SCALE UP
community-driven
bioeconomy development

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 Matisons

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Responsible author(s):	Gerardo Anzaldúa (ECO)
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EXECUTIVE SUMMARY

This report aims to provide a general overview of the activities, results and lessons learned from the implementation of the SCALE-UP Innovation Support Programme (ISP). It hopes to shed light on current conditions in six regional markets for bio-based products and services, drawing on evidence and insights collected using a common framework to assist innovators that was implemented in a distributed manner to build regional capacity that will outlast the project. This deliverable covers Tasks 4.3 and 4.2 of the SCALE-UP Horizon Europe project.

The work of 12 regional Task Forces set up to assist selected innovators with market assessment and business model design work has highlighted the crucial role of structured innovation support in enhancing the market readiness of bio-based enterprises. A key finding is that, under the rapidly shifting political and social circumstances, market access remains a significant challenge for sustainability-oriented products and services that require premium pricing, emphasizing the need for strong marketing and sales strategies, negotiation skills, and supportive policies to promote sustainable consumption. The type of innovations joining the programme also underscored the growing influence of the Social and Solidarity Economy (SSE) in the bioeconomy transition, with half of the innovators either prioritising social and environmental objectives over profit maximisation, or incorporating elements of the SSE sector in their business model. To support these mission-driven enterprises, targeted mechanisms such as improved access to finance, legal guidance, and tailored capacity-building initiatives will continue to be needed in the future. From a programme implementation perspective, the experience of establishing the regional Task Forces showed the importance of preparation, adaptability, and stakeholder engagement to ensure effective innovation support. Additionally, the SCALE-UP ISP demonstrated the value of international collaboration in the EU, helping innovators to explore new markets and learning from each region to adapt standardised support services to local dynamics. Future programmes could benefit from and build on these lessons to increase the impact and efficiency of publicly funded innovation support programmes. Overall, iterative and incremental efforts in business strategy development, stakeholder engagement, structured, yet flexible support frameworks, and consistent long-term assistance can strengthen Europe's transition to a sustainable and circular bioeconomy.

Chapter 1 introduces the report presenting the most relevant and recent EU policy developments and efforts put in place to underpin the region's bioeconomy transition. It then presents the conceptual framework of the SCALE-UP project and the approach of the ISP, positioning them as concrete contributions to align efforts in six European regions towards achieving the goals of the EU Bioeconomy Strategy, its national counterparts, Regional Development Plans and Smart Specialisation Strategies for Research and Innovation. Chapter 2 gives a brief overview of the 12 innovations that were selected to participate in the ISP, with insights into the specific needs that they chose to tackle during the programme. Chapter 3 compiles synthesised results of the market assessment carried out in the six European regions and briefly presents against them the business idea and value proposition of the 12 innovations. It then showcases the insights collected from joint analysis of the business model canvas of each innovation. Chapter 4 presents observations emerging from the market assessments and other support activities that were carried out with the innovators, and then discusses the main practical lessons learned from the implementation of the ISP. Chapter 5 concludes the report and provides recommendations aimed at entities associated with the conception, development, funding and implementation of future assistance programmes for innovation in the European bioeconomy sector. Lastly, the annexes include a briefing documenting the set-up of the regional Task Forces, and six confidential synthesis reports providing detailed descriptions of the innovations, their strategic relevance for each region, the nine elements of their business model (Business Model Canvas), and considerations for the future.

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Abbreviations

CAP	**EU Common Agricultural Policy**
CHP	**Combined Heat and Power**
EGD	**European Green Deal**
ELAN	**Evolution du Logement, de l'Aménagement et du Numérique**

EoI	**Expression of Interest**
EU	**European Union**
GDP	**Gross Domestic Product**
GHG	**Greenhouse Gas**
HoReCa	**Hotel/Restaurant/Café**
ISP	**Innovation Support Programme**
LR	**Logging Residues**
NDA	**Non-Disclosure Agreement**
NEIA	**New European Innovation Agenda**
OTP	**Olive Tree Prunings**
RE2020	**Réglementation Environnementale 2020**
RIS3	**Research and Innovation Strategies for Smart Specialisation**
RIV4BFS	**Regional Innovation Valleys for Bioeconomy and Food Systems**
SDG	**Sustainable Development Goals**
TF	**Task Force (for market assessment and business model design)**
TRL	**Technology Readiness Level**
WP	**Work Package**

1 Introduction

The bioeconomy concept presents an attractive framework for policymakers in Europe, as it holds the potential to foster innovations that match specific community needs with regionally available resources. It is expected to drive economic growth and job creation while contributing to climate and environmental sustainability through the efficient and eco-friendly use of natural resources. The SCALE-UP project brings together these principles from various EU-level policies to shape its conceptual framework (see Figure 1): the six priorities of the European agricultural fund for rural development, the rural orientation of the Common Agricultural Policy's (CAP) second pillar, along with national and regional frameworks, including national bioeconomy strategies, regional development plans, and Research and Innovation Strategies for Smart Specialisation (RIS3). According to the European Commission (2020), the bioeconomy serves as a catalyst for systemic transformation, addressing economic, environmental, and social challenges simultaneously. A sustainable and circular bioeconomy is important to address the wide range of challenges that communities across Europe are facing, including climate, biodiversity, energy, and food security (Council of the European Union, 2023).

A study by Ronzon et al. (2022) notes that between 2015-17, economic growth was stronger in EU bioeconomy services[1] than in the EU economy as a whole. Bioeconomy services accounted for 5.0-8.6% of EU GDP and 10.2-16.9% of the EU labour force during this period. The European Commission (2023) recognises the potential of the bioeconomy and innovative value chains for both industrial ecosystems and rural communities by: providing essential products, increasing competitiveness, diversifying incomes, and creating jobs in rural and coastal areas. Some studies (Mittra and Zoukas, 2020; Eversberg et al., 2022), however, call into the question the growth and impact potential surrounding the bioeconomy. They point to the negative correlation between jobs and growth, as well as the differing numbers between southern and eastern Europe (primarily biomass suppliers), and northern and western Europe (primarily processors), leading to a potential productivity gap (see also Vlad & Toma, 2022 for a detailed study of the bioeconomy sector in central and eastern Europe). As such, further research is needed into the economic potential of the bioeconomy in the broader context of a just transition.

Strategically implemented, the bioeconomy can contribute significantly to achieving the Sustainable Development Goals (SDGs) and advancing EU policies on economic development and competitiveness, sustainability, and social justice. A key aspect of this transition is the shift from fossil-based to renewable, bio-based resources, particularly in industrial production. The critical role of the bioeconomy in EU industrial policy is underlined by the EU Council in its Conclusions of the future of industrial policy (Council of the European Union, 2024). This transition is therefore anticipated to play a critical role in reducing greenhouse gas (GHG) emissions, playing an important role in climate change mitigation efforts (Spatial Foresight et al. 2017).

Moreover, supporting practical experience with the concept of bioeconomy can generate new perspectives necessary for the transition toward a circular economy. An ambitious and committed implementation of the concept entails a fundamental transformation across all economic sectors, affecting the production, processing, utilisation, and end-of-life management of biomass. This shift promotes the reuse, cascading use, and recycling of biomass and waste streams, facilitated by both technological and social innovations (Spatial Foresight et al. 2017). The European Commission therefore envisions the bioeconomy in a holistic and cross-cutting manner, requiring policy coherence to ensure not only the uptake of innovative bio-based solutions, but also the potential positive impacts towards achieving the targets of the European Green Deal (EC, 2023).

In its 2024 Communication "Building the future with nature: Boosting Biotechnology and Biomanufacturing in the EU", the European Commission highlighted the importance of the bioeconomy in securing the EU's competitiveness and resilience. The Commission recognised the need to update EU policy in view of the bioeconomy's industrial dimension and links to biotechnology and biomanufacturing. As such, a review of the Bioeconomy Strategy is planned in 2025 (EC, 2024). This

[1] The updated EU Bioeconomy Strategy (2018) broadens the scope of the bioeconomy to include related service activities, defining a bioeconomy that: "includes and interlinks: land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources (…); and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services" (EC, 2018)

is further echoed in Mario Draghi's 2024 report on European competitiveness, which underlines the need for a competitiveness strategy to address the challenges of technological advancement and demographic shifts, both of which are especially relevant to European regions working to develop sustainable bioeconomy sectors (Draghi, 2024).

1.1 Elements of the EU framework to support the bioeconomy transition

The efforts to roll out a bioeconomy in the European Union are coordinated via the EU Bioeconomy Strategy and its associated Action Plan. These were updated in 2018 and prioritise the development of new business models with a view towards bringing the potential economic benefits to rural regions. A sustainable bioeconomy is also seen as a key dimension of the EU's Long-Term Vision for Rural Areas and the EU Rural Action Plan through the development of cohesion in rural areas, as well as the promotion of social fairness and the just transition (EC, 2023).

In 2022, the European Commission published a progress report on the implementation of the EU Bioeconomy Strategy and its action plan (EC, 2022a). This was produced at the request of the Council of the European Union in light of the new policy context surrounding the European Green Deal, and to identify any gaps or room for improvement in the Bioeconomy Strategy. The progress report shows that the actions are on track to achieving the strategy's main objectives, namely: an increasing number of national and regional bioeconomy strategies, progress on bioeconomy deployment in Central and Eastern Europe, and the mobilisation of private investments in research and innovation. However, the report also identifies some gaps in the action plan, including the need for more focus on how to improve land management and biomass demand to meet environmental and economic requirements. Additionally, there is a need to develop more sustainable consumption patterns to ensure environmental integrity. The EU Council's conclusions on the potential of the bioeconomy (2023) therefore recommend an update to the Bioeconomy Strategy, as well as an in-depth assessment of actions being taken at EU level. They also recommend better integration of the bioeconomy into other policy areas and improved knowledge transfer towards less developed regions and rural areas. A review of the EU Bioeconomy Strategy will be completed by the end of 2025 (EC, 2024)

In 2022, the European Commission launched the "New European Innovation Agenda" (NEIA) which aims to push Europe to the cutting edge of technical innovations and start-ups responding to societal challenges (EC, 2022b). This is operationalised across five flagship initiatives and 25 targeted actions. One of these actions calls for the establishment and connection of "regional deep tech innovation valleys" (RIVs). In this context, and with the support of Member State input, the European Commission presented a concept note on "Regional Innovation Valleys for Bioeconomy and Food Systems" (RIV4BFS) (EC, 2023a). The RIV4BFS will support and accelerate the deployment of the bioeconomy in European regions (with a particular focus on Central and Eastern Europe) across specific goals, for example transitioning to a zero plastic textile system or living within local biosphere limits. Importantly, the RIV4BFS consider all three pillars of sustainability: **environment**, by managing land and resources within ecological boundaries; **economic**, through sustainable value chains and consumption; and **society**, by considering equity and inclusion towards a just transition. To this end, the RIV4BFS should be based on regionally sourced and sustainably produced biomaterials through the involvement of primary producers, industry, and consumers. In total, the European Commission has committed EUR 170 million towards the development of the Regional Innovation Valleys, with the goal of building 100 RIVs, as set out in the NEIA.

In addition to the funding committed towards the development of the Regional Innovation Valleys, EU research funding on bioeconomy topics continues to be important, with the Horizon Europe program (2021-27) having already invested EUR 900 million into projects on "Circular economy and bioeconomy sectors" from its Cluster 6 on "Food, bioeconomy, Natural Resources, Agriculture and Environment" (EC, 2023b)

While a supportive policy environment and targeted research & innovation programmes provide helpful enabling conditions for the development of the bioeconomy, a successful transition requires that significant attention be given to the financial feasibility and market readiness of business efforts to develop bio-based products and services (Reim et al., 2019). As such, dedicating sufficient time and resources to innovation management and market entry can assist entrepreneurs to reflect and refine

key aspects of their business models such as value proposition, creation, delivery, and capture as a means of improving their economic viability (Reim et al. 2019).

1.2 SCALE-UP's positioning and its Innovation Support Programme

The SCALE-UP project aims to enhance the capacity and expertise of multi-actor partnerships to accelerate the development of market-ready bio-based products and services while facilitating their successful market deployment. A key focus is to deepen the understanding of nutrient recycling potential across the project's target regions, ensuring that both practical and scientific knowledge are effectively leveraged. The project also seeks to foster a high level of awareness among local communities regarding the bioeconomy, its opportunities, and its broader societal and environmental impacts. Additionally, SCALE-UP strengthens collaboration among primary producers, SMEs, industry clusters, social actors, and policymakers, promoting a cohesive approach to innovation. Ultimately, the project contributes to regional, rural, and urban transitions towards a sustainable, regenerative, and inclusive circular economy and bioeconomy, fostering just and resilient development pathways across Europe.

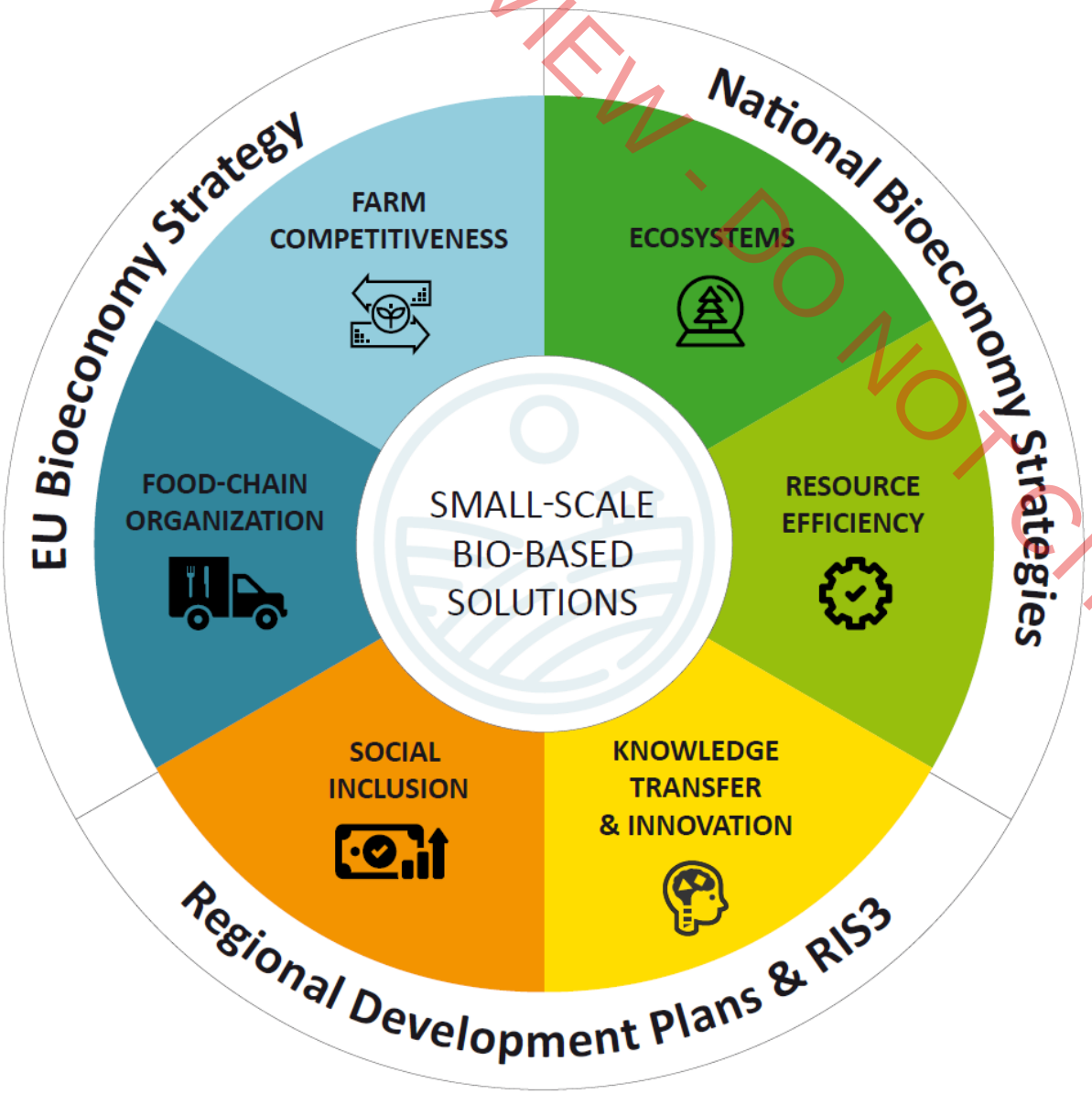

Figure 1. Visual representation of the conceptual framework guiding the work on the SCALE-UP project. Source: Gerdes et al., 2023.

Based on their specific needs and priorities, the selected innovators had a menu of support activities to choose from, put on offer by the business strategy experts and the regional partners from the SCALE-UP consortium. Figure 2 shows the preparatory activities carried out to establish the groundwork for the Innovation Support Programme (ISP) (left end of the figure), and the specialised modules with possible support activities from which the innovators could choose to benefit from, ranging from market assessment to business plan drafting and funding scanning (middle and right end of the figure).

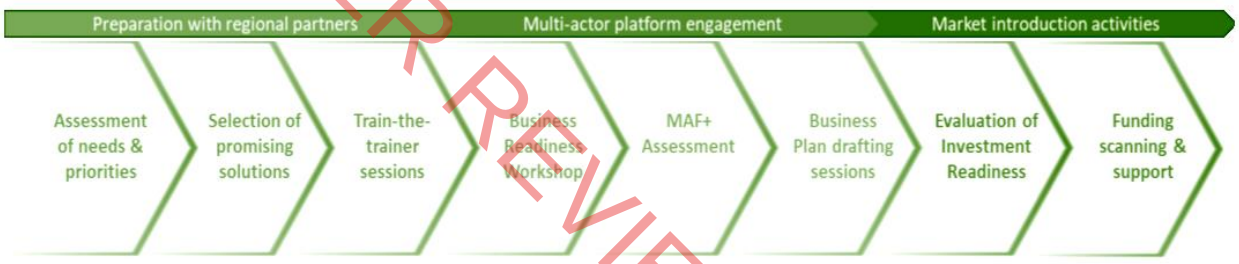

Figure 2. The SCALE-UP Innovation Support Programme modular, flexible approach to innovation support. Source: own elaboration.

Figure 3 shows the outline of tasks integrating SCALE-UP WP4: *Bio-based Business Models, Value Chains & Markets*. This report provides an overview of the lessons collected from Task 4.3 –the implementation of the SCALE-UP ISP– and the practical experience of the regional Task Forces (TFs) that were set up in Task 4.2. The findings and insights presented are grounded in the extensive efforts undertaken by the SCALE-UP project consortium, the 12 selected innovators, and the external members of the TFs through the structured, multi-phase support program.

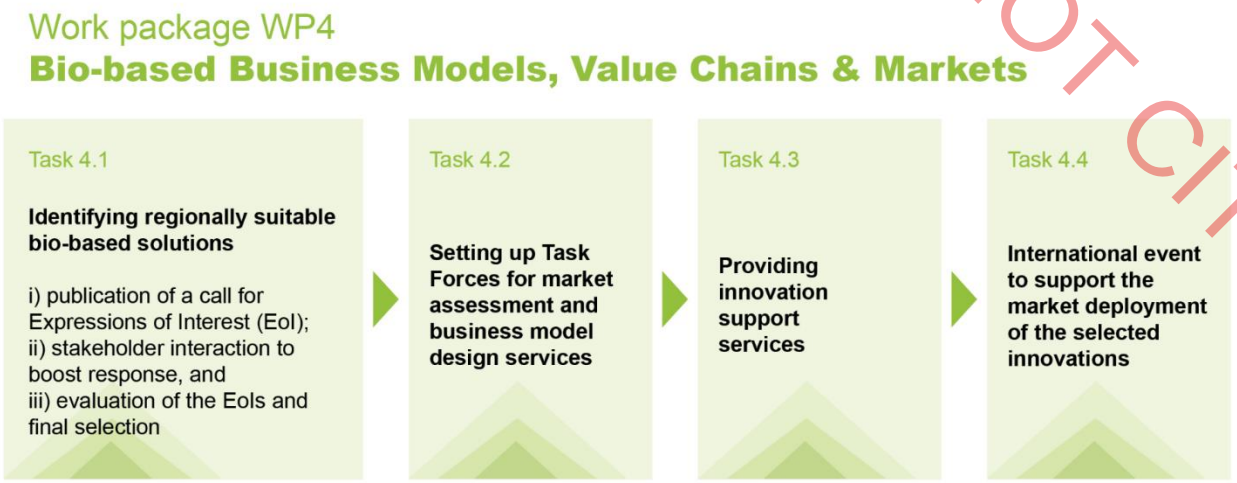

Figure 3. Task structure of SCALE-UP's work package on bio-based business models, value chains, and markets. Source: Nieto et al., 2023.

The process began with a comprehensive stocktaking exercise (Task 4.1), in which consortium partners, in collaboration with their regional networks, identified and evaluated promising bio-based solutions involved or seeking opportunities in regionally relevant value chains. Following an open call for Expressions of Interest and a structured selection process, 12 innovators—two per project region—were chosen to receive tailored support services.

Building on this foundation, Task 4.2 established dedicated TFs to provide targeted business development assistance. These TFs brought together a diverse set of stakeholders, including industry experts, investors, and local knowledge holders, ensuring that market realities and community priorities were embedded in the innovation support process. Through their contributions —ranging from scientific and practical expertise to market insights and access to strategic networks— TF members played a key role in shaping the strategic development of the selected innovations.

The core of the project's support activities was then delivered under Task 4.3, where the TFs, led by the SCALE-UP regional partners, worked closely with the selected entrepreneurs to identify their priority needs and work towards resolving them. Over the course of subsequent working sessions, in some cases face-to-face, in others remotely, advisory services were provided to conduct market appraisals, select target groups, assess business feasibility, and identify funding opportunities. Access to regional networks was also provided via direct connections with TF members and other contacts, as part of the ISP sessions, events, and visits. The ISP drew inspiration and tools from the BRIGAID Business Development Programme, yet in SCALE-UP it expanded its previous reach by giving regional partners a more prominent role as leaders of the TFs. This allowed to have a common framework that was implemented by partners with a deep understanding of local market dynamics.

Collectively, these efforts constitute the evidence base for the observations and lessons outlined in this report. The combination of in-depth market assessments, iterative business model development, and close multi-actor collaboration has provided valuable empirical insights into the opportunities and barriers faced by emerging bio-based businesses in the project regions (see Chapter 4).

2 Overview of the bio-based solutions participating in the SCALE-UP Innovation Support Programme

As stated in Deliverable D4.1 –*Overview of regionally suitable bio-based solutions*– SCALE-UP set out to identify regionally-relevant innovations that could benefit deeply from participating in the ISP and that simultaneously are compatible with the overarching goals of the project. This resulted in the engagement of 12 initiatives that strongly depend on, or promote collaboration along the value chain; that have strong interest in- or contribute to the enhancement of regional ecological resilience; that have a clear benefit to offer or gain from resource efficiency; that enable and benefit from knowledge transfer; that positively impact the food sector; and that show a clear potential to increase their region's competitiveness (Nieto et al., 2023).

Figure 4 shows the declared needs and priorities that the selected innovators shared with us at the start of the process.

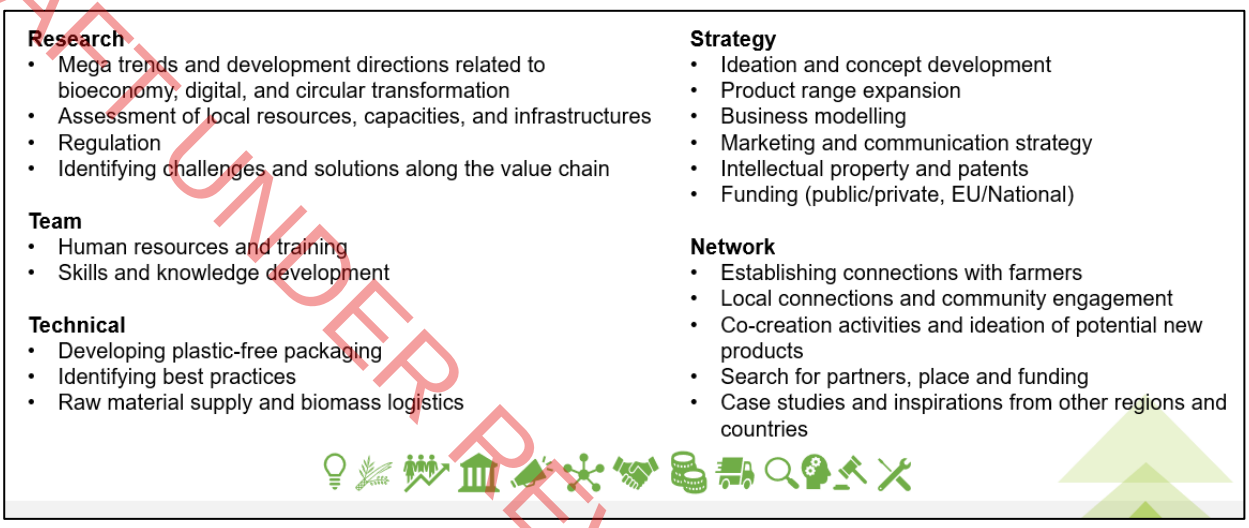

Figure 4. Top needs and priorities of the innovators selected to participate in the ISP. Source: own elaboration.

Based on the type of innovation, its stage of development, the particular needs and priorities of the innovators, customised support activities were selected from the different modules of the ISP (see Figure 2) and coordinated by the SCALE-UP project partners. This included organising the punctual, voluntary contributions from the regional experts and stakeholders that integrated each TF.

Table 1 provides a synthetic overview of the 12 participating entities of the ISP, with short descriptions of their innovations, country of registry, indicative TRL (Technology Readiness Level) before and after the ISP[2], and the main needs identified for each innovator at the start of the programme.

[2] The presentation of TRL before and after the ISP is to be understood as indicative, and it is important to note that progress of an innovation along the TRL scale during the period of the programme can hardly ever be exclusively associated to the programme itself. The ISP and the assistance provided to the innovators may certainly play a contributing role in this progress but cannot serve to explain the developments in their entirety.

Table 1: Bio-based innovators participating in the SCALE-UP Innovation Support Programme

Country	Organisation	Product/Service	TRL		Main needs at the start of the ISP
			Oct-2023	Feb-2025	
Austria	Velvety	P – Cosmetics incorporating vegetable proteins from sunflower oil press cake	n/a	6	Expanding customer base, information on funding sources, skill and knowledge development, scaling up from laboratory level.
	HochBROTzentig	P – Distilled spirits from waste bakery products	n/a	9	Market analysis, identification of partners
France	COPANO	P – Straw-based insulation panels for construction and renovation	5-6	7-8	Development of pilot project, dissemination of innovation, human resources and training, identification of priority customers
	L'Atelier du Biosourcé / Fabrik du BTP	S – Facility for community building, access to materials and equipment, and exchange of know-how on construction with bio-based materials	n/a	n/a	Business plan support, identification of potential partners and funding streams
North Macedonia	Horti-Eko	P/S – Mulching machine for fine grinding residues from viticulture, gardening and fruit growing	6	6	Concept development and business model support, funding research support, leveraging network for implementation
	Bio-Based Value-Added Grape Products	P/S – Eco-friendly methods for crafting grape-based products that prioritize the preservation of natural qualities and nutritional value at competitive prices	4	4	Business plan development, positioning, market analysis, networking
Poland	Bio-circular Apple Farm	S – Space for developing and testing new technological, social, educational and cultural concepts and solutions in the circular bioeconomy	n/a	n/a	Relevant case studies from other regions/countries, business model generation, testing and validation, branding and marketing
	Gospodarstwo Sadownicze MB Monika Bankiewicz	P – New health-promoting, functional and ecological products from apple pomace	1-2	2-3	Market research, business model generation, branding and marketing, financial monitoring and funding options, assessment of local resources and capacities.
Spain	Bioliza	P – Biochar obtained from olive waste pyrolysis	7	8-9	Clarification of legal framework, market analysis, funding research, business model development
	Compolive	S – Facility to condition, treat and make olive tree prunings compatible for integration as reinforcement in polymer-based composite materials	4	5	Market analysis, intellectual property development, logistics support, business model development, funding research
Sweden	Wood Fuel Network	S – Social innovation to strengthen the value chain for logging residues	n/a	n/a	Identification of challenges/solutions in the logging residue value chain, and screening for areas where best practices can be developed and shared.
	RESELO	P – Suberin extract from birch bark to produce fossil free rubber.	5	6-7	Support and input to a raw material supply analysis (2030-2100) with marginal cost curves around a given location for supply of birch bark.

Expanding on the last column of the synthetic overview given by Table 1, the passages below provide brief descriptions of what the TFs offered to each of the innovators, outlining the work carried out during the ISP and the concrete benefits generated. This information has been extracted from an internal report prepared by SCALE-UP partners CTA at the end of Task 4.2 (see Annex I).

Velvety

In Upper Austria, the TF supported Velvety in a flexible way, due to changing needs of the innovation development process (partially due to the economic situation in Austria). The ISP supported Velvety in further developing its business plan with a particular focus on market development, including both existing customers and new ones. One of Velvety's priorities is to expand into foreign markets; here, the TF supported by disseminating information among the project consortium, leading to exchanges with the Spanish consortium partners about the cosmetics market in their region and an analysis of the competition and the possibility to enter the Spanish market. Furthermore, the TF supported the innovation in providing information on the national funding landscape in Austria, as well as offering support in marketing and product development.

HochBROTzentig

The TF and the team from Business Upper Austria supported HochBROTzentig by doing research on bakeries in the region that could join their initiative. The group decided to divide the identified bakeries into three target categories: *small bakeries, large bakeries* and *bakeries that also run a café, a mini market or a restaurant*. This categorisation was important, as one of the challenges that HochBROTzentig faced is the increasingly negative image of alcohol, and the feedback that some bakeries refuse to sell alcohol in general. Since the third target group is already selling or serving alcohol, it carries the most potential. The general goal of HochBROTzentig is to scale up the business idea to whole Austria and then to the whole DACH region (Germany, Austria and Switzerland).

COPANO

The TF from the French Atlantic Arc supported COPANO in a variety of ways, including detailed work on its business plan and market development. Furthermore, the TF provided support on issues related to intellectual property rights (patents and innovation protection) as well as human resources and training. As the company currently operates on a volunteer basis, the aim is to train employees to be multi-skilled and be able to access a range of jobs, also while offering adequate salaries.

L'Atelier du Biosourcé / Fabrik du BTP

The initial innovation explored in the SCALE-UP project was the "Atelier du Biosourcé". In June 2024, the responsible innovator met another entrepreneur running a similar initiative called "La Fabrik du BTP". It was then decided by them independently to merge the two projects to take advantage of the synergies and not duplicate the efforts of each initiative. As the innovation is in early stages, ISP support primarily focused on developing concrete ideas for the innovation's business plan, as the exact operation of the initiative is still under development.

Horti-Eko

Involvement in the SCALE-UP ISP offered support to Horti-Eko on a range of topics including its business model development, innovation development and extending not only its network of authorities but also potential implementers. The innovators were supported in understanding regulatory aspects relevant to their business and connected with public authorities. Additionally, they were offered technical expertise to enhance the educational and research dimensions of the project. Finally, the TF offered support in further developing Horti-Eko's networks, especially with regards to regional associations.

Bio-Based Value-Added Grape Products

The TF supported the business owner, Agro-Cooperative Bojane, primarily in developing the business plan for the bio-based products from Bojane's vineyards. The agriculture sector was identified as a strong potential target customer segment, aligning well with the initiative's goals and offering strong possible collaborations. The ISP further supported the innovation in sharpening its value proposition and strategy towards health-conscious consumers who value eco-friendly, high-quality products. Finally, the ISP encouraged the innovation to not only emphasize sustainability but also refine its channels and strengthen existing partnerships.

Bio-circular Apple Farm

The Bio-circular Apple Farm was supported in Mazovia particularly in its business model development. The TF supported the identification of a potential market, particularly for its educational offerings. Additionally, the possibilities for collaboration with the local and regional administration were explored.

Gospodarstwo Sadownicze MB

The SCALE-UP ISP and team from UNIMOS supported Gospodarstwo Sadownicze MB in developing a concept to process the apple farm's pomace into dried apple powder. The TF helped with market research, particularly on trends in the food sector with regards to healthy snacks, where the apple powder could be used. Furthermore, the TF supported the business model development, especially identifying potential synergies with the nearby Bio-circular Apple Farm.

Bioliza

Bioliza was supported by the TF firstly in better understanding the regulations and legal framework surrounding the obtainment of biochar relevant in Andalusia. Further support was offered in terms of the market analysis with regional cooperatives, as well as refining of the already existing business model. Finally, the ISP supported Bioliza in connecting with potential funders such as venture capital firms and investment funds.

Compolive

A key focus for the TF in Andalusia was to support Compolive with their market analysis, especially to identify the potential for long-term biomass availability. Support from two cooperatives in the region was able to help with awareness raising in this regard. The issue of logistics and biomass transport was also an area of focus, with important exchanges taking place on good practices from a case in Catalonia. The TF also supported Compolive on topics of intellectual property in the go-to-market stage as well as consulting on an expert investment report to further develop their financing opportunities.

RESELO

Participating in the SCALE-UP ISP offered this solution's developers the opportunity to assess and map the availability of raw materials across Sweden. The SCALE-UP partner Biofuel Region facilitated access to a wide network of regional actors directly involved in the forestry sector. This gave RESELO new insights into existing by-product streams, helping them to (re)shape their business model and explore possibilities for widening their product portfolio. In the Nordic countries, large quantities of bark are primarily used for heat and electricity production. Extracting valuable compounds like suberin before combustion aligns with the cascading use principle and could serve as a catalyst for retrieving even higher-value chemicals from biomass.

Wood Fuel Network

To mobilise a wide range of actors along the entire value chain of logging residues, this beneficiary of the SCALE-UP ISP worked in close cooperation with buyers and sellers of wood fuels in Northern Sweden. Using a web survey, the Wood Fuel Network was able to determine challenges and solutions relevant to the value chain, as well as identify where best practice cases could be shared or further

developed. This information was fed into the design of workshops and training sessions that are now targeting heating plants, entrepreneurs, and suppliers of wood fuels.

3 Overview of the assessments

This chapter provides an overview of the abridged results of the market assessments carried out by the TFs in each of the six SCALE-UP regions (shown in Figure 5). Synthesis reports providing detailed descriptions of the innovations, their strategic relevance for each region, the nine elements of their business model (Business Model Canvas), and considerations for the future, are available in the annex of this report.

The first step in running these assessments was formulating clear market definitions. Given the focus of our project on previously selected value chains relevant to each of these regions, the screened regional markets were defined accordingly and adjusted as the exercises of the strategic assessment were being completed.

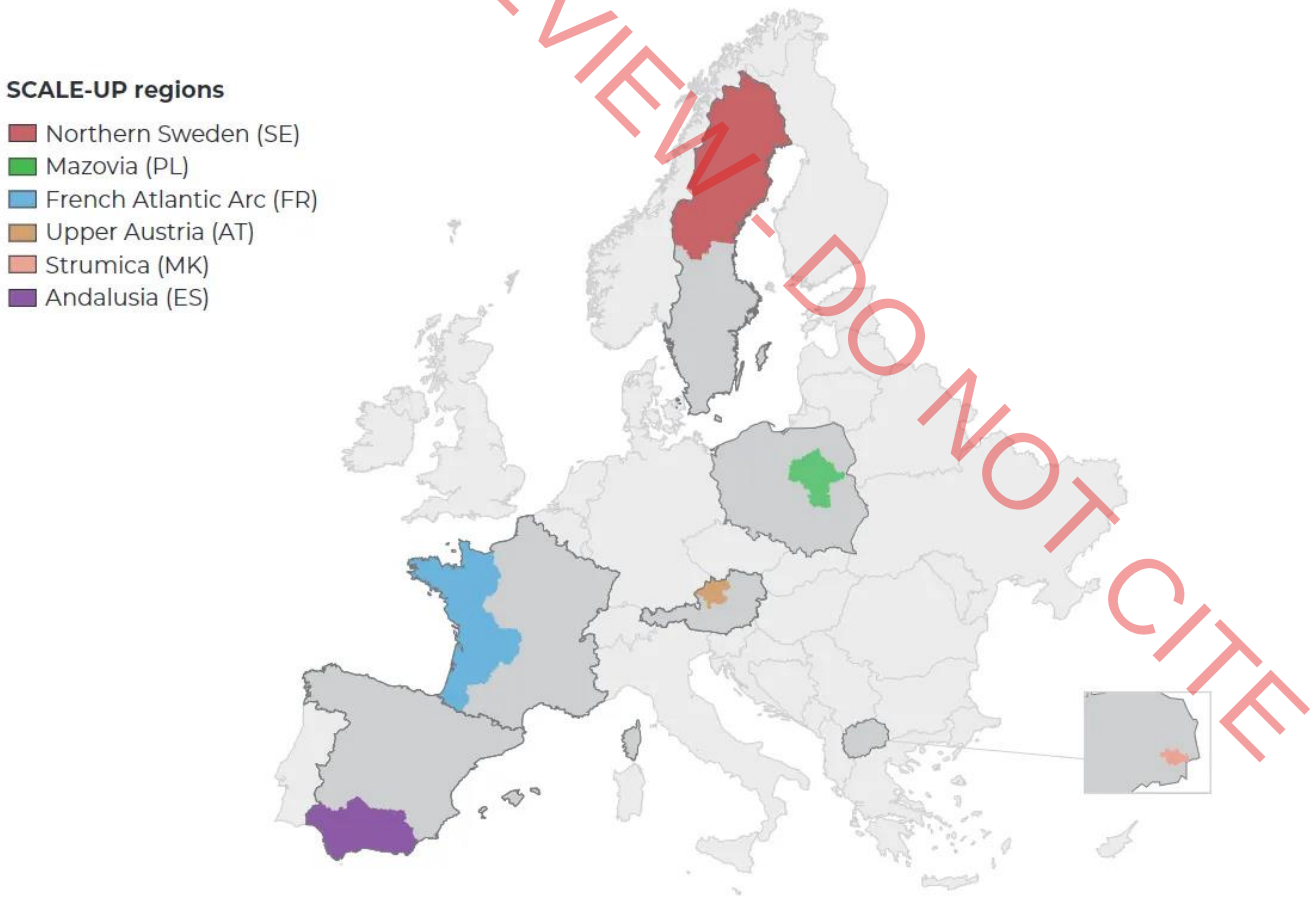

Figure 5. The six SCALE-UP regions: six regional markets assessed as part of the Innovation Support Programme. Source: SCALE-UP project.

3.1 Market needs in six European regions and new bio-based offers to meet them

Upper Austria

Upper Austria has a diverse food processing industry, generating a wide range of food waste and by-products, such as fruit and vegetable residues, as well as bakery and brewery side streams. These by-products can be upcycled to new food products, utilised for feed, biogas or chemicals production, and for the development of other innovative products. The valorisation of such unused resources and by-products is explored and promoted by the Bioeconomy Strategy for Austria: "The Bioeconomy Strategy is aimed to assign a value to previously unused residuals and by-products and make their recovery both climate and environmentally friendly and economically feasible" (BMNT, 2019). The strategy emphasizes reducing food waste and improving resource efficiency as key elements of sustainable development. Specific initiatives include promoting food waste reduction programs, encouraging innovative uses for organic residues, and enhancing consumer awareness to minimize waste.

The business idea of **HochBROTzentig** is driven by the fact that in Austria, every 5th bread is thrown away. As the business idea owner is a baker himself, his motivation is to use these wasted resources. His idea was also to use the bakers' regional identity and to not just take their leftover bread as a resource for his distilled spirits, but to offer the bakeries a service, so they can sell the spirits made of their own bread in their shops. He created the brand "HochBROTzentig" as his idea was to establish this brand and to add a small label from the bakery where the bread is from. He gave new names to these distilled spirits (BROTKA, BROTGINSKY and BROTUZO) to ensure compliance with the Austrian Codex Alimentarius[3], which dictates that sprits like gin and vodka can only be made from agricultural resources. Since baked bread does not classify as an agricultural resource, the products could not be directly labelled as gin or vodka.

Velvety is a cosmetics producer based in Upper Austria that focuses on solid cosmetics like shampoo bars, shower bars, bath bombs, deodorant sticks, and similar products. A vital part of the company's business model is the development private label products for market leading retailers in the DACH region (Germany, Austria, and Switzerland). Velvety has been a pioneer in the production of predominantly solid cosmetics for many years and continue to set the highest standards in their R&D and operations. The commitment to the environment is an integral part of all corporate activities, and sustainability lies at the center of their production and sales cycles. This has led to their collaboration with the University of Applied Sciences Upper Austria and an oil pressing company to explore applications of proteins extracted from sunflower oil press cake in a new cosmetics line. With SCALE-UP, Velvety has explored the market potential of these new products in the DACH region and in Spain. The company's value proposition is the reduction or—in most of their products—the complete avoidance of plastic materials. Their products are much smaller, lightweight and easier to transport than bottled shampoo and care products, resulting in reduced resource use, transport costs and carbon emissions.

French Atlantic Arc (FR)

In France, a number of recent regulatory developments are encouraging the use of agricultural biomass for industrial purposes: the National Low Carbon Strategy[4], the Energy Transition Law for Green Growth[5] and the National Recovery Plan[6]. More specifically, the construction sector, one of the most carbon-intensive sectors of the French economy, is governed by environmental regulations

[3] The Austrian Codex Alimentarius is a set of standards and guidelines established to assist stakeholders, authorities, and courts to ensure food quality and safety. Developed over the past century, it serves as a flexible and indispensable instrument in the country's food regulation framework. For more information see Vojir F. et al., 2012.
[4] https://www.ecologie.gouv.fr/strategie-nationale-bas-carbone-snbc
[5] https://www.ecologie.gouv.fr/politiques-publiques/loi-transition-energetique-croissance-verte
[6] https://www.economie.gouv.fr/plan-de-relance

for buildings, known as RE2020 (Réglementation Environnementale 2020)[7] and stemming from the ELAN law (Evolution du Logement, de l'Aménagement et du Numérique of November 2018)[8]. The RE2020 plan has set 3 objectives: energy efficiency, reducing the carbon impact of buildings (aiming for neutrality by 2050) and thermal comfort during the summer period. This regulatory framework is encouraging eco-construction projects that use bio-sourced materials, particularly for insulation. In addition, at a more local level, some local authorities are contributing to the development of the bio-based construction sector by choosing, as contracting authorities, to procure bio-based materials for their building projects. Straw construction concerns all types of buildings: from single-family homes to multi-storey buildings, including industrial and commercial buildings. According to the French Network of Straw Construction (RFCP), there are currently around 6,000 straw-built buildings in France, with 500 new constructions every year, representing a steady annual increase of 8% in the number of buildings (RFCP, n.d.). The French straw construction industry is the most dynamic in Europe. In the Pays de la Loire region, 83 out of 27,300 buildings are currently constructed using straw, a very small number. Thus, given the mentioned regulatory push and the resulting demand, the potential for growth is significant. A study by Guillo and Lafargue (2024)[9] on biomass availability in the French Atlantic Arc region (composed of Normandy, Pays de la Loire, Brittany and New Aquitaine), explores biomass produced in these regions and compares it to the market evolution. This report assesses the biomass available according to several market growth assumptions, as well as the opportunity of development for the farmers. The study showed that the market for bio-based building materials is growing steadily: +10%[10], and some actors even think that it will grow by 25% per year.

COPANO's market can be defined as: *the market for insulation materials for construction and renovation*, and the company is currently focused on gaining a strong position in the French market. The company's main activity is the construction of insulation/construction panels using straw. COPANO has chosen to keep the scope of its sales strategy close to its factory (i.e. Loire-Atlantique and neighbouring departments) to limit the costs and CO_2 emissions associated with transport. The aim is also to source production inputs locally. The expansion model will then be based on setting up COPANO factories in other regions in France.

L'Atelier du Biosourcé / Fabrik du BTP is an organisational innovation whose concept fits squarely into the dynamics of the bioeconomy in the French Atlantic Arc (more concretely, the Rouen area in the Normandy region). It aims to promote the production and use of bio-based materials for construction by creating a physical space to facilitate access to biobased materials, equipment, training and knowledge exchange for craftsmen. The objective is to raise awareness among stakeholders in the construction sector, encouraging their adoption of bio-based materials and creating an ecosystem conducive to their development. It builds community, which in turns will offer concrete benefits like supplies at discounted prices though group purchases, rental of specialised materials/tools/equipment, storage space, trainings and exchanges with experts.

[7] See https://www.ecologie.gouv.fr/politiques-publiques/reglementation-environnementale-re2020 for additional information.
[8] https://www.ecologie.gouv.fr/loi-portant-evolution-du-logement-lamenagement-et-du-numerique-elan
[9] This study is part of the SCALE-UP report on regional biomass availabilities, nutrient balances and ecological boundaries by Groenestege et al. (2024).
[10] See also *Panorama des marchés* « *fibres végétales techniques matériaux* (hors bois) en France » - Memento 2020 – réalisé par FRD & IAR - financé par l'ADEME et France AgriMer : https://france-miscanthus.org/wp-content/uploads/2020/03/Memento-March%C3%A9s-fibres-v%C3%A9g%C3%A9tales-techniques-mat%C3%A9riaux-2020-va.pdf

Strumica (MK)

Driven by climate change and soil health deterioration as well as regulatory changes, the market for bio-based solutions in sustainable agriculture in North Macedonia is currently putting focus on innovative products –such as green fertilisers– to replace traditional agricultural inputs and adjust management practices. This market is becoming increasingly animated in regions where environmental sustainability and resilience to climate change are becoming critical priorities. Technological advances in GPS and mobile applications (e.g. for tracking of biomass and feedstock) are expanding the capabilities of innovators to valorise waste and byproducts and for users to improve their operational efficiencies. From a policy perspective, while the EU promotes bioeconomy initiatives with ambitious goals for reducing the use of synthetic fertilisers, national climate adaptation policies remain underdeveloped. Government support has also diminished recently, posing challenges for innovators. However, local policies, such as the Strumica region's Local Environmental Action Plan (LEAP)[11], offer opportunities to promote bio-based practices and drive adoption. In spite of the current global economic downturn, the financial capacity of consumers of agricultural products in North Macedonia appears to remain stable. Nevertheless, the lack of public financial support forces businesses to rely on own funding to acquire new machinery and run adjusted operations, limiting access to new solutions and market growth for the latter. From a social perspective, there is a need for educational efforts to drive behavioral change, particularly in areas like waste management and resource conservation.

Horti Eko is the provider of an innovative mulching machine offering a transformative approach to agricultural and waste management practices. Designed for versatility and efficiency, the mulcher attaches to a tractor and shreds agricultural residues into fine particles, which are subsequently incorporated into the soil to enrich composition, increase fertility, regulate temperature, retain moisture, and prevent erosion. These features collectively improve crop yields while reducing reliance on artificial fertilizers. For farmers, the mulcher addresses critical needs, including improving soil quality and reducing the use of synthetic fertilizers, which can help them attain better market prices for their crops. It also enables farmers to increase their time efficiency. For communal enterprises, the solution can help minimise landfill waste and improve the efficiency of vehicle and labor use, optimising spending while enhancing the environmental and public image of municipal utilities. In both applications, the mulcher demonstrates its potential to replace inefficient and environmentally harmful practices.

The Agro-Cooperative Bojane focuses on enhancing agricultural productivity and fostering collaboration among local farmers in the Saraj region of North Macedonia. Specialising in table grapes and grape products, the cooperative aims to strengthen market competitiveness while creating a sustainable model for agricultural development that can inspire similar initiatives across other regions. The **Bio-Based Value-Added Grape Products** from Bojane's vineyards represent an innovation in sustainable agriculture and food production. This initiative focuses on transforming locally grown grapes into a diverse high-end product line currently not available in the region, including grape juice concentrates, raisins, cold-pressed grape seed oil, and flavoured vinegars. By utilizing advanced processing techniques, these products preserve the natural health-promoting elements of the grapes, such as antioxidants and nutrients, enhancing dietary quality and overall wellness. The innovation is centred around sustainability and local sourcing. Each product is crafted using eco-friendly methods that prioritise the preservation of natural qualities and nutritional value. They are positioned as a superior, yet price-

[11] The LEAP is a strategic document designed to protect and improve the environment within the municipality. Its main goal is to ensure a clean and healthy environment for the residents of Strumica by implementing structured measures and activities within a defined timeframe and budget. The plan is valid for six years, after which it is reviewed and updated based on new developments and conditions. See https://strumica.gov.mk/leap/ for additional information.

competitive alternative to imported or mass-produced products currently in the market. By offering the same product quality at a lower price and with a reduced environmental impact, this initiative addresses a significant market gap.

Mazovia (PL)

The European Green Deal and the Common Agricultural Policy (CAP) have set a favorable policy environment and driven public support for sustainable agriculture and bioeconomy initiatives in Poland. This is further undergirded by the regional development goals of the Mazowieckie Voivodeship, although intricate procurement processes can place constraints on the set up and operation of projects. There is consumer interest in sustainable, slow living lifestyles and experiences (e.g. hands-on agricultural activities, wellness programs, and culinary workshops), and in community-driven education. These concepts appear to be particularly appealing to younger generations but might also be interesting to institutions engaged in initiatives to raise climate-awareness. EU and national funding for educational and sustainability projects, combined with Poland's growing interest in ecotourism and experiential activities, may open promising perspectives for models that use public funding in their early stages to gain traction and build capacity that then leads to financial independence in the mid- to long term. The economic fluctuations and uncertainty felt at global level are also playing their part in Mazovia, however, some innovators are responding to this by exploring ideas to diversify their businesses and by setting up collaborations with public and private entities –at different jurisdictional levels– to enhance their resilience. From the technological perspective, digitalisation continues to expand and enhance capabilities for co-creation, for using new educational formats and tools, and for sharing good practices across regions and communities more efficiently.

Agricultural residues and food and beverage processing byproducts are often utilised as animal feed, with some of them carrying substantial nutritional value. Political drive for circular economy and circular bioeconomy initiatives, as well as increased awareness on the importance of short and resilient supply chains are increasingly leading to the exploration of byproduct/waste repurposing and upcycling, including for applications as ingredients in human food products. Market trends point toward growing demand for health-preserving foods and ingredients that address specific dietary requirements (e.g. low-calorie, gluten-free, or low-glycemic index options). In Mazovia, consumer demand seems promising, concretely in the HoReCa sector (comprising Hotels, Restaurants, and Cafés), educational institutions (for incorporation into school meals and research activities related to biology and ecology), and specialty health food stores. Specific segments of the HoReCa sector are clearly characterised by high innovation and an eagerness to experiment, driven by a continuous demand to enhance and diversify offerings for consumers. Further factors for these businesses to engage in circular bioeconomy initiatives include Corporate Social Responsibility (CSR) commitments and efforts to combat food waste. In the Mazovia region alone, the HoReCa sector encompasses over 500 entities, indicating significant market potential at the regional level.

The **Bio-circular Apple Farm** is anchored in the heart of European and Polish apple production, in an apple orchard estate with a nearly century-old heritage in Mazovia. The innovator has managed the farm for three decades, effectively leveraging advancements in science and technology while implementing innovative solutions to enhance productivity and support sustainable development. The farm aims to disseminate knowledge, engage communities, and collaboratively develop innovative solutions to enhance circular economy practices in apple production. It will capitalise on its existing resources (expertise, facilities and commitment to development of the region) to operate as a centre for education, entrepreneurship and innovation testing. The initiative will function as a space coordinated by a non-profit organisation, gradually assessing the need to transition into a commercial model. Its primary target market includes NGOs focused on ecology, tourism, and education, with an estimated 7,500 potential partners in the region, as well as educational institutions–particularly kindergartens and primary schools–which seek nature-based learning experiences. Additionally, vocational schools specialising in agriculture and gastronomy, along with providers of training services on sustainable

development, represent an attractive niche market. While its geographic location presents challenges, the Farm's established partnerships, diverse offerings, and ability to integrate bioeconomy education into its services provide a distinct competitive advantage. Offerings from recreational parks and other educational farms represent competition in the region, but the Farm's specialised focus on bioeconomy education is its point of differentiation. Overall, the versatility of the offer, compounded with the innovator's strong network and alignment with current sustainability trends position this innovation well for long-term success in the region's bioeconomy sector.

Gospodarstwo Sadownicze MB is a recognised regional producer of export-quality apples and apple juices in Mazovia that are produced in a 24-hectare apple orchard. The latter is managed according to integrated farming principles, ensuring a consistent supply of high-quality raw materials for producing apple and multi-fruit juices. Apple pomace, a byproduct generated during the juice extraction process, constitutes 20–25% of the weight of the processed raw materials. It is abundant in pectins, fibre, and polyphenols, rendering it a valuable resource for the food and cosmetics industries. Traditionally, pomace has been utilised as animal feed; however, due to its notable nutritional benefits, this new initiative has been developed to repurpose it as a raw material for the culinary and processing sectors. This initiative includes the production of dried pomace, pomace powder, and vacuum-packed fresh pomace. Owing to its established brand presence and reputation, the innovator maintains a robust position and a stable customer base within the HoReCa sector, regional companies, and educational institutions, the primary target audiences for the new product line. Pomace may be utilised to prepare functional beverages and fruit teas in their undried form. At the same time, the powdered variant can serve as an ingredient in baking bread, bars, muesli, and dairy products. Another promising customer segment comprises speciality retailers and wholesalers targeting health-conscious consumers, who can reach individuals seeking natural food products. Additionally, culinary innovators, including culinary schools and restaurants engaged in product experimentation, represent a significant audience facilitated by a strategic partnership with the Bio-circular Apple Farm presented above.

Andalusia (ES)

It is estimated that the amount of biomass resources generated by olive tree pruning in Andalusia amounts to 2,622,280 tons/year (Junta de Andalucía, 2023). Ongoing research and development on biochar, as well as its application as a soil management practice considered in the EU Carbon Removal Certification Framework[12], is leading to the fast development of market interest and demand. Part of the significant quantity of biomass generated by the olive grove and its associated industries can also be converted into biochar. The transformation of this biomass into biochar gives it added value, turning it into a product with multiple applications. The production and use of biochar can create new economic opportunities in rural areas, fostering sustainable development. The production of biochar requires several stages, from the collection and transportation of biomass to its transformation into biochar and its subsequent marketing. Each of these stages involves the creation of jobs, both direct and indirect, in areas such as agriculture, logistics, production and marketing. For an optimal use of olive biomass and its related industries, it is necessary to train new professional profiles capable of generating added value through different strategies for the use of these by-products, both at field and industrial level, helping to generate qualified employment. Simultaneously, demand for biocomposites is expected to increase as industries in sectors such as automotive, construction and consumer goods increasingly adopt sustainable practices. Since 2023, Andalusia has a plan of measures to strengthen the industrial ecosystem of the automotive industry[13], whose objective is the growth of its value chain through the

[12] For more information, consult European Union (2024) Regulation establishing a Union certification framework for permanent carbon removals, carbon farming and carbon storage in products. European Parliament., 2024. Available at https://data.consilium.europa.eu/doc/document/PE-92-2024-REV-1/en/pdf.
[13] Plan de cadena de valor CRECE Industria de la automoción en Andalucía. See https://www.juntadeandalucia.es/index.php/organismos/transparencia/planificacion-evaluacion-estadistica/planes/detalle/452236.html for more information.

consolidation of industrial activities, whether they are suppliers or manufacturers of components, materials, and even service providers for these. One of the objectives of the Plan is environmental sustainability, seeking to reduce the carbon footprint of the value chain and throughout the life cycle of products, the development of integrated solutions in line with the principles of the circular economy, energy optimisation and new forms of production and repair to achieve these objectives.

The innovation proposed by **Andaltec** valorizes olive pruning waste to convert it into a value-added raw material with the potential to be introduced into polymeric matrices and improve their properties, also reducing the environmental impact of the final products (automotive components, urban furniture, home furnishings or packaging). It also avoids the emissions caused by the burning of olive pruning, which generates more than 500 thousand tons of CO_2 each year in the province of Jaen alone (Universidad de Jaén, 2023). These new developments will contribute to the establishment of a suitable ecosystem based on a new business model from which farmers can benefit thanks to the potential added value of olive pruning as a reinforcement of technical materials. On the other hand, the production of new materials requires the development and implementation of new technologies, which can generate opportunities for research and development. Knowledge transfer and the training of qualified personnel are essential for the development of this sector. The innovation presented by Andaltec will position Andalusia as a benchmark in obtaining these materials from olive pruning, helping to strengthen the Andalusian industrial ecosystem.

With the biochar produced by **Bioliza**, Andalusia reinforces its leadership in the olive oil industry, demonstrating how the agricultural sector can be a crucial ally in the transition to a low-carbon economy. According to the Spanish Biomass Association, in 2023 biochar accounted for 94% of long-term carbon removal credits (International Biochar Initiative, 2024), standing out as a fundamental tool to achieve global climate targets. By sequestering carbon, improving soil health, and reducing reliance on synthetic fertilizers, biochar production can contribute to a more sustainable agricultural system in Andalusia. One of the main challenges that Andalusia has to face is drought. The biochar obtained by Bioliza improves the water retention capacity of crops, which means greater resistance to drought. In addition, biochar stores carbon stably in the soil for hundreds of years (Polonio Baeyens et al., 2024), helping to mitigate climate change by reducing the amount of carbon dioxide in the atmosphere.

Northern Sweden (SE)

The forestry sector plays a crucial role in the economy of Sweden, where roughly fifty per cent of the forest land is owned and managed by small-scale private proprietors (SFA, n.d.). Driven in part by the EU's increasing ambitions on climate and biodiversity targets, the block's need for energy security/independency, and, more recently, the calls to ensure competitiveness at global level, the forest industry in Northern Sweden is evolving dynamically. Here, the demand for timber has remained steady, underpinned by both domestic construction needs and strong international exports. Simultaneously, several investments are planned to produce biocarbon, biofuels and biochemicals from forest industry byproducts (sawdust and bark), and the region is experiencing a revival in the interest to use the byproducts of harvesting operations in bioenergy production. Forestry operates as a co-production system where multiple products e.g., saw logs, pulpwood, and logging residues, are generated simultaneously, and thus their availability is inherently interconnected. Fluctuations in the demand or production of one product inevitably influence the supply of others (Matisons and Fridman, 2023). This interdependence underscores the importance of integrated forest management strategies to optimise resource use while balancing economic, environmental, and industrial needs. Woodworking industries, such as sawmills, generate substantial volumes of sawdust and bark. These materials are

repurposed into various applications, including mulch production, animal bedding, and biofuel, ensuring that a significant portion of the residual biomass re-enters the market. Similarly, large quantities of logging residues—comprising primarily branches, tops, and needles—are produced during harvesting operations. Currently, in Northern Sweden, these residues serve as a supplementary feedstock for Combined Heat and Power (CHP) plants in the region. However, their widespread utilisation is hindered by logistical challenges related to extraction, transportation, and storage, making their valorisation more expensive than that of sawdust and bark. As a result, a substantial portion of the biomass generated during harvesting remains uncollected and unutilized. On average, approximately 31 million cubic meters of timber are harvested annually in Northern Sweden. The primary factor influencing forest owners' harvesting decisions is the prevailing market price of timber, as it directly impacts profitability. The price of wood and woody biomass used for energy generation is said to have comparatively limited influence on the decision when to harvest. The recent market developments have already sparked initiatives to make the use of logging residues as an energy source more widespread and economically viable. New biorefinery applications are also being explored that extract high added value chemicals and materials from forestry byproducts. These trends are expected to continue as the region seeks to optimise resource efficiency and transit towards a more sustainable, more circular bioeconomy.

The **Wood Fuel Network**, a social innovation with longstanding roots in Northern Sweden, was the first of the 12 selected innovations to receive assistance via the SCALE-UP ISP, and has already put into practice the strategic insight gathered as part of the market analysis carried out in the programme. Its goal is to mobilise and connect multiple regional actors (local and regional authorities, large energy producers, forestry entrepreneurs, logistics operators, equipment developers, forest owners) within the whole value chain and to communicate and exchange best practices for cost-effective deliveries of high-quality logging residues for their valorisation. For operators of CHP plants, membership in the Wood Fuel Network is of interest as it can facilitate the access to- and mobilisation of larger volumes of high-quality logging residues, securing supply and potential decreases in price in the long term. The established contacts and direct communication with suppliers is essential to ensure the biomass meets the operator's specifications (e.g. nutrient and moisture content). For forest entrepreneurs, the network can be an invaluable source of knowledge and insight on past experiences and lessons collected by regional stakeholders over many years. It provides a reliable sounding board to explore new ideas and seek workable ways to expedite the stages of development, implementation and scale up. Lastly, for forest owners, the network can unlock concrete opportunities to generate additional income from the sale of logging residues and endow them with new ideas and validated knowledge on forest management practices to help them deal with the current changing macroenvironmental conditions more effectively.

Reselo is a young startup spinning off from the Wallenberg Wood Science Center of the Royal Institute of Technology (KTH) in Sweden. The team is contributing to the fossil phase-out of large economy sectors, like the footwear and automotive industries, by pursuing an impact-through-scale approach. Concretely, this has led Reselo to develop a scalable process to replace synthetic rubber by converting birch bark into a novel, elastomeric biomaterial: Reselo Rubber. Birch bark is a highly promising feedstock for industrial-scale material production due to its abundance as a residue from the global pulp, paper, and plywood industry. This widespread availability ensures that it remains an easily accessible resource. Furthermore, in Northern Sweden, a significant portion of birch bark is sourced from sustainably managed forests, reinforcing its role in environmentally responsible manufacturing. In addition to its accessibility and sustainability, birch bark contains valuable compounds with diverse applications, such as betulin, which can be used in coatings. These characteristics make birch bark a commercially attractive raw material for various industries. In Northern Sweden, a few large forest companies hold a dominant position in the market, shaping long-established business relationships and trust between buyers and sellers of woody biomass. These deep-rooted connections, developed over decades, can represent significant barriers for new startups and innovators seeking market entry and, importantly, access to biomass. The scalability potential of bio-based rubber will largely depend on the availability of birch bark, which

is primarily obtained from birch logs that are debarked before processing by the forest industry. To ensure a steady and efficient supply of raw material, production facilities should ideally be located near sawmills or pulp mills that process birch and generate large volumes of bark in a single location. A key challenge is that this bark is typically used as biofuel, limiting its availability for new applications. In SCALE-UP, Reselo has gained access to the network of forest companies and stakeholders in Northern Sweden, and through this is exploring the possibilities to enhance the operational and economic viability of their novel solution.

3.2 Key characteristics of the small-scale businesses explored

For confidentiality reasons, particularities of the individual businesses cannot be discussed in this report. Instead, to gain insights that could feed into the design of future innovation policy and support schemes, this sub-chapter offers a cross section of the business models examined with the 12 innovators., a frequency analysis of various elements integrating the 12 innovations' business model canvases was conducted to identify convergence along target groups, key resources, key partners, and communication and sales channels. Other elements of the canvases were also explored in comparative analysis, yet the ones shown below were considered to be the most illustrative.

Target groups

The analysis of the data collected by the TFs during the ISP sessions showed that half of the innovators supported by SCALE-UP (6 innovators from Austria, France, North Macedonia and Poland) consider *distributors and retailers* as a key target group. Within the merged group are included both large, international resellers as well as smaller shops operating at local level. Innovators also often listed *individual consumers* as another relevant customer segment. Here, direct sales to consumers are either already taking place or planned e.g. via their own or third-party online portals. The same number of innovators largely converge on the customer profiles they target for these direct sales, and together they could be described as *health and/or ecologically conscious consumers seeking to acquire premium or specialty products*. Overall, expectations recurrent among the innovators are that a comparatively larger proportion of revenues will come from the former group (retailers and distributors) due to the greater volume of consumers reached through them. Although contingent on the individual terms agreed with each retailer, profit margins should also be comparatively larger here, as economies of scale would allow the innovators to reduce logistics and sales costs per unit. At this point, the unit price for direct sales to consumers cannot range too high, as most of the products and services being offered are early stage and have little or no market traction yet.

Another interesting insight emerging from the data on customer groups was that one-third of the ISP participants (4 innovators from France, Spain and Sweden) are targeting their offer to an array of groups that are members of their own innovation system[14] (e.g. including individual consumers, craftsmen, knowledge workers, and public authorities), even if the latter play very different roles and have distinct needs in the market situation. Some are final users of the product or service, while other play a procurer or intermediary role. In two cases this reflects the versatility of the products offered, and in the two others it is a result of particular characteristics of the innovation, like having a main vision of developing the regional market through concrete objectives of building community, sharing knowledge, and sparking collaboration among local and regional actors.

Another observation is that innovations that could be classified as leveraging more complex technology consistently listed large-scale manufacturers (ranging from the automotive, through the footwear, and to the cement industries) as key target groups. Here, 3 innovators from Spain and Sweden have received direct support during the ISP to explore collaborations that could eventually lead to first- or expanded industrial application of their solutions.

Lastly, a comparatively small proportion of the innovations in SCALE-UP are being targeted to agricultural and energy sector players (often predominant groups in the market for bioeconomy products and

[14] Following the definition proposed by Edquist (1997) „all important economic, social, political, organizational, institutional, and other factors that influence the development, diffusion, and use of innovations."

services). Here, 2 innovations offer advantages in soil enhancement applications and 1 in the generation of bioenergy.

Key resources

The frequency analysis of the entries in the *key resources* element of the Business Model Canvas template showed that 7 out of 12 innovators identify biomass as a fundamental resource to deliver on their value proposition. Almost the same number of innovators, 6 out of the 12, consider networks and strategic partnerships as essential. Similarly, 6 innovators listed skilled personnel. Here, the analysis distinguished between entry formulations referring explicitly to the team and those referring to expertise, information, knowledge, and intellectual property, as these assets/competences could be held outside the organisation or within its knowledge management system, as opposed to among staff. Taking that consideration, 9 innovators listed the mentioned assets/competences as fundamental resources for the business. Other trailing entries included financial resources, facilities, equipment, marketing and sales, and R&D (including market research and business planning).

Key partners

Perhaps unsurprisingly given the type of organisations that the SCALE-UP innovators are and the type of operations that they run, suppliers and R&D partners were the second and third groups most frequently listed as *key partners* in the assessments (by 7 and 6 innovators, respectively). Innovators often included groups here that they had previously also categorised as clients. This is commonly observed in such exercises and has probably to do with the fact that early-stage enterprises often rely largely on their prospects or first clients to pilot and test their prototypes. Thus, a dual relationship ensues.

Marketing and sales channels

As regards the preferred channels to raise awareness and drive purchase decisions, the majority (10) of the innovators who participated in the ISP are visiting trade/industry fairs and exhibitions, conferences and online events regularly to promote their business. Further, 7 out of the 12 innovators are reaching out to potential clients directly, this includes following up with contacts established in the visited events. The same number of innovators listed online presence via websites and social media as key channels to spread the word about their offer, and 3 innovators included online shops/e-commerce platforms as their sales channels.

4 Discussion and main lessons learned

Some observations on the assessments

The relative prominence of retailers and distributors in the lists of target groups is noteworthy, as it reflects the common dependency of early-stage enterprises on intermediaries that they can lean upon to leverage market presence and sales. This could be seen to indicate that if regionally focused bio-based businesses are to remain small scale, they will need to develop strong bargaining power vis-à-vis larger, international clients they might be dependent upon in their spin-off and start-up phases. This will require a diversified client portfolio and a dependable network of logistics partners. Support seems necessary to successfully navigate these initial periods of market entry and transition into later stages of development, where a strong market pull can be a determinant factor for the enterprise‘s decision-making.

The current economic downturn and the erosion of purchasing power due to high inflation rates are combining with a shift in global politics towards narratives that pit national competitiveness agendas increasingly sharply against social and environmental policies. In this light, regional bioeconomies will be confronted with the complex task of balancing economic development with social and environmental goals more bluntly than before. Roughly half of the innovations examined in the SCALE-UP programme are high-end consumer products oriented towards health- and/or ecologically conscious consumers. For these young enterprises to enter the market and become financially viable, they will require a customer base that is willing and able to (continue to) pay a premium for their market goods. The rather opposite scenario builds up on the current market, and so this could indicate a need for rolling out policy instruments that increase affordability of healthy, environmentally sustainable products.

The SCALE-UP ISP has drawn a good number of innovations that could be directly classified in the Social and Solidarity Economy category[15] (3 of them from FR, PL and SE are distinctly social innovations) or that strongly incorporate one or more features of entities in that category (3 others from FR, MK, and PL). Some were more focused on ethical research and small-scale operation, prioritising financial sustainability over traditional profit-oriented models. They sought legal guidance on licensing and knowledge transfer while committing to maintain their ethical framework. These innovations appear to carry significant potential to push forward their regional bioeconomy, mainly because of the passion and commitment that drives their leaders—often holders of specialised knowledge and being themselves important nodes of regional networks. If the positive response that the social innovations who participated in SCALE-UP have seen so far is something to be generalised, it would be important to spot these initiatives as they emerge and facilitate their journey. As in these cases a great deal seems to hinge initially on the personal knowledge and dedication of a small group of highly motivated and well-connected individuals, setting up adequate means to ensure knowledge transfer and management may be important to build redundancy and reduce dependencies.

On the aspect of replicability, the core ideas of many of the innovations explored in the ISP are easily replicable and build upon exploitation and business models that already give serious consideration to the question of technology/capacity transfer via both commercial and open mechanisms —e.g. licensing, setting up operations in other markets, sharing, and open sourcing— as market expansion strategy (e.g. HortiEko, Compolive, Bio-based Value-added Grape Products, COPANO). The same can be said of the social innovations explored in France, Poland and Sweden, which place explicit emphasis on knowledge sharing and incorporate notions of open innovation into their core activities.

As regards scalability, while several innovators are optimistic about their prospects and even have already gained good traction (e.g. Gospodarstwo Sadownicze MB, Bioliza, Compolive, Wood Fuel Network), the main limiting factor for some others seems to be the well-known one for the bio-based sector: access to a steady, affordable supply of biomass in the necessary volumes (e.g. to enable semi- or industrial scale operation) and meeting the required specifications (to ensure consistent quality of the end product without disproportionate costs). Here, resistance to change and a lack of clear, strong incentives for biomass holders, competition between current and alternative uses of biomass, and tradeoffs that raise questions of environmental sustainability and affordability of end products, come into play.

Reflections on the implementation of the SCALE-UP ISP

Overall, the experience of planning, setting up, and running the SCALE-UP ISP has been enriching in several ways for both its main beneficiaries (i.e. the 12 selected innovators) as for the consortium members who have been directly involved in the task (Ecologic Institute and all regional partners). For some of the latter, adopting the role of regional leads in the support programme—which entailed taking on community building and entrepreneurial activities—has demanded that they themselves upskill and adopt new stances. The ISP thus represented a challenge in terms of their own skills and capacity. While all regional partners in SCALE-UP possess great knowledge on the technical aspects of bioeconomy in their region, business, marketing and finance strategies were not always their core work. While somewhat disorienting for them and their network at first (e.g. as their peers do not know them as innovation managers), they have overcome this successfully and gathered positive experiences from the engagement. They have built expertise and capacity on these topics and have improved their position as go-to partners in their region. Some partners have directly expressed their conviction that can truly support the bioeconomy innovation ecosystem in their region. In some cases, SCALE-UP has sparked the partners' involvement in new projects and with this they have been able to contribute to concrete strategic developments in the bioeconomy sector of their countries.

On the side of the innovators, they have described their experience participating in the programme as satisfactory, with some of them expressing great gratitude for the concrete opportunities (e.g. participation in international trade fairs, exposure to potential partners and investors) and expanded perspectives that their TFs provided them with. Several innovators primarily struggled with funding,

[15] See https://social-economy-gateway.ec.europa.eu/about-social-economy/social-economy-definitions-and-glossary_en for common principles and definitions of the concept considered by the European Commission.

and aligning business model design with a clear target was crucial to securing and keeping their engagement. Others lacked human resources and marketing support, and so seeking opportunities within the consortium to help them explore possibilities in new geographic markets (e.g. establishing contacts to foreign distributors for gaining supply chain access) and to diversify their products was key. Overall, the ISP was seen as beneficial as it brought time and resources to invest in activating networks around concrete solutions and their value chains, and in pushing different groups in a region to bridge communication gaps.

The experiences with the concept of the TFs and with the engagement of their members has been mixed. The TFs were seen in some regions as instrumental for further developing the bioeconomy network and fostering collaboration within the community. At the same time, in some cases TF members initially invited turned out to not always be the most suitable ones to support with the specific situation the innovators were going through. Flexibility to adapt and rearrange TF membership, and perhaps involving them later, once a better understanding of the innovators' needs was confidently secured, were proposed as ways to improve in the future. Thankfully, some experience with such proposed improvements was already gathered during the programme, as some supporting partners who started later with the more intensive work with the innovators did exactly that. They adopted a flexible approach to setting up and handling the TFs. They met several times with the selected innovators first, and selected TF members once they felt they had a solid grasp of what the innovators needed. They emphasised the importance of confidentiality, as some TF members were too close to the innovators' competitors. This effectively meant that their contributions to the discussions were of high relevance, with sufficient depth and concreteness, but it simultaneously complicated the dynamics of the exchange. Another clear lesson was that pro-bono, recurrent support from the TF members was challenging to secure, which made it crucial to identify incentives and formulate in-kind contributions from SCALE-UP to them. Concretely, one of the regional partners leveraged their social media presence and "marketed" the TF concept as contributing to the broader innovation ecosystem in Andalusia, giving thus the TF members a clear role and spotlight in that frame.

Some partners faced difficulties at the start in identifying innovations and reaching out to potential participants. From the view of some regional partners, the initial effort to standardise general requirements, selection criteria, and scheduling of the call for Expressions of Interest among the six regions at the start of WP4 was perceived as a barrier. For instance, more flexibility in the timing (i.e. accounting for differences in the summer break in different regions of Europe) and earlier communication are expected to have ultimately improved engagement. Steps were indeed taken afterwards to incorporate a certain level of customisation into the open call, but this meant less time was available to keep them open for applications. Once the ISP started, logistical issues (e.g. remoteness, limited accessibility) and the seasonal nature of the innovator's running business (e.g. apple orchards) also complicated their earlier engagement and the coordination of schedules with local stakeholders that would be involved in the TFs. Despite these hurdles, meetings of the regional stakeholder platforms supported by SCALE-UP helped foster collaboration and activate community members, and maintaining a flexible and adaptive approach led to the efforts being fruitful.

One of the advantages of SCALE-UP's structure which innovators could most tangibly benefit from was the geographical spread of the project across Europe. In several cases where innovators were seeking to expand beyond their domestic markets or seek collaborations with international partners, consortium members were able to provide valuable insights and network contacts in their own country/region. Similarly, the distributed conduction of the ISP activities and management of the TFs across the six regions proved to be a good practice. As mentioned earlier, while some regional partners lacked experience with innovation management and support services, they do possess valuable local knowledge and networks, and a nuanced familiarity with the dynamics of the regional bioeconomy. This proved invaluable as it helped potentialise the standard framework and methodology that the project provided the regional partners with, ultimately generating more targeted assistance to the innovators.

Lastly, the shared experiences of several regional partners highlighted the importance of consistency in the planning and diligence in the execution of the working sessions with the TFs. The steady sequence of meetings, scheduled well in advance and involving small groups of 2-6 regular attendees provided a feeling of continuous and incremental progress as a group. Online sessions helped speed

up the process, while face-to-face meetings were beneficial to bring the TFs closer as teams, when this was possible.

5 Conclusions and recommendations

The SCALE-UP project has demonstrated the potential of structured innovation support to enhance the market readiness of bio-based innovations across six European regions. Through their active engagement along the four Tasks in WP4, and particularly in the Innovation Support Programme (ISP), consortium partners and other contributors have provided tailored business development services, activated regional networks, and sparked collaboration between innovators and key local experts along concrete projects with punctual needs. The experience gathered with the ISP highlights key lessons about the challenges and opportunities faced by early-stage bio-based enterprises and initiatives, which we hope can inform future policy and support initiatives.

One of the main findings of the programme is that market access remains a difficult endeavor for bio-based innovators, particularly those operating in niche markets or with sustainability-oriented products whose price is often marked at a premium. The reliance on retailers and distributors as intermediaries underscores the need for young enterprises to develop robust sales strategies and strong negotiating power to ensure long-term viability. On the one hand, the skills and time resources necessary for these are rarely at hand for spin-offs and early-stage start-ups, and future programmes offering innovation support services could give particular focus to addressing this. Conversely, policies that promote sustainable consumption and increase the affordability of bio-based products could play a crucial role in expanding market demand.

The programme coordinators also experienced first-hand the growing role of social innovations and of the influence of the Social and Solidarity Economy (SSE) in the effort to transit to a sustainable bioeconomy. Enterprises operating in the SSE often adopt alternative business models that prioritise social, democratic and environmental objectives over traditional profit maximisation. Several participating innovators exhibited strong commitment to the social and ethical dimensions of their business. Given their potential to drive place-based, mission-driven bioeconomy solutions, targeted support mechanisms should be considered to facilitate their viability. This could include improved access to finance—recurrently listed as a burden by bio-based innovators—legal guidance on business models with a strong ethical or cooperative angle, and capacity-building initiatives tailored to social innovation initiatives.

From an implementation perspective, the experiences collected in setting up and running the regional TFs highlight the importance of preparation, flexibility and adaptability in structuring innovation support. Taking enough time at the start to align the membership of these groups sufficiently well with the identified needs and priorities of the innovators is essential to avoid discouragement at the start. Further adjustments during the run of the group sessions are to be foreseen, as often necessities change as new information becomes available, and this happened systematically during the SCALE-UP ISP. Future programs should allow for an iterative approach to stakeholder engagement, ensuring that the right expertise and networks are mobilised accordingly. Additionally, sustained voluntary engagement from TF members and contributors will continue to be a challenge. Organising for punctual inputs that require moderate to low effort, and identifying incentives—even if through the provision of in-kind benefits—could help ensure committed participation.

The geographical coverage of the SCALE-UP consortium also proved to be a key asset, allowing some innovators to access international market insights and networking opportunities. This underscores the value of collaboration across regions in bioeconomy innovation, particularly in helping early-stage entrepreneurs explore new markets and identify business opportunities. EU-supported programs should continue to facilitate such linkages and synergies, yet with a clear pursuit of meaningful exchange. The distributed approach that the ISP adopted, which gave regional partners a common framework to follow while allowing flexibility—in the timing and the selected programme activities—and the incorporation of their own understanding of local norms and dynamics proved to be successful in generating value for the innovators.

Finally, ensuring consistency and steady progress during the programme is essential. The structured and regular sequence of TF sessions followed by some regional partners was highly beneficial in maintaining momentum and progress.

Building on these areas, future initiatives can leverage the positive achievements and lessons of SCALE-UP to further support the transition towards a sustainable, circular bioeconomy in Europe.

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Annexes

Annex I – Setting up Task Forces report

Annex II – Synthesis Reports for the six SCALE-UP regions