



SCALE^{UP}

community-driven
bioeconomy development

Evaluation and synthesis of capacity- building activities

May 2025

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EXECUTIVE SUMMARY

This report presents the content, organisation, and evaluation of the capacity-building activities for the SCALE-UP project. These activities were to enable regional stakeholders to develop biobased-solutions and discuss inclusive development pathways. The project organised a capacity-building program with 21 online training sessions, 4 field trips, and one international study tour.

More than 1,300 participants from 32 countries took part in the training programme, with over 400 unique attendees, and presentations by over 70 international speakers. Contents and format were determined on basis of a needs assessment. Subjects covered nutrient recycling, integration of primary producers into value chains, digitalisation, logistics, social innovation, governance and strategies to address social, ecological, and economic trade-offs. To lower the language barrier, smart translation tools were used, and in separate breakout rooms discussions took place in the local language. A wide range of topics was discussed, as well as measures to address these issues.

The field trips and international study tour complemented the training programme with hands-on activities on bioeconomy practices in five countries across Europe. Participants listened to entrepreneurial passion, learned about logistical and technical considerations, and saw the benefits of regional collaboration between the bio-based sector and the local governments. The field trips and study tour provided opportunities to network and cooperate, and the chance to talk about challenges and solutions for implementing bioeconomy practices.

The discussions during the training sessions and study tours included a wide range of topics. Debated were the challenges and the requirements for investment climate and policy improvements and the potential risks for frictions with ecological boundaries. Discussed were new opportunities provided by digitalization and by nutrient recycling to maintain fertile soil for sustainable production. The most important issues have been listed in this report. A summary of possible solutions mentioned in the various discussions, has been given. Recommendations are presented how to continue the valuable discussions within the regional platforms.

Sustaining the capacity building activities - and continuing the important discussion on relevant topics - is essential. The continuation depends highly on ensuring a well-defined organisational and communication plan, and a clear commitment from platform members. Stakeholders must show their commitment by supporting either financially or in-kind by participation and organisation of activities. Close cooperation between bio-based production enterprises and science institutes is essential. The support of the regional government is key, as it supports local market players and improves investment opportunities. The recommendations given in this report, should be addressed in SCALE-UP's Guidance Framework (Deliverable 5.3) and are important input for the Sustainability Plans for the regional platforms.

Finally, ambitious goals should be developed to foster new collaborations, increase investment opportunities and drive the adoption of bio-based solutions which are in line with ecological boundaries and sustainable growth objectives. By implementing these recommendations and leveraging networks, the platforms can continue to expand sustainable bioeconomy practices. Especially the basic exchange of practical project experience and the vivid discussions on barriers and opportunities, should set the basis for such regional development. The SCALE-UP capacity building activities were very inspiring in that regard.

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Abbreviations

CoP	Community of Practice
WP	Work package
WS	Workstream

1 Introduction

This report provides an overview of the contents, structure, evaluation and learnings of the capacity-building activities created under the framework of the SCALE-UP project. It has been written for the regional bioeconomy platforms, which were established in the frame of the SCALE-UP project, as to use the lessons learnt, and to develop plans for continuing the capacity building activities and to continue the valuable discussions that have taken place on a wide range of topics, regional similarities and differences and stakeholder-specific concerns.

The capacity building activities are to promote cross-sectoral and cross-regional capacity-building and knowledge exchange among stakeholders, to increase interdisciplinary discussions and find innovative solutions.

The capacity-building activities under the project included a training programme, field trips and an international study tour. During the training programme, the content, organisation and quality of the sessions were evaluated on basis of questionnaires. The content and organisation of the study tour and field trips was also evaluated after every activity.

Recommendations have been made regarding the continuation of activities, both on (a) the activities in general, as on (b) addressing the topics that were discussed. For the activities in general, three future scenarios based on the available level of funding have been presented. For the topics, the main issues have been analysed on basis of the protocols that have been prepared. Important is to learn from the challenges that were brought forward, and how they can be overcome by measures that were suggested. In this report, recommendations are given how to address these issues and the role the platforms could play in this regard.

In Chapter 2, the capacity building activities are described and in chapter 3 the main results are discussed. Chapter 4 includes the synthesis and discussion of the results. In chapter 5 the main conclusions and recommendations are presented, as to be considered for input for SCALE-UP's Guidance Framework report (Deliverable 5.3) and Sustainability Plans.

2 Knowledge exchange and capacity-building activities

2.1 Training programme

The capacity-building events within the SCALE-UP project were designed to enhance collaboration and knowledge sharing among European regions. The core was formed by 21 capacity-building events, which were held as online training sessions. In addition to the training sessions, four field trips and an international study tour rounded off the capacity-building events, to give participants real-life examples of how bioeconomy can be implemented in different regions across Europe.

The contents for the online training sessions were based on the needs analysis conducted in the beginning of WP3. The needs analysis questionnaire as well as the capacity-building events are built on seven thematic work streams (WS) covering different aspects of bioeconomy, which have been identified prior to the project. For each work stream, three sessions were organised. These sessions were to equip participants with the skills and insights needed to drive sustainable development in their regions. The diverse inputs from various European countries were intended to enrich the learning experience and to foster a shared vision for a sustainable and resilient bioeconomy.

2.1.1 Capacity needs assessment

A needs analysis was conducted through an online survey to identify the training needs of the stakeholders in the project regions: Andalusia (ES), the French Atlantic Arc (FR), Mazovia (PL), Northern Sweden (SE), Strumica (MK) and Upper Austria (AT). In addition, the survey was sent to the members of the SCALE-UP Community of Practice (CoP) to identify similarities and variances between the regional and CoP needs and to further collect best practice examples of bio-based solutions in the bioeconomy. The questionnaire included the seven thematic work streams (WS). Additionally, several key-topics were defined in each work stream. The seven work streams cover different ways to improve nutrient recycling with cross-sectoral approaches (WS1), how to integrate primary producers into bio-based value chains (WS2), forms of digitalisation in the bioeconomy (WS3), efficient regional infrastructures and biomass logistics (WS4), types of 'social innovation' in the context of rural bioeconomy and how to develop and implement them (WS5), the effective governance of regional bio-based systems (WS6) and different strategies to address social, ecological and economic trade-offs of regional bioeconomy development (WS7). The survey participants were asked to rate their knowledge as well as their interest/training needs in these key-topics. With the information gained from the survey, the region-specific knowledge and interest about bioeconomy topics were evaluated, and key knowledge holders were identified.

In total 98 stakeholders from all six project regions filled in the questionnaire. Additionally, six CoP members also rated their knowledge and interest for the training topics. The cross-regional comparison of the survey results showed that the participants had high interest especially in efficient regional infrastructures and biomass logistics, ways to integrate primary producers into the bio-based value chains and nutrient recycling in circular bioeconomy. Furthermore, understanding, developing, and improving business models for bio-based solutions as well as various aspects of legislation, regulation and policies in bio-based work fields were two focus topics that were pointed out as particularly relevant throughout most of the work streams and by each project region.

In addition to the training content, respondents were asked about their ideas regarding the structure and organisation of the courses. There was a clear preference for a combination of presentations and interactive discussions. Deliverable 3.1 provides more details about the capacity needs assessment (Wolkerstorfer et al., 2023).

2.1.2 Topics and organisation of the trainings

Based on the capacity needs assessment, a series of online training sessions has been developed.

The training programme was organized into seven workstreams, each workstream covering three training sessions. Each workstream was organized by two alternating project partners. These partners were responsible for the realisation of the three workstream sessions. Their tasks included: choosing the topics of the sessions, choosing and contacting speakers, setting the agenda, advertising the session, preparation of the Microsoft-Teams meeting settings, hosting, moderation and technical support during the meeting as well as post-preparations like writing protocols, preparing statistics and content for the project website. The organising project partners were well supported by the WP-leader TMG. The trainings started in September 2023 and ended in December 2024, covering 15 months.

The list in Table 1 shows which workstreams dealt with which topics and which project partners were responsible for the each workstream, starting with the lead partner plus one supporting partner.

Table 1: Training programme workstreams, titles and responsible project partners.

Workstream and Titel	Project partners
Workstream 1: Improved Nutrient Recycling	BTG & SDEWES
Workstream 2: Integrating Primary Producers into Bio-Based Value Chains	AC3A & SDEWES
Workstream 3: Digitalisation in the Bioeconomy	TMG & UNIMOS
Workstream 4: Efficient Regional Infrastructures and Biomass Logistics	AC3A & BFR
Workstream 5: Practices of Social Innovation in Rural Bio-Economies	UNIMOS & TMG
Workstream 6: Governance of Regional Bio-Based Systems	CTA & WIP
Workstream 7: Strategies to Address Social, Ecological, and Economic Trade-Offs in Regional Bioeconomy Development	WIP & ECO

2.2 Field trips and study tour

The SCALE-UP project is dedicated to fostering sustainable regional development through innovative bioeconomy practices. A key component of this initiative is the series of field trips and an international study tour.

The study tour and field trips were designed to highlight and display the bioeconomy themes and value streams of each region. Each of the project regions has its specific bio-based resources, processes and challenges. Diving into these region-specific topics, participants (project partners and stakeholders) from other regions learn about different, but also similar challenges and how other regions address those.

One key topic that was focused on, was nutrient recycling. It is a crucial component of sustainable bioeconomy practices, and the study trip, site and field trips provided in-depth exploration of topics like biogas and compost as far as possible in the regions. Participants visited facilities where these processes are implemented, gaining insights into how nutrient recycling not only generates renewable energy but also enhances soil fertility, promoting long-term agricultural sustainability. Through these study trips, participants will gain a comprehensive understanding of how nutrient recycling is implemented within bioeconomy strategies, showcasing diverse methods and technologies that drive global sustainability.

Regional stakeholders were invited to a field trip to North Macedonia, with the focus on biogas and composting, to a field trip to Sweden with focus on forest resources including food and wood residues and an international study tour to Austria and Germany diving into food residues, biomass heating, wood research and cellulose fibres.

Additionally, the kick off meeting in Spain and the project meeting in Poland also included site visits and best practice examples but for project partners only. In Spain, the consortium visited an olive oil mill showcasing ways to upcycle olive residues and the nutrient cycle of the olive production. In Poland, the focus was on apple production processing as well as storage, production of side products and processing of residue streams. These hands-on experiences helped the whole group to deepen the understanding of each other's challenges and how the bioeconomy is developed in different regions throughout Europe.

3 Results

3.1 Training programme

Within a period of 15 months, an online training program has been conducted. This program included 21 online training sessions. These sessions reached more than 1,300 participations from 32 countries, showcasing widespread interest and engagement from various sectors.

The training sessions were enriched with 72 presentations. These presentations were delivered by over 70 speakers from 10 different countries. The program spanned across 6 regions. Each region brought its challenges and opportunities, which were addressed through content and discussions.



Figure 1: Key figures of the online training sessions.

3.1.1 Training session overview

Table 2: Overview of the training sessions per workstream.

Workstream 1: Improved Nutrient Recycling (12-03-24 to 23-04-24)		BTG & SDEWES
Nutrient recycling is essential for sustainable agriculture and environmental protection. This workstream, led by BTG and SDEWES, explores innovative methods to enhance nutrient recovery from organic waste. Participants learn about advanced technologies such as anaerobic digestion and composting, which convert waste into valuable fertilizers. Case studies from countries like the Netherlands and Spain highlight successful implementations and the resulting benefits for soil health and crop yields.		
Session 1	Introduction and main recycling routes: composting and digestion	
Session 2	Closing the loop: nutrient recycling value chains - with focus on digestion -	
Session 3	Innovative applications of bio-based fertilizers in modern agriculture	
Workstream 2: Integrating Primary Producers into Bio-Based Value Chains (09-11-23 to 07-12-23)		AC3A & SDEWES
Primary producers, including farmers and foresters, are crucial to the bioeconomy. This workstream focuses on strategies to integrate these producers into bio-based value chains, ensuring they benefit from the transition to a bio-based economy. Training sessions cover topics such as cooperative models, value chain optimization, and market access. Examples from Sweden and France illustrate how primary producers can collaborate with industries to create sustainable products and services.		
Session 1	Production of Biomass from Farmers and Foresters	
Session 2	Value Chains and Markets - Linking Producers and Stakeholders	
Session 3	Innovations and Challenges in Production and Mobilization of Biomass	
Workstream 3: Digitalisation in the Bioeconomy (16-01-24 to 27-02-24)		TMG & UNIMOS
Digital technologies are revolutionizing the bioeconomy by improving efficiency and sustainability. This workstream delves into the role of digital tools such as IoT, smart farming technologies, and artificial intelligence in bio-based industries as well as cyber security issues. Participants gain insights into how these technologies can optimize resource use, enhance traceability, and reduce waste. Case studies from Austria, Poland and North Macedonia demonstrate the successful integration of digital solutions in forestry and agriculture.		
Session 1	Introduction to Digitalization in the Bioeconomy	
Session 2	Applications of Digitalization in Bioeconomy	
Session 3	Safeguarding Progress	
Workstream 4: Efficient Regional Infrastructures and Biomass Logistics (07-09-23 to 19-10-23)		AC3A & BFR
Efficient infrastructure and logistics are vital for the bioeconomy, ensuring that biomass resources are transported and processed effectively. This workstream addresses the challenges and solutions		

related to biomass logistics, including transportation, storage, and processing. Training sessions feature best practices from countries like Sweden and France, showcasing innovative logistics models that minimize environmental impact and improve economic viability.		
Session 1	Introduction to challenges of biomass logistics	
Session 2	End-users' challenges in the local value chain	
Session 3	Sustainability and policy drivers for a regional bioeconomy	
Workstream 5: Practices of Social Innovation in Rural Bio-Economies (14-05-24 to 25-06-24)		UNIMOS & TMG
Social innovation plays a key role in the development of rural bio-economies. This workstream explores how community-driven initiatives can foster sustainable development and resilience in rural areas. Participants learn about successful social innovation projects from Austria, Poland and Germany, where local communities have developed bio-based solutions that support, for instance, food security and enhance social cohesion. The training emphasizes the importance of stakeholder engagement and participatory approaches.		
Session 1	Driving growth in rural communities via social innovations – policies, concepts, drivers	
Session 2	Fostering Novel Collaborative Approaches for Boosting Social Innovations	
Session 3	Recreating the food system through social innovations	
Workstream 6: Governance of Regional Bio-Based Systems (05-09-24 to 17-10-24)		CTA & WIP
Effective governance is crucial for the success of regional bio-based systems. This workstream examines governance frameworks and policies that support the bioeconomy at the regional level. Training sessions cover topics such as regulatory frameworks, public-private partnerships, and stakeholder collaboration. Examples from Spain, Sweden and Slovenia illustrate how regional bioeconomy strategies can facilitate the development of bioeconomy activities.		
Session 1	Empowering Rural Communities - the importance of developing Governance Models on Circular Bioeconomy	
Session 2	Building Sustainable Future: Innovative Governance Tools for the Circular Bioeconomy	
Session 3	Digital Innovation Hubs A Game - changer for leveraging the circular bioeconomy potential	
Workstream 7: Strategies to Address Social, Ecological, and Economic Trade-Offs in Regional Bioeconomy Development (31-10-24 to 12-12-24)		WIP & ECO
Balancing social, ecological, and economic objectives is a significant challenge in bioeconomy development. This workstream provides strategies to address these trade-offs, ensuring that bio-based initiatives are sustainable and equitable. Participants explore tools and methodologies for assessing trade-offs and making informed decisions. Case studies from Germany, France and Austria highlight approaches to achieving a balanced and inclusive bioeconomy.		

Session 1:	Balancing socio-economic and environmental objectives: Indicators, tools and practical insights
Session 2:	Biomass Utilization and Food Security: Synergies and Challenges
Session 3:	How should the EU Bioeconomy Strategy and its upcoming review address challenges arising from bioeconomy-related trade-offs?

3.1.2 Content of the presentations

The content of the training courses covered a wide range of topics within the bioeconomy. The full overview of presentations and speakers is shown in the Annex. As many areas are interlinked, several sectors were often addressed in the training sessions. Most presentations dealt with topics from the **primary sector** like agriculture, forestry and energy. **The quinary sector** was often discussed as the highest levels of decision-making is an important driver for the bioeconomy. This covers governance including bioeconomy strategies, education, NGOs, grassroot initiatives and regional development. The management of agricultural and forest resources is increasingly using technological innovations like precision agriculture, AI, smart sensing, etc. This **quaternary sector**, including technological innovation, scientific research and information technology, was discussed in various sessions. The **secondary sector**, production & processing, was included via the food industry and other industries like biorefineries and construction. The **tertiary sector**, who focuses on services, engaged in topics like logistics, appeared to be also an important discussion area.

A visual analysis in Figure 2 shows that some topics are more often connected than others. Topics that were often linked are agriculture, forestry and digitalisation; social innovations, food and regional development; and trade-offs, research and legislation.

Precision and smart farming are a noticeably big topics in bioeconomy, as they are an important tool for managing and organising the use of resources effectively. Social innovations play a key role in regional development and often deal with topics concerning food. Research in bioeconomy is often involved in questions of governance where legislation must deal with trade-offs and establish balance between the use and the protection of resources.

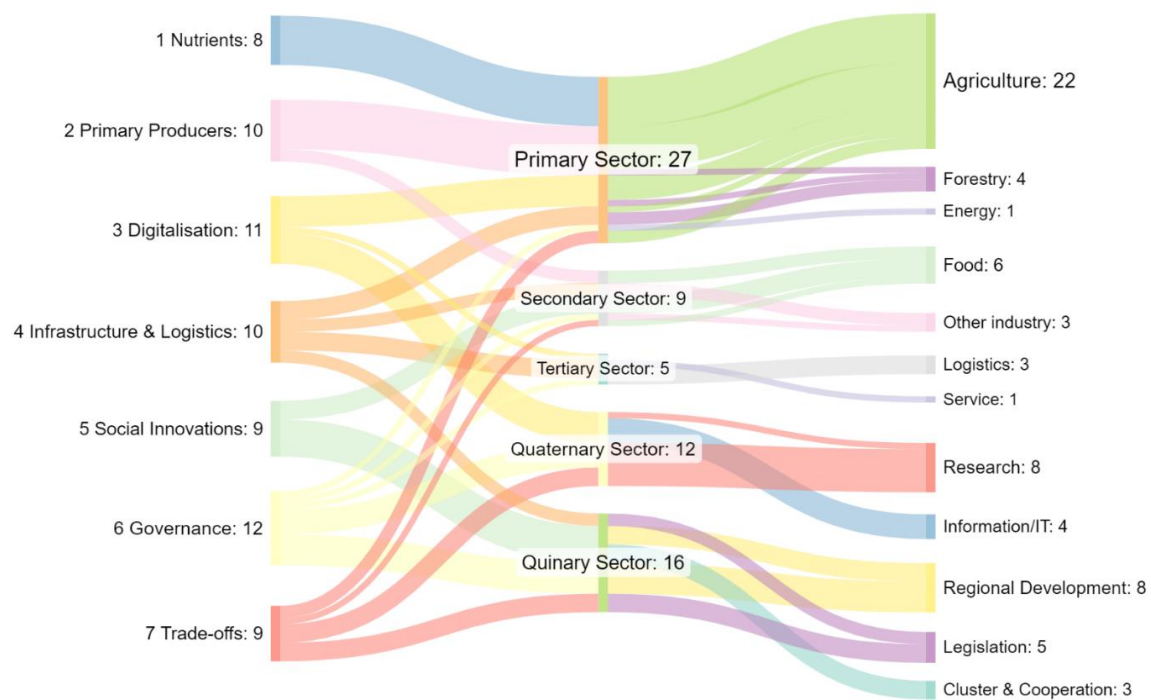


Figure 2: Sankey diagram of the workstream topic (left), connected by the sector of the participants (middle and right). The numbers represent the number of keywords. Made at SankeyMATIC.com.

3.1.3 International speakers

The training sessions were enriched by the contributions of over **70 speakers** from **10 different countries**, each bringing their knowledge and diverse perspectives. These speakers came from a variety of backgrounds, ensuring a comprehensive and multifaceted approach to the topics discussed.

Academia – researchers and university professors	Agriculture representatives and primary producers	Regional stakeholders and business owners	Corporate sector and clusters	Representatives from NGOs and regional development	EU officials
• Latest research results • Theoretical frameworks	• Practical experiences • Case studies	• Local perspective • Practical experiences	• Industry trends • Innovations	• Social impact • Community engagement • Intersectoral collaboration	• Broader policy perspective • Regulatory frameworks • Funding opportunities

Figure 3: Speaker background and perspective.

3.1.4 Promotion activities

All project partners spread the information and invitations to the capacity-building events within their stakeholders and regional network. For effective promotion of the events and to ensure maximum participation, promotion activities included:

1. **Release of information on social media:** invitations and the agenda of the trainings were posted on LinkedIn to reach a broad audience and generate interest.
2. **Direct emails:** Personalized emails were sent to stakeholders, the regional platforms, and previous contacts to ensure they are informed and invited.
3. **RuralBioUp newsletter:** the training sessions were featured in the RuralBioUp newsletter, which reaches a dedicated audience interested in our initiatives.
4. **Cluster contacts and targeted invitations:** targeted invitations were sent out to ensure key individuals and organizations are aware of the event.
5. **Bilingual invitations:** regional partners translated the invitations into the native language of the recipients if necessary.
6. **Personal dissemination via regional representatives:** regional partners disseminated information in B2B meetings to ensure a more direct and impactful reach.
7. **Distribution of information material:** The folder, the agenda and information on the training courses were distributed at other events organised by the project partners and passed on to interested parties.

3.1.5 Participation statistics

As mentioned in Figure 1, the training programme has attracted significant interest, with over 1,300 participations recorded. Notably, 913 of these participations (71% of total participations) came from external organizations, highlighting the program's broad appeal and relevance. The remaining participants were made up of internal networks, which also encouraged a professional exchange within the existing community.

It should be noted that the workstreams and training sessions had specific topics, as discussed in Section 2.1.2. Therefore, not all training sessions were equally attractive to all the regions, which could explain the variety in participation numbers. A total of 409 unique individuals participated actively in the training sessions. The unique number of participants per workstream is visible in Figure 5.

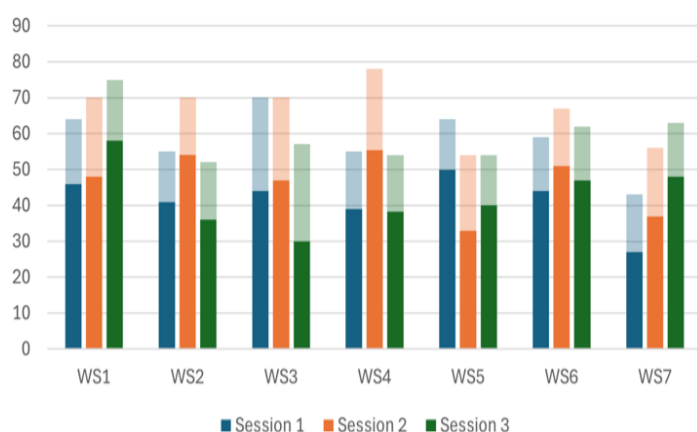


Figure 4: Number of participations per session, divided in internal (light) and external (bold) participations.



Figure 5: Number of unique participants per workstream.

The program's reach extended across 32 countries, including 9 non-European countries (Argentina, Canada, Chile, Egypt, India, Morocco, Pakistan, Tanzania and Tunisia). The distribution of participants in Europe is shown in Figure 6. The biggest group of participants was from Spain with 169 unique participants, followed by the other SCALE-UP regions: Austria (45), North Macedonia (27), France (24), Sweden (21), and Poland (16). This diverse participation underscores the global interest in bioeconomy and the program's success in fostering knowledge sharing and collaboration across borders.

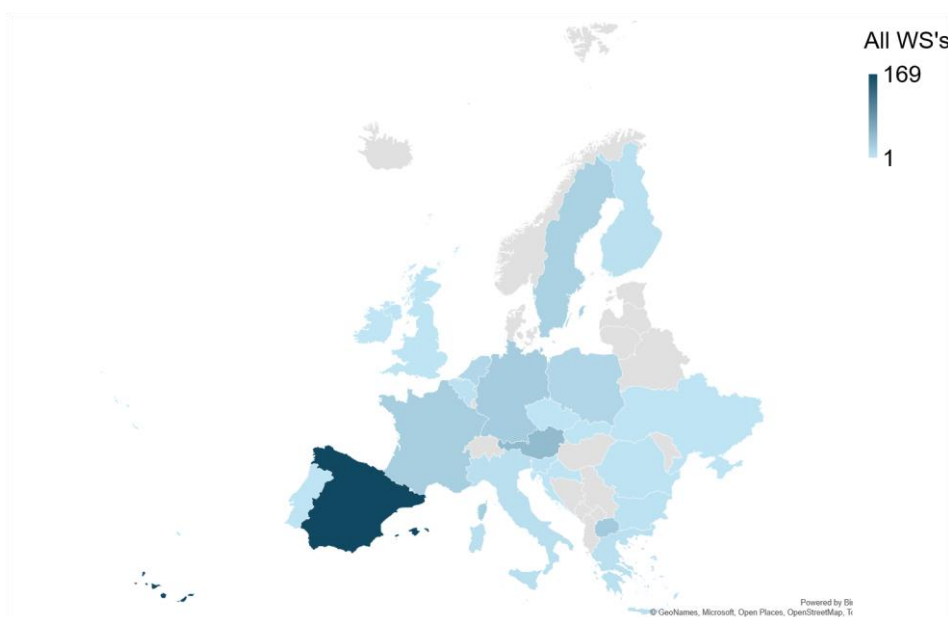


Figure 6: Distribution of unique participants per European country.

The occupation of the participants is partly unknown. Only the participants responding to the questionnaires (see Section 3.1.9.1 for more information) could (voluntarily) fill in their field of occupation. As visible from Figure 7, most participants (who filled in the questionnaire) were from the agriculture and forestry or research and consultancy sector.

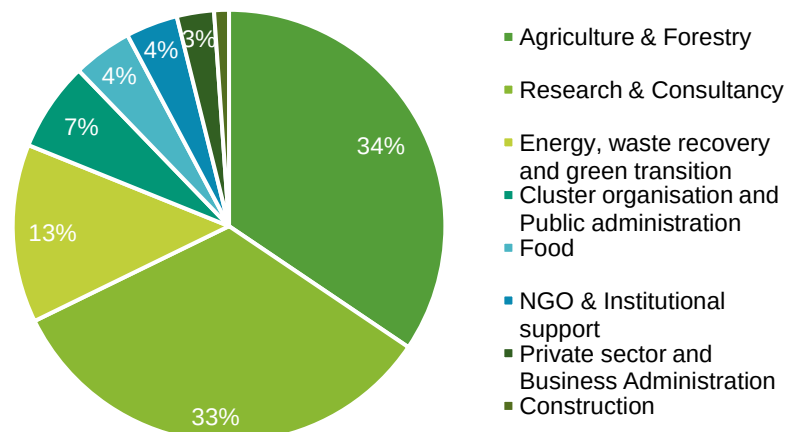


Figure 7: Field of occupation distribution over various sectors from questionnaire entries over the 7 WS's.

3.1.6 (Technical) organisation of the training sessions

The online training sessions, conducted via MS Teams, have been designed to maximize engagement and learning. The presentations were primarily delivered in English, with an artificial intelligence (AI) translator tool available to assist participants who may need it. Since the Macedonian language was not supported in MS Teams, OpenBrain was used as translator tool.¹ The translator tools did face some issues with the live translation, for example when speakers talked too fast, resulting in an incomplete translation.

Each session typically features three presentations, providing a comprehensive overview of the topic at hand.

In addition to the presentations, one or two case studies or best practice examples were included to illustrate practical applications and successful implementations. This approach helped participants connect theoretical knowledge with real-world scenarios.

The sessions were organised into different workstreams to cater to specific regional needs and interests. Workstreams 1-5 utilised breakout room sessions after the plenary part for each region, allowing for focused discussions and tailored content. This setup ensured that regional nuances and specific challenges were addressed effectively. The breakout-sessions were in local language.

9.00	9.15 – 11.00	11.00 – 11.45	Closure
Opening	Presentations (2-4) including case studies	Break-out room with discussion per region	Summary and closure
English/French with translation		Language of the region	

Figure 8 : Typical time planning for the training sessions (WS 1-5).

¹ <https://openbrainai.com/>

For workstreams 6-7, podium and plenary discussions were conducted after the presentations of the speakers. These sessions brought together all participants for broader discussions, fostering a collaborative environment where diverse perspectives were shared and debated.

3.1.7 Breakout room sessions

Discussing the subjects that were covered by the training sessions: this is an essential element in the design of the courses. The project team has deliberately chosen for an interactive approach and guided discussion in the language spoken in each region in so-called break-out rooms. The break-out rooms were to trigger discussion on the presentations and the subjects covered by the speakers.

Initially, there were seven different breakout rooms, one for each focus region and an international one. In some sessions, there was not much participation from some of the regions, these were then combined with an international breakout room. During the breakout rooms, a regional moderator facilitated the discussions guided by a number of questions, prepared in advance, to trigger discussion.

The breakout room sessions were to provide an opportunity for the participants from the project regions to discuss the regional aspects of the training session topic together. As the discussion took place in the local language and in a smaller setting, the barrier to discussion was low. Results, however, were mixed. Challenge remains to attract regional stakeholders. Participation was low in most cases. Only in the case of the Spanish target region, participation remained very good in all sessions! Here, the break-out rooms resulted in valuable discussions, leading to interesting exchanges between participants. Open questions were addressed and practical examples from the region were brought back into the training. The participants were able to network to stay in touch later. Ideas for new co-operations and business ideas emerged.

An example of the success of the sessions has been a project that has been launched during the project. The project “Solutions for old bread” were presented in the WS 5 “Social Innovation” training programme. The subsequent discussion in the Upper Austria breakout room was very stimulating. Logistical problems were discussed and solutions sought. After six months, a project was launched in which one of the bakers took up these solutions and now wants to summarise them in a project and is now implementing them.

In the closing session - after the break-out rooms – a summary was given to learn from the discussions in the regions, from controversial topics that came up as well as regional similarities and differences, relevant issues, and stakeholder-specific concerns. The most important topics that were discussed, are listed in the following subsection.

3.1.8 Topics discussed during the training sessions

Table 3 shows a summary of the main topics that were discussed in the break-out sessions and measures that have been discussed in the sessions themselves and in meetings throughout the programme. The Table shows the challenges that were met and the way they could be tackled and overcome.

For a full list of topics, see Annex.

Table 3: Summary with the main topics discussed during the training sessions WS 1-6.

	Most discussed topics	Proposed measures
WS1 – Nutrients	▪ Bio-based fertilisers ▪ Quality control ▪ Production costs ▪ Awareness and education ▪ Regulatory frameworks	▪ Knowledge transfer activities for stakeholders and agricultural sector ▪ Organising joint collection, processing and cost and quality control of biobased fertilisers.

		Nutrient recycling should be integrated in circular economy framework and ecological screening activities with environmental experts.
WS2 – Primary Producers	- Position primary sector - Cross-sector partnerships - Diversification and flexibility - Ecological boundaries - Sustainable forestry practices	- Improve understanding and encourage primary producers and processing industry to enter multi-actor partnerships. - Flexibility in biomass resources and biobased production - Promote alignment of bioeconomy production schemes with sustainability goals and eco-friendly methods.
WS3 – Digitalisation	- Smart farming tools (drones) - Cybersecurity - Awareness and acceptance	Assist in training programs and measures to reduce cyber risks along the full value chain.
WS4 – Infrastructure & Logistics	- Storage facilities - Biomass hubs - Seasonality of biomass - Multi-actor cooperation	Training of and assistance to stakeholders in entering multi-actor partnerships and in developing decentralised storage solutions.
WS5 – Social Innovations	- Rural development through social innovation - Long term policy plans and investment strategies	- Empowering communities to start new initiatives and to encouraging shared responsibility. - Building partnerships with the local government, SME's, NGO's and local communities and in developing long term strategies for rural development.
WS6 - Government models	- Scaling-up biobased sector - Deployment bio-economies across EU - Ecological boundaries	- Regional bioeconomy policies - Strategic collaboration and stakeholder engagement. - Innovation hubs and capacity building
WS7 - Biomass Utilization and Food Security	- Challenges arising from bioeconomy-related trade-offs. - Leveraging available frameworks to support effective implementation	- Political attention and action required for regional bioeconomy - Regional solutions tailored to local conditions like environmental factors, resource availability and regulatory frameworks - Cross-sector collaboration

In Chapter 4, the synthesis part of this report, it is discussed how these issues could be addressed by the stakeholders and the regional platforms.

3.1.9 Evaluation of the training sessions

3.1.9.1 Responses on questionnaires

At the end of each session, the participants were asked to fill in a questionnaire to evaluate the training session. These questionnaires were available in English and in the language of each SCALE-UP region. The questionnaire consisted of seven content related questions. The average percentage of participants from the training session filling in the questionnaire is 17%.

As visible from Figure 9, the quality of the training sessions was rated between 3 to 4 on a scale of 4. Figure 10, shows the understandability, which was rated between 2.5 and 4 on a scale of 4.

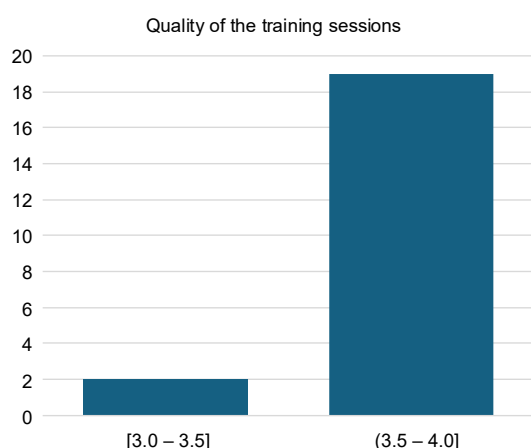


Figure 9: Quality of the training sessions per rating.

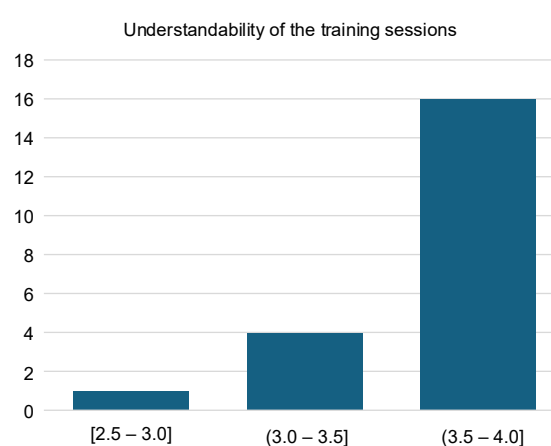


Figure 10: Understandability of the training sessions per rating.

A summary of the comments per workstream is shown in the Annex to this report. Generally, the comments related to practical issues (e.g. translation issues, speaking speed, time management). However, there were also some broader parts of the training sessions mentioned specifically as positives:

- The breakout room sessions (more time for this part of the session was often requested).
- The international crowd.
- The possibility to exchange contacts.
- Presentation of practical examples.
- The introduction polls.

3.1.9.2 Workstream leader evaluation

The workstream organisers also evaluated the training sessions. Finding (relevant) speakers willing to voluntarily give a presentation was seen as a challenging task. Technical and practical things were mentioned, for example:

- Presentations in English guarantee better quality.
- Send out the agenda more in advance.
- Do not schedule training sessions during national holidays.
- Warm-ups in the beginning of the session were considered a particularly good introduction to the topic.
- Make sure to stick to the time limit of the session.
- Do a proper technical check before the session.

Additionally, the following general points were mentioned as key take-aways and recommendations:

- Best practice, hands-on, and practical examples and experiences of the speakers were easiest to follow and had the most impact.
- Multiple speakers with different perspective in one session results in a broad overview of the topic to engage all interested stakeholders.
- To showcase SCALE-UP regional examples during the session (WS7).

Specifically, the breakout rooms were positively experienced, some observations:

- “Good discussions in the breakout sessions. Especially the Spanish breakout rooms seem to be popular, as they organised their own presentations and had a very structured discussion.” (WS1)
- Breakout sessions resulted in lively discussions and “inspired participants for more actions to tackle regional challenges” (WS4).

- “Discussions in the Swedish breakout room has resulted in several meetings to develop business cooperation” (WS4).
- “... some bakeries were very interested in initiating a project on bakery waste and receive more information about this topic” (WS5).

3.1.9.3 Midterm Internal evaluation

After the first five workstreams, the past sessions were evaluated and the learnings until then were summarized. Five questions were sent to the project partners prior to the one-on-one virtual meetings. The whole list of answers can be found in the Annex, but the most important key learnings are stated in Table 4.

Table 4: Topics midterm evaluation, the changes and other recommendations.

Topic	Details	Changes in WS6 and WS7	Other recommendations that have not been followed up
Invitations	Give more information about the speakers in the invitation	<i>Creation of “sharepics” which can be shared on social media (Figure 11)</i>	
Participation	Rural areas struggle with internet connectivity and online training in foreign languages Some topics are not suitable for all stakeholders/ regions Competing offers Promotion difficult with this high frequency		Provide offline options, consider podcasts for rural participants
Breakout room sessions	Mixed feedback: too short, too long, and even unnecessary for some Importance of practical case studies	No breakout rooms in WS6 and WS7 Include speakers in a discussion round after their presentations A plenary discussion at the end of the session	Invite local speakers to breakout rooms to stimulate conversations
Session timing	High frequency, long duration and inconvenient timing	Sessions were shortened and started later	Record sessions and provide subtitles on recorded videos
Technical improvements	Issues with translation, fast-speaking speakers and internet connection issues	Asked speakers to be aware of translation tool that needs slow-speaking participants to work properly	Record sessions and provide subtitles on recorded videos; consider podcasts for rural participants
Engagement and interactivity	Need for more interaction with polls (e.g. via MS Teams, a whiteboard or Mentimeter) and icebreakers		Questionnaire at the end via a poll



Figure 11: Example of a “sharepic” for social media outreach.

3.1.10 End evaluation project partners

After completion of the training programme, an online survey was sent to the project partners to give their feedback from the view of a host, from the view of a participant and comparing the mid-evaluation of the first 5 workstreams with the slightly adapted workstreams 6 and 7 in the end.

Except for one person, the project partners felt that the suggested changes from the mid-evaluation were applied very well in the last two workstreams.

Table 5: End evaluation project partners.

Category	Positive changes/feedback	Challenges
Changes applied	- Information about the speaker - Shorter sessions - Practical case studies - Interactive part - Plenary session - More expert exchanges	Skipping breakout rooms led to less inter-regional exchange, impacting specific regions (mostly the Spanish stakeholders)
General feedback	Trainings became more attractive	Difficult to compare the different workstreams due to varied formats and topics
Facilitator view	- Well-organised - Finding speakers is easier with partners help - The most interesting training sessions were those that matched the user's field of expertise	- Audience interest decreases when there are many sessions - Technical and translation issues - Facilitating discussing when audience is silent

Additionally, an interview was done with CTA to talk about the high numbers of Spanish participation. The Spanish participation in training sessions was notably high, comprising around 40% of all attendees. This success was driven by proactive promotion, integration with other activities, strong networks, and government involvement. Local experts and targeted outreach efforts helped attract key stakeholders. Additionally, social media and newsletters played a significant role in sustaining engagement. During the

training sessions, almost all sectors were represented at some point, depending on the topic (e.g., financial, investment, government agencies).

The regional platform, supported by CTA and already pre-existing before SCALE-UP, facilitated connections among stakeholders, encouraging collaborations beyond the training sessions. The training sessions contributed to improvement of the regional cluster formation by the regularity of the sessions, the opportunity to talk to each other in the breakout rooms, and in this way provide knowledge-sharing and collaboration opportunities between stakeholders.

The direct impact of the training programme on the innovation support programme was not as large as expected and as hoped. The main reason was that the sessions focussed mostly on technical biomass topics rather than financial and management related subjects. The relation between the innovation support programme and the other capacity-building activities is further elaborated on in Chapter 4.3.

3.1.11 Conclusions and lesson learned

Several observations and conclusions can be drawn for the training programme. The most important ones are:

1. The training sessions were successful, with more than 1,300 participations from 32 countries. Most participants had a background in agriculture & forestry, research & consultancy and energy, waste and green transition. More than 70% of the participations came from external organizations, the remaining participants were made up of internal networks, which encouraged a professional exchange within the existing community. A total of more than 400 unique individuals participated actively in the training sessions. These figures showed the widespread interest and engagement from various sectors.
2. The training sessions were focussed on six different regions and organised by alternating partners from the consortium from different countries. This proved valuable. Each region brought its unique challenges and opportunities, which were addressed through tailored content and discussions.
3. The content of the sessions and selection of speakers was based on a detailed capacity needs assessment. More than 70 speakers were selected from 10 different countries. This provided a rich exchange of ideas and perspectives which was highly appreciated. This was well supported by good preparation and organisation of the courses and regular internal evaluation by the organisers within the consortium. The quality of the training sessions was rated 3,5 - 4.0 on a scale of 1 to 4.
4. By the selection and preparation of speakers supported by smart translation tools applied, most presentations were good to follow. The understandability was rated mostly 3-4 on a scale of 4 in the feed-back from the participants.
5. The set-up of the courses, with warm welcomes, nice warm-ups, professional presentations and guided interactive discussions, enhanced learning experience and fostered understanding of the topics covered. The set-up with break-out rooms, allowing discussions in each own language, proved valuable. Especially in Andalusia, where the break-out rooms were used as part of the platform programme. This attracted many participants. From the more than 400 unique participants, 169 came from Spain.
6. The training sessions contributed to strengthening the bioeconomy community in the regions. They facilitated networking and exchange among stakeholders, leading to new collaborations and emerging projects. This enhanced regional cooperation and fostered a more interconnected and dynamic bioeconomy ecosystem.
7. It is important to have room for discussion. Open and well guided discussions in training sessions are valuable to strengthen platform coherence and to come to shared answers. Interactive

approaches are essential to trigger discussion on topics, especially when they are controversial. It is important to be open for regional differences and specific stakeholder-specific concerns.

8. The discussions in the training sessions covered a wide range of topics. Valuable lessons were learnt from the presentations, especially from the practical examples and the discussions in the break-out rooms or after the presentations. Also, barriers that were experienced by stakeholders, were discussed. Most interesting were the many subjects on which, despite the many differences, regions could learn from each other and where measures were discussed to scale up biobased production within ecological boundaries (for follow-up, see Chapter 4).
9. Challenges remain with respect to the time required to follow the courses by regional partners, especially in a language that is not well understood. This is especially the case for production partners in the agricultural and forestry sectors.
10. Overall, this 15-month journey of online training has been a testament to the power of virtual learning and international collaboration. The dedication of the organizers, the expertise of the speakers, and the enthusiasm of the participants have collectively contributed to the success of this program. It stands as a model for future initiatives aiming to leverage online platforms for widespread education and professional development and a balanced bioeconomy development.

3.2 Study tour and field trips

3.2.1 Overview of study tour and field trips

The kick-off meeting in Spain and the project meeting in Poland were combined with field trips. Separate field trips were organised in North Macedonia and Sweden. An international study tour was organised in Upper Austria & Germany.

Table 6: Summary of the study tour and field trips goals and activities.

Type of activity and location	Goal	Key activities
Kick-off meeting (Spain)	To gain insight into Spain's innovative approaches to sustainable resource management and bio-based production	An experimental oil mill visit to gain insights into upcycling olive oil residues and the olive nutrient cycle
Project meeting and field trip (Poland)	To showcase Poland's advancements in bio-based technologies and sustainable practices	- City of Radom: regional development results - Komorow: apple production, processing and storage, production of side products and processing of residue streams
Field trip (North Macedonia)	To show the potential of bioeconomy in fostering regional development and sustainability	- Saramzalino biogas power plant - Meeting with Strumica's Mayor - Large-scale composting machine in Novo Selo - Wood and wooden products factory - Biolaboratory: transformation of biowaste
International study tour (Upper Austria & Germany)	To provide a broader perspective on bioeconomy practices	- Biomass power plant of Linz - WoodKplus visit: leading research institute on wood and wood-related renewable resources - HochBROTzartig: bakery cooperating with a distillery to produce high quality spirits from leftover bread - Oil mill Raab: organic farm and oil mill - Eggenberg brewery: using spent grains as feed - Lenzing AG: world leading fibre producer for cellulose fibres - Anatol Donkan: leather tanning out of fish hide for materials (purses, belts) - BioCampus Straubing GmbH: sector-focused location development and business promotion company
Field trip (Sweden)	To show Sweden's integrated approach to bioeconomy, integrating environmental, social, and economic aspects	- Norra Skog presentation - Family-owned Forest area displaying sustainable forest management - Brännlands Cider: producer of artisanal ice cider - NK Lundström: family-owned sawmill

3.2.2 Participation

There was a total of 116 participants over the field trips and study tour, of which 84 project partners and 32 stakeholders. There were two stakeholders from North Macedonia who participated in two field trips and the international study tour. From the innovation support programme, two Spanish entrepreneurs participated in the Austrian and Germany study tour. The Austrian innovator presented his company within the Austrian and Germany study tour.

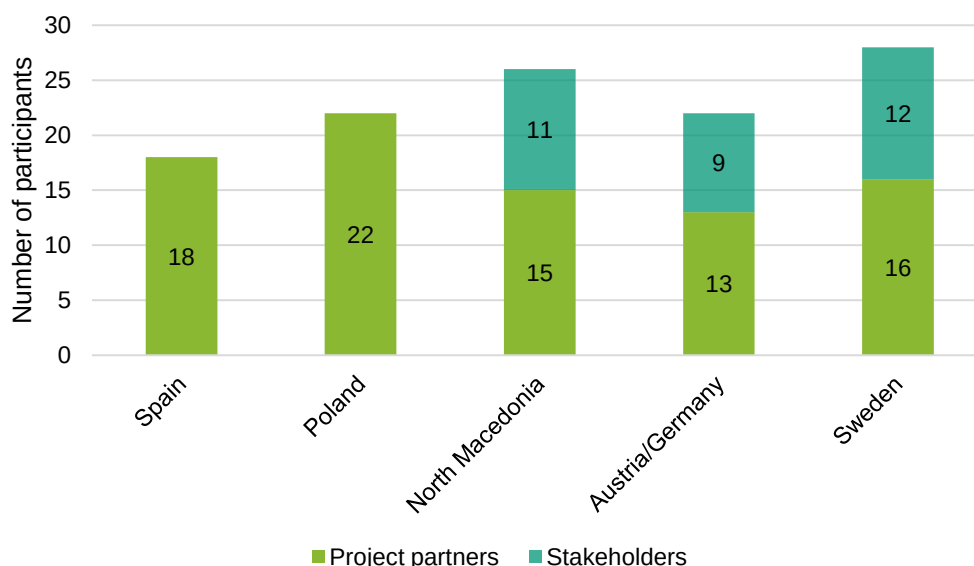


Figure 12: Participation distribution of project partners and stakeholders during the field trips and study tour.

3.2.3 Lessons learned from the study tour to Upper Austria and Germany

As an example of what was done during the study tour and field trips, this section describes the lessons learned during the Upper Austria and Germany study tour. During the welcome workshop of this study tour, participants were asked several questions about what they think is important for innovation, what are the hurdles and how to overcome these. In the workshop at the end of the study tour, participants were asked again these questions but this time with the focus on what they observed at the visited organisations, the results of this are described in Table 7.

Restrictions and political frameworks were mentioned on both sides, so while they can support one solution, they can of course hinder another one. Generally, they were seen as quite powerful to give directions.

Table 7: Conclusions and lessons learned from the study tour and field trips.

General ideas		For the visited organisation
Qualities needed to promote innovations/new ideas in the bioeconomy	- Personal qualities: risk awareness, flexibility, networking, open mind, persistence, willingness to share, courage and creativity - Practical: quality of the feedstock, fundraising, social environment	Win-win thinking, solution oriented, negotiation skills, enthusiasm, persistence, (technical) knowledge, identity, vision and mission, coping with uncertainty, passion, empathy, self believe, diversity, storytelling, sharing and public speaking

Factors as drivers of innovations	Common goals, public support, societal change, policy framework, creativity, trust, courage, experience, knowledge exchange and education, best practice and taxes	Funding by EU, restrictions and political frameworks and regional acceptance/branding/marketing
Factors that inhibit innovation	Access to infrastructure, social vs political pressure, business as usual mentality, risks, regulations, funding, substitution, lobbying, logistics and no trust in the future	Lack of funding, permits, market dynamics, global crisis, restrictions and political framework competition for biomass or changing demands
How did the organisation(s) overcome hurdles	N.A.	Flexibility, adaptability, courage and willingness to take risk, digitalization, diversification, skills, hands on mentality, trial and error, marketing and storytelling, passion, vision, dreams, cooperation, finding new distribution channels, having a plan B, knowledge transfer and hands on mentality.

3.2.4 Responses on questionnaires from study tour and field trips

For the Austria/Germany study tour and Sweden field trip, a questionnaire was sent out to the participants for evaluation. For the North Macedonia field trip, this was done in a less official manner by speaking to the project partners.

Table 8: Summary of the study tour and field trip evaluations.

	Most mentioned highlights	Most interesting visits	Suggestions
North Macedonia	- Setting of developments - Different perspectives from stakeholders - Support of the local government	- Saramzalino biogas power plant, - Biolaboratory	Use of bio-based materials for soil improvement very relevant and will be addressed in future study tours and field trips
Austria/Germany	- The passion of the companies - The diversity of the program	Lenzing AG, Anatol Donkan	- More regional stakeholders - More entrepreneurial firms
Sweden	Forest visit and walk	Family-owned Forest area	

3.2.5 Evaluation project partner from North Macedonia

Project partner Emilija Mihajloska (SWEDES) was interviewed about the participation of the two North Macedonian stakeholders who joined two field trips and the international study tour. These were two policy makers from the municipality of Strumica. In North Macedonia, waste disposal is a major issue: there is no bio-waste separation, leading to piling of agricultural residues and open burnings and illegal cuttings. During the study tour and field trips, the stakeholders saw solutions that could be implemented in their own region. However, challenges remain in knowledge transfer, funding access and collaboration without a facilitator or organising party. The challenges, key learnings and other observations from the study tour and field trips from the Macedonian perspective are further elaborated on in Table 9.

Table 9: Summary of study tour and field trips from a Macedonian perspective.

Evaluation from North Macedonia of the study tour and field trips	
Challenges in participation	• Difficult to interest stakeholders due to language barriers and time investment (participation takes 3-4 days per tour, including travel days).
Key learnings from study tour and field trips	• See best practices throughout Europe and possible (policy) replications on the regional level. • Feasible solutions available for waste management problem. • Sweden: sawmill visit showcased the potential of forest residues. • Austria/Germany: broader scope.
Contribution of study tour and field trips to innovations	• Some issues of the innovations were addressed during sessions, which helped find solutions for the innovators. • In the end, the innovator itself needs to apply for (national) funding mechanisms, which will determine the future implementation of the innovation.
Future prospective	• Even though the stakeholders in the region know each other well, the project activities helped in regional networking and platform building. • For effective communication between EU and regions proper translation - from (a) English to local languages and (b) from international used concepts to regional practical realisation, is required. The platforms and the internationally oriented consortium members can take a vital role in this field.

3.2.6 Conclusions and lessons learned

1. In total one international study tour and four field trips, of which two of them were combined with project meetings, were organised, covering five countries across Europe. They formed a valuable complementary part in the capacity building activities with 116 participants in total.
2. The field trips and study tour were well organised, with useful information on the programme, good transport and facilities, well-arranged site-visits and good opportunities for networking and cooperation.
3. Most interesting general issues included: the entrepreneurial passion of the companies visited, the need for flexibility, variety of stakeholders perspectives and the importance of good regional cooperation between the bio-based sector and the local government.
4. Most important technical subjects included: logistics around forestry and agriculture, nutrient recycling and soil improvement, combined bio-based material and energy production and dealing with ecological boundaries when increasing bio-based production levels.
5. Challenge remains to interest regional stakeholders due to language barriers and time investment (participation takes 3-4 days per tour, including travel days). From the 116 participants, 84 were partners and 32 stakeholders.
6. Overall, the study tour and field trips brought together project partners and regional stakeholders from across Europe. By visiting bioeconomy sites participants gained insights and inspiration to implement sustainable bioeconomy solutions in their own regions.

4 Synthesis and discussion of results

4.1 Results and continuation

From the previous chapters, we learnt that, over the course of 15 months, 21 online training sessions were conducted. They were complemented by an international study tour and field trips. The activities provided knowledge exchange and networking opportunities. The results showed engagement from stakeholders in several of the regional platforms. Spanish stakeholders formed the majority of the participants due to the targeted and proactive promotion of the Andalusian regional platform and integrating the trainings with other activities. The Upper Austria and Strumica regions were also successful into engaging their stakeholders both in the training sessions and in the study tours. Other regions, specifically the French Atlantic Arc, Northern Sweden and Mazovia struggled more to find interested stakeholders to participate. Time and language barriers were the largest challenges for all regions to attract stakeholders. Several other key points can also be extracted from the results:

- There was both cross-sector and cross-regional participation in the training sessions with high numbers of external stakeholders.
- Regional collaboration was stimulated by breakout room discussions and practical case studies.
- The connection between theory and practical implementation was strengthened during the field trips and study tour.

The challenge for the regional platforms now is how to continue activities to ensure the ongoing cooperation, knowledge transfer and development of new initiatives on bio-based production.

4.2 Conceptual framework

SCALE-UP's conceptual framework was organised around the six priorities of the European agricultural fund for rural development (EAFRD), and is embedded within the policy frameworks of the EU Bioeconomy Strategy, the national bioeconomy strategies and the Regional Development Plans and RIS3 of SCALE-UPs regions (see Figure 13).

The capacity-building activities contributed to these six priorities in several ways. Every field trip, the study tour, and training session's workstreams contributed to at least one of the six priorities stated in the project's conceptual framework.

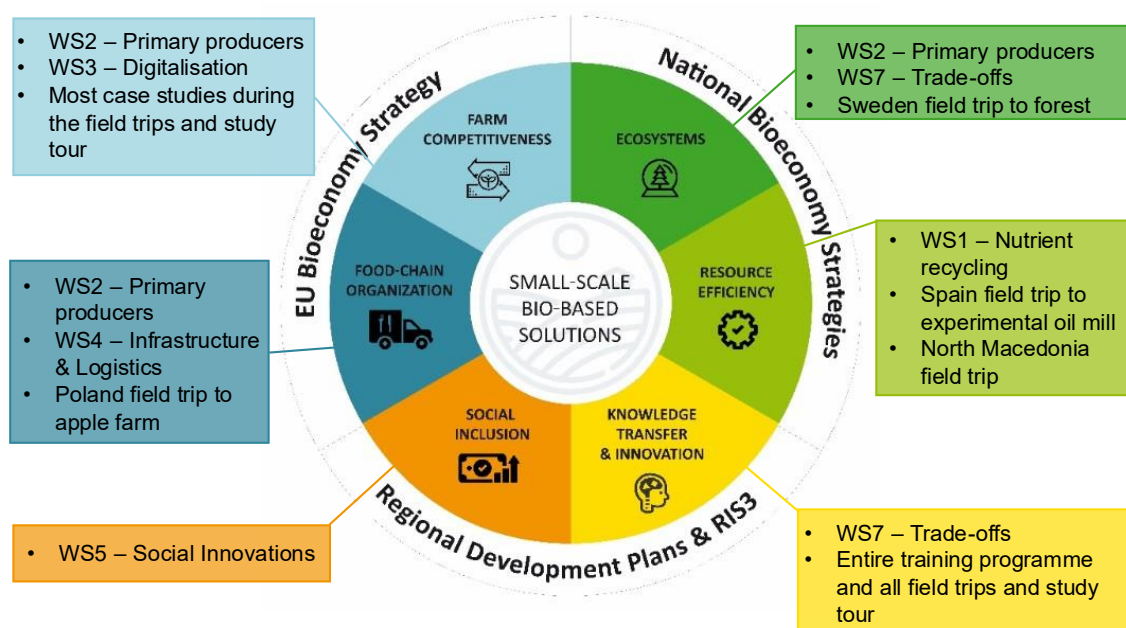


Figure 13: Visualisation of the project's conceptual framework (from project proposal) with the related capacity-building activities (Gerdes et al. 2023).

4.3 Links between training programme, field trips, international study tour and innovation support programme (ISP)

As the capacity-building events within the SCALE-UP project were designed to enhance collaboration and knowledge sharing among European regions, they provided a great possibility to link the trainings and study trips from work package 3 with the innovation support programme from work package 4. Figure 14 visualises the links between these capacity-building activities. As visible, the link between the innovators and the field trips, study tour and training programme, is mostly indirect and will be explained in more detail later in this section.

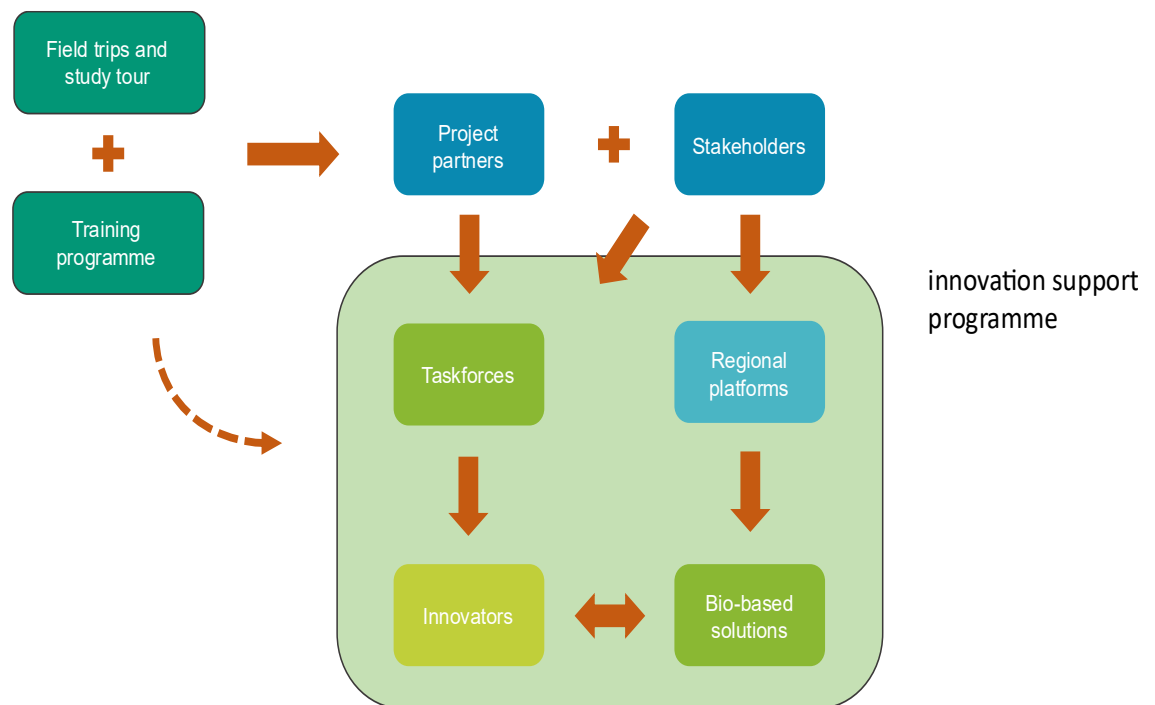


Figure 14: Visualisation of the links between the training programme, field trips, international study tour and innovation support programme.

The training programme was linked to the field trips and study tour in various ways topic wise, as visible in Figure 15.

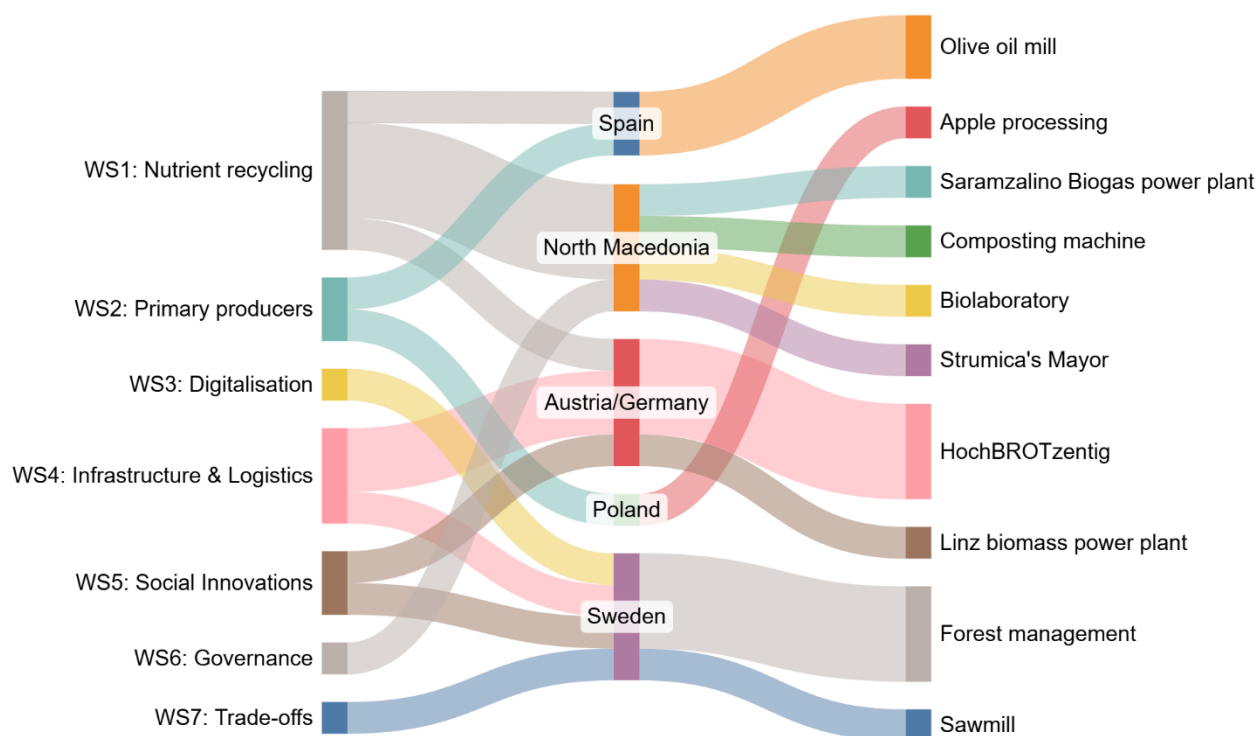


Figure 15: Topics of the training session workstreams (left) matched to in which field trip and/or study tour these topics were discussed (middle) and the specific visit (right). Made at SankeyMATIC.com.

Innovation support programme (ISP)

There were several links between the innovation support programme, the training programme, the field trips and the international study tour.

Andaltec, one of the Spanish innovations, gave a presentation in WS 4 “Bio composites based on olive pruning fibres for automotive and furniture. Industrial end-users and the creation of a biomass value chain”. Two representatives of *Andaltec* also took part in the international study tour to Upper Austria and Germany. In this study tour, *WoodKplus* was visited, a research centre also working in the field of bio composites. Two representatives from *WoodKplus* took part in the field trip to Sweden and there also was a presentation about the role of bioinformatics in digitalised bioeconomy in WS3 the organization.

Another best practice case that was presented during the international study tour was *HochBROTzentic*, a small bakery that started a brand of high-quality spirits that are made from old bread. After getting to know this great example of upcycling food waste, it was an all-agreed decision to ask *HochBROTzentic* to become the replacement after one of the innovators from Upper Austria dropped out. In the end it was a lucky twist, as the innovator was very motivated and the whole support programme was very successful although the timespan was much shorter than for the other innovations. During the field trip to Sweden the consortium and the stakeholders had the chance to meet the Swedish innovators like *RESELO* and stakeholders that also presented their field of expertise during the training sessions like Jonas Fridman from the *Swedish University of Agricultural Sciences*, Uppsala (SLU).

The French innovation *COPANO* indicated during an (informal) conversation², that she was not necessarily aware of the existence of the training programme and had thus not participated.

² Conversation at the BIO360 exhibit in Nantes (5th and 6th of February 2025).
D3.2 Evaluation and synthesis of capacity-building activities

CTA, from the Andalusian platform in Spain, indicated that for some of their innovators, the training programme did help. They stated that in Spain, the knowledge about the bioeconomy was still in its early stages, therefore the training programme could provide support to increase the knowledge of the region.

The language barrier for some of the innovators was quite substantial, therefore we expect that this could be one of the main reasons for not participating in the training programme and field trips/ study tour.

5 Recommendations for continuation of capacity-building activities

The capacity-building activities within SCALE-UP were substantial: More than twenty training sessions with seventy speakers from ten different countries, and several field trips and a study tour provided a comprehensive learning experience. Regional platforms were established or strengthened during the SCALE-UP project. The training sessions provided regular meetings between stakeholders in the regional platforms and several collaborations have been initiated as a result.

The experience, the organisation and the information collected during the training sessions, should provide a basis for a continuation beyond the project period. In this section, we discuss the options to achieve this goal.

Large attention will be paid how to address the issues that were raised during the training sessions and the way platforms could take up the measures proposed, and challenges associated.

Preliminary ideas

During the field trip in Sweden in September 2024, a World Café was organised to discuss and brainstorm about the training programme and its continuation. The following questions and key points were discussed:

What lessons can be learned from the training sessions?

- It is possible to organise a programme with different countries, languages and backgrounds
- Similar challenges and solutions can be found in different countries and regions
- Stakeholder motivation is crucial
- A clear target group is needed

What are good examples of how to organise the training sessions?

- Speakers from different countries with different perspectives was very valuable and interesting
- Inspiring solutions from other regions
- Initiation of cross-regional exchange

How can the training content be made available for both the consortium and the public:

- Analyse the entire content, match the needs (from the breakout rooms) and the barriers and solutions (from the presentations), and determine how it can be transferred to the different regions.
- Prepare a “library” or one organised and searchable document (e.g., a “book”) of all the protocols and presentations. This way, the content can be searched for the topic the reader is interested in. This idea will be executed, as the content of the training programme will be published on the website and will be publicly accessible even after the project.

What are key takeaways from the training sessions for the SCALE-UP platforms for after the project period?

- Use the documented presentations for future platform meetings
- Summarise, translate and present the content of the training sessions
- Potential use for activities in the meta-cluster

Contribution of the training activities to the EU Bioeconomy Strategy

When continued, training activities should contribute to the priority areas of the current EU Bioeconomy Strategy. These three priority areas are:

1. Strengthen and scale up the bio-based sectors, unlock investments and markets.
2. Deploy local bioeconomy's rapidly across the whole of Europe.
3. Understand the ecological boundaries of the bioeconomy.

For each of these areas, the following key actions should be considered:

Priority area 1: Strengthen and scale up the bio-based sectors, unlock investments and markets

According to the EU action plan, "The EU is committed to fostering the further development and deployment of sustainable and circular bio-based solutions and will take a series of concrete steps to speed up this process."

The capacity-building activities should continue to share experience on circular economy practices, regulatory frameworks, and supply chains. In the evaluation forms, especially presentations of practical solutions and field visits are evaluated positively. The increase in knowledge should strengthen the bio-based sector. Fostering relationships among stakeholders and the expansion of the cluster networks are important activities for unlocking investments and markets.

Priority area 2: Deploy local bio-economies rapidly across the whole of Europe

One of the key action points defined by the EU in this priority area is "Promote education, training and skills across the bioeconomy." The training programme should continue to educate and train stakeholders in the regions spread out over Europe. The six regional stakeholder platforms should be expanded to help sharing information and promote innovations. Training programmes could provide a regular meeting times for regional stakeholders.

Priority area 3: Understand the ecological boundaries of the bioeconomy

Two key action points in this priority area are important: "Enhance knowledge on biodiversity and ecosystems" and "Enhance the benefits of biodiversity in primary production."

Training sessions should continue to be provided dealing with this priority area. The sessions that were held on subjects which showed large interest. They attracted almost 100 participants and triggered discussion on balancing socio-economic and environmental objectives. Also here, practical examples were highly rewarded. Such as a Spanish circular economy initiative that helps entrepreneurs valorise renewable organic materials, promoting closed-loop systems with reduced ecological footprints. Also, the example in France, Terres de Sources (Brittany, France), illustrating how hemp cultivation contributed to water protection and the establishment of biodiversity-enhancing value chains. This initiative, for example, directly aligns with the EU goal of enhancing biodiversity in primary production and highlights the interconnectedness between ecological health and bio-based innovation. Experiences, like these ones, should be shared in the future.

The EU Bioeconomy Strategy is currently under review. A revised Strategy is scheduled to be published in 2025-2026. Changes made should be taken into consideration when designing capacity building activities in the SCALE-UP regions.

5.1 Addressing the topics raised during the training sessions

During the training sessions, a range of topics were discussed (see Table 3, Chapter 3.1.8). There is an important role for the regional platforms to take up the measures that have been proposed. Therefore, the following actions should be taken into consideration:

- The platforms should continue knowledge transfer activities for stakeholders and agricultural sector and organising joint collection, processing and cost and quality control of biobased fertilisers. The platforms should promote that nutrient recycling is integrated in the circular economy framework and ecological screening activities with environmental experts.

- The platforms should improve understanding and encourage primary producers and processing industry to enter multi-actor partnerships. The platforms should encourage flexibility in biomass resources and biobased production
- The platforms should promote alignment of bioeconomy production schemes with sustainability goals and eco-friendly methods.
- The platforms should have training programs and promote measures to reduce cyber risks along the full value chain.
- The platforms should encourage stakeholders in entering multi-actor partnerships and in developing decentralised storage solutions.
- The platforms should encourage communities to start new initiatives and to promote shared responsibility. The platforms should help building partnerships with the local government, SME's, NGO's and local communities and help in developing long term strategies for rural development.

The way platforms carry out these actions and the way they are organised, is also important subject of Platform Sustainability Plans (MS 6) and the Guidance Framework (D5.3). It is recommended the actions be taken up in these reports.

5.2 Scale and funding

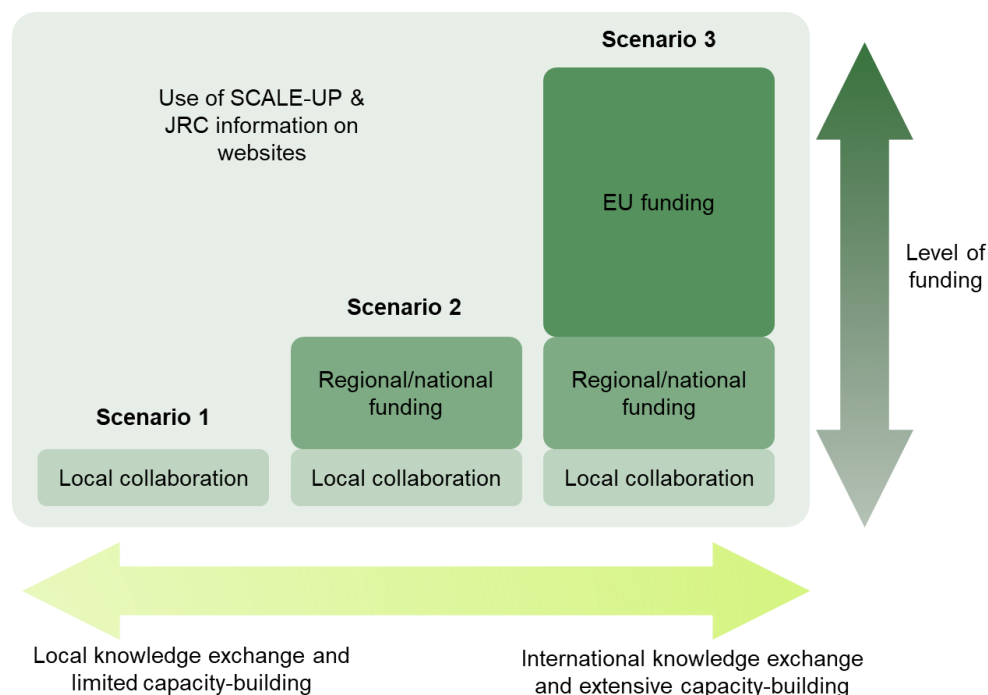
The continuation of the capacity building activities and the actions proposed above, depends on the continuation of regional platforms. They are required for the organisation of activities. The capacity building activities, or, in general, knowledge exchange activities, in turn, form the basis for the social coherence of the platforms.

If the stakeholders are committed, it should be feasible to uphold a minimum level of activity and a minimum level of organisation. Especially the continuation of low-cost workshops might be feasible: events at which project experiences and market developments are shared, and other matters of shared interest are discussed. In these events use can be made of the information collected during the SCALE-UP-project and the information available from JRC. From this minimum basis further development and expansion may be possible.

In short, the level of activities in the future, depends on:

1. Commitment of the platform stakeholders to contribute, in kind or financially and their willingness to support the organisation. This depends on the common interest, the benefits and the way the cooperation is organised.
2. Governmental collaboration and support. This depends on the importance of the sector in the region and the commitment of the stakeholders.
3. Policy frameworks and a long-term vision. This can be well supported by cooperation between the regional government and the platform.
4. Funding opportunities from either a regional, national or EU level. This is often dependent on the regional policy and the commitments of the local government and the stakeholders and the effective organisation of the platform.

Three scenarios are distinguished. These are shown in the diagram below.



In scenario 1, the level of knowledge exchange is limited to sharing project experience, low-cost local site visits and discussing matters of common regional interest. Including low-cost workshops with stakeholders most interested. Use can be made of the SCALE-UP information packages and training course material.

In scenario 2, activities can expand to more dedicated actions including workshops, regional policy improvements, monitoring progress and cooperation in developing production chains.

In scenario 3, activities will be comparable with the level of activities during the SCALE-UP project: full exchange of information within the region, cooperation between regions, training webinars, field trips, the study tour and taking-up EU-level of information for local implementation. The development of the Meta cluster for Bioeconomy could play a decisive role here.

5.3 Recommendations for continuation

To continue capacity building activities at a reasonable level, the following issues need to be addressed. These issues need to be included in the sustainability plans. Knowledge exchange activities form the heart of any platform.

These recommendations are to be considered for the Guidance Framework report (D5.3) and for the Sustainability Plans (MS 6) and are directed at (a) the organisation of the platforms and their activities and (b) the way biobased production topics need to be addressed and to be included in the platform organisation.

1. **Organisation of the activities.** Activities need preparation and organisation. Options should be explored to have one of the regional stakeholders make staff available at reasonable costs. This will be the platform team or knowledge exchange team. It should also be explored to have a dedicated legal entity or to integrate with an existing entity. For the continuation of the discussion of certain issues (see point 5 below), special task forces should be considered.
2. **Commitment.** Platform members should show a minimum level of commitment in terms of financial contribution or in-kind contribution towards participation and organisation of activities. E.g. participation in certain task forces.

3. **Regional government.** Support from the regional government is important to interest market players, improve investment opportunities and to receive additional funding. The regional government should help in creating a positive business climate, the commercial stakeholders should, in turn, develop investment initiatives and improve regional cooperation.
4. **Meetings and workshops.** This is the heart of platform life and basis for networking, new initiatives and knowledge exchange. A large part of these activities should be directed at knowledge exchange.
5. **Topics.** Important topics that were addressed during the training sessions, should be included in the capacity building programmes, with due respect to:
 - Issues that are directed at the priority areas of the EU Bioeconomy Strategy (see section 5.2).
 - Issues addressed during the training courses, including logistics for biomass supply and nutrient recycling, multi-actor partnerships and community initiatives, ecological boundaries, digitalisation and cyber security (see section 5.1).
6. **Database.** There is a massive database of information collected during the SCALE-UP project. In the form of information packages, training material and information from the JRC-Centre for Bio-based Economy. This information should be made more accessible, especially for non-academic regional stakeholders in the agricultural and forestry sectors.
7. **Room for discussion.** To come to joint answers, open and well guided discussions are important as essential element in training sessions. Important are interactive approaches that trigger discussion on controversial topics. It is important to be open for regional differences and specific stakeholder-specific concerns.
8. **Website.** It should be explored whether a digital platform should be developed for the regional platforms. This could be either a separate website, or a website from an existing platform that can be used. Also, the use of a separate part of the current SCALE-UP website should be explored.
9. **Communication.** A communication plan should be made with e-mail options, newsletters, social media and links to the website. This could be done together with other networks or the regional government.
10. **Funding.** Funding for knowledge exchange activities should be directed at (a) regional stakeholders and governments (see above) and at (b) EU-funds. Cooperation with other SCALE-UP-partners should be encouraged for EU-broad opportunities (the META-cluster or other associations). Platforms should also look at INTERREG-opportunities.
11. **Expansion.** To get beyond the minimum level of continuation, further expansion of activities is necessary. New developments in bio-based solutions make this necessary. If external funding can be secured, such expansion should be feasible.
12. **Ambition.** A strong ambition for a sound regional bio-based economy by intense cooperation between regional stakeholders, is crucial for success. The community-based approach is key. It is crucial to maintain a high level of capacity building activities and it is crucial for developing investment initiatives that replace fossil fuel well within the given ecological boundaries. It is strongly hoped the new Biobased strategy is going to help in keeping up this high ambition.

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7 Annex

Contents of Annex:

- Overview of all topics and speakers of the training sessions
- Training session questionnaire evaluation
- Mid-term evaluation training programme
- Topic suggestions from Handbook of social innovation
- Comparison with target outcomes and expectations
- Contribution to the overall objectives of the project
- Discussions in the break-out rooms

Overview of all topics and speakers of the training sessions

1 IMPROVED NUTRIENT RECYCLING

WS 1, Session 1 – Introduction and main recycling routes: composting and digestion

- Importance of biowaste for the Bioeconomy EU policy initiatives
 - *Dr. Stefanie Siebert, European Compost Network*
- Use of composting and digestate in the EU agricultural sector Product regulation and market perspective
 - *Dr. Stefanie Siebert, European Compost Network*
- Smart innovations in composting
 - *Prof. Tomasz Skalski, Ambioteco*

WS 1, Session 2 – Closing the loop: nutrient recycling value chains and optimizing logistics

- Anaerobic digestion of manure and agricultural residues and its role in EU-biogas production and nutrient recycling
 - *Lucile Sever, European Biogas Association*
- Circular solutions for biowaste – video showing the production and application of biofertilizers from manure by anaerobic digestion at Groot Zevert (the Netherlands)
- Production routes for alternative fertilisers from agricultural residues
 - *Francisco Corona Encinas, CARTIF Technology Center*

WS 1, Session 3 – Innovative applications of bio-based fertilizers in modern agriculture

- Bio-based fertilizer application: from national to European level – feedbacks from European projects Nurti2Cycle and Nutriman
 - *Jean-Philippe Bernard, Chamber of Agriculture of Charente-Maritime and Deux-Sevres*
- Application of bio-residues in industrial fertilizer production
 - *Marc van Oers, Van Iperen International*
- Towards a regional supply chain for bio-based fertilizers produced from plant residues: technical and commercial feasibility study with the RUSTICA project
 - *Céline Marjolet, Chamber of Agriculture of Pays de la Loire*

2 INTEGRATING PRIMARY PRODUCERS INTO BIO-BASED VALUE CHAINS

WS 2, Session 1 – Production of Biomass from Farmers and Foresters

- Producers in the Value Chains of Bioeconomy: overview
 - *Emilija Mihajloska, SDEWES-Skopje*
- Miscanthus biomass: production and use cases
 - *Ludivine Mignot, Chamber of Agriculture of Pyrénées Atlantiques*
- Testimonials from producers
 - *Composting plant in North Macedonia (Cvetanco Gjorgiev)*
 - *Forestry in Sweden*

WS 2, Session 2 – Value Chains and Markets -Linking Producers and Stakeholders

- Successful project consultation for soil and water protection - knowledge transfer from theory to agricultural practice
 - *Patrick Falkensteiner, Chamber of Agriculture Upper Austria*
- Involving producers in the setup of a new value chain
 - *Guillaume Mesnildrey, Chamber of Agriculture of Normandy (France)*
- Sustainability and Circular Economy Potentials in terms of Food Waste
 - *Prof. dr Jana Klopchevska, Faculty of Technology and Metalurgy (North Macedonia)*

WS 2, Session 3 – Innovations and Challenges in Production and Mobilization of Biomass

- From Trash to Treasure: Innovative soil substrates from food waste
 - *Natalija Burgieva, MamaOrgana (North Macedonia)*
- Planning, harvesting and storage: big challenges in fiber crops production
 - *Soazig Perche, Chamber of Agriculture of Brittany (France)*
- Challenges in mobilisation of producers to match the demand from value chains
 - *Sophie Rabeau Epsztein - Chamber of Agriculture Normandy (France)*

3 DIGITALIZATION IN THE BIOECONOMY

WS 3, Session 1 – Introduction to Digitalization in the Bioeconomy

- Digitalisation in the Bioeconomy - Overview
 - *Katarzyna Kowalska, UNIMOS*
- Digital Region: needs and challenges for digital transformation
 - *Frederic Hadjari, IT Cluster – Business Upper Austria*
- Digital technologies for unlocking biomass potential: Understanding the integration of digital technologies in bio-based product development
 - *Katarzyna Kowalska, UNIMOS*

Case studies:

- Future Farm – Digitalization in the agri-food sector
 - *Manuel Pérez, University of Seville*
- Value Chain Generator: Smart data platform for the development of bioeconomy
 - *Jon Goriup, VCG.AI GmbH*

WS 3, Session 2 – Applications of Digitalization in Bioeconomy

- Advanced technologies: Drones, Space technologies, AI & Machine Learning, Advanced Robotics
 - *Viktoria Motsch, University of Applied Science in Upper Austria*
- Role of Bioinformatics in Digitalised Bioeconomy
 - *Martin Riegler, woodKplus*

Case studies

- Use of drones in agriculture: detection of diseases and pests
 - *Mario Petkovski, AgFutura Technologies*
- Digitalisation of the Swedish National Forest Inventory
 - *Jonas Fridman, Swedish University of Agricultural Sciences, Umeå*

WS 3, Session 3 – Safeguarding Progress

- Understanding Cybersecurity in the Bioeconomy (Internet security & data protection in bio-based systems)
 - *Wolfgang Siegel, Siemens Austria AG*

Case studies:

- Digitalization of agriculture, experience, problems, data processing
 - *Aneta Łobodzińska, Science-Technology Center for Unmanned Systems*
- Navigating the Bioeconomy: Lessons Learned from the Frontlines of a Cybersecurity Breach
 - *Volker Kromrey, Bodensee-Stiftung*

4 EFFICIENT REGIONAL INFRASTRUCTURE & BIOMASS LOGISTICS

WS 4, Session 1 – Introduction to challenges of biomass logistics

- Presentation of selected biomass streams in the 6 SCALE-UP regions
 - *Frans Feil, Biomass Technology Group*
- Developing a local biomass supply system
 - *Magnus Matisons, Biofuel Regio*

WS4, Session 2 – End-users' challenges in the local value chain

- End-users' challenges in the local value chain: Further building on the insights
 - *Magnus Matisons, Biofuel Region*
- Biocarbon producer perspective on biomass supply and logistics
 - *Tobias Brink, Business developer, Envigas, Sweden*
- Bio composites based on olive pruning fibers for automotive and furniture. Industrial end-users and the creation of a biomass value chain
 - *Juan Pablo Ferrer from FUNDACIÓN ANDALTEC (R&D+I technological center)*

WS 4, Session 3 – Sustainability and policy drivers for a regional bioeconomy

- EU and the bioeconomy drivers and threats
 - *Magnus Matisons, Biofuel Region*
- EU and the bioeconomy with a focus on forest legislation
 - *Carina Gerken Christiansen, Project Manager Bioeconomy EU North Sweden*
- EU and the bioeconomy with a focus on agricultural legislation
 - *Maja Forssell, Sustainability specialist, The Federation of Swedish Farmers*

5 PRACTICES OF "SOCIAL INNOVATIONS" IN RURAL BIOECONOMIES

WS5, Session 1 – Driving growth in rural communities via social innovations – policies, concepts and drivers

- Analysing the potential of social innovation within the framework of LEADER 2014-20
 - *Michael Fischer, ÖAR*
- Understanding (bio-inspired) social innovations
 - *Bel Barroso, Cronopios Comunicación con Propósito*
- LEADER project: "Tischlein deck dich" Food Coop
 - *Barbara Aichinger*

WS5, Session 2 – Fostering Novel Collaborative Approaches for Boosting Social Innovations

- Boosting clusters of social and ecological innovations
 - *Katarzyna Rull Quesada, UNIMOS*
- Social Innovation Handbook
 - *Silvia Caneva*
- Seeds of Change: Innovating Rural Communities through agenda.zukunft Netzwerk Upper Austria
 - *Johannes Meinhart & Lena Füßberger, Regionalmanagement OÖ GmbH*

WS5, Session 3 – Recreating the food system through social innovations

- Recreating the Food System Through Social Innovations: New Cooperation and Pooling Approaches
 - *Julia Jägle, Ecologic Institute*
- Short Food Supply Chain
 - *Marion Francois, Chambres d'agriculture de Normandie*
- Rebread
 - *Patrycja Nierada, Rebread*

6 GOVERNANCE OF REGIONAL BIO-BASED SYSTEMS

WS6, Session 1 – Empowering Rural Communities - the importance of developing Governance Models on Circular Bioeconomy

- BIOMODELS4REGION, establishing innovative governance models in the bio-based economy.
 - *Magnus Matisons and Barbro Kalla, BioFuel Region*
- Andalusian Strategy for the Circular Bioeconomy
 - *Mar Cátedra, Regional Government of Andalusia*
- Podravje Regional Strategy for Transition to Circular Bioeconomy. The Slovenian case supported by the CCRI.
 - *Igor Kos, VPI*
- Bio-based Industries Consortium (BIC), a governance model at private level promoting industrial sector partnership.
 - *Samuele Ambrosetti, BI*

WS6, Session 2 – Building Sustainable Future: Innovative Governance Tools for the Circular Bioeconomy

- The ROBIN toolbox: supporting regions in the development of governance models for a circular bioeconomy
 - *Nadja Schlichenmaier, Steinbeis Europa Zentrum*
- Biowaste in North Macedonia: Mapping the problem and finding solutions
 - *Nikola Derebanov, Viridi*
- BIOTRANSFORM Transition Pathways to Circular Bioeconomy: the MooV tool to address the logistic challenges
 - *Astrid Stalmans, VITO*
- Circular Cities & Regions Initiative (CCRI): Self-assessment tool to measure cities and regions' progress with their CSS
 - *Jannis Lambert, CCRI-CSO*

WS6, Session 3 – Digital Innovation Hubs A Game-Changer for leveraging the circular bioeconomy potential

- CEE2ACT project: e-solutions for sustainable governance and green transition
 - *Maria Beatriz Rosell, Geonardo Environmental Technologies Ltd.*
- BioHubCat & DIHAFcat. From 8 small villages to entire region: the growth of a strategic need
 - *Víctor Falguera, Catalonia Bioeconomy Hub*
- EDIH InnovATE: Driving Digital Transformation in Agriculture, Timber and Energy Sectors
 - *Stefan Ehrenberger, THI TECHHOUSE GMBH*
- Digital Impact North. Northern Sweden's gateway to the European innovation network for digital and green transformation
 - *Carola Häggström, Swedish University of Agricultural Sciences*

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

WS7, Session 1 – Balancing socio-economic and environmental objectives: Indicators, tools and practical insights

- Key results of the MonBio project: Improving monitoring of environmental aspects of the bioeconomy
 - *Aaron Best, Ecologic Institute*
- Assessing the ecological boundaries at regional level – SCALE-UP's Sustainability Screening
 - *Gerardo Anzaldúa, Ecologic Institute*
- Regional & decentralized bio-based value chains: Insights on opportunities & trade-offs from a German perspective
 - *Johannes Rupp, Institute for Ecological Economy Research (IÖW)*

WS7, Session 2 – Biomass Utilization and Food Security: Synergies and Challenges

- Multi-Purpose Oilseed Crops for more Food Security
 - *Klaus Thuneke, Kompetenzzentrum für Nachwachsende Rohstoffe (TFZ)*
- Building regional supply chains to support producers in the Agri/Agro transition: the example of 'Terres de Sources' hemp supply chain
 - *Flore Millet, Collectivité Eau du Bassin Rennais (CEBR)*
- By-products as a New Resource: Opportunities and Challenges for Food Supply Security
 - *Gernot Zweght, University of Applied Sciences Wiener Neustadt*
- Biomass and Biofuels: Key Pillars for Sustainable Agri-Food and Bioeconomy Development in Andalusia
 - *Amparo Manso, Andalusian Energy Agency*

WS 7, Session 3 – How should the EU Bioeconomy Strategy and its upcoming review address challenges arising from bioeconomy-related trade-offs?

- The EU Bioeconomy Strategy – Objectives and time plan of the upcoming review and update process
 - *Laura Liepina, European Commission*
- Trade-offs in the bioeconomy – The role of policy-relevant research
 - *Maria Teresa Borzacchiello, European Commission*
- Relevant aspects for sustainable bioeconomy policies
 - *Jens Günther, German Environment Agency (UBA)*

Training session questionnaire evaluation

Work stream	Date	#	Comments
WS4 Efficient Regional Infrastructures and Biomass Logistics	09 & 10 2023	1	- More time during breakout sessions needed - Exchange of contacts - Interactive bulletin board during breakout sessions - Issues with real-time translation
		2	- Difficulties entering breakout rooms - Quality of translation - More visual material - More time for breakout rooms
		3	- Clear definition of the bioeconomy needed - For the report after breakout rooms: each region could present one main issue/challenge with more detail
WS2 Integrating Primary Producers into Bio-Based Value Chains	11 & 12 2023	1	- Speakers difficult to follow, problems with translation - Not enough people in the breakout room, not enough time.
		2	- Slower, easier to follow - Concrete and practical examples - Subtitles from French not working so well - Presentations could be more visual
		3	- Interesting examples and illustrative images. - Problems with translation, bad connection and audio - Speakers should talk slower
WS3 Digitalisation in the Bioeconomy	01 & 02 2024	1	- Very positive - Some technical issues
		2	- Length of the presentations, too much information - Time management
		3	- Smooth session with better time management

<i>Work stream</i>	<i>Date</i>	<i>#</i>	<i>Comments</i>
<u>WS1</u> Improved nutrient recycling	03 & 04 2024	1	- Large international crowd - Internet connection speakers - Time management - First presentation very long - Presenters could have talked slower
		2	- Good practical examples, nice video - Presentations not too long, better time management - More general overview in presentations, discussed in more detail in breakout rooms - They liked the introductory polls - Issues with simultaneous translation
		3	- Liked the polls - More time for presentations - Louder microphones - Issues with translation to Spanish
<u>WS5</u> Practices of Social Innovation in Rural Bio-Economies	05 & 06 2024	1	- Good practical examples
		2	- Good practical examples - Session was a bit too long (condensed form advised) - Breakout rooms too long
		3	- Interesting presentations - Session was a bit too long
<u>WS6</u> Governance of Regional Bio-Based Systems	09 & 10 2024	1	- Content of the presentations was good - Issues with translation - Information missing about private-public company cooperation
		2	- Short, clear presentations - Good practical examples
		3	- Good presentations and discussion - Good moderation in breakout room discussions

<i>Work stream</i>	<i>Date</i>	<i>#</i>	<i>Comments</i>
<u>WS7</u> Strategies to Address Social, Ecological, and Economic Trade-Offs in Regional Bioeconomy Development	10 & 11 & 12 2024	1	- Good practical examples - Good discussion - Good time management
		2	- Interesting presentations - Stricter time management
		3	- Interesting presentations - More time for discussion

What are the reasons people are not participating?

- Rural areas: **problems with connection**, not used to take part in online trainings
- We are trying to meet the needs of all of the regions: some of the topics are **not suitable/relevant** for stakeholders/countries
- A lot of **competing offers** in the region
- Tired after so many workstreams – **too frequent!**
- **Too long** - other trainings are 1 or 2 hours
- Also difficult the **whole morning** (start later?)
- Maybe **not disseminating** enough
- Language – **translation problems**
- **Different stakeholders levels**, looking for more pointed events
- EU – non EU topics: many **examples are not applicable!**
- Speakers:
 - Difficult to attract speakers, because its only voluntarily!
 - Payment for speakers would be easier to find speakers.
- **Personal contacts are really important**



How can the trainings be more attractive to participants?

What would you like to change for the upcoming sessions?

- **Information about the speakers** in the invitations
- **shorter sessions**
- the **beginning should be later** (9:30 or 10:00)
- shorter/longer/no breakout rooms
- **interactive part** in the beginning
- **individual invitations** per region
- Stimulate conversations in the breakout room, **local speakers**
- Inviting (officials) to break out room (Spain)
- **Practical case studies** are important!
- speaker should **talk more slowly**
- Trainings that build on the **information from WP 2**
- **Not so many sessions**: 3 hours training every 3 weeks
- **Targeting on one profile** or 2, e.g. forest and building
- **recorded sessions** (1 speaker)
- make **training materials** available that can be used in another way
- **Podcasts** format would be attractive
- **Subtitles on recorded videos**, so the translation is better
- Analyzation of where the participants are from? How did they hear about the training? Regional platforms? Social media? Etc.



Suggestions for subjects

In the Social Handbook per region several items are mentioned that are suggested to be covered in the training courses in the future. They are listed in Table 10.

Table 10: Recommendations per region from the Social Handbook and possibilities for follow-up (Celik et al., 2025).

Region	Recommendations Social Handbook (D5.1)
Northern Sweden	▪ Local bioeconomy cooperatives ▪ Forest education centres ▪ Forest innovation grants • Wood fuel network
Mazovia (Poland)	▪ Collaborative platform ▪ Bio-based packaging incentives ▪ Educational campaigns and workshops ▪ Living labs
French Atlantic Arc	▪ Collaborative supply chains ▪ Community-based research ▪ Green building certifications
Upper Austria	▪ Food waste awareness campaigns ▪ Circular economy training ▪ Trust building intentions ▪ Food sharing ecosystem
Strumica (North Macedonia)	▪ Training programmes ▪ Targeted communication activities ▪ Policy advocacy movements ▪ Financial support mechanisms
Andalusia (Spain)	▪ Circular bioeconomy awards ▪ Cross-sector collaboration ▪ Agrotourism initiatives

Comparison with target outcomes and expectations

The project expected outcomes and expectations as stated in the project proposal are shown in Table 11. In the table, they are compared with the observed outcomes of the project. As shown, most of the outcomes matched the expectations. Time will tell if also the targeted enhanced cooperation between key players in each region (#1) has been achieved in full, but the capacity building activities did play an important role for increasing knowledge, sharing good practices and to learn from each other's challenges.

Table 11: Project expected outcomes related to the capacity-building activities and the observed outcomes.

Project targeted outcomes	Expectations capacity-building activities	Observed outcomes	Achieved ?
#1 Enhanced cooperation between key players and knowledge holders resulting in sustainable business model pathways for bio-based innovations in rural areas	- Empower 75 stakeholders in each of the regions - Involve key actors for co-generation of knowledge and co-ownership of the innovation process - Build capacity in the field of bioeconomy - Facilitate cooperation between participants to jointly co-create business models	Spain reached more than 75 unique participant stakeholders during the training programme (namely, 168), followed by Austria (45). CTA has established multiple collaborations between participants as result of the capacity building activities. BFR combined the field trip with a platform event to promote cooperation between members and SCALE-UP-partners In Austria, a bakery developed a based on the information and solutions from the training sessions and the discussions in the breakout rooms.	~
#2 Provision of tailored and independent innovation support services to innovators in order to accelerate the development of marketable products and services and to improve the market penetration of bio-based solutions in Europe	Site visits and study tour to pinpoint specific regional needs, capacities and priorities	The strengths, opportunities and challenges in each region were discussed during the site visits (field trips) and study tour. By participation of other regions in the study tour and field trips, knowledge was exchanged, and ideas were generated.	✓
#3 Successful deployment of existing scientific and practical knowledge and more bio-based solutions	Promotion of information packages during the capacity building activities	The information packages were discussed at the regional platform meetings, the study tour to Austria & Germany, and presented	✓

introduced in rural areas in line with relevant policy initiatives		during the WS1 training sessions.	
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Regarding the training programme, there were also expectations on implementation methods and results. This is analysed in Table 12. This shows that all expectations have been well achieved.

Table 12: Implementation descriptions and observed implementation.

Description of implementation	Observed implementation	Achieved?
Develop and implement a demand-driven training programme	Developed and implemented according to the capacity needs as analysed in D3.1	✓
Facilitate knowledge exchange across the SCALE-UP regions	Cross-regional participation during the training programme, field trips and study tour. Especially the field trips and study tour were inspirational for stakeholders from other regions.	✓
Online training programme for cross-sectoral and cross-regional capacity-building and knowledge transfer	Topics and participants of the training programme were cross-sectoral and cross-regional	✓
Reflect the needs and priorities of key stakeholder groups	Developed and implemented according to the capacity needs as analysed in D3.1	✓
Incorporate up to 7 different thematic work streams and organise 3 virtual capacity-building events per workstream	7 workstreams with each 3 trainings	✓
Allow for uptake and application of key components by the regional platforms as part of tailored, region-specific capacity-building activities	Training sessions, field trips and study tour were discussed and promoted during platform meetings	✓
2 site visits and an international study tour	2 field trips organised in North Macedonia and Sweden and 1 international study tour in Austria and Germany with stakeholders from the project regions and 2 field trips for the project partners included in project meetings.	✓
Involvement of knowledge holders from each platform, sharing of experiences and good practices that can be taken up in other regions	Several regional stakeholders were invited as speakers throughout the training sessions. They shared experiences and the case studies were input for other regions	✓

Contribution to the overall objectives of the project

The objectives that are relevant to the capacity-building activities are mentioned and analysed in Table 13. It can be noted that all objectives and KPI's related to the capacity-building activities were achieved successfully.

Table 13: Overall project objectives, KPI's and the observed results.

Objective	KPI	Observed result	Achieved ?
Objective 1: To increase capacity and knowledge of multi-actor partnerships to accelerate the development of marketable products and services and to improve the market penetration of bio-based solutions	Training programme developed	Materials for the training sessions developed which will be available as a library on the project's website after the end of the project.	✓
	21 cross-regional capacity-building events	21 online training sessions conducted	✓
	1 international study tour	1 international study tour organised to Austria/Germany	✓
	2 field trips	4 field trips organised in Spain, North Macedonia, Sweden and Poland	✓
Objective 2: To improve knowledge about the potential of nutrient recycling in the regions	Work stream on nutrient recycling potentials included in the training programme	WS1 developed with the topic of 'Improved nutrient recycling'	✓
	3 cross-regional capacity-building events carried out on this topic	3 training sessions in WS1 about 'Improved nutrient recycling'	✓
Objective 4: To achieve high level of awareness and understanding of the bioeconomy and its potential impacts among local communities	No KPI related to capacity-building activities	Targeted knowledge building via the training programme educated on the fundamentals of bioeconomy	N/A
Objective 5: To strengthen collaboration between primary producers, SMEs, clusters, social actors and policymakers	No KPI related to capacity-building activities	Networking during the breakout room sessions between different stakeholder groups. New collaboration opportunities identified and achieved	N/A

Discussion topics break-out rooms

In this annex, the discussions at the break-out rooms are listed. We have categorised the challenges and associated measures per region, per relevant issue and per workstream.

The main issues that were discussed are:

- Knowledge and awareness
- Supply, value and market chain
- Competition between sources
- Infrastructure and technologies
- Waste management
- Policy and finances

Table 14: Challenges and proposed measures in the Northern Sweden BO-room.

Challenges	Proposed measures in BO-rooms
Knowledge and awareness	
▪ More promotion about the adoption of digestion needed	▪ Sharing success stories highlighting economic viability
Supply, value and market chain	
▪ High costs of bio-fertilisers	▪ Network to meet and discuss common problem solutions ▪ Change attitude towards products from sludge and other waste streams ▪ Certification and testing of products
Competition over biomass resources	
▪ Competition over biomass resources, tied to the dominance and conservatism of the established (forestry) industry	▪ Clustering activities for end users ▪ Multi-actor partnership and develop long-term planning. ▪ Encourage strong players to ask for new assortments

Table 15: Challenges and proposed measures in the Mazovia BO-room.

Challenges	Proposed measures in BO-rooms
Knowledge, awareness and acceptance	
▪ Citizens and primary producers lack acceptance and awareness of bio-based fertilisers ▪ Primary producers lack knowledge of new digital technologies	▪ Develop educational programs, align policies with EU initiatives, state level financial support by engaging with policymakers ▪ Establish demonstration projects ▪ Further support and education necessary ▪ Facilitate cluster activities
Supply, value and market chain	
▪ The apple production (volume, bulk density and quality) is highly seasonal and varies based on the weather, diseases and pests ▪ Lack of a constant stream of biomass ▪ Appropriate quality cannot be ensured easily ▪ Missing connection between upstream and downstream in the value chain ▪ High costs for bio-fertilisers	▪ Good mapping of all its elements, good management system. These should be used to conduct good communication and build cooperation between value chain participants ▪ Creating a control system for small producers ▪ Create a system for collecting and storing biomass from small producers (Biohub) ▪ Promote consumer awareness and market demand
Infrastructure and technology	
▪ Limited infrastructure and facilities regarding the lack of surplus food redistribution ▪ Lack of proper storage methods, transportation and infrastructure for bio-based fertilisers ▪ Limited technical resources ▪ Implementation of new digital technologies	▪ Provide new technologies for new applications of apple biomass ▪ Infrastructure advancement and technological solutions ▪ Partnerships and collaborations ▪ Facilitate cluster activities
Policy and finances	
▪ Initial investment costs (also for digital technologies) with limited financial resources ▪ Limited bargaining power of small producers in an industry with conservative producers that are reluctant to introduce changes ▪ Regulatory barriers for digestion	▪ Developing a settlement and payment model for small producers ▪ optimizing use of available funding ▪ Policy incentives and subsidies ▪ Collaborative efforts between government, businesses and NGOs ▪ Improve trust ▪ Comprehensive legal framework (data ownership, sharing agreements, privacy protections, safety standards, licensing and certification requirements etc.) ▪ Collaborative efforts to develop regulations and promote use of technologies

Table 16: Challenges and proposed measures in the French Atlantic Arc BO-room.

Challenges	Proposed measures in BO-rooms
Supply, value and market chain	
▪ Securing a constant biomass stream from local primary producers	▪ Developing a collective approach for producers to meet the demand in quality, quantity and regularity
Infrastructure	
▪ Cost and duration of straw storage	▪ Create a better understanding of the needs of the construction industry to anticipate production and storage of biomass
Policy and funding	
▪ Obstacles with the European agricultural policy regulations regarding crop diversification and the ban on bare soil. This restricts farmers in their use of maize and wheat straw, which is often left in the field as alternative for plant covers ▪ Support systems on public funds do not support value based on human interaction and manual work, rather supporting industrial/manufactured products	

Table 17: Challenges and proposed measures in the Upper Austria BO-room.

Challenges	Proposed measures in BO-rooms
Knowledge and education	
▪ Investors and construction companies lack the awareness of bio-based building solutions ▪ Primary producers have different levels of knowledge regarding digital solutions ▪ Businesses and schools lack circular economy education ▪ Actors are lacking expertise to identify and apply for regional funding ▪ Limited research due to costs of new technologies and processes	▪ Educate citizens, businesses and investors on circular economy and bio-based solutions ▪ Provide dedicated capacity-building activities for the construction sector ▪ Educate primary producers on digital tools ▪ Provide specific support for small businesses
Supply, value and market chain	
▪ Heterogeneity in biomass and the differences between quality and application ▪ Land availability with low quality of soil ▪ Availability of necessary raw materials ▪ Difficult to create value out of waste ▪ Without clear economic incentives, farmers will hesitate to adopt sustainable practices ▪ Material flows from food and agricultural industries are difficult ▪ Difficult to launch marketable products ▪ Low prices for bio-based fertilisers ▪ Austrian market not ready for innovations	▪ Waste disposers should take responsibility and recognise value ▪ Collaboration of stakeholders to increase information flow and to develop robust and transparent business models ▪ Bilateral agreements between producer and processor ▪ Some extra incentives or little push from the government ▪ Cultivation of spring truffles as good practice example where small amount of product could yield high value

Infrastructure and technology	
▪ Lack of infrastructure (also for redistributing food waste) ▪ Lack of proper biomass storage ▪ Lack of decentralised processing facilities ▪ High transportation costs ▪ High logistical effort for digestate products ▪ Lack of proper technologies	▪ Building individual storage systems ▪ Engage in agricultural cooperatives that already possess the efficiency of biomass storage ▪ Better planning and forecasting ▪ Strengthen connections among stakeholders in the system ▪ Similarities with French example of hemp value chain, emphasizing need for persuasive efforts to foster acceptance among farmers
Policy	
▪ Regulatory framework for digestion lacks flexibility and limits full potential ▪ Lack of legal framework and final investment decisions ▪ Regulations for bio-based materials and biomass are new and change often ▪ No proper legislation for use of drones ▪ Difficult to actively engage with policymakers ▪ Gap between European level and local reality ▪ Gap in advocacy for circular nutrient management	▪ Discussion and development of new legislation to meet new needs of stakeholders ▪ New initiatives should complement existing frameworks to minimise disruption and a seamless transition ▪ Improvement in support organisations (e.g., farmer unions) and communication between farmers and these organisations ▪ Specific examples and projects that are implemented directly in the municipalities ▪ Dedicated organisations that recognise sustainable farming practices
Collaboration	
▪ No incentives to collaborate ▪ Lack of an overall sense of community ▪ Gap in advocacy for circular nutrient management	▪ Regional platform as driver of innovations as missing link to policy makers
Waste management	
▪ Unclear where the responsibility of waste production lies (if bakery sells to supermarket, not every supermarket becomes responsible for waste created): so inconsistent and difficult to manage amount of food waste ▪ Lack of infrastructure to redistribute food waste	

Table 18: Challenges and proposed measures in the Strumica BO-room.

Challenges	Proposed measures in BO-rooms
Knowledge and awareness	
- Primary producers have limited knowledge, understanding and awareness of the possibilities, benefits, tools of the bioeconomy and agricultural residues/by-products - Primary producers have limited knowledge about suitable machinery and equipment - Lack of knowledge of digital tools	- Establish more agricultural cooperatives that support robust networking and knowledge sharing - Establishment of an information/knowledge hub to connect academia with primary producers - Demonstration farms or projects - Increased education and support - Agreement between largest vegetable processing company and biogas plant for handing over residues as good practice example
Supply, value and market chain	
- Lack of synergy between supply and demand of bio-based products and food (residues) - High differences in prices along value chain - Low levels of communication and transparency between producers and buyers - Lack of cohesive sustainable market chain for composting - Limited utilisation of digestion and products - High costs of bio-fertilisers	- Increased collaboration and networking with local primary producers and engagement of proactive stakeholders - Joint collection of agricultural residues at centralised location in - A coordinated system - Integrate supply chain to streamline operations and reduce costs - Develop viable business models tailored to the local context - Regional platform to coordinate efforts - Support structures combining regulatory clarity, strategic policies and economic incentives
Infrastructure and technologies	
- Lack of proper infrastructure, storage solutions and technologies due to, amongst others, expensive machinery - Presented technologies are new to this region and require further research before practical implementation	- Improve the infrastructure - Enhanced knowledge and peer-to-peer experience sharing - Better utilization of existing financial support measures to improve machinery and tools
Waste management	
- Illegal landfills and open waste-burning - Lack of consistent separation of food waste - Lack of an organisation of records for food surpluses	- Regional landfill - Waste segregation of organic waste - Comprehensive plans and policies to set target and implement measures - Systematic method for tracking and managing excess food - Engagement of proactive stakeholders
Policy and finances	
- Limited financial support for the usage of digital tools - Administrative burdens for support programmes for farmers	- Improving accessibility to financial support - Increased education and support

Table 19: Challenges and proposed measures in the Andalusia BO-room.

Challenges	Proposed measures in BO-rooms
Knowledge	
▪ Lack of knowledge of primary producers and actors in the supply chain about the potential of biomass and digital solutions ▪ Lack of digitalisation throughout the production system	▪ Promotion of innovative solutions that already exist in the market ▪ Awareness-raising activities for primary producers to prevent burning of biomass ▪ Mobile pilot plants for biomass treatment during peak season
Supply, value and market chain	
▪ Lack of a constant biomass stream due to droughts and the seasonality of olives ▪ High dependency of main products due to the low added value of residual biomass streams per product unit	▪ Digital hub to improve biomass availability and information accessibility ▪ Mixing biomass from different crops with feedstocks from olives for seasonality ▪ Find more added-value byproducts to mitigate dependency
Infrastructure and technology	
▪ Lack of efficient logistics for managing and transporting biomass resources ▪ Expensive transport costs ▪ Inability of agricultural technology startups to enter the business funnel	▪ Mathematical model and AI development to optimise logistics ▪ Decentralized production of biogas ▪ Portable recycling plants ▪ Pre-treatment of biomass to make transport cheaper; develop alliances between academia, biomass value chain and technology providers to develop tools to optimise storage and transport ▪ Increased awareness under older generations who are the decision makers in the agricultural sector, so capacity building and promotion of intergenerational dialogue
Policy	
▪ Legislation gaps between regional and European policies regarding for example the status of agricultural residues (by-product or waste)	▪ Develop new governance models involving entire value chain
Demographic factors	
▪ Lack of territorial and social cohesion in the region, combined with depopulation	