

THE SCALE-UP PROJECT IMPACT IN STRUMICA REGION

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SDEWES SKOPJE

SCALE^{UP}

community-driven
bioeconomy development

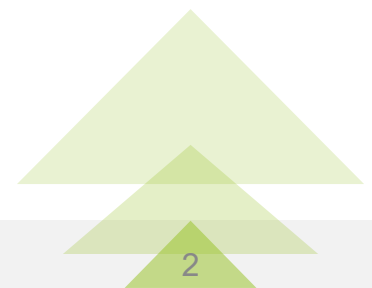


July 1st, 2025

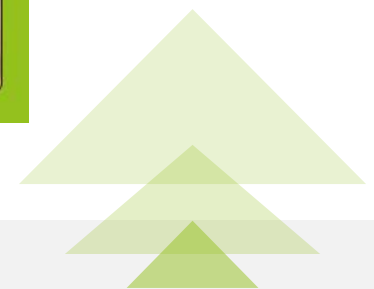
THE SCALE-UP PROJECT

A three – year EU funded project, aiming to achieve:


- Increased capacity of regional multi-actor partnerships to accelerate the development of marketable bio-based products and services
- Strengthen collaboration between primary producers, SMEs, clusters, social actors and policymakers;
- Improved knowledge about nutrient recycling potential in regional bioeconomies;
- High level of awareness and understanding of the bioeconomy and its impacts on local communities;
- Promotion of a sustainable, inclusive and just regional economy.



DIVERSE REGIONS



THE SCALE-UP IMPACT - ACCESS TO RESOURCES



Biomass Potential & Ecological Boundaries
Strumica, North Macedonia

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Biomass availability

The Strumica region is the country's largest producer and exporter of agricultural products. The region is a major producer of cereals and garden crops, especially in tomatoes and peppers.

In both agricultural production and the processing industries, significant residues are generated. As there is no unified waste management approach in the region, the majority ends up in landfills. It is estimated that Strumica's biomass potential is between 10,000 and 40,000 tons per year (fresh material).

These organic residues from primary producers, industries and communities can be used in a more circular and economically viable way by composting or for biogas production and biofertilizer. The use of compost will turn waste into a valuable resource that improves soil quality and provides nutrients for crops.

Sown area of agricultural crops and potential residue quantities in Strumica

Agricultural crops	Sown area (ha)	Organic residues (t)
Cereals	2383	4766
Garden crops	1640	3280
Fodder crops	480	960
Industrial crops	580	1160
Oil crops	38	76
Fruit crops	120	240
Vine crops	137	274

Ecological boundaries

Resources screened	Sub-Category	Potential benefits	Potentially detrimental
Water	Surface water bodies	<ul style="list-style-type: none"> Shift to preparation of compost in securely lined spaces and controlled application Implementing natural water retention measures Increasing irrigation efficiency 	<ul style="list-style-type: none"> Removal agricultural residues → nutrient runoff & eutrophication Lack of maintenance & investment on water monitoring infrastructure
	Ground water bodies	<ul style="list-style-type: none"> Conservation tillage, maintaining/increasing soil organic carbon and nutrient levels, reducing soil erosion Incorporating agents in residues for compost, avoiding leachate 	<ul style="list-style-type: none"> Unrestrained removal of agricultural resources → soil erosion Discharge of processed agri-food residues → soil contamination
Land resources	Endangered species	<ul style="list-style-type: none"> Carefully controlling compost quality for desired microorganisms Applying digestate at appropriate levels → enhance soil microbial biomass 	<ul style="list-style-type: none"> Large-scale removal of residues on which birds may depend Introduction of new crop varieties without consideration on local species, water and nutrients.
	Critically endangered species		


Recommendations

Promote knowledge exchange on biomass resources and joint collection systems in the regional platform.	Develop proper regulations on waste management and compost production.	Surface water bodies: (Ground) water monitoring on potential nutrient leachages and state of surface water in the region	Ground water bodies: Promote reduction of water use in the value chain.
Promote biomass segregation and collection at the agro-industry facilities and encourage them to participate in regional composting initiatives	Develop pilot plants and R&D activities on integrated composting systems for production of compost mixes to meet crop requirements	Soil: Promote leaving part of crop residues in the field to maintain carbon and nutrient soil levels. Promote use of compost or digestate.	Biodiversity: Implement compost quality control regulations.

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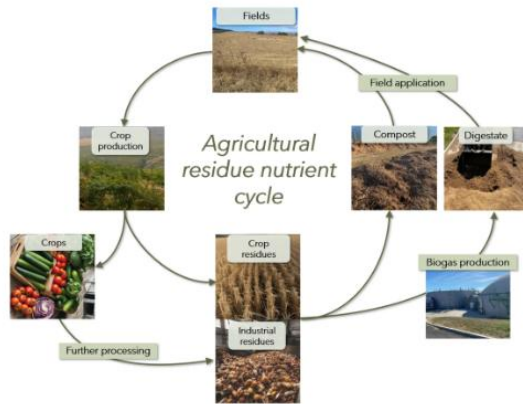
WWW.SCALE-UP-BIOECONOMY.EU

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101019094.



Nutrient Recycling
Strumica, North Macedonia

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Agricultural residue nutrient cycle

Nutrients

Strumica is progressing towards eco-friendly farming. Composting initiatives are welcomed, turning organic waste into a valuable resource and reducing the need for chemical fertilizers. Compost can be made with agricultural residues or residues from the food processing industry in the region. The aim is to improve soil quality and provide nutrients for crops: nitrogen, phosphorus and potassium, with especially phosphorus being crucial for crop growth.

These agricultural residues could also be used in a biogas plant, resulting in digestate which can be applied in the fields.


Recommendations

Promotion of composting practices (at both the household and industrial levels) and pilots, in order to help farmers gain experience.	Invest in research and policies focused on nutrient recycling, e.g. composting and digestion and promoting the use of biofertilizers in order to reduce the use of mineral fertilizers.
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SCALE-UP Information Package

T2.4 Review and preparation of existing scientific and technological information supporting bio-based solutions

Region:

Organization:

Biomass stream/value chains:

Bio-based solutions:

This information package aims at reviewing and collecting information relevant to the SCALE-UP project and for the regional platforms. Relevant studies should aim at supporting the bio-economy rollout in the SCALE-UP regions and of the specific bio-based solutions.

Information on the following topics will be gathered:

1. EU Policies and legislation
2. Research projects
3. Local policies
4. Technical Information on specific bio-based solutions
5. Biomass availability & Nutrient recycling

THE SCALE-UP IMPACT DOCUMENTED IN PUBLICATIONS



Report on 12 small-scale business models explored in the SCALE-UP regions

March 2025

Gerardo Anzaldúa, John Tarpey, Susanne Mader, Gabriele Wolkerstorfer, Sylvie Guillo, Rafael Castillo Barrero, Marina Barquero León, Antonio Carlos Ruiz Soria, Carmen Ronchel Barreno, Emilija Mihajloska, Pavlina Zdraveva, Julia Kosikowska, Anna Bialik, Katarzyna Rull Quesada, Magnus Matsons



Handbook of social innovation in rural bioeconomies

Updated in January 2025

Duygu Celik, Silvia Caneva, Chuan Ma, Yasmin Zaror



Overview of regionally suitable solutions

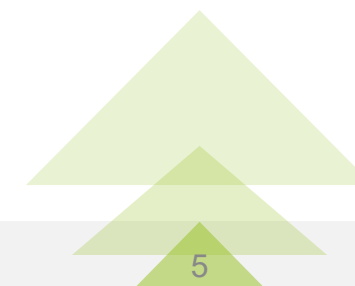
September 2023



Conceptual framework for the design and implementation of participatory activities in the SCALE-UP regions

January 2023

Gerdes, H., Kiresiowa, Z., Tarpey, J., Wolkerstorfer, G., Dauwa, L., Pammer, K., Bailet, N., Kalla, B., Macias Aragonés, M., Ronchel Barreno, C., Castillo Barrero, R., Kowalska, K., Mihajloska, E.



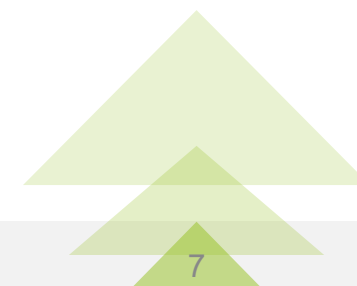
THE SCALE-UP IMPACT – KNOWLEDGE EXCHANGE

Study tours in North
Macedonia, Austria and
Sweden



THE SCALE-UP IMPACT – IMPROVED GOVERNANCE

Position the Regional Platform in Strumica as a dynamic hub for bioeconomy growth in the Strumica region and a replicable model for other regions.



THE SCALE-UP IMPACT – TRAINING PROGRAMME

EFFICIENT REGIONAL INFRASTRUCTURE & BIOMASS LOGISTICS

WS4
September & October 2023
07.09.23 / 26.09.23 / 19.10.23

INTEGRATING PRIMARY PRODUCERS INTO BIO-BASED VALUE CHAINS

WS2
November & December 2023
09.11.23 / 21.11.23 / 07.12.23

DIGITALISATION IN THE BIOECONOMY

WS3
January & February 2024
16.01.24 / 06.02.24 / 27.02.24

IMPROVED NUTRIENT RECYCLING

WS1
March & April 2024
12.03.24 / 04.04.24 / 23.04.24

PRACTICES OF „SOCIAL INNOVATIONS“ IN RURAL BIOECONOMIES

WS5
May & June 2024
14.05.24 / 04.06.24 / 25.06.24

GOVERNANCE OF REGIONAL BIO-BASED SYSTEMS

WS6
September & October 2024
05.09.24 / 26.09.24 / 17.10.24

STRATEGIES TO ADDRESS SOCIAL, ECOLOGICAL AND ECONOMIC TRADE-OFFS IN REGIONAL BIOECONOMY DEVELOPMENT

WS7
October, November & December 2024
31.10.24 / 21.11.24 / 12.12.24

Implemented by
SDEWES Skopje

A community-driven and needs based training programme for bioeconomy development.



ONLINE TRAININGS: KEY FIGURES

MORE THAN
1300
PARTICIPANTS

IN
15
MONTHS

21
ONLINE
TRAININGS

6
TARGETED
REGIONS

72
PRESENTATIONS

OVER **700**
PRESENTATIONS
DOWNLOADED ON
OUR WEBPAGE

OVER **27.000**
IMPRESSIONS OF
POSTS

THE SCALE-UP IMPACT – YOUTH ENGAGEMENT



Activity led by
SDEWES Skopje

- **WHY:** Actively engage with secondary schools (at least 100 students per region) in the six regions. High level of awareness and understanding of the bioeconomy and its potential and impacts among local communities;
- **HOW:** An interactive competition for students “BIOECONOMY THTROUGH ART” designed and implemented, through which students became familiar with innovative bio-based solutions and associated employment opportunities in rural areas;

THE SCALE-UP IMPACT – YOUTH ENGAGEMENT



- Dimitar Vlahov High School students in Strumica
- 90 participants, 50+ students, and 25 teacher mentors in 20 teams
- Wine stoppers from grapevine bio-waste
- Sustainable cosmetics: from eyeliner to flowers
- Recycling and upcycling projects
- Nettle-based organic farming
- Textile innovations: waste transformed into art
- Natural colors, eco-friendly soap, and kombucha leather

THE SCALE-UP IMPACT – IMPROVED BIOECONOMY SCIENTIFIC REASEARCH AND NETWORKING



31st European Biomass Conference and Exhibition, 5-8 June 2023, Bologna, Italy

CONCEPTS, TOOLS AND APPLICATIONS FOR COMMUNITY-DRIVEN BIOECONOMY DEVELOPMENT IN EUROPEAN RURAL AREAS – THE SCALE-UP PROJECT

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ABSTRACT: The overall goal of SCALE-UP is to support regional multi-actor partnerships, consisting of private businesses, governments and policymakers, civil society organisations, and researchers, in identifying and scaling-up innovative and sustainable bio-based value chains that leverage regional resources. SCALE-UP aims to adapt, implement, and evaluate tools to help regional actors overcome barriers and fully exploit bioeconomy potential. The methodology consists of four phases: establishing existing knowledge and creating regional platforms, facilitating cross-regional knowledge transfer and capacity building, forming a pan-European 'Community of Practice,' and disseminating project results in collaboration with key stakeholders. SCALE-UP also includes a business development program that promotes co-creation, transparency, and open innovation to support local communities in assessing market conditions, developing business plans, and identifying funding sources for 12 bio-based solutions. This paper presents the project's methodology, scientific relevance, and expected outcomes.
Keywords: bio-based products, bioeconomy, biomass, rural development, innovative concepts, project

1 INTRODUCTION

It is widely acknowledged that an innovative, circular, and resource-efficient bioeconomy can offer social and economic opportunities to entrepreneurs in rural areas while reducing greenhouse gas emissions. However, small-scale technological developments that utilize regional biomass resources have not yet gained momentum. Questions about promoting equitable distribution of benefits among local communities and avoiding detrimental effects of increased biomass production on regional ecological systems remain partially unanswered [1]. Therefore, exploring the sustainability of bio-based innovations is crucial to mainstreaming bio-based solutions in European rural areas. Within SCALE-UP, a "bio-based solution" refers not only to specific products or services but also to the entire value chain that relies on the involvement and interaction of various actors.

Transitioning to sustainable, regenerative, inclusive, and just regional bioeconomies requires a comprehensive framework that links bio-based solutions to rural development goals and sustainable development principles. This framework enables rural communities to identify, compare, and implement alternative bio-based development pathways.

Despite numerous EU-funded projects and initiatives supporting the uptake of the bioeconomy at the regional level, the capacity of rural actors to collaborate and develop sustainable bio-based products and services remains low. This is also evident in SCALE-UP's focal regions (Figure 1): Northern Sweden, Mazovia (PL), the French Atlantic Arc, Upper Austria (AT), Strumica (MK), and Andalusia (ES). Although these regions possess abundant, underutilized biomass resources and various promising valorisation options, stakeholders face challenges due to a lack of technical expertise, competitive networks, and market knowledge. SCALE-UP aims to

address these bottlenecks through a multi-actor approach. The six focal regions, with their diverse biomass streams and valorisation options, provide a high potential for replicating the project's outcomes in rural areas across Europe. Therefore, they have been selected as case studies to achieve the project objectives outlined below.



Figure 1: Locations of SCALE-UP's focal regions.
Source: own elaboration.

2 THE SCALE-UP PROJECT

The overall goal of SCALE-UP is to support regional multi-actor partnerships, consisting of private businesses (including primary producers and associated organisations), governments and policymakers, civil society organisations, and researchers in identifying and scaling-up innovative and sustainable bio-based value chains that build on regional resources. The expected results of the project are:



THE SCALE-UP IMPACT – SUSTAINABILITY

POLICY BRIEF



community-driven
bioeconomy development

**Scaling up biobased production
within ecological boundaries –
Recommendations for an updated
EU Bioeconomy Strategy**

KEY POLICY RECOMMENDATIONS:

- Consideration of ecological boundaries must be prioritised in parallel to increasing the efficient and circular use of biological resources. The EU Bioeconomy Strategy must anchor efficiency improvements within ecological limits to avoid rebound effects and protect natural capital.
- Understanding ecological boundaries requires improved monitoring and data availability at the regional level. Improved regional monitoring and data are essential to define ecological boundaries and guide sustainable bioeconomy practices.
- Monitoring systems should be designed to incorporate precautionary principles for environmental protection. Strategic, forward-looking monitoring can ensure bioeconomy development remains within environmental limits and policy frameworks are aligned.
- Full chain development and supply chain efficiency can support the availability and sustainability of biomass resources. Strategic supply chain development and proactive governance can balance biomass demand with environmental limits.



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THE SCALE-UP IMPACT – SUSTAINABILITY



Strumica Regional Platform – Sustainability Plan

June, 2025

SDEWES-Skopje and Municipality of Strumica



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101060264.

- The Strumica Regional Platform has matured into a vital ecosystem for bioeconomy development in North Macedonia. Its sustainability is based on strong municipal partnerships, a multi-actor governance model, and alignment with national policy goals. Through continued engagement, resource mobilisation, and integration into the SCALE-UP Metacluster, the platform is well-positioned to contribute to a circular, inclusive, and resilient bioeconomy in the Western Balkans and beyond.
- In the short term, the platform will continue operating through in-kind contributions from the Municipality of Strumica and voluntary efforts by platform members. In the medium to long term, the platform will develop a Financial Sustainability Plan that defines resource needs and diversifies funding sources. Efforts will be made to align platform activities with EU strategic priorities, including the Smart Specialisation Strategy (S3) framework, to position Strumica for inclusion in future EU Structural Funds (e.g., ERDF, EAFRD, JTF) as national policy evolves.
- Funding will be pursued through EU programmes such as Horizon Europe (Cluster 6 and Missions), Interreg, or LIFE. The platform will also seek partnerships with international donors, national agencies, and regional investment programmes, with support for identifying upcoming calls and building competitive consortia.
- To support private sector engagement, the platform will lease with Micro, Small and Medium Enterprises to identify most appropriate Public-Private Collaboration Models, offering local businesses access to research outputs, piloting services, and co-branded sustainability initiatives in exchange for financial or in-kind contributions.
- All activities will be guided by the principles of co-creation, openness, transparency, and sustainability.

THE SCALE-UP IMPACT – SUSTAINABILITY



- Bridge the knowledge and skills gap in rural areas by creation of interconnected stakeholder clusters - a “network of networks” - at regional, national, and EU levels enabling structured, inclusive, and continuous engagement.
- Empower primary producers as active agents in bio -based innovation by fostering producer cooperatives and promoting investment in local infrastructure such as biomass storage, logistics, and pre-processing units,
- Enhance policy coherence with other major sustainability frameworks such as the Green Deal, the Common Agricultural Policy, and the Circular Economy Action Plan, by establishing joint planning tools and cross-sectoral task forces that promote integrated, place-based strategies.
- Overcome financial barriers to scale up bio-based solutions by simplifying access to funding, integrate advisory services into financial programmes, and support the development of regional investment hubs that help de-risk innovation and enable SMEs to move from pilot phase to market deployment.

SDEWES-SKOPJE PROJECTS

Horizon 2020



EUKI

Completed



Horizon Europe

Ongoing



In pipeline




SWIM
Sustainable Water and Integrated Management of Fish
Migration and their Habitats in the Danube River Basin and NW
Black Sea

SHARES+ Project



Concepts, tools and applications for community-driven bioeconomy development in European rural areas



Find out more 

THANK YOU FOR YOUR ATTENTION