV prioritised submissions):
- Navarra clearly commits to circular water management.
- Northern Netherlands mentions water as a possible area still to be determined.
- North Middle Sweden addresses water as industrial side stream from the steel industry
- Scotland includes water-related circular opportunities within construction and infrastructure-related sections rather than as a standalone ECIV submission

4.1 – RAP Navarra

European
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Regional Action Plan

Place-based mission-oriented circular transition

Navarra

March 2026

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European
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Valley

Regional Action Plan

1. Submission commitment
2. Regional system context and starting point
3. Theory of Change
4. Regional ECIV actions and initiatives
5. Timeline and responsibilities
6. Monitoring, learning, and adaptation

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1. Submission commitment

CIRCULAR PACKAGING - Circular Industrialization of all types of packaging

Commitment - Navarra commits to industrialize circular solutions across different packaging materials. This includes scaling eco-design, increasing recycled content, promoting reuse models, and strengthening recovery capacities.

Reasoning - Navarra has a strong manufacturing ecosystem and an established packaging value chain, supported by technological centers and innovation clusters.

CIRCULAR AGRIFOOD Revalorization of vegetable byproducts from the agrifood industry

Commitment - Navarra commits to developing circular value chains that transform vegetable byproducts from the agrifood sector into high-value applications such as food ingredients and bio-based materials.

Reasoning - Agrifood is a strategic sector in Navarra's economy. The significant volume of vegetable side streams, combined with strong R&D capabilities and bioeconomy expertise, provides the capacity to convert waste into value-added products.

CIRCULAR WATER MANAGEMENT - Water recirculation and reuse

Commitment - Navarra commits to advancing water recirculation and reuse in industrial systems through innovation, improved efficiency and treatment technologies.

Reasoning - Navarra has a strong industrial base—including automotive, food processing, paper, and chemical sectors—where water is a critical production input.

2. Regional system context and starting point

The transition toward a circular economy in Navarra formally began with the launch of the **ECNA** – Circular Strategy of Navarra 2030 – established in 2019, this strategy set up **circular economy as a strategic priority of Navarra** aligned with European sustainability objectives and regional competitiveness. To operationalize this strategy, Navarra created **Navarra Zirkular (NZK)** in 2021 as a regional circular hub. NZK was conceived as a coordination and support platform to engage companies, public authorities, technological centers, and other stakeholders in circular economy initiatives. It was **embedded within Navarra's Smart Specialisation Strategy (S4),** reinforcing the link between sustainability, innovation, and regional economic development.

Between **2021** and the beginning of ECIV, Navarra Zirkular focused primarily on **awareness-raising, capacity building, and the development of individual circular diagnoses** for companies and sectoral stakeholders. These diagnoses helped identify inefficiencies, and opportunities for circular improvements at company level. While this approach generated valuable insights and engagement, actions were often fragmented and not fully connected under a shared strategic framework.

At the end of **2024**, with the adoption of the **ECIV place-based mission methodology**, Navarra began a structured process of analysing the circular diagnoses in conjunction with the priorities of the Smart Specialisation Strategy. This marked a shift toward a **mission-oriented approach**, enabling Navarra to move from isolated initiatives to coordinated, high-impact circular missions aligned with its industrial strengths and innovation capacity. **The ECIV framework provides coherence, scale, and strategic direction**, enabling the region to leverage its industrial strengths, innovation capacity, and governance structures to accelerate the circular transition in a structured and measurable way.

2. Regional system context and starting point

Steps Followed in the Mission Development Process

1. The key factors affecting the adoption of a circular economy (CE)

Regulation and policy frameworks, market, technology, knowledge, fundings and collaboration.

2. Analysis of Navarra's Priority Value Chains

Priority sectors were identified based on Navarra's Smart Specialisation Strategy (S4) and the needs detected through circular economy questionnaires and individual company diagnoses carried out within Navarra Zirkular. Building on this, a step-by-step circular value chain analysis was developed for each selected mission: circular packaging, circular agrifood industry and circular water management.

3. Identification of Circularity Gaps – influencing variables

Based on the value chain analysis and company diagnoses, key gaps were identified, including technological limitations, lack of infrastructure, regulatory barriers, market constraints, and collaboration challenges that hinder circular implementation.

4. Identification of Key Stakeholders per Mission

Relevant stakeholders were mapped for each mission, including companies (diagnosed and non-diagnosed), clusters, technological centers, public authorities, and research institutions. The objective was to ensure coordinated action and alignment between actors influencing different stages of the value chain.

Activities

The process has been supported by ongoing communication activities, mission-oriented events, and participatory workshops to validate findings, foster collaboration, and build shared ownership of the missions across the regional ecosystem.

2. Regional system context and starting point

1. The key factors affecting the adoption of a circular economy (CE)

REGULATION
- Regulation that hinders circularity with restrictions and legal barriers
- Excessive bureaucracy
- New regulations make it difficult to understand and stay up-to-date on the legislation

MARKET
- Problems with the supply of secondary materials, in quantity or quality
- End consumer's lack of awareness of the complexity of the supply chains
- Lack of demand in the public, private and industrial procurement market

TECHNOLOGY
- Difficulty modifying product design and existing production lines
- Need for advanced treatment technologies to enable product, component, and material circularity
- Challenges in identifying suitable technologies for CE transition.

KNOWLEDGE
- Lack of specialized knowledge and qualified personnel
- Need to create new training skills

FUNDING
- Need for financial support for new circular models or services – new lines of funding
- Complexity in the management of aid

COLLABORATION
- Beginnings of a cultural shift towards cross-sector collaboration
- Facilitate interconnection between companies and learn more about the capabilities of the territory

2. Regional system context and starting point

2. Analysis of Navarra's Priority Value Chains – Circular packaging

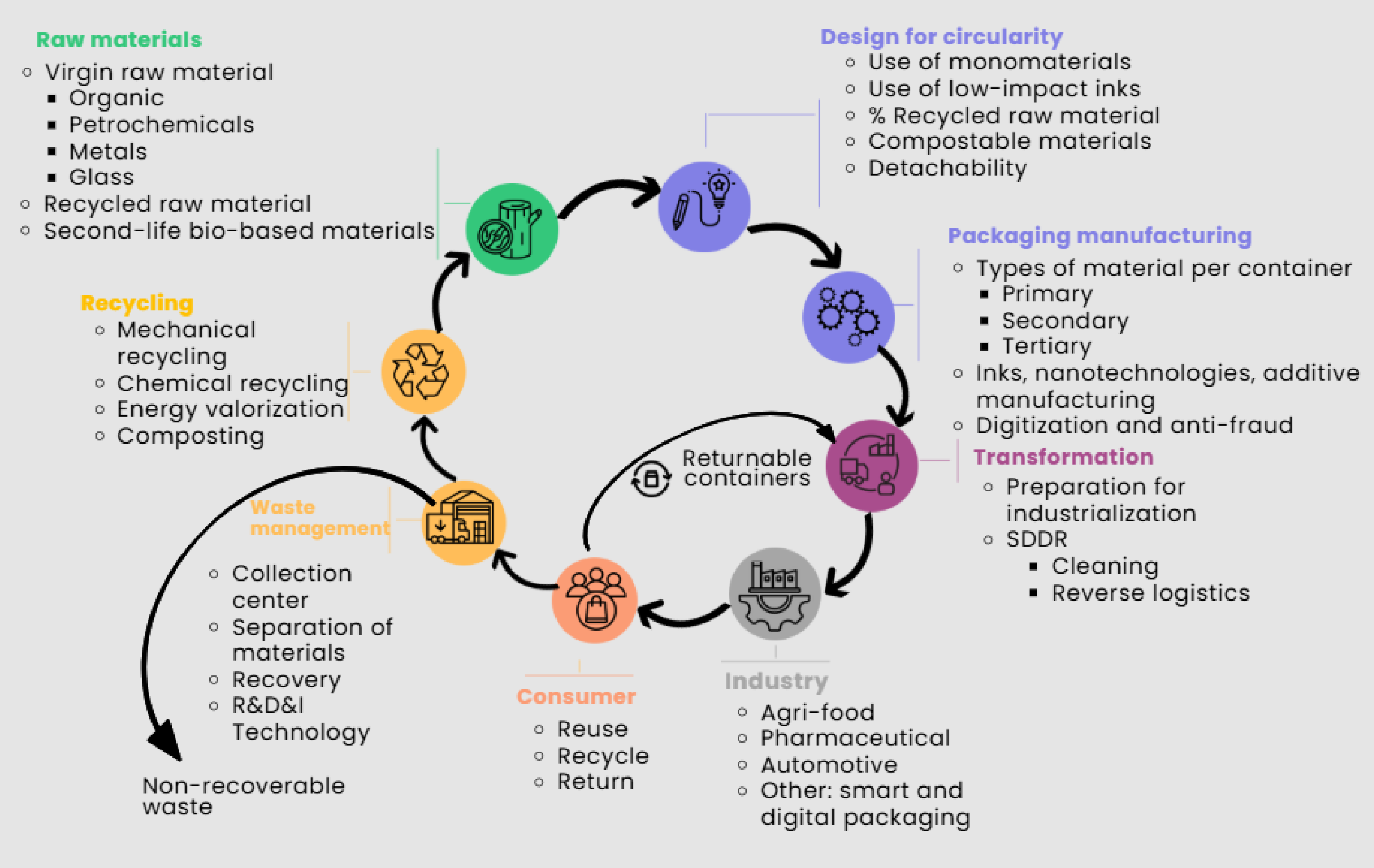

Figure 1 : Circular packaging value chain

The following action lines **were prioritized** in a in-live poll (from more to less relevance):

- **Design for circularity** (eco-design and recyclability by design).
- Process **technologies** enabling large-scale industrialization with new materials.
- **Recycled** and fully **recyclable** packaging solutions.
- Packaging made from **bio-based materials.**
- **Implementation of SSDR** (Deposit, Return and Refund Systems) for returnable packaging.

Participants also prioritized key enabling factors necessary for implementation: Regulation and policy frameworks, Market development, Technology, Knowledge, Funding and Collaboration.

Additional ideas shared:

Limited dissemination and awareness hinder CE adoption, need for stronger citizen collaboration and participation, barriers t effective packaging reuse systems, inefficient logistics systems constrain circular operations.

2. Regional system context and starting point

2. Analysis of Navarra's Priority Value Chains – Circular agrifood industry

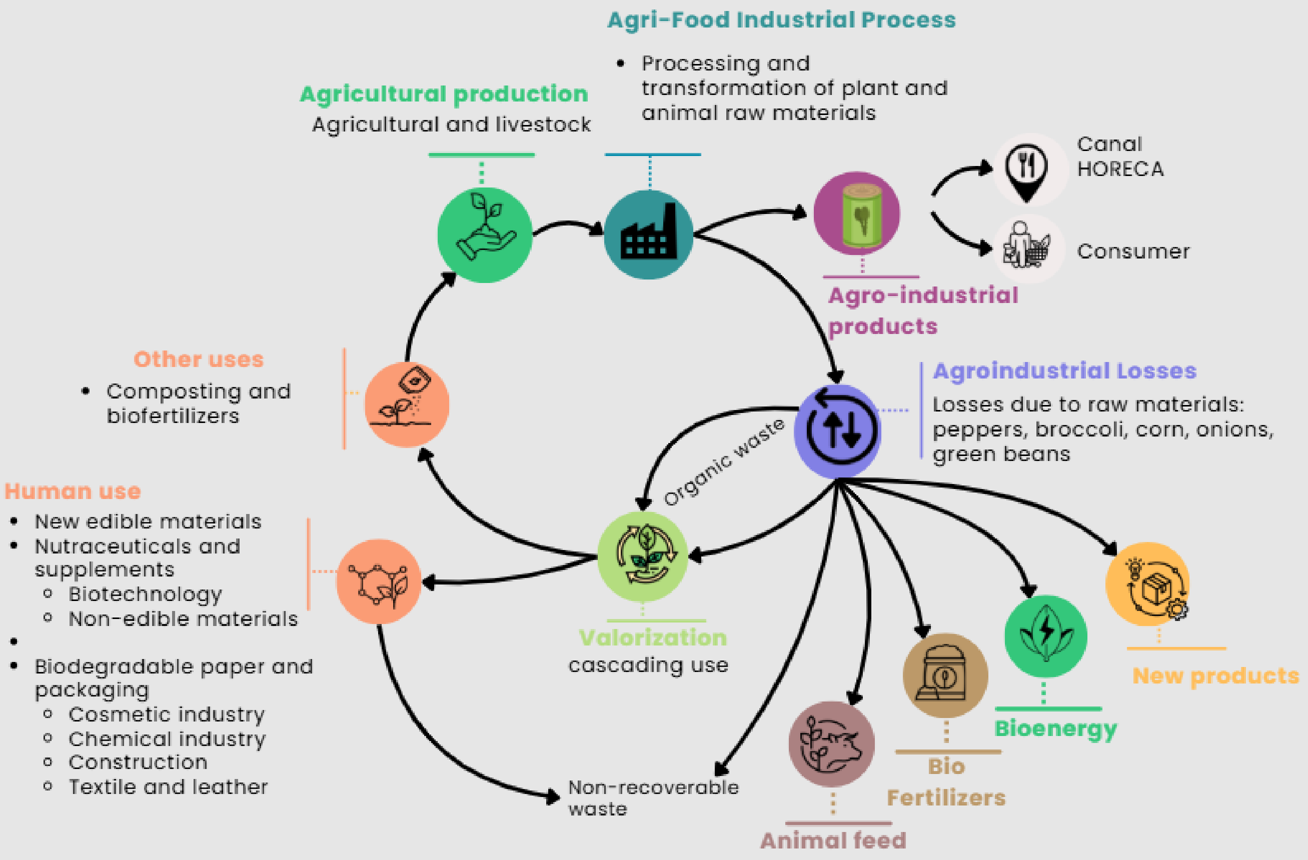

Figure 2 : Circular Agrifood value chain

The following action lines **were prioritized** in a in-live poll (from more to less relevance):

- Development of **new valorization technologies** for **animal and human food** applications.
- **Homogenization** and standardization of raw materials.
- Development of **new valorization technologies for other uses** (materials, packaging, fertilizers, etc.).
- Creation of **new mar**kets for valorized products.
- **Industrialization** of the processing of new circular products.

Participants also prioritized key enabling factors necessary for implementation: Regulation and policy frameworks, Market development, Technology, Knowledge, Funding and Collaboration.

Additional ideas shared:
Process optimization to reduce processing costs while maximizing final value, Logistics and distribution, including efficiency and coordination across the value chain, Analysis of lower-value recycling circuits, such as composting and animal feed, Strengthening the sectoral approach and achieving sufficient critical mass, Ensuring food safety in new valorization pathways.

2. Regional system context and starting point

2. Analysis of Navarra's Priority Value Chains – Circular water management

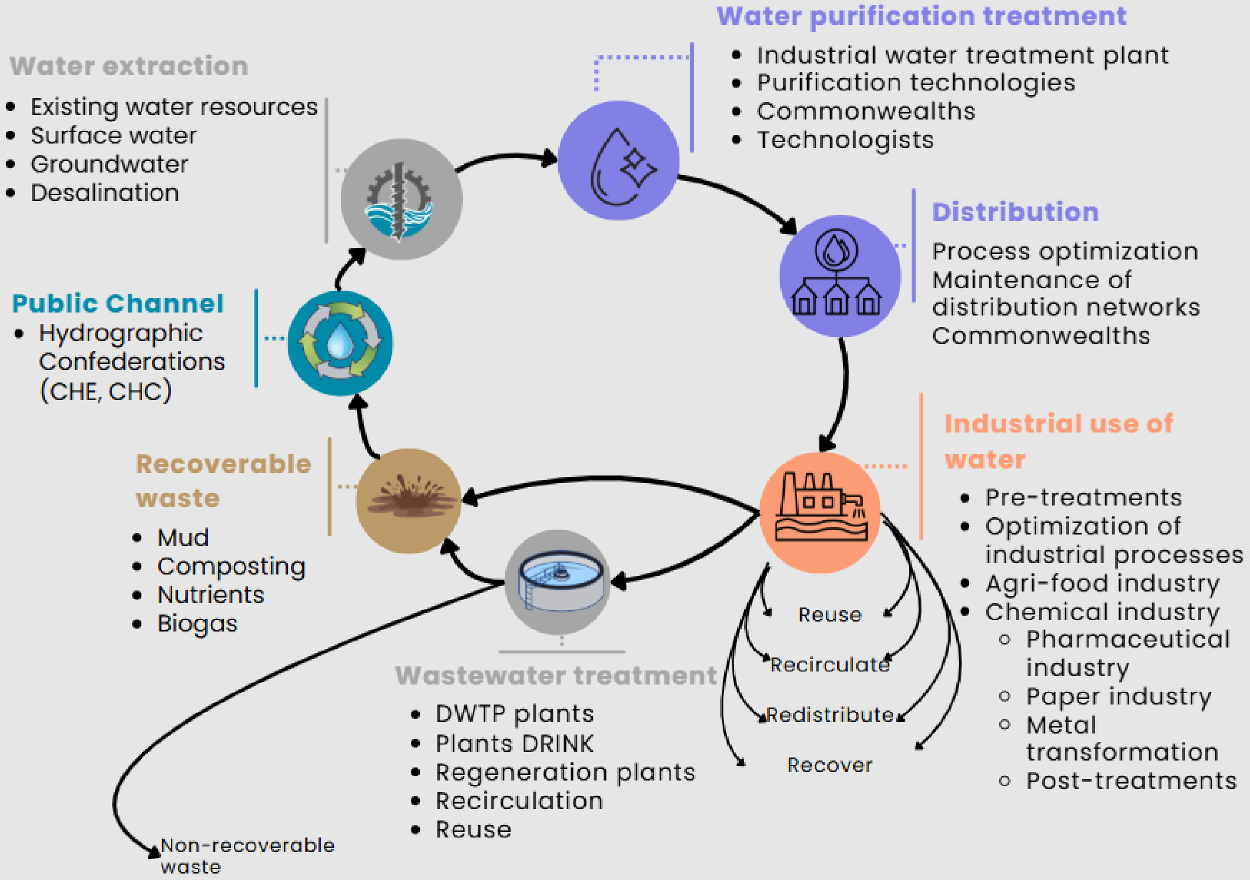

Figure 3: Circular Water Management value chain

The following action lines **were prioritized** in a in-live poll (from more to less relevance):

- **Regeneration processes** to restore water to suitable standards for recirculation.
- **Post-processin**g treatments to facilitate safe reuse in industrial
- **Pre-treatment before processing**
- **Nutrient recovery from wastewater**

Participants also prioritized key enabling factors necessary for implementation: Regulation and policy frameworks, Market development, Technology, Knowledge, Funding and Collaboration.

Additional ideas shared:
Strengthening public–private collaboration to scale solutions, Expanding reuse applications in the food industry, ensuring safety and compliance, Enhancing data capture and monitoring of water consumption to support optimization.

3. Theory of change

3. Identification of Circularity Gaps – Influencing variables and opportunities

Circular packaging influencing variables

- Sustainability and food safety causing material conflicts.
- Legal uncertainty and variable interpretations discourage investment and innovation.
- High administrative burden
- Regulations often outpace technology

- Recycled or biobased raw materials are significantly more expensive than conventional ones.
- Limited access to food-contact materials that are safe and competitively priced.
- Lack of stable suppliers to guarantee volume, quality, and price, making it difficult to scale innovations.
- Low market demand

- Only PET is suitable for food-contact recycled plastics; recycled PP and PE have limitations.
- Chemical recycling and some biopolymers lack scale and competitiveness.
- Coatings, varnishes, adhesives, and inks hinder recyclability and certification.
- Existing machinery may require upgrades for new materials.
- Complex packaging and visually similar materials limit proper sorting and recycling.

- Innovation focuses on early stages without considering end-of-life feasibility
- Limited technical training in packaging; SMEs often lack specialized expertise.
- Difficulty identifying technically valid, regulation-compliant solutions; more expert support is needed.

- Insufficient funding to industrialize circular solutions; investments in machinery and technology upgrades are often not covered by grants, especially for large companies

- Fragmented value chain: designers/engineers and waste managers work in silos, limiting real circularity

Circular packaging opportunities

- Support regulatory frameworks for sustainable materials (biopolymers, certified recycled paper/cardboard).
- Enable compliance pathways for advanced treatments, compostable plastics, and innovative coatings.

- Strengthen circular business models and valorization (upcycling, composting, energy recovery).

- Integrate ecodesign, functional printing, sensors, and digitalization into packaging development.
- Improve logistics and reverse supply chains with reusable packaging systems and digital tracking.

- Train industrial designers, engineers, and technical staff in circular and functional packaging.
- Organize workshops and awareness sessions on ecodesign, sustainable materials, and reuse/refill models

- Support investment in industrial-scale production of biopolymers and biobased materials.

- Strengthen partnerships between manufacturers, technology centers, R&D hubs, clusters, and public authorities.
- Facilitate multi-actor projects for pilot-scale processing, sustainable logistics, and circular packaging solutions.

3. Theory of change

3. Identification of Circularity Gaps – Influencing variables

Circular agrifood industry influencing variables

- Restrictive legislation, especially for human food applications, limits innovation and new uses of subproducts.
- Rigid safety, quality and traceability requirements hinder market entry.
- Need for authorized waste managers and unclear classification of subproducts.

- Lack of existing demand for revalorized products.
- Negative or hesitant consumer perception
- Seasonal production and insufficient volumes reduce commercial viability.

- Lack of affordable and efficient processing technologies.
- Technical difficulty in homogenizing and stabilizing subproducts.
- Limited separation and standardization processes for heterogeneous materials

- Lack of specific technical knowledge in key valorization processes
- Gaps in know-how related to subproduct homogenization and quality control
- Weak transfer of research results to industry

- High initial investment costs compared to traditional waste management
- Limited funding for process preparation and technological adaptation.

- Difficulty finding industrial partners to use or transform subproducts.
- Weak coordination between producers, revalorization companies and end-users.
- Lack of structured reverse logistics systems.

Circular agrifood industry opportunities

- To establish a regional one-stop-shop ("ventanilla única") to guide companies through regulatory pathways (including Novel Food procedures).
- Advocate for EU alignment to facilitate integration into European value chain using subproducts.

- Identify companies outside the agrifood sector willing to integrate subproducts.
- Develop new markets for functional ingredients
- Promote consumer education and awareness

- Develop technologies for stabilization, storage and homogenization of high-moisture or seasonal subproducts.
- Improve traceability and logistics systems to optimize reverse flows

- Strengthen applied research focused on industrial validation.
- To foster knowledge transfer from universities and technology centers to companies.

- Support spin-offs and start-ups emerging from research or established companies.

- Create structured networks connecting producers, revalorization companies, technology centers and end-users.
- Promote cross-sector partnerships (agrifood ↔ biotech ↔ chemistry ↔ construction ↔ textiles).

3. Theory of change

3. Identification of Circularity Gaps – Influencing variables

Circular water management influencing variables

- Regulatory restrictions on the use of reclaimed water, particularly under Real Decreto 1085/2024, limiting application in sensitive sectors (e.g. agri-food, hospitals)
- Lack of regulatory confidence in current technologies
- Absence of regulatory incentives that prioritize reuse over freshwater abstraction

- Non-competitive cost of reused/recirculated water compared to raw water
- No clear market demand for products manufactured using reused water

- Need for further development of more efficient, robust, and cost-effective reuse technologies.
- Innovation sub-challenges (e.g. regeneration and nutrient recovery) face higher technological barriers than pre-treatment and recirculation, which are already more consolidated.

- Limited cross-sector understanding of the systemic benefits of water reuse.
- Insufficient integration of circular water strategies at the design phase of industrial processes.
- Gap between available R&D developments and their practical industrial application

- Insufficient dedicated financial instruments for water circularity projects
- Limited funding for scaling innovative solutions beyond demonstration stages

- Weak coordination among water suppliers, technology providers, industries, regulators, and waste valorisers.
- Lack of integrated value-chain vision to align economic, environmental, and operational objectives.

Circular water opportunities

- Potential creation of regulatory incentives for industrial water circularity, e.g., facilitating use of reclaimed water in agri-food and other sectors.

- New business models for selling regenerated water as a service to other industries.
- Valorization of recovered nutrients (N, P) into high-value products for agriculture, feed, or bioproducts..

- Development of advanced water regeneration, pre-treatment, and recirculation technologies.
- Emerging biotechnologies, e.g., microalgae cultivation, for nutrient removal and biomass generation for food, nutraceuticals, fertilizers, and industrial compounds.

- Collaboration with R&D centers to test, validate, and transfer circular water technologies
- .Knowledge-sharing networks between industries, technology providers, and regulators.

- Access to financing for pilot projects, technological validation, and scaling of circular water solutions.

- Establish industrial symbiosis clusters for shared water reuse infrastructure and resource exchange.
- Multi-stakeholder co-creation and workshop initiatives to define circular water solutions.

3. Theory of change

4. Identification of Key Stakeholders per Mission

Circular packaging

For each stage of the circular packaging value chain, stakeholders were identified:

Materials: plastics, paper/cardboard, biobased, recycled → suppliers, material developers, research centers
Design: ecodesign, functionality, disassemblability → designers, engineers, R&D teams, clusters
Manufacturing & Processing: injection, extrusion, printing, assembly → manufacturers, technology providers, industrial partners
Industrial Use: food, pharma, cosmetics, logistics → end-users, brand owners, industrial operators
Waste Management & Valorization: collection, sorting, recycling, composting → waste operators, recycling centers, public authorities

Circular Agrifood Industry

The main stakeholders that need to be involved in the circular agrifood value chain:

Primary producers and agrifood processing industry: farmers, livestock producers, cooperatives,meat, dairy, fruit, cereal, beverage companies)
Byproducts transformers: biotechnology firms, nutraceutical and cosmetic industries, and green chemistry companies developing bioplastics and bio-based additives
Key complementary actors: animal feed producers, composting and biofertilizer plants, bioenergy operators, biodegradable packaging manufacturers, emerging sectors such as sustainable textiles and circular construction.
Commercialization: distribution, retail and HORECA , waste management.
Transversal: technology centers, universities, innovation center

Circular Water Management

Circular water management value chain in Navarra:

- **Industrial water suppliers and utilities, industrial water users** (agrifood, manufacturing, energy sectors),
- **Providers of water treatment technologies** (for pre-treatment, purification and recirculation)
- **Suppliers of nutrient recovery technologies**, and companies offering reuse, regeneration and recovery solutions within industrial processes.
- **Key complementary actors:** authorized operators and managers of water treatment plants, waste valorization companies handling sludge and by-products from wastewater treatment,
- **Transversal:** R&D and innovation service providers specializing in industrial water efficiency.

3. Theory of change

Challenges	Resource	Activities	Result	Expected change / Impact /Effect	Missions and Sub-missions
Uncertainty in regulatory compliance Limited industrial-scale biopolymers, recycled and compostable materials Unconnected knowledge Low market demand for recycled materials. Fragmented collaboration insufficient technical knowledge inefficiencies in production, handling, and logistics	FUNDING: • ECIV 1ST open call • ECIV Experimentation Fund • ECIV 2nd open call • Government of Navarra circular innovation projects funded STAKEHOLDERS • Local R&D centers (Naitec, CNTA, Functional Print) • Industry partners • Recycling operators • Regional clusters Local industry interested in valorization ECIV support Navarra Zirkular coordination	Transition team creation encompassing the main stakeholder per value chain steps. Knowledge-sharing networks among industry, tech centers, and public administration Pilot circular use models and reusable packaging systems. Conduct workshops ad-hoc to clarify lack of certainty in both circular economy criteria and circular economy transition. Facilitate collaborative logistics and valorization networks Organize intersectoral workshops and co-creation sessions. Share success cases and best practices.	Regional government innovation projects in circular packaging. ECIV projects in circular packaging Local map of industrial and R&D capabilities. Increased volume of high-quality recycled materials. Trained workforce in circular practices. Increase the offer of biobased materials available	Accelerated industrialization of circular materials. Better compliance with regulatory and market demands. Closed-loop packaging ecosystem established Stronger collaboration along waste and recycling value chain. Increased alignment of industry, policy, and technology for circularity. Enhanced visibility and replication of successful circular packaging models.	Industrialization of circular packaging

Figure 4 : Theory of change representation for the circular packaging mission

3. Theory of change

Challenges

Overcome the rigid norms to ease the valorization process.

Limited technological maturity

Gaps in specific know-how(homogeneization..) and a weak transfer from research to industry.

Lack of cross-sectoral mapping

Seasonal products and insufficient volumes

Resource

FUNDING:

- ECIV 1ST open call
- ECIV Experimentation Fund
- ECIV 2nd open call
- Government of Navarra circular innovation projects funded

STAKEHOLDERS

- Primary producers
- Byproducts transformers
- Regional cluster
- Emerging sectors to use byproducts

MISSING:

- To include consumers
- Reverse logistic system
- Shared industrial-scale infrastructure

Activities

Transition team creation encompassing the main stakeholder per value chain parts.

Establish a regional one-stop-shop for regulatory guidance and Novel Food support.

Map available subproducts and cross-sector applications (food, feed, biotech, cosmetics, green chemistry, bioenergy, packaging).

To facilitate cross-sectoral collaborations by the development of demand – offer needs workshops.

To promote reclassification of certain residues as recognized subproducts.

Result

Regional government innovation projects in circular agrifood.

ECIV projects in circular agrifood

Increase in standardized, stabilized secondary raw materials available for industry.

Increase in cross-sector agreements and collaboration projects.

New products creation an inclusion in the market

Expected change / Impact / Effect

Stronger integration between agrifood, biotech, green chemistry, feed, bioenergy and materials sectors.

Higher market trust and acceptance of circular products.

Positioning of Navarra as a European benchmark in circular bioeconomy

Missions and Sub-missions

Revalorization of vegetable agroindustry byproducts

Figure 5 : Theory of change representation for the circular agrifood mission

3. Theory of change

Challenges	Resource	Activities	Result	Expected change / Impact / Effect	Missions and Sub-missions
High cost and low adoption of water reuse and recirculation. Lack of awareness of environmental, economic, and resilience benefits.- Regulatory restrictions Insufficient technological maturity for industrial-scale water regeneration. Limited market demand for products using reclaimed water or recovered nutrients. Fragmented collaboration across the value chain.	FUNDING: • ECIV 1ST open call • ECIV Experimentation Fund • ECIV 2nd open call • Government of Navarra circular innovation projects funded • Taxes STAKEHOLDERS • R&D and technology providers • Water treatment • Industrial water uses MISSING • Market incentives • Integrated industrial symbiosis framework	Transition team creation encompassing the main stakeholder per parts of the supply chain. Create industrial symbiosis networks to share reclaimed water and recovered nutrients. Conduct workshops and knowledge-sharing sessions between industry, tech providers, and regulators. Facilitate multi-stakeholder platforms for dialogue, e.g., workshops, roundtables, and innovation labs Disseminate best practices, success stories, and case studies from other regions or industries.	Regional government innovation projects in circular water management. ECIV projects in circular water management. Number of industries implementing water reuse or recirculation. Nutrients recovered and valorized. Participation in collaborative networks and workshops	Widespread adoption of circular water practices in Navarra's industry. Reduced consumption of freshwater. To improve regulatory compliance. Creation of new markets and business models based on water and nutrient valorization. Strengthened industrial symbiosis and cross-sector collaboration. Increased knowledge, technical capacity, and innovation in water circularity.	Recirculation and reuse of water in industrial processes

Figure 6 : Theory of change representation for the circular water management mission

4. Regional ECIV actions and initiatives

Having identified the leverage points, we can better define the results we aim to achieve and the systemic impact expected by March 2027. To reach this horizon, activities will be coordinated with clusters and territorial agents to ensure alignment and shared responsibility. Territorial plans should incorporate a dedicated Circular Economy component, periodically coordinated with Navarra Zirkular to maintain coherence and progress tracking.

Circular packaging

Transition team creation encompassing the main stakeholder per value chain steps.

Knowledge-sharing networks among industry, tech centers, and public administration

Conduct workshops ad-hoc to clarify lack of certainty in both circular economy criteria and circular economy transition.

Facilitate collaborative logistics and valorization networks

Organize intersectoral workshops and co-creation sessions.

Share success cases and best practices among circular packaging.

Circular agrifood industry

Transition team creation encompassing the main stakeholder per value chain parts.

Establish a regional one-stop-shop for regulatory guidance and Novel Food support.

Map available subproducts and cross-sector applications (food, feed, biotech, cosmetics, green chemistry, bioenergy, packaging).

To facilitate cross-sectoral collaborations by the development of demand –offer needs workshops.

To promote reclassification of certain residues as recognized subproducts.

Circular water management

Transition team creation encompassing the main stakeholder per parts of the supply chain.

Create industrial symbiosis networks to share reclaimed water and recovered nutrients.

Conduct workshops and knowledge-sharing sessions between industry, tech providers, and regulators.

Facilitate multi-stakeholder platforms for dialogue, e.g., workshops, roundtables, and innovation labs

Disseminate best practices, success stories, and case studies from other regions or industries

5. Timeline and responsibilities

MARCH 2026 – MARCH 2027

Mission	Activity	Timeframe	Responsible Actors
Circular Packaging	Envisioning Events	Mar–Apr 2026	Industry, Tech Centers, Public Admin, Clusters
	Transition team creation	Mar–Jun 2026	Industry, Tech Centers, Public Admin, Clusters
	Ad-hoc workshops on CE criteria & transition clarity	May–Sep 2026	Public admin,Experts, Industry
	Collaborative logistics & valorization networksJun–Dec 2026	Collaborative logistics & valorization networksJun–Dec 2026	Public admin,RA, Logistics companies, Industry
Circular Agrifood	Transition team creation	Mar–Jun 2026	Public admi, Agro-industry, Tech Centers, clusters, Byproduct technology providers, other industry
	One-stop-shop (regulatory & Novel Food support)Mar 2026–Mar 2027RA, Regulators, Industry	Mar 2026–Mar 2027	Public admin, Regulators, Industry
	Cross-sector demand–offer workshops	May–Aug 2026	Public admin, Industry, Tech Centers, Experts
Circular Water Management	Transition team creation	Mar–Jun 2026	Public admin, Water providers, industry water consumers,
	Industrial symbiosis networks (water & nutrients)	Jun 2026–Mar 2027	Industry, Experts, Tech Providers, Public admin
	Workshops & knowledge-sharing	Jun–Sep 2026	Industry, Experts, water management comapanies, public admin

6. Monitoring, learning and adaptation

Regional Monitoring focusing on system variables in order to create a robust and adaptable evaluation framework. The goal is to track both transformative change mechanisms and circular economy indicators of progress based on the Transformative Innovation Program of ECIV.
In the case of Navarra the RAP focuses on regional systems across three circular approaches (agrifood, water management, packaging), capture learning from implementation, and support adaptive action aligned with ECIV.

The combination of **two existing frameworks** that integrates both needs of measuring directionality and performance.

- **TIME (Transformative Innovation Monitoring & Evaluation):**Focuses on transformation mechanisms (institutional change, actor behaviour, networks, resource shifts, capabilities. It was developed by KMU Forschung Austria.
- **CCRI Self-Assessment Tool (SAT):**Provides structured circular economy maturity evaluation (contextual analysis, indicator selection, continuous monitoring), tailored to local needs. from the European Commission's Circular Cities and Regions Initiative

TIME as regional transformation catalyst tracks system change in institutions, behaviour, networks, resources, capabilities.

CCRI SAT measures the regional circular performance and maturity by tracking governance and strategy maturity, resource efficiency, waste prevention, circular business models, and stakeholder engagement.

In a limited scope inspiration was also motivated by **Mazzucato** theory.

MONITORING OF NAVARRA RAP

System Variables Along the Theory of Change based on TIME

1. Directionality and Shared Vision
Degree of alignment around the regional transition mission
Stakeholder commitment to long-term transformation
Integration of ECIV priorities into regional strategies

2. Actor Networks & Collaboration
New cross-sector partnerships formed
Participation of non-traditional actors (civil society, SMEs, citizens)

3. Experimentation & Innovation Portfolio
Number of ECIV projects
Number of regional innovative projects on circular economy

4. Institutional Change
Circular Public Procurement
Increase of budget on circular economy priorities

5. Learning and capacity building
Development of new skills in public sector
Development of new skills in private sector

6. Monitoring, learning and adaptation

INDICATORS PER MISISON	Circular economy	Local structures established	Institutional change	Networking and capacity building	Experimentation and innovation portfolio
Circular packaging	• Uptake of reusable/refill systems • Adoption of packaging-as-a-service models • Share of secondary raw materials (% reduction in single-use packaging)	• Reverse logistics capacity • Local reuse hubs established	• Investment in reuse infrastructure • Public tender with circular criteria on packaging	• Consumer adoption of refill models • Logistics collaboration platforms • Trainings and leaning - ecodesing	• Number of ECIV projects on circular packaging • Number of regional innovative projects on circular packaging
Circular Agrifood	• Organic waste valorization (tonn of nutrients valorization) • Reduction of food waste • Reduce of synthetic fertilizers	• Public procurement on local food • Regional valorization capacities	• Procurement prioritising local new products (Budget shift) • Adjustment in subsidy schemes • Other public investments in valorization activities	• Development of new skills in public sector • Development of new skills in private sector	• Number of ECIV projects on circular agrifood • Number of regional innovative projects on circular agrifood
Circular Water Management	• % waste water reuse • Number of companies with industrial water recirculation incorporated • Water losses reduction • Cost savings from reduced water losses	• Cross departamental coordination established	• Policy revision that enables the recirculation and water reuse • Public – private partnerships working on CE in water	• Cross sectoral learning forum • Integration of pilot projects	• Number of ECIV projects on circular water management • Number of regional innovative projects on circular water management

Table 1: RAP monitoring per mission

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4.2 – RAP Northern Netherlands

European
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Regional Action Plan Northern Netherlands

March 2026

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1. Submission commitment

Submission	Rationale
Textiles	In the Northern Netherlands, various stakeholders, projects, policies and strategies are aimed at the transition to circular textiles. This counts for both natural and synthetic fibre materials. Moreover, important crosslinks can be made between biobased construction and natural circular fibres, through cascading value models.
Construction	The Northern Netherlands is actively working on circular and biobased construction, with multiple stakeholders across the quadruple helix working on the matter.
Agrifood	As a rural region, agrifood is a core element of the Northern Netherlands economy with many societal, environmental and economic challenges ahead.
Packaging	Building on regional strenghts, there is growing regional ecosystem on circular and biobased packaging.
(Metals)	Important sector for the development of a circular economy. Northern Netherlands has a relatevily large manufacturing industry. ToC under development.
(Water)	To be determined whether or not a ToC should be developed. Northern Netherlands has a longtime and strong ecoystem on water technology.

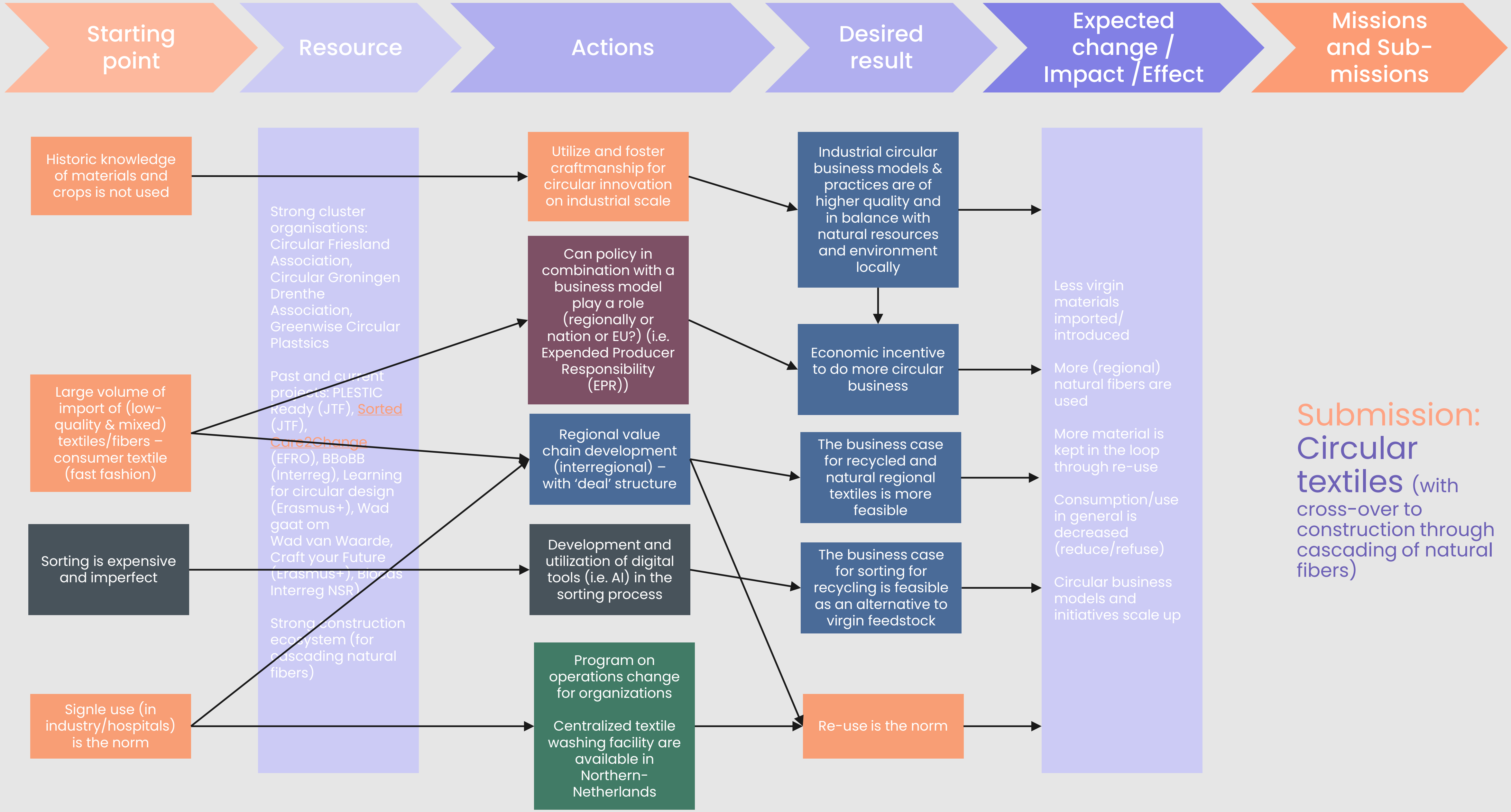
2. Regional System Context and starting point

The circular economy in Northern Netherlands (Friesland, Groningen and Drenthe) has developed rapidly in recent years and is increasingly seen as an important regional economic transition. Governments, companies and knowledge institutions collaborate in networks and projects focused on the reuse of raw materials, innovation and sustainable production. Within the regional innovation agenda, the RIS3 (Research and Innovation Strategy for Smart Specialisation), the circular economy is identified as one of the key transitions.

At the same time, concrete initiatives are emerging in sectors such as construction, agriculture, healthcare and recycling, where materials remain in use for longer and waste streams are reduced. Friesland is often mentioned as a frontrunner, with a relatively high share of material reuse and a strong network of organisations working together on circular solutions. In Groningen and Drenthe, attention to circularity is also increasing, for example through projects focusing on biobased materials, sustainable agriculture and circular construction. In the region, *Vereniging Circulair Friesland* and *Vereniging Circular Groningen / Drenthe* are key drivers.

An example of regional collaboration is the programme *Noord-Nederland Verdient Circulair*, which supports companies and organisations in developing and scaling circular business models. Despite this progress, Northern Netherlands still faces challenges, such as scaling up circular initiatives and structurally changing production and consumption patterns, but strong regional cooperation provides an important foundation for further development.

Theory of Change - Textiles



Theory of Change - Construction

Starting point	Actions	Desired result (2029)
Legislation and regulations that do not fully facilitate, encourage and prescribe	Developing mandatory performance standards	Desired mandatory performance standards are known
Demand lags behind what is needed for a healthy market	Scale guarantee: creating structural demand	Public purchasers systematically include biobased and circular construction in tenders
Insufficient market structure and chain cooperation	Organising capacity to close more value chains (director)	Structural capacity organised across value chains
Limited practical knowledge and applicable tools for builders		
Limited processing capacity for biobased materials	Making sufficient risk investments available	X processing sites in developing region
Increasing the earning capacity of biobased crops	Investing in application innovation	Value per hectare increases by x%

Resources

Knowledge, capacity, funding, cooperation, network.

Circular Friesland Association / VCGD as an important stakeholder

Capacity for lobbying

Close regional cooperation

Knowledge at knowledge institutions

Output of current projects (BBoBB, Fryske Fiber Hemp Deal)

Expected change / Impact / Effect

Increase amount of biobased and circular materials in construction

Increase in earning capacity for biobased materials

Missions and Sub-missions

Submission

Accelerate the use of sustainable, circular biobased materials..

Theory of Change - Agrifood

Starting point

Economic: Revenue models are still insufficiently robust; high dependence on input costs (fertilizer, feed, energy)

Social/cultural: Resistance to change; uncertainty; insufficient knowledge about regenerative agriculture

Systemic: Lock-ins in current linear model focused on exports and volume; fragmented chain management; regulations hinder circularity

Resources

Strong agri-food cluster; knowledge institutions; entrepreneur network; CAP & NPLG resources; data infrastructure

Regional education (vocational, higher vocational, and university education); practical networks; agricultural collectives; demonstration farms

Practical experience in manure processing; water boards; circular coalition;

Provincial coordinating role; policy scope POVI / Agricultural main structure; Triple Helix governance; KPI developments

Actions

Strengthening the open innovation ecosystem through **Fascinating** (protein transition, chain collaboration, data-driven chain management)

Developing and operationalizing **BodemCampus** for long-term research, practical experiments, and monitoring

Implementation of the '**Closing Nutrient Cycles**' program (iconic project for area development at Spoordok, manure processing, RENURE, 4J fertilization, residual flows)

Integral linking of SoilCampus + Fascinating + Nutrient Program in an area-specific approach

Desired result

- 5–8 operational chain pilots
- New regional protein products on the market
- 10–15% higher added value in pilot chains
- Improved margins for participating companies

- 3–5 Living Labs active
- Uniform soil monitoring protocol
- 500+ farmers reached through knowledge program
- Measurable increase in soil organic matter in pilots

- 30–50% reduction in fertilizer use in pilot projects Closing the loop through a pilot project on the use of human waste in agriculture.
- Regional nutrient balance developed
- Scaling up RENURE application
- 3 operational circular processing chains

- Three area-specific pilots (peat, clay, mixed)
- KPI-driven remuneration system tested
- Concrete policy adjustments prepared
- Transition approach included in regional implementation agenda

Expected change / Impact / Effect

Increased regenerative and circular agrifood systems

Missions and Sub-missions

Submission

Accelerate the transition toward regenerative and circular agrifood systems

Theory of Change - Packaging

Starting point

Economic: No viable business case for circular packaging vs. virgin plastics. Regulation is necessary

Social: Shortage of skilled technical personnel (especially operators) Circular plastics perceived as "non-sexy" topic

Susyemic:
- No European level playing field (mandatory - recycled/biobased content lacking) barriers (e.g. food-grade recycling)
- Fragmented regional value chain

Resources

Strong circular plastics cluster; knowledge institutions; entrepreneur network; resources; infrastructure

Regional education (vocational, higher vocational, and university education); and other knowledge infrastrure is present (**NTCP**)

Practical experience in recycling, new biobased materials

Regional wide (Northern Netherlands) commitment and governance via **Greenwise, circular associations and company clusters; PlesTic Ready methodology developed**

Actions

Develop Market Demand: Engage retailers and brand owners. Strengthen public procurement criteria.
Launch annual large-scale PPP demonstration projects

Implementing of **PlesTic Ready approach**

Develop Level playing field for recycled and biobased plastics/packaging

Long term regional comiitment on strategy and governance for circular plastics

Desired result

Continuation and scaling of initiating projects l

- 1 whitepaper ECIV wide on Circularity of Packaging/Plastics

- Structurel cooperation with 2-3 ECIV regions
- Min. 3 ECIV project on Circular Packaging

Recognised long-term regional governance strategy

Expected change / Impact / Effect

Increased use of recycled and biobased materials in packaging

More economic activity on biobased and circular plastics

Level playing field. More equal EU regulatory framework

Missions and Sub-missions

Submission
Accelerate the transition toward circular packaging

4. Regional ECIV actions and activities

Textiles

- Exploring (‘kwartiermaken’) for a regional value-chain ‘deal’.
- Exploring and executing scale-up projects for cascading value chains from the construction sector.
- Exploring which stakeholders and initiatives have a potential for scaling up, and how they can benefit from interregional cooperation (within ECIV).
- Scouting projects derived from Sorted, Plestic Ready, care2change and others, that have a potential for scaling up and how they can benefit from interregional cooperation (within ECIV).
- Exploring with regional authorities if regional political competencies can lead to behaviour change regarding consumerism and inflow large volumes of (low quality) textiles.
- Exploring what industrial textile single-use cases can be transformed to re-use or refuse and developing the needed infrastructure (like washing facilities) to do so.

Construction

- Developing a joint procurement strategy between public organizations
- Appointing chain coordinators who connect the agriculture, construction and industrial sectors
- Developing an investment fund for circular and biobased construction projects
- Adding circular and biobased construction as a requirement in public construction projects
- Developing a digital marketplace for materials
- Establishing a living lab for training and developing students and construction professionals

4. Regional ECIV actions and activities

Agrifood

- Strengthening the open innovation ecosystem through Fascinating (protein transition, supply chain collaboration, data-driven supply chain management)
- Developing and operationalizing the BodemCampus for long-term research, practical experiments and monitoring
- Implementation of the programme “Closing Nutrient Cycles” (flagship project area development Spoordok, manure processing, RENURE, 4R fertilisation, residual flows)
- Integrating BodemCampus + Fascinating + the Nutrient Programme in an area-based approach

Packaging

- Develop Market Demand: Engage retailers and brand owners. Strengthen public procurement criteria. Launch annual large-scale PPP demonstration projects
- Implementing of PlesTic Ready approach
- Develop Level playing field for recycled and biobased plastics/packaging
- Long term regional comiitment on strategy and governance for circular plastics

5. Timeline and responsibilities

Activity	Timeline	Responsible actors
Establish core participants of SMG	March 2026 – April 2026	Provinces Friesland, Groningen, Drenthe
Hackathon for regional SME	June 2026	Circular Friesland / Circular Groningen, Drenthe
Establish synergies with relevant projects in NNL	April 2026 – September 2026	Provinces
Continious dialogue between ECIV project and regional policy making	March 2026 – ongoing	All regional stakeholders
… To be established further		

6. Monitoring, learning and adaptation

In Northern Netherlands the progress of the circular economy is not monitored by a single organization. Instead, it is tracked through **various systems and collaborations** that together provide insight into the transition. Regional, national, and European indicators all play a role.

Based on the ToCs for all SMGs, KPI are developed for the different actions. Monitoring of these KPIs will come from different sources.

As ECIV is a learning-based, iterative and adaptive program, KPIs may change following the course of changes.

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4.3 – RAP North Middle Sweden

European
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Valley

D2.10
North Middle Sweden Regional Action Plan

2026-03-10

REGION DALARNA

Region Gävleborg

Region Värmland

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Structure

1. **Submission commitment**
2. **Regional system context and starting point**
3. **Theory of Change (core of the RAP)** *(one Theory of Change per submission)*
4. **Regional ECIV actions and initiatives**
5. **Timeline and responsibilities**
6. **Monitoring, learning, and adaptation (TIP-aligned)**

1. NMS submission commitment

North Middle Sweden (NMS) will focus on three submissions based on the Strategy for Industrial Transition in North Middle Sweden (NMS-strategy). Green and circular industry is an integrated core in the priorities of the strategy and shall secure conditions to handle transition processes and to create and positioning innovations.

Construction and Build environment:
- **We accelerate the use of sustainable, circular biobased materials in construction, to show how circular principles create more sustainable, healthy, and regenerative built environments**.

Steel, Metals and Mining:
- **Accelerate the use of circular steel and other base metals, and increase circular use of materials covered by the Critical Raw Materials Act**

Circular and sustainable packaging:
- **By 2029, develop innovative solutions that accelerate packaging circularity to significantly reduce the use of virgin oil-based raw materials**

Relevance

The labor market in NMS is highly depending on forestry, sawmills, wood production, construction industry, pulp and paper industry, mining, steel and specialist steel production, metal goods and machinery manufacturing. The region is the most export dependent region in Sweden and has several world-leading companies in their respective industries. However, the GRP per Capita in purchasing power as a share of EU average has declined 18.1 % between the years 2012 and 2023. (Eurostat) One of the reasons is probably the high share of manufacturing industries which has a slower productivity growth than the service sector in metropolitan regions.

To support industrial green, circular and digital transition, there is non-profit actors who is focused on e.g steel or pulp and paper industry and supports SME:s in innovation processes, networking and internationalization. The regional authorities Region Dalarna, Region Gävleborg and Region Värmland has drawn up "Strategy for industrial transition in North Middle Sweden" as a common governing document for the innovation promoting system in NMS. This strategy, together with the regional development strategizes and Smart specializations, makes the foundation of what is prioritized in the NMS context.

In Sweden each year, the manufacturing sector discards materials and products worth approximately SEK 71 billion, with only SEK 3 billion—or 4%—currently recovered through recycling or other value-retaining processes. (CGR The Value Gap Sweden 2025) This makes the sector a significant point of value erosion in Sweden's economy.

NMS:s purpose to join ECIV is to use skills and knowledge and both contribute to, and take advantage of, the potential with circular economy.

2.1 Regional system context and starting point

The current situation related to the sub-missions:

- **Construction and biobased materials**

In NMS there is an insufficient infrastructure for collection, sorting and recycling of clean wood and other biobased materials. Because of a long tradition based on primary material production in linear processes, often for export, the need is clear of new roles and financial drivers for circular and biobased materials, processes and business models. Key variables to make impact for this submission in NMS is digital traceability, logistic chains for biomass flows, access to reliable bio-based construction systems and quality assurance for secondary materials.

- **Steel, Metals and Mining:**

The industries need to secure access to circular steel, base metals and material in critical raw materials. The reliability of imports has declined and the need for self-renewal has increased sharply. The challenge is i.e how to rise from low value creation of side streams and bridge lack of knowledge about extraction of REEs. Management of residual flows, manufacturing processes for circular and climate-friendly products, recycling and extraction of critical rare earth metals are key therefore variables to make impact for circular steel, metals and mining.

- **Circular and sustainable packaging:**

In NMS we face a societal challenge where today's packaging system is characterized by linear flows, knowledge gaps and changing regulations. Systematic bio-based packaging solutions needs to accelerate. Key variables to make impact for circular and sustainable packaging are accessibility to new tests and experiments, new innovative projects, increased ability to build packaging value chains and positioning fiber-based materials within NMS and other European regions.

2.2 Methodology

The first step was to frame the scope of ECIV. The NMS project group assessed how many relevant submissions that are realistic to handle within ECIV and related them to the largest industry sectors described in the NMS-strategy.

With this as a background, we involved regional experts, innovation actors, researchers and companies to develop the basis for the regional action plan. Depending on submission we organized different groups for dialogue and workshops.

We used the methodology of system mapping to formulate a Theories of Change for each submission.

- One regional group per submission
- Two workshops per group.
  - The 1st to identify variables that affect the submission and how these variables are interconnected.
  - The 2nd workshop to identify key variables and describe starting points, desired results, resources, activities, expected impact and KPI:s.
- We compiled the results to a draft of ToC for each submission
- The draft was presented to the groups and to the Regional Advisory Board for feed back and advises before this 1st version was set.

Submission Construction and Build environment:
We accelerate the use of sustainable, circular biobased materials in construction, to show how circular principles create more sustainable, healthy, and regenerative built environments.

Theory of Change: **Construction**

Starting point

Infrastructure:
- Insufficient infrastructure for collection, sorting and recycling of clean wood and other biobased materials.

Technology
- Lack of proven, market-ready and certifiable biobased building systems.
- Construction elements are often overdimensioned and materials are not used efficiently due to short design times, safety margins and limited optimisation in design and construction processes.

Resources

Infrastructure:
- Support for reuse depots (financial and process support)
- Ongoing and completed innovation projects on digital infrastructure
- Access to digital sorting solutions
- Industrial side streams (waste wood and timber products)
- Regional innovation clusters
- Universities / applied research partners

Technology
- Regional bio-based raw material streams
- Industrial processing capacity
- Demonstration buildings
- Universities / applied research actors
- Interregional ECIV network
- Existing competence in structural design and material optimisation
- Research working on sustainable construction
- Digital design tools (e.g. modelling and simulation tools) enabling better dimensioning of structures
- Pilot and demonstration projects in circular and biobased construction
- Regional construction companies and industry

Actions

Infrastructure:
- Engage expert knowledge on biobased materials
- Support use of existing digital solutions
- Facilitate regional coordination of material flows
- Pilot structured collection systems for clean wood streams

Technology
- Develop business models
- Import / apply new technology
- Strengthen collaboration between research and industry
- Strengthen regional value-chain coordination
- Promote design approaches that optimise material
- Strengthen collaboration between architects, engineers and contractors to improve material efficiency
- Increase knowledge of resource-efficient and robust construction methods
- Test and demonstrate resource-efficient design solutions in pilot projects

Desired result

Infrastructure:
- Operational infrastructure for collection, sorting and recycling of clean wood and other biobased materials is established or significantly strengthened in NMS.

Technology
- Improved availability and scaling of proven and certifiable circular biobased building systems in NMS.
- Increased longevity and efficient use of construction materials, resource efficiency and robustness in construction.

Expected change / Impact

- NMS evolves from a primary raw material supplier to a competitivecircular bio-based construction region, contributing to climate-neutral, resource-efficient and regenerative built environments.
- Increased resource efficiency and value retention in the builtenvironment
- Greater resilience of regional construction value chains
- Contribution to climate neutrality and regenerative land-usepractices
- Healthier indoor environments and improved materialtransparency

Sub-mission

We accelerate the use of sustainable, circular biobased materials in construction, to show how circular principles create more sustainable, healthy, and regenerative built environments.

Theory of Change: **Construction**

Starting point	Resources	Actions	Desired result	Expected change / Impact	Sub-mission
Businessmodels and incentives • Limited regional value capture beyond primary raw material produc tion, with insufficient development of higher-value processing and circularproduct systems. • Limited awareness of financial drivers and opportunities to future-proof businesses through circular and biobased construction.	**Businessmodels and incentives** • Regional bio-resources • Existing primary processing capacity • Industrial actors in the value chain • Regional development mandate • Access to green bonds and taxonomy-aligned loans • Public financing instruments (regional and national) • Ongoing circular procurement pilots • Public property companies as front-runners and signal actors • ECIV interregional examples of viable circular projects • EU regulatory direction (e.g. Taxonomy, CSRD) shaping capital flows	**Businessmodels and incentives** • Shift focus from raw material extraction to higher-value production. • Support circular and ecosystem-based business models • Promote procurement practices favouring higher-value products • Strengthen design approaches enabling long-life and disassemble products • Engage regional financial actors and investors in circular construction dialogue • Increase awareness and applicability of green and taxonomy-aligned financing instruments for circular building projects • Support businesses in identifying circular economy as a competitiveness and future-proofing strategy • Showcase business cases demonstrating profitability and resilience of circular construction models	**Businessmodels and incentives** • Movement beyond primary raw material supply toward higher-value processing and circular product system development within the region. • Increased awareness of financial drivers and clearer understanding of how circular and biobased construction can strengthen long-term competitiveness and access to financing.	Increased regional competitiveness through higher-value bio-based production	**We accelerate the use of sustainable, circular biobased materials in construction, to show how circular principles create more sustainable, healthy, and regenerative built environments.**

Theory of Change: **Construction**

Starting point

Culture and values

- Need for new roles and competences, and adaptation of the construction process.
- Limited acceptance of reuse, modular construction and design for disassembly, combined with low trust in secondary materials.

Resources

Culture and values

- Knowledge in traditional construction and craftsmanship
- Existing professional competence
- Industry associations
- Ongoing pilot projects on circular procurement
- Existing quality assurance methods
- Successful regional pilots
- Nordic full-scale circular demonstrations
- Shifting cultural norms
- Increasing consumer demands

Actions

Culture and values

- Strengthen circular competences across the value chain
- Support adaptation of construction processes
- Facilitate cross-sector collaboration
- Use pilots as learning environments
- Address risk perception via insurance, guarantees and liability clarification
- Strengthen trust in secondary materials
- Use demonstration projects to validate performance
- Increase visibility of successful circular cases

Desired result

Culture and values

- Construction processes increasingly integrate circular and biobased solutions, supported by new roles and strengthened competences
- Increased acceptance of reuse and circular design, and strengthened trust in secondary materials among market actors.

Expected change / Impact

Increased attractiveness of NMS as a region for sustainable investment in circular and biobased construction value chains

Sub-mission

We accelerate the use of sustainable, circular biobased materials in construction, to show how circular principles create more sustainable, healthy, and regenerative built environments.

Submission Steel, Metals and Mining:
Accelerate the use of circular steel and other base metals, and increase circular use of materials covered by the Critical Raw Materials Act.

Theory of Change: **Metals**

Starting point	Resources	Actions	Desired result	Expected change / Impact	Sub-mission
Technology • Low value creation of side streams (i.e. waste water) • Lack of knowledge about extraction of REEs - technique and environmal impact **Culture and values** • Lack of processes enabling circular products across the 9R hierarchy	**Technology** • Expertise / ongoing research regarding waste water treatment • Expertise and networks regional innovation hubs • Expertise within regional innovation • Industrial tests / testbeds • Existing waste-material from mining for extraction • Existing waste materials from industrial production. • Existing waste from machines, products, materials • Ongoing research (in Sweden) regarding extraction techniques • Mining companies **Culture and values** • Existing production processes • Existing products • Industrial testbeds and pilot production environments • Committed industrial partners with mandate to experiment • Applied technical expertise in material flow and process optimisation	**Technology** • Pilots for technical solutions • Investigate industrial symbiosis • New circular business • Testing of processes and techniques for accessing REEs in existing products and materials • Development of new proscesses for ectration of REEs from production and existing products (metals) • Develop and scale technologies for industrial application **Culture and values** • Investigate models of industrial symbiosis • Developed technology for New processes for production of circular products • Development of new proscesses for ectration of REEs from production and existing products (metals) • Test of sorting processes	**Technology** • Increased value creation. • Circular use of side- / byproducts. • Cost-effective solutions for minimising sidestreams/waste streams • Increased knowledge and skills of technical solutions for REE extraction. • Existing landfills, waste streams and products have become resources for material recovery. **Culture and values** • Developed technology for New processes for production of circular products. • New business models.	• Minimise the use of chemicals. • Attractive conditions for industrial establishment. • Strengthen competetiveness of the industrial sector. • Increased resilience and preparedness of essential supply chains • New Circular Businesses	**Accelerate the use of circular steel and other base metals, and increase circular use of materials covered by the Critical Raw Materials Act**

Submission Circular and sustainable packaging:

By 2029, develop innovative solutions that accelerate packaging circularity to significantly reduce the use of virgin oil-based raw materials.

Theory of Change: **Packaging**

Starting point	Resources	Actions	Desired result	Expected change / Impact	Sub-mission
1. Lack of knowledge in companies about circular packaging. We face a societal challenge where today's packaging system is characterized by linear flows, knowledge gaps, and changing regulations.	• The cluster Paper Province (responsible for biobased circular economy in Värmland). • Businesses/Experts in packaging, materials, regulations, etc. Universities and research in NMS, • The Swedish Environmental Protection Agency • NPA (Näringslivets ProducentansvarTrade Association Packaging Producer Responsibility) - an approved producer responsibility organisation that helps fulfilling producer responsibility for packaging) • Avfall Sverige (Municipal waste management industry association)	1. **Increase Knowledge** dissemination on a broad scale about new regulations and what they entail. We need to contribute to a common interpretation of upcoming regulations and participate in and influence the dialogue when specific requirements within, for example, PPWR are decided over the coming years. Within the framework of ECIV we need to gather knowledge about which areas and materials are being developed in European regions to build circular value chains at the European level. NMS actors need to spread knowledge about the bio-based/fiber-based materials we work with in NMS to enable collaboration in Europe.	**1. Increased knowledge** Increased knowledge among companies in NMS to start building value chains for bio-based circular packaging across Europe. NMS has showed that the fiber materials we work with in NMS can be recirculated, sorted, washed, etc. Matching of companies regarding packaging. Increased collaboration and intensified knowledge sharing in NMS and Europe.	1. **Increased knowledge** Companies work according to new regulations, and there is knowledge in NMS about materials and processes for circular packaging. The share of circular bio-based packaging has increased. There is knowledge about how other European regions work with circular packaging (materials, collection, sorting, separation, traceability), helping us build an ecosystem for circular packaging.	**By 2029, develop innovative solutions that accelerate packaging circularity to significantly reduce the use of virgin oil-based raw materials**

Theory of Change: **Packaging**

Starting point	Resources	Actions	Desired result	Expected change / Impact	Sub-mission
• Lack of connecting packaging value chains. The systemic transition to circular and bio-based packaging solutions needs to accelerate.	• Research organisations (e.g. RISE, Universties) • Clusters (Paper Province, NIFA - Nordic Innovation Food Arena) • Business organisations, • Testbeds and Living Labs • ECIV partners and stakeholders	**2. Connecting Packaging Value chains** Matchmaking and hands-on support needed to find actors to build value chains in Europe. We need to work with value chains for collection, sorting, separation, and traceability. We find it important to stimulate and facilitate actors in the value chain, both business-supporting actors and companies.	**2. Connecting Packaging Value chains** Fast and effective dialogue across the packaging value chain. Packaging value chains connected within NMS and with other European regions. Increased knowledge of the entirepackaging value chain (design, materials, increased reuse, functioning sorting). Established collaboration and strengthened competitiveness in NMS and Europe regarding circ ular packaging chains.	**2. Connecting packaging value chains** We have transitioned from fossil-based to bio-based packaging, and reuse has increased significantly. Fiber-based packaging is used and circulated in NMS and throughout Europe. Climate and the environment have been positively impacted.	**By 2029, develop innovative solutions that accelerate packaging circularity to significantly reduce the use of virgin oil-based raw materials**

Theory of Change: **Packaging**

Starting point	Resources	Actions	Desired result	Expected change / Impact	Sub-mission
• Need of testing new ideas • Need of innovative projects	• The ECIV project, but also other ideas/initiatives/projects within NMS and outside.	**3. Testing of New Ideas/4. New Innovative Projects.** One important activity is to initiate innovative ECIV Open Call projects within NMS and find interesting experimental ideas and test of new solutions for bio-based packaging in NMS together with European partners. Testing includes design for circularity and recyclability, material technology, and recycling systems.	**3. Testing of New Ideas** New innovative tests and projects completed with results that support circular packaging. New environmentally friendly materials are used. Packaging is traceable and recyclable. **4. New Innovative Projects in NMS** The regions' positions in fiber-based materials and conditions for circularity are strengthened. Our fiber-based packaging is seen as an alternative in Europe. Packaging is traceable and recyclable.	**3. Testing new ideas/New Innovative projects** Increased competitiveness in NMS. Fossil-based materials have been phased out, and Sweden succeeds in reaching environmental and climate goals.	**By 2029, develop innovative solutions that accelerate packaging circularity to significantly reduce the use of virgin oil-based raw materials**

4. Regional Activities and Initiatives:
Overall Cross-Cutting Activities with Shared Regional Responsibilities

1. Advance Inclusive Innovation Across All ECIV Activities

- Enable that diverse actors — including SMEs, rural stakeholders, youth, civil society and social-economy organisations — are actively engaged in ECIV processes, experimentation and dialogue.
- Apply inclusive and participatory methods to broaden perspectives, surface different needs and barriers, and strengthen the capacity of actors to contribute to circular innovation.
- Integrate social and behavioural insights into system change processes, ensuring that circular solutions are relevant, accessible and beneficial across different sectors, communities and regions.

2. Enable Knowledge Building During Implementation

- Conduct competence-building: workshops, seminars, peer learning, and hands-on capacity support.
- Support all actors gain increased knowledge about circular design, materials, regulations, and value-chain requirements throughout the project period.

3. Support Legal and Regulatory Readiness

- Monitor and interpret upcoming regulations (e.g., PPWR, circular economy legislation, CRMA).
- Contribute to common interpretation, provide guidance to companies, and feed insights into national dialogues on necessary legal adjustments.

4. Promote Design for Circularity

- Encourage adoption of circular design principles across construction, metals, packaging, textiles, agrifood, etc.
- Motivate actors to prioritize modularity, repairability, reuse, disassembly, and material purity in product and system design.

5. Strengthen Material and Product Traceability

- Support companies in using digital systems to track materials, components, and products.
- Help actors share the information needed to ensure quality, enable reuse, and create safe and reliable circular material flows.

6. Enable Cross-Regional Value Chain Coordination

- Guide actors in mapping and connecting to relevant value chains in Sweden and Europe (collection, sorting, separation, processing, reuse).
- Strengthen collaboration between clusters, companies, academia, and public sector actors across regions.

4. Regional Activities and Initiatives:

Overall Cross-Cutting Activities with Shared Regional Responsibilities

7. Stimulate Innovation, Testing, and Experimentation

- Initiate and support ECIV Open Call projects and other test and demo activities.
- Facilitate experimentation with new circular materials, processes, technologies, and system solutions.
- Leverage existing regional testbeds, pilot facilities, and research platforms.

8. Strengthen Communication, Outreach, and European Positioning

- Produce communication materials and highlight circular solutions from NMS and partner regions.
- Promote regional strengths at European level to attract partners, investment, and project opportunities.
- Engage in multi-level dialogues with policymakers, EU platforms, and strategic networks.

9. Strengthen Circular Business Models

- Facilitate development of circular business models across all submissions through participation in Dance Floors and interregional collaboration.
- Support companies in understanding financial incentives, green financing, and long-term economic benefits of circularity.

10. Ensure Monitoring, Learning, and Strategic Adaptation

- Use shared KPIs and the 9R framework to track progress across submissions.
- Capture learning during implementation, not only at the end.
- Adjust actions based on insights, outcomes, and changes in the regulatory or market context.

Inclusive innovation

How do we ensure an inclusive innovation process:

Aim for diversity to ensure competence, experiences, perspectives, and networks regarding:
- Equal gender balance
- Age
- Diversity
- Roles / functions
- Backgrounds

Include specific skills, networks, experiences, and perspectives for the challenge being addressed:
- Project participants
- Competence outside or inside the technical domain
- Social and solidarity economy actors — such as cooperatives, social enterprises, and community-led organisations that combine economic activity with social or environmental objectives

Include internal (hidden) competence within the ECIV project group that contributes to the implementation of the ECIV process:
- Enablers

Include external (hidden) competence and specialists from outside the ECIV project group for effective implementation of the ECIV process:
- Policy makers
- Enablers (e.g. OECD Observatory of Public Sector Innovation, Danish Design Centre, or citizen-driven initiatives)

Include possible current and future professional roles and actors:
- Policy makers
- Civil society actors
- Innovation cluster managers
- Innovative businesses
- Circular economy experts

Protect and support different innovation models:
- Recognise and enable social, organisational, and societal innovations that do not rely on patents or traditional business models.
- Provide safeguards so these models can scale without losing their ethical or value-based foundations

Strengthen inclusivity with methods and tools:
- Use systematic methods for mapping, analysis, and engagement to avoid blind spots.
- Apply VUCA awareness (Volatility, Uncertainty, Complexity, Ambiguity) to design resilient processes that adapt to shifting contexts.
- Explore the responsible use of Artificial Intelligence to support inclusive data analysis, decision-making, and scenario building — ensuring human oversight, transparency, fairness, accountability, and the protection of personal and sensitive data.

Note: *Hidden competence* refers to expertise or experience found in unexpected places — beyond the "usual suspects." It means identifying and valuing people, roles, and perspectives that may not typically be associated with innovation processes but can provide fresh insights or bridge important gaps.

5. Timeline and responsibilities

Key milestones and phases until August 2029
The implementation of the Regional Action Plan (RAP) will be synchronised with the overall ECIV process. Activities will be aligned with the “Dance Floor” system dialogue activities, the cascade-funded projects, and Open Call 2.

Key phases include:

- Launch and follow-up of cascade-funded projects
- Alignment with Open Call 2 and related interregional collaboration
- Six-monthly reviews of funded projects to assess progress, lessons learned and alignment with the Theory of Change
- Annual review of the RAP in connection with the evaluation and iteration of the Transformative Innovation Programme (TIP)

The RAP is treated as a living framework, evolving alongside project implementation and interregional learning processes.

Responsible regional actors for delivery within ECIV
The regional ECIV coordination team is responsible for overseeing implementation of the RAP, ensuring alignment with funded projects and interregional activities. Delivery is carried out in collaboration with regional innovation actors, clusters, research partners and public stakeholders involved in the funded projects and related initiatives.

Embedding within existing mandates and practices
The RAP does not introduce new formal structures but builds on existing regional mandates, networks and strategic processes. Activities are embedded within ongoing regional development work and aligned with relevant regional strategies and programmes.
By synchronising RAP follow-up with project monitoring, “Dance Floor” activities and the annual TIP evaluation cycle, the region ensures continuity, commitment and iterative adjustment within existing resources and governance structures.

6. Monitoring, learning, and adaptation (TIP-aligned)

The regional authorities will follow up the KPI:s via project reportings. Not only for the sub-projects in ECIV, but also when its relevant for other projects related to the
submissions. We use the same KPI:s for all project: See slides.

Learning combines two complementary dimensions:

- **Learning in the transition** — use existing networks and coordinate dialogue between projects,, follow up on going projects and use results from existing follow-up research, have common rules of the games how to secure psychological safety, invite partners in ECIV-consortium to take part of results,; what impact they make and mistakes to learn from.
- **Learning about the transition** — activities to build understanding of the systemic changes required for circularity in regional economies, including new business models, policy instruments, and value chains. Open and regular communication adapted to targets groups.

KPIs

Technical solutions, technical development

- Number of solutions developed to minimise the use of chemicals
- Number of cost-effective solutions developed to reduce side-/waste streams
- Number of technological circular solutions tested in pilots or in real life

Innovation and market transformation

- Number of innovative circular concepts developed
- Number of new circular business models developed
- Number of new value chain collaborations initiated

Ecosystem and collaboration

- Number of organization involved from Quadruple Helix:
    - Academia, networks and clusters working together
    - Private sector companies
    - Public sector
    - Civil society organisations including social economy actors
    - New international collaborations

Governance and policy integration

- Number of policies adapted or influenced (e.g. S3, circular economy strategy)
- Creation of links between strategies
- New tools or methodologies developed thanks to ECIV

Capacity building and long-term change

- New monitoring methods and indicators created
- Capacity of stakeholders to initiate and successfully access future funding (No. of initiatives for interregional projects)
- Training and awareness activities (public authorities, clusters, companies) to raise capacity within:
    - Circular economy
    - Eco-system building, interregional and international
    - Policy and regulation for circular economy

All KPIs apply across metals, construction and packaging.
Circular depth and quality are ensured through the 9R positioning framework.

Use of 9R Principles

Framing framework (all submissions)

- The 9R hierarchy is used to clarify circular ambition and depth across all submissions.
- It ensures focus beyond recycling and positions solutions along the circular value retention ladder. Focus on maximizing value retention and creation.
  It provides a shared language for metals, construction and packaging.

Testing as portfolio mapping tool (strategic learning)

- Funded projects will be mapped against their dominant 9R level(s).
- This enables analysis of the overall portfolio distribution and helps identify gaps or over-concentration.
  The insights will inform future strategic prioritisation and call design.

The 9R principles are not used as scoring KPIs, but as a strategic positioning and governance tool.

The **9R framework** describes a hierarchy of circular economy strategies that prioritise actions to avoid resource use and maintain the value of products and materials for as long as possible (Potting et al., 2017). The strategies include:

- **Refuse (R0)** – Avoid the use of a product or material altogether by eliminating unnecessary consumption.
- **Rethink (R1)** – Rethink product use, for example through shared use models or multifunctional products.
- **Reduce (R2)** – Reduce the use of materials and energy in production and use.
- **Reuse (R3)** – Use a product again for the same purpose without significant modification.
- **Repair (R4)** – Repair and maintain products to extend their lifespan.
- **Refurbish (R5)** – Restore and update a product so it can continue to be used.
- **Remanufacture (R6)** – Use parts of discarded products in a new product with the same function.
- **Repurpose (R7)** – Use a product or its parts for a different function than originally intended.
- **Recycle (R8)** – Process materials to recover raw materials for new products.

Source: Potting, J., Hekkert, M., Worrell, E., & Hanemaaijer, A. (2017). *Circular Economy: Measuring innovation in product chains*. PBL Netherlands Environmental Assessment Agency.

European
Circular
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REGION DALARNA

Region Gävleborg

Region Värmland

4.4 – RAP Normandy

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Normandy Regional Action Plan

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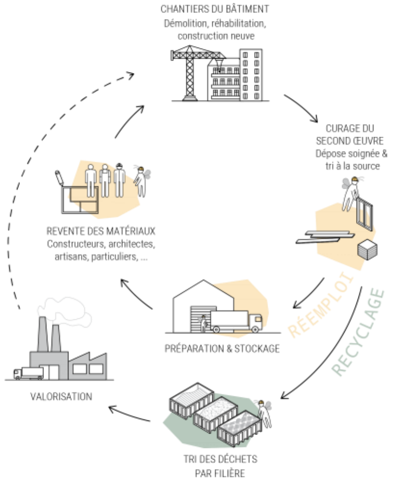
Index

ASR	Assisted self-Rehabilitation
C&IW	Commercial & industrial waste
CREC	Circular Economy regional Commitee
EPCI	Public establishment for inter-municipal cooperation
HW	Household waste
LCA	Life cycle assessments
NBRC	Normandy Building reuse Club
NECI	Normandy Circular Economy
PAT	Territorial food project
RRM	Recycled raw material
RSF	Recovered Solid Fuel
S3	Smart spacialisation strategy
SB	Sustainable building
SRADDET	Regional plan for planning, sustainable development and territorial equality
SRDEEII	Regional Scheme for the Economic Development of Businesses, for Innovation and Internationalisation
SSE	Solidarity and social economy

Submission Commitment

By the end of 2029 the role of **wool and other natural fibres** and recycled synthetic fibres is increased in clothing and other regional value chains

By 2029, develop innovative solutions that accelerate **packaging circularity** to significantly reduce the use of virgin oil-based raw materials.



We accelerate the use of sustainable, circular biobased materials in **construction**, to show how circular principles create more sustainable, healthy, and regenerative built environments.

Accelerate the use of **circular steel and other base metals** and increase circular use of materials covered by the Critical Raw Materials Act.

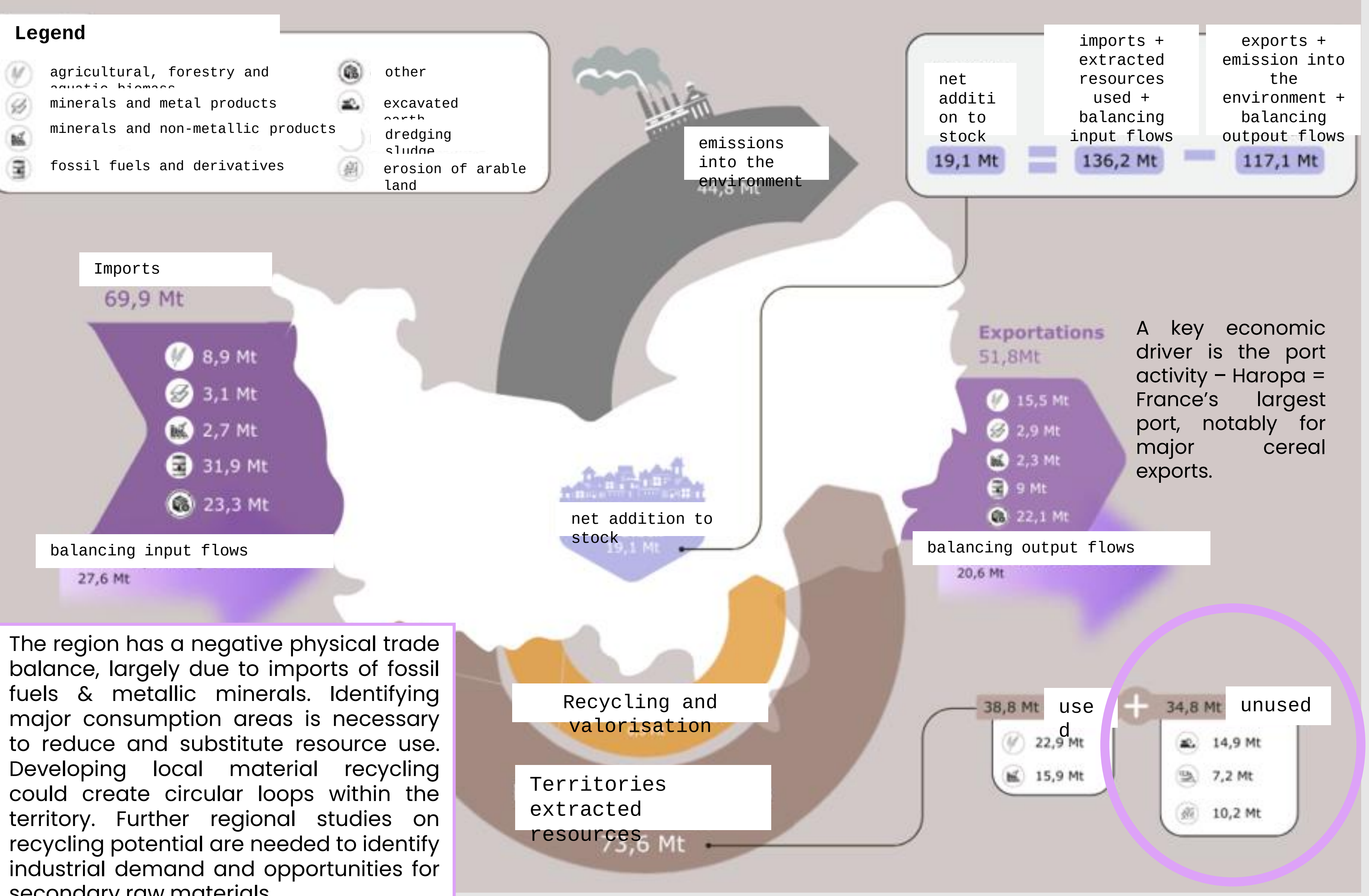
We accelerate the transition toward **regenerative and circular agrifood** systems that minimise waste & losses, close nutrient loops, and strengthen regional food resilience and value creation.

Design out waste & by product valorization are cross-cutting

Textile	Packaging	Construction	Metals	Agrifood
Normandy faces growing challenges in textile collection, sorting, reuse, and recycling. The region has many voluntary collection points and good sorting habits, but local recycling capacity is limited and relies on external processing. Textile waste is rising rapidly: production increased +41% between 2020 and 2024. Material quality is declining, with synthetic fibers dominating (~67% globally). The downstream sector is under pressure, with social economy actors relying on subsidies. Industrial recycling capacity remains insufficient in the region. Unsustainable consumption and fast fashion continue to increase textile waste. Despite these pressures, Normandy has strategic assets, particularly its role as a major flax producer, offering opportunities to develop local circular textile value chains	Packaging circularity is a strategic priority for Normandy due to the significant volumes of waste generated and the associated environmental impacts, particularly plastic pollution affecting coastal areas and soils. It helps reduce resource consumption and waste management costs for local authorities. The region also has strong industrial assets across the plastics and materials value chain, creating opportunities for local economic development and jobs. Circularity can strengthen access to recycled raw materials for companies and improve territorial resilience.	The construction sector is one of the most resource-intensive activities, generating around 8 million tonnes of construction waste per year in Normandy, while reuse rates remain below 1%. At the same time, the region has abundant local resources for eco-construction : straw, flax, expanding hemp production, and significant forestry resources for timber construction. Bio-based materials can significantly reduce emissions, as construction materials account for around 40% of the carbon footprint of buildings in Europe. Normandy also has a strong ecosystem of actors (ARPE Normandie, research centers, SMEs, CRBN),	Metal circularity is a major opportunity for Normandy due to the large volumes of available metal waste and its strong industrial base. Around 508,000 tonnes of steel scrap are collected annually, while local industry needs only about 114,000 tonnes. Strengthening collection, sorting, and recycling could retain more value locally, reduce dependence on virgin raw materials, and support industrial decarbonisation. Normandy's industrial profile—linked to nuclear energy, offshore wind, and mobility supply chains—makes it highly relevant for European circular metals strategies. With its strong logistics infrastructure and port access, the region could become a hub for circular metal processing and recovery, including critical raw materials and rare earths from electronic waste.	Agriculture and agri-food are core to its economy and territorial identity. The region has strong assets, with agricultural production capacity equivalent to 180 % of local food needs and agri-food processing capacity of 103 %, yet the system remains highly export-oriented, highlighting opportunities for more circular local value chains. Regional strategies already prioritise sustainable resource use, agroecology, and the valorisation of agricultural co-products, which align directly with circular food system objectives. At the same time, environmental pressures, climate risks, and economic vulnerabilities in the sector require systemic transformation.
Circular economy strategy : Promotes the structuring of a regional valorisation value chain **SRDEEII** : Valorisation of flax and hemp resources and downstream reindustrialisation (textile fibres). **Textile roadmap** in progress **S3** : innovative project (Cité du textile) in progress	**Circular economy strategy** **Plastic plan :** end of single-use plastic packaging **SRADDETT** : Develop glass recycling for reuse, respecting the principle of proximity and a balanced territorial network **S3** : chemistry, biobased materials, glass valley	**Circular economy strategy** **Ecoconstruction strategy**	**Circular economy strategy** : Enabling the development of activities for the recovery of rare earth elements and critical metals **S3** : decarbonisation, energy, supply chain, automotive	**S3** : Preserving and sustainably transforming agricultural resources and production systems **Circular economy strategy** : Supporting change in practices in the Normandy agricultural sector on issues relating to the production, mobilisation and sustainable processing of bioresources. Promoting the potential of co-products from the agri-food industry

Regional system context & starting point

Regional system context and starting point



A key economic driver is the port activity – Haropa = France's largest port, notably for major cereal exports.

The region has a negative physical trade balance, largely due to imports of fossil fuels & metallic minerals. Identifying major consumption areas is necessary to reduce and substitute resource use. Developing local material recycling could create circular loops within the territory. Further regional studies on recycling potential are needed to identify industrial demand and opportunities for secondary raw materials

Agricultural biomass: 54% of extracted resources used. Normandy is a highly agricultural region but strongly specialized. Agriculture is the main source of air emissions contributing to climate change (CO_2, CH_4, N_2O). Significant soil erosion leads to land degradation and biodiversity loss. Key challenge: diversify agricultural models and practices. Around 2 Mt of crop residues remain unused. There is potential for valorization, but it must consider the need for soil regeneration. Norman fiber represents 53% of national production, largely due to flax cultivation, questions remain about its uses and the value chains involved . A project for an Agricultural Biomass Observatory aims to improve knowledge on uses, imports/exports, and soil return of biomass.

Emissions to nature (CO_2 = 54%) linked to Normandy's economic activities, particularly agri-food, automotive, pharmaceutical, and petroleum industries. Developing decarbonisation projects is necessary.

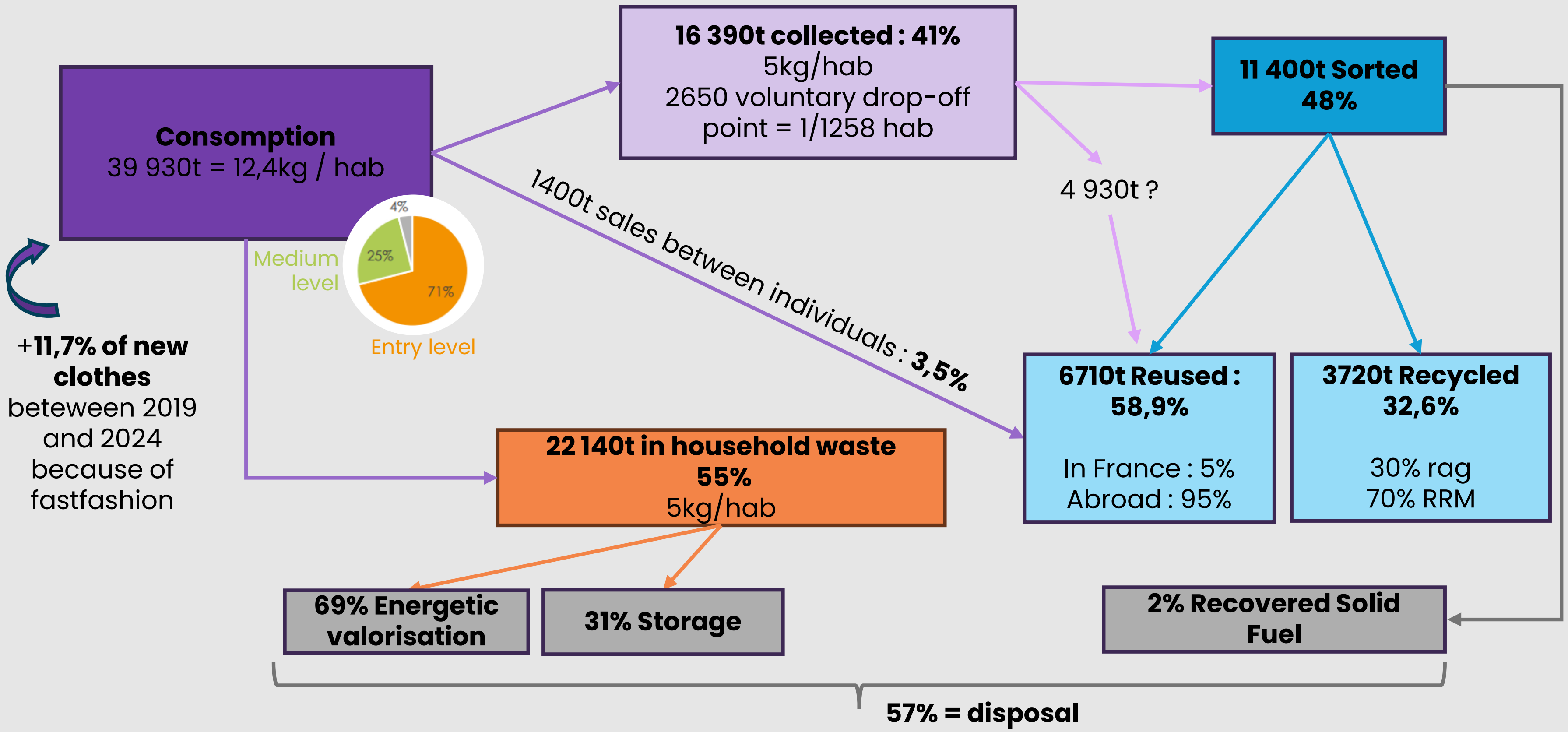
Aquatic biomass : 20% of French fishing activity. Products sold outside fish auctions are not well quantified, and sea discards remain significant, depending on fishing techniques. A dedicated study is needed to improve knowledge and practices.

Construction: Non-metallic minerals = 41% of domestic extraction (marble, granite, sand, gravel, chalk). Large quantities of extracted materials remain unused, particularly excavated soil. Improving management of extracted resources is therefore a key challenge.

Regional system context : Textile

Production : Approximately 5000 jobs in the textile, clothing, leather and footwear sector

Flax	Hemps	Wool
64% of French textile flax produced in Normandy (40% au global production) 15–25% of the plant becomes long textile fiber → The rest valorised as co-products. 80–90% of the fibers exported outside Europe for processing. Few spinning mills today, but several projects are underway.	Production is growing (France is the world leader). 700 ha of textile hemp are cultivated in Normandy 60 producers, 1 processor + 1 association working to develop a complete value chain from field to garment. 0,5 % of global production for textile	Collectives of breeders and artisans aiming to revive local textile production + Recent companies are valorising regional wool with full traceability. Orientation can be observed towards: short supply chains, textile craftsmanship, high-end products (yarns, garments, bedding), local and sustainable economy.



STRENGTHS

- Good material circularity and limited disposal when textiles are collected separately and export function properly
- Driver of SSE jobs
- Repair bonus
- Sorting behaviour of Normandy residents slightly above the French average
- Strong network of reuse centres
- Major flax production region

WEAKNESSES

- Large quantities of textiles in residual household waste (black bins)
- Competition between collectors ("cream skimmers") and sorting centres
- Recycling challenges due to contaminants (multifibre materials, buttons, etc.)
- Few closed-loop recycling and pre-recycling preparation facilities
- Lack of flow monitoring (including exports)
- Sorting centres no longer adapted to increasing volumes
- Absence of large, functional recyclers

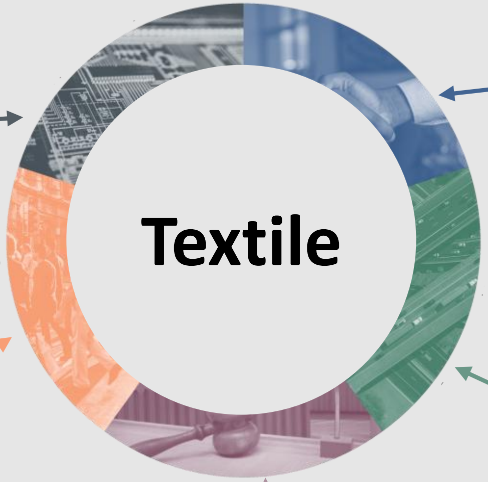
OPPORTUNITIES

- Growth of the second-hand market
- Development of recycling
- National and European policy momentum on the topic
- Development of RSF initiatives
- Development of a cross-sector project across the entire value chain (project Cité du Textile)
- Dynamic wool sector
- Regional reflection on the topic, led by CREC + ECIV

THREATS

- Fast fashion & overconsumption
- Declining household purchasing power
- Closure of second-hand export markets

Influencing variables



Technology and systems

- Wool processing technologies (washing, scouring, carding, spinning).
- Digital traceability tools and product passports.
- Sorting technologies (automation, optical sorting, adapted to heterogeneous wool quality).
- Eco-design and material innovation (including bio-based fibres such as flax & wool).
- Textile recycling technologies (synthetic fibres, chemical recycling).
- Quality and composition of textile materials.

Business models and incentives

- Industrial relocalisation and regional value-chain integration.
- Dependence on exports of used textiles.
- Circular business models: repair, reuse, rental, resale.
- Sheep farming economics (meat-oriented vs fibre-oriented systems).
- Second-hand market (digital platforms).
- Social and solidarity economy (SSE) model based on reuse valorisation.
- Fast fashion and ultra-fast fashion (rapid, low-cost production).
- Short supply chains and territorial branding (local wool products).

Culture and norms

- Awareness of environmental issues.
- Adoption of repair and second-hand practices.
- Skills and know-how loss in textile crafts.
- Perception of price and quality.
- Acceptance of local and bio-based textiles.

Policy and regulation

- Textile Extended Producer Responsibility (EPR) framework and the role of Refashion.
- National recycling and reuse targets – AGEC law
- Repair bonus scheme.
- Agricultural policies affecting sheep farming viability
- Public procurement policies favouring bio-based materials (e.g., insulation).
- Industrial relocalisation policies (France 2030, EU textile strategy).
- Regional collection targets (PRPGD / SRADDET)

Infrastructure

- Network of collection points (PAV).
- Transport and logistics of material flows.
- Agricultural production systems for flax & hemp
- Sorting centres and reuse facilities.
- Recycling capacities in France and Europe.
- Industrial processing capacities (spinning, weaving, recycling).

The flax value chain represents a particularly important leverage point because it connects agriculture, industry, and circular economy objectives.

Regional system context and starting point : Packaging

Normandy is a strategic region for packaging circularity because it concentrates actors across the entire plastics lifecycle:

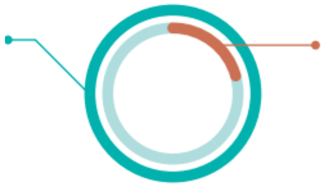
- Production of virgin polymers (refineries, petrochemicals).
- Plastics transformation industries.
- Packaging users (agri-food, cosmetics, logistics, pharmaceuticals).
- Waste management and recycling infrastructure

Around 200 plastics companies employing ~10,800 workers with €2.3 billion turnover. Transformation of ≈350 kt/year of plastics into products. Approximately 84 % virgin fossil plastics, 16 % recycled, 1 % bio-based materials currently used.

Normandy generates significant plastic waste flows: Around 180 kt/year plastic waste produced.

Infrastructures:
38 sorting facilities (600,000 t/year capacity).
6 plastic recycling plants (~140 kt/year capacity) with projects increasing potential to ≈300 kt/year.
Energy recovery and landfill capacities still dominant.

>3 837M of packaging used by agrifood industry



>774M easy to reuse

1557M of packaging produced & consumed in Normandy (loop)

>249M easy to reuse

About **40 % of plastic consumption** is packaging. At regional scale, eliminating single-use packaging could reduce demand by **112,7Kt/year**

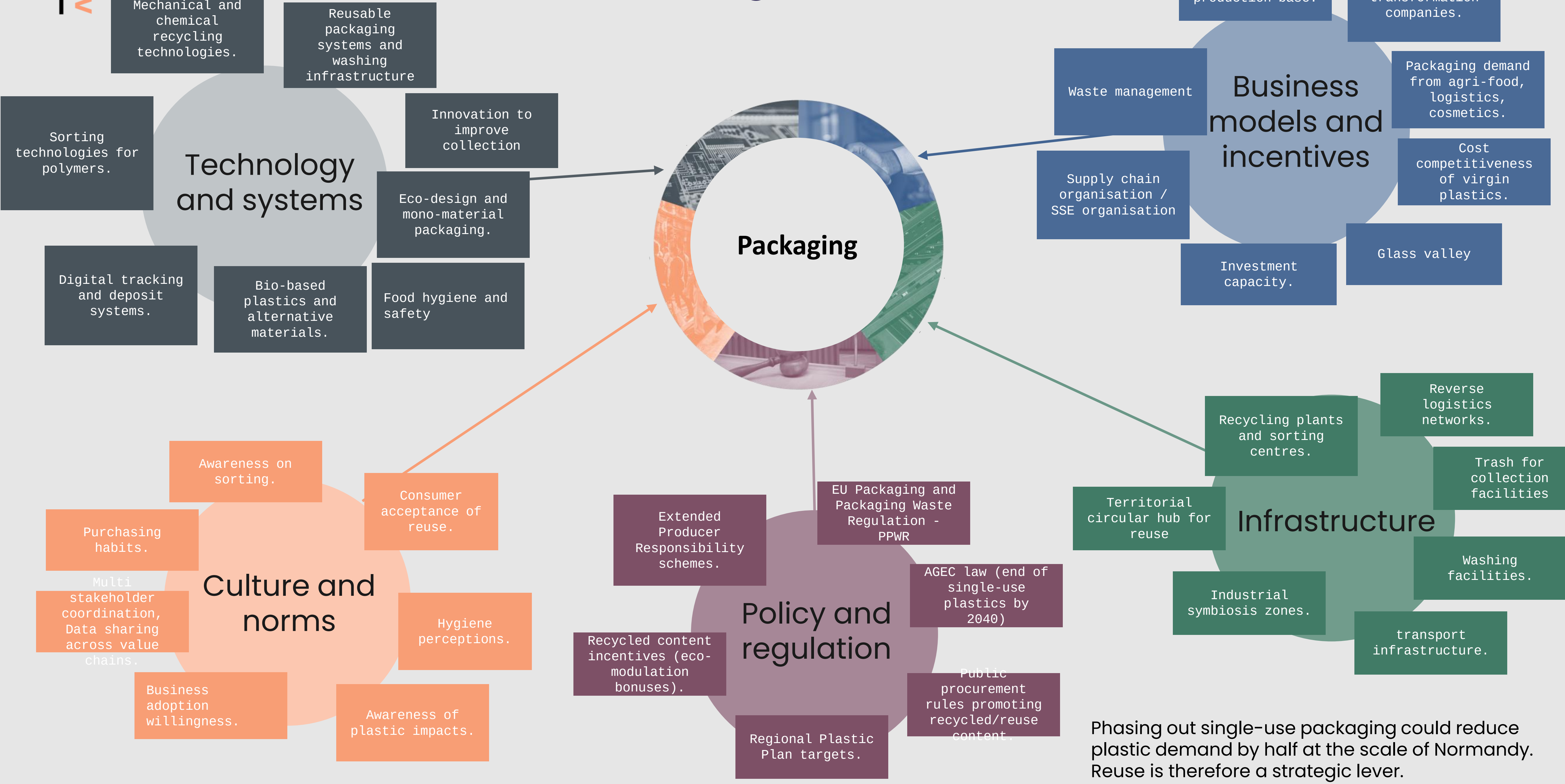
STRENGTHS
Significant packaging and processing industry: Plastics processing sector with SMEs and industrial groups.
Agrifood industry generating large packaging demand.
Strong recycling (projects) and waste management operators.
The ecosystem enables regional circular packaging value chains : Existing recycling infrastructure, Sorting centres for household packaging waste, Paper and cardboard recycling industry Glass recycling loops already highly circular
NECI network, reuse & deposit club, 2 observatories (biomass, waste), glass & cosmetic valley, area, valorial. Regional plastic plan.

WEAKNESS
High dependence on virgin fossil
Complex multilayer materials. Packaging difficult to recycle.
Limited reuse infrastructure : washing and reverse logistics infrastructure. Lack of standardised reusable packaging formats. Retail logistics not optimised for reuse. This prevents scaling reuse models.
Collection needs to be imoproved. Insufficient sorting of certain polymers. Contamination issues. This limits high-quality recycled material production.
Consumers behaviour.
Producer Responsibility systems not efficient

Opportunities
European regulatory : PPWR → Recycled content, Plastic reduction targets. EPR system.
Technological innovation : advanced recycling technologies, bio-based plastics recyclable, mono-material packaging, digital tracking systems, smart sorting technologies.
Circular packaging business models are expanding: deposit-return systems reusable food packaging grefill stations, packaging-as-a-service models.
Demand for recycled materials is growing: recycled plastics recycled aluminium, recycled glass, recycled paper fibres.

THREATS
Recycled materials often face: price competition from virgin materials? oil price fluctuations, unstable demand.
Regulatory uncertainty :compliance uncertainty for companies investment risks.
Circular packaging solutions compete with: cheaper imported packaging, large multinational packaging suppliers.
Packaging circularity depends heavily on consumers sorting behaviour, reuse adoption, refill acceptance.

Influencing variables

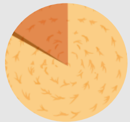


Phasing out single-use packaging could reduce plastic demand by half at the scale of Normandy. Reuse is therefore a strategic lever.

Construction

8M tonnes of construction waste/year **≈80 % of total regional waste. 5.4M** tonnes treated in regional facilities (potentially up to 7.7 Mt including estimates). **92 % inert materials**, mainly mineral resources (soil, aggregates). **88 %** material recovery rate about, largely through quarry backfilling rather than high-value recycling

Timber construction market in the Seine Valley: ≈ €178 million in turnover for Norman companies in 2018. Share of timber housing in Normandy: **8.7% of new homes** (above the national average). ➔ The wood sector is already structured

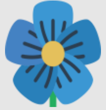


467,000 hectares of straw cereal crops in Normandy. **2 to 3.5 million tonnes of straw** harvestable each year. >400 000 tonnes potentially usable for construction. Straw is a co-product of cereal crops that does not compete with human or animal food. ➔ Massive local resource, currently largely underutilised.

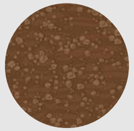
Hemp is a sector under development with an identified regional ecosystem (manufacturers, companies, agricultural stakeholders). Specific regional programmes, Carbon storage capacity and improvement of agricultural soils. ➔ Strategic material for low-carbon buildings.

Reuse < 1%
Up to 10–20 % of building materials could technically be reused. Reuse can reduce material-related emissions by 20–30 % for some projects. It generates 2 to 4 times more jobs than recycling.

728 hectares in Normandy (still marginal). Secondary agricultural resources that can be mobilised for materials.



Linen : Major production. Strong potential for composite materials and insulation.



Traditional techniques such as cob and wattle-and-daub. CobBauge project (France–UK) has played a key role in modernising cob construction by developing building systems that meet current energy efficiency standards. Earth is a locally abundant resource, with large volumes of excavated soil from construction sites. remains emerging, requiring further structuring

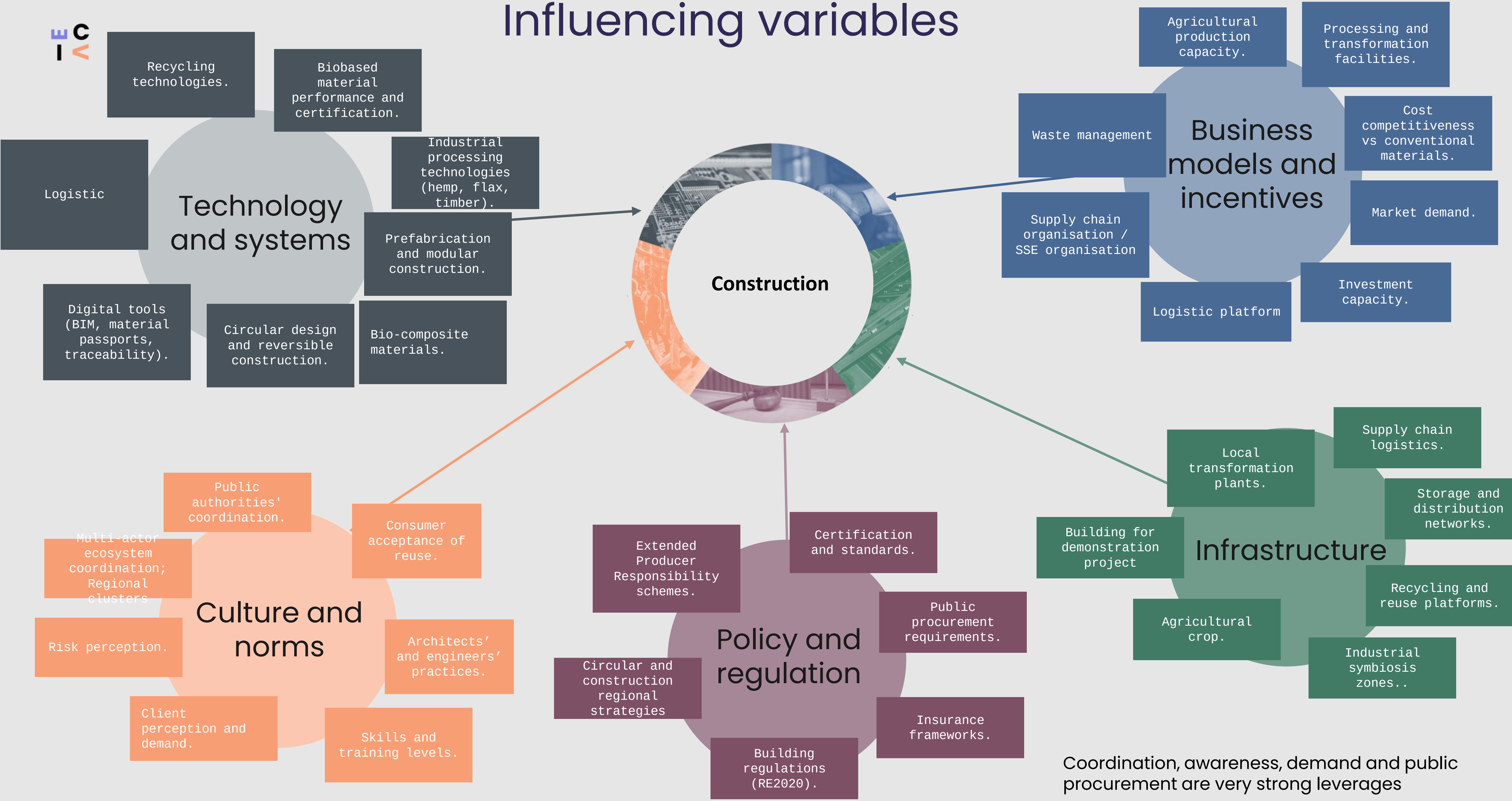
Strengths
- Large agricultural biomass resources
- Forestry resources enabling timber construction.
- Significant volumes of excavated soils usable for earth construction.
- Reuse and biobased construction cluster. Strong network
- Active construction sector and SMEs across the territory. Timber construction market
- Emerging biosourced material companies.
- Presence of innovation actors and technical centres.

Weaknesses
- Perceived higher costs compared to conventional materials. Limited economies of scale.
- Limited industrial scale for biomaterials.
- Fragmented supply chains between agriculture, industry, and construction.
- Insufficient local transformation capacity for some materials.
- Lack of standardised products and certifications.
- Insufficient training among architects, engineers, and contractors. Limited workforce skills in biobased and circular construction.
- Insufficient reuse platforms and logistics hubs.
- Weak reverse logistics for materials reuse.
- Lack of demand

Opportunities
- Public procurement requirements for biosourced & reu sed materials.
- Construction EPR schemes promoting reuse and recycling.
- Climate policies and carbon neutrality objectives. RE2020 and future regulations. EU Green Deal and circular economy policies.
- Innovation : Prefabrication and modular construction. Bio-composite materials. Digital tools (BIM, material passports). Circular design methods, circular concrete.

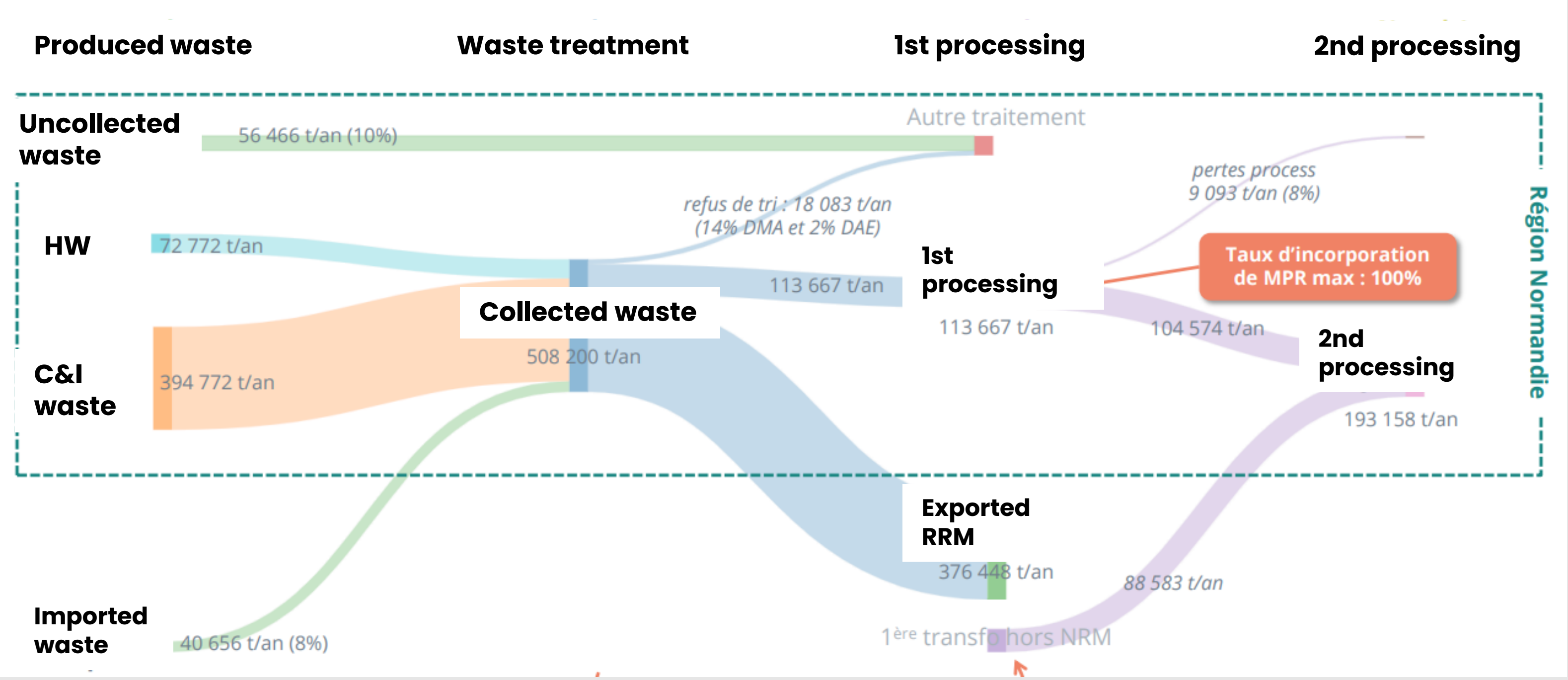
Threats
- Volatility of construction markets.
- Competition from conventional industrial materials.
- Price fluctuations of raw materials.
- Investment constraints and financing challenges.
- Agricultural production variability due to climate change.

Influencing variables



Coordination, awareness, demand and public procurement are very strong leverages

Regional Context : Metals



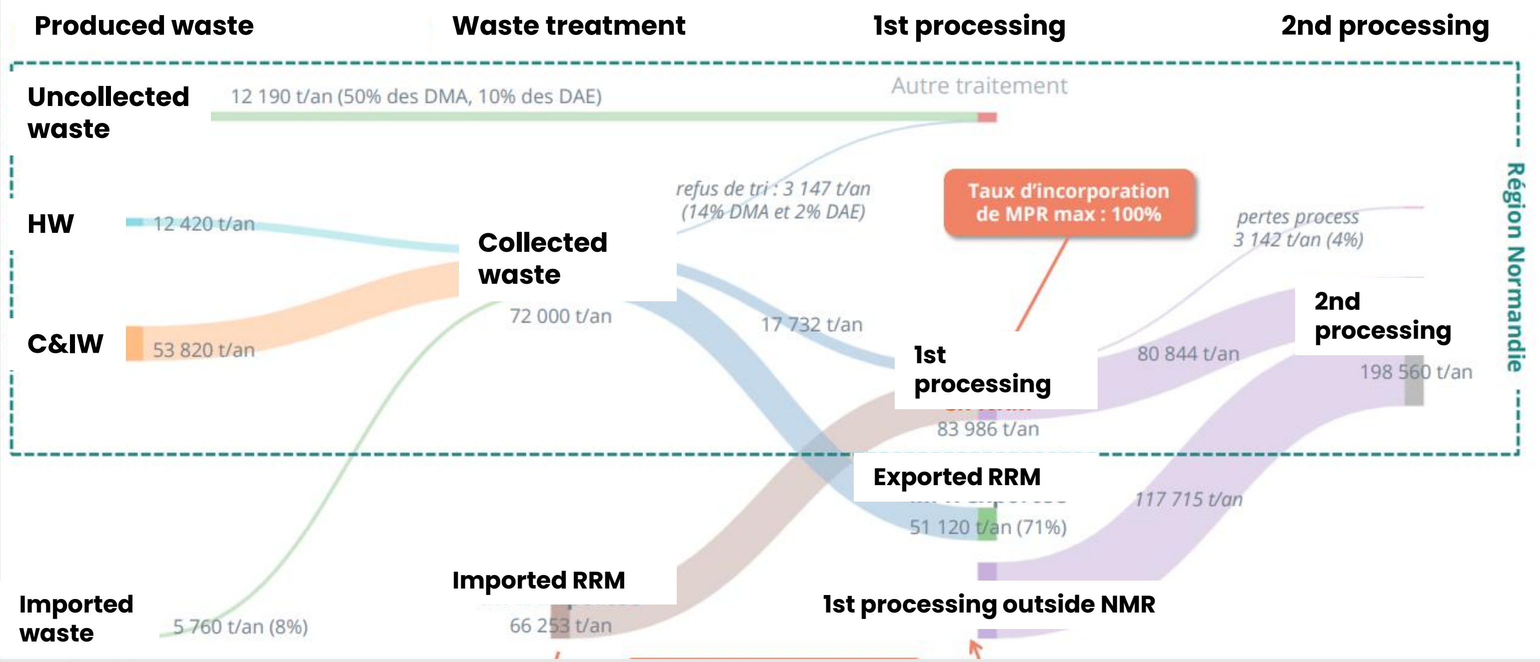
STEEL

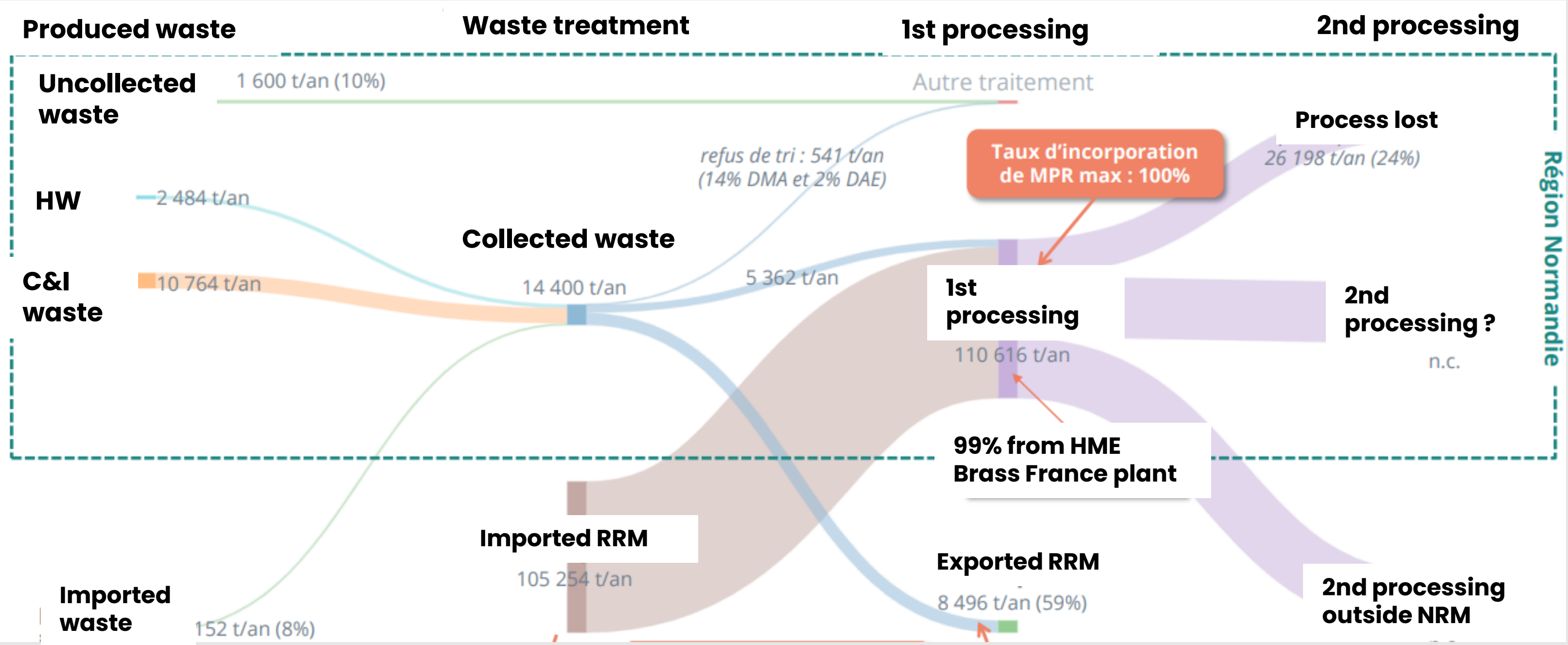
- Regional theoretical circular supply rate*: **447 %** (region is a net exporter of scrap).
- Industrial base:
- **1 primary steel plant**.
- **7 ferrous metal foundries**
- At the scale of Normandy, no changes in the sector are expected over the coming years (company openings, closures, etc.).
- French steel demand is declining, notably due to the shift toward aluminium thermal vehicles (to varying degrees depending on the scenario).
- Collection techniques are generally improving.

*Ratio between the quantities of waste produced in the region and the material needs of primary processors, reflecting Normandy's capacity to meet its industries' material requirements by reintegrating its waste into industrial processes.

ALUMINIUM

- Major industrial actors: 2 primary transformation plants (including recycling foundry). Several secondary processors.
- In Normandy, collected waste covers 86% of the raw material requirements of primary processors.
  – If all steel waste were collected, this figure would rise to nearly 100%.
- At the scale of Normandy, no changes in the sector are expected over the coming years (company openings, closures, etc.).
- Aluminium demand is increasing, driven by the shift from internal combustion vehicles to electric vehicles.
- However, there is a time lag between the peak demand for aluminium and the time required for aluminium products to reach end of life, enabling the production of recycled raw materials (secondary aluminium). Supply then stabilises afterwards.





Copper

- Two primary processing plants in Normandy: HME Brass France (representing 99% of production and producing brass, a copper–zinc alloy) and Fonderie Cornille Havard.
- One company recycling copper through melting: Valinéo (recovery of used electrical cables).
- Regional circular supply coverage: 13 %.Strong dependency linked to large industrial users (e.g., metallurgy plants). If all steel waste were collected, this figure would rise to nearly 14.5%.
- A sector organised at the European scale, for which circularity is difficult to consider at the national or regional level (BNS)
- Demand is increasing, driven by the development of the electrical grid.
- As with aluminium, this is a material for which demand will increase before copper waste becomes available. In the short term, copper supply will be strategic to enable the development of the infrastructure required for the electrification of processes as part of the energy transition. This need will be even greater as energy demand increases.

Circular metals in Normandy

Strengths

- Strong industrial base in metallurgy and manufacturing.
- Large volumes of available secondary metals (especially steel).
- Port infrastructure enabling logistics and industrial development
- Existing recycling and transformation capacities.
- Near self-sufficiency potential for aluminium.
- Industrial demand creating market opportunities.
- Strong construction sector generating metal waste streams.

Weaknesses

- Export of significant quantities of recyclable metals.
- Limited local processing for some material streams.
- Dependence on imported critical raw materials (e.g., copper).
- Fragmented value chains between waste and industry.
- Insufficient data transparency on material flows.
- Limited integration of circularity in procurement and design..

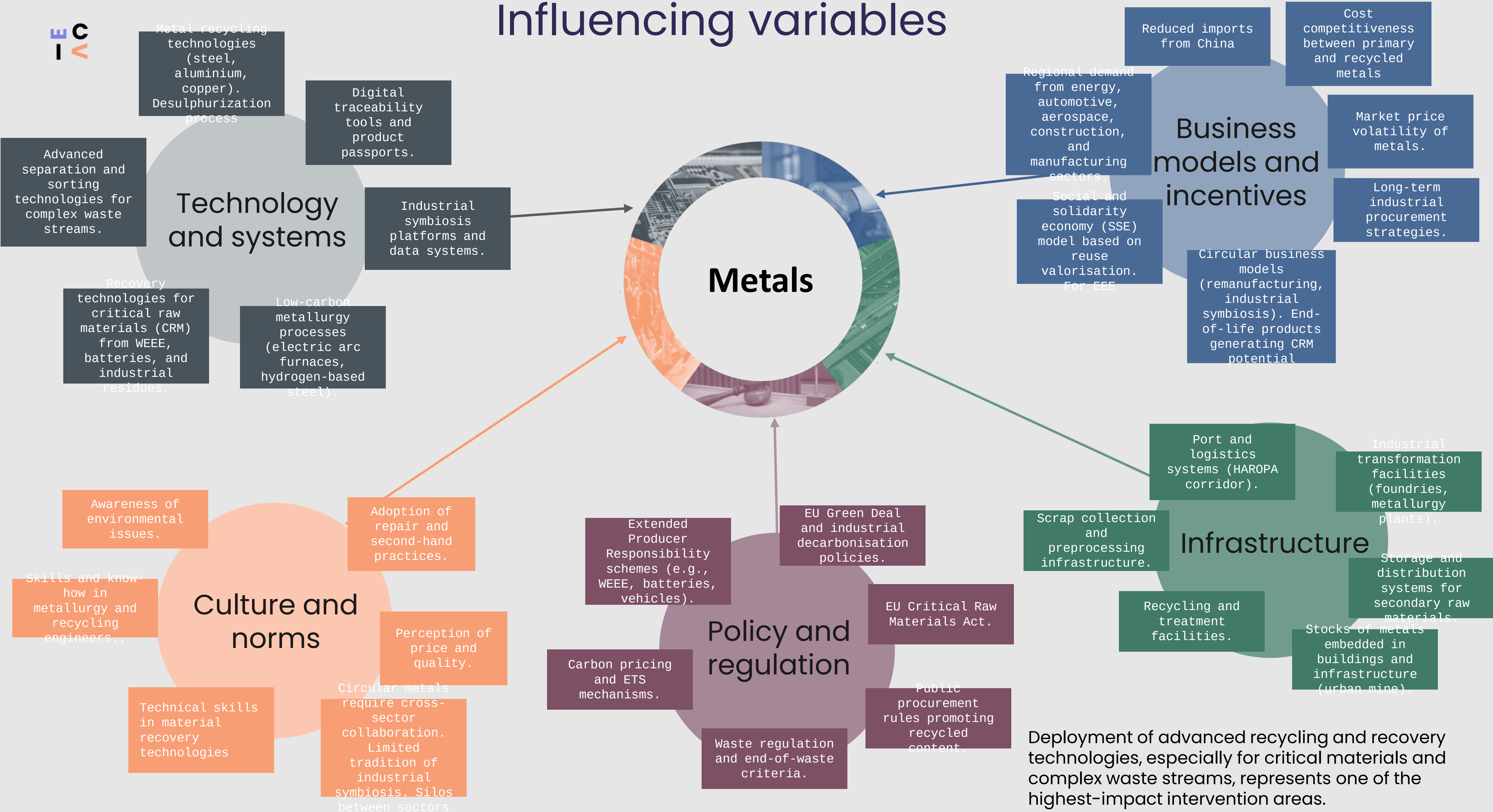
Opportunities

- EU Critical Raw Materials Act and Green Deal policies.
- Industrial decarbonisation driving demand for recycled metals.
- Industrial symbiosis clusters.
- Recovery of metals from WEEE, batteries, and complex waste streams.
- Circular steel production and low-carbon metallurgy.
- Strategic autonomy and supply security agendas.
- Industrial clusters linked to energy transition sectors (nuclear, offshore wind, mobility).

Threats

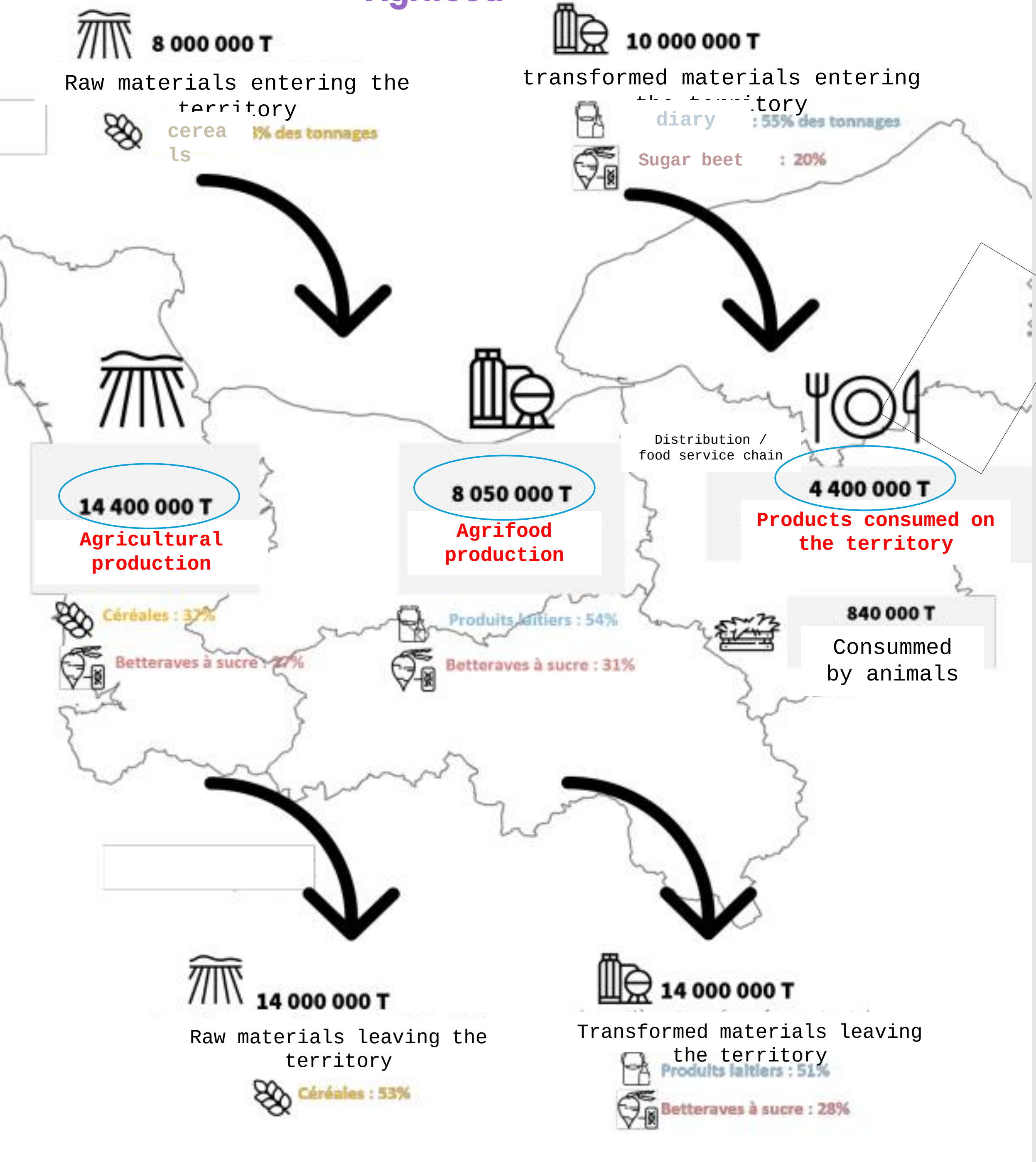
- Global competition for secondary raw materials.
- Price volatility of primary metals reducing recycling competitiveness.
- Regulatory complexity and permitting delays.
- Industrial relocation risks.
- Technological investment costs.
- Dependence on international supply chains for critical materials.

Influencing variables



Deployment of advanced recycling and recovery technologies, especially for critical materials and complex waste streams, represents one of the highest-impact intervention areas.

Agrifood



Normandy is one of France's leading agricultural and agro-industrial regions. Leading French region for the production of cow's milk cheeses, butter, cream, cider products, textile flax, and shellfish, A highly productive but export-oriented food system with limited regional food autonomy.
Agriculture dominated by cereals, sugar beet, and dairy (≈90 % of production).

Agrifood = **517 companies** and more than 26,000 salaried jobs (23% of the regional industry). An annual **turnover of €5.2 billion**, including €1.2 billion from exports.

Without any change in dietary patterns, the **food supply potential in Normandy is around 180%**, with large disparities between sectors and between geographic areas (densely populated urban areas vs. rural zones).
Still without any change in dietary patterns, **the agro-industrial potential is 103%**, again with significant disparities between sectors and within sectors depending on the products (a potential of 311% for oils but 45% for bread/pastry)

About 10 million tonnes of food waste annually in France. Losses occur throughout the supply chain (production, processing, distribution, consumption).

STRENGHT
Strong agricultural base. Large biomass availability .Agro-industrial ecosystem. Existing organic waste streams. Policy support and strategies. Innovation actors and research. Anaerobic digestion infrastructure. Logistics infrastructure. Development of short supply chains and direct sales platforms, Territorial food projects (PAT), Public procurement integration in collective catering, Local brands and producer networks, Platforms connecting consumers and producers. REGAL network aiming to reduce food waste by 50 % and facilitates cooperation between Producers, Food industries, Retailers, Associations, Public institutions

WEAKNESSES
Nutrient losses and inefficiencies & dependence on external input (Energy-intensive nitrogen, phosphorus & fertilisers dependency), Food waste across supply chains .Investment barriers. Knowledge gaps. Market power imbalances, most co-products are still used for low-value energy recovery or insufficiently integrated into circular value chains. Fragmented value chains. Contribution to GGE, soil degradation, water pollution.

OPPORTUNITIES
Growing demand for sustainable food. Circular bioeconomy development. Climate and biodiversity policies. Innovation in precision agriculture. Nutrient recovery technologies. Short supply chains and local food systems. Public procurement leverage. Digital tools and traceability.

THREATS
Climate change impacts, market volatility. Input price increases. Policy uncertainty. Industrial competition. Farmer income instability. Social acceptance challenges.

Influencing variables

Technology and systems

- Data tracking
- Circular protein production, Protein extraction
- Soil health and fertility, organic matter
- Valorisation : Biochemical extraction, Nutraceuticals, biomaterials, bio-refineries
- nutrient recovery, phosphorus recovery from wastewater
- Digestate treatment, Anaerobic digestion of manure and agro-industrial waste
- co-product transformation : Whey from dairy. Slaughter by-products. Sugar beet pulp. Cereal bran. Vegetable trimmings. Seafood residues, Animal feed, Biogas, Compost.Energy
- Water management, energy efficiency

Business models and incentives

- Agricultural production capacity, Livestock density, crop diversity & rotation
- Processing facilities often centralised and industrial
- Waste management : Organic waste collection, composting & digestion
- Export-dominated production model
- Supply chain organisation
- Market volatility
- Investment capacity
- Logistic platform

Culture and norms

- Consumer behaviour : local & organic product, vegetables protein
- Dietary habits
- Supply chain relationships
- Food waste awareness
- Farmer attitudes
- Cosmetic standards rejection

Policy and regulation

- Regional strategies
- Agricultural policies (CAP)
- Public procurement requirements.
- PAT initiatives
- Waste regulation
- Climate and biodiversity policies

Infrastructure

- Local transformation plants.
- Household bio-waste collection
- Storage and distribution networks.
- Processing capacity for valorisation
- logistics for surplus redistribution, reverse logistic, short supply chain, Food redistribution systems
- Agricultural crop.
- Industrial symbiosis
- storage : cold storage, aggregation for small producers, avoid Overstocking, expiry management.

THEORIES OF CHANGES

Theory of Change : textile

Challenges	Resource	Actions (potential through ECIV)	Result	Expected change / Impact / Effect	Missions and Sub-missions
• Rapid increase in the volume of textiles linked to fast fashion and overconsumption • Low value of collected textile • Economic fragility of collection, sorting, and reuse actors (SSE). • Dependence on export markets for reuse. • Low recyclability of textiles (blended fibers, dominance of polyester). • Lack of consumer awareness • Too much textile in HW • Territorial inequalities in access to collection and repair services. • Imbalance between collected volumes and valorisation capacities	**Existing resources** • Regulatory framework for textile : EPP (Refashion), Textile repair bonus scheme, Public financial support • Network of SSE actors (collection, sorting, reuse). • 2650 voluntary drop-off collection points • Flax production • Cité du textile (innovation, training) **Missing resources** • Textile recycling capacities in France. • Large-scale automated sorting technologies. • Industrial skills for textile circularity. • Coordination between upstream and downstream actors • Reliable data and traceability of flows. • Mandatory for Refashion	**Prevention and consumption** Raise awareness, promote local second-hand markets, durable and repairable products. **Collection & sorting** Optimize the territorial collection network. Improve the quality of sorting at source Modernize sorting centers Develop regional logistics. **Recycling and industry** Support innovation in textile recycling & ecodesign. Promote the incorporation of recycled materials. Wool & flax processing technologies **Governance** Structure a regional circular textile strategy. Create public–private–SSE partnerships. Study on sustainable business models for SSE actors	**What increase** Number of textiles repaired. Volume of textiles reused locally. Collection rate. Proportion of textiles recycled. Number of actors involved in circularity. Local skills and jobs. Investments in the sector. **What decrease** Quantities of textiles disposed of. Dependence on exports. Waste management costs. Volumes of fast fashion consumed.	**Environmental** Reduction of carbon emissions in the textile sector. Reduction of textile waste. Preservation of natural resources. Increased material circularity. **Economic** More resilient regional textile industry. New local jobs (repair, sorting, recycling). Strengthened SSE models. **Social** Change in consumer behaviour. Increased accessibility to sustainable clothing. Social inclusion through the SSE.	Reduce textile consumption and extend product lifespans. Promote reuse and repair at the regional level. Develop industrial textile recycling capacities. Support innovation and eco-design in textiles.

Theory of Change : packaging

Challenges

- High dependence on virgin fossil plastics in packaging
- Limited recycled and biobased content incorporation
- Significant plastic consumption
- Growing packaging waste volumes
- Environmental pollution affecting rivers, coastline, soils, and air. Climate impact of plastics production
- Industrial vulnerability linked to fossil resource dependency
- Economic competitiveness of virgin plastics vs recycled materials.
- Limited reuse infrastructure and reverse logistics.
- Insufficient coordination across value chains.
- Technical complexity of multi-material packaging.
- Behavioural barriers to reuse adoption.
- Regulatory complexity and evolving frameworks.
- Sanitary complexity with food contact packaging

Resource

- Entire plastics lifecycle infrastructures.
- Major packaging user sectors
- Existing funding instruments (ADEME, Region, EU).
- knowledge and innovation: Technical centres (IPC, Polyvia).Research institutions .Circular economy clusters.

Missing resources

- Territorial washing and reuse infrastructure at scale.
- Reverse logistics optimisation.
- Reliable traceability systems for materials.
- Standardised reusable packaging formats.
- Strong market demand for recycled materials.

Actions (potential through ECIV)

Reduce virgin material demand
Eco-design and material reduction.
Recycled content integration.
Alternative materials development,
Develop bio-based material alternatives where relevant.

Scale reuse and refill systems
Deposit-return infrastructure.
Washing and logistics hubs.
Standardised reusable packaging formats.
Retail and industrial pilots.
Develop business models for reuse and refill.
Build regional reuse logistics networks

Improve recycling performance
Advanced sorting technologies.
Chemical recycling for complex plastics.
Industrial symbiosis for material loops.
Quality improvement of recycled polymers.

Engaged public authorities (procurement)
Awareness

Result

- Reduce single-use packaging and virgin plastic demand.
- Pilot reuse systems deployed.
- New recycling technologies installed.
- Industrial collaborations created.
- Circular packaging products developed.
- Training programmes launched.
- Increased reuse rates.
- Increased recycled content in packaging.
- Reduced virgin plastic consumption.
- Improved material recovery efficiency.
- Stronger circular supply chains

Expected change / Impact /Effect

- Reduced fossil resource extraction.
- Lower greenhouse gas emissions.
- Reduced packaging waste.
- Behavioural change toward reuse.
- Increased public awareness.
- Industrial competitiveness
- Innovation leadership.
- Reduced exposure to fossil price volatility

Well-structured eco-construction sectors to renovate differently and better in Normandy

2030 Objectives	Levers	Actions
Support regional sector initiatives that generate exemplary projects. Build networks through "SB" in Normandy, a driver for accelerating eco-construction and high-performance building renovation initiatives. Manage low-carbon resources to ensure their availability. Let's shift towards new methodological, technical, and economic renovation models to achieve material efficiency and quality of use.	• Contribute to the emergence and development of structuring actions, facilitation, and promotion of sectors and cross-sector initiatives. • Make NBRC a project catalyst, combining performance and exemplary approaches. • Diversify funding for regional initiatives. • Develop and strengthen the SB network to scale up new "Zero Carbon" building standards. • Support the establishment, improvement, or transformation of structuring industrial tools, sector by sector. • Monitor low-carbon material production for the building sector to reassure renovation stakeholders regarding resource availability. • Expand the applications of materials to overcome insurance-related barriers • Capitalise on methodologies and construction techniques to achieve multi-performance projects and ensure their economic accessibility (whole-life cost). • Reuse: rethink practices to restore meaning and ambition to projects.	• Support the regional anchoring of innovative, low-carbon and inclusive initiatives aimed at reducing the environmental impact of the construction and renovation sector and assist in implementing their action plans. • Support the emergence of projects and their monitoring, Identify local projects eligible for support under ECIV ("European Circular Economy Valley") to boost the industrialisation of building reuse and support project leaders in the ECIV process. • Promote and support the facilitation of the NBRC &SB and contribute to the development of its roadmap • Monitor opportunities to respond to European calls for proposals (LIFE, ELENA, INTERREG — partner search, etc.). • Launch sector-focused calls for expressions of interest to reach the maturity needed to scale low-carbon materials and complement existing schemes (e.g. wood), including resource processing into products and construction systems (primary processing, secondary processing, prefabrication, etc.). • Support agricultural investments to develop bio-based material production for each regional sector with high development potential: wood, earth, straw, flax, hemp, miscanthus, wood fibre/cellulose insulation. • Integrate regional governance of the Biomass Observatory (led by the Normandy Chamber of Agriculture) to promote bio-resources for the building sector. • Identify regional resource deposits (type, quantity, quality) to secure eco-material supply and anticipate competing uses. • Explore the creation of a matching tool between supply and demand for low-carbon materials. • Promote research and eco-design in buildings to achieve material efficiency and performance (including reversibility and adaptability of uses). • Support R&D to meet renovation and construction market needs and anticipate future regulations. • Identify technical barriers to bio-based material use (health and safety coordination, fire risk assessments, control bodies) and develop recommendations to prevent underperformance or construction defects. • Demonstrate the feasibility of frugality and material efficiency in renovation through carbon life-cycle assessments (LCA) to objectify the carbon performance of material choices and energy performance. • Understand building economic models and make them replicable in Normandy. Produce feedback sheets to clarify building reuse processes. • Support experimentation, prototyping, and certification work. • Work on the architectural value of materials (concrete, Normandy-specific materials). • Disseminate and communicate guides, tools, and training resources.

Committed and exemplary stakeholders supporting the scaling up of low-carbon materials in construction

2030 Objectives	Levers	Exemple of actions
Strengthen our public policies, making them more incentive-based to decarbonise the building sector. Strengthen a network of trained and committed professionals to eco-design projects with "positive externalities Mobilise proactive project owners integrating low-carbon materials into buildings that are durable and adapted to climate and energy constraints Assisted Self-Rehabilitation (ASR) as a driver of eco-construction. Communicate, capitalise and promote to accelerate the use of low-carbon materials.	• Define a support strategy for processing, production, and distribution tools for agricultural or mineral resources for the building sector. • Adapt public policies to better target support towards building renovation with lower environmental impacts. • Train the professional ecosystem in low-carbon construction systems and materials (initial and continuing training). • Mobilise and engage professionals to invest in low-carbon resources (project management assistance, designers, engineering firms, manufacturers, companies, and craftspeople). • Train and support project owners to systematically develop Normandy projects aiming for Bio-based Building labels (including renovation), through increased use of eco-materials. • Sustain and strengthen the dynamics around the Normandy Bio-based Building Pact and establish a complementary approach focused on reuse. • Integrate eco-construction challenges into urban planning and territorial planning documents • Make the Normandy Region an exemplary contracting authority • Engage Normandy local authorities in favour of ASR • Raise awareness within the building sector about the benefits of ASR • Foster dialogue, awareness, and networking across sectors to secure eco-construction practices (producers, manufacturers, industries, researchers, specifiers, and professionals). • Promote the sectors and materials and highlight the committed and decarbonised approaches of Normandy stakeholders. • Showcase Normandy excellence in France and beyond.	• Initiate support schemes for innovative production and processing activities. • Mobilise economic development support actors (business development, audits, etc.) • Identify and mobilise tools to measure low-carbon (or carbon-storing) building projects to justify their support and promote them, highlighting additional benefits of bio-based materials (summer comfort, thermal lag). • Make the use of bio-based materials more incentive-based in renovation and construction support schemes (e.g. bonus/malus systems). • Identify and adapt initial training programmes on low-carbon materials (vocational training centres, higher technical certificates, universities, engineering schools, etc.) • Inform and train all building professionals in low-carbon materials and promote their actions (European Erasmus-EDU COVE-RECEBA project, 2CBBC, etc.) • Renovating secondary schools in Normandy using eco-friendly and reused materials • Initiate collaboration with EPCIs to clarify their role in promoting the ASR (liaison, support, feasibility studies, funding for ASR activities in their territory).

Theory of Change : metals

Challenges

- High dependence on imported primary metals and critical raw materials.
- Industrial decarbonisation requirements.
- Increasing resource scarcity and geopolitical risks.
- Incomplete circular loops between waste and manufacturing.
- Export of secondary metals despite local demand.
- Limited recovery of critical raw materials from complex waste streams.
- Rising demand from energy transition sectors (renewables, mobility, electrification).
- Limited local recycling and processing capacity for certain materials.
- Economic competitiveness of recycled versus primary metals.
- Industrial risk perception regarding recycled materials quality.
- Lack of traceability and data on material flows.
- Skills shortages in advanced recycling technologies

Resource

- Strong industrial base (energy, automotive, aerospace, metallurgy).
- Significant volumes of secondary metals available.
- Existing recycling ecosystem and metal processing actors.
- EU policy framework (Green Deal, Critical Raw Materials Act).
- Regional circular economy strategy and public support programmes.
- Industrial decarbonisation commitments.
- Research and innovation capacities.

Missing resources

- Advanced recycling facilities for complex materials.
- Critical raw material recovery infrastructure.
- Integrated circular industrial hubs.
- Reliable material traceability systems. Long-term procurement commitments for recycled metals.

Actions (potential through ECIV)

- Support the main steel waste producers in Normandy in their waste reduction and circular economy strategies
- Improve scrap collection, sorting and quality control techniques
- Support the development of electric steel plants, the decarbonisation of the scrap sectors
- Support the relocation of aluminium sector.
- Ensure the development of the aluminium recycling sector in Normandy by addressing scale requirements
- Increase the incorporation of recycled raw materials into industrial processes
- Develop recycling through melting processes by ensuring optimal collection quality
- Support copper recycling stakeholders in Normandy and neighbouring regions to secure supply
- Develop CRM recovery from WEEE, batteries, and industrial residues.
- Promote recycled content targets in procurement
- Facilitate industrial symbiosis partnerships
- Support circular business models (remanufacturing, reuse, repair)
- Improve data sharing and material flow monitoring

Result

What increases

Quantity of secondary metals processed locally.
Industrial incorporation rates of recycled materials.
Recovery rates of critical raw materials.
Number of industrial partnerships.
Investment in circular metallurgy infrastructure.
Skills and workforce capacity.
Industrial symbiosis projects.

What decreases

Export of secondary metals outside the region.
Dependence on imported primary metals.
Carbon intensity of industrial production.
Material losses in recycling processes.
Supply chain vulnerability.

Expected change / Impact /Effect

- Reduce quantity of steel waste.
- Ensure consistency and quality and reduce exports.
- Reduced CO_2 emissions from metal production.
- Reduced extraction of virgin resources
- Lower environmental footprint of industrial supply chains.
- Improved resource efficiency.
- Improved industrial competitiveness & resilience.
- Reduced exposure to raw material price volatility.

Missions and Sub-missions

- Increase local use of recycled steel and base metals.
- Develop recovery of critical raw materials from waste streams.
- Support low-carbon metallurgy technologies.
- Strengthen industrial symbiosis and collaboration.
- Improve material traceability and data systems.
- Develop skills and workforce capacity.
- Reduce dependence on imported primary materials.

Theory of Change : Agrifood

Challenges

- Reduce food waste and losses.
- Improve soil health and biodiversity.
- Reduce input dependency.
- Close nutrient cycles.
- Strengthen food resilience.
- Increase value creation
- Fragmented supply chains
- Economic pressures on farmers
- Behavioural barriers
- Infrastructure gaps
- Export dependency

Resource

Existing resources

- Agricultural land and biomass.
- Agro-industrial ecosystem.
- Organic waste streams.
- Anaerobic digestion infrastructure.
- Research and innovation actors.
- Circular economy networks (NECI).
- REGAL network.
- Logistics and ports.
- Policy frameworks.

Missing resources

- Integrated nutrient management systems.
- Circular business models.
- Coordination platforms.
- Investment financing.
- Data and traceability.
- Skills and training.
- Processing infrastructure for co-products.

Actions

Agricultural actions

- Support regenerative practices.
- Improve soil management.
- Optimise nutrient use.
- Diversify production systems (adapt to climate change).
- Promoting low-input sectors and ensuring economic opportunities

Industrial and circular actions

- Development of a network of small and medium-sized processing and distribution units that are innovative, versatile and share services.
- Develop new agri-food industries linked to the crops to be developed (vegetables, etc.).
- Develop bio-refineries.
- Valorise co-products.
- Industrial symbiosis
- Circular processing technologies.

Waste and nutrient actions

- Expand bio-waste collection.
- Composting and digestion systems.
- Innovation for Nutrient recovery.
- Food waste prevention programmes.

Market actions, Governance actions

- Strengthen local food value chains.
- Fair value distribution.
- Circular business models.
- Procurement commitments.
- Regional coordination platforms.
- Reduce the number of intermediaries between links in the chain for better value distribution and traceability (on-farm processing, tripartite contracts, etc.).
- Models for cooperation and pooling: Fostering and supporting new governance for the sector through the creation of collectives. Encouraging meetings between local authorities and economic operators (industry, logistics) to create synergies.

Consumer awareness

Food waste reduction. Sustainable diets promotion.

Result

What increases

Nutrient recycling.
Soil health indicators.
Circular business models.
Local value creation.
Partnerships.
Innovation projects.
Food redistribution.
Farmer income stability.

What decreases

Food waste.
Input dependency.
Nutrient losses.
Environmental impacts.
Supply chain inefficiencies.

Expected change / Impact /Effect

Expected impacts

Environmental

Improved soil fertility.
Reduced emissions.
Increased biodiversity.
Reduced pollution.

Economic

Regional value creation.
Farmer income resilience.
New jobs.
Industrial innovation.

Strategic

Food system resilience.
Resource sovereignty.
Alignment with EU strategies.
Territorial autonomy.

Societal

Healthier

Timeline and responsibilities

1. Timeline

2025 /2026 => Launch of first actions in collaboration with cluster, state & ademe

Mobilization of stakeholders in WP3 activities / support stakeholders in developing strategic regional and interregional projects
Stakeholders mapping
Experimentation journey project : experiment public procurment to create demand
Receba project to develop circular economy skills

2027 => project portfolio & first evaluation and adjustment of actions/indicators
2029 => Last evaluation, adapt monitoring and new indicators
Then new open call and European project

2. Responsibilities :

- **Coordination Unit**

Economic policy & environmental departments : provides overall strategic and operational steering, ensuring coherence between sectoral, transversal and European dimensions.

Partner : ADEME & state

- **Cluster / Neci network**

They play a key role in co-leading sectoral work agendas, ensuring that the circular strategy remains anchored in real economic needs and industry dynamics. They act as intermediaries between public authorities and businesses by identifying field-based challenges and opportunities.
→ To be developed thanks to ECIV

Monitoring Learning and adaptation :
transformation catalyst tracks system change (2029 & long term)

Directionnality & shared vision	Governance, networks, collaboration	Experimentation & innovation potfolio	Learning & capacity building	European culture	Tools, methodology	Institutional change
Adaptation of regional and local policies through ECIV, integration of ECIV priorities	Number of companies & laboratories engaged in ECIV projects	Number of Eciv projects : submitted and completed	Development of new skills in public & private sectors	Number of new european projects led by stakeholders or by the region	New tools developed through ECIV :mapping, plateform...	Number of circular public procurment, Public tender with circular criteria
Links created between S3, SRDEEII and circular economy policies	Number of non-traditional actors engaged in ECIV projects (civil society, SSE, local authorities...)	Number of new solutions, innovations, products...	Number of jobs createdt hanks to ECIV projects	Number of public servant trained and engaged in european projects	New methodologies used ECIV : TOC, mission approach...	Regional budget dedicated to Circular economy priorities
Stakeholder commitment : eciv workshop attending	Number of cooperation between clusters (at regional and european scale)	Private Investments	Number of public servant trained (capacity building, placa based policies...)	Integration of european culture in cluster support's programs	New indicators to follow after ECIV	Number of public autorities engaged (strategies, procurment...)
Transition team, break the silos		Cross sectoral innovations & cooperation	Turnover, Value added generated by circular sectors	Number of regional departmets engaged in european projects		Schemes & calls for projects with circular assessment criteria

Monitoring Learning and adaptation :
Circularity (long term)

	Textile	Packaging	Construction	Metals	Agrifood
Resource use, circular material flows, environmental impact	• Tonnes of natural or recycled fibres reintroduced into textile production • Share of textile waste reused • Tonnes of textile waste collected and sorted in the region • Share of products designed for durability or recyclability • Number of brands integrating recycled or bio-based fibres • Reduction in virgin synthetic fibre use • Reduction of textile waste sent to disposal	• % reduction in virgin fossil plastic in packaging • Tonnes of packaging avoided through reuse systems • Packaging recycling rate • % of recycled and biobased content in packaging products • % of packaging that is reusable or fully recyclable	• % of bio-based materials used in construction projects • Tonnes of reused construction materials • % of buildings designed for material reuse • Tonnes of CO_2 stored in bio-based materials	• % of steel demand covered by recycled steel in the region • Tonnes of metal scrap processed locally • Reduction in virgin metal consumption • CO_2 reduction in metal supply chain	• Reduction of food waste • Reduction of synthetic fertilizers • Organic waste valorisation • % of organic waste returned to soils (compost/digestate) • % of nutrients valorised into agriculture • Share of regenerative agriculture practices • Regional food self-sufficiency index
Local structures established, industrial ecosystem, market	• Number of pilot facilities for fibre recycling or processing • Investment mobilised in circular textile infrastructure	• Reverse logistic capacity • Local reuse hub established • Number of reuse systems deployed (deposit, refill, return) • Share of recyclable or reusable packaging in regional markets	• Number of buildings using bio-based materials • Number of construction companies adopting circular practices • Number of reuse platforms for building materials • Volume of construction waste reused rather than recycled	• Number of companies integrating circular metals into production • Number of pilot projects for critical raw material recovery • Number of industrial symbiosis projects using metal scrap • Regional capacity for critical raw materials recovery	• Regional valorisation capacities (infrastructure creation) • Industrial symbiosis • Number of short supply chain initiatives
Networking & capacity building	Number of companies involved in local textile value chains	Number of collaborative projects Knowledge & capacity adquires	Number of experimentation Number of collaborative projects Knowledge & capacity adquires	Number of collaborative projects Knowledge & capacity adquires	Number of collaborative projects Knowledge & capacity adquires

4.5 – RAP Wallonia

European
Circular
Innovation
Valley

WP2
ECIV Regional Action Plan
Wallonia

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1. Submission commitment

Wallonia is prioritizing the themes of **biobased construction**, **metals**, and **agrifood.**

Reasons :

- These sectors already demonstrate a **high degree of circular innovation**, providing a solid basis to further strengthen their **competitiveness**.
- These ecosystems show strong potential to **scale pilot projects to an industrial level**.
- The selection reflects a **political decision** to prioritize areas where impact and value creation can be maximized.
- This strategic orientation ensures **alignment with European priorities and trends**, particularly regarding circularity, sustainability, and low-carbon transitions.

1. State of play of the value chain

For each priority sector (sub-mission), an identification/mapping of:

- the state of play of the value chain in terms of circularity and innovation
    - ongoing innovation projects on circularity — publicly funded and private :
        - Identification of the main strategic technologies, business models developed ;
        - Identification of the type of funding ;
        - Evaluation of the typology of actors involved ;
        - Evaluation of the main circularity principles adopted (eco-design, new business models, reuse…)
    - involvement in EU initiatives
    - existing tools — support schemes, eco-design tools;
    - applicable regulations;
    - key actors of the value chain ;
    - Main resources, competencies ;
    - Main obstacles and sector challenges ;
    - …

This research was conducted by the circular economy team at the public administration through :

- Literature research, articles and publications ;
- Consultation of main stakeholders (bilateral meetings) ;
- Consultation of regional tool that register and classifies circular innovation projects.

2. Identification of challenges and resources

Based on the state of play and consultation, identification, per value chain, of :

- main regional challenges,
- main public levers to mobilize (financing, skills, public procurement, end-of-waste regulation…),
- Public and private resources (competencies, technologies, actors…).

3. Identification of actions to face the challenges

Based on all the data gathered, identification of specific action plan per value chain.
The actions have been challenged and validated by regional stakeholders (federations, clusters) and the Ministry of Economy.

2. Regional system context and starting point

2. Regional system context and starting point

	Construction	Metals	agrifood
Economic context	• Major regional sector (15.5 B€ turnover, 7 B€ added value). • Highly fragmented (99% SMEs) and facing skilled-labour shortages. • Rising material costs, more bankruptcies, volatile exports.	• Strategic sector supporting high-value industries (defence, aerospace, green tech, e-mobility, renewables). • ~12,000 direct jobs (4.2% of industrial employment), mainly in Liège & Hainaut. • Dense industrial base: 1,332 metal-working companies. • Significant export contributor (metals included in ~34% of chemical/pharma & industrial goods exports).	• Major industrial pillar with €10.5B turnover (2022), including €6B in exports. • 25,298 direct jobs + significant indirect employment (agriculture, logistics, services). • Dense network of ~1,650 employers, 95% with <100 employees, reflecting strong SME-driven innovation.
Resource dependency	• Strong reliance on mineral inputs (aggregates, sands, stones). • Sand reserves under pressure; river sand nearly exhausted. • Exposure to global price volatility (wood, metals, insulation, electronics).	• Strong dependence on imported metals & critical raw materials (lithium, cobalt, rare earths, etc.). • Geopolitical tensions and market volatility create supply risks. • EU's CRMA targets: by 2030 → 10% extraction, 40% processing, 25% recycling within the EU; no >65% dependence on a single third country.	• Highly dependent on biomass and water availability. • Pressure from climate impacts and need to secure sustainable inputs.
Circularity performance	• 7 M tons of inert waste/year; 360 recycling centres producing 6 M tons of recycled aggregates. • Several streams still weak: glass, gypsum, plastics, composites.	• 35% of non-ferrous metals used in Wallonia already come from recycling. • Strong capacity in non-ferrous metallurgy, hydrometallurgy & advanced separation technologies. • Secondary raw materials from e-waste, batteries, end-of-life vehicles and industrial residues remain under-exploited.	• Circularity seen as a direct driver of competitiveness. • Key levers: reducing waste, ecodesign, systematic valorisation of co-products, closing loops (materials, nutrients, heat). • Strong potential for synergy with other sectors (energy, chemistry, construction).
Regional strengths	• 42% of biosourced insulation produced locally (potential > 85%). • Strong regional wood production (1 M m³), but low local transformation capacity.	• Internationally recognised metallurgical know-how. • Strong recycling infrastructure and expertise (copper, zinc, cobalt). • Leading R&D ecosystem (Reverse Metallurgy, Win4C collaborations).	• Dense and territorially anchored network of SMEs, cooperatives and large processors. • Resilient sector showing growth in turnover, investment and employment despite difficult conditions. • High export capacity and international positioning. • Strong innovation potential across the food value chain.

2. Regional system context and starting point

	Construction	Metals	Agrifood
Innovation trends	• Growth in modular & reversible construction, prefabrication, selective deconstruction, reuse, and circular BIM. • Buildings seen increasingly as material stocks (urban mining).	• Development of advanced processes: hydrometallurgy, AI-based automated sorting, selective recycling, pyrolysis. • Digitalisation as a key enabler (traceability, data platforms, flow optimisation). • Synergies with chemistry & energy sectors (waste heat recovery, CO_2 valorisation, electrification, hydrogen use).	• Growth of bio-based ingredients, bioprocessing and local valorisation of organic residues. • Increasing demand for traceability, low carbon footprint and sustainable products.
Regulatory pressures	• EU Green Deal & CPR push for circularity, traceability & climate neutrality. • Barriers: norms geared toward new materials, costly certifications, complex procedures (permits, tenders).	• Complex, multi-layered regulatory environment (EU/federal/regional). • Permitting, compliance and administrative steps slow down circular projects. • Need for clearer, more coherent rules to support CRMA implementation and industrial investment.	• Complex, multi-layered regulatory environment (EU/federal/regional).
Market barriers	• Lack of economic incentives for biosourced or reused materials. • SMEs struggle with certification and administrative costs.	• Heavy dependence on imports creating exposure to price volatility and supply disruptions. • High investment costs for advanced recycling technologies; industrial scaling remains difficult. • Limited visibility on long-term markets reduces private investment incentives. • Secondary material flows not sufficiently captured or massified. • Skills shortages increasing operational constraints and limiting innovation deployment.	• Need for major shifts in resource efficiency (water, energy, materials). • Fragmentation of actors across the food chain increases complexity. • Rising expectations from markets require investments that small firms may struggle to support. • Lengthy procedures for bringing innovative products to market undermine companies' financial viability and make investors hesitant.

3. Theory of change : BIOBASED CONSTRUCTION

Main challenges

1. Strong dependence on raw materials and resource scarcity
- The sector relies heavily on mineral inputs (aggregates, sand, gravel), most of which are extracted locally.
- Belgian sand reserves could be exhausted within 80 years, while river sand may run out in 3–4 years.
- Increasing use of marine sand has environmental consequences (erosion, biodiversity loss).
- Prices for essential materials (wood, metals, electronics) remain highly volatile, highlighting the sector's exposure to global supply tensions.

2. Highly fragmented business landscape and skilled labor shortage
- 87% of firms have fewer than 10 workers; 99% are SMEs, limiting investment capacity in innovation and circular practices.
- Persistent shortage of qualified labor affects the sector's ability to adopt new methods (selective deconstruction, prefabrication, BIM circular, etc.).

3. Rising costs and economic pressure
- Increased material prices, growing numbers of bankruptcies, and reduced gross value added signal financial stress.
- Export performance fluctuates due to post-Covid recovery followed by energy and price shocks.

4. Waste Generation and Underdeveloped Recycling Streams
- Construction generates 7 million tons of inert waste annually.
- While aggregate recycling is mature (6 million tons/year), several key streams (glass, gypsum, plastics, composites) remain insufficiently structured.

5. Regulatory and Normative Barriers
- Current norms are designed for new materials, making reuse difficult due to strict performance and traceability requirements.
- Certification and approval procedures are costly and time-consuming for SMEs.
- Complex administrative steps (tenders, building permits) slow circular projects.
- Unclear legal status (waste vs. by-product vs. resource) complicates circular material flows.

6. Lack of Market Incentives

Biosourced and reused materials remain less competitive due to:
- limited industrial capacity,
- higher production costs,
- absence of financial or fiscal incentives.

Regional strengths and resources available to address challenges

1. Significant Local Production Capacity
- Wallonia already produces **42% of its insulation needs** through biosourced materials (cellulose, hemp-lime, grass, wool, recycled wood fibre).
- With scaling, regional producers could meet **over 85%** of insulation demand.
- The region produces **over 1 million m³ of construction wood**, though 61% is exported — offering high potential for **local value-chain development**.

2. Strong Recycling Infrastructure
- Nearly **360 recycling centers** operate in Wallonia, enabling high-volume aggregate recycling.
- Potential to build targeted recycling chains for glass, gypsum, plastics, and composites.
- Future development of **industrial recyparks** will help structure these specialized streams.

3. Emerging Circular Innovation Ecosystem

Companies and industry actors increasingly adopt:
- modular and reversible building systems,
- selective deconstruction,
- prefabrication,
- circular BIM and material passports,
- ecodesign approaches.

4. Opportunities for Relocalization and Reindustrialization
- Developing local production of secondary materials (e.g., **secondary sand**) can reduce import dependence and improve supply security.
- Strengthening upstream activities (wood processing, recycled materials, biosourced solutions) boosts regional resilience.

5. Support from European Regulatory Frameworks
- The European Green Deal, circularity targets, and climate neutrality goals by 2050 create:
  - funding opportunities,
  - innovation drivers,
  - structured monitoring (LCA, EPD, DoPC, CPR rules, material passports).

3. Theory of change : METALS

Main challenges	Regional strengths and resources available to address challenges
1. Supply vulnerability and import dependence • Strong dependence on imported metals and critical raw materials. • Exposure to geopolitical tensions, price volatility and supply disruptions. • Risk of competitive distortions due to unstable global markets.	**1. Strong industrial base and recognised metallurgical expertise** • Well-established competencies in metallurgy and strong industrial fabric. • ~12,000 direct jobs and 1,332 metal-industry companies. • Concentration of key actors in Liège and Hainaut.
2. Insufficient capture and valorisation of secondary resources • Secondary deposits (e-waste, batteries, ELVs, industrial residues) remain under-exploited. • Lack of adapted infrastructures and efficient logistics to capture these flows locally. • Need for regional hubs to massify and treat secondary materials instead of exporting them.	**2. High-level non-ferrous metallurgy and recycling capacity** • Major producers of copper, zinc, cobalt. • 35% of non-ferrous metals used in Wallonia come from recycling. • Strong infrastructures for treatment and recycling.
3. Technological and industrial scaling barriers • Processing increasingly complex resource streams requires advanced technologies (hydrometallurgy, AI-based sorting, pyrolysis). • High costs, technical complexity and uncertain market visibility hinder industrial deployment.	**3. Advanced expertise in hydrometallurgy and separation technologies** • Ability to recover strategic metals from complex streams (e-waste, batteries, high-value alloys). • Consolidated through collaborative innovation initiatives (Reverse Metallurgy, Win4C).
4. Fragmented value chain. • Missing key steps (refining, reconditioning, repair of components). • Fragmentation reduces integration, retention of value and circularity.	**4. Technological and innovation ecosystem** • Research centres, universities and industrial actors involved in pilot and demonstration projects. • Potential to form a circular innovation ecosystem.
5. Skills shortages and loss of know-how • Decline in technical expertise. • Shortage of qualified labour slows the circular transition.	**5. Digitalisation as a transversal enabler** • Tools for improving traceability, flow optimisation and transparency. • Digital platforms and shared data infrastructures planned to support implementation of the CRMA.
6. Regulatory complexity and lack of clarity • Multiplicity of procedures and overlapping regulatory levels (EU / federal / regional). • Administrative burdens slow down circular projects (permitting, follow-up). • Lack of clarity on rules and responsibilities for recycling and valorisation activities.	**6. Environmental advantage through circularity for decarbonisation** • Recycled metals emit 5 to 10 times less CO_2 than primary production. • Synergies with chemistry and energy sectors: waste-heat recovery, CO_2 valorisation, shared hydrogen use, electrification of processes.
7. Need for industrial and climate transition alignment • Circularity must address not only resource issues but also climate and decarbonisation. • Heavy industry (e.g., steel) requires major transformation.	**7. Alignment with European frameworks (CRMA)** • EU targets for extraction, processing and recycling create opportunities. • Wallonia can position itself in European strategic value chains.

3. Theory of change : AGRIFOOD

Main challenges	Regional strengths and resources available to address challenges
1. High complexity of the food system involving many actors along the chain. 2. Need to reduce waste across production and processing. 3. Need to improve eco-design of food products. 4. Need to valorise co-products systematically. 5. Need to optimise water and energy consumption. 6. Need to close loops (materials, nutrients, heat) to improve efficiency. 7. Increasing market expectations on traceability, sustainability and low carbon footprint. 8. Strong dependence on biomass availability. 9. Sector exposed to economic difficulties despite recent growth.	• A major industrial and export sector in Wallonia. • €10.5 billion turnover (including €6 billion exports). • 25,298 direct jobs + numerous indirect jobs. • Dense network of 1,650 employers (95% < 100 workers), showing strong local anchoring and innovation potential. • Existing growth in turnover, investment and employment despite difficulties. • Strong territorial roots with SMEs, cooperatives and large processors. • Sector well positioned for circularity as a direct driver of performance, food sovereignty and innovation. • Synergies with chemistry, construction and energy sectors.

4. Regional ECIV actions and initiatives : **BIOBASED CONSTRUCTION**

Strategic priorities	Priority description	Public resources
1. Stimulating the Industrialisation of Circular Construction Systems	The shift toward industrialised, modular and digitally enabled construction methods drives efficiency, quality and circularity, but requires strong technological support to help SMEs adopt prefabrication, standardised components and circular BIM so they can integrate reuse-oriented and low-waste practices into their business models.	Economic and research department, regional financial actors
2. Supporting a circular approach to material and resource management : valorisation and optimization of material flows	This strategic priority seeks to embed circularity across construction material flows by promoting secondary raw materials, innovative recycling and reuse-oriented industrial activities, while strengthening competitiveness, reducing carbon emissions and enabling circular design, high-value recycling, smart resource management and collaborative logistics supported by reuse hubs.	Environmental department (waste management), regional financial actors, international relations public actor (WBI).
3. Strengthening skills, training and the attractiveness of the sector	The circular transition in construction requires a sector-wide skills upgrade, with coordinated efforts from schools, training centres and companies to address labour shortages and equip future professionals with the abilities needed for modular design, selective deconstruction, material reconditioning and the use of secondary resources, while enhancing the sector's attractiveness through a stronger focus on sustainability and innovation.	Regional actors for skills and competencies
4. Stimulating innovation and accelerating the digital transition	Innovation drives circularity in construction by enabling digital monitoring of material flows, supporting new technical and bio-based solutions, and introducing tools like the Digital Product Passport, all aimed at strengthening competitiveness, decarbonisation and transparent, data-driven value chains aligned with the Smart Specialisation Strategy.	Economic and research department, public agency for digital transition
5. Consolidating industrial and logistics infrastructure	The circular model depends on dedicated infrastructure, and Wallonia must strengthen shared logistics, reuse hubs and industrial recycling zones to efficiently manage deconstruction flows, optimise costs, increase material volumes and reintegrate recycled resources into territorial value chains.	Cluster Logistics in Wallonia
6. Mobilising public procurement levers	Public procurement can accelerate circular practices by shifting award criteria toward performance and sustainability, supporting SMEs in obtaining certifications, and encouraging business models built on functionality and services rather than price alone.	Public administration
7. Supporting alignment with European frameworks and strengthening integration into Europe	In a shifting European regulatory landscape, the construction sector must anticipate and integrate new requirements to remain competitive, drive innovation and meet EU sustainability goals, while Wallonia seeks to position itself as a key European actor in circular construction by strengthening participation in transregional projects, accessing European funding and aligning regional priorities with European frameworks.	Economic department, Export agency, NCP Wallonia, EEN network
8. Strengthening the internationalization of Walloon circular construction actors	By building on innovation, industrial scaling and circular material value chains, this priority aims to position Wallonia as an internationally recognised player in circular construction by diversifying markets, attracting foreign investment and strengthening value chains globally, thus driving growth and competitiveness for Walloon companies.	Export agency, international relations agency, EEN network

4. Regional ECIV actions and initiatives : **METALS**

Strategic priorities	Priority description	Public resources
1. Strengthening Wallonia's Participation in European Industrial Dynamics	The EU's Critical Raw Materials Act requires Wallonia to align its industrial actors with European frameworks by contributing to CRMA implementation, strengthening participation in EU programmes and Belgian coordination, and anticipating new requirements on traceability, reporting and circularity so that Walloon companies can position themselves within Europe's strategic value chains.	Economic department
2. Securing Supply and Relocating Value Chains	Strengthening resilience in critical materials requires Wallonia to better identify and valorise secondary resources by leveraging its hydrometallurgical and advanced-recycling expertise, while consolidating circular hubs, fostering industrial synergies and creating local production-and-reuse loops closely aligned with the European framework for managing strategic raw materials.	
3. Stimulating Research, Development, Innovation and Digitalisation	The circular transition for metals and critical materials relies on continued technological and organisational innovation—ranging from digitalised processes, smart traceability and high-TRL circular solutions to new business models such as leasing, repair and product-as-a-service—in order to retain value locally, create skilled jobs and strengthen Wallonia's industrial anchoring in line with the Smart Specialisation Strategy.	Economic department, Financial agency, Digital transition agency
4. Accelerating Circular Decarbonisation of the Sector	Decarbonisation and circularity are deeply interconnected, as increasing recycling, substituting virgin materials, reusing energy flows and optimising by-products reduce emissions at the source, leading Wallonia to promote integrated projects—from CO_2 reuse to electrification and high-quality recycled steel production—in order to close material and energy loops and position circularity as a concrete pathway for industrial decarbonisation.	Economic and research department, Financial agency,
5. Strengthening Skills and Training	Companies highlight a lack of skills adapted to the needs of the circular economy. It requires new expertise in engineering, processes, materials, management and economic modelling. Yet technical and university curricula remain largely focused on traditional linear models. This gap between field needs and training supply is a major barrier to sector transformation.	Regional actors for skills and competencies
6. Creating Market Conditions Conducive to Circular Products	Many SMEs still struggle to fully engage in circular models due to economic, structural and organisational barriers. The cost of modernising equipment, the complexity of technical standards and difficulties in accessing stable markets hinder the adoption of remanufacturing, ecodesign and recycling practices. Circular materials markets remain immature and fragmented, limiting long-term visibility and investment profitability. These constraints particularly affect smaller businesses, which have fewer financial and human resources to adapt processes, certify products or respond to demanding technical specifications. Key challenges include integrating recycled materials while guaranteeing traceability, quality and compliance with existing standards. Several levers can be activated: adapted certification tools, financial incentives, and improved use of public procurement to promote circular-loop products.	Public administration for public procurement and for end-of-waste management
7. Strengthening the attractiveness and international visibility of the sector	Although Wallonia's metals and critical materials sector benefits from a strong and internationally recognised industrial base, emerging actors such as SMEs and start-ups still face limited international visibility and access, making it essential to better align economic diplomacy, export support and regional industrial strategy to strengthen their integration into European value chains and enhance Wallonia's global positioning.	EEN network, international relations agency, Export agency

4. Regional ECIV actions and initiatives : **AGRI-FOOD**

Strategic priorities	Priority description	Public resources
1. Accelerate circularity and local valorisation	The transition to circular models in the agri-food sector relies on innovation and digitalization to optimize resource flows, valorize co-products, replace fossil inputs, and strengthen sustainable, local, and competitive value chains.	Economic department, end-of-waste management department, public agency for digital transition, public financing agency
2. Facilitate the transition to the industrialisation phase	The transition from research to industrial production is hindered by long innovation cycles, high initial investments, regulatory complexity, and limited funding—especially for SMEs—highlighting the need for a clearer financial framework and stronger alignment between regional and European instruments to accelerate technological maturation and industrial demonstrators.	Economic and research department, , end-of-waste management department, public financing agency
3. Facilitate access to data	Public data is scattered across numerous sources with complex access procedures, which particularly hinders SMEs, making it essential to create a simplified, structured, and secure data framework to support innovation projects, foster collaboration, and accelerate the transition to circular models through technical, economic, regulatory, and territorial data.	Regional agency for digital transition
4. Simplify administrative procedures and clarify the regulatory framework	Administrative and regulatory complexities—such as lengthy, unclear permitting processes and fragmented or incomplete multi-level regulations—create uncertainty and slow down the development of circular innovation projects in the agri-food and bio-based sectors, particularly for smaller organizations.	End-of-waste management department,
5. Strengthen skills, training, and the attractiveness of the sector	Labour shortages in technical roles related to water, energy, and raw-material processing make it essential for the sector to develop specialized training, support professional retraining, and strengthen its attractiveness to young people and career-changers in a context of growing circular and digital skills needs.	Competencies and skills public agencies
6. Anticipate European orientations and support integration into European frameworks	In a context of increasingly ambitious EU policies on the bioeconomy and circular economy, Walloon companies must be supported to anticipate regulatory changes and access European programmes, enabling them to strengthen their competitiveness, align with European frameworks, and seize opportunities for funding, innovation, and transnational collaboration.	Economic department, EEn network, NCP Wallonia, Export agency, International relations agency,
7. Promote the internationalisation and visibility of the sector	Strengthening the international visibility of Wallonia's circular and bio-based sector—by showcasing its expertise, innovative projects, and committed actors—is essential to access new markets, boost exports, enhance resilience, and promote technology and best-practice exchanges with global partners.	EEN network, NCP Wallonia, Export agency, International relations agency

5. Timeline and responsibilities

1. Timeline

2026 => Launch of first actions in collaboration with sectoral federations and other public actors
Mobilization of stakeholders in WP3 activities / support stakeholders in developing strategic regional and interregional projects
Mobilization of public actors depending on the needs and obstacles faced in the development of strategic projects (digital, waste management, skills…)
Mid-2027 => first evaluation and adjustment of actions/indicators
2029 => Last evaluation

2. Responsibilities :

- **Coordination Unit**

The Coordination Unit at the public administration (Economic policy department) provides overall strategic and operational steering, ensuring coherence between sectoral, transversal and European dimensions.

- **Sectoral federations**

Federations play a key role in co-leading sectoral work agendas, ensuring that the circular strategy remains anchored in real economic needs and industry dynamics. They act as intermediaries between public authorities and businesses by identifying field-based challenges and opportunities.

- **Public actors**

Public actors will collaborate to ensure coherence between regional competencies and will mobilize their public tool to facilitate the transition.

Involvement of other actors such as clusters, research centers, companies… through specific working groups and strategic projects.

3. Alignment with existing strategies

Strategic coherence with other regional plans and strategies—such as Circular Wallonia 2.0, the PACE (Air-Climate-Energy Plan), Digital Wallonia (the regional digital strategy), the S3 (Smart Specialisation Strategy), and the PWDR (Regional plan on waste management)—as well as with the federal level through the Belgian Federal Circular Economy Plan.

6. Monitoring, learning, and adaptation (TIP-aligned)

Methodology

Monitoring will rely on a **mixed approach**:

- **Quantitative monitoring**, focused on structuring projects through a limited set of shared and project-specific KPIs measuring tangible economic, environmental, and territorial impacts.
- **Qualitative monitoring**, capturing systemic dynamics such as governance, actor collaboration, policy coherence, and inter-regional cooperation. This will be based on stakeholder feedback, case analyses, and lessons emerging from transversal and operational working groups.

The core of the evaluation will focus on the **structuring projects developed within each value-chain agenda**, assessing their impacts, obstacles, and enabling conditions, while minimising administrative burden for businesses and public services. Insights from these projects will directly inform strategic adjustments.

A first evaluation will be done at **mid-2027** =>

Adjustments could be integrated on the actions developed and /or on the indicators.

Last evaluation end of August 2029.

How to collect data ?

- Feedback from companies participating in structuring projects in Circular Wallonia and ECIV actions (support from sectoral federations to collect data) : gathering data on material flows captured, recycled content, digital deployment…
- Consult administrative data (number of pilot tests validated, number of end-of-waste decisions, number of trained workers…) / Feedback from public regional actors
- Usage statistics on digital platforms (BIM, material passports creations…)

6. Monitoring, learning, and adaptation (TIP-aligned)

Quantitative KPIs

≥ 2 regional strategic projects developed in the construction sector deploying at least one of the following practices :

- prefabrication, modularity ;
- incorporating biobased materials in their process ;
- reducing in on-site material losses.

≥ 2 regional strategic projects developed in the metallurgy sector deploying at least one of the following practices :

- the integration of secondary raw materials (e-waste, batteries, ELVs, residues) ;
- Advanced recycling operations (hydrometallurgy, AI sorting, pyrolysis).

≥ 2 strategic projects developed in the agrifood sector deploying at least one of the following practices :

- valorisation of agrifood co-products in food or non-food applications ;
- treatment and reuse of water in agrifood industrial sites.

≥ 200 professionals trained in :

- circular-construction skills (material inventories, reuse audits, circular renovation) ;
- eco-design, advanced recycling, and circular metallurgy skills ;
- bioprocessing and sustainable food systems.

≥ 100 companies using digital traceability systems aligned with EU requirements

Qualitative KPIs

≥ 50% of companies involved in strategic projects report improved regulatory clarity on waste/by-product/resource status.

Clarity score ≥ 3.5/5 regarding the coherence and clarity of regional policy mix and regional and European regulations.

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4.6 – RAP Lithuania

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ECIV Regional Action Plan (RAP) – Lithuania,

Audronė Janulaitytė,

Dr. Marija Meišutovič-Akhtarieva

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1. Lithuania’s Committed missions

Lithuania commits to three ECIV missions:

Mission	Alignment
Raw Materials	CRMA / NZIA strategic alignment
Industrial Decarbonisation	Net-zero Industry & GHG reduction
Bioeconomy	Sustainable Bio-based Value Chains

These missions support Lithuania’s national objectives of climate neutrality 2050, energy independence, and industrial competitiveness

Rationale:

- Strong relevance to Lithuanian industry sectors
- Existing data sources and regulatory framework
- High potential for pilot projects and innovation
- These missions aim to strengthen resource security, industrial competitiveness, and environmental performance.

Why this is feasible:

- Strong stakeholder network: Ministry of Environment, Innovation Agency, EPR schemes and industry associations are committed to circular goals. Key partners (SME, waste companies, recyclers, construction firms, retailers) are already engaged.
- Existing pilot infrastructure and regulatory alignment

Strategic Alignment: NZIA, CRMA, European Green Deal , SDG 13 – Climate Action, SDG 9 – Industry, Innovation and Infrastructure, SDG 12 – Responsible Consumption and Production, SDG 17 – Partnerships for the Goals, Contribution to Lithuania’s Climate Neutrality 2050 target, National Energy and Climate Plan, Contribution to Industrial Modernisation Strategy.
Strategic Objective (2026–2029): To strengthen industrial competitiveness while accelerating circular transition and measurable GHG reduction.

2. Regional system context and starting point

Key circular economy indicators in Lithuania:

- **Raw materials:**

Circular material use rate: **4.2%** remains below the EU average;

- **Decarbonisation & Industrial parks:**

Lithuania's **national GHG reduction target for 2030** is to cut **greenhouse gas emissions by at least 70 % compared with 1990 levels**. Under the WEM scenario, Lithuania will not reach its 2030 GHG target; even WAM projections remain insufficient (Figure 1). Industrial decarbonisation is essential to close the projected emissions gap.

- **Bioeconomy**

According to Economy-Wide Material Flow Accounts (EW-MFA), Lithuania extracts up to **22.5 million tonnes** of primary biomass annually, accounting for approximately **42%** of total material extraction (average 2018–2022). Net exports of primary biomass exceed 4 million tonnes per year.Between 2010 and 2022, primary biomass extraction grew at an average annual rate of **2.3%,** while net exports increased by **4.4%** per year.

Lithuania aims to reduce fossil resource dependency.

Systemic challenges:

- Limited secondary raw material markets
- Fragmented value chains
- Low consumer awareness in some waste streams
- Insufficient circular procurement practices
- Lithuania does not have a national strategy or roadmap to develop an advanced bioeconomy and reduce dependence on imported fossil resources.

These structural gaps define Lithuania's starting point and justify targeted intervention through the **Theory of Change.**

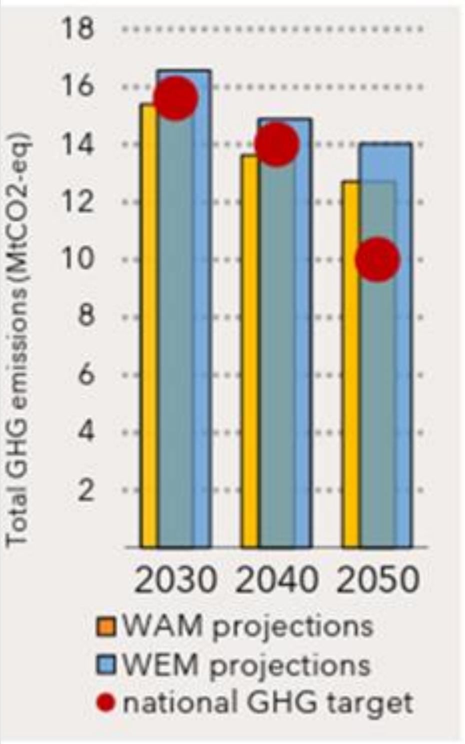

Figure 1. GHG emission projections (Source: Climate Change Report, 2023)
WAM projections – existing and additional measures
WEM projections – existing measures only

3. Theory of Change

Three missions target high-impact value chains:

Mission	Sector	Leverage point
Mission A: Critical Raw Materials	Electronics and batteries	Critical raw materials recovery
Mission B: Industrial Decarbonisation	Industrial parks & energy-intensive industries	GHG reduction and net-zero industrial infrastructure
Mission C: Circular Bioeconomy	Bio-based value chains (forestry, agriculture, biomass processing)	Transition from primary extraction to value-added bio-based production

These missions focus on material-intensive sectors with high environmental and economic impact. The missions collectively address environmental sustainability, economic resilience and innovation capacity.

Missions A
Critical Raw Materials

Goal

- Increase recovery of critical raw materials and metals from electronic waste and battery streams.

Starting Point

- Growing WEEE and battery waste streams
- Limited traceability and illegal flows
- Export-dependent recycling value chains

Desired Change

- Higher collection rates
- Improved traceability
- Increased recovery of high-value metals.

Key ECIV actions:

- Pilot **traceability system for WEEE and batteries**
- Improve **collection infrastructure and campaigns**
- Develop **pre-processing capacity for high-value fractions**
- Support **industrial partnerships for recycling value chains**
- Implement **safety standards for battery handling**

Resources:

- Innovation Agency networks
- Producer responsibility organisations
- Waste management companies
- Research institutions

Missions A
Critical Raw Materials

KPI	Type	Assessment
High-value fractions prepared for recycling	Quantitative	Directly linked to mission objective
Traceability coverage of collected materials	Mixed	Improves transparency
Number of stakeholders participating	Qualitative	Measures ecosystem development

Missions B
Industrial Decarbonisation

Goal
- Reduce industrial GHG emissions and accelerate net-zero transition.

Starting Point
- High industrial energy intensity
- WEM scenario insufficient to meet 2030 targets
- No confirmed Green Industrial Park model

Desired Change
- Measurable GHG reduction
- Green Industrial Park established
- Companies implementing decarbonisation measures

Key ECIV actions:
- Develop Green Industrial Park model
- Support energy efficiency & electrification
- Provide decarbonisation advisory to companies

Resources:
- Industry
- Public authorities
- Research institutions

Industrial decarbonisation is a core pillar of sustainable industrial transformation.

Missions B
Industrial Decarbonisation

KPI	Type	Assessment
GHG reduction in industry	Quantitative	≥10% projected reduction
Green Industrial Park established	Quantitative	≥1 park established
Total estimated CO_2 reduction (tCO_2e)	Quantitative	Cumulative reduction by 2029
Companies receiving consultations on decarbonisation solutions	Quantitative	≥30 companies
Companies implementing decarbonisation measure	Quantitative	≥10 companies
International best-practice partnerships established	Quantitative	Cumulative partnerships established by 2029

Missions C
Circular Bioeconomy

Goal

Accelerate the deployment of circular bio-based solutions that:
- reduce fossil dependency
- increase material circularity
- strengthen EU strategic autonomy
- generate regional economic value

Starting Point

- High overall recycling rates in Lithuania, but low recycling performance for plastic and composite packaging
- Limited reuse systems beyond deposit schemes
- Weak industrial symbiosis between biomass producers and processors
- Bio-based products face regulatory and scale-up barriers

Desired Change

- More recyclable packaging designs
- Increased reuse systems
- Improved sorting and recycling outcomes.

Key activities:
- Enhance regulatory readiness for bio-based products
- Develop skills and capacity in bioeconomy sectors
- Run stakeholder engagement and knowledge transfer initiatives

Resources:
- Industry
- Research institutions
- Authorities

Bioeconomy strengthens Lithuania's strategic autonomy by shifting from raw biomass export toward high-value domestic bio-based production.

Aligned with the EU Bioeconomy Strategy, the European Green Deal and the Clean Industrial Deal, the bio-based sector is expected to become climate-neutral, more circular and sustainable while remaining globally competitive.

Missions C
Circular Bioeconomy

KPI	Type	Assessment
Secondary Biomass Valorized within the Sandbox	Quantitative	tonnes/year
Number of food companies consulted on bio-based product development	Quantitative	numbers of companies
Volume of Circular Bio-based Products Produced	Quantitative	tonnes/year

4. Regional ECIV activities and initiatives

Key system variables based on system mapping, five system dimensions influence circular transition:

Technology and systems

- Sorting and recycling technologies
- Design for recyclability
- Identification of new R&D (MTEP) project opportunities for ecosystem partners

Infrastructure

- Support for Green Industrial Park development
- Reverse logistics capacity

Business models

- Market demand for recycled materials
- Circular business models (reuse, repair, product-as-a-service)

Policy and regulation

- Extended Producer Responsibility (EPR)
- Green public procurement
- Interinstitutional coordination

Culture and behaviour

- Stakeholder engagement workshops
- Industry awareness of circular practices
- Business awareness

These variables interact to influence circular material flows in Lithuania.

5. Timeline and responsibilities

2026

System mapping and ToC development

•Launch pilot initiatives

2027-2028

Implementation of pilots

•Monitoring and evaluation

2028-2029

Scaling successful solutions

Integration into regional and national policy frameworks

Lead organisation: **Innovation Agency Lithuania**

Partners:

- Ministry of Environment
- Waste management companies
- Industry associations
- Research institutions
- Municipalities

5. Timeline and responsibilities

Key actions and horizontal KPIs

Since the planned activities contribute to the implementation of several missions, it is useful to identify **horizontal KPIs** that reflect **institutional capacity building, coordination, and the development of the innovation ecosystem**. The main indicators could be linked to the following actions:

- **Establishment of Competence Centre for Smart and Climate-Neutral Manufacturing Processes, Materials, and Technologies**
  (KPI: 1 competence centre established)
- **Formation and operation of an interministerial working group on circular economy issues**
  (KPI: working group established)
- **Expansion of the KTU innovation promotion network across Lithuanian regions**, including circular economy topics
  (KPI: regional innovation network operating)
- **Designation and launch of the Lithuanian circular economy monitoring institution**
  (KPI: monitoring institution approved and operational)

6. Monitoring, learning, and adaptation

Monitoring approach aligned with ECIV TIP framework. Components:

- Continuous KPI monitoring
- Stakeholder learning workshops
- Policy feedback loops
- Knowledge sharing across ECIV regions

The RAP will remain an adaptive document, updated based on pilot outcomes and stakeholder feedback.

It is also important to note that the **Lithuanian Circular Economy Action Plan (RAP)** was **reviewed at the interministerial level**.
On **5 March 2026**, during a meeting held at the **Ministry of Environment**, the working group titled *"On the designation of the institution responsible for monitoring the implementation of Lithuania's transition to a circular economy until 2035 and the coordination of monitoring"* convened.
In **Part III of the meeting**, the **ECIV Lithuanian Circular Economy Action Plan** was presented, and **feedback from the ministries on its content and implementation directions was collected**.

Summary

Lithuania's circular economy performance remains **significantly below the EU average**, with a circular material use rate of **4.2%** , highlighting the need for systemic action.

Key systemic barriers include:

- Limited domestic processing capacity for secondary raw materials
- Weak market demand for recycled materials
- Data gaps and insufficient traceability of waste streams
- High industrial energy intensity and slow uptake of decarbonisation technologies

To accelerate circular transition within the ECIV framework,
Lithuania commits to **three missions aligned with ECIV sub-missions**:

1. Critical Raw Materials (CRM)
Improving recovery of metals and critical materials from WEEE and batteries.
2. Industrial Decarbonisation
Reducing industrial GHG emissions through energy optimisation, green industrial parks, circular production models and investment mobilisation.
3. Bioeconomy
Strengthening high-value biomass utilisation, developing bio-based value chains, and enabling innovation, regulatory improvement and ecosystem collaboration.

These missions target high leverage points in Lithuania's circular economy system and are feasible within the ECIV project timeline.

These missions contribute directly to Lithuania's Climate Neutrality 2050 target and support EU priorities under the Green Deal, CRMA, and NZIA

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4.7 – RAP Helsinki-Uusimaa

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Regional Action Plan/ Helsinki-Uusimaa Regional Council

March, 2026

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1. Sub-mission commitment: Circular Agrifood

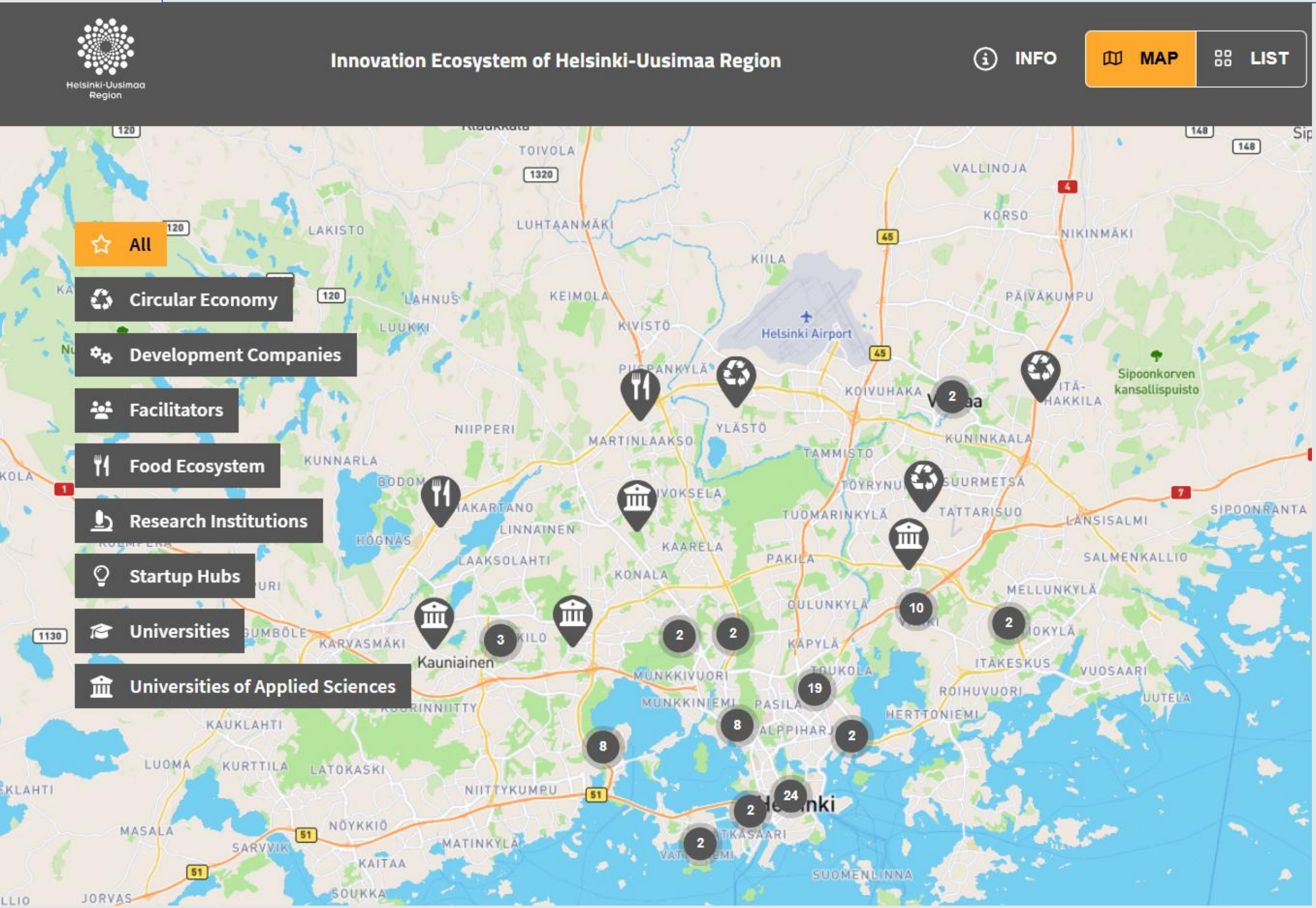
The Helsinki–Uusimaa Region aims to transform the food system in the region towards innovative circularity, building on its **strong food-industry base**, **research and innovation ecosystem**, and **circular economy competence**.

Although primary agriculture is limited, the region serves as a national testbed for urban food production, food-waste reduction and high-value use of biomass side streams.

Circular economy is a strategic priority in the Helsinki–Uusimaa Regional Programme, which targets a climate-neutral circular-economy society and positions the region to become Europe's most environmentally smart and innovative region.

The Regional Council supports this transformation by convening ecosystems, enabling pilots and scaling circular agrifood innovations, strengthened by initiatives such as the Helsinki–Uusimaa Circular Hub.

2. Regional system context and starting point



The active RDI network in Helsinki-Uusimaa includes multitude of actors. In addition to municipalities and innovative companies, the region's universities, research institutes, development companies and startup hubs are key players in the regional innovation network. We have compiled these actors on a regional Innovation Ecosystem Map.

[Innovation Ecosystem – Helsinki-Uusimaa Regional Council]

2.1 Ongoing Circular Food System Projects in Helsinki-Uusimaa

🌱 Regenerative agriculture & soil carbon (4 projects)
CARBON ACTION, SOFASU, COVERE2, Maasta elinvoimaa

♻️ Circular nutrients & resource cycling (3 projects)
CiNURGi, P2GREEN, SOFASU

Resilient & secure food systems (3 projects)
Food System Resilience, SustAnimalFood, Maasta elinvoimaa

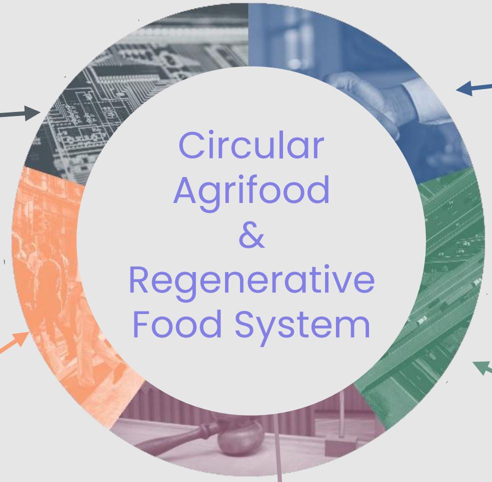
🌿 Plant-based & protein innovation (5 projects)
RETHINK, National Protein Cluster, Sustain-a-bite, FoodID, FinBioFAB

Food waste & resource efficiency (2 projects)
Food Waste Ecosystem, Waste Monitoring

🌍 Ecosystems, networks & export (6 projects)
Food SystemiCity, Urban & Local, Networks, Value4Pack, FinFoodNET, Food from Finland

2.2 Sub-mission: Circular Agrifood Systems

Influencing variables



Technology and systems

- Regional RDI actors are actively involved in projects implementing latest technology and innovative solutions to the agrifood sector
- Unpredictability of resources availability due to climate change and natural cycles
- Strong RDI network
- Farmers close to food companies and research institutes (possibilities to piloting)
- Agricultural data management, lack of regional level data

Business models and incentives

- Requirements (e.g. recycled fertilizers, soil health) of the city for field renting
- Procurement practices that often prioritize lowest upfront cost rather than life-cycle value
- The Availability of appropriate circular business models
- National incentives for food system development and exports
- Corporate sustainability targets and reporting requirements
- National Green Deal Commitment to Circular Economy

Culture and norms

- Helsinki-Uusimaa has forward-thinking consumers, which enables testing food innovations on the consumer market
- Food waste reduction and biowaste collection at a low level
- Agricultural sector not seen as an attractive career option by youth
- "Prestige" and traditions, trends, ideologies

Policy and regulation

- Public procurement requirements for circular food
- National Food Strategy
- Helsinki-Uusimaa Regional Programme: Regenerative Food System as a regional RDI priority
- National and EU level regulation hindering the scalability of new innovations

Infrastructure

- Clean water, water infrastructure, cheap electricity
- Lack of skilled workforce
- Active RDI network in Helsinki-Uusimaa
- Regional actors active in European level development projects (e.g. HE)
- New investments in the food sector development, e.g. the University of Helsinki's Master's programme in food exports
- Multiple startup hubs, higher education and research institutions focused on food system development

3. Impact targets /missions map – Theory of Change

Challenges	Resource	Activities	Result	Expected change / Impact /Effect	Missions and Sub-missions
Linear Food System creating high waste and emissions Lack of scalability of innovations Lack of incentives (funding&regulation&guidelines) for circular agrifood Lack of commitment for circular agrifood on a municipal level	Funding for RDI projects and events Incentives on EU and national level for circular economy in food systems Expertise on the food system and circular economy in Helsinki-Uusimaa region	Regional CE Circular Economy Green Deal: • Helping municipalities to reduce food waste and adapt regenerative food systems • Increasing food system innovations created in Helsinki-Uusimaa region Regional funding for circular agrifood Facilitation for new research&development projects in circular agrifood Lobbying for incentives in EU and national level in order to enhance circular agrifood Stakeholder events and workshops to create cooperation and to share best practices	The waste, emissions and nature footprint from food system decreases in Helsinki-Uusimaa Region More incentives for circular agrifood in CE Act The amount of circular agrifood innovations increated Helsinki-Uusimaa increases Municipalities committed to actions on circular agrifood	The amount of waste and emissions created in the food system has decreased in Helsinki-Uusimaa. Municipalities and other stakeholders have adapted circular agrifood system practices with the help of incentives. Helsinki-Uusimaa is a pioneer in circular agrifood systems creating new food system innovations.	We accelerate the transition toward regenerative and circular agrifood systems that minimise waste & losses, close nutrient loops, and strengthen regional food resilience and value creation.

Figure 12. Illustration of an example of an impact target map / Theory of Change

4. Regional ECIV activities and initiatives

HURC actions on the sub-mission of the **agrifood system are:**

1. Implementing Regenerative Food Systems and one of the regional RDI priorities
2. Strengthening our regional agrifood related innovation network (Helsinki-Uusimaa Circular Hub) by organising several events and stakeholder meetings in 2026-2029
3. Enabling circular food system changes by implementing National Circular Economy Green Deal with one of its aims to enhance regenerative food systems (our goals: reducing food waste and increasing the amount of food innovations)
4. Helping municipalities in our region to make a National Circular Economy Green Deal commitment (one of its aims is to enhance regenerative food systems). Commitment can involve targets for public procurement in food services, reduction of food waste in food services, enhancing soil health in the fields owned by the municipalities
5. Increasing the project portfolio in agrifood systems by directing funding for regional and EU projects, and facilitating networking and project development in the Helsinki-Uusimaa Region
6. Strengthening Helsinki-Uusimaa's agrifood innovation ecosystem by connecting it to the ECIV stakeholders to create more impact.
7. Actively influencing for incentives in EU and national level to enhance circular agrifood

5. Timeline and responsibilities

- **Key milestones and phases until August 2029**

  We will determine the quantitative baseline for food system innovations developed in Uusimaa and set growth targets by 2027.

  We will determine the amount of food waste and food loss generated in the Uusimaa region by 2027

  Target by 2030: 26 municipalities committed to halving the amount of food waste and food loss.

- **Responsible regional actors for delivery within ECIV**

  Municipalities, companies, researchers, developing organisations, other stakeholders

- **Reflections on how the changes proposed in the RAP and the commitments made in the Theory of Change can be embedded in existing regional practices, mandates, or ongoing processes *(e.g. alignment with existing strategies, programmes, networks, or ways of working)***

  HURC has a regional strategy 2026-2029 (decided in December 2025), which now will be implemented into regional roadmaps on environment, innovations and vitality and the RAP will be embedded in the roadmaps

|

6. Monitoring, learning, and adaptation

What we will monitor:
Regional:

- Ecosystem development:
  - Number of actors,
  - Number of partnerships,
  - Circular Hub activity (such as projects, pilots, funding)
- National Green Deal commitments and actions in municipalities
  - **food waste reduction** – achieving the regional target of reducing 50% of food waste in Helsinki-Uusimaa
  - Increase of uptakes of new food innovations
- Policy and incentive changes (EU & national)

ECIV TIP aligned indicators

- Ecosystem development:
  - Circular Hub activity (such as projects, pilots, funding created based on ECIV network)

How learning will be captured:

- Continuous learning-by-doing (workshops, reflection sessions)
- Feedback loops via surveys, events, stakeholder networks
- Stakeholder engagement and narratives as new leverage points emerge

How insights will guide adaptation:

- Adjusting priorities based on real-time learning

"We expect our participation in ECIV will open opportunities for the HURC stakeholders to have wider connections in the circular economy in European regions. Bringing inspiration and contacts, potential partners and benchmarking examples."

ECIV sub-mission

We accelerate the transition toward regenerative and circular agrifood systems that minimise waste & losses, close nutrient loops, and strengthen regional food resilience and value creation.

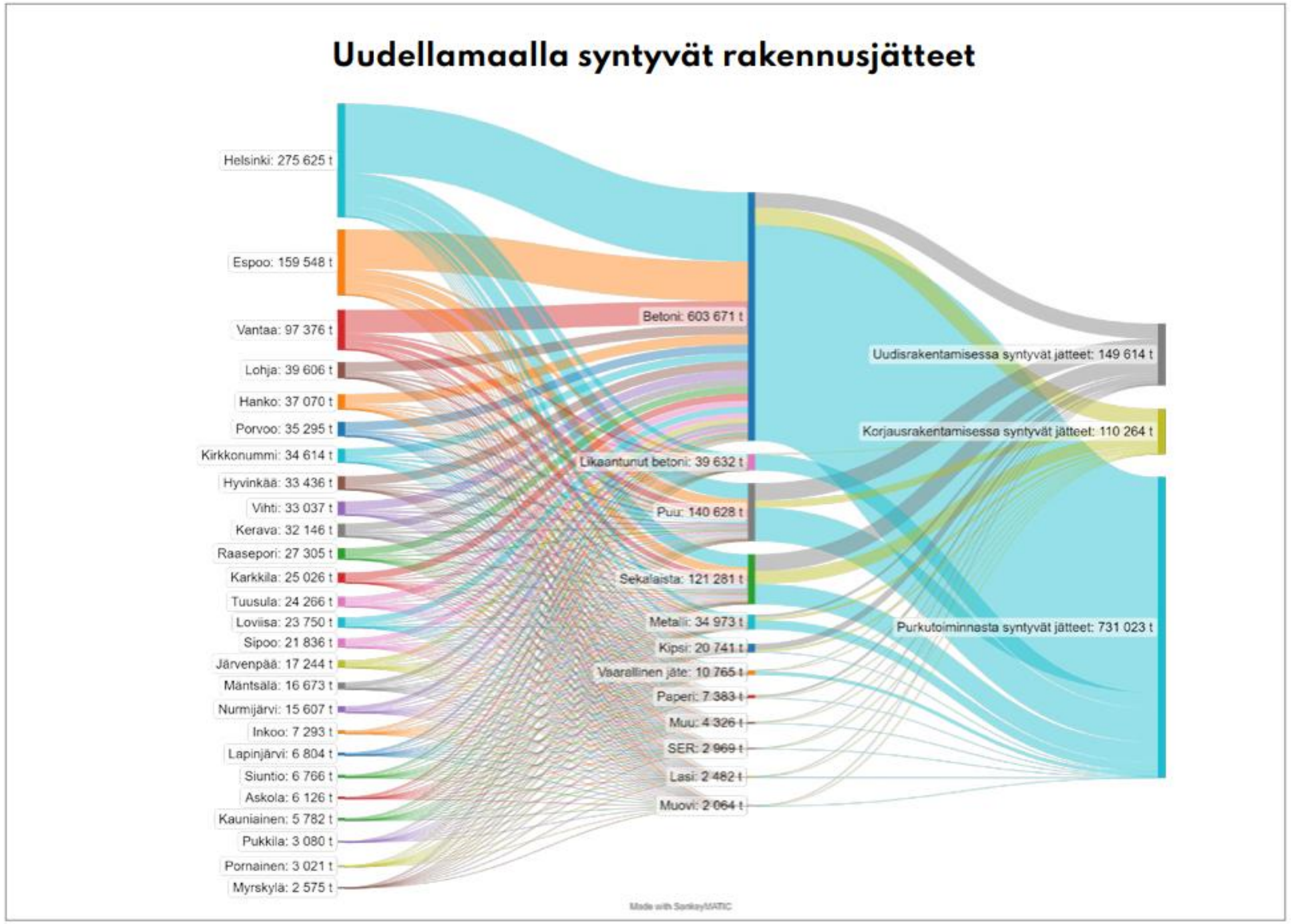
1. Sub-mission commitment: Circular Biobased Materials in Construction

The Helsinki–Uusimaa Region promotes circularity in construction as part of its Regional Programme objective to build a climate-neutral circular-economy society, a core goal under the Environmentally Smart Uusimaa priority.

Circular construction also aligns with the region's RDI spearheads, which emphasizes resource-wise and innovative industrial solutions. Uusimaa advances circular practices through regional pilots on building-component reuse, mass coordination and other circular models developed within the regional green deal and Circular Hub initiatives. These create strong capabilities for adopting and scaling biobased and recycled construction materials.

Circular construction is a relatively new priority in the region, which we are currently developing. Our Helsinki–Uusimaa Circular Hub further strengthens this work by fostering collaboration between municipalities, companies, research organisations and innovators, construction being one of its priority CE sectors.

2. Regional system context and starting point



Kuva 2: Perustuu v. 2018-2020 keskiarvoon. Rakentamisen materiaalivirtatieto on arvioitu mallintamalla syntyviä jätemääriä eri jätekertoimien avulla hyödyntäen rakennusneliömetrimäärän muutoksia rakennustyypeittäin. Kerrosalan muutoksissa on isoja vuosittaisia vaihteluja rakentamis-/korjausvaiheessa. Jätetietoihin ei sisälly rakennustuotetuotannossa syntyviä jätteitä.

Construction waste generated in the Helsinki–Uusimaa region: second biggest flows in wood

Uudenmaan kiertotalouslaakso

Construction

In the Closing Loops project, windows used in the project were refurbished at Spolia Design's warehouse.
Photo: Mira Jarkko

An experiment was carried out on Kaikukatu, where decommissioned windows were used as interior partitions.
Photo: Martin Sommerschield

> Collaboration is also needed with research institutes and universities to bring theory into practical experiments
>
> Mira Jarkko, Team Lead for Green Transition and New Technologies, Business Helsinki

Challenges

- Recycling and reuse of materials: dismantling intact, cost-effective verification of materials, logistics and planning time frame, building the market
- In Finland, the material footprint (RMC/capita) is among the largest in the EU, mostly due to soil and mineral extraction. Coordination of soil masses is still limited
- The technological complexity of preparing building components for reuse makes processes expensive
- The linear thinking model does not support the reuse of building components
- Lack of legislation and standards

Solutions

- New innovations and technologies: piloting new operating models
- Collaboration between different actors – large construction companies also involved
- Digitalization and smart technologies can enhance material recycling: for example, AI-based BIM
- Development of a material bank or marketplace
- Focus on impactful solutions that reduce the carbon footprint: proactive, efficient coordination of soil masses and reuse of building components in both public and private sectors
- Land use planning based on circular economy criteria
- Extending the lifecycle of buildings and increasing their utilization rate
- The revival of craftsmanship, for example, in repair activities

Submission: Circular biobased construction materials

Influencing variables

Amount of circular biobased material in construction

Technology and systems

Nordic conditions and needs in construction (thermal insulation and winter approveness of structures)

Technical performance in terms of durability, fire resistance, and acoustic/thermal insulation. Humidity./ the amount of tests required is huge

Property consistency needs to be ensured with biobased raw materials

Lacking testing standards

Unpredictability of resources availability due to climate change and natural cycles

Knowledge transfer between academia, industry, and practitioners.

Compatibility of bio-based materials with existing construction techniques and digital design tools (BIM, prefabrication)./ development of new tools is expensive

Business models and incentives

Green washing: environmental sustainability is not real (including communication)

Cost competitiveness of bio-based materials compared to traditional alternatives

The hegemony of concrete structures in house building

Procurement practices that often prioritize lowest upfront cost rather than life-cycle value

Building of new markets is challenging

Amount of raw materials and secondary raw materials for production is unknown

Risk perceptions in financing (e.g., fire safety concerns with timber buildings)

Market disruption of timber materials due to the Russian situation

Lack of standardized certification and labelling that can complicate market entry (such as in clay)

Hurry and lack of resources drives to use commonly used materials

Relatively small markets for the development of new materials

Culture and norms

Systems and processes the construction sector are based on the use of concrete as the main building material

Perceptions of bio-based materials as less durable and susceptible compared to non biobased materials

"Prestige" and traditions, trends

Conservative atmosphere towards material innovations in construction sector

Risk-aversiveness of construction sector

Natural materials as enablers for wellbeing/healthy living

Eurocodes for structural engineers needs for new biobased materials

Aesthetic preferences and architectural traditions that may favour conventional materials

Biobased materials and structures may be seen as robust structures for winter conditions

Professional norms within engineering and architecture communities

Policy and regulation

Building codes and standards that may restrict or favour the use of bio-based materials

Existing construction sector actors have advocacy power for conservative methods

Guidance (like land use planning) in municipalities for biobased materials

Subsidies, tax incentives, or carbon pricing mechanisms that favor sustainable materials./ higher price for unsustainable materials

EU and national legislation for the use of natural resources and decrease of climate emissions and CE

Pilots and criteria´s (such as % of biobased; health&nature aspects; LCA) in public procurement

Strict Nordic environmental regulations

Harmonize more interregional and European regulations and standards (when possible)

Infrastructure

Climate change and the role of sinks

Supply chains for harvesting, processing, and distributing bio-based materials

Physical and digital infrastructure for availability and accessibility of materials

Sectoral cooperation that could enhance knowledge sharing

Lack of knowledge and places to share best practices

Availability of skilled labour and training (including retraining) in bio-based raw material production (such as farmers), material development and construction methods

Long distances

Testing, demonstration, and reference projects that build trust and experience

The experts interviewed for the system mapping on circular biobased construction materials

- Pipsa Salolammi, Circular Economy Specialist, Helsinki-Uusimaa Circular Hub
- Lari Sirén, Project Manager, Helsinki Circular Economy Cluster Program
- Anna Hjelt, CBDO - EcoCocon Nordic Oy/Ab
- Johanna Hyrkäs, doctoral researcher, Aalto University

Impact targets /missions map – Theory of Change

Challenges	Resource	Activities	Result	Expected change / Impact / Effect	Missions and Sub-missions
Linear construction sector creating high waste and emissions and biodiversity footprint Lack of scalability of innovations Lack of incentives (funding&regulation&guidelines) for circular biobased materials in construction Lack of commitment for circular biobased materials for construction on a municipal level	Funding for RDI projects and events Incentives on EU and national level for circular economy in food systems Expertise on the food system and circular economy in Helsinki-Uusimaa region	Market dialogues with construction companies, researchers, architects and other stakeholders Events, workshops and matchmaking meetings with stakeholders (including potential) Regional CE Circular Economy Green Deal: • Reuse of building material components • Helping municipalities to use circular biobased materials in construction Study on the potential for circular biobased materials in agriculture&land use (including reed)	The waste, emissions and nature footprint from construction decreases in Helsinki-Uusimaa region More incentives for circular biobased materials for construction in CE Act Pilots in circular biobased construction Helsinki-Uusimaa increases	The amount of waste and emissions created in the construction has decreased in Helsinki-Uusimaa. Companies, municipalities and other stakeholders have adapted circular biobased construction materials with the help of incentives. Helsinki-Uusimaa is a pioneer in circular biobased construction creating new innovations.	We accelerate the use of sustainable, circular biobased materials in construction, to show how circular principles create more sustainable, healthy, and regenerative built environments.

Figure 12. Illustration of an example of an impact target map / Theory of Change

HURC actions focus on the sub-mission of the **circular biobased materials in construction. Those actions are:**

- **Strengthening our circular biobased construction related innovation network (Helsinki-Uusimaa Circular Hub) by organising events and stakeholder meeting in 2026-2029. First in March 2026 on circular biobased materials in construction**
- **Market dialogues in circular biobased materials for construction**
- **Enabling circular biobased materials in construction by implementing National Circular Green Deal**
- **Enhancing pilots in circular biobased materials in construction**
- **Increasing the project portfolio in circular biobased material in construction**

Our Region is actively developing new types of circular biobased materials in construction innovations with significant international potential. In order to achieve circularity and systemic change in the whole of construction sector, European cooperation is needed. Therefore, our goal is to strengthen our own biobased construction innovation ecosystem and to connect it to the ECIV stakeholders to create more impact.

5. Timeline and responsibilities

- **Key milestones and phases until August 2029**
  - Increasing the awareness and interest towards circular biobased construction (studies, events, market dialogues 2026-)
  - Enhancing pilots in circular biobased materials in construction (2027-)
  - Increasing the project portfolio in circular biobased material in construction (2027)

Uusimaa Regional Council's goals in the National Circular Economy Green Deal by 2030: 12 municipalities have circular economy Green Deal commitments (one of the chosen themes can be "construction")

- **Responsible regional actors for delivery within ECIV**

Municipalities, RDI-network, companies, developing organisations

- **Reflections on how the changes proposed in the RAP and the commitments made in the Theory of Change can be embedded in existing regional practices, mandates, or ongoing processes**
  (e.g. alignment with existing strategies, programmes, networks, or ways of working)

  HURC has a regional strategy 2026-2029 (decided in December 2025), which will now be implemented into regional roadmaps on environment, innovations and vitality, and the RAP will be embedded in the roadmaps.

6. Monitoring, learning, and adaptation (TIP-aligned)

What we will monitor:
Regional
- **Ecosystem development:**
  - number of actors,
  - partnerships,
  - circular Hub activity (such as projects, pilots, funding)
- National Green Deal commitments and actions in municipalities
- Policy and incentive changes (EU & national)

ECIV TIP aligned indicators
- Ecosystem development:
  - Circular Hub activity (such as projects, pilots, funding created based on ECIV network)

How learning will be captured:
- Continuous learning-by-doing (workshops, reflection sessions)
- Feedback loops via surveys, events, stakeholder networks
- Stakeholder engagement and narratives as new leverage points emerge

How insights will guide adaptation:
- Adjusting priorities based on real-time learning

ECIV

We accelerate the use of sustainable, circular biobased materials in construction, to show how circular principles create more sustainable, healthy, and regenerative built environments.

"We expect our participation in ECIV will open HURC stakeholders wide connections to the circular economy in European regions. Bringing inspiration and contacts, potential partners and benchmarking examples."

4.8 – RAP Scotland

European
Circular
Innovation
Valley

Regional Action Plan (Scotland)

Brooke O'Connell, Scottish Enterprise

Scottish Enterprise IBioIC

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Co-funded by the European Union

Glossary

ABE — Acetone–Butanol–Ethanol (biorefining process/products)

AD — Anaerobic Digestion (biogas production from organic residues)

AM-BATS — Additive Manufacturing Business Adoption (NMIS support programme)

BIM — Building Information Modelling (digital design lifecycle)

CENSIS — Scotland's Innovation Centre for sensing, imaging & IoT

DPP / DPPs — Digital Product Passport(s) (lifecycle/traceability data standard)

EISMEA — European Innovation Council and SMEs Executive Agency

FTE(s) — Full-Time Equivalent(s) (employment metric)

GVA — Gross Value Added (economic output measure)

HIE — Highlands and Islands Enterprise

IBioIC — Industrial Biotechnology Innovation Centre

IoT — Internet of Things

NMIS — National Manufacturing Institute Scotland

ONS — Office for National Statistics (UK)

REACH — Registration, Evaluation, Authorisation & Restriction of Chemicals (EU/UK chemicals regulation)

REACT — the UK's first cross-institution research centre for sustainable electronics

SRUC — Scotland's Rural College

TRL — Technology Readiness Level (e.g., TRL 4–7 pilot/demo readiness)

ZWS — Zero Waste Scotland

Summary

THEME	STRENGTHS	BARRIERS	ACTIONS
Public Procurement	Proven pilots in food, textiles, energy, and bioeconomy; strong policy support	Limited circularity criteria in contracts; risk aversion; lack of supplier certification	Update frameworks; launch pilots; develop procurement-ready specs; train buyers
SME Innovation & Scale-Up	Active SMEs in food, textiles, bioeconomy, electronics	Fragmented access to pilot infrastructure; high costs	Intervention pilot programmes; create centralised portals
Infrastructure Co-location	AD plants, biorefineries, textile hubs, energy clusters show feasibility	Dispersed supply chains; planning delays; lack of anchor tenants	Feasibility studies; support modular design strategies; incentivise co-location
Digital Tools & Traceability	DPPs, BIM, digital twins in textiles, manufacturing, construction, ICT	Low SME awareness; fragmented data systems; integration challenges	Launch pilots; develop standards; organise training and support platforms
Circular Design & Modularity	Pilots in textiles, manufacturing, electronics; strong academic support	Legacy design standards; lack of modularity in procurement	Develop design standards; intervening modular pilots
Carbon & Resource Efficiency	Precision agriculture, carbon farming, circular insulation, blade reuse	Verification gaps; tenancy barriers; lack of lifecycle costing	Develop carbon codes; intervening pilots; lifecycle costing in procurement
Regional Hubs & Clusters	Hagshaw Energy Cluster, textile hubs, biomass aggregation pilots	Coordination challenges; capital costs; fragmented governance	Scale successful models; fund regional feasibility; support cluster coordination
Regulatory Navigation	SEPA sandboxes, REACH support proposals, FSS consultation process	Dual UK–EU compliance; unclear licensing; SME capacity gaps	Create support consortia; publish guidance
Workforce & Skills	Training programmes (textiles, bioeconomy, ICT, construction)	Limited access to micro-credentials; SME time constraints	Develop sector-specific training; incentivise apprenticeships

Introduction

The European Circular Innovation Valley (ECIV) is a flagship initiative under Horizon Europe's Regional Innovation Valleys programme. It connects innovation ecosystems across Europe to tackle major EU challenges, reducing fossil fuel reliance, improving food security, mastering digital transformation (including AI and cybersecurity), enhancing healthcare, and achieving circularity. Scottish Enterprise and IBioIC joined the ECIV consortium, positioning Scotland within a pan-European network of circular innovation. ECIV is best understood as Europe's "dance floor" for circularity; where businesses, researchers, governments, and communities co-create solutions that turn waste into resources, design smarter products, and build resilient, low-impact value chains. ECIV's twelve missions are:

- Water Management
- Food and Agriculture
- Bioeconomy
- Textiles
- Plastics
- Steel and Metals
- Manufacturing
- ICT & Electronics
- Energy Storage
- Energy Production
- Transport and Mobility
- Construction

The missions addressed in this document reflect outputs from examining Scotland's current market conditions and policy priorities and have in some instances been incorporated into other missions to best reflect the interconnected nature of the sectors. This action plan prioritises sectors where circular innovation is most needed and most feasible in Scotland, and where alignment with Scottish Enterprise's strategic missions is strongest. Scottish Enterprise's strategic missions are:

- Accelerating the energy transition
- Scaling innovation and entrepreneurship
- Driving capital investment to boost productivity

The Circular Economy (Scotland) Act 2024 and the Circular Economy and Waste Route Map to 2030 provide the legislative and strategic foundation for Scotland's approach to circularity. This plan complements those frameworks by identifying actionable opportunities for businesses, researchers, and public bodies to align with ECIV missions and accelerate Scotland's circular transition.

Scottish Enterprise IBioIC

Methodology

- Developed through a structured, iterative process aligned with the ECIV mission-oriented innovation framework
- Methodology draws directly from the ECIV regional action plan model
- Tailored to Scotland's policy context, innovation ecosystem, and stakeholder landscape
- Began with comprehensive mapping of the current state of Scotland's circular economy
- Initiated stakeholder engagement to understand roles, relationships, and governance structures across sectors
- Reviewed existing material flow analyses to assess how materials move through Scotland's economy
- Undertook system mapping to identify interconnections, feedback loops, and leverage points
- Reviewed regulatory, infrastructural, and technological conditions to understand enabling factors and barriers to transition
- Conducted a SWOT analysis to assess strengths, weaknesses, opportunities, and threats for circular economy development
- Identified high-impact leverage points (e.g. policy instruments, funding mechanisms, procurement levers)
- Analysed sector-specific value chains and companies to identify effective intervention points
- Used stakeholder engagement to validate findings and ensure alignment with lived experience and operational realities

- Opportunities and challenges were prioritised using a structured approach, including risk assessment and effect-versus-effort evaluation. This distinguished between quick wins, strategic investments, and longer-term transformation pathways
- Prioritisation was grounded in Scotland's economic and environmental context and reflected the ambitions of the ECIV missions
- Final phase considered theories of change and leverage points, including proposals for local innovation platforms, industrial symbiosis networks, and cross-sector collaboration within Scotland and across the UK and EU
- Resulting action plan designed as both a strategic roadmap and a practical tool for guiding Scotland's contribution to the ECIV programme
- Remainder of the document presents the findings, including stakeholder insights, a prioritised set of circular economy opportunities, and a portfolio of strategic initiatives

Scottish Enterprise IBioIC

Food and agriculture

Scotland's food and agriculture sector is undergoing strategic transformation to address climate change and resource inefficiency. It plays a central role in national missions around bioeconomy, land use, and food system resilience, supported by agencies such as SEPA, NatureScot, Zero Waste Scotland, and research institutions like SRUC and the James Hutton Institute. Scotland also generates more than 10 million tonnes of organic surplus each year.

Base scenarios at current carbon market prices		Carbon Revenue	Jobs – FTE
Peatland	Restoring 10% of degraded peatland	£8.7m	10
Forestation	Setting aside 15% of agricultural land and planting native woodland at 1,600 trees per hectare	£312m	2,320
Silvopasture (a blend of tree growing, foraging and grazing on the same land)	Setting aside 10% of agricultural land, planting native woodland at 400 trees per hectare	£16m	1,820
Enhanced scenarios at greater levels of uptake and higher carbon prices			
Forestation	Setting aside 20% of agricultural land, planting native woodland 1,600 trees per hectare	£831m	3,060
Silvopasture and forestation	Setting aside 25% of agricultural land, planting native woodland 1,600 trees per hectare; 20% of grassland converted to silvopasture	£1.6b	7,550
High carbon value integrated	Setting aside 30% of agricultural land, planting native woodland at 1,600 trees per hectare, converting 25% of grassland to silvopasture	£3.2b	9,320

- Valorisation of by-products from whisky production (draff and pot ale), shellfish waste, and surplus produce is emerging as a profitable circular opportunity
- These materials are being converted into functional ingredients, bioplastics, and packaging by innovators such as MiAlgae and CuanTec
- Scotland's 80+ anaerobic digestion (AD) plants are rarely co-located with food processors, limiting circular integration
- Companies including Glenfiddich and BrewDog convert residues into biogas for heat, power, and fuel
- Glenfiddich's AD system has reduced CO_2 emissions by over 95%, while BrewDog's Ellon site has cut water use by 50%
- Precision agriculture is advancing through GPS-guided machinery, soil sensors, and AI analytics
- Scottish SMEs such as Soilessentials are supported by the £14 million Future Farming Investment Scheme and National Robotarium pilots
- These technologies reduce input waste, improve soil health, and boost productivity, particularly in Tayside, Fife, and the Borders
- Public sector food procurement is a strategic lever for circular adoption
- Pilots show upcycled products and compostable packaging can reduce waste, cut costs, and stimulate SME demand (e.g. Revive Eco)
- Regional biomass aggregation hubs, such as HIE's Argyll and Bute project, demonstrate how fragmented residues (e.g. straw, bark, sawdust) can be transformed into local circular value
- HIE estimates the long-term carbon market potential for Argyll and Bute at tens of millions to billions of pounds
- A proposed Scottish Novel Food Innovation Hub could address access to pilot facilities and regulatory complexity. This would support SMEs with safety assessments, scale-up, and export access, reinforcing Scotland's position as a leader in circular food systems

Scottish Enterprise IBioIC

Bioeconomy

'Grangemouth has long been one of Scotland's leading industrial locations, with over a century of experience in petrochemical refining and manufacturing. The site and its surrounding area are currently undergoing an economic transformation - developing into a world-class manufacturing hub for low carbon, sustainable fuels, and fine chemicals.' (Scottish Development International)

Scotland’s bioeconomy underpins circular transition by converting over 10 million tonnes of bioresources annually from agriculture, food and drink, wastewater, and forestry into high-value products. These flows are increasingly being valorised into bio-based chemicals, energy, and functional ingredients through a rapidly growing ecosystem of SMEs and innovation centres.

- Modular biorefineries offer a scalable model for regional biomass conversion
- Facilities such as Celtic Renewables’ ABE plant in Grangemouth demonstrate viability, supported by IBioIC’s bioresource mapping tool for feedstock matching and site selection
- Co-location with industrial clusters reduces transport emissions and enables integration with district heating and logistics systems
- SMEs face barriers accessing TRL 4–7 infrastructure, with uneven pilot facility availability, limited technical support, and high costs slowing commercialisation
- Digitalisation using AI, IoT, and digital twins is advancing fermentation and downstream processing
- Capacity is being built by centres such as CENSIS and IBioIC, though uptake remains limited due to cost and technical complexity
- Regulatory navigation remains challenging, particularly around REACH compliance and waste-derived feedstocks
- SMEs often lack resources to manage dual UK–EU alignment, delaying innovation and market entry
- Scotland’s marine bioeconomy is constrained by fragmented licensing and limited processing capacity
- While seaweed cultivation is expanding, unclear classification pathways and infrastructure gaps hinder scale-up
- Multi-species hubs demonstrate potential for scalable production of food-grade, cosmetic, and packaging ingredients
- Emerging pollutants (e.g. microplastics, pharmaceutical residues) are not effectively captured by conventional wastewater systems
- Scottish SMEs are developing low-energy filtration and monitoring technologies, but face barriers to certification and deployment
- Scotland’s bioeconomy could be accelerated through investment in modular biorefineries and regional processing hubs
- Priorities include expanding SME access to pilot infrastructure, supporting digitalisation via innovation centre partnerships, streamlining regulatory processes, and reforming marine licensing to enable scalable seaweed and multi-species hubs

Scottish Enterprise

IBioIC

Textiles and Fashion

Scotland's textiles sector is undergoing a strategic shift as it confronts high environmental impact and global supply chain vulnerabilities. Though textiles account for just 4% of household waste by weight, they contribute nearly 32% of its carbon footprint[10]. The sector itself aims to grow to £540 million in GVA and 13,000 jobs by 2030[11]. It is regionally significant, particularly in rural areas, and benefits from a strong heritage in wool and knitwear. Companies like Prickly Thistle, Johnstons of Elgin, and KC Manufacturing are pioneering circular design, reuse, and modular manufacturing.

	Waste by weight	Waste by net carbon impacts
Remaining waste categories	54%	17%
Paper and cardboard wastes	12%	3%
Metallic wastes, mixed ferrous and non-ferrous	3%	4%
Plastic wastes	9%	14%
Animal and mixed food waste	18%	30%
Textile wastes	4%	32%

- Regional textile sorting and reprocessing hubs could enable fibre-to-fibre recycling and reuse, reducing landfill and export
- The Circular Textiles Fund has supported 20+ projects, and the Waste Reprocessing Infrastructure Report identifies textiles as a priority stream
- Charities and social enterprises supported by Circular Communities Scotland (e.g. Stitch the Gap) demonstrate local reuse viability, but would benefit from stronger industrial integration
- Circular design and manufacturing pilots, led by organisations such as KC Manufacturing and Prickly Thistle, demonstrate scalable zero-waste apparel through modular systems and redistributed production
- Projects including ReMantle and Make show how co-location with design schools and innovation centres supports training and SME development
- Extended Producer Responsibility (EPR) for textiles could shift waste accountability to producers and incentivise circular design and recovery
- A voluntary Scottish pilot involving brands and reuse organisations could test fee structures and logistics, funding infrastructure and supporting market development
- Natural fibre innovation and regenerative cultivation (e.g. flax, hemp, nettle, wool) offer opportunities to reduce imports and support rural economies
- Trials by the Scottish Fibre Flax Field Lab and initiatives such as Fibreshed Scotland demonstrate strong yields and decentralised production potential
- Linked initiatives include Fantasy Fibre Mill (fibre processing and economic potential) and Edinburgh Street Stitchers, promoting mending and soil-to-soil circularity
- Digital Product Passports (DPPs) can improve traceability and circularity by embedding material composition and lifecycle data. CENSIS and GS1 UK are developing standards, while NMIS is piloting DPPs for high-integrity sectors
- A pilot involving Scottish producers and public buyers could validate DPP deployment in textiles

Scottish Enterprise IBioIC

Energy Systems

Scotland's energy production sector is a cornerstone of its net zero transition and a strategic platform for circular innovation. While renewable generation now exceeds national electricity demand, the infrastructure underpinning it remains resource intensive, with rising demand for steel, concrete, and rare earth elements.

Estimates only (FTEs)	2023 (rounded)	% of All
All sectors	33,500	
Other energy efficient products	8,000	23.90%
Energy efficient lighting	3,800	11.30%
Offshore wind	3,500	10.40%
Onshore wind	3,300	9.90%
Low emission vehicles and infrastructure	2,500	7.50%
Renewable heat	2,200	6.60%
Nuclear	2,100	6.30%
Low carbon financial and advisory services	1,900	5.70%
Energy monitoring, saving or control systems	1,600	4.80%
Solar photovoltaic	1,100	3.30%
Bioenergy	1,000	3.00%
Hydropower	800	2.40%
Renewable combined heat and power	500	1.50%
Fuel cells and energy storage	500	1.50%
Other renewable electricity	400	1.20%
Alternative fuels	200	0.60%

- The sector contributed over £6.6bn GVA and supported 47,000+ jobs, with strengths in offshore wind, hydropower, and renewable heat. Within low-carbon and renewables, employment stood at approximately 33,500 FTEs in 2023
- Growing volumes of end-of-life energy infrastructure are driving demand for reuse and recovery solutions
- Wind turbine blade reuse addresses a complex waste stream, with companies such as ReBlade converting blades into public infrastructure and trialling downsizing and material recovery
- Material recovery from decommissioned assets enables reuse of steel, copper, aluminium, and critical raw materials from turbines, grid assets, and EV batteries. Companies including EMR are supporting more circular and resilient supply chains
- Recovery hubs co-located with ports and industrial estates could reduce import dependence and strengthen regional resilience
- Hydrogen infrastructure presents opportunities to embed circularity across production, storage, and component reuse
- Projects such as HydroGlen demonstrate locally embedded systems combining on-site generation, storage, and distribution
- Companies like Logan Energy and innovation programmes are developing circular refuelling infrastructure and low-carbon manufacturing of electrolysers and fuel cells
- Integrated regional energy clusters are emerging as a circular delivery model. The Hagshaw Energy Cluster integrates wind, solar, biomass, storage, blade reuse, and shared logistics. These clusters enable full lifecycle asset management, support local economic development, and provide a replicable model for Scotland
- Wastewater heat recovery is an underutilised opportunity to cut emissions and improve energy efficiency
- Projects at Borders College and Stirling demonstrate systems supplying up to 95% of heating demand, with significant emissions reductions

Manufacturing

- Scotland's manufacturing sector is undergoing strategic reorientation in response to decarbonisation and resource efficiency
- Its systemic importance reflects strong interconnections with construction, energy, ICT, and transport
- Digital Product Passports (DPPs) are advancing traceability and remanufacturing in high-integrity sectors. NMIS and the University of Strathclyde have developed the ReMake DPP, integrating lifecycle data to support reuse and compliance. GS1 UK is working to standardise frameworks aligned with EU regulations
- Public contracts can validate deployment, while SME adoption is supported through infrastructure, training, and procurement reform
- Modular design and end-of-life strategies are being embedded in industrial equipment manufacturing to extend asset lifespans and retain material value
- SP Automation & Robotics delivers bespoke modular automation systems that can be adapted, upgraded, or remanufactured as production needs evolve. This approach is supported by public-sector initiatives, including SIR's Design for Remanufacture Toolkit
- Circular procurement frameworks are being piloted to stimulate demand for reused and remanufactured components
- SP Energy Networks, with Zero Waste Scotland and Interreg ProCirc, has embedded circular metrics in procurement
- ScottishPower has committed to 100% blade recycling and 50% sustainable steel use by 2030
- Regional remanufacturing hubs are proposed to refurbish turbine and grid components. Co-location with ports and industrial estates, supported by investment zone funding, would enable disassembly, inspection, and refurbishment
- Industrial water loop demonstrators offer high-impact opportunities to reduce water use, discharge, and energy demand
- Companies including Cascade Water Products, Bridge Biotechnology, Carbogenics, and Dryden Aqua are developing greywater recycling, nutrient recovery, and low-energy purification
- IoT-based monitoring platforms from ProcessPlus and M2M Cloud support performance tracking

Scottish Enterprise

IBioIC

Electrical & Electronic Equipment

- Scotland's ICT & Electronics sector is entering a critical phase of transformation driven by environmental, economic, and geopolitical pressures
- Electronics are among the fastest-growing global waste streams, with the UK second worldwide for per-capita e-waste generation
- The sector is energy-intensive and closely linked to manufacturing, energy, transport, and healthcare
- Circular design standards in ICT procurement can reduce embedded emissions and extend asset lifespans
- The REACT Centre is developing modular, repairable electronics, alongside CENSIS and GS1 UK work on digital product passports (DPPs)
- Scottish Procurement has integrated circularity into ICT frameworks, though application to energy infrastructure systems remains inconsistent
- Regional disassembly and component recovery hubs could enable extraction of high-value materials from energy-related electronics. Retronix and WEEE Scotland provide advanced recovery services, while Enscape Consulting has piloted biological and electrochemical recovery with academic partners
- Lifecycle modelling supports predictive maintenance and emissions tracking across ICT infrastructure
- Scotland's Green ICT Strategy and AI Playbook promote lifecycle-based procurement
- The Data Lab supports applied data and AI projects to optimise performance and resilience
- Additive manufacturing (AM) enables modular design and use of recycled materials in ICT and electronics. NMIS has supported 100+ SMEs through the AM-BATS programme, with Angus 3D Solutions pioneering circular AM with Renewable Parts
- A recurring innovation challenge fund could accelerate circular electronics by supporting SMEs and spinouts
- REACT, Zero Waste Scotland, and Scottish Enterprise provide technical and financial support, with public sector buyers positioned to validate emerging products

Construction and Built Environment

Waste category	Amount by weight (tonnes)	Percentage of total (%)
Soils	685,000	37.8
Sorting residues	562,000	31.0
Household and similar	294,000	16.2

- Scotland's construction sector is undergoing transformation driven by environmental, economic, and regulatory pressures. Construction and demolition account for over 50% of Scotland's waste by weight, with soils, concrete, timber, brick, and insulation frequently landfilled or down-cycled
- Soils represented 37.8% of landfilled waste in 2024, while embodied carbon in cement, steel, and glass is a major contributor to industrial emissions
- Circular timber recovery is being trialled through small-scale hubs that collect, sort, regrade, and certify reclaimed wood
- Co-location with demolition zones and civic sites, supported by digital tracking and waste audits, could enable structural reuse under building regulations
- Clay bricks are often discarded despite durability due to lack of standardised reuse protocols
- Pilot hubs could demonstrate cleaning, sorting, grading, and certification aligned with building warrant regulations
- Bio-based insulation from hemp, straw, wool, and industrial fibre residues offers carbon storage and regenerative land-use benefits
- IndiNature manufactures certified hemp insulation and has received national recognition for carbon-negative products
- Circular retrofit kits using modular, pre-certified components (e.g. reused windows, doors, insulation, heating systems) are being validated through innovation challenges. Suppliers such as Kenoteq provide certified components, with kits manufactured regionally using reclaimed and bio-based materials
- Digital construction and deconstruction tools (BIM, digital twins, material passports) are embedding circularity at the design stage
- These tools support selective deconstruction and material recovery and are being integrated into planning and procurement
- Nature-based urban water infrastructure (constructed wetlands, bioswales, rain gardens) manages stormwater at source while delivering biodiversity and cooling benefits
- Projects such as Scottish Water's Cowdenbeath CSO Wetland and Glasgow's Smart Canal demonstrate feasibility

Sector Takeaways

Food and Agriculture

- Key opportunities include by-product valorisation, regional biomass aggregation hubs, and precision agriculture
- A Scottish Novel Food Innovation Hub could support SMEs with safety assessments, scale-up, and export access
- Public sector procurement is a strategic lever to stimulate demand for circular products and drive market transformation

Bioeconomy

- Investment in modular biorefineries and regional processing hubs (e.g. Grangemouth) is critical for converting bioresources into high-value products
- Improved access to pilot infrastructure and digitalisation can overcome commercialisation barriers
- Streamlined regulation and reformed marine licensing are key enablers for scalable production and innovation

Textiles and Fashion

- Opportunities include fibre-to-fibre recycling, extended producer responsibility (EPR), and natural fibre innovation
- Actions include piloting EPR schemes, supporting regional textile hubs, and fostering community initiatives
- Initiatives such as Fantasy Fibre Mill and Edinburgh Street Stitchers help extend product lifecycles, reduce waste, and support rural economies

Energy Systems

- Priority pathways include recovery hubs for end-of-life infrastructure, circular hydrogen pilots, and integrated energy clusters
- Material recovery, reuse, and innovative technologies enable full lifecycle management
- These approaches enhance resilience and reduce reliance on imported resources

Scottish Enterprise IBioIC

Manufacturing

- Circularity can be embedded through digital product passports, modular design, and regionalremanufacturing hubs
- Practical steps include piloting DPPs, adopting modular systems, and co-locating hubs with portsand industrial estates
- These measures extend asset lifespans and retain material value

Electrical & Electronic Equipment

- Transition is supported through modular, repairable electronics, regional recovery hubs, andinnovation challenge funds
- These measures aim to reduce e-waste, accelerate circular electronics, and stimulate SME-ledinnovation

Construction and Built Environment

- Opportunities include circular retrofit kits, timber recovery hubs, and digital tools for planning andselective deconstruction
- Adoption of bio-based insulation, standardised reuse protocols, and nature-based urban waterinfrastructure supports waste and emissions reduction

Key Takeaways

- Across all sectors, digitalisation, SME enablement, skills development, and regulatory alignment are recurring enablers of successful implementation
- These actions are interconnected, with progress in one area often enabling or amplifying opportunities in others
- Collaboration between public, private, and community stakeholders is essential to scale impact and deliver system-wide change
- Stakeholders are encouraged to use this Action Plan as a strategic roadmap
- Recommendations are intended to be adapted and built upon through ongoing engagement, collaboration, and knowledge sharing
- The collective actions outlined provide a strong foundation for Scotland's leadership in the circular economy and a more sustainable, resilient future
- Scotland's participation in the European Circular Innovation Valley marks a pivotal step towards sustainability and resilience
- By embedding circular principles across food, bioeconomy, textiles, energy, manufacturing, electronics, and construction, the Action Plan provides a clear roadmap for collaboration and innovation
- The opportunities and actions identified are designed to accelerate Scotland's transition, leveraging national strengths while addressing sector-specific challenges
- Continued engagement, partnership, and knowledge sharing will be critical to realising the full potential of circularity
- The Action Plan is intended to serve as both a guide and a catalyst, supporting delivery of legislative and strategic commitments and enabling Scotland to lead by example within the wider European community

European
Circular
Innovation
Valley

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5 - Conclusions

Conclusions

The Regional Action Plans represent the regional implementation of the ECIV Transformative Innovation Programme.

Through the RAPs, partner regions translate the ECIV mission-oriented innovation approach into concrete regional commitments, activities, and pathways for change. In line with the ECIV mission-oriented innovation approach, the RAPs help move from strategic direction to coordinated action.

They provide a structure through which regions can align stakeholders, mobilise resources, and develop portfolios of initiatives that contribute to the ECIV submissions and shared circular transition goals.

At the same time, the RAPs form the basis for continuous learning and adaptation within the ECIV partnership.

Through monitoring, reflection, and dialogue, regions will update their priorities and activities as implementation progresses. In this way, the Regional Action Plans are not static documents but evolving instruments that support experimentation, mutual learning, and coordinated progress towards circular economy transformation across European regions.

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6 – Supporting Documentations
RAPs

6.1 – Additional documentation Navarra

European
Circular
Innovation
Valley

Annex

Evidence of regional events on circular place-based missions

I PLACE-BASED MISSIONS ON CIRCULARITY WORKSHOP

II PLACE-BASED MISSIONS ON CIRCULARITY WORKSHOP

CIRCULAR AGRIFOOD

CIRCULAR WATER MANAGEMENT

CIRCULAR PACKAGING

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2. Regional system context and starting point

I PLACE-BASED MISSIONS ON CIRCULARITY WORKSHOP 28.02.2025

Image 1 : 28.02.2025 I workshop

On 28 February 2025, Navarra's circular economy ecosystem met at Sala Salesas to advance the mission-oriented approach under ECIV and Navarra Zirkular. The event focused on presenting the results of the value chain analyses conducted in priority sectors and moving toward collective prioritization of action lines.The circular value chain analysis for packaging, agrifood and circular water management. Based on this work, participants engaged in a voting process to prioritize strategic lines of action.

The event represented a significant step in consolidating a shared regional vision, aligning stakeholders around concrete priorities, and reinforcing Navarra's transition toward coordinated, mission-driven circular economy action.

II PLACE-BASED MISSIONS ON CIRCULARITY WORKSHOP - 16.05.2025

Image 2 : 16.05.2025 Ii workshop

On 16 May 2025, Navarra's circular economy ecosystem came together at Baluarte for the II Place-Based Missions on Circularity workshop, advancing the region's mission-oriented approach under ECIV and Navarra Zirkular. The workshop was structured around dedicated rooms for each mission, allowing participants to explore sector-specific challenges and opportunities in circular value chains, including packaging, agrifood, and circular water management. Building on preliminary analyses and questionnaires that identified priorities and critical factors for each mission, attendees engaged in interactive discussions to define priorities and factors affecting the circular economy transition.

By combining rigorous analysis, collaborative discussion, and cross-sector engagement, the workshop represented a significant milestone in consolidating a shared regional vision and reinforcing Navarra's coordinated, mission-driven transition toward a circular economy. All in all with the political commitment with the participation of the regional minister.

2. Regional system context and starting point

CIRCULAR AGRIFOOD - 10.09.2025

Images 3 : 10.09.2025 III workshop

Navarra's agrifood ecosystem gathered to advance the circular economy transition under **ECIV** and **Navarra Zirkular**. Participants explored the valorisation of agroindustrial by-products, identified opportunities for interregional collaboration, and discussed project ideas aligned with ECIV's innovation framework. The workshop contributed to defining priorities for circular agrifood initiatives and supporting Navarra's mission-driven approach.

CIRCULAR WATER MANAGEMENT - 25.09.2025

Images 4 : 25.09.2025 IV workshop

A technical session focused on industrial water regeneration brought together companies, policy makers, and research institutions. Attendees reviewed challenges, potential solutions, and collaborative opportunities for circular water management. Insights from this session will guide regional strategic action lines and feed into ECIV's interregional project development.

CIRCULAR PACKAGING - 10.10.2025

Images 5 : 10.10.2025 V workshop

Navarra's packaging ecosystem met to advance the industrialisation of circular packaging under ECIV. Participants explored collaborative innovation opportunities, shared sector challenges, and prioritized strategic actions for circular packaging solutions. The session fostered stakeholder engagement, B2B collaboration, and alignment with ECIV's mission-driven objectives, contributing to the region's roadmap for sustainable industrial transformation.

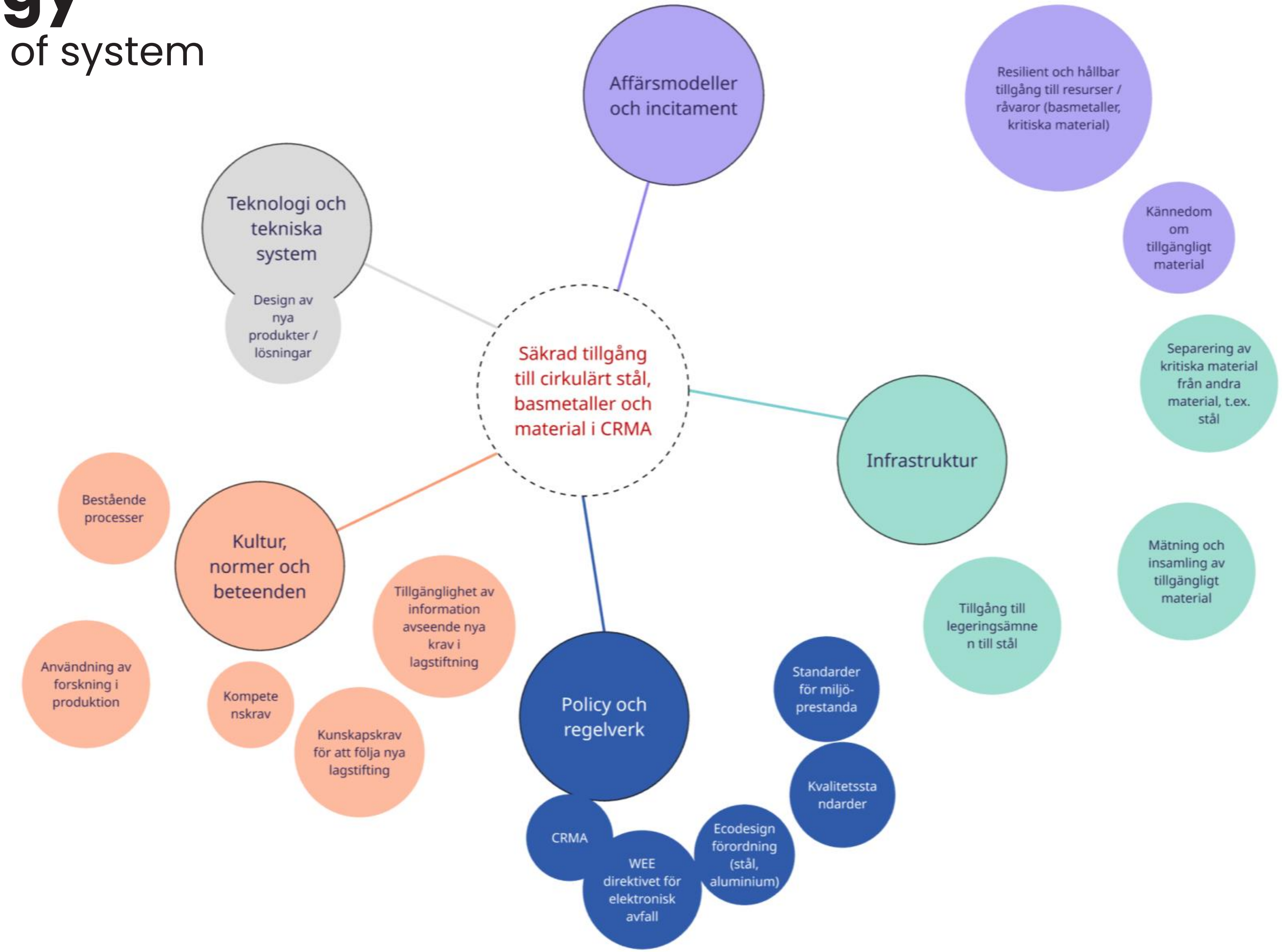
6.2 – Additional documentation North Middle Sweden

Referenced governing document for NMS

[Strategy for Industrial Transformation in North-Middle Sweden]

ToC Methodology

Example and illustration of system exploration map
Metals
Step 1



ToC Methodology

Example and illustration of simplified system map
Metals
Steps 2 and 3

RIPPLE EFFECTS

Which variables or loops have a strong effect on the entire system?

FROZEN AREAS

Which parts of the map are quite hard to change?

POTENTIAL FOR CHANGE

Where in the map you see high potential for change?

POSITIVE CHANGE HAPPENING

Where in the map you see positive change already happening?

ToC Methodology

Example and illustration of Theory of Change: Metals
Step 4

Starting point → **Resources** → **Actions** → **Desired result 2029** → **Expected change/impact** → **Submission**

Starting point	Resources	Actions	Desired result 2029
Low value creation of side streams (i.e. waste water)	Expertise / ongoing research regarding waste water treatment Expertise and networks regional innovation hubs Expertise within regional innovation	Industrial tests / testbeds Pilots for technical solutions Develop and scale technologies for industrial application. Investigate industrial symbiosis	Increased value creation. Circular use of side- / byproducts. Cost-effective solutions for minimising sidestreams/waste streams
Lack of processes for circular products (9R)	Existing production processes Existing products Industrial testbeds and pilot production environments Committed industrial partners with mandate to experiment Applied technical expertise in material flow and process optimisation	Development of new proscesses for ectration of REEs from production and existing products (metals) Test of sorting processes Accelerate technological development for reuse and recycling.	Developed technology for New processes for production of circular products. New business models.
Lack of knowledge about extraction of REEs - techique and environmal impact	Existing waste-material from mining for extraction Existing waste materials from industrial production. Existing waste from machines, products, materials Ongoing research (in Sweden) regarding extraction techniques Mining companies	Testing of processes and techniques for accessing REEs in existing products and materials Investigate models of industrial symbiosis Develop and scale technologies for industrial application.	Increased knowledge and skills of technical solutions for REE extraction. Existing landfills, waste streams and products become resources for material recovery.

Expected change/impact

- Strengthen competetiveness of the industrial sector.
- New circular business
- Increased resilience and preparedness of essential supply chains
- Attractive conditions for industrial establishment.
- Minimise the use of chemicals.

Submission

Accelerate the use of circular steel and other base metals, and increase circular use of materials covered by the Critical Raw Materials Act.

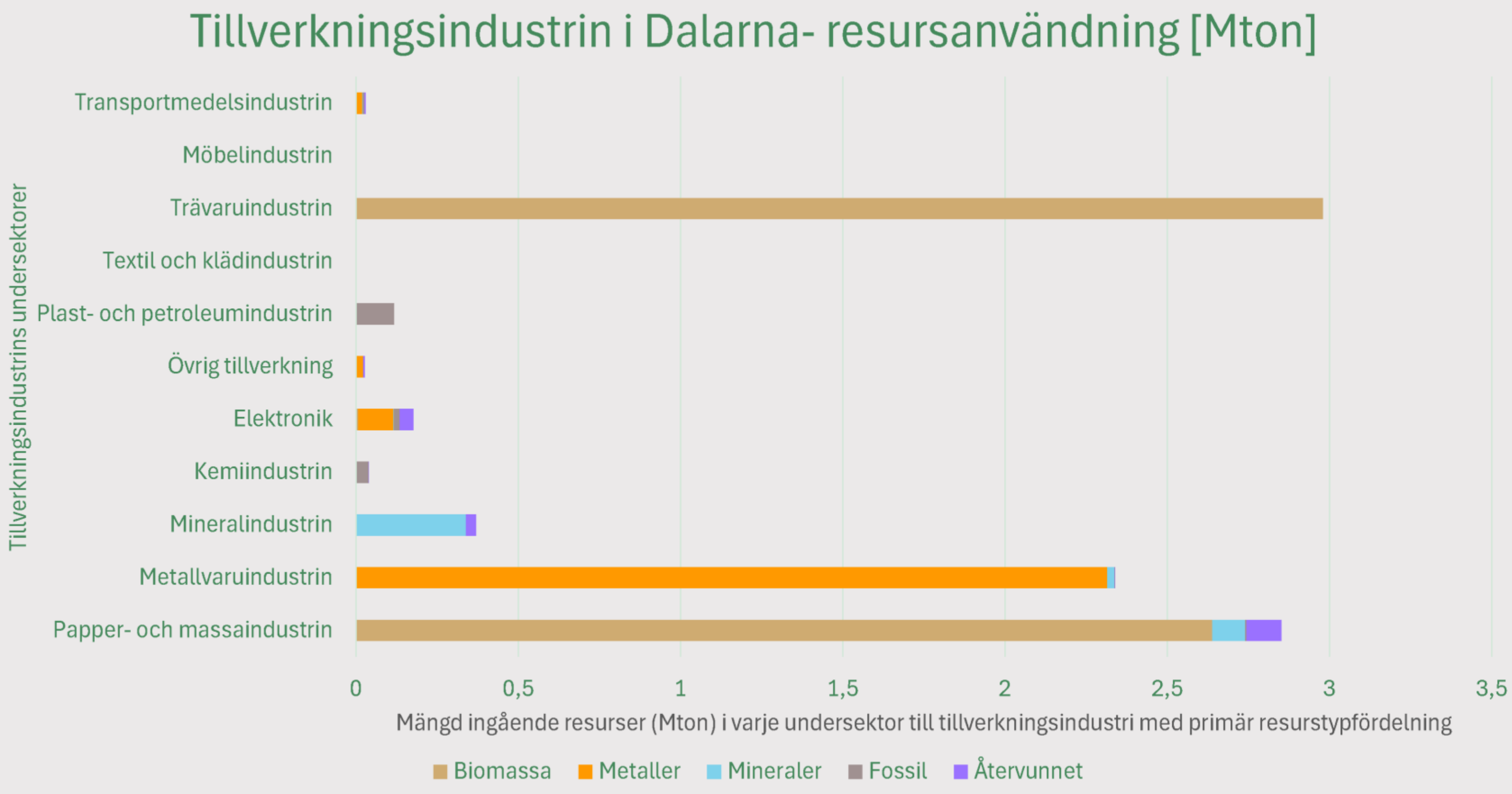
Resursanvändning i Dalarna

Graf som visar tillverkningsindustrins resursanvändning uppdelat i undersektorer

Mapping Regional Resource Use

This method, developed by Anthesis, maps resource use across economic sectors at regional and municipal level. Resource inputs are analysed by sector and grouped into five main categories: biomass, minerals, metals, fossil materials and recycled materials.
The sectoral structure follows the Swedish industrial classification system (SNI codes). Data is compiled from national statistics (e.g. Statistics Sweden – SCB), economic reports and sector-specific information. Where statistical data is limited, interviews with key companies and sector representatives are used to complement the analysis. Leading companies are treated as representative for their respective sectors in order to estimate overall resource use patterns. The approach allows for both bottom-up and top-down estimations of resource use within individual sectors.
The method provides an overview of how material resources enter and are used within the regional economy and helps identify opportunities for circular resource flows.

The graph illustrates the major resource flows in the manufacturing industries and highlights key material inputs to the regional economy.



Resursanvändning i Värmland

Graf som visar tillverkningsindustrins resursanvändning uppdelat i undersektorer

Mapping Regional Resource Use

This method, developed by Anthesis, maps resource use across economic sectors at regional and municipal level. Resource inputs are analysed by sector and grouped into five main categories: biomass, minerals, metals, fossil materials and recycled materials.
The sectoral structure follows the Swedish industrial classification system (SNI codes). Data is compiled from national statistics (e.g. Statistics Sweden – SCB), economic reports and sector-specific information. Where statistical data is limited, interviews with key companies and sector representatives are used to complement the analysis. Leading companies are treated as representative for their respective sectors in order to estimate overall resource use patterns. The approach allows for both bottom-up and top-down estimations of resource use within individual sectors.
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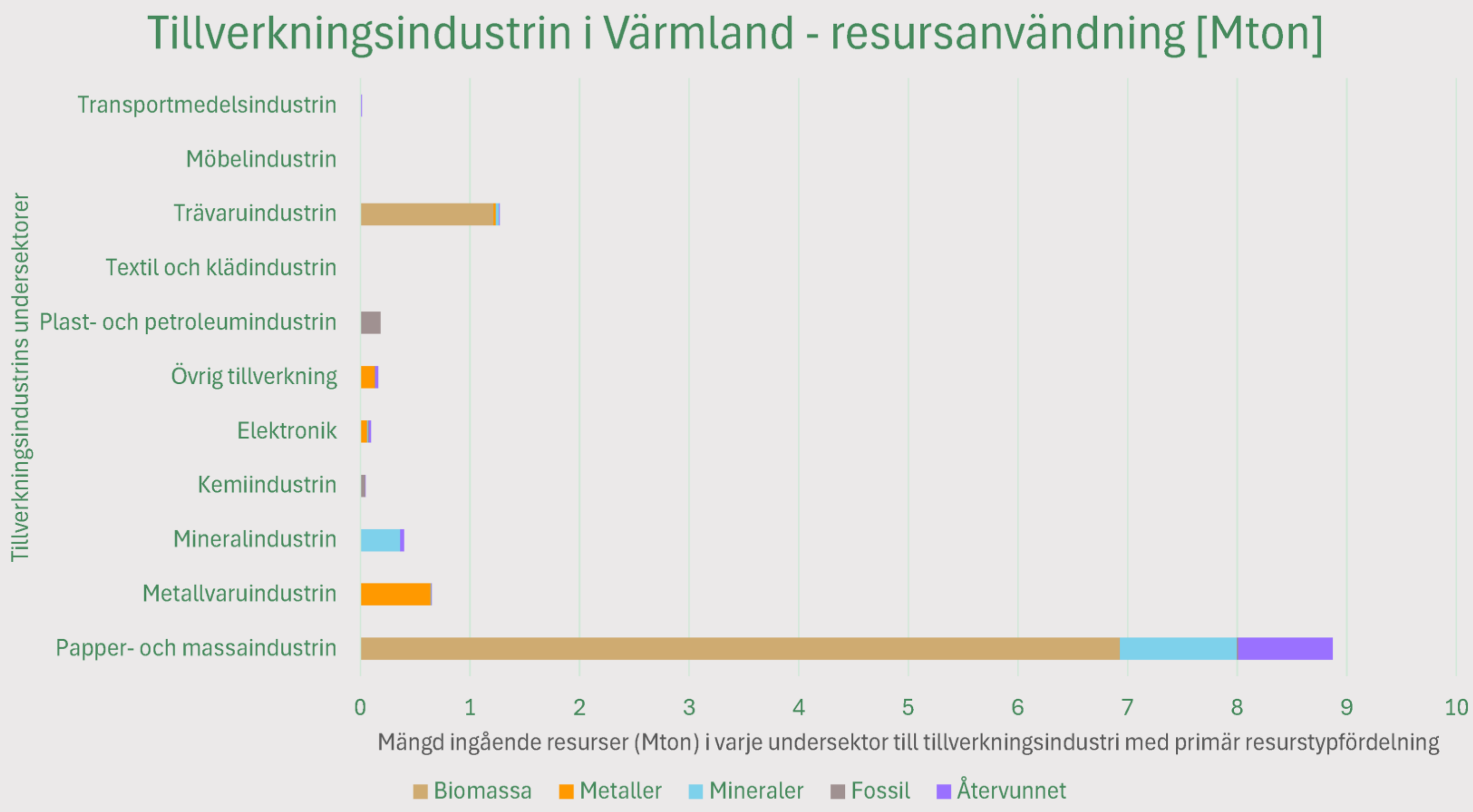


6.3 – Additional documentation Normandy

Appendices

Normandy at a Glance

3.3 millions inhabitants

Regional responsibilities

- **Local economic development and environment : waste, energy, circular economy, biodiversty…**
- Public transports
- Economy
- Agriculture
- Education

Key sectors

Industry

Energy

Logistics

Construction

Health

Equine activities

S3 Strategy

- Focuses on sustainable production and agro-ecology practices to maintain biodiversity and adapt to climate change

Preserving and Transforming Agricultural, Marine, and Forestry Resources

- Supports clean energy initiatives, particularly wind and marine, to contribute to climate goals and energy security

Carbon-Neutral Energy Mix Development

- Promotes digitalization, energy efficiency, and the use of advanced materials to modernize Normandy’s manufacturing sector

Industrial Transformation for Performance and Sustainability

- Encourages innovations in transport systems, including autonomous vehicles and electrification, to reduce emissions

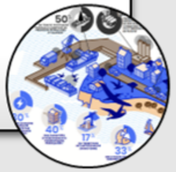
Efficient, Low-Carbon Mobility Solutions

- Advances biomedical research and digital health tools, addressing local health challenges with a focus on preventive and personalized care

Health and Resilience Innovation (5P Medicine)

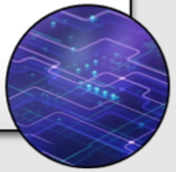
- Develops anticipatory technologies and practices for environmental and industrial risk mitigation, reflecting Normandy’s climate and industrial risk profile

Risk Management and Resilience (Emergent Priority)



- Embedded across all domains to enhance technological innovation and competitiveness, digital initiatives support the shift to Industry 4.0 and data-driven decision-making

Digital Transformation (Transversal Priority)



Methodology

Bottom-up approach

ECIV workshops with stakeholders to define missions and priorities.

Regional textile event including conferences and workshops.
Textile's stakeholder interviews to gather insights from key actors in the sector.
Interregional workshop and shared roadmap in progress with two other French regions.
Development of the Plastic plan: online consultation, workshops, and stakeholders' interviews.
Reuse & plastic clusters
Agri-food packaging day planned for September 2025
Regional event on reuse with conferences & workshop
Stakeholders' consultation in the context of the Conference of the Parties – Regional Ecological planning led bythe state

Regional studies

Textile sector study conducted by the Regional Observatory on Waste and Circular Economy.
New study underway on end-of-life management and circular business models.
Study on recycling potential in Normandy
Study on deposit & reuse : including stakeholder consultation
Study on construction waste
Study on the resilience of the agrifood system

Strategies (top down & bottom up)

Regional textile roadmap currently under development.
Plastic Plan
Ecoconstruction strategy in progress
Agrifood is a regional priority of the S3 strategy

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