REGIONAL FOCUS GROUP WORKSHOP

From Agro-Industrial Residues to High-value Chemicals

Belgium

Funded by the European Union · Grant Agreement No 101135166

SYMBIO
MEET YOUR SUSTAINABILITY TARGET

alchemia nova research

Cardiff Metropolitan University

Startup Europe
REGIONS NETWORK

Agenda

01 Introduction to SYMBIO Project

02 The Value Chain: CSL to 1,3 - PDO

03 Material Flow Analysis

04 Economic, Ecological & Social Aspects

05 Ecosystem Map

06 Designing the Implementation Blueprint

07 Validating Belgium’s Ecosystem Map

08 Networking and light Lunch

The SYMBIO Project

WP1

DATA-HUB BUILDING

Explored and analyzed regional resources that trigger symbiotic activities close to the market.

- Quantified biomass availability
- Mapped 12 promising bio-based products and transformation pathways
- Ecosystem mapping

WP2

VALUE-CHAIN DESIGN

Connecting companies in circular value chains based on their specific material flows and available technologies

- 47 prioritised value chains
- selected based on local feedstock supply, conversion technologies, and clear local market demand
- Use of AI-tool VCG.AI

Have a look at VCG-AI:

WP3

BUSINESS MODELLING

Development of a circularity index and reporting system to support companies in building a circular business model

- 11 regional value chains were prioritized via Multi-criteria decision-making analysis (MCDMA)
- Visualization through Material Flow Analysis
- Multi-criteria overview
- Followed by multi-stakeholder workshop
- Policy recommendations

WP4

BUSINESS DEPLOY

Accelerate business case development by measuring social, economic and environmental impact

- LCC, LCA, social and sociological benefits assessment
- Building Synergies with EU projects, networks, initiatives
- Exploitation routes

Pilot regions

Methodology designed, tested and validated in **12 EU pilot regions** selected based on their biological resources, infrastructure and potential for developing close-to-market CBE supply chains.



Austria

Carinthia



Belgium

Brussels Capital, Wallonia, Flanders



Croatia



Italy

Lombardy, Piedmont, Veneto, Friuli-Venezia Giulia, Emilia-Romagna

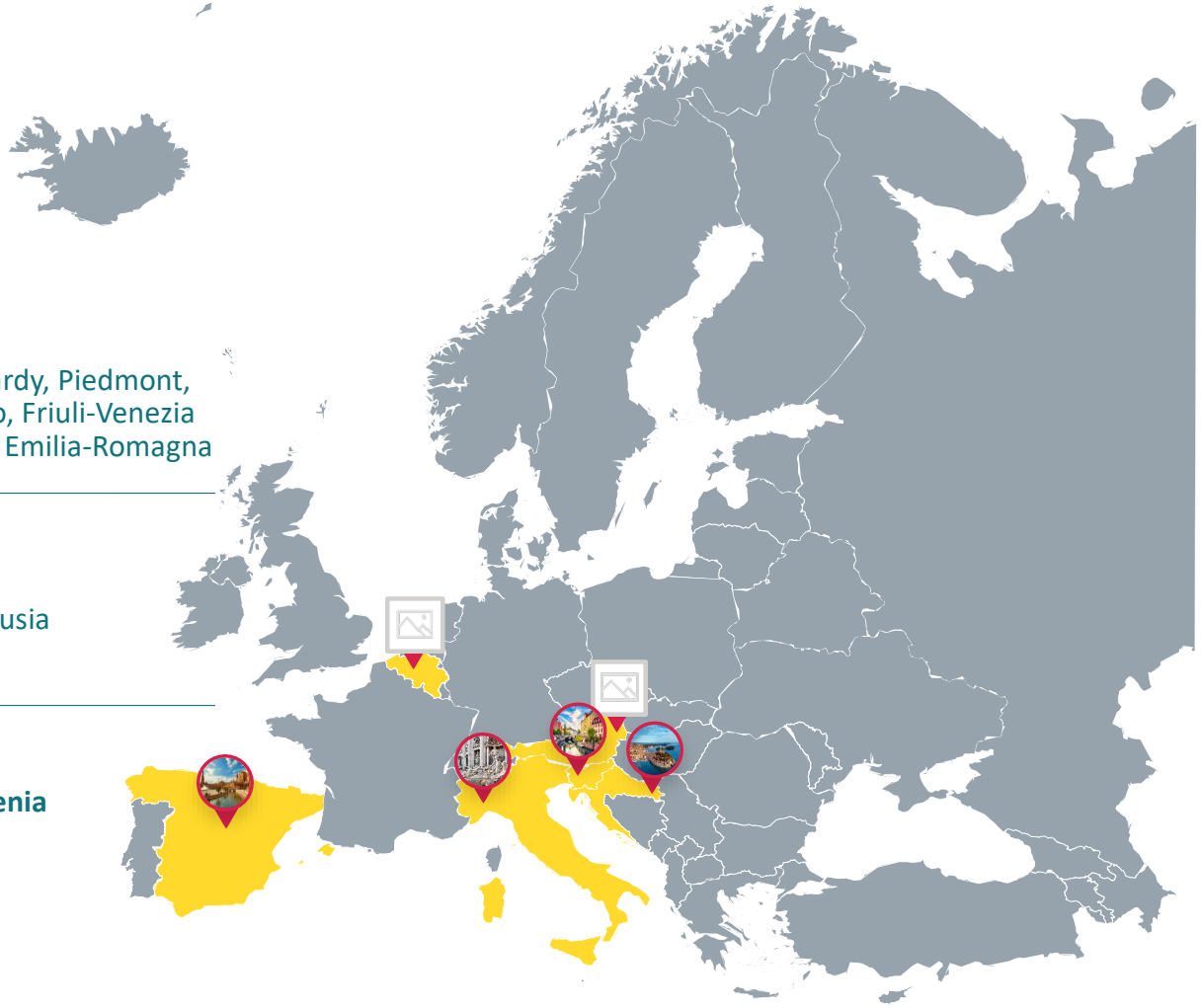


Spain

Andalusia



Slovenia



Strategic Decision-Making

Multi-Criteria Decision Analysis (MCDMA)

- Integrates **environmental, economic & social criteria**
- Enables **transparent comparison** of options
- **Ranks value chains** based on overall **performance**

Material Flow Analysis (MFA)

- Quantifies **material inputs and outputs**
- **Visualises resource flows** through the system
- Assesses **circularity and resource efficiency**
- Applicable for **ESRS E5 corporate reporting**

Multi-Stakeholder Focus Groups

- Brings together **all actors across the value chain**
- Identifies **barriers, enablers** and financing options
- Validates **implementation potential** in practice

Combining data, sustainability metrics, and stakeholder insight to guide strategic decisions.

From Corn Steep Liquor to 1,3-Propanediol

Corn Steep Liquor (CSL)

What is CSL?

A nutrient-rich liquid by-product of industrial corn wet milling — the process used to produce starch.

40–50%	3.37%
of corn dry weight	CAGR growth rate 2025 - 2035

Potential

→ Well suited for biotechnological conversion pathways

→ Nutrient rich

Current use: animal feed and bioethanol production

1,3-Propanediol (1,3-PDO)

What is 1,3-PDO?

A versatile platform chemical for bio-based polymers, cosmetics, and specialty chemicals.

USD 506,43M	9.2%
global market (2025)	CAGR growth rate (2025-2034)

Key applications

→ PTT polymers (textiles)

→ Cosmetics & personal care

→ Pharmaceuticals & specialty chemicals

The conversion of CSL into 1,3-PDO is typically achieved through microbial fermentation in combination with crude glycerol.

Material flow analysis

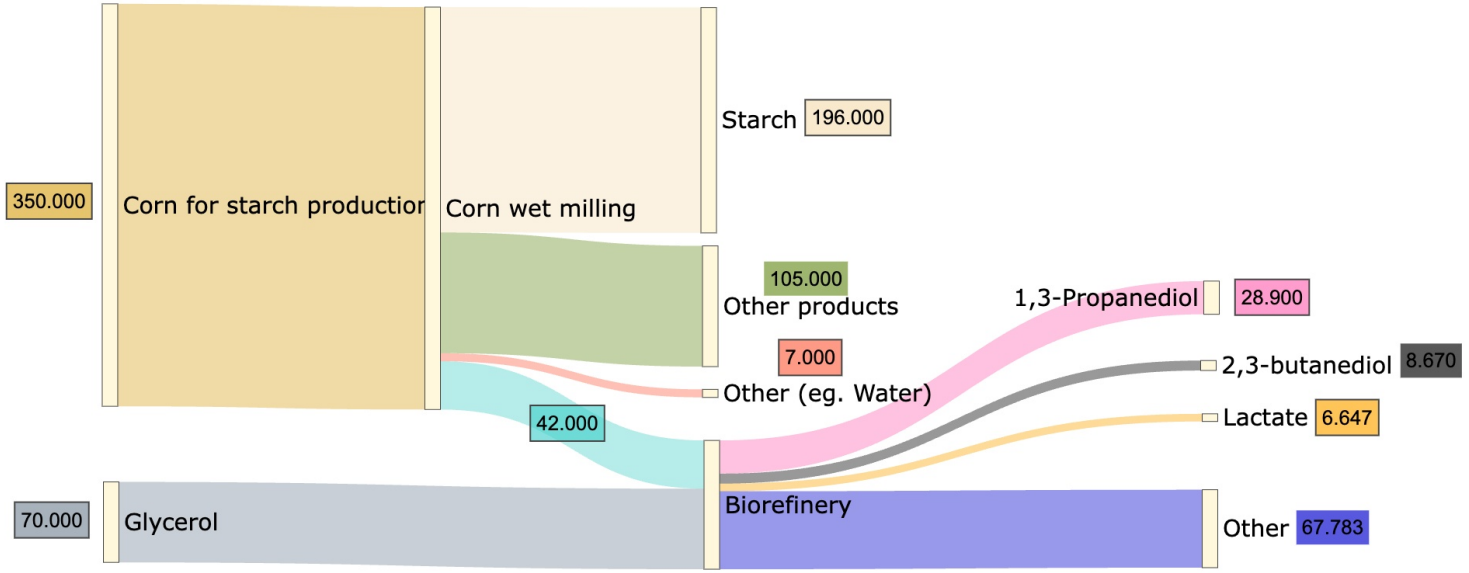
6
Starch Prod. Facilities
in Belgium

350,000 t
Corn Input Volume
Approx. per facility pa.

42,000 t
CSL Available as feedstock

70,000 t
Glycerol needed

28,900 t
1,3-PDO potential product output



Flow legend [t]

- Corn for starch production
- Starch production
- Other products from starch production
- Other (eg. Water)
- CSL for 1,3-PDO production
- Glycerol
- 1,3-Propanediol
- 2,3-butanediol
- Lactate
- Other

Economic Reality: Opportunities vs Challenges

💰 Feedstock Cost Advantage
CSL replaces expensive nitrogen sources (e.g. yeast extract) → cost reduction to one-fifth

🔬 Fermentation Efficiency
CSL supplies vitamins (B12), amino acids & minerals – increases product yield & shortens fermentation cycles

🏭 Infrastructure & Synergies
World-class chemical cluster at the Port of Antwerp-Bruges; Bio-Base Europe pilot plant for scale-up

⚠️ Challenges
Price pressure from petrochemical alternatives; competition from the livestock feed & bait industries

Growing market for biobased materials in textiles & cosmetics sector

Additional revenue through sale of by-product in an integrated biorefinery model

Feedstock availability supported by regional corn production

Reallocation of CSL for PDO production requires careful evaluation of displacement effects

Environmental Profile

–20%

GHG emissions vs. petrochemical route

–40%

Energy use vs. fossil-based production

365 days

Year-round availability (no seasonal effect)

STRENGTHS

- Low water and energy requirements
- Offers significant circularity potential
- No or minimal pre-treatment required

RISKS

- High biological oxygen demand (BOD) – wastewater risk
- Ecological performance depends on regional energy mix
- Competition with existing circular uses (eg. animal feed)

Social & Regulatory Landscape

Policy Framework	Regional Ecosystem	Tax incentives
– increasingly strict EU packaging and sustainability regulations (REACH etc.) – Go4Brussels 2030 & Flanders Bioeconomy 2030: target −30% material footprint	– VIB (Flanders' life sciences hub), Farming cooperatives & biotech incubators (BlueChem) enable SME participation in the supply chain and industrial symbiosis	– Domestic production tax credits & CO_2 offset credits improve competitiveness over imported materials

Why Ecosystems Matter for Bio-based Value Chains

1 Bio-based value chains depend on strong regional innovation ecosystems.

2 Industrial symbiosis requires coordination between businesses, research, policy and funding actors.

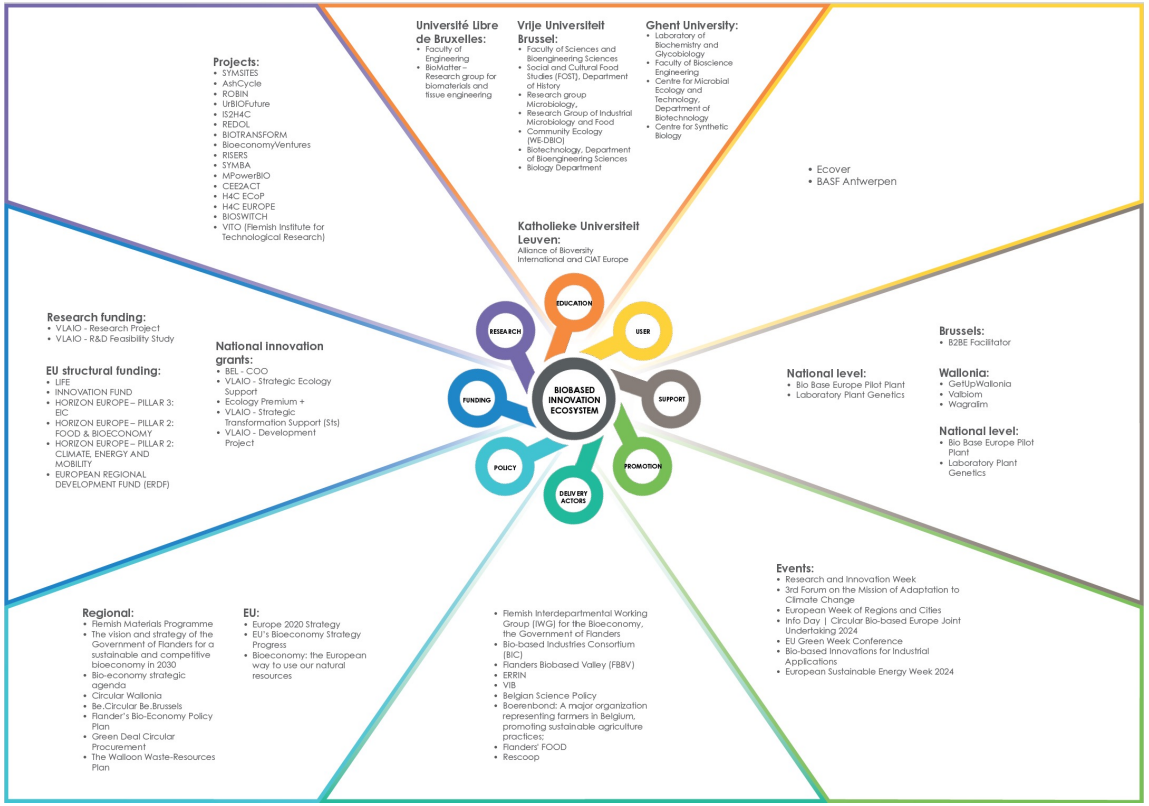
3 Ecosystems enable collaboration, knowledge transfer, investment and scale-up of circular bio-based solutions.

4

- Businesses and value-chain actors form the core of the ecosystem.
- Supporting actors include research institutions, education providers and innovation support organisations.
- Policy, funding bodies, networks and promotion agencies create enabling conditions for innovation.

Belgium's Bioeconomy Innovation Ecosystem – Snapshot

- **Research & R&D:** Ghent University, KU Leuven, Flanders life sciences research hub VIB
- **Innovation & scale-up support**: Bio Base Europe Pilot Plant, Flanders Biobased Valley
- **Networks & collaboration platforms**: Bio-based Industries Consortium (BIC), B2BE Facilitator (matchmaking for bioeconomy value chains)
- **Policy & funding:** EU Bioeconomy Strategy, Bioeconomy in Flanders Strategy (2030), VLAIO – Flanders Innovation & Entrepreneurship



Funded by the European Union Grant Agreement No 101135166

Key Drivers and Challenges in Belgium

Drivers

- Strong biotechnology and chemical industry base
- Well-established research and innovation infrastructure
- Dedicated bioeconomy organisations
- Strong EU and regional policy frameworks supporting circular bioeconomy

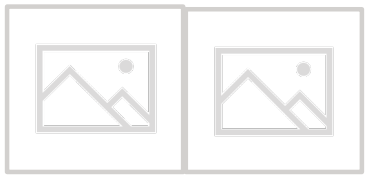
Challenges

- Complex and fragmented support landscape across regions
- Difficult navigation of funding programmes for companies
- Data sharing and confidentiality barriers between industry actors
- High costs & risks for small firms developing bio-based solutions

Funded by the European Union Grant Agreement No 101135166

Contacts

Antonia Zerobin
Scientific Project Manager – Circular Bioeconomy
alchemia-nova research & innovation
antonia.zerobin@alchemia-nova.eu



Piotr Swiatek
Project Manager – Design and innovation policy
www.pdr-design.com
pswiatek@pdr-design.com

Katie Beverly
Senior researcher in sustainable design
www.pdr-design.com
kbeverly@pdr-design.com

Jessica Pellizzari
Project Manager
Startup Europe Regions Network
jessica.pellizzari@startupregions.eu

Naiara Landa
Project Assistant
Startup Europe Regions Network
naiara.landa@startupregions.eu

Co-creation session

You are now invited to share insights and co-develop solutions to help forming industrial symbiosis in the bioeconomy

Generating an Implementation Blueprint

1

Step 1: Actors and Flows (10 min)

DRAW on the poster:

- Draw the main **material flow**
  - You can add additional stages if needed.
- Identify the **lead and side actors (roles)** for each stage of the value chain (Feedstock / Biorefinery / Market)

Generating an Implementation Blueprint

2

Step 2: Bottlenecks & Enablers (15 min)

STICK on the poster:

- Write critical **bottlenecks** on **RED sticky notes** (e.g. technology gaps, policies, logistics, market demand)
- For each bottleneck, add a **GREEN sticky note** describing what would be **needed to resolve it**
- Add any existing **financing instruments** or funding opportunities you are aware of

Generating an Implementation Blueprint

3

Step 3: Key Leverage Point (10 min)

- Ask yourselves: What is the most important next step to move this value chain from concept to implementation?
- As a group, **agree on ONE concrete action** that would have the **biggest impact** on making this value chain happen.
- Write this ONE key action clearly on the poster.

Group Pitches & Discussion

Now each group has **5 minutes** to present their implementation blueprint

1

Core Logic:

What is the core logic of your implementation model? Who drives what?

2

Biggest Bottlenecks:

What is the most critical obstacle in your model and why? What would help to solve it?

3

Leverage point:

What single action would make the biggest difference?

4

Cross-group reflection:

Participants can move to the presenting goups poster and place sticky notes after raising disagreements or agreements (red/green).

Belgium's Bioeconomy Innovation Ecosystem – Snapshot

This session explores whether the **regional innovation ecosystem is ready to support the bio-based value chains discussed earlier.**

Rather than perfecting the map, we **focus on what enables implementation, what blocks it, and where coordination gaps exist.**

Activity

- Review the ecosystem map and consider the BioLink/value chain discussed earlier.
- Use sticky dots to mark:
  - 🟢 **Enablers** – elements already supporting implementation
  - 🔴 **Bottlenecks** – gaps, barriers, or missing capacities
- Write a short note explaining why it helps or blocks implementation.

Funded by the European Union Grant Agreement No 101135166

Feedback Survey

Before we move to networking, we would love to take a moment to hear your feedback.