



SCALE^{UP}

community-driven
bioeconomy development

Overview of regionally suitable solutions

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Task leader:	CTA
Responsible author:	María Nieto (CTA)
Contributing authors:	Rafael Castillo (CTA), Marina Barquero (CTA), Carmen Ronchel (CTA), Sofía Sánchez (CTA), Zoritz Kiresiewa (ECO), Holger Gerdes (ECO), Gerardo Anzaldúa (ECO), Emilija Mihajloska (SDEWES-Skopje), Katarzyna Rull Quesada (UNI), Kristina Pammer (TMG) Barbro Kalla, (BFR) Sophie Rabeau-Espstein (AC3A), Alexandre Morin (AC3A)
Internal peer review:	Frans Feil, Marisa Goenestege (BTG)
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EXECUTIVE SUMMARY

The present document summarises Task 4.1 “Identifying regionally suitable bio-based solutions”, the first and key activity to develop Work Package 4 of the SCALE-UP project, focused on providing dedicated innovation support services to innovative bio-based solutions in the six regions that participate in the project.

The first section introduces the objectives of the project in the context of this task. The project's goal is to support twelve bio-based solutions, ensuring they provide economic, environmental, and societal benefits in alignment with significant policies like the European Green Deal and the EU Bioeconomy Strategy. The selected solutions should foster stakeholder involvement, respect ecological boundaries, emphasize resource efficiency, facilitate knowledge transfer, support the food sector, and boost competitiveness. To ensure this, SCALE-UP launched a call for Expression of Interest (EoI) to select the solutions.

The design and implementation of this EoI are explained in section 2 from the preparation of the documents of the Call for EoI to the evaluation process. Eligibility and evaluation criteria in connection with the objectives of the project are explained as well.

Section three gives information about the characteristics of each of the regions, the reality of existing networks and the stakeholder types among other characteristics relevant to the implementation of the EoI. Furthermore, how the regional partner develops the implementation of the call according to its regional characteristics to boost interaction with stakeholders is explained along with a brief explanation of their evaluation process and publication of results.

Section four is dedicated to giving an overview of the twelve selected solutions through the EoI. An explanation of the solution, its innovation and its contribution to the regional value chain and location in the biomass value pyramid are detailed.

Sections five and six connect with the next step in the project, the creation of the Task Forces that will develop the Innovation Support Programme and the conclusions and lessons learned in this task, which will serve as valuable insights for the rest of the activities in the project, especially for Task 5.4. This task will elaborate a framework guidance that links bio-based solutions to rural development based on SCALE-UP experiences.

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Abbreviations

EoI	Expressions of Interest
EU	European Union
KoM	Kick Off Meeting
MoU	Memorandum of Understanding
ISP	Innovation Support Programme
ktoe	Kilotonne of Oil Equivalent
WP	Work Package
R&D&I	Research and Development and Innovation
SMEs	Small and Medium-sized Enterprises
NGOs	Non-Governmental Organizations
RTD	Reaction Technologies Department
t	Tonne
ha	Hectares

1. Introduction

The implementation of small-scale bio-based business models at regional level by using locally available resources has a high potential for fostering rural development. There are, however, two important aspects to be considered: the fair distribution of benefits to **local communities and the ecological impact** of increased biomass production. As such, SCALE-UP aims to identify and provide assistance to twelve bio-based solutions that bring economic, societal, and environmental benefits to the respective regions. The innovation support services offered by the project are designed to align with key policy objectives, including, among others, those set out in the European Green Deal, the EU Bioeconomy Strategy, the EU's long-term vision for rural areas, and the EU Rural Pact and Action Plan.



Figure 1. Visualisation of the project's conceptual framework.

As outlined in Figure 1, the selected innovations should respond to one or more of the following objectives:

1. Firstly, the innovations should aim to involve and **benefit various stakeholders** along the value chain within the regions, fostering collaboration, participation, and equal opportunities for all individuals and the community involved (Gerdes et al. 2023).
2. Secondly, the innovations should be designed and implemented with the objective of preserving and enhancing the health and resilience of regional ecological systems by taking their **ecological boundaries into account** (ibid.).
3. **Resource efficiency** is another crucial aspect that the innovations should address, by involving approaches such as circular economy principles, efficient production processes, and food waste reduction. Innovations should also build on regional biomass resources (e.g., agricultural and forest residues, side streams from the food industry).
4. Knowledge transfer and innovation are key drivers of progress and development. The innovations should contribute to the dissemination and exchange of **knowledge** and best practices, and encourage novel ideas, research, and social and technological innovation.
5. Furthermore, the innovations should have a positive impact on the **food sector**. This entails supporting sustainable agricultural practices, promoting food security, and avoiding food waste.

6. The innovations should aim to **increase competitiveness**. This involves fostering the acquisition of new skills and capabilities among stakeholders, such as farmers, entrepreneurs, and local communities and promoting entrepreneurship. Further, as outlined in SCALE-UP's conceptual framework, the innovations should strive to promote regional added value for rural communities, which includes generating new employment opportunities; fostering demand for innovative and sustainable products and services; and promoting the efficient utilization of natural resources. Lastly, the innovations should be in line with relevant policy objectives set out in the European Green Deal, the EU Bioeconomy Strategy and relevant national and regional bioeconomy strategies and action plans.

To ensure that the selected solutions are in line with the project's objectives and the broader strategic goals at the European, national and regional level, SCALE-UP initiated a **call for Expression of Interest (Eol)**. The Eol process incorporated clearly defined selection criteria aligned with the stated objectives, aimed at identifying bio-based solutions with the greatest potential for generating regional added value and making positive environmental, social, and economic impacts. Following the evaluation process, SCALE-UP will proceed to establish **Task Forces** in every region.¹ The Task Forces, guided by the project team, will support the selected entrepreneurs in developing small-scale business models for their bio-based solutions. The methodology employed will be based on the Business Development Programme utilized in the Horizon 2020 project BRIGAD. The primary goal of the task forces is to enhance the business capabilities of the chosen innovators and facilitate the market entry of their bio-based products or services. Finally, an international event will be organised to facilitate the market deployment of the selected solutions. Figure 2 illustrates the main stages of the innovation support programme.

Work package WP4

Bio-based Business Models, Value Chains & Markets



Figure 2. Visualisation of the phases of WP4. Source: own elaboration.

This report centers on the initial stage (Task 4.1), which involves the selection of innovative bio-based solutions, and concludes by providing a glimpse into the upcoming phases.

2. Preparation and launching of the Call for Expression of Interest

To coordinate the preparation of the call for the Expression of Interest (Eol), and to facilitate the design of the Eol document and the evaluation process, several meetings were held between the project

¹ More information about the Task Forces and the upcoming activities under this WP can be found in chapter 5.

partners under the leadership of CTA as work package leader. The methodology followed in these meetings was very participative, trying always to incorporate the feedback from all regional partners. One of the main challenges in the task has been to harmonize and unite a common Eol for six regions with very different value chains (see table 1), levels of penetration of the bioeconomy in the economic sectors, and even very different levels of knowledge about what the bioeconomy is, which means that some concepts, which are basic in some regions, are not well known in others.

The following table shows relevant bio-based value chains identified in each of the six regions:

Table 1. Relevant biomass streams and identified valorisation options in the SCALE-UP regions.

Region	Biomass streams	Valorisation options to be explored in SCALE-UP
Northern Sweden	Sawdust, bark, logging residues, needles	Fractioning of biomass for heat and power, biofuels and chemicals
Mazovia	Agri-food side streams and residues (apple pomace, prunings)	Production of new fertilizers, new functional additives, bio-based packaging
French Atlantic Arc	Fibre crops (e.g. flax and hemp)	Production of bio-based products from fibre plants (hemp, flax, etc.) for applications in building (insulation, agro-materials, etc.) and other markets (textile, food and feed, chemistry, etc.)
Upper Austria	Residues from bakeries and breweries, e.g. hops, draff/spent grain, bakery products	Protein from food waste, packaging from food waste (bioplastics, paper), polymers, feed
Strumica	Agricultural residues; raw materials from forest biomass	Production of fertilizers based on composting of waste generated by the agri-food sector; production of bio-based commodities (pots, containers, various types of packaging, construction boards, insulation materials)
Andalusia	Olive kernels, pomace, flowers, wood, branches, leaves	Biochemical compounds, essential oils, other bioactive compounds for cosmetics, chemicals, feed, biofertilizers

One of the main aims of the project is to involve the **primary producers** of the regional value chains. A common characteristic of all of the regions is that many of the primary producers don't have a good level of English, which could be a barrier to participating in the Eol.

Therefore, in order to solve the language barriers and to customize the Eol in a more accurate way, the document for the Call for Expression of Interest has been published in the local languages and adapted by each of the regional partners to their particularities. A common first version of the call in English was decided. Each regional partner translated and customized the official document of the call proposed in the first version.

2.1 Eligibility criteria

Within the regional context of SCALE-UP, the aim of the Call for Eol was to identify innovative bio-based solutions developed by entrepreneurial initiatives. The potential bio-based solutions had to empower the R&D&I ecosystem of the targeted value chain for each region, meaning that these solutions have the ability to enhance the processes related to research, development, and innovation within the targeted industry sectors in different geographic areas. There were **no restrictions concerning the type of entity** that can apply (from start-ups or SMEs to universities and RTD

institutes, large companies or even NGOs). However, the generation of social, environmental, and economic benefits for the local community was **highly recommended**.

SCALE-UP focusses on **small-scale technologies** to facilitate the transition to a regional bio-based economy. Those innovative solutions must be products or services to comply with the following requirements:

- Simple solution;
- Low capital costs (less than 2M€);
- Less investment risk;
- Low processing capacity (less than 100 t/day);
- Low process complexity;
- Using local material and feedstocks;
- Mostly producing partly pure and intermediate products².
- Easy to operate.

In the case of services:

- Simple,
- Less expensive
- Easy to replicate.

To keep the **regional context** of the EoI one of the requirements was that applicants have either an established office or a branch office in the target region.

2.2 Evaluation criteria and scoring

The selection of applications was based on a wide-ranging set of evaluation criteria carefully chosen to identify solutions that **comply with the objectives of the SCALE-UP** project. These evaluation criteria were discussed and agreed in consortium meetings with all the regional partners.

Special attention was given to identify the position of the solutions in the biomass value pyramid (see Figure 3). The pyramid highlights the variety of opportunities we have to derive value from biomass and identifies which applications can add the most value to it. The value of the applications and the amount of knowledge and expertise needed to use the biomass increase as one moves up the pyramid.

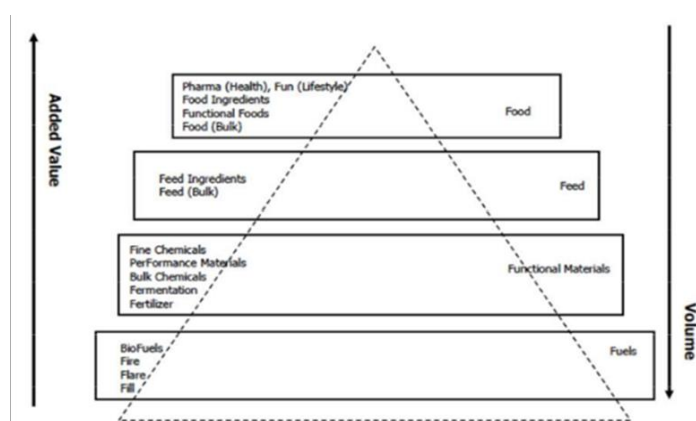


Figure 3. Biomass value pyramid (Vis et al., 2016)³

² "Partially pure" means that the solutions primarily produce products that are not entirely refined or pure. They might still have some impurities or might be intermediate goods, meaning they might need further refining or processing. The term "partly pure" suggests that the product is largely pure, but not entirely, indicating that there might be some minor impurities.

³ European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, Reichenbach, J., Mantau, U., Vis, M. (2016). *CASCADES : study on the optimised cascading use of wood*, (U.Mantau,editor,M.Vis,editor,B.Allen,edito) Publications Office. <https://data.europa.eu/doi/10.2873/827106>
D4.1 – Overview of regionally suitable solutions

Each of the regional project partners make significant efforts to explain the evaluation criteria of the EoI to as many potential applicants in their regions as possible. In many cases these explanations were done through bilateral meetings.

The evaluation criteria used are explained below:

- **Extent to which the bio-based solution will contribute to achieving SCALE-UP's key objectives.**

This criterion assesses how well the entrepreneurial initiative aligns with the overarching goals of the SCALE-UP project. Initiatives that aim to promote collaboration along the value chain, enhance regional ecological resilience, focus on resource efficiency, enable knowledge transfer, positively impact the food sector, and increase competitiveness (as mentioned in Chapter 1 would score high on this criterion.

- **Extent to which the bio-based solution is suitable for the regional bioeconomy.**

This checks the compatibility of the innovation with the unique attributes and needs of the region's bioeconomy. This directly corresponds to the objective of resource efficiency, building on regional biomass resources, and the goal of fostering regional added value. Solutions that are tailored to or can be seamlessly integrated into the regional bioeconomy will be prioritized.

- **How innovative is the bio-based solution?**

This gauges the novelty and groundbreaking nature of the initiative. It links closely to the objective emphasizing the role of knowledge transfer and innovation as key drivers. Highly innovative solutions that also support knowledge dissemination and bring about technological or social changes would be favourable under this criterion.

- **Extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social).**

This assesses the tangible benefits the support programme would offer to the entrepreneurial initiative. Initiatives that can show significant improvements in economic, environmental, and social aspects when supported align with the objectives of preserving regional ecological systems, resource efficiency, positive impacts on the food sector, and increasing competitiveness.

- **The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.**

This criterion evaluates the likelihood of the initiative's success in the market. Initiatives with a strong market approach, a sustainable business model, and founders with relevant experience would align with the objectives of benefiting stakeholders, fostering entrepreneurship, and promoting demand for innovative products/services. A strong business potential also ensures alignment with the European Green Deal, the EU Bioeconomy Strategy, and regional bioeconomy plans, as these policies are also geared towards economic viability and growth.

Each criterion was evaluated with a score between 1 and 5 points (Table 2); no half-points were allowed. Furthermore, each criterion has a dedicated weight for the final score. This weight was agreed upon by all the project partners in the consortium meetings.

Table 2. Evaluation criteria in SCALE-UP EoI.

#Criteria	Evaluation criteria	Max. Score	Weight	Max. weighted score
1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	5	3	15
2	Extent to which the bio-based solution is suitable for the	5	3	15

regional bioeconomy				
3	How innovative is the bio-based solution? (new technology or new generation of benefits (social, ecologic or economic))	5	4	20
4	The extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social)	5	6	30
5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	5	4	20

The same evaluation criteria and scorings applied to all bio-based solutions. The maximum score achievable was 100 points.

The meaning of the scores with respect to the criteria are as follows:

- 1 – Poor. The criterion is addressed in an inadequate manner, or there are serious inherent weaknesses.
- 2 – Fair. While the Eol broadly addresses the criterion, there are significant weaknesses.
- 3 – Good. The Eol addresses the criterion well, but with at least one moderate weakness.
- 4 – Very good. The Eol addresses the criterion very well, although with minor weaknesses.
- 5 – Excellent. The Eol successfully addresses all relevant aspects of the criterion in question.

To facilitate the work of the evaluation committee a template with the evaluation criteria, the score and the formulation of the sums was prepared and distributed to the project partners. The template can be found in Annex I.

2.3 Regional evaluation committee

Initially, for the evaluation, a selection committee formed with members of the steering groups of the regional SCALE-UP platforms, consortium partners and Advisory Board members was planned. However, this approach has been modified as the Eol was published in each of the local languages and the applications were allowed in the local language of the applicant to boost participation. In this context, the use of **regional evaluation committees** made more sense than international evaluation committees. It was thus decided to create six evaluation committees, one per region. The members of each evaluation committee would be members of the steering groups of the regional platforms and members of the regional partner's organizations.

2.4 Evaluation process

At all times, the solution selection process was kept as simple as possible to avoid unnecessary delays and facilitate participation.

Along with this, it is important to highlight that there has been a desire to have broad participation, focusing on the impact of the solutions on the value chain and rural communities and not on the type of requesting entity. For this reason, the eligibility criteria were defined allowing a wide range of entities to be covered.

As shown in Figure 4, a **one-step evaluation** was selected to be the procedure to follow:

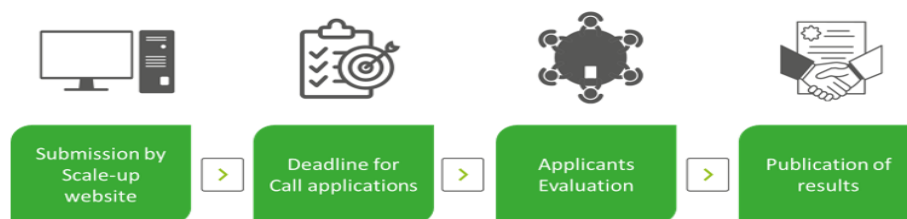


Figure 4. Evaluation process. Source: own elaboration.

3. Implementation of the selection process in the SCALE-UP regions

Taking into account the regional context of SCALE-UP's case studies, the following actions were conducted at the regional level to boost the response to the Call for EoI and identify two **innovative** bio-based solutions in each of the six regions.

3.1 Northern Sweden

The forest industry in Sweden is 150 years old. Forestry biomass has primarily been used for sawn timber products and is increasingly used for energy purposes. The use of biorefineries is expected to increase rapidly. Forestry is a co-production system, simultaneously producing saw logs, pulpwood, and forest residues. Forest residues, or logging residues, are the branches and tops left in the forest after harvest.

As a result of forest industry activities, large amounts of secondary process residues are available. These are by-products, such as sawdust and bark and as a result of harvesting operations, large volumes of logging residues are available in the region. In the SCALE-UP project, we want to find ways to add value to the value chain for bark, sawdust, and logging residues.

Biofuel Region has been active in supporting the bioeconomy in Northern Sweden for the past 20 years and has already established fruitful cooperation and strong networks within different themes such as biomass logistics, upgrading and biorefining; biogas, wood fuel and with different kinds of stakeholders. The stakeholders are other bioeconomy clusters, politicians, regional strategists in the bioeconomy, policymakers, researchers, and companies.

Engagement activities for boosting participation in the EoI in Northern Sweden included twenty preparatory meetings with the members of the Bioeconomy Platform Steering Group. We were responsible for building the program for the national bioeconomy conference, Bioeconomy Parliament. The aim was to showcase the bioeconomy in northern Sweden. A special focus was to include in the program the EU's work that affects our development plans in northern Sweden (the European Green Deal and the EU Bioeconomy Strategy). We also invited the secretaries responsible for the coming national strategies for bioeconomy to a meeting and to lecture during the conference. Together and in our networks, we looked for interesting innovations that were then included in the program and exhibition.

Parallel to this we arranged network meetings and discussions with wood fuels industry stakeholders in Northern Sweden. Our network work reaches politicians, academia and companies.

A SCALE-UP innovation support call was launched on BioFuel Region's web page on April 17th, 2023 to find innovators. Established networks and the SCALE-UP platform have been used as channels for finding suitable innovations. The task to support innovations has been communicated since the project started through e.g. reports to the board of BioFuel Region, during network meetings, and when

communicating about the project in general. Multiple personal emails and phone calls were made to explain the benefit for innovators by participating in the call. At the deadline of the call, three innovators have shown interest in participating.

The evaluation meeting was arranged online June 29th, 2023. Members of the Regional Platform participated. The evaluation form was used and there was a consensus about which two solutions to select. An interesting debate about how this solution can be supported followed, showing the engagement within the Regional Platform.

3.2 Mazovia

Apples have been grown in Poland since the 12th century, and today form an integral part of its economy and economic heritage. Today, according to Agroberichten Buitenland, Poland is the largest apple producer in the EU⁴ with over 143,000 ha and almost half of the country's production of apples is concentrated in the Mazovia region (68.816 ha). There is biomass available from apple production – including apple pomace and apple prunings – that currently are being used for animal feed and combustion. Within the SCALE-UP project, the focus will be on searching for new potential applications of this biomass to add economic, social and/or environmental value.

The information about the Call for EoI has been promoted using formal and informal networks and channels, in order to reach out to potential applicants and engage them in the preparation of applications that would suit their needs and interest. Several activities took place, including sharing information through social media, launching of the Mazovia Bioeconomy Platform, cross-project synergy generation, cluster and network meetings, together with phone calls with relevant Mazovian stakeholders. All documents were translated and adapted to the Polish conditions.

The Call for EoI was also boosted by a study visit of the SCALE-UP consortium to the Mazovia region, where potential stakeholders had a chance to personally meet with the SCALE-UP team, as well as received information through local media and television. Additionally, public authorities were engaged in the organization of the mission to raise project visibility, recognition and prestige. Moreover, information about the call was shared with other regional clusters working with waste, recycling and circular economy. At the deadline of the call, two innovators had expressed their interest in participating.

An evaluation meeting was arranged online on 30th of June 2023 with the participation of the Mazovia Bioeconomy Platform and the UNIMOS team. The evaluation template was used and there was a consensus about the selection of two solutions that fulfilled the SCALE-UP criteria.

3.3 French Atlantic Arc

The region covered by the Atlantic Arc is wide (covering four administrative regions) and it is difficult to present a unique set of characteristics for the stakeholders on this territory. Nevertheless, some main characteristics on the regional scale relevant for the SCALE-UP project.

There are several bioeconomy networks in the region, as well as several regional associations dealing more specifically with bio-based-construction.

As regulations evolve, the downstream sector, notably social landlords, are becoming increasingly interested in integrating bio-based materials into construction.

This pressure from the market brings a growing demand to the farmers as providers of raw materials (fiber plants) for the construction market.

Since the 2010s, Normandy has had a business cluster originating (but legally separated) from the chambers of agriculture and dealing with non-food biomass value chains. This cluster reintegrated into the chambers in 2018, no longer separated from the chambers and is now a part of the services

⁴ Ministerie van Landbouw, Natuur en Voedselkwaliteit. (2023, June 14). *Poland: land of temperate climate fruits*. Nieuwsbericht | Agroberichten Buitenland. <https://www.agroberichtenbuitenland.nl/actueel/nieuws/2023/06/12/soft-fruit-production-in-poland>

provided by the chambers of agriculture to farmers and rural stakeholders. The cluster includes only industries from Normandy but has a network across the four French regions covered by SCALE-UP. It also works closely with other clusters involved in the bioeconomy.

In SCALE-UP, the development of the regional platform was first based on this existing network from this cluster and was then expanded by asking experts in the bioeconomy in each territory to join the platform.

The call for interest was launched through this network, and applications were collected for evaluation.

The evaluation was carried out by nine specialists in the field of bioeconomy: members of the SCALE-UP project, including the four experts detached from their original chambers to AC3A by the four regional chambers of agriculture, a bio-based materials researcher, an expert from “Village By CA” (support network for start-ups by French bank Crédit Agricole) and two experts from a regional bio-based building association.

Each application was presented, then the experts debated in order to evaluate and set a common score for each criterion to be assessed.

Each assessment was sent to the candidates concerned by e-mail. The winners were also highlighted and announced on Social Networks.

3.4 Upper Austria

In the national accounts for 2020, Upper Austria has a gross regional product of 65.2 billion euros, making it one of the leading business locations in Austria with national and international companies⁵. Many companies invest, research, develop and produce and are thus strong drivers for the economy. The food industry is a major economic factor in Upper Austria and encompasses a wide range of activities. These range from agricultural production to the distribution of food and beverages.

Many activities are currently being set up in the region to initiate a green transformation of the agri-food sector. The following points can be highlighted in particular:

- Renewable energy: Upper Austria relies heavily on renewable energies such as wind power, hydropower and solar energy.
- The region has set itself the goal of being energy self-sufficient by 2030, which means generating as much energy as it consumes.
- Sustainable agriculture: Agriculture plays an important role in Upper Austria. More and more farms are turning to organic farming to preserve soil fertility, minimize the use of pesticides and ensure sustainable food production.
- Education and awareness: Educational institutions in Upper Austria promote environmental awareness and sustainability in curricula and through events. This helps to raise awareness of the importance of sustainability in society.
- Innovative initiatives: Upper Austria is known for innovative projects in the field of sustainability. This ranges from the promotion of environmentally friendly technologies to social initiatives aimed at community and sustainability.
- Waste management and recycling: The region attaches great importance to efficient waste management and promotes recycling. This helps to reduce waste and conserve resources.

The hub for regular meetings of Food Value Chain actors is the food cluster of Business Upper Austria. Since 2000, a network has been established in Upper Austria that covers the entire value chain in the food sector. This regional network of companies in the food industry, which cooperate closely with

⁵ (*Land Oberösterreich - Wirtschaft, Arbeit und Tourismus*, s. f.-c) - *Land Oberösterreich - Wirtschaft, Arbeit und Tourismus*. (s. f.-c). Land Oberösterreich. <https://www.land-oberoesterreich.gv.at/157.htm>

suppliers, universities, research and educational institutions as well as public institutions, forms the basis for a supra-regional competitive advantage. The food cluster has now established itself as a cross-industry interface contact hub for the food industry. The approximately 250 cluster partners reflect the multi-faceted picture of the industry. The broad spectrum of the food cluster ranges from agricultural production to distribution.

The interaction with stakeholders about the call has been composed of three parts:

- Mailings to possible applicants;
- Phone calls with companies, who are interested in the call;
- Online communication activities via social media channels.

The Upper Austrian Evaluation Committee was composed of three members: two from the Food Cluster Upper Austria and one representative from a member company of the Food Cluster with extensive knowledge in the field of bioeconomy. This representative is part of the Upper Austrian regional platform of SCALE-UP.

All applications for innovative bio-based solutions were reviewed by the evaluation committee. As a first step, each member scored the applications individually. Afterwards, the committee discussed the individual scores together and agreed on a common score. For each of the solutions, a justification for the rating was included, the evaluators consider the degree to which the solution meets the criteria set by the SCALE-UP consortium.

The result of the call was first communicated to each participant by mailing. It was announced to the winners that first measures will be set in autumn 2023 and that a customized offer will be provided to them. As a second step, the winners of the call were publicly communicated on the social media networks of the Upper Austrian Food Cluster.

3.5 Strumica

Strumica is represented as the largest producer and exporter of agricultural products of Macedonia. The total agricultural area in the region is 24,000 ha, and 87% belongs to the arable lands, primarily focused on grain and vegetable crops. Hence, the beneficial location and climate are assets that increase agriculture as the main economic branch, accounting for 40% of the total economy categories (such as textile industry (25%), wood industry (13%), food industry (10%), as well as mining and metal processing.) on municipal level⁶. Accordingly, the most dominant industries are the ones for processing and higher finalization of the primary agricultural production, such as canned vegetables, milk and meat processing, facilities for processing and fermentation of tobacco, mill-bakery industry, confectionery plants etc.

Such prerequisites as ampleness of agricultural residues and biodegradable waste from the developed processing industries could be the core for effective bio-based solutions for compost production. With currently approximately 22.000 t/y biodegradable waste being underutilized, the SCALE-UP Call for EoI for innovation support for regional bio-based solutions spots on time.

In order to boost the promotion of the SCALE-UP call on a regional level, the regional SCALE-UP platform was of great support and ensured high interest among visitors. Additionally, the call has been communicated by email to more than 60 relevant stakeholders. Moreover, the call was shared in several posts published on the social media channels of SDEWES-Skopje, the municipality of Strumica

⁶ Center for the Development of the Southeast Planning Region, Waste Management Plan of the Municipality of Strumica for the period from 2017-2022, 2017.

and the Fund for Innovation, enlarging the reach and impact. In order to further increase the awareness about the SCALE-UP call, a promotional information meeting was organized by SDEWES-Skopje for interested applicants, to explain the objectives and benefits of the innovation support programme, as well as to emphasize the regional value of proper residue management.

For the purpose of selecting two solutions that are considered as most appropriate to the call's objectives, a local evaluation committee was established. It consisted of four members: two representatives from SDEWES-Skopje, one from the regional platform and one from the Municipality of Strumica. The assessment of the received applications was conducted in an online meeting, organized on the 30th of June 2023. An in-depth discussion took place for every application, appropriate ranks were assigned and justified with comments matching the predefined criteria. At the end, two solutions that gained the highest scores were acknowledged to proceed in the further stages of the SCALE-UP Innovation Support Programme.

The final results were shared on the SCALE-UP website and social media. Furthermore, the selected applicants were contacted and notified by email. To wrap up, a MoU was set up between SDEWES-Skopje and the nominated applicants along with an online meeting to reiterate the call's aim, define next steps and discuss the Task Force that will guide the entire process.

3.6 Andalusia

Andalusia has historically been an agricultural region where the primary sector is an important source of employment, and it is the second European region in terms of agricultural production with about 300,000 farms. Considering only agriculture, the biomass production reaches more than 8 million tonnes per year and the biomass potential is about 3,955 ktoe of which 1,322 are agricultural waste, 1,023 industrial waste and 322 forestry waste⁷. Of the agricultural waste, 55% belongs to olive groves and in the industrial waste: olive leaf represents 7% (of the total), olive oil stone represents 11% and wet pomace of olive oil fat represents the 60%. Therefore, the biomass potential related to the olive grove sector in Andalusian agriculture accounts for 27% of the total potential. Currently, olive biomass has evolved considerably, and the olive industry has incorporated the use of olive by-products into its value chain. The main current uses are, from highest to lowest use: energy, composting, direct field application and high-value components.

The objective of the EoI in the Andalusian region is to take advantage of the region's biomass potential to promote the adoption of small-scale solutions that can address some of the regional difficulties associated with biomass exploitation, such as the availability and use of large amounts of biomass, its storage and mobilisation or the lack of locally available infrastructures to process biomass, among others. To solve this problem, it is necessary to promote new solutions that allow the region to take advantage of its potential, to develop new technologies and products derived from regional biomass. To do this, it is necessary to collaborate with technology developers and entrepreneurs to provide them with the necessary skills to create new value chains that allow regional growth.

For this reason, the exchange of knowledge of representatives of the quadruple helix in the value chain is highly appreciated in the sector and the participation in the Call for EoI of SCALE-UP has been high. The communication of the Call was carried out using the communication channels of CTA: weekly email newsletters, social networks such as LinkedIn and Twitter and specific email campaigns among bilateral meetings.

The Andalusian Evaluation Committee was comprised of three members well-versed in innovation and evaluation processes. This committee included two CTA members and an academic from the University of Granada, who possesses expertise in employment strategies and territorial management. The assessment process began with the online submissions of innovative bio-based solutions from

⁷ Agencia Andaluza de la Energía. Consejería de Hacienda, Industria y Energía. (2020). La Bioenergía en Andalucía. https://www.agenciaandaluzadelaenergia.es/sites/default/files/Documentos/3_2_0068_20_LA_BIOENERGIA_EN_AN_DALUCIA.PDF

April 17th to June 16th, 2023. Applications were grouped for evaluation, presented with comprehensive details such as contact information, company description, market approach, and more.

On June 26th, 2023, the committee received the evaluation document and template, employing a scale of 1 to 5 to assess criteria. The evaluation meeting aimed to identify score discrepancies, consolidate ratings, and finalize rankings. Although no equal rating cases emerged, evaluators collectively established a joint evaluation for each solution.

Individual scores, justified with comments, were assigned to solutions, considering their alignment with SCALE-UP criteria. Communication of results was carried out in two phases: an internal email followed by public announcements on CTA and SCALE-UP social platforms. Importantly, communication was conducted in the region's native language.

4. Overview of selected solutions

This chapter provides an overview of the selected solutions that will participate in the Innovation Support programme. In this section, for each of the selected solutions, a brief explanation of their novelty and applications is explained, along with the comments from the evaluation committee that explain their connections to the SCALE-UP project and its objectives. The solution's place on the "biomass value pyramid" (Figure 3) is shown as well.

4.1. Northern Sweden

Solution 1. Reselo: Suberin extraction from birch bark to produce fossil free rubber.

The first solution selected from Northern Sweden is an innovative and patent-pending material that replaces rubber from fossil raw materials. It can be used for shoes, tires and in the automotive industry. The driving force is sustainability. Replacing traditional rubber materials with Reselo Rubber can reduce the carbon footprint significantly. Find below the solution one average score (Table 3):

Table 3. Evaluation score of solution number one: Reselo.

#Criteria	Evaluation criteria	Score (max. 5 points)	Qualitative comments to justify the score	Weight	Total score
1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	4	A nice product that can add value to the value chain of bark.	3	12
2	Extent to which the bio-based solution is suitable for the regional bioeconomy	4	An interesting resource but with limitation when it comes to new employment	3	12
3	How innovative is the bio-based solution? (new technology or new generation of benefits (social, ecologic or economic))	5	Strong sustainable branding. Target group already addressed	4	20
4	The extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social)	4	The programme can suggest a business model how to get access to large volumes of birch bark.	6	24
5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	4	Alternative to fossil based rubber is a huge market	4	16

Suberin can be extracted from birch bark, RESELO already developed a strong sustainable branding and target groups are already addressed. This solution is a good example of efficient utilization of natural resources and thereby promoting more of such products. The challenge for RESELO is to secure access to large amounts of birch bark. Birch bark is available in some pulp and paper industries and is used for the generation of heat and power.

The biorefinery concept aims at valorizing complex biomass streams by separating it into components that are used to produce materials and/or to generate energy. This solution uses a biorefinery approach to isolate raw rubber from birch bark, an abundant residue of the global pulp, paper and plywood industry.

Being part of the SCALE-UP Innovation Support Programme can help this solution quantify and map the available raw material in the Nordic countries. To get access to existing by-product streams a new business model will be suggested. Huge amounts of bark are used for the generation of heat and electricity in the Nordic countries. Extracting valuable chemicals such as suberin before combustion is in line with the cascading principle and can be a driver for the extraction of more valuable chemicals even higher in the **biomass value pyramid**.

Solution 2. Wood Fuel Network: Social innovation to strengthen the value chain for logging residues.

In northern Sweden, several investments are planned for the production of biocarbon, biofuels and biochemicals based on forest industry by-products (sawdust and bark). These investments are on higher levels in the **biomass value pyramid** than energy generation.

Sawdust and bark are today used for combustion in CHP (combined heat and power) plants that must look for alternative wood fuels. Logging residues (branches and tops) represent a huge underutilized biomass resource. To mobilize this resource several actors must make strategic decisions. A goal of the social innovation is to mobilize all actors within the whole value chain and to communicate and exchange best practices for cost-effective deliveries of logging residues with high quality. A wood fuel network including buyers and sellers of woodfuels in northern Sweden will be mobilized in this solution. Table 4 shows the solution number two average score:

Table 4. Evaluation score of solution number two: Wood Fuel Network.

#Criteria	Evaluation criteria	Score (max. 5 points)	Cualitative comments to justify the score	Weight	Total score
1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	5	Mobilizing a huge underutilized resource.	3	15
2	Extent to which the bio-based solution is suitable for the regional bioeconomy	5	Wood fuel actors have shown a great interest to participate	3	15
3	How innovative is the bio-based solution? (new technology or new generation of benefits (social, ecologic or economic))	3	Many coordinated decisions from many actors are needed to realise this potential	4	12
4	The extent to which the innovation support programme will help the	3	The programme can make the process more effiecient	6	18

	entrepreneurial initiative improve its status (economic, environmental, social)		and faster. To learn about multi-actor partnership from the others region.		
5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	5	Up to 20% more biomass can be extracted from Sustainable Forestry	4	20
Final score:					80

4.2. Mazovia

Solution 3. Gospodarstwo Sadownicze MB Monika Bankiewicz – Innovations from apple pomace - new health-promoting, functional and ecological products.

The innovative bio-based solution is based on the use of pomace resulting from the production of natural juices pressed from apples, directly on the farm. The solution of new health-promoting, functional and ecological products from apple pomace will driven by consumer needs and co-created using collaborative, multi-actor and participatory approaches (it might be: healthy and nutritious snacks and meals, baked goods, bakery products and/or stomach-friendly comfortable food). Analysis of potential use of apple pomace for other industries and sectors will be also evaluated.

Apple pomace is produced during the pressing process of apples for the production of apple juice. The apples are sourced from the company's own fruit farm and from other orchards growing in the Radomka Valley. The apples are of high quality because the protection of the apple trees is carried out in accordance with the Integrated Production Programme, which is a cultivation method for producing quality fruit while at the same time protecting both human health and the environment.. The cold-pressed juice is pasteurised at 84° C, resulting in a natural, cloudy juice which is a source of vitamins, minerals, fibre and antioxidants. During juice production, a large amount of waste remains to be used in the form of pomace, which is a valuable source of many valuable nutrients. The pomace contains about 20-30% dry matter, 1.5-2.5% pectin and 10-20% carbohydrates. 5 litres of apple juice is extracted from approximately 8kg of apples.

Table 5 shows the solution number three's average score:

Table 5. Evaluation score of solution number three: Innovations from apple pomace.

#Criteria	Evaluation criteria	Score (max. 5 points)	Cualitative comments to justify the score	Weight	Total score
1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	5	Good alignment with the SCALE-UP objectives, addressing the majority of them.	3	15
2	Extent to which the bio-based solution is suitable for the regional bioeconomy	5	The solution is addressing the major agri-food asset in the region and is well aligned with the regional strategy.	3	15
3	How innovative is the bio-based solution? (new technology or new generation of benefits (social, ecologic	4	The solution might generate new benefits for society, including the shift in mindset	4	16

or economic)			towards circularity.		
4	The extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social)	4	The solution will support new product development for a healthy society and using a current current waste stream as source for new products.	6	24
5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	4	Access to biomass resources, passion for health and healthy food development	4	16
Final score:					86

Within the **biomass value pyramid**, the bio-based solution proposed is located within the category of Functional Food.

The bio-based solution fits perfectly with the objectives of the SCALE-UP project, as it contributes to accelerating the creation of new products and services based on bio-based resources - apple pomace - and exploiting the potential of the bioeconomy in apple production in the Mazowieckie Voivodeship. The applicant is a local leader, well networked in the regional innovation ecosystem and has a network of contacts among business, scientific, educational, local government and non-governmental institutions. The implementation of activities in cooperation with the above-mentioned actors will not only support the strengthening of cooperation between different actors at different levels, but also the building of new links. This will help promote changes and transformations in rural areas and increase awareness of the bioeconomy, sustainable development, circular economy and holistic development of Mazovia based on available resources and their efficient use. Given the wide reach of the action, the implementation of the project will contribute to an increase in knowledge and understanding of the bioeconomy among local communities.

Solution 4. Stowarzyszenie Jabłkowa Farma – Bio-Circular Apple Farm

The biocircular apple farm is an innovative space for developing innovations, testing new technological, social, educational and cultural concepts and solutions in the areas of bioeconomy, digitalisation of the agri-food industry and the circular bioeconomy.

It is characterised by being multifunctional, interdisciplinary and learning, as it works at the interface between areas and sectors; and is serving to integrate the local community around shared interests and values based on nature and the potential of biomass for the regional bioeconomy. Table 6 shows the solution number four average score:

Table 6. Evaluation score of solution number four: Bio-Circular Apple Farm.

#Criteria	Evaluation criteria	Score (max. 5 points)	Qualitative comments to justify the score	Weight	Total score
1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	5	Good alignment with the SCALE-UP objectives, addressing the majority of them.	3	15
2	Extent to which the bio-based solution	4	The solution is aligned with	3	12

is suitable for the regional bioeconomy			the RIS3 strategy of the Mazovia region.		
3	How innovative is the bio-based solution? (new technology or new generation of benefits (social, ecologic or economic))	4	The solution will generate social, economic and environmental benefits.	4	16
4	The extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social)	4	The solution will boost local bioeconomy and serve as inspiration to follow.	6	24
5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	5	The solution interconnects the network approach and resource-based approach.	4	20
Final score:					87

Within the **biomass value pyramid**, the proposed bio-based solution is located within the category of Fun (Lifestyle) and Food and Functional Materials.

The solution will strongly contribute to the key objectives of the SCALE-UP project, mainly in supporting regional actors to exploit the bioeconomy potential of apple production in the Mazowieckie Voivodeship. In addition, there will be an acceleration of the co-creation of new products and services based on bio-based resources, multi-level knowledge circulation, as well as an increase in knowledge and experience in understanding the bioeconomy among local communities. Through the use of a participatory approach and cross-sectoral and inter-industry collaboration, cooperation between value chain and complementary chain actors will be strengthened, which will naturally support the promotion of rural transformation among consumers and producers towards a sustainable, regenerative, inclusive and equitable circular economy and bioeconomy in Mazovia.

4.3. French Atlantic Arc

Solution 5. COPANO: Production of straw-based insulating panels for construction/renovation.

COPANO makes the most of agricultural by-products by developing a straw insulation panel suitable for the construction and thermal renovation of buildings, meeting the objectives of the French legislation on sustainable building (RE 2020).

The project is innovative thanks to the following points:

- There is no glue involved in the making of the panels. In the process, the straw is pressed and sewn cold and dry.
- Low power consumption.
- The insulating panel developed by COPANO broadens the range of bio-based construction possibilities, with a top-of-the-range, 100% bio-sourced product that combines the ecological advantages of straw bales with the ergonomics of industrial panels. Table 7 shows the COPANO's average score:

Table 7. Evaluation score of solution number five: Production of straw-based insulating panels for construction/renovation.

#Criteria	Evaluation criteria	Score (max. 5 points)	Qualitative comments to justify the score	Weight	Total score
1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	4	In line with the objectives of SCALE-UP.	3	12
2	Extent to which the bio-based solution is suitable for the regional bioeconomy	4	Relevant on a territorial level, possibility for extension to other regions	3	12
3	How innovative is the bio-based solution? (new technology or new generation of benefits (social, ecologic or economic))	5	No equivalent known (no product with the same fabrication mode). Most innovative of the candidates.	4	20
4	The extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social)	4	SCALE-UP can broaden the introduction of stakeholders, especially with the agricultural level missing so far in their network.	6	24
5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	4	The product seems to match the market expectations, even if the sales volume is difficult to evaluate and will depend on certification for compatibility with construction norms.	4	16
Final score:					84

Within the **biomass value pyramid**, this solution is located at “functional materials” level.

This innovation will reduce the carbon footprint of construction by replacing conventional insulation materials with biobased insulation. This insulation captures carbon from the soil as the plant grows, and keeps it captured throughout the building's life, i.e. for several decades.

Solution 6. DUCHESNE: Atelier du biosourcé (Biosourced Workshop)

Collectively and equitably promote the use of bio-based materials in the construction and renovation of buildings.

The creation of a conversion and production unit for insulating materials and structural solutions for new buildings and renovation by controlling resources throughout the process: production, cultivation, harvesting, processing, transport, marketing and sales.

Innovation: the innovation is a technical solutions but rather the structuring of the project. Indeed, all the bio-based solutions already exist independently, but are not offered as a complete solutions package in the same place. Table 8 shows the DUCHESNE's average score:

Table 8. Evaluation score of solution number six: Atelier du biosourcé.

#Criteria	Evaluation criteria	Score (max. 5 points)	Qualitative comments to justify the score	Weight	Total score
1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	4	The solution is applicable to multiple value chains and centered on widening access to biobased materials in construction.	3	12
2	Extent to which the bio-based solution is suitable for the regional bioeconomy	4	The project aims to serve local businesses at territorial level with an open access approach.	3	12
3	How innovative is the bio-based solution? (new technology or new generation of benefits (social, ecologic or economic))	4	Innovative at organisational level	4	16
4	The extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social)	4	Opportunities for support in structuring the offer, help needed in communication, legal statuses, business model etc.	6	24
5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	3	Business plan still to be drafted.	4	12
Final score:					76

Within the **biomass value pyramid**, this solution is located at “functional materials” level.

This project contributes to SCALE-UP objectives by:

- Developing innovative, sustainable, and small-scale bio-based solutions in a rural area;
- Accelerating the development of innovative bio-based products and services, and facilitating their access to the market;
- Enabling the deployment of existing practical and scientific knowledge of bio-based industries;
- Raising awareness of the bioeconomy and its potential for communities in rural areas;
- Promoting the transition to circular, sustainable, inclusive and fair regional bioeconomies in all regions of Europe.

4.4. Upper Austria

Solution 7. Velvety Manufaktur GmbH - SUN PROJECT: Extraction of vegetable proteins from sunflower oil press cake.

Sunflower oil press cake has a high protein content. Further processing and reintroduction into the raw material cycle can lead to the development of new high-quality food, pharmaceutical or (natural) cosmetic products. The aim is to use solid state fermentation including membrane separation technology to dissolve and concentrate the proteins and then develop natural cosmetic products.

Together with the University of Applied Sciences Upper Austria, work is being done on a process for extracting proteins from the oil press cake. This knowledge will also be applied practically. After the proteins are extracted and can be processed, the company Velvety Manufaktur GmbH would also like to develop innovative products together with their essential customers. The focus of customers is more and more on resource conservation and sustainability. Regional raw material waste can be recycled (in the long term) with little resource input. The aim is to obtain even more raw materials from waste in the future and thus to promote circular economy.

Sunflower oil press cake is currently only used as animal feed or is disposed of. By extracting these proteins, Velvety Manufaktur GmbH's existing products can be further refined, and new products can be created. Products that do not yet exist in this form on the market. The goal is to create product lines from purely 'recovered' resources which is in the second phase of the **biomass value pyramid** "Materials".

Velvety relies on long-standing customer relationships in its market strategy and the constant expansion of existing markets by developing business relationships and offering new products. These are developed specifically for customers. Product innovations are regularly presented and selected by the customer. This current innovation project is to be presented to the company's largest customers as a first step.

Customer loyalty in this area is very high and is constantly being expanded. The focus is clearly on innovation leadership and the product selection is increasingly focused on sustainability and innovation. Targeted efforts will be put into building up the company's own brand and online sales via several channels using an omnichannel strategy. Omnichannel refers to a marketing and sales strategy aimed at providing a consistent user experience across multiple communication and sales channels, such as physical stores, websites, mobile apps, social media, email, live chat, and more. Table 9 shows the DUCHESNE's average score:

Table 9. Evaluation score of solution number seven: SUN Project.

#Criteria	Evaluation criteria	Score (max. 5 points)	Cualitative comments to justify the score	Weight	Total score
1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	5	Addresses SCALE-UP Objectives 3 (Successful deployment of existing practical and scientific knowledge), 5 (Strengthened collaboration between primary producers, SMEs, clusters, social actors and policymakers), and 6 (Promotion of regional, rural, local/urban and consumer-based transitions towards a sustainable, regenerative, inclusive and just circular economy and bioeconomy across all regions of Europe). Addresses overarching SCALE-UP objective: The project involves a partnership between the private sector and a research institution with the aim of producing an innovative, sustainable bio-based cosmetic product (multi-actor partnerships).	3	15
2	Extent to which the bio-based solution is suitable for the regional bioeconomy	4	The products are regionally produced and sold. They increase regional added value and reduce regional waste streams through the use of side products.	3	12

3	How innovative is the bio-based solution? (new technology or new generation of benefits (social, ecologic or economic))	4	Sunflower oil press cake is currently only used as animal feed or is disposed of. By extracting the proteins, new cosmetic products are created. Products that do not yet exist in this form on the market. Through the cooperation with the research institution, new processes are developed for the extraction of the proteins.	4	16
4	The extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social)	4	Through the innovation support programme, the market strategy will be improved and new routes to customers will be identified.	6	24
5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	5	The business potential of this innovation is high. The degree of innovation as well as the impact of the products on the bio-based market in the region is high.	4	20
Final score:					87

Solution 8. Streuobstwerkstatt e.U. Valorizing the biodiversity hotspot meadow orchard.

The company Streuobstwerkstatt e.U. has set itself the task of generating as much added value as possible for farmers who cultivate orchards. Only if farmers receive sufficient economic incentive, it is guaranteed that orchards are maintained and preserved.

The company Streuobstwerkstatt e.U. buys scattered fruit from farmers who no longer cultivate their orchards due to the high labour input and low economic output. They develop high-quality food products from it and then create various distribution channels for these products. Together with the partner farmers, solutions are developed with regard to product development, distribution channels and especially with regard to awareness raising on the topic of biodiversity, species and variety diversity. In cooperation with institutions such as the Nature and Biodiversity Conservation Union, ARGE Streuobst, Bio Austria and the food retail trade, a high added value is created for agriculture as well as for the consumer.

In addition to the company's own knowledge of biodiversity, agriculture and the circular economy, scientific expertise will also be increasingly used in the future in order to generate even more solutions. Thus, a cooperation with different research institutions is aimed at.

The business model of Streuobstwerkstatt e.U. is based on the cooperation of farmers, food manufacturers, food industry and food trade. A regional economic cycle is established, expanded and increased through greater efficiency, thereby increasing regional added value and promoting a sustainable economy. In addition to the reduction of food waste, an important part of the Upper Austrian cultural landscape is protected with the meadow orchards. Scattered fruit is often no longer collected. The stock of meadow orchards is decreasing dramatically in Austria. Strong and practical models are needed to curb this development.

This business model is novel. Mostly the industry buys scattered fruit, but only from large farms. The goal of Streuobstwerkstatt e.U. is to involve as many small-structured agricultural enterprises as possible. Furthermore, the degree of innovation regarding product development, logistics, fulfilment, marketing, sales and supply chain is continuously developed.

All developed products are sold under the brand name STREUOBSTWERKSTATT, with a uniform corporate design. The products developed are mainly food products and are correspondingly high in the **biomass value pyramid**. The customers' primary motive for buying the product is to actively

contribute to the topic of biodiversity. Raising awareness for the topic is the main focus and is carried out intensively via social media and inbound marketing. Furthermore, sales measures are very focused on digitalization. For example, the products are specifically positioned on digital marketplaces and distributed internationally.

In general, the sale of Streuobstwerkstatt products is the focus of business activities. However, in the future, the focus will increasingly be on other measures that create value for biodiversity areas. For example, companies can contribute sponsorships and biodiversity contributions for orchards. Table 10 shows the Streuobstwerkstatt's average score:

Table 10. Evaluation score of solution number eight: Valorizing the biodiversity hotspot meadow orchard.

#Criteria	Evaluation criteria	Score (max. 5 points)	Qualitative comments to justify the score	Weight	Total score
1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	4	The company Streuobstwerkstatt e.U. buys hitherto unused fruit from farmers who cultivate orchards, uses it to develop high-quality food products and creates various distribution channels for these products.	3	12
2	Extent to which the bio-based solution is suitable for the regional bioeconomy	5	Together with the partner farmers, the orchard fruit workshop develops solutions with regard to product development, distribution channels and especially with regard to awareness raising on the topic of biodiversity, species and variety diversity. This sustainably promotes value creation, the preservation of regional agriculture and a sustainable way of doing business.	3	15
3	How innovative is the bio-based solution? (new technology or new generation of benefits (social, ecologic or economic))	5	The business model of the Streuobstwerkstatt is based on the cooperation of farmers, food manufacturers, the food industry and food trade. A regional economic cycle is continuously built up, expanded and increased through greater efficiency. This approach is a socially new innovation as well as economically and ecologically sound.	4	20
4	The extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social)	4	The company needs support in market analysis, distribution channels, networking with marketers and sales agents, customer analysis.	6	24
5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	3	A business model has been developed to sell the products. However, this model is to be expanded in the future to include other measures of adding value to the biodiversity areas.	4	12
Final score:					83

4.5. Strumica

Solution 9: INTERAKTIVNA IDNINA: Bio-Compost Machine

The company Interaktivna idnina is proposing solution to install a bio-compost machine in the city market and the surrounding buildings in the city of Strumica, with a parallel effort to enhance citizen awareness about depositing organic waste. This strategic approach is directed at addressing the dominant contribution of organic waste, which accounts for 60% of total waste in the Strumica city (according to the Plan for Waste Management in the Municipality of Strumica 2017-2022). The project will have a positive effect on the community, serving as a demonstrative model for converting waste into organic fertilizer. Based on previous examples in other municipalities, the company carried out a preliminary analysis and they concluded it will lead to a substantial reduction of the weight of the waste up to five times. Initial financial analysis showcases possible benefits up to 1000 EUR on monthly level.

According to the previous analysis carried out, they concluded that the main benefits that this solution could contribute are:

- Reduce municipal waste by about 70%;
- Turn biowaste into organic fertilizer;
- Reduce the cost of transportation and waste disposal by about 70%;
- Eliminate spontaneous combustion of landfills;
- Reduce the amount of emitted greenhouse gases;
- Bring the city closer to achieving the "Zero Waste" goal;
- Increase the sustainability and resilience of the city;
- Open the possibility of creating partnerships between institutions, associations and businesses.

Within the **biomass value pyramid**, this solution is located at "functional materials" level.

Table 11 shows the INTERAKTIVNA IDNINA's scores:

Table 11. Evaluation score of solution number nine: Bio-Compost Machine.

#Criteria	Evaluation criteria	Score (max. 5 points)	Cualitative comments to justify the score	Weight	Total score
1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	5	The solution is in full compliance with the bio-based value chain for the Strumica region as both are related to composting and solving issues of proper management of the agricultural residues.	3	15
2	Extent to which the bio-based solution is suitable for the regional bioeconomy	5	The solution is addressing multiple issues on the regional level. Primarily, it could possibly solve the problem with illegal landfills, and thus reduce waste. Furthermore, the farmers will use locally sourced compost at more affordable prices.	3	15
3	How innovative is the bio-based solution? (new technology or new generation of benefits (social, ecologic or economic))	4	The solution is providing innovative technology and enzymes that are rare to be found on national scale.	4	16
4	The extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social)	5	As the technology is already developed and applied in other cases, the innovative support programme will assist in the assessment of the local market and establishing contacts with stakeholders.	6	30

5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	3	The programme will provide onsite support, as the business idea holder is not located in the Strumica region, but is however assessing the market situation in Strumica. The company has previous experience in this field, yet there is a strong need for the development of a business model.	4	12
Final score:					88

Solution 10. HORTI EKO: Mulching Machine For Fine Grinding Residues From Viticulture, Gardening And Fruit Growing

A large amount of agricultural residues in the Strumica region end up in landfills near populated areas. The rest is mostly burned, which pollutes the environment, increases the GHG emissions, and can end up in river basins, causing flooding and water pollution. The second selected solution addresses these issues by proposing mulching to fractionate the residues into small particles, which will be plunged in the soil and become a bio-fertilizer. The advantage of this bio-based solution is the low-cost technology.

The main benefits that can be obtained are:

- Improved environment with less plant material that is deposited into rivers or burned;
- Reduced environmental pollution;
- Reduced microflora destruction;
- Enrichment of soil with biofertilizer;
- Reduced use of artificial fertilizers.

Within the **biomass value pyramid**, this solution is located at “functional materials” level

Table 12 shows the HORTI EKO's average score:

Table 12. Evaluation score of solution number ten: HORTI EKO solution.

#Criteria	Evaluation criteria	Score (max. 5 points)	Qualitative comments to justify the score	Weight	Total score
1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	5	The solution is in full compliance with the bio-based value chain for the Strumica region as both are related to composting and solving issues of proper management of the agricultural residues.	3	15
2	Extent to which the bio-based solution is suitable for the regional bioeconomy	5	The solution is addressing multiple issues on a regional level. Primarily it could possibly solve the problem with illegal landfills, and thus reduce waste. Furthermore, the farmers can use locally sourced compost at more affordable prices.	3	15
3	How innovative is the bio-based solution? (new technology or new generation of benefits (social, ecologic or economic))	4	The solution will be innovative to the local farmers, as it is not vastly known or used process and product in the region.	4	16

4	The extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social)	4	The bio-based solution will require significant assistance in the market penetration due to low awareness of this technology.	6	24
5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	4	The bio-based solution has already developed technology (imported). Moreover, the business holders are skilled and experienced in this field with strong connections on a regional level. However, there is lack of a fully developed business model, which should be successfully covered within the Innovation support programme.	4	16
Final score:					86

4.6. Andalusia

Solution 11. BIOLIZA: Biochar Obtained From Olive Waste Pyrolysis.

“Design and development of a business model for the commercialization of the biochar obtained from the pyrolysis of by-products of the olive tree and the industry olive oil for use as a soil improver, water absorber and CO₂ sink in the olive grove”.

The olive grove and its associated industries, mills and extractors of pomace oil mainly, generate a significant volume of residues and by-products such as pruning remains, olive stone, oily and wet pomace or alperujo, remains of leaves and branches, wastewater, etc., likely to be recovered through emerging technologies (TRL > 8) to obtain bioenergy and bio-products of high added value, as is the case of biochar, which can help to increase farmers' income and it is an action that is in line with the good practices of the circular economy.

One of the most emerging technologies in this field is pyrolysis, which consists of a thermal decomposition of the biomass or residue, in the total absence of oxygen, and at a temperature that can oscillate between 250 and 450 °C. As a result of the process, they obtain 3 fractions, one solid or biochar, the main one; another liquid called pyrolysis oil which is a bio-oil, and another soda or syngas that is used to maintain the process temperature so that it is auto thermal.

The biochar obtained depends on certain parameters, but above all the content in Carbon, has innumerable applications in very diverse fields: agriculture, industry, pharmacy, chemistry, construction, packaging, etc., due to its excellent physicochemical properties. In addition, it presents other advantages such as reducing the volume of waste or by-products treated and their current capacity as a CO₂ sink, of the order of 2.5-3 tons of CO₂ per ton of biochar.

However, it is an unknown product for the market, especially the agricultural one, in which it can play a fundamental role as a soil improver, water absorber and CO₂ sink, among other advantages. But for this, it is necessary to obtain a standardized product that meets a series of technical requirements, and to develop a strategy suitable commercially, in which all the advantages it presents can be integrated so that they are known and validated by farmers, in order to increase their progressive penetration in the market. Table 13 shows the BIOLIZA's average score:

Table 13. Evaluation score of solution number eleven: BIOLIZA solution.

#Criteria	Evaluation criteria	Score (max. 5 points)	Cualitative comments to justify the score	Weight	Total score
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1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	5	Build on regional biomass, environmental sustainability, European Green Deal (sustainable primary sector through the development of an innovative technique for agriculture: fundamental role as a soil improver, water absorber and CO2 sink, among other advantages). High degree of cooperation with different agents. Highly appropriate for the olive value chain. Allows direct application to the primary sector.	3	15
2	Extent to which the bio-based solution is suitable for the regional bioeconomy	5	High-added value for the value chain. Valorization of by-products from the olive sector. Obtaining products with high added value. Obtaining biochar that acts as a CO2 sink, moisture absorber and reintroduction into the production system.	3	15
3	How innovative is the bio-based solution? (new technology or new generation of benefits (social, ecologic or economic))	4	Pyrolysis and its applications are one of the most innovative technologies for recovering prunings in the olive grove, with no great added value in the recovery ingredient. Pyrolysis is an innovative technology in the Spanish market. Use in the olive sector.	4	16
4	The extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social)	4	The program can improve the solution's market strategy, to be known and validated among farmers. Become known at the regional level to cooperate with other existing initiatives based on the use of olive by-products (synergies).	6	24
5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	4	Spin-off with years of development, strong technical background and knowledge of the sector of the founder	4	16
Final score:					86

Within the **biomass value pyramid**, the bio-based solution proposed by Bioliza is located within the category of Functional Materials and in the subcategory of fertilisers/biofertilisers: "Commercialization of biochar for use as a soil improver, water absorber and CO2 sink in the olive grove".

The bio-based solution is considered to be in line with the objectives of the SCALE-UP project (criterion 1 within the evaluation criteria) as it allows the increase of knowledge of local actors within the value chain to accelerate market penetration: such as biochar and bio-oil, with direct applications in agriculture and in the olive sector. On the other hand, it allows an efficient use of resources, as it enables the improvement of knowledge on bio-products that improve the quality of the soils where olive trees are grown.

It allows the transfer of practical application of the knowledge acquired, in this case through a spin-off such as BIOLIZA.

This bio-based solution is a bioeconomy project based on the conversion of waste and by-products into raw materials for new processes based on emerging technologies, with a high degree of

cooperation with local agents (farmers, cooperatives, research centres, universities, companies, etc.). It thus enables the acquisition of new skills and capacities among stakeholders, allows the efficient use of natural resources and is in line with the objectives of the European Green Pact, the EU Bioeconomy Strategy and relevant national and regional bioeconomy strategies because this project promotes key points such as:

- **New business** opportunities for Andalusia.
- The use and **valorization of waste** and specific by-products from the olive grove and olive oil industry in a sustainable and competitive manner.
- Introduction of **emerging technologies** such as pyrolysis in the primary sector.

Solution 12: Fundación Andaltec I+D+i: COMP0LIVE biorefinery.

The bio-based solution proposes a facility to condition, treat and make olive tree prunings compatible for integration as a reinforcement in polymer-based composite materials, getting a biomaterial tested in several sectors applications such automotive or furniture industry. This application would consist of a biorefinery for the integral use of olive pruning in the framework of the polymer sector.

To do this, pruning waste is transformed into short fibres that are incorporated as reinforcement in biocomposites with conventional thermoplastic matrices, from fossil resources, or even bio-based.

Therefore, compounds can be obtained from prunings to produce bioplastics or nanocomposites based on cellulose or lignin. Table 14 shows the COMP0LIVE biorefinery's average score:

Table 14. Evaluation score of solution number twelve: COMP0LIVE biorefinery.

#Criteria	Evaluation criteria	Score (max. 5 points)	Cualitative comments to justify the score	Weight	Total score
1	Extent to which the bio-based solution will contribute to achieving Scale-up key objectives	5	Build on regional biomass resources, added value for rural communities, consider environmental sustainability, in line with policy objectives in the European Green Deal, and feature a wide range of regional actors. It is in line with SCALE UP's objectives, which include the importance of the bioeconomy and the principles related to this concept, such as the circular economy, adapted to the olive value chain. In this olive pruning, waste is used to create high-value products, in particular fibers that are incorporated as reinforcements in biocomposites. For the exploitation of resources, the support of local producers and the necessary emergence of synergies between multiple actors are needed to adapt to industrial requirements and public support for the advancement of this new opportunity.	3	15
2	Extent to which the bio-based solution is suitable for the regional bioeconomy	5	Remains of pruning are not recovered at all in the region, leading to significant environmental waste. New possibility of industry in Andalusia. Generation of jobs.	3	15
3	How innovative is the bio-based solution? (new technology or new generation of benefits (social,	5	High added value. Allows, for example, the substitution of traditional fibres in automotive materials. Reduces the use of plastic.	4	20

ecologic or economic)					
4	The extent to which the innovation support programme will help the entrepreneurial initiative improve its status (economic, environmental, social)	4	Helps to define business model. One of the main issues of the project is the production capacity of this material to make it feasible for incorporation in industry (e.g. automotive). The programme can help them to get more funding for this investment, possible partners to make their manufacturing line available, new trade options, etc.	6	24
5	The business potential is based on the market approach, business model and experience of the entrepreneurial initiative.	4	There is a high level of equity, well defined structure, huge size of the market, clear business model. Not lucrative entity.	4	16
Final score:					90

Within the biomass value pyramid, the bio-based solution proposed by Andaltec is located in the category of Functional Materials and in the subcategory of Performance Materials: "Treat and make compatible olive pruning to integrate it as reinforcement in polymer-based composite materials".

The bio-based solution is considered to be aligned with the objectives of the SCALE-UP project (criterion 1 within the evaluation criteria), as it involves and benefits various actors along the olive value chain, as these innovative materials are starting to be known in the agricultural sector in the province of Jaen and have aroused great interest in large multinationals in the automotive and furniture sector. Furthermore, the use of this renewable biomass resource, olive pruning, requires the collaboration and support of local producers. The valorisation of this waste can promote collaboration between local producers, agricultural cooperatives, local industries, and large industries (as the end user of the biocomposite product). To this end, the project promotes collaboration between all these actors, in addition to the support of policymakers and public administration officials - therefore, this solution can encourage regional actors to identify and develop innovative business models based on the bioeconomy.

In addition, it enables the efficient use of resources, as these materials obtained through the revalorisation of agricultural waste, are a way to access the traditional agricultural sector to subsequently implement more solutions based on the circular economy, energy efficiency, and renewable energies in this sector. Olive pruning waste (essential to maximise olive oil production) is valorised and processed to function as reinforcement fibres in polymeric composite materials, allowing the creation and transfer of new knowledge and improvement of competitiveness, as the materials developed with olive fibres constitute a product of technical and commercial value extensible to all olive oil producing regions in the Mediterranean area.

4.7 Regionally suitable biobased solutions: links, challenges and deviations

Table 15. Needs categorization table for selected solutions.

REGION	SOLUTION	NEEDS				
		Technical aspects	Business development	Regulatory compliance	Financial	Skill & knowledge development
Northern Sweden	Reselo: Suberin extraction from birch bark to produce fossil free rubber	x	x		x	
	Wood Fuel Network: Social innovation to strengthen the value chain for logging residues.		x	x		
Mazovia	Innovations from apple pomace - new health-promoting, functional and ecological products	x	x			x
	Bio-Circular Apple Farm	x	x	x		
French Atlantic Arc	COPANO: Production of straw-based insulating panels for construction/renovation.		x	x		x
	DUCHESNE: Atelier du biosourcé (Biosourced Workshop)	x	x		x	
Upper Austria	Velvety Manufaktur GmbH - SUN PROJECT: Extraction of vegetable proteins from sunflower oil press cake.	x	x		x	X
	Streuobstwerkstatt e.U. Valorizing the biodiversity hotspot meadow orchard.	x	x			
Strumica	INTERAKTIVNA IDNINA: Bio-Compost Machine	x	x	x		x
	HORTI EKO: Mulching Machine For Fine Grinding Residues From Viticulture, Gardening And Fruit Growing		x		x	x
Andalusia	BIOLIZA: Biochar Obtained From Olive Waste Pyrolysis.	X	x	x	x	
	COMPOLIVE biorefinery		x	x	X	

The main challenges during the design of the Call for EoI were to harmonise a common EoI for six regions focused on very different value chains, significant disparities in the penetration of the bioeconomy in each region, and very different levels of knowledge about what the bioeconomy is.

In addition to the eligibility criteria, we valued the fact that the selected biobased business models clearly impact regional social sustainability. All of them, based on small-or medium scale technologies, benefit a wide range of regional actors along the value chain, contributing to strengthening and maintaining current and future jobs in rural areas, stimulating economic sustainability, growing regional enterprises, and empowering rural communities.

Table 15 shows an overview of the regional biobased solutions and their main needs. It highlights the key business modeling need for solutions at TRL 7 mainly based on demonstrating the system prototype, validating its performance and capabilities, accelerating development, evaluating real-world use, and validating the underlying business model and revenue streams. In addition to financial modeling for the market introduction, market analysis is essential for evaluating the viability and potential of business solutions. Similar needs allow SCALE UP project to carry out a cross-sectorial support to innovators since experts from the Task Forces could participate in different supports providing knowledge and expertise from other regions. At the same time, it facilitates the advisory board members participation and the regional platforms interaction. The holistic perspective enables a deeper understanding of the selected solutions a promote a collaborative identification and validation of concrete needs.

5. Establishment of Task Forces for market assessment and business model design

This section outlines the methodology to be followed for the establishment of the Task Forces that will support the implementation of the Innovation Support Programme.

In each of the six SCALE-UP regions, two Task Forces will be set up to orchestrate the ISP for each of the selected bio-based solutions described in the previous chapter. These Task Forces will be led by members of the SCALE-UP consortium and further integrated by the selected entrepreneurs as well as local stakeholders. The latter will be people who, due to their **specialized knowledge** of the region, experience, and/or access to specific data, information and contacts, could make significantly valuable contributions to scale up the selected bio-based solutions. These knowledge holders can be producers, owners, and distributors of biomass, creators of bio-based goods and services, creators and distributors of enabling technologies and tools, potential and/or actual paying clients and end-users, as well as the pertinent public authorities. These individuals will be invited by SCALE-UP to engage at specific stages of the ISP for the respective solution they are assigned to. By involving these stakeholders, the SCALE-UP Task Forces can serve as effective **sources of market intelligence** by providing direct input from potential end users and paying consumers from the region.

As stated above, each of the twelve selected solutions will count on a dedicated Task Force that will accompany and assist the entrepreneurs during the course of the ISP, ultimately improving the market penetration and financing capacity of the initiative. The members of each Task Force will be sought according to the **specific needs for improvement** identified in the assessment that will be explained in this section.

5.1. What is the objective of the Task Force?

The intention of the SCALE-UP project in WP4 is to create a framework to provide customised innovation support services for each of the individual solutions. The creation of the Task Forces has the ultimate objective of a) **accelerating the market penetration** of the selected bio-based solutions, and b) improving and increasing their chances of **attracting financing**. Another main objective is to incorporate the **vision of the rural communities** and all the **interest groups** along the value chain into the design of the business model for the selected solutions.

The creation of the Task Forces at the start of the second year of the project does not exclude the incorporation of some new members to the group at a later stage or the consultation with other stakeholders who are not part of the respective Task Force. The regional platforms are the ideal point to collect these inputs.

All Task Force participants are required to sign a Non-Disclosure Agreement (NDA) in order to ensure the protection of the intellectual property rights of the bio-based solutions that will be supported during the ISP. The same rules will apply to any other members of the regional platform to whom the Task Force decides to give access to confidential data. A draft of the NDA will be facilitated by SCALE-UP project to the selected solutions to be adapted to their specific needs.

5.2. Key aspects to select Task Force members

To facilitate the creation of the Task Force by the regional partner a three-step methodology has been designed. These are the main steps:

5.2.1. Asses the main needs of the selected biobased solutions.

The membership of each Task Force will be defined to respond to the **needs of the solution to scale up** and to incorporate the **interests of different social groups** in the value chain, especially rural communities.

To asses these needs, a survey will be created targeting the unique needs of the solutions in five areas:

- Technical aspects
- Business development
- Regulatory compliance
- Financial needs
- Skill & knowledge development

The survey can be completed by the entrepreneur with the support of the regional partner. These are the questions to include in each area:

A. Technical Needs:

- What is the current Technology Readiness Level (TRL) of your solution? Are you planning to raise this TRL within the next 12 months? If so, to what level?
- What challenges or bottlenecks are you currently facing as regards the technical development of your solution?
- Do you have the necessary equipment and laboratory resources for your R&D activities? If not, what are you lacking?
- Are there specific technologies or techniques you're struggling to adopt or implement?

B. Market Development Needs:

- Have you identified the geographical boundaries of your market? Have you identified your market segmentation? Have you selected your target group?⁸
- What are your biggest challenges in reaching your potential customers?
- What are your biggest challenges in acquiring new customers?

⁸ An example of answers for this three questions: geographical boundaries could be the market for bio-based disposable tableware in the DACH región, the market segmentation could be distributors of disposable cups and cutlery; wholesalers of disposable cups and cutlery; household consumers of disposable cups and cutlery) and the target group selection the household consumers of disposable cups and cutlery)

- How well-defined and validated is your value proposition?
- Are you facing challenges in scaling your customer acquisition or entering new markets?

C. Regulatory & Compliance Needs:

- Are you aware of all the regulatory requirements that your bio-based solution has to comply with?
- Have you faced any challenges or obstacles in obtaining necessary licenses or approvals? What are they?
- Are there intellectual property (IP) issues you need help with, like patent filings, other IP protection measures, or potential infringements?
- Do you require guidance on specific standards or quality controls for your products or solutions? If so, which ones?

D. Financial Needs:

- What are your current funding sources? Are they sufficient for your planned activities (e.g. R&D, commercialisation, IP protection) and your projected growth?
- Do you have a detailed financial projection for the next 1-3 years?
- Are you seeking investments? If so, what kind of investors or capital are you targeting?
- Do you need assistance with financial management, budgeting, or cost optimization?

E. Skill & Knowledge Needs:

- Are there skills or expertise gaps in your current team?
- Do you need specialized training or knowledge transfer in certain areas? If so, which ones?
- Have you identified areas where mentorship or external consultancy would be beneficial?
- What non-technical challenges (like team dynamics, leadership, or organizational culture) are you facing?

Although the survey is simple and has been designed to adapt to any development step (from very early-stage entrepreneurship initiatives to more mature startups), by posing these questions to the entrepreneur, the regional partners will be able to paint a detailed picture of their **current status** and understand where they most need **assistance and guidance**. This information will be invaluable when mobilizing the task forces to provide the ISP. Using the data gathered from the survey and insights from the regional platforms, the key areas of expertise required can be identified.

5.2.2 Expert Mapping based on Regional Platforms

When establishing the Task Force, it is beneficial to take into account the roles played by specific stakeholders within the **value chain** of the selected bio-based solutions, as this can help determine what type of perspectives and contributions can be expected from each of them.

Figure 5 provides a brief illustration of stakeholder positions in a generic, linear value chain using the river metaphor. It shows how conducting a simple exercise of mapping stakeholders along the solution's value chain can be useful a) for ensuring that the Task Forces are well balanced in terms of the relationship each member has to specific material inputs and value-adding operations, and b) for the entrepreneur and the Task Force leader to reflect, at an early stage, on the focus of the future consultations with specific Task Force members and to start formulating concrete questions for them.

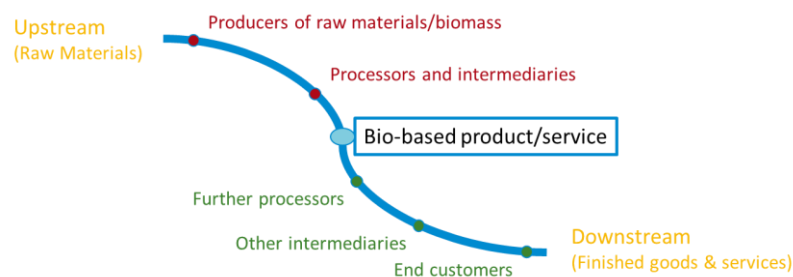


Figure 5. General overview of a generic linear value chain. Source: Anzaldúa et al., 2020.⁹

As stated earlier, members of the regional platform may encompass various stakeholders such as input suppliers, distributors, paying customers, regulators, and end-users, each **contributing distinctively** due to their position in the value chain and specialized knowledge. While not mandatory to represent all value chain stages within the Task Force, it is crucial for the business idea owner to **collaborate** with other members of the value chain in market approach to improve their scaleup strategy. To enhance information access and success prospects, engaging a **diverse range of stakeholder** groups is advised. Task Force selection isn't limited to previously identified stakeholders but can also involve newly recognized participants from this phase.

Given the establishment of 6 regional platforms, the composition of the task forces should be reflective of the unique strengths of each region. The knowledge holders that have to be identified in the regional platform according to the needs of the startups are the following:

For Technical Needs:

- Regional academics, researchers, and professionals who understand the technical nuances of the local bio-economy.
- Stakeholders in the regional platforms who have hands-on experience in addressing bio-based technical challenges specific to their locality such as issues of feasibility, effectiveness, reliability of a solution.

For Market Development Needs:

- Regional business leaders with proven track records in launching and scaling bio-based solutions.
- Potential end-users and/or paying customers of the solutions being explored, any prospect distributors and resellers, as well as suppliers of the production inputs.

For Regulatory & Compliance Needs:

- Experts from the regional platforms who are well-versed with European, national, and local regulations governing bio-based innovations.
- Local authorities and policymakers to ensure alignment with policies like the European Green Deal and the EU Bioeconomy Strategy.

- For Financial Needs:

- The regional financial ecosystem (local investors, venture capitalists, finance professionals or public or private providers of grants experienced in bio-innovation).

For Skill & Knowledge Needs:

- Local trainers, mentors, and experts to bridge the identified gaps.
- Experts from educational institutions, clusters, hubs and training centres in the region.

⁹ Anzaldúa, G., Araujo, A., Tarpey, J. (2020). Briefing paper: Analysing market conditions and designing business models within BE-Rural's OIPs. Deliverable of the H2020 BE-Rural project. https://be-rural.eu/wp-content/uploads/2020/11/BE-Rural_D5.1_Market_conditions_business_models.pdf
D4.1 – Overview of regionally suitable solutions

5.2.3. Task Force Selection Process

For the last step, the first activity is the potential TF Member Identification. Regional partners will utilize insights from regional platforms and the **quintuple helix model**¹⁰ to curate a list of potential task force members who represent some of the following domains:

- **Academia:** Researchers, scholars, and experts in bio-based solutions, sustainable business models, and environmental impact.
- **Industry:** Entrepreneurs, industry leaders, and professionals with experience in the commercial aspects of bio-based products, along with sustainable technology innovators.
- **Government:** Policy-makers, local authorities, and experts familiar with European, national, and regional regulations related to bio-based innovations and environmental conservation.
- **Civil Society:** Non-governmental organizations (NGOs), community leaders, and representatives from social enterprises focused on sustainable development and environmental advocacy.
- **Environment:** Ecologists, environmental scientists, and experts who specialize in understanding ecological boundaries, environmental repercussions, and the sustainable utilization of bio-resources.

Many times the same member of the Task Force can hold several knowledge areas or represent various domains. Although the aim is to involve representatives of all of the domains, this requirement is **not mandatory** for the creation of the TF. For reasons of efficiency in subsequent work, it is recommended to have Task Force **with a maximum number of four or 5 people**.

Through interviews and with the knowledge that the regional partners already have about the members of their platform, the regional partners will engage potential TF members in discussions, ensuring their expertise aligns with the objectives of SCALE-UP and the specific needs of the selected bio-based solutions.

After this it is important, with the project's timeline and milestones in mind, to verify the potential members' commitment and availability.

To finalize this step, after the creation of the 12 solution-specific task forces that ensure a diverse mix of skills and expertise, a brief **orientation session** will be made to synchronize efforts with the overarching goals of SCALE-UP.

The success of the ISP SCALE-UP project is deeply rooted in the **alignment and synergy** between its various components: the regional platforms, the task forces, and the selected bio-based solutions. Each of these components has a distinct role to play, and their effectiveness lies in their seamless integration and collaboration.

¹⁰ This is an approach to innovation which posits that the applicability and social acceptance of new knowledge can be enhanced by combining the perspectives and experiences from representatives of the policy, business, academia and civil society communities within a framework of open collaboration that gives consideration to the needs and constraints presented by current environmental challenges. For more information see: Carayannis, E.G. and Rakhmatullin, R. (2014): "The quadruple/quintuple innovation helixes and smart specialisation strategies for sustainable and inclusive growth in Europe and beyond". *Journal of Knowledge Economy*, Volume 5, Issue 2, 212–239.

<https://link.springer.com/article/10.1007/s13132-014-0185-8>; Grundel, I. and Dahlström, M. (2016): "A Quadruple and Quintuple Helix Approach to Regional Innovation Systems in the Transformation to a Forestry-Based Bioeconomy". *Journal of the Knowledge Economy*, Volume 7, Issue 4, 963–983.

<https://link.springer.com/article/10.1007/s13132-016-0411-7>; and Abhold, K., Gerdes, H., Kiresiewa, Z., Davies, S. (2019). D1.1 Sustainability and Participation in the Bioeconomy: A Conceptual Framework for BE-Rural. Deliverable of the H2020 BE-Rural project. Available online at: <https://www.ecologic.eu/sites/files/publication/2020/2815-d1-1-conceptual-framework.pdf>.

Coherence in this context means more than just each component doing its part. It involves a shared understanding of the SCALE-UP:

Scope: All components must have a clear understanding of the project's boundaries, the specifics of what is to be achieved, and the roles and responsibilities of each member. Any deviation or misunderstanding in scope can lead to inefficiencies or missed opportunities.

Ambition Level: The objectives set by the SCALE-UP project are ambitious yet achievable. All parties involved should have a unified vision of the project's ambition, ensuring that they work towards the same goals at a similar pace and intensity.

Membership of the Task Forces: The members selected for the TF should not only be experts in their fields but also individuals who understand the objectives of SCALE-UP project. The right members will ensure that decisions are taken with the broader project's best interests in mind.

Regular communication will be the backbone of ensuring this coherence. By having consistent check-ins, feedback loops, and alignment assessments, the project can identify misalignments early, rectify them, and ensure that all components are working harmoniously towards the shared objectives. Only through such a focused and collaborative approach can the ISP SCALE-UP project ensure that the objectives are met and that the supported solutions truly achieve the desired improvement in their scaleup possibilities.

6. Conclusions and learned lessons

The response to the call for Expressions of Interest in SCALE-UP has offered some glimpse into the **regional engagement and potential for bio-based solutions** in the regions involved in the project.

In **Northern Sweden**, with its deep-rooted 150-year-old forest industry history, there's a prevailing focus on a forest co-production system. Two proposals were submitted in this region, indicative of its inclination towards enhancing the value chain of forest residues such as bark and sawdust. **Mazovia**, on the other hand, known for its significant contribution to apple production in the EU, leveraged its historical and economic ties to the fruit, yielding 4 proposals aimed at harnessing biomass from apple cultivation more effectively. Shifting the attention to the **French Atlantic Arc**, a varied landscape is found with its diverse bioeconomy networks and an increasing shift towards bio-based construction. The 6 proposals from this region mirror its adaptability and response to the evolving bioeconomic environment. **Upper Austria** stands as a testament to the harmonious blend of economic vigor and sustainable vision, showcasing commitments to renewable energy and organic farming. Their 3 proposals emphasize a vision for a green transformation of the agri-food sector. Further south **Strumica** in Macedonia, predominantly an agricultural region focusing on grain and vegetable crops, presented 3 proposals. These are rooted in the potential of agricultural residues and waste from its processing industries. Lastly, **Andalusia** is synonymous with agricultural prowess, particularly in the olive grove sector. With the highest submission of 8 proposals, this region echoes a quest to optimize the olive biomass value chain and expand on olive by-products' potential uses.

In total, the EoI received **twenty six proposals across these diverse regions**. From these twenty-six proposals received, two were selected per region. Following, the distribution of these twelve solutions among the value pyramid explained in section 2.2 (evaluation criteria) is highlighted:

Most of applications selected proposed a solution focused on the creation of Functional Materials. An important group are related to the food sector account. A minor percentage of the solutions are related to the fuel sector (Figure 6).

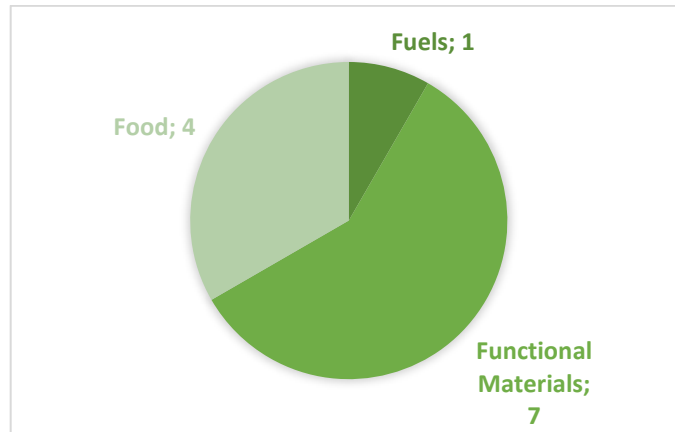


Figure 6: Selected solutions in the Biomass value pyramid. Source: own source.

Evaluating these proposals within the context of each **region's specific characteristics** provides foundational insights for this 'lessons learned' section, aiming for data-driven future interventions.

The SCALE-UP project's dedication to scaleup small-scale bio-based business models at a regional level carries promising potential for **rural development**. Several key takeaways and lessons were gathered from the process of selecting the twelve solutions that will participate in the Innovation Support Programme:

- **Alignment with Objectives of the project:** The entire project's efforts in this task, starting from the design of the EoI to the identification and selection of bio-based solutions, were grounded in ensuring that they were in sync with the overarching objectives of the European Green Deal, EU Bioeconomy Strategy, and other related policy frameworks. This alignment not only ensured policy cohesion but also underlined the commitment to the societal, environmental, and economic betterment of the project.
- **Emphasis on Regional Adaptability:** One of the standout features of SCALE-UP was its dedication to regional adaptability. The initiative recognized that regions vary in their understanding of bioeconomy, their resource availability, and the challenges they face. Solutions were sought that would cater to the unique attributes and needs of each region.
- **Collaborative Approach:** Throughout the implementation of this Call of EoI, from the planning to the evaluation phase, collaboration emerged as a key theme. By seeking feedback from all regional partners and fostering a participative approach, the SCALE-UP project ensured that a diverse range of voices and perspectives were heard in each of the steps.
- **Addressing Language Barriers:** Recognizing that English language proficiency varied among primary producers across regions, the project took proactive steps. By publishing the Call for Expression of Interest in local languages and customizing them to regional specificities, SCALE-UP made strides in inclusivity.
- **Transparent and Comprehensive Evaluation:** The evaluation criteria, while rigorous, were transparent and comprehensive. They were rooted in ensuring that the selected bio-based solutions were innovative, regionally apt, and had the potential to bring about tangible economic, environmental, and social benefits.
- **Regional Evaluation Committees:** Instead of going with an international committee, the decision to use regional evaluation committees further reinforced the emphasis on regional specificities. It also simplified the evaluation process, given the language customizations and region-specific challenges.
- **Flexibility:** The flexibility showcased by the project, especially in its decision to alter its initial approach of an international evaluation committee in favour of regional ones, stands out. This pivot underscored the importance of adaptability in large-scale projects.

- **Emphasis on Broad Participation:** Rather than restricting participation to a specific entity type, the eligibility criteria were designed to encourage a broad range of entities to get involved. This ensured a diverse range of innovative solutions and approaches.

In summary, the SCALE-UP selection of solutions serves as an exemplary model of multi-regional approach through collaborative, inclusive, and adaptive methods. These valuable lessons learned, and the ones the project will get from the Innovation Support Programme will feed the development of Task 5.4, titled "Guidance framework for designing, implementing, and monitoring small-scale bio-based solutions in rural areas."

The value of an evidence-based framework is vital not only for the success of our ongoing endeavours but also for future projects that might be replicated in other rural regions. The aim of Task 5.4 will be to leverage the accumulated experiences of SCALE-UP project to devise a robust and comprehensive framework. This framework **will bridge the gap between bio-based solutions and rural development goals** while also aligning with principles of sustainable development. It will not just be theoretical; it will offer actionable steps, a result of the earlier experiences in the project, enabling rural communities to decipher, compare, and implement suitable bio-based development pathways.

Moreover, ensuring that the guidance framework remains relevant and effective at the European level, it will be intricately linked to the European Commission's long-term vision for the EU's rural areas. The association with the EU Rural Pact, the EU Rural Action Plan, and the EU Bioeconomy Strategy underscores the SCALE-UP commitment to creating a roadmap that is in harmony with larger European objectives and strategies.