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SYMBIO

Shaping symbiosis in bio-based industrial ecosystems based on circular by-design supply chains.



Over three years (2024–2026), SYMBIO has developed and applied an integrated approach to identifying industrial symbiosis opportunities and designing circular bio-based value chains across 12 European pilot regions, providing European regional communities with tools and methodological approaches to build business models based on circular bioeconomy.

Our goals and objectives

SYMBIO unlocked local bioeconomy by promoting sustainable and innovative paths towards the green transition, following five strategic objectives:

1. Identifying and evaluating secondary resources and technical solutions for enabling industrial symbiosis in the **bio-based ecosystem**.
2. Shaping symbiotic **value chains** using a **zero-waste** approach through **big data** and **artificial intelligence** tools.
3. Developing an integrated **reporting system** to measure and monitor industrial symbiosis.
4. Demonstrating zero waste's **economic**, **social** and **environmental impacts** of SYMBIO models.
5. Engaging multiple stakeholders in accelerating **local value chains** and training of circular practitioners.

Our strategy and outcomes

SYMBIO has developed and tested an integrated approach to identifying, designing and assessing circular bio-based value chains across 12 European pilot regions.

By combining regional biomass inventories, AI-powered value chain modelling, stakeholder engagement and sustainability assessments, the project has generated practical tools, replicable business models and policy recommendations to support industrial symbiosis and the transition towards a circular bioeconomy.

The SYMBIO methodology was implemented through four interconnected phases:

Data-Hub Building

Scout and analyse resources, solutions, and market enablers to make them accessible to industries that trigger symbiotic activities close to the market.

- Inventory of regional inputs/outputs
- Ranking of critical factors enabling circularity by design

- **12 pilot regions involved** across 6 EU countries
- **12 romising bio-based** products investigated
- **10 main gaps** selected
- **12 co-creation workshops**

Value-Chain Design

Connect companies in circular value chains based on their specific material flows and available technologies for material reprocessing, proven value change design, regulatory requirements and more.

- 150+ technologies available to cluster/business networks thanks to tailor-made training
- Prioritisation of circular by-design value chains

- **47 priority BioLinks identified**

Business Modelling and Sustainability Assessment

Develop a Circular Index and a reporting system to support companies in building a business model based on recycling, upcycling, and downcycling by-products and energy use in industrial symbiosis.

- Selecting highpotential industrial symbiosis models by MCDA
- Model a reporting system by MFA fully integrated into the corporate

- **6 replicable symbiosis business models designed,** represented by 11 regional BioLinks
- **3 sustainability dimensions assessed:** economic, environmental and social
- **6 multistakeholder focus groups**
- **320+ stakeholders involved in BioLink validation**

Policy Support and Business Deploy

Accelerate the development of business classes identified by measuring social, economic and environmental impact to maximise the support of companies, investors and regions.

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

- **1,000 subjects reached**
- **3 thematic events organised**
- **2 policy recommendation reports developed, covering 9 thematic areas**
- **5 Key Exploitable Results identified**

SYMBIO contacts
www.symbioproject.eu

Lombardy Green Chemistry Association

Project Coordinator
Ilaria Re
ilaria.re@italbiotec.it
Project Manager
Maria Elena Saija
mariaelena.saija@italbiotec.it

Seguici