Interreg CENTRAL EUROPE

Co-funded by the European Union

BIOECO-UP

A1.3 Transnational testing of intersectoral cooperation procedures

D.1.3.2 Transnational peer review of draft procedures for bioeconomy intersectoral cooperation

September 2025

Bioeconomy Cluster

Content

1. Executive Summary

The deliverable D1.3.2 documents the transnational peer review process of the draft procedures for bioeconomy intersectoral cooperation (D1.2.1). The peer review was designed to ensure that the procedures are robust, practical and widely applicable by collecting feedback from external experts across participating countries.

The transnational peer review process consisted of several steps:

- Project partners identified and engaged external stakeholders to provide feedback using structured peer review template;
- National inputs were consolidated into national peer review reports, highlighting countryspecific perspectives;
- A transnational summary of recommendations was prepared, synthesizing the feedback into the chapters;
- A co-creation workshop was held on 16 April 2025, where project partners jointly reviewed the consolidated results, prioritized recommendations and discussed the most relevant issues for future improvement of procedures.

The feedback collected covered all sections of the draft procedures, ranging from the introduction and identified barriers for cooperation, to the quadruple helix approach, procedural steps, toolbox and conclusions. Recommendations included both simple clarifications and more ambitious proposals, while some suggestions extended beyond the scope of the current project.

This deliverable does not yet include the final improvements to the draft procedures. Instead, it provides a comprehensive overview of the peer review process and its outcomes as a preparatory step. The most relevant recommendations will feed directly into deliverable D1.3.3 (Intersectoral cooperation procedures for bioeconomy value chain design), which will present the final version of the procedures for bioeconomy intersectoral cooperation.

2. Introduction

The development of effective procedures for bioeconomy intersectoral cooperation is one of the objectives of BIOECO-UP project. Building on the activity A1.2, the result of which were the draft procedures for bioeconomy intersectoral cooperation (D1.2.1), the activity A1.3 is focused on testing and validating these procedures through a transnational peer review.

The purpose of Deliverable D1.3.2 is to document the peer review process and its outcomes. Specifically, the peer review aimed to:

- Evaluate the draft procedures from multiple national and sectoral perspectives;
- Gather constructive feedback from external stakeholders who were not involved in earlier stages within activity A1.2;
- Consolidate and compare national experiences to identify common trends and unique perspectives;
- Validate and prioritize recommendations during online transnational co-creation workshop.

This activity represents a crucial intermediate step between the drafting of the procedures (D1.2.1) and the preparation of the final version (D1.3.3). While this deliverable does not yet incorporate the revisions to the draft procedures, it ensures that the final procedures will be based on a broad, transnationally validated foundation.

By documenting the methodology, stakeholder engagement and consolidated results of the peer review, D1.3.2 highlights the added value of involving diverse perspectives in shaping intersectoral cooperation practices. It also demonstrates how the project ensures transparency, inclusiveness and responsiveness to both project partners and external experts.

3. Methodology of the Peer Review Process

The transnational peer review was designed to ensure that the draft procedures for bioeconomy intersectoral cooperation (D1.2.1) were critically evaluated by independent experts and enriched with diverse national perspectives. The methodology was structured to guarantee transparency, comparability and active involvement of external stakeholders across all participating countries.

The transnational peer review process consisted of five steps:

1) Preparation of peer review templates
2) Selection of external experts
3) National peer review process
4) Consolidation of results
5) Co-creation workshop

3.1. Preparation of Peer Review Templates

To support a consistent process across partner countries, two templates were prepared:

- A transnational peer review questionnaire for external stakeholders – this document included a structured feedback table with targeted questions for each section of the draft procedures (introduction, barriers and challenges, quadruple helix approach, procedures, conclusions and recommendations, and toolbox).
- A national peer review report template for project partners – this document allowed partners to systematically compile, summarize and analyse the feedback received in their country.

3.2. Selection of External Stakeholders

Each project partner identified between two to five relevant external stakeholders in their country. To ensure independent evaluation, these experts were not drawn from those who had participated in earlier Focused Interviews conducted within A1.2. Instead, the peer reviewers represented diverse perspectives on the bioeconomy, including research, industry, policy and civil society actors.

3.3. National Peer Review Process

Selected external experts received the D1.2.1 Draft procedures for bioeconomy intersectoral cooperation, including the Annex – the toolbox with practical solutions to enhance intersectoral cooperation, and also the peer review questionnaire with the instructions.

The experts were asked to provide structured feedback, addressing both content-specific and overarching questions. Project partners then collected the responses and compiled them into national peer review reports, which followed a common format and structure.

3.4. Consolidation of Results

The national peer review reports were analysed and synthesized into a consolidated summary of potential improvements and recommendations to the draft procedures for bioeconomy intersectoral cooperation. This consolidated document grouped feedback according to the structure of D1.2.1, allowing comparison across countries, whereby various perspectives were highlighted. Recommendations included simple adjustments (e.g. clarifications, rephrasing), more extensive proposals (e.g. adding new sections, introducing tools) and also suggestions not feasible to be implemented within the project (e.g. creating digital platform).

3.5. Co-creation Workshop

The consolidated summary served as the basis for the transnational co-creation workshop, held online on 16 April 2025. Each partner presented the national results and highlighted up to three recommendations that were particularly relevant and useful, considered essential for inclusion and/or raised important questions for further discussion.

The workshop enabled open dialogue, validation of findings and prioritisation of proposals across countries. It ensured that the transnational peer review process was not only a collection of individual national inputs, but a collective reflection and co-creation effort.

4. Overview of Peer Review Results

The transnational peer review generated extensive feedback from external stakeholders across all participating countries. Overall, the draft procedures were positively received, with many reviewers confirming that the structure, thematic coverage and orientation of the document provide a solid foundation for strengthening intersectoral cooperation in the bioeconomy. The step-by-step approach was considered logical and comprehensive, and the inclusion of tools such as stakeholder mapping and SMART objectives was particularly appreciated.

While national perspectives reflected specific contexts, several common themes emerged, focusing on opportunities to improve clarity and applicability. The following overview presents the key trends identified for each section of the draft procedures.

1) **Introduction**

Stakeholders recommended strengthening the introduction by linking bioeconomy intersectoral cooperation to EU priorities such as the Green Deal and the Competitiveness Compass. Also, it was recommended to highlight the contribution of cooperation to sustainable competitiveness, productivity and resilience of businesses and regions.

Several reviewers emphasised the importance of adding practical examples and good practices to illustrate the benefits of intersectoral cooperation for businesses and local communities. In addition, some comments pointed out the importance of clarifying the target audience of the document — whether it primarily addresses policymakers, industry representatives, academia or all combined.

In addition, feedback suggested broadening the sectoral scope by referencing a wider range of industries and emphasising the interconnection of sectors, rather than treating them in isolation.

2) **Identified Barriers and Challenges**

Stakeholders largely confirmed the relevance of the barriers presented in the draft, but recommended giving greater emphasis to additional obstacles such as financial constraints, regulatory inconsistencies, limited awareness of the bioeconomy concept and insufficient infrastructure for scaling up innovative solutions.

A recurring theme across several countries was the shortage of trained professionals and the need to strengthen education and training programmes focused on bioeconomy skills. External stakeholders also pointed out the persistence of institutional silos and rigid business models, which, combined with misaligned incentives and limited coordination between ministries and sectors, continue to hinder collaboration.

Concerns were also raised about global competitiveness, including the risk of competition from countries with less developed regulations and the need for international harmonisation of standards.

3) **Quadruple Helix Approach**

Reviewers strongly confirmed the importance of engaging stakeholders early in the process and allowing for adaptive approaches. However, they asked for greater clarity on what 'flexibility' means in practice and which actors (public institutions vs. businesses) are expected to demonstrate it.

The risk of stakeholder fatigue, conflicting priorities and unequal capacities was highlighted, underlining the need for measures to sustain engagement. Respondents also suggested leveraging existing networks, clusters and initiatives to strengthen collaboration, rather than creating entirely new mechanisms.

Finally, clear communication and transparency were emphasised as essential, including the definition of common goals, management of conflicting interests and development of trust among stakeholders.

4) **Developing Intersectoral Cooperation Procedures**

The step-by-step approach of the draft procedures was generally appreciated, but stakeholders called for additional guidance and practical examples to illustrate application.

Many reviewers noted that the challenges of moving from pilot projects to commercialisation were underestimated and recommended adding elements such as financing models, risk management strategies and regulatory considerations.

Several proposals were made to integrate decision-making tools into the process, including the use of key performance indicators (KPIs), risk assessment frameworks and prioritisation methods to support strategic choices. Stakeholders also stressed the need for conflict management mechanisms to address diverging interests and avoid stalemates.

5) **Conclusions and Recommendations**

Feedback indicated that the conclusions in the draft were sometimes too general and should be more specific, with clear evidence of the benefits and implementation requirements of intersectoral cooperation.

Stakeholders also highlighted the importance of including timelines, monitoring frameworks and indicators to track progress over time. Finally, experts recommended reinforcing links to EU and national policy frameworks and referencing relevant financial instruments and international cooperation mechanisms.

6) **Toolbox**

The tools provided — such as stakeholder mapping templates, SMART objectives and memorandum of understanding — were generally considered practical and useful. Nevertheless, reviewers recommended complementing them with additional resources tailored to financial planning, risk management and technology transfer.

Many experts suggested including collaborative digital platforms, knowledge-sharing repositories, and case study databases to strengthen implementation and to inspire stakeholders. The adaptability of tools to regional contexts was also highlighted, along with the need to ensure they are used by qualified professionals to generate meaningful outcomes.

Finally, stakeholders proposed measures to enhance the practicality of the toolbox, including visual aids such as infographics or GANTT charts, standardised impact assessment frameworks and guides to support commercialisation and financing.

5. Organisation of the Co-creation Workshop

One of the milestones in the transnational peer review process was the co-creation workshop, held on 16 April 2025 with the participation of all project partners. The workshop provided a space to jointly review, validate and prioritise the recommendations collected through national peer reviews and presented in the consolidated summary document.

The workshop was organised with three main objectives:

- To jointly reflect on the consolidated recommendations from external stakeholders.
- To identify proposals considered most relevant, feasible and impactful for improving the draft procedures.
- To ensure alignment across all partner countries.

Ahead of the meeting, project partners received the consolidated summary of national peer review reports. Each partner was asked to review the recommendations carefully and select up to three proposals that they found particularly relevant, essential to include, or raised questions for further discussion. This preparatory task ensured that the workshop discussion was focused and that all participants arrived with a clear perspective on priorities.

During the workshop:

- Each partner presented the key findings from their national peer review, highlighting the priorities they had identified.
- The group collectively reviewed overlaps and differences between national perspectives.
- Proposals were discussed in terms of their relevance, feasibility within the project scope and potential contribution to strengthening intersectoral cooperation in the bioeconomy.

The discussion confirmed that while many recommendations were highly valuable, not all could be implemented within the project's timeframe or resources. Nonetheless, even suggestions considered "out of scope" were recognised as useful for informing longer-term strategies beyond the project.

The workshop achieved the following outcomes:

- Validation of key themes: Partners agreed on the importance of issues such as clarifying the target audience, addressing regulatory barriers, strengthening education and skills, enhancing practical tools and providing more specific examples and case studies.

- Prioritisation of recommendations: Each partner's selections helped identify the most widely supported proposals to be considered for the final revision of the procedures.
- Shared understanding: The workshop created consensus on how the peer review feedback should be used. Partners agreed that deliverable D1.3.2 would focus on documenting the process and outcomes of the peer review, while deliverable D1.3.3 would present the final revised version of the procedures, incorporating the validated recommendations.

The co-creation workshop was crucial in transforming a set of fragmented national inputs into a coherent, transnationally validated basis for improvement. It provided space for dialogue, comparison and negotiation, ensuring that the final procedures will reflect both national specificities and shared European perspectives.

6. Lessons Learned from the Transnational Peer Review

The implementation of the transnational peer review process provided valuable insights into both the content of the draft procedures and the methodology of engaging stakeholders across different countries.

By engaging different experts from multiple countries, it was possible to capture diverse perspectives, ensuring that the procedures reflect not only theoretical approaches but also practical realities across different contexts. The external validation enriched the quality of the recommendations, as experts highlighted spots for potential improvement, e.g. regarding the regulatory barriers, commercialization challenges and the role of education and skills development.

The use of common templates across countries ensured consistency and comparability in the feedback process. This methodological alignment was crucial for synthesizing national results into a coherent transnational summary, which subsequently facilitated meaningful discussion at the co-creation workshop.

While national perspectives varied, the co-creation workshop showed that many challenges and opportunities are shared across borders. The dialogue between project partners helped to prioritise issues, balance different viewpoints and confirm which recommendations could realistically be integrated into the final version of the procedures.

In addition, it became clear that not all recommendations could be implemented within the scope of the project. Some proposals of external experts, such as the establishment of new financial

instruments or large-scale infrastructure investments, are beyond the project's scope. However, these inputs remain valuable as they point to longer-term needs and opportunities for policy and practice.

The peer review process reinforced the importance of co-creation as a foundation of developing practical, widely applicable procedures. It also underlined the need for continuous stakeholder engagement, not only in reviewing documents but also in shaping strategies and monitoring implementation. These insights will further guide the development of deliverable D1.3.3 linked with the final version of procedures for bioeconomy intersectoral cooperation.

7. Conclusions

The transnational peer review process represented a critical step in validating and strengthening the draft procedures for bioeconomy intersectoral cooperation. By engaging independent experts at the national level and consolidating their feedback into a transnational perspective, the project ensured that the procedures were critically assessed against practical needs, sectoral experiences and regional differences.

The co-creation workshop confirmed that many of the recommendations are highly relevant and should be integrated into the next update of the procedures. At the same time, the discussion also recognised that some proposals are either too ambitious to be realised within the project's timeframe or extend beyond its scope. This balance between ambition and feasibility was essential to defining the way forward.

It is important to note that this deliverable does not present the final improvements or revised procedures. Instead, it documents the process of peer review, summarises the feedback received and records how the recommendations were jointly validated and prioritised at the transnational level. The results presented here provide a foundation for the preparation of the final version of the procedures (Deliverable D1.3.3), which will incorporate the agreed improvements and adjustments.

In conclusion, D1.3.2 demonstrates the value of transnational peer review not only in improving the content, but also in enhancing legitimacy and ensuring that the final outputs of the project are both relevant and actionable across different national contexts.

8. Annexes

Annex 1: Template for Peer Review

Dear Madam/Sir,

Thank you for agreeing to provide feedback on the draft procedures for bioeconomy intersectoral cooperation. This document outlines guidelines designed to enhance collaboration across various sectors within the bioeconomy. Your expertise is invaluable in ensuring that these procedures are practical, relevant, and effective.

We have created a brief table with targeted questions related to specific sections of the document. Your insights on these questions will help us refine the procedures and make them more applicable to real-world scenarios. Please take a moment to review the table and provide your feedback. There's no need to edit the document directly—your responses in the table will be sufficient.

Thank you for your time and contributions!

BIOECO-UP team

Instructions for Reviewers

- Please provide the information regarding the country and institution you represent.
- Please provide concise answers to the questions in the table.
- If you have any general comments or suggestions, feel free to include them in a separate section below the table.
- There is no need to use track changes or directly edit the document; your feedback in the table is sufficient.

General Information

Country:	**Vyberte položku.**
Institution:	
Name:	

Feedback Table

Section	Key Points in the Section	Questions for Feedback	Feedback
Introduction	Overview of bioeconomy, importance of intersectoral cooperation	1. Does the introduction clearly define the scope and importance of intersectoral cooperation in the bioeconomy? 2. Is there any information or perspective missing that you believe should be included?	
Identified Barriers and Challenges	Common barriers across sectors, challenges specific to stakeholder groups	1. Are the identified barriers and challenges comprehensive? 2. Do you see any specific additional barriers? 3. Do the challenges align with your experience in intersectoral cooperation?	
Quadruple Helix Approach	Lessons from round tables, importance of engagement and flexibility	1. Are the lessons learned accurately reflected? 2. Do you agree with the emphasis on early engagement and flexibility?	

Developing Intersectoral Cooperation Procedures	Step-by-step guide to designing and implementing cooperation	1. Are the procedures clear? 2. Are there any steps that seem unrealistic? 3. What improvements would you suggest to enhance the practicality of these steps?	
Conclusions and Recommendations	Summary of findings and suggested actions	1. Do the conclusions reflect the main points that you consider important? 2. Are the recommendations actionable and relevant? 3. Are there any additional recommendations you would propose?	
Annex: Toolbox – Practical Solutions to Enhance Intersectoral Cooperation	Overview of tools for setting SMART objectives, stakeholder mapping, engagement planning and MoUs to support intersectoral cooperation	1. Are the tools provided practical and easy to implement? 2. Which tools do you think will be the most useful for enhancing intersectoral cooperation, and why? 3. Are there any additional tools or resources you would recommend including in the toolbox?	

Annex 2: National Reports from Peer Review

The individual national peer review reports elaborated by project partners summarizing the feedback from external experts are presented in following order:

1. Croatia
2. Czech Republic
3. Hungary
4. Italy
5. Poland
6. Slovakia
7. Slovenia

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HPK & ICE

National peer review report: Croatia

Content

Executive Summary

Provide an overview on the national peer review process and its objectives. Summarize key findings from the review and outline the most significant conclusions:

- Country: Croatia
- Institutions involved:
  - Hrvatske šume d.o.o. (Croatian Forests);
  - Society for sustainable development design (DOOR);
  - Croatian Association of Drink Producers (GIUPPH);
  - University of Zagreb Faculty of Agriculture
  - Competence Centre Ltd for research and development
- Number of stakeholders involved: 5
- Summary of key findings from the peer review:

The peer review process provided valuable insights into the current framework for promoting intersectoral cooperation within the bioeconomy. Reviewers praised the clarity in defining the scope and importance of cross-sector collaboration but suggested that incorporating additional perspectives, such as sustainable competitiveness and decarbonization, would further strengthen the approach.

Feedback also emphasized the need to involve industry players, especially when they lack direct profitable incentives. Several reviewers highlighted the importance of early engagement in collaboration efforts, which can foster trust and align stakeholders, while flexibility in the process helps adapt to evolving challenges.

The provided toolbox, including tools like stakeholder mapping and engagement planning, was generally seen as practical and relevant. However, suggestions were made to add a risk management framework and collaborative project management tools to enhance the effectiveness of intersectoral cooperation.

Further recommendations included integrating more detailed case studies into the procedures, lobbying for greater recognition of the bioeconomy within broader EU policies, particularly in the context of the Clean Industrial Deal, and ensuring bioeconomy projects align with EU's overarching competitiveness goals.

The peer review process confirmed the viability of the existing procedures while proposing actionable improvements.

1. Findings from Peer Review Process

This section will summarize the feedback received in each section from the reviewers. Refer to the corresponding sections in the peer review table template.

1.1 Introduction

Summary of participant's feedback on the introduction of the procedures, including:

- Clarity of scope and importance of intersectoral cooperation.

The majority of reviewers agreed that the introduction effectively defines the scope and highlights the importance of intersectoral cooperation within the bioeconomy. It successfully emphasizes how collaboration between industry, government, and research institutions fosters innovation, sustainability, and economic growth. Additionally, the introduction is commended for addressing resource efficiency and integrated efforts for sustainable development. However, one reviewer pointed out the absence of a reference to the European Commission's "Competitiveness Compass for the EU", which could strengthen the discussion on economic competitiveness.

- Suggestions for additional perspectives and missing elements, if any.

While two reviewers found the introduction comprehensive and complete, others suggested areas for improvement:

- Sustainable Competitiveness: One reviewer suggested incorporating a perspective on how intersectoral cooperation enhances sustainable competitiveness for local and regional businesses. The introduction could expand on how collaboration leads to higher productivity, better environmental practices, and overall business resilience, especially considering Europe's lag in productivity growth over the last two decades.
- Social Inclusiveness: Another reviewer recommended elaborating on how intersectoral cooperation benefits local communities and marginalized groups. Including examples such as job creation and community resilience could strengthen the introduction's social dimension.

1.2. Identified Barriers and Challenges

Comprehensiveness of barriers:

- Were the barriers and challenges identified sufficient?

Overall, the identified barriers and challenges are considered comprehensive and well-addressed by most reviewers. The analysis successfully covers common obstacles across sectors, such as communication gaps, regulatory misalignment, and differing stakeholder priorities. One reviewer particularly emphasized that the findings accurately reflect practical difficulties in collaboration, resource management, and project implementation.

- Did the feedback suggest any additional challenges?

While some reviewers found the coverage complete, others suggested additional emphasis on five horizontal enablers, which are crucial for enhancing competitiveness across sectors:

- Lowering barriers to the Single Market
- Simplification and reducing administrative burden
- Financing competitiveness

- Promoting skills and quality jobs
- Better coordination of policies at EU and national levels

Additionally, one reviewer highlighted the challenge of industry participation, noting that businesses often show little interest in intersectoral cooperation unless there is a clear direct financial benefit. Another emphasized the persistent issue of financial constraints and differing goals among partners, which remain significant challenges in fostering cross-sector collaboration. One reviewer also mentioned the need for a change of mindset of stakeholders.

- Did the findings align with national experience in intersectoral cooperation?

The feedback indicates that the identified barriers strongly align with real-world experiences in intersectoral cooperation. Reviewers confirmed that the challenges outlined in the report accurately reflect practical difficulties observed at both national and sectoral levels. The report effectively captures key obstacles but could further strengthen its analysis by incorporating the suggested horizontal enablers and exploring ways to enhance industry engagement.

1.3. Quadruple Helix Approach

Lessons learned:

- How well were the lessons from round tables and stakeholder engagement reflected?

The lessons learned from roundtable discussions and stakeholder engagement are accurately and comprehensively reflected in the report. Reviewers highlighted that the report effectively captures key takeaways, particularly the importance of open communication, proactive collaboration, and adaptive approaches to addressing evolving challenges.

- Was there consensus on the importance of early engagement?

Yes, there was a strong consensus on the importance of early stakeholder engagement as a crucial factor for successful cross-sector collaboration. Reviewers emphasized that early engagement helps build trust, align priorities, and foster smoother cooperation. Additionally, flexibility in approach was highlighted as essential for responsive decision-making in a dynamic environment.

However, one reviewer suggested that leveraging existing initiatives should not be overlooked, as they provide valuable frameworks, networks, and insights that can complement early engagement and flexibility. Integrating both new approaches and established initiatives could enhance the overall effectiveness of bioeconomy projects.

1.4. Developing Intersectoral Cooperation Procedures

Feedback on the draft procedures:

- Were the steps clear and realistic?

Yes, the procedures are generally clear, well-structured, and logical. Reviewers agree that they provide a practical framework for designing and implementing intersectoral cooperation. The

document is easy to follow and aligns well with real-life scenarios. None of the steps appear unrealistic or impractical. Reviewers noted that the procedures consider common challenges and solutions, making them feasible for implementation. However, some steps, such as pilot-tocommercialization, may require more detailed explanations due to their complexity in realworld applications.

- Were any steps suggested for improvement?

- Clearly define sectoral interests and responsibilities: One reviewer emphasized the need to strictly identify sector-specific interests and responsible experts (including names and salaries) to improve the practicality of further steps.
- Reorder steps for better flow: A modification was suggested to start with "Understanding and defining market demands", followed by "Identifying Potential for Intersectoral Cooperation", and then continuing with the outlined steps.
- Provide more details on complex steps: Expanding on pilot-to-commercialization could help address challenges in real-world applications.
- Include practical tools: A simplified step-by-step infographic or real-world case studies could enhance understanding and illustrate how the procedures apply in practice.
- Coordinator: the role of coordinator (initiator) in the implementation of these steps should be emphasized.

1.5. Conclusions and Recommendations

Participants insights on the conclusions and recommendations:

- Did the conclusions align with the feedback received?

Yes, the conclusions accurately reflect the key points raised by participants. They effectively summarize the importance of cross-sector collaboration, the barriers and challenges identified, and the strategies needed for effective cooperation. The conclusions also emphasize the need for improved communication, policy alignment, and capacity-building efforts to strengthen intersectoral cooperation.

- Additional actionable recommendations proposed, if any.

- Incorporate "sustainable competitiveness" and "decarbonization" as these are among the most pressing global challenges.
- Lobby for the bioeconomy sector to be included as a priority in the new EC Competitiveness Coordination Tool to ensure its role in economic growth and sustainability is fully recognized.
- Ensure the bioeconomy sector is explicitly addressed within the Clean Industrial Deal to integrate its potential into the EU's transition strategy.
- Strengthening competitiveness across sectors should be further emphasized in the recommendations.
- Consider adding a timeline for implementation or a monitoring framework to enhance the practicality of the recommendations and track progress over time.

1.6 Toolbox for Enhancing Cooperation

Feedback on the tools provided:

- Practicality and ease of implementation.

The tools provided are generally practical and well-structured, guiding stakeholders through essential steps such as goal setting, stakeholder mapping, engagement planning, and formalizing commitments. However, some tools may require a certain level of knowledge and experience to be effectively implemented, which could present challenges for less-experienced users.

- Most useful tools identified.

▫ Memorandum of Understanding (MoU) was highlighted as a critical tool, as it serves as a concrete proof of cooperation and ensures long-term commitment.

▫ Stakeholder Mapping and Engagement Planning were also noted as particularly valuable, as they help identify key players, define roles, and establish effective communication strategies. ▫ The SMART Objectives Framework was recognized as a fundamental tool, providing a structured approach to defining clear, measurable, and strategic goals for collaboration.

- Suggestions for additional tools or resources.

▫ While the toolbox is largely comprehensive, a risk management framework could be beneficial for anticipating and mitigating challenges in intersectoral cooperation.

▫ The inclusion of a collaborative project management tool could further enhance effectiveness by helping stakeholders track progress, responsibilities, and deadlines.

2. General Comments and Observations

Summarize additional feedback/comments that reviewers may have shared outside the structured table format. This may include observations on the overall process, methodology, or unforeseen challenges.

One reviewer noted that the views and opinions expressed in their feedback are personal and do not necessarily reflect those of their organization. Additionally, they emphasized that the organization cannot be held responsible for the views provided.

While no other unstructured comments were explicitly mentioned, this highlights the importance of clarifying the distinction between individual and organizational perspectives in the review process.

3. Next Steps and Recommendations

Identify key actions that should be taken based on the national peer review results. These may include revisions to the procedures, additional stakeholder engagement, or further research.

Based on the per review process the following actions (or some of them) could be taken:

▫ **Revisions to the Procedures**

- Incorporate sustainable competitiveness and decarbonization as key challenges to ensure alignment with pressing EU priorities.

- Modify the procedural sequence by making "Understanding and Defining Market Demands" the first step before identifying intersectoral cooperation potential.
- Provide more detailed descriptions for complex steps, such as pilot-tocommercialization, to ensure feasibility in real-world applications.

- **Enhancing Stakeholder Engagement**
  - Strengthen engagement with industry stakeholders, particularly to address their lack of participation due to a perceived absence of direct financial benefits.
  - Ensure that the bioeconomy sector is explicitly addressed within EU competitiveness frameworks, such as the Clean Industrial Deal and Competitiveness Coordination Tool.
  - Highlight the importance of early engagement and flexibility, while also leveraging existing initiatives for added efficiency.

- **Further Research and Development**
  - Explore a risk management framework to help stakeholders anticipate and mitigate common challenges in intersectoral collaboration.
  - Develop a collaborative project management tool to improve tracking of progress and shared responsibilities across sectors.

- **Additional Recommendations for Practical Implementation**
  - Provide real-life case studies and best practices to illustrate how the procedures work in different contexts.
  - Consider creating a step-by-step infographic to simplify complex procedural steps for stakeholders.
  - Define a clearer timeline for implementation and establish a framework for monitoring progress to ensure long-term impact.

4. Conclusions

Indicate the primary takeaways from the peer review. Summarize the overall value and outcomes of the peer review process in advancing intersectoral cooperation for the bioeconomy.

The peer review highlighted the importance of early engagement, clear communication, and structured collaboration in advancing intersectoral cooperation for the bioeconomy. It reinforced the need to address industry involvement while emphasizing the role of sustainability and competitiveness. The feedback provided actionable recommendations to refine procedures, enhance stakeholder engagement and integrate bioeconomy priorities into broader policy frameworks.

Annex 1: Peer review at national level

Please provide the individual results of peer review at national level.

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National peer review report: Czech Republic

CZU & ART

Content

Executive Summary

- Country: Czech Republic
- Institutions involved:

  VSB-Technical University Ostrava

  Forests of the Czech Republic

  IREAS, Institute for Structural Policy (IREAS, Institut pro strukturální politiku, o. p. s.)

  Technical University of Liberec
- Number of stakeholders involved: 4
- Summary of key findings from the peer review:

This report presents the findings of the national peer review process in the Czech Republic, which evaluated challenges, best practices, and recommendations for strengthening intersectoral collaboration in the bioeconomy. The review underscored the need for structured governance, financial support, and knowledge-sharing mechanisms to enhance synergies among key sectors such as agriculture, forestry, fisheries, food, and the chemical industry, ultimately driving sustainable bioeconomic growth.

Experts highlighted the interconnected nature of these sectors and the vital role of research and innovation. The review identified major barriers, including regulatory inconsistencies, cultural silos, resource constraints, market uncertainties, competition from open economies, misaligned stakeholder incentives, and limited data sharing. Addressing these obstacles requires early engagement, knowledge transfer, and leveraging existing initiatives to foster cooperation. The structured "plan-do-check-act" approach was recognized as a practical framework, though experts emphasized the need for stronger financial and institutional support to scale up and commercialize bioeconomic initiatives.

To translate these insights into action, key priorities include improving governance structures, increasing financial support, and fostering digital innovation. Specific recommendations include aligning policies across sectors, strengthening participation frameworks that integrate academia, industry, government, and civil society, developing flexible financing instruments, implementing digital knowledge-sharing platforms and standardized impact assessment tools, and establishing structured mechanisms to track cooperation success.

The peer review process provided valuable insights into both strengths and areas for improvement in fostering intersectoral cooperation. By addressing regulatory, financial, and technological challenges, the bioeconomy can evolve into a more integrated and resilient system, supporting long-term sustainability and economic growth.

1. Findings from Peer Review Process

1.1. Introduction

Experts agree that the introduction presents a solid and well-structured framework on the scope and importance of intersectoral cooperation in the bioeconomy. They highlight its comprehensive nature, emphasizing the interconnection of key sectors such as agriculture, forestry, fisheries, food, and the chemical industry. They also value how the relevance of this cooperation for innovation, sustainability, and resource efficiency is underlined. The fundamental role of research and innovation in generating intersectoral synergies is also recognized.

Participants consider the content innovative and relevant and that it meets the requirements established for this material. However, they suggest that the introduction could have gone into more depth on the specific objectives of the document and the concrete benefits of the proposed approaches. They also recommend including practical examples that facilitate understanding the procedures presented and help illustrate successful cases of intersectoral cooperation and their actual impacts. Suppose the document is primarily addressed to decision-makers. In that case, it might be helpful to expand the analysis of intersectoral cooperation's economic and social dimensions, including estimates of its scope and the resources involved. However, given the level of uncertainty in these projections, their inclusion should be cautiously assessed.

Finally, it is suggested to highlight the socio-economic benefits further and provide concrete tools to strengthen cooperation between sectors, such as policy recommendations or good practices implemented in other regions.

1.2. Identified Barriers and Challenges

Comprehensiveness of barriers:

- Were the barriers and challenges identified sufficient?

The description of the barriers is very comprehensive. While it may seem general at first glance due to the document not focusing on specific areas, this is understandable and appropriate for the approach taken in this section.

The document presents a comprehensive view by listing various barriers, including cultural and institutional barriers, lack of alignment in regulatory frameworks, lack of knowledge across sectors, resource scarcity, market uncertainty, regulatory mismatches, cultural silos, knowledge gaps, resource constraints, and market uncertainties. In addition, it includes sector-specific challenges, reinforcing the robustness and comprehensiveness of the analysis.

- Did the feedback suggest any additional challenges?

This section does not explicitly address the impact of open economies, or the threat posed by products from countries where the bioeconomy is not yet developed. This may affect the competitiveness of companies that adopt cross-sector cooperation approaches within the bioeconomy. While this barrier is indirectly mentioned, it is not discussed about the global economy.

Another unmentioned challenge is the difficulty of aligning incentives between stakeholders with divergent priorities, which may hinder cross-sector cooperation. Furthermore, the role of digitalization and limitations in data sharing as factors that may influence the effectiveness of this cooperation could be further explored.

Furthermore, it does not detail how to address differences in specific regulatory standards between sectors, an aspect that could be key to the practical implementation of the bioeconomy. However, this topic may exceed the scope of the paper.

- Did the findings align with national experience in intersectoral cooperation?

The challenges identified in the paper are consistent with the experts' experience in promoting intersectoral cooperation. In particular, regulatory inconsistencies and the need for more transparent communication between sectors reflect recurring obstacles. Furthermore, unaligned objectives and different priorities between sectors represent common barriers to intersectoral cooperation, and these findings are supported by the experts' knowledge and experience in the field.

1.3. Quadruple Helix Approach

Lessons learned:

- How well were the lessons from round tables and stakeholder engagement reflected?

Experts agree that the document effectively reflects lessons learned from the roundtables and stakeholder engagement. Although some did not participate directly in these activities, they consider that the issues mentioned are well described and that the findings capture key aspects of intersectoral cooperation. The importance of early engagement of stakeholders, clear communication, flexibility, and adaptation to circumstances is highlighted. Furthermore, knowledge transfer and leveraging existing initiatives are essential to strengthen collaboration.

- Was there consensus on the importance of early engagement?

Experts fully agree on the importance of early engagement. They stress that involving stakeholders from the start enables their needs to be identified, builds trust, and ensures that their interests are considered from the outset. Furthermore, they point out that this approach facilitates the alignment of objectives and, together with flexibility, allows collaborations to adapt to emerging challenges and opportunities. Both factors are key to the long-term success of cross-sector cooperation.

1.4. Developing Intersectoral Cooperation Procedures

Feedback on the draft procedures:

- Were the steps clear and realistic?

Experts agree that the procedures for intersectoral cooperation are well structured, presented logically, and outlined in steps from opportunity identification to implementation and scaling up. It is highlighted that the approach follows the "plan-do-check-act" management cycle, with a more

detailed division into the planning phase and an integration of the verification and action phases. Each step is clearly described, providing practical guidance for developing intersectoral cooperation.

However, some aspects may present challenges, especially regarding scaling up and commercialization, which may be difficult to achieve without sufficient financial and institutional support. It is also noted that aligning objectives and resources between stakeholders may not always be straightforward. In addition, specific steps, such as the design of new business models, may require more detailed guidance, as their generalization is complex. Finally, each step's feasibility may depend on each company's size and level of involvement, with institutional support being a key factor, as mentioned in the third step of the procedure.

- Were any steps suggested for improvement?

The experts suggest several improvements to strengthen the document. They recommend including concrete case studies or good practices that illustrate the successful implementation of the procedures. They also propose adding guidance on securing financing, managing risks, and resolving stakeholder conflicts to make the procedures more applicable. In addition, they suggest incorporating specific tools to map synergies between sectors and detailed examples of the implementation of pilot projects. Finally, they highlight that, in addition to institutional support from the State, other entities such as alliances, associations, and spin-offs can play a key role in intersectoral cooperation, which should be mentioned in the document.

1.5. Conclusions and Recommendations

Participants insights on the conclusions and recommendations:

- Did the conclusions align with the feedback received?

Experts agree that the conclusions adequately reflect the main themes of the document, highlighting the importance of intersectoral cooperation, the challenges involved, and the need for strategic planning and supporting policies. The recommendations are acknowledged to be realistic and useful, especially concerning policies, education, and financing. Furthermore, they are valued as concrete steps to strengthen regulatory frameworks, improve financing mechanisms, invest in education, and foster international collaboration.

However, some experts suggest that the order of the recommendations could be adjusted, first emphasizing the need for awareness-raising on the bioeconomy and its benefits before addressing other aspects. It is also proposed that some of the recommended steps be further developed so that they indicate what is needed and how to achieve it effectively.

- Additional actionable recommendations proposed, if any.

More international examples of successful initiatives are suggested to be included as a source of inspiration. A stronger focus on using digital tools and data-sharing platforms to improve the efficiency of cross-sectoral collaboration is also recommended. Another valuable proposal is the development of sector-specific pilot programmes, demonstrating the feasibility of cooperation in different contexts. In addition, the need is raised to establish a structured approach to monitoring

and evaluating progress over time, which would allow for strengthening the long-term impact of these initiatives. In terms of awareness-raising, it would be useful to include examples of good practices that, although they may not be ideal in terms of future objectives, illustrate the potential of the bioeconomy and the benefits it can offer.

1.6. Toolbox for Enhancing Cooperation

Feedback on the tools provided:

- Practicality and ease of implementation.

The tools presented in the document are practical and feasible for implementation in various bioeconomy sectors. Their step-by-step approach allows actors to follow a structured process, facilitating cross-sectoral cooperation. Furthermore, the flexibility of the proposed procedures allows their adaptation to different national and sectoral contexts, increasing their applicability.

Including stakeholder mapping, stakeholder engagement planning, and using SMART objectives demonstrates a well-developed approach to strengthening cooperation. Furthermore, the emphasis on regulatory alignment, knowledge sharing, and creating market opportunities for bioeconomy-based products and processes provides a solid foundation for their implementation. The toolkit offers a useful and inspiring guide to advancing the sector's development.

- Most useful tools identified.

The most useful tools identified include those aimed at the preparation and planning phase, such as formulating initial ideas and approaches. Setting SMART objectives is key to turning visions into concrete actions, providing a clear roadmap, and preventing strategies from remaining mere intentions.

Stakeholder mapping and identification also stand out as an essential tool, as stakeholder engagement is often overlooked despite its fundamental role in the viability of many initiatives. Implementing a Memorandum of Understanding (MoU) on cross-sectoral cooperation in the bioeconomy can be a strategic step to consolidate alliances and progressively adjust objectives.

Another valuable resource is the structured framework for establishing collaboration networks, ensuring that cooperation between various actors is developed on solid foundations. Likewise, developing integrated value chains boosts resource efficiency and fosters innovation by linking different sectors in mutually beneficial relationships. Finally, the recommendation to leverage existing initiatives rather than starting from scratch is especially relevant, as it reduces costs, capitalizes on prior learnings, and accelerates the implementation of collaborative efforts.

- Suggestions for additional tools or resources.

To further strengthen intersectoral cooperation, it would be useful to include innovative tools for identifying and participating key stakeholders beyond the overview in section 1.3 on the “Stakeholder Engagement Plan Template.”

It is recommended that a cost-benefit analysis be considered to assess the viability of initiatives and develop a knowledge-sharing platform to facilitate collaboration between sectors.

Furthermore, implementing collaborative digital platforms would allow actors to share information, monitor progress, and communicate in real time, improving the efficiency of joint work. A repository of best practices with case studies of successful projects could also serve as inspiration and guidance to overcome common challenges.

Another valuable resource would be a financing guide that includes a directory of sources of financial support, such as grants and investments, to boost intersectoral cooperation initiatives. Finally, including standardized impact assessment frameworks would allow for measuring the success of cooperation and continuous adjustment of strategies to achieve better results.

2. General Comments and Observations

Summarize additional feedback/comments that reviewers may have shared outside the structured table format. This may include observations on the overall process, methodology, or unforeseen challenges.

3. Next Steps and Recommendations

The national peer review findings identify some key actions to strengthen intersectoral cooperation in the bioeconomy. One of the first steps recommended is the review and adjustment of current procedures to ensure better alignment between the sectors involved. It is essential to establish monitoring and evaluation mechanisms to measure the effectiveness of the strategies implemented and make adjustments when necessary. This will contribute to creating a more dynamic framework that is adaptable to the needs of the different actors.

In addition, the importance of expanding the participation of stakeholders in cooperation processes is highlighted. To this end, it is recommended that representatives from the private sector, civil society, and academia be more actively integrated in developing and implementing intersectoral strategies. Promoting structured spaces for dialogue will strengthen coordination, generate synergies, and ensure that different perspectives are considered when formulating bioeconomy policies and projects.

Another key aspect identified is the need to deepen research and capacity building. It is suggested that additional studies be carried out on financial and regulatory incentives that facilitate cooperation between sectors and the factors currently limiting their effectiveness. At the same time, it is essential to develop training and capacity-building programs that reinforce the technical and managerial skills of the actors involved, ensuring they have the necessary knowledge to face the bioeconomy challenges.

Innovation and digitalization also play a crucial role in improving intersectoral cooperation. Exploring digital tools can facilitate knowledge exchange and strengthen the coordination between sectors, increasing efficiency in implementing strategies. In this regard, it is recommended to develop shared data platforms and standardized methodologies that objectively evaluate the impact of intersectoral cooperation, ensuring that decisions are based on accurate and up-to-date information.

Finally, the need to strengthen financing and sustainability strategies for bioeconomy initiatives is highlighted. It is crucial to design innovative financial mechanisms that facilitate the scalability of intersectoral projects, ensuring that they have the necessary resources for their implementation and consolidation. Furthermore, integrating sustainable financing approaches will help ensure the long-term viability of these initiatives, allowing cross-sectoral cooperation to generate lasting and practical impacts on the development of the bioeconomy.

4. Conclusions

The national peer review has been a valuable exercise to assess the current state of intersectoral cooperation in the bioeconomy, identifying its strengths and challenges. Through the analysis of experiences and practices, the need for a more integrated and structured approach to strengthen synergies between key sectors such as agriculture, forestry, fisheries, food, and chemical industries has been highlighted.

One of the main results of the review is the recognition that, although there are significant efforts to foster collaboration, regulatory, institutional, and financial barriers that limit its effectiveness persist. The lack of aligned incentives and the fragmentation of policies have been identified as recurring obstacles, highlighting the need for more coordinated strategies and governance mechanisms that facilitate interaction between actors from different sectors.

Likewise, the review process has highlighted the importance of the active participation of all actors in the bioeconomy value chain. Intersectoral cooperation's success has been proven to depend mainly on involving representatives from academia, industry, government, and civil society in a continuous and structured dialogue. This "Quadruple Helix" approach has proven to be key to building trust, aligning interests, and promoting the adoption of innovative and sustainable solutions.

Another relevant finding has been the need to strengthen financing mechanisms and access to resources to promote intersectoral initiatives. The review has highlighted the urgency of developing financial instruments that allow successful projects to be scaled up, facilitate investments in research and technology, and ensure the sustainability of initiatives. Without a clear and sustainable financial strategy, many of the identified opportunities run the risk of being left without effective implementation.

Likewise, the peer review has underlined the value of innovation and digitalization as key tools to improve intersectoral cooperation. It has been identified that implementing digital platforms for shared knowledge, developing standardized impact indicators, and using emerging technologies can significantly contribute to better integration between sectors.

Finally, the review process has allowed us to evaluate the current state of intersectoral cooperation in the bioeconomy and generate a set of practical recommendations for its strengthening. The consolidation of more coherent regulatory frameworks, the strengthening of dialogue between actors, the improvement of financial instruments, and the commitment to innovation and digitalization are key aspects that can enhance the impact of the bioeconomy on sustainable development.

Annex 1: Peer review at national level

General Information

Country:	**Czech Republic**
Institution:	**IREAS, Institute for Structural Policy (IREAS, Institut pro strukturální politiku, o. p. s.)**
Name:	**Jan Macháč**

Feedback Table

Section	Key Points in the Section	Questions for Feedback	Feedback
Introduction	Overview of bioeconomy, importance of intersectoral cooperation	1. Does the introduction clearly define the scope and importance of intersectoral cooperation in the bioeconomy? Is 2. there any information or perspective missing that you believe should be included?	1. The scope and the importance of intersectoral cooperation is very well defined. The introduction very accurately captures the relevance of the problem. 2. I'm not missing anything of importance in this section. In case, that the document would be focused primary on the decision makers, then perhaps it would make sense for me to elaborate more on the economic and social dimensions. For example, give some estimates of how large the scope for cooperation is and how much resources it may involve. But since these are only estimates, given the uncertainty, there may be no point in giving them.
Identified Barriers and Challenges	Common barriers across sectors, challenges specific to stakeholder groups	1. Are the identified barriers and challenges comprehensive? Do 2. you see any specific additional barriers?	1. Very comprehensive. Although at first view the description of barriers may seem to be more general, given that the topic is not focused on specific areas,

Section	Key Points in the Section	Questions for Feedback	Feedback
		3. Do the challenges align with your experience in intersectoral cooperation?	then more detailed descriptions cannot be expected in this section. 2. Within this section I may be missing the problem of open economies and the fact that the bioeconomy is partly threatened by the products from countries where the bioeconomy is not yet developing. These countries threaten the competitiveness of companies that are open for bioeconomy intersectoral cooperation. This barrier is mentioned indirectly (not in connection to global economy) 3. It matches my experience.
Quadruple Helix Approach	Lessons from round tables, importance of engagement and flexibility	1. Are the lessons learned accurately reflected? 2. Do you agree with the emphasis on early engagement and flexibility?	1. Since I did not participate in the activities, I cannot judge what was said. However, from my point of view, the problems mentioned are well described (including reflection of lessons learned). 2. Fully agree. It is very advantageous to include the needs of stakeholders from the very beginning.
Developing Intersectoral Cooperation Procedures	Step-by-step guide to designing and implementing cooperation	1. Are the procedures clear? 2. Are there any steps that seem unrealistic? 3. What improvements would you suggest to enhance the practicality of these steps?	1. yes, it is corresponding very well with the basic management process plan-do-check-act. In this case, phase “Plan” is divided in two steps, and phases “check” and “act” are merged into one. Each step is very well described. 2. The individual steps are described realistically. However, the extent to which they are achieved is partly determined by the size of the company and whether the company will play a more active role or a more passive one. To get started, there must be

Section	Key Points in the Section	Questions for Feedback	Feedback
			institutional support, which is mentioned in step three. 3. From my point of view, in addition to institutional support from the state, other entities such as various alliances, associations and spin-offs can also play a role and should be mentioned.
Conclusions and Recommendations	Summary of findings and suggested actions	1. Do the conclusions reflect the main points that you consider important? 2. Are the recommendations actionable and relevant? 3. Are there any additional recommendations you would propose?	1. I fully agree with the recommendations. They capture very well what is needed. From my point of view, I would have chosen a slightly different order of recommendations; I think that the key is still to raise awareness of the bioeconomy and its benefits. Only after overcoming of the lack of awareness, other recommendations are more relevant. 2. They are relevant. However, with regard to the next steps, it would be good to elaborate on some of them further, so that the formulation of what is needed can also provide ways to achieve it. 3. I would also include examples of good practice in the recommendation related to the raising awareness. While many of the current examples may not be entirely ideal with respect to future goals, they do show the way where the bioeconomy can go along with the benefits provided.
Annex: Toolbox – Practical Solutions to Enhance	Overview of tools for setting SMART objectives, stakeholder mapping, engagement	1. Are the tools provided practical and easy to implement? 2. Which tools do you think will be the most useful for enhancing intersectoral cooperation, and why?	1. The overview presents the tools applicable to the different steps. From my point of view, they are a good inspiration that can greatly help to support the development of the topic.

Section	Key Points in the Section	Questions for Feedback	Feedback
Intersectoral Cooperation	planning and MoUs to support intersectoral cooperation	3. Are there any additional tools or resources you would recommend including in the toolbox?	2. The first three tools are suitable for the preparation and planning phase, when basic ideas, approaches, etc. are formulated. Setting SMART goals is important to translate visions into reality and to set a clear roadmap to avoid visions remaining just visions. At the same time, I also welcome the tools for stakeholder identification and engagement. Involvement of stakeholders is often forgotten. They play a key role in the enforceability of many activities. Memorandum of Understanding (MoU) on Intersectoral Cooperation within Bioeconomy can then be a good step to establish and to deep cooperation leading to the progressive achievement of objectives or their adjustment. 3. From my point of view, I would welcome perhaps more description of innovative tools to include (reach) stakeholders that are only generally described within 1.3 Tool: Stakeholder Engagement Plan Template.

General Information

Country:	Czech Republic
Institution:	**VSB-Technical University Ostrava**
Name:	**Dagmar Juchelkova**

Feedback Table

Section	Key Points in the Section	Questions for Feedback	Feedback
Introduction	Overview of bioeconomy, importance of intersectoral cooperation	1. Does the introduction clearly define the scope and importance of intersectoral cooperation in the bioeconomy? Is 2. there any information or perspective missing that you believe should be included?	1. Yes, the introduction highlights that the bioeconomy encompasses a wide range of sectors such as agriculture, forestry, fisheries, food and chemical industries, and that linking these sectors is key to innovation, sustainability and resource efficiency. The 2. document could identify more concrete examples from practice to make the proposed procedures easier to understand. It may be useful to include successful examples of cooperation from different sectors. However, the scope and content are innovative, adequate and meet the requirements of this material.
Identified Barriers and Challenges	Common barriers across sectors, challenges specific to stakeholder groups	1. Are the identified barriers and challenges comprehensive? Do 2. you see any specific additional barriers? 3. Do the challenges align with your experience in intersectoral cooperation?	1. Yes, they are. The document lists a wide range of barriers, such as cultural and institutional barriers, mismatched regulatory frameworks, lack of knowledge between sectors, limited resources and market uncertainty. 2. It does not describe in detail how to overcome differences in specific regulatory standards between sectors, which could be key for practical application,

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Section	Key Points in the Section	Questions for Feedback	Feedback
			but this fact is probably beyond the scope of the submitted document. 3. Challenges, such as mismatched objectives and different priorities between sectors, correspond to common problems of intersectoral cooperation and are supported by my knowledge.
Quadruple Helix Approach	Lessons from round tables, importance of engagement and flexibility	1. Are the lessons learned accurately reflected? 2. Do you agree with the emphasis on early engagement and flexibility?	1. Yes, the document describes the need for early engagement, clear communication and flexibility, which are key factors from the roundtables 2. This emphasis is beneficial as it fosters trust and ensures that the interests of all parties are taken into account from the outset.
Developing Intersectoral Cooperation Procedures	Step-by-step guide to designing and implementing cooperation	1. Are the procedures clear? 2. Are there any steps that seem unrealistic? 3. What improvements would you suggest to enhance the practicality of these steps?	1. The procedures are structured into clear steps, from identifying opportunities to implementing and testing. 2. Some steps, such as designing new business models, may require more detailed practical guidance for individual cases, their generalization may be very difficult. 3. Add specific tools for mapping synergies between sectors and examples of how to implement pilot projects, e.g. in the form of best practices?
Conclusions and Recommendations	Summary of findings and suggested actions	1. Do the conclusions reflect the main points that you consider important? 2. Are the recommendations actionable and relevant? 3. Are there any additional recommendations you would propose?	1. Yes, the summary highlights key lessons, such as the need for engagement, communication and building on existing initiatives. 2. The recommendations are useful and realistic, particularly the focus on policy, education and financing. 3. It is recommended to include more international examples of successful initiatives for inspiration.

Section	Key Points in the Section	Questions for Feedback	Feedback
Annex: Toolbox – Practical Solutions to Enhance Intersectoral Cooperation	Overview of tools for setting SMART objectives, stakeholder mapping, engagement planning and MoUs to support intersectoral cooperation	1. Are the tools provided practical and easy to implement? 2. Which tools do you think will be the most useful for enhancing intersectoral cooperation, and why? 3. Are there any additional tools or resources you would recommend including in the toolbox?	1. Tools such as SMART objectives, stakeholder mapping and engagement planning are relevant and expertly developed. 2. Stakeholder mapping and SMART objectives seem to be key to collaboration planning and are done with expert knowledge. 3. I would recommend perhaps considering including a cost-benefit analysis tool and a knowledge sharing platform.

General Information

Country:	**Czech Republic**
Institution:	**Forests of the Czech Republic**
Name:	**Mgr. Petra Počtová**

Feedback Table

Section	Key Points in the Section	Questions for Feedback	Feedback
Introduction	Overview of bioeconomy, importance of intersectoral cooperation	1. Does the introduction clearly define the scope and importance of intersectoral cooperation in the bioeconomy? Is 2. there any information or perspective missing that you believe should be included?	Yes, it is complete and understandable.
Identified Barriers and Challenges	Common barriers across sectors, challenges specific to stakeholder groups	1. Are the identified barriers and challenges comprehensive? Do 2. you see any specific additional barriers? 3. Do the challenges align with your experience in intersectoral cooperation?	Yes, this section sums up everything that is important for our point of view.
Quadruple Helix Approach	Lessons from round tables, importance of engagement and flexibility	1. Are the lessons learned accurately reflected? 2. Do you agree with the emphasis on early engagement and flexibility?	Yes, round tables and knowledge transfer is necessary step.

Section	Key Points in the Section	Questions for Feedback	Feedback
Developing Intersectoral Cooperation Procedures	Step-by-step guide to designing and implementing cooperation	1. Are the procedures clear? 2. Are there any steps that seem unrealistic? 3. What improvements would you suggest to enhance the practicality of these steps?	Procedures are clear and realistic with stakeholder support.
Conclusions and Recommendations	Summary of findings and suggested actions	1. Do the conclusions reflect the main points that you consider important? 2. Are the recommendations actionable and relevant? 3. Are there any additional recommendations you would propose?	The conclusions reflect the main points, recommendations are relevant.
Annex: Toolbox – Practical Solutions to Enhance Intersectoral Cooperation	Overview of tools for setting SMART objectives, stakeholder mapping, engagement planning and MoUs to support intersectoral cooperation	1. Are the tools provided practical and easy to implement? 2. Which tools do you think will be the most useful for enhancing intersectoral cooperation, and why? 3. Are there any additional tools or resources you would recommend including in the toolbox?	The tools are practical. The most important is enhancing market opportunities for bio-based products and processes.

General Information

Country:	**Czech Republic**
Institution:	**Technical University of Liberec**
Name:	**Assoc. Prof. Pavla Vrabcová, Ph.D.**

Feedback Table

Section	Key Points in the Section	Questions for Feedback	Feedback
Introduction	Overview of bioeconomy, importance of intersectoral cooperation	1. Does the introduction clearly define the scope and importance of intersectoral cooperation in the bioeconomy? 2. Is there any information or perspective missing that you believe should be included?	1. The document's introduction provides a solid basic framework for intersectoral cooperation in the bioeconomy. It highlights its importance for innovation, sustainability, and economic growth, explaining the key sectors involved in this process (agriculture, forestry, food, chemical industry, etc.). It also mentions the role of research and innovation, which is important for promoting cross-sectoral synergies. However, the introduction could have been more focused on the specific objectives of the document and the benefits of the proposed approaches. 2. The document draws on experiences from seven European countries and offers a broad perspective. It could have been helpful to analyse specific examples of successful intersectoral cooperation and their practical impacts in more detail. It would also have been beneficial to highlight more the socio-economic benefits and specific tools to support cooperation between sectors, for example,

Section	Key Points in the Section	Questions for Feedback	Feedback
			in policy recommendations or good practices in other regions. It is a high-quality and structured document that could be supplemented with more specific examples of how the proposed measures were applied.
Identified Barriers and Challenges	Common barriers across sectors, challenges specific to stakeholder groups	1. Are the identified barriers and challenges comprehensive? 2. Do you see any specific additional barriers? 3. Do the challenges align with your experience in intersectoral cooperation?	1. Yes, the document provides a thorough overview of common barriers, including regulatory misalignment, cultural silos, knowledge gaps, resource constraints, and market uncertainties. It also considers sector-specific challenges, making the analysis well-rounded. 2. One potential missing barrier is the difficulty in aligning incentives among stakeholders with different priorities. The role of digitalization and data-sharing limitations in intersectoral cooperation could be explored further. 3. The challenges described align well with practical experiences in fostering intersectoral cooperation, particularly regarding regulatory inconsistencies and the need for clearer communication across sectors.
Quadruple Helix Approach	Lessons from round tables, importance of engagement and flexibility	1. Are the lessons learned accurately reflected? 2. Do you agree with the emphasis on early engagement and flexibility?	1. Yes, the document effectively summarizes key lessons from intersectoral cooperation, including the importance of stakeholder engagement, clear communication, adaptability, and leveraging existing initiatives. These insights align with best practices in collaboration. 2. Absolutely. Early engagement fosters trust and alignment, while flexibility ensures that partnerships can adapt to evolving challenges and opportunities. Both factors are critical for the long-term success of intersectoral cooperation.

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Section	Key Points in the Section	Questions for Feedback	Feedback
Developing Intersectoral Cooperation Procedures	Step-by-step guide to designing and implementing cooperation	1. Are the procedures clear? 2. Are there any steps that seem unrealistic? 3. What improvements would you suggest to enhance the practicality of these steps?	1. Yes, the procedures are well-structured and logically outlined, providing a step-by-step guide from identifying cooperation potential to implementation and scaling. 2. Some aspects, such as scaling up and commercialization, may be challenging without sufficient financial and institutional support. The assumption that all stakeholders can easily align their goals and resources may also be optimistic. 3. The document could include more concrete case studies or best practices to illustrate successful implementation. Adding guidance on securing funding, managing risks, and handling conflicts between stakeholders would make the procedures more actionable.
Conclusions and Recommendations	Summary of findings and suggested actions	1. Do the conclusions reflect the main points that you consider important? 2. Are the recommendations actionable and relevant? 3. Are there any additional recommendations you would propose?	1. Yes, the conclusions effectively summarize the document's key themes, emphasizing the importance of intersectoral cooperation, the challenges involved, and the need for strategic planning and supportive policies. They reinforce the necessity of stakeholder engagement, regulatory alignment, and sustainable innovation, which are crucial for successful bioeconomy collaboration. 2. Absolutely. The recommendations provide concrete steps that stakeholders can take, such as strengthening policy frameworks, enhancing funding mechanisms, investing in education, and promoting international collaboration. They are well-aligned with the identified challenges and

Section	Key Points in the Section	Questions for Feedback	Feedback
			offer practical solutions to facilitate effective cooperation. 3. One potential addition could be a stronger focus on digital tools and data-sharing platforms to enhance collaboration efficiency. Another helpful recommendation would be the development of sector-specific pilot programs that demonstrate the viability of intersectoral cooperation in different contexts. A structured approach to monitoring and evaluating progress over time could further strengthen the long-term impact of these initiatives.
Annex: Toolbox – Practical Solutions to Enhance Intersectoral Cooperation	Overview of tools for setting SMART objectives, stakeholder mapping, engagement planning and MoUs to support intersectoral cooperation	1. Are the tools provided practical and easy to implement? 2. Which tools do you think will be the most useful for enhancing intersectoral cooperation, and why? 3. Are there any additional tools or resources you would recommend including in the toolbox?	1. Yes, the tools outlined in the document appear to be both practical and feasible for implementation across different sectors within the bioeconomy. The step-by-step approach ensures that stakeholders can follow a structured process, making navigating the complexities of intersectoral cooperation easier. The emphasis on stakeholder engagement, knowledge-sharing platforms, and regulatory alignment provides a solid foundation for practical application. Additionally, the proposed procedures allow for flexibility, which can be adapted to different national and sectoral contexts, further enhancing their usability. 2. One of the most valuable tools is the structured framework for establishing partnerships and collaborative networks, as cooperation between diverse stakeholders is crucial for success. The emphasis on stakeholder engagement from the

Section	Key Points in the Section	Questions for Feedback	Feedback
			beginning, clear communication strategies, and alignment of common objectives helps to create a strong foundation for long-term collaboration. Another highly useful tool is the development of integrated value chains, which encourages resource efficiency and innovation by linking different sectors in mutually beneficial ways. The recommendation to leverage existing initiatives rather than starting from scratch is particularly important, as it helps to minimize costs, build on past successes, and accelerate the implementation of cooperative efforts. 3. To strengthen intersectoral cooperation's effectiveness further, I suggest incorporating digital collaboration platforms where stakeholders can share knowledge, track progress, and communicate in real time. A best-practice repository with case studies from successful cooperation projects could serve as an inspiration and provide practical insights into overcoming common challenges. Another valuable addition would be specific funding guidance, such as a directory of financial resources, grants, and investment opportunities that could support intersectoral initiatives. Lastly, including standardized impact assessment frameworks would help stakeholders measure the success of their cooperation efforts and continuously refine their strategies for better outcomes.

Interreg CENTRAL EUROPE

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BIOECO-UP

A1.3 Transnational testing of intersectoral cooperation procedures

D 1.3.2 Transnational peer review of draft procedures for bioeconomy intersectoral cooperation

National peer review report: Hungary

Bay Zoltan Nonprofit Ltd for Applied Research

Content

Executive Summary

Provide an overview on the national peer review process and its objectives. Summarize key findings from the review and outline the most significant conclusions:

- Country: Hungary
- Institutions involved:
  - **Hungarian Chamber of Agriculture;**
  - **Óbuda University, Department of Business Sciences and Digital Skills,**
  - **Óbuda University, Keleti Károly Faculty of Business and Management**
- Number of stakeholders involved: 3
- Summary of key findings from the peer review:

1. Findings from Peer Review Process

This section will summarize the feedback received in each section from the reviewers. Refer to the corresponding sections in the peer review table template.

1.1. Introduction

Summary of participant's feedback on the introduction of the procedures, including:

Clarity of scope and importance of intersectoral cooperation

Reviewers agree that both the scope and the importance of intersectoral cooperation – somehow co-operation – is clearly defined, its importance is effectively emphasized and this highly important and timely issue is well addressed in the introduction. It is highlighted that the integration of different sectors is essential for maximizing the potential of the bioeconomy, enabling the efficient use of resources, the development of new products and services, and the creation of sustainable value chains.

When narrowing down the findings to the sector, it needs to be mentioned that the field of bioeconomy is not widely known, particularly in the countries where the roundtables have taken place. This chapter discusses the concept of the bioeconomy and its overarching paradigm.

Suggestions for additional perspectives and missing elements, if any

One of the reviewers mentioned that the introduction rather focuses on the general aspects of intersectoral cooperation while not always specifying whether there are any **bioeconomy-specific features**. The reviewer thinks it might worth adding references to the specificities and bottlenecks in intersectoral cooperation in the field of bioeconomy. That is why it is suggested explaining one or more of the following items in the introduction:

- delimitation between bioeconomy and circular economy;

- the characteristics and importance of value chains in bioeconomy;
- maybe there is no one-size-fits-all solution, reference to the national/regional/local level since bioeconomy might often occur in a sustainable way on the local level;
- more detailed information about the stakeholders involved in the focused interviews and quadruple helix round tables (not only the list of countries, but also the sector, the organization type etc.);
- a summary of evidence-based insights/good practices.

The other reviewer would like to see more emphasis on **the influence of the different sectors on each other**. It is stated that while highlighting specific sectors is valuable, as the introduction rightly does, it is crucial to stress that all sectors can influence their functioning. These highlighted sectors should be considered flagship sectors within the bioeconomy theme, but all other sectors are also connected to them, either directly or indirectly, at some level. Today, sustainability is no longer the responsibility of just one or a few sectors—all sectors can contribute. There is no doubt that cooperation must be strengthened. The introduction makes this clear and underscores the benefits of collaboration, particularly in areas such as sustainability, resource efficiency, innovation, and economic growth. It is essential to emphasize that innovation plays a key role in shaping the bioeconomy and should be more closely aligned with it. Additionally, the state of social capital in each country should be considered, as its level significantly influences the potential for cooperation in a given region.

Another reviewer states that while discussing the importance of intersectoral cooperation, the potential risk that arises from the - often - **competitive status of the value chain actors** is overlooked.

1.2. Identified Barriers and Challenges

Comprehensiveness of barriers:

Were the barriers and challenges identified sufficient?

Reviewers agree that the identified barriers and challenges are comprehensive and well defined in the draft document, though the way of reducing the risk coming from the undefined finance, is not highlighted. The problems and obstacles identified are relevant to most countries. Indeed, differences in regulations, institutional frameworks, and resource constraints pose significant challenges.

Did the feedback suggest any additional challenges?

One reviewer identified a challenge, but provided solutions to it as well. He finds it is important to highlight that the **bioeconomy remains a relatively unfamiliar concept** among economic operators. While many have heard of it, they often lack a clear understanding of how it functions or what it truly entails. This underscores the crucial role of education in raising awareness and fostering expertise in the field. The text rightly suggests that research institutes and research centres play a key role and should collaborate more closely with industry. While the need for

increased focus on bioeconomy-related research is acknowledged, a critical question remains: What about the training of professionals? Where are the talents who truly understand this field, and how is the next generation being educated? Training programmes must be designed to equip individuals with the necessary skills, while younger generations should be encouraged and motivated to pursue careers in this sector.

While this chapter effectively outlines the key challenges, it is worth considering whether these **challenges are interrelated**. Do they stem from a common root cause? Exploring the underlying factors that have led to these problems could add further depth to the analysis. Additionally, while the chapter highlights the difficulties faced by various stakeholders, it does not delve deeply into the reasons behind these struggles. Important questions remain: What has led to the crisis of confidence among economic operators, and how can it be mitigated? How do regulatory inconsistencies contribute to market uncertainties? Furthermore, the discussion should extend to the role of innovation, examining the risks and uncertainties associated with it in the context of the bioeconomy. The text could also address the cultural differences and varying objectives across sectors that make cooperation challenging.

The key question is how these obstacles can be overcome. To what extent does a lack of trust contribute to these difficulties, and could it be a barrier to effective collaboration? Another important consideration is the **role of digitalisation** in facilitating cooperation. Effective communication, information sharing, data storage, and overall technological integration all require strong digital capabilities. What kind of IT infrastructure or information systems are available to stakeholders in the bioeconomy? What digital tools are commonly used in organic farming? Additionally, greater attention should be given to **workforce skills**, **education systems**, and the supply of trained professionals in the bioeconomy sector. **Financial constraints** are another recurring issue. However, the problem is not necessarily the availability of resources but rather the lack of targeted funding for specific cooperative initiatives. This aspect needs to be explored in greater detail. More opportunities should be created to promote intersectoral cooperation and win-win financial strategies. The problems and challenges outlined in this chapter are real and significant. Cultural, regulatory, and institutional differences can act as barriers to cooperation. The science and education sectors should take on a more active role in addressing these challenges, while economic policy should focus on strengthening social capital. The bioeconomy needs greater visibility and promotion to ensure wider societal engagement. Presenting best practices and successful case studies of cooperation could be beneficial. Furthermore, the chapter should explore motivational factors and market incentives in greater depth. These aspects deserve thorough analysis to identify effective solutions.

Some additional barriers were also mentioned: industrial silos, policy-making silos, governance silos, funding silos, etc. The good practices reported in the field of Regulatory Science could be exploited (how to close the gap between science and policy in bioeconomy, bioeconomy-specific insights); which could even help the targeting and development of public-funded research calls, a better communication between policy-makers who can “order” the research for developing evidence-based policy and the researchers who should carry out targeted (not blue-sky) research that will have a positive effect on public issues. And additional barrier can also be the scarcity of input materials and/or the distance between the source of input materials and the utilization site (that might easily render bioeconomy unsustainable). On the governmental side the cycles of national elections might render the development of long-term strategies difficult.

The last barrier mentioned is the lack of trust among the participants of the value chain.

Did the findings align with national experience in intersectoral cooperation?

According to the Hungarian experts, challenges and barriers listed are in line with their experience, however they identified some more (see previous sub-chapter) or added some more layers to the already identified ones.

1.3.Quadruple Helix Approach

Lessons learned:

How well were the lessons from round tables and stakeholder engagement reflected?

The answer for this question was contradictory among the reviewers. One says that it cannot be judged without taking part in/having the verbatim of the round table sessions within the quadruple helix approach. The other states that they are clear. It is important to develop a common language and understanding among stakeholders from different sectors, clarifying technical terms, operational procedures and strategic objectives. This will ensure that all par□es are on the same page.

Was there consensus on the importance of early engagement?

There was an absolute consensus on the importance of early engagement among the reviewers. They agree with the emphasis on early engagement and flexibility and the importance of getting informed the participants as early as it can shorten the time takes to convince the parties involved.

One reviewer states that emphasizing the early and inclusive involvement of stakeholders is an area where the education system can already play a significant role. In the deeper evaluation of this chapter, the reviewer mentions that this part highlights the importance of communication, flexibility, and adaptability, all of which are indeed crucial competencies. Additionally, it acknowledges that existing initiatives could be expanded upon. While this is certainly true, such efforts should be undertaken on a much larger scale. The chapter rightly identifies flexibility as an essential factor. However, a key question arises: From whom, specifically, is flexibility expected, and in what form? The concept of flexibility differs depending on whether it applies to institutions or businesses. It is crucial to clarify who should be expected to demonstrate flexibility and adaptability. Furthermore, it is important to consider the potential limitations of flexibility and adaptability and explore strategies for overcoming them. The emphasis on early stakeholder involvement and adaptability is well-founded. Engaging stakeholders at an early stage allows for the identification and resolution of conflicting interests before they become obstacles to cooperation. An inclusive approach not only strengthens stakeholder engagement but also enhances the long-term sustainability of intersectoral initiatives. Finally, fostering an innovative approach is essential for the development of the bioeconomy. The key question is: How can this be facilitated? Innovation inherently requires creativity, critical thinking, diverse perspectives, flexibility, and adaptability. If the goal is to truly advance bioeconomy development, it is essential

to cultivate an innovative mindset among stakeholders. Achieving this will require targeted instruments, appropriate incentives, strong support structures, and long-term strategic planning.

Some suggestions arrived as well for considering also the following factors:

- Which party should lead the process among the stakeholders?
- Which party could serve as the "ignition" for making the process start?
- Should stakeholders be included in the same way, at the same grade?
- Is it sure that stakeholders can express their needs properly? If not, how to help them in this?
- How to ensure the representation of the different interests of the different stakeholders?
- What will be the leverage point for the stakeholders, in other words, why would the stakeholders spend their time on this process?

1.4. Developing Intersectoral Cooperation Procedures

Feedback on the draft procedures:

Were the steps clear and realistic?

Reflections to this part were different. According to one reviewer, steps are clear and there are no unrealistic ones.

Other reviewer rather finds this chapter as a list of relevant items/factors than a step-by-step procedure that could be followed like a "cookbook". As for the unrealistic nature of the mentioned factors she says that they should be judged on the local/regional level, where the actual bioeconomy processes occur. On the EU level one might do a stock of steps that should be further refined and tailored to the geospatial level of the actual processes. Maybe one of the biggest factors that might lead to the perception that one or more steps are unrealistic is the system of adequate interests, possible gains, financial resources, and timeframe that might be bottlenecks not only in the private sector but also in the public sector.

According to the third reviewer, this chapter offers valuable insights into identifying opportunities for collaboration, developing synergies, and testing new approaches. These are all useful recommendations, and in some cases, practical advice is provided to enhance understanding.

Were any steps suggested for improvement?

To resource mapping one reviewer would recommend to add mapping the ability to provide added value. She would also consider not only raw materials but also the input ones as well. She would also consider the limitations of bioeconomy and the needs for targeted standards (e.g. the BSE outbreak was in a way a result of a process that falls within the remit of bioeconomy/circular economy; to prevent such public health crisis clear animal health standards would have been needed).

The other reviewer lists certain aspects could be further elaborated. One key issue that remains unaddressed is how businesses of different sizes can bridge gaps in funding and resources. A crucial question is how these businesses should begin the process: What should be their first step, and who will guide them in taking those initial steps? Additionally, who will support them in implementing pilot projects? While the overall process is clear, some details still require further clarification. Another critical aspect that should be explored is the extent of regulatory and bureaucratic barriers in different countries and how they can be minimized. The chapter does not sufficiently address the variations in legal frameworks across sectors or the degree of bureaucratic obstacles involved. Furthermore, a more in-depth discussion of the differing interests of stakeholders within each sector would be beneficial. The priorities of a university, for instance, differ significantly from those of a local government or a private business. Where interests diverge, there is a high potential for tensions, conflicts, and disagreements. A key question is how these conflicts can be managed effectively. What conflict resolution strategies could be implemented, and can a structured framework for conflict management be developed? Based on these considerations, the following practical steps could be recommended: presenting a more detailed financial model to address funding challenges, identifying and addressing regulatory barriers, introducing conflict management mechanisms or mediation strategies to facilitate cooperation between stakeholders with differing interests, developing strategic steps to reduce bureaucratic hurdles, establishing measurable key performance indicators (KPIs) to track progress, implementing continuous evaluation and feedback monitoring mechanisms. Ultimately, fostering trust, openness, and reliability among stakeholders remains a fundamental element in building successful cooperation.

1.5.Conclusions and Recommendations

Participants insights on the conclusions and recommendations:

Did the conclusions align with the feedback received?

Reviewers agree that the conclusions reflect the main, macroscopic points that are important. Recommendations are relevant, however, their exact nature (whether they are actionable or not) can only be judged on the geographical level where the given bioeconomy process occurs.

In a deeper analysis it has been found that conclusions and proposals are always a crucial part of a document, as they help define the direction for future development. The recommendations and suggestions presented in this document are all significant, with points on innovation and education being particularly valuable. Additionally, there is a clear need for improvement in areas such as funding, regulatory frameworks, knowledge sharing, and sustainability. The proposals are wellstructured and highly relevant to bioeconomy cooperation. Most of the recommendations are feasible, but their successful implementation depends on the right institutional and economic policy framework. It is important to note that some elements may require a longer timeframe to materialize—such as international harmonization of regulations or the promotion of global cooperation. These aspects must be supported by long-term strategic plans with clearly defined milestones, ensuring a gradual and structured approach to progress. Similarly, addressing regulatory challenges, reducing bureaucratic barriers at the international level, and fostering trust

among stakeholders will require sustained coordination over time. To achieve this, it is essential to establish the necessary institutional and technological infrastructure to support effective longterm implementation. Moreover, key tools such as feedback mechanisms, digital and technological solutions, pilot projects, and social studies—as previously mentioned—can play a vital role in facilitating cooperation.

Additional actionable recommendations proposed, if any.

Only few recommendations were proposed.

One reviewer states that the conclusions and recommendations section, while valuable, is relatively brief. Given the importance of this topic, there is significant potential to expand on possible solutions in greater depth. It is assumed that further research and analysis will be conducted to refine and elaborate on these proposals.

The other reviewer adds that based on the draft document she cannot see the references and the data that would support the following statement (significant potential) in the Conclusions chapter: "The analysis conducted…has showed both the significant potential…". For such a statement I would recommend adding more evidence, among others data to the text.

Another advice is that more focus should go on recommendation on deepening the involvement of participating parties and communicating the individual participation benefits of the project and the actors (supporting the benefits with appropriate utility calculations).

1.6.Toolbox for Enhancing Cooperation

Feedback on the tools provided:

Practicality and ease of implementation.

The theoretical background provided in the draft toolbox was found relevant, practical, and evidence-based. However, the factors that might enhance/hinder their implementation mainly depends on the geographical area where the given bioeconomy process occurs.

The tools presented here appear to be applicable, but their effectiveness ultimately depends on the expertise of those who use them. It is crucial that these tools are operated by professionals with the necessary knowledge and that the results generated by the models are interpreted by qualified experts.

The listed tools are commonly used in strategic planning, relatively easy to implement the concept of SMART (Specific, Measurable, Achievable, Relevant, and Time-Bound) objectives. Higher focus should go on the way to transfer the aims into „figures", so in some cases the usage of GANTT diagram, design methods also can make easier the implementation.

The Stakeholder Mapping is one of the first step to design the network and connections between the parties of the value chain. The method can be applied appropriately according to the

connection diagram and table provided. If the communication between the parties is iterative, in time, the Stakeholder Engagement Plan will work.

The Memorandum of Understanding on intersectoral cooperation in the field of bioeconomy is a necessary statement, but cannot be considered as a „real tool“, as it is not practical and might be of interest only for some types of stakeholders. In case of certain stakeholder types a MoU could even be considered as redundant/superfluous/risky.

Most useful tools identified.

Stakeholder mapping was found to be the most practical tool since it might be standardized also on the EU level, and can serve as a base for any further, national/regional/local level analysis.

Suggestions for additional tools or resources.

Cohen model (including risk management) was suggested by one of the experts.

Some suggestions for improvement are given for the listed tools as well:

One reviewer has some comments for the proposed stakeholder mapping tool and mentions that the guidance for identifying the preferred communication (vs. reference to the stakeholder mapping on page 12) could not be found. She suggests examining also the preferred, concrete communication channels and language for each stakeholder group, their preferred spokesman/spokeswoman/interlocutor etc. She also gives ideas on how to incentivize the different stakeholder groups to take part in the mapping, in the actual bioeconomy cooperation etc. If stakeholders are expected to invest their time, knowledge etc. in the mapping process etc., they might expect financial/in-kind/etc. compensation.

Related to the Memorandum of Understanding, it is recommended adding a disclaimer that due to the differences of the relevant legislation among Member States/their regions, a local legal control is needed before applying the provided template and the authors do not take any responsibility, neither legal, nor other, for the application of the template provided.

The importance of expertise must continue to be emphasized. There is no doubt that the tools and processes discussed in the text can contribute to fostering cross-sectoral cooperation. However, a key question remains: how can these stakeholders be brought together, encouraged to engage in dialogue, and motivated to recognize the potential benefits of collaboration? Tools such as SMART goal setting, stakeholder mapping, and stakeholder engagement plans are all straightforward and valuable for project management and stakeholder interaction. Nonetheless, further exploration is needed to determine how software and technical support can be provided to stakeholders, what additional digital solutions can facilitate collaboration, how experiencesharing should be structured, and which IT applications, platforms, or systems can best support cooperation. The role of education and innovation has already been highlighted in previous sections, but their promotion requires additional tools and proposals, as does the development of social capital and trust among economic operators. One of the most effective tools for this purpose is stakeholder mapping, which not only identifies key stakeholders but also clarifies their roles in collaboration. Beyond simple identification, models should be employed that analyze

stakeholders' contributions and the value created for them. It is essential to determine what level of collaboration is necessary to generate mutual benefits. If required, new models should be developed, research conducted, and networks analyzed. A stakeholder map can help actors from different sectors understand who the key partners are and what roles they play in achieving successful cooperation. A stakeholder-interest analysis matrix can also be beneficial, but the primary question is: how much value does collaboration bring to each stakeholder? If the potential benefits can be clearly demonstrated, stakeholders will be more willing to engage in cooperation. While a structured framework could be useful, it may not be as practical for smaller businesses or less experienced organizations that lack the capacity for long-term planning. Given the volatility of today's business environment, long-term planning is often challenging, as numerous unpredictable factors can influence the path to a given goal. Therefore, a rigid framework may not be widely adopted by all stakeholders.

Additional substantive proposals could enhance the effectiveness of cross-sectoral cooperation. First, greater emphasis should be placed on risk management, as such collaborations inherently involve risks. Identifying, assessing, and mitigating these risks should be a priority. Similarly, project management should receive more attention, as it plays a crucial role in guiding the establishment and execution of cooperation initiatives throughout their entire life cycle. It is recommended that stakeholders acquire more advanced project management knowledge and skills. Moreover, the development of digital competencies is essential. Enhancing stakeholders' proficiency in digital tools, online platforms, applications, and database management will facilitate closer and more efficient collaboration. Strengthening these digital capabilities will enable stakeholders to establish and maintain effective communication, streamline data sharing, and improve overall cooperation within and across sectors.

2. General Comments and Observations

Overall, the reviewers found the document valuable, however suggested some improvement or some in-depth analysis of some parts of the document. There comments were added to the relevant sections, although some of their reflections had a more general nature worth considering.

3. Next Steps and Recommendations

Key actions proposed by the Hungarian reviewers should be the following:

- analysing the suggested points in the Introduction part and adding the missing information • examining the role of digitalisation, as this point of view is missing
- checking the provocative questions listed by the reviewers and adding the answers if possible or relevant
- as many comments and critics were addressed to the Toolbox chapter, we recommend reconsidering it

4. Conclusions

According to the reviewers from Hungary, the document is well-designed and deals with very important aspects of advancing intersectoral cooperation for the bioeconomy, however some finetuning is essential to be carried out.

Annex 1: Peer review at national level

Please provide the individual results of peer review at national level.

Dear Madam/Sir,

Thank you for agreeing to provide feedback on the draft procedures for bioeconomy intersectoral cooperation. This document outlines guidelines designed to enhance collaboration across various sectors within the bioeconomy. Your expertise is invaluable in ensuring that these procedures are practical, relevant, and effective.

We have created a brief table with targeted questions related to specific sections of the document. Your insights on these questions will help us refine the procedures and make them more applicable to real-world scenarios. Please take a moment to review the table and provide your feedback. There's no need to edit the document directly—your responses in the table will be sufficient.

Thank you for your time and contributions!

BIOECO-UP team

Instructions for Reviewers

- Please provide the information regarding the country and institution you represent.
- Please provide concise answers to the questions in the table.
- If you have any general comments or suggestions, feel free to include them in a separate section below the table.
- There is no need to use track changes or directly edit the document; your feedback in the table is sufficient.

General Information

Country:	**Hungary**
Institution:	**the review is based on the experience gained during working for the Hungarian Chamber of Agriculture (20218-2023)**
Name:	**Andrea Gyorffy**

Feedback Table

Section	Key Points in the Section	Questions for Feedback	Feedback
Introduction	Overview of bioeconomy, importance of intersectoral cooperation	1. Does the introduction clearly define the scope and importance of intersectoral cooperation in the bioeconomy? 2. Is there any information or perspective missing that you believe should be included?	1. Yes, the introduction clearly defines the scope and importance of intersectoral cooperation in bioeconomy. However, the introduction rather focuses on the general aspects of intersectoral cooperation while not always specifying whether there are any bioeconomy-specific features. I think it might worth adding references to the specificities and bottlenecks in intersectoral cooperation in the field of bioeconomy. 2. I suggest explaining one or more of the following items in the introduction: delimitation between bioeconomy and circular economy; the characteristics and importance of value chains in bioeconomy; maybe there is no one-size-fits-all solution, reference to the national/regional/local level since bioeconomy might often occur in a sustainable way on the local level; more detailed information about the stakeholders involved in the focused interviews and quadruple helix round tables (not only the list of countries, but also the sector, the organization type etc.); a summary of evidence-based insights/good practices.
Identified Barriers and Challenges	Common barriers across sectors, challenges specific to stakeholder groups	1. Are the identified barriers and challenges comprehensive? 2. Do you see any specific additional barriers? Do 3. the challenges align with your experience in intersectoral cooperation?	1. The identified barriers and challenges are comprehensive in the draft document. 2. Additional barriers might be: industrial silos, policymaking silos, governance silos, funding silos, etc. The good practices reported in the field of Regulatory Science could be exploited (how to close the gap between science and policy in bioeconomy,

			bioeconomy-specific insights); which could even help the targeting and development of public-funded research calls, a better communication between policy-makers who can "order" the research for developing evidence-based policy and the researchers who should carry out targeted (not blue-sky) research that will have a positive effect on public issues. And additional barrier can also be the scarcity of input materials and/or the distance between the source of input materials and the utilization site (that might easily render bioeconomy unsustainable). On the governmental side the cycles of national elections might render the development of long-term strategies difficult.
Quadruple Helix Approach	Lessons from round tables, importance of engagement and flexibility	1. Are the lessons learned accurately reflected? 2. Do you agree with the emphasis on early engagement and flexibility?	1. It cannot be judged without taking part in/having the verbatim of the round table sessions within the quadruple helix approach. 2. I agree with the emphasis on early engagement and flexibility, while I would suggest considering also the following factors: Which party should lead the process among the stakeholders?; Which party could serve as the "ignition" for making the process start?; Should stakeholders be included in the same way, at the same grade?; Is it sure that stakeholders can express their needs properly? If not, how to help them in this?; How to ensure the representation of the different interests of the different stakeholders?; What will be the leverage point for the stakeholders, in other words, why would the stakeholders spend their time on this process?

Developing Intersectoral Cooperation Procedures	Step-by-step guide to designing and implementing cooperation	1. Are the procedures clear? 2. Are there any steps that seem unrealistic? 3. What improvements would you suggest to enhance the practicality of these steps?	1. I rather find this chapter as a list of relevant items/factors than a step-by-step procedure that could be followed like a "cookbook". Not knowing the exact expectations of the funding body, I do not feel entitled to give more insights on this point. 2. The unrealistic nature of the mentioned factors should be judged on the local/regional level, where the actual bioeconomy processes occur. On the EU level one might do a stock of steps that should be further refined and tailored to the geospatial level of the actual processes. Maybe one of the biggest factors that might lead to the perception that one or more stapes are unrealistic is the system of adequate interests, possible gains, financial resources, and timeframe that might be bottlenecks not only in the private sector but also in the public sector. 3. To resource mapping I would recommend to add mapping the ability to provide added value. I would also consider not only raw materials but also the input ones as well. I would also consider the limitations of bioeconomy and the needs for targeted standards (e.g. the BSE outbreak was in a way a result of a process that falls within the remit of bioeconomy/circular economy; to prevent such public health crisis clear animal health standards would have been needed).

Conclusions and Recommendations	Summary of findings and suggested actions	1. Do the conclusions reflect the main points that you consider important? 2. Are the recommendations actionable and relevant? 3. Are there any additional recommendations you would propose?	1. Yes, the conclusions reflect the main, macroscopic points that I consider important. 2. The recommendations are relevant, however, their exact nature (whether they are actionable of not) can only be judged on the geographical level where the given bioeconomy process occurs. 3. Based on the draft document I cannot see the references and the data that would support the following statement (significant potential) in the Conclusions chapter: "The analysis conducted…has showed both the significant potential…". For such a statement I would recommend adding more evidence, among others data to the text.
Annex: Toolbox – Practical Solutions to Enhance Intersectoral Cooperation	Overview of tools for setting SMART objectives, stakeholder mapping, engagement planning and MoUs to support intersectoral cooperation	1. Are the tools provided practical and easy to implement? 2. Which tools do you think will be the most useful for enhancing intersectoral cooperation, and why? 3. Are there any additional tools or resources you would recommend including in the toolbox?	1. I think that the theoretical background provided in the draft toolbox is relevant, practical, and evidencebased. The factors that might enhance/hinder their implementation mainly depends on the geographical area where the given bioeconomy process occurs. 2. I think stakeholder mapping is the most practical tool since it might be standardized also on the EU level, and can serve as a base for any further, national/regional/local level analysis. 3. I would like to mention that in the stakeholder mapping I could not find a guidance for identifying the preferred communication (vs. reference to the stakeholder mapping on page 12). I would suggest examining also the preferred, concrete communication channels and language for each stakeholder group, their preferred

			spokesman/spokeswoman/interlocutor etc. I would also give ideas on how to incentivize the different stakeholder groups to take part in the mapping, in the actual bioeconomy cooperation etc. If stakeholders are expected to invest their time, knowledge etc. in the mapping process etc., they might expect financial/in-kind/etc. compensation. I think the MoU tool is not practical and might be of interest only for some types of stakeholders. In case of certain stakeholder types a MoU could even be considered as redundant/superfluous/risky. As for providing a template for MoU: I would recommend adding a disclaimer that due to the differences of the relevant legislation among Member States/their regions, a local legal control is needed before applying the provided template and the authors do not take any responsibility, neither legal, nor other, for the application of the template provided.

Dear Madam/Sir,

Thank you for agreeing to provide feedback on the dra procedures for bioeconomy intersectoral coopera on. This document outlines guidelines designed to enhance collabora on across various sectors within the bioeconomy. Your exper se is invaluable in ensuring that these procedures are prac cal, relevant, and effec ve.

We have created a brief table with targeted ques ons related to specific sec ons of the document. Your insights on these ques ons will help us refine the procedures and make them more applicable to real-world scenarios. Please take a moment to review the table and provide your feedback. There's no need to edit the document directly—your responses in the table will be sufficient.

Thank you for your me and contribu ons!

BIOECO-UP team

Instruc ons for Reviewers

- Please provide the informa on regarding the country and ins tu on you represent.
- Please provide concise answers to the ques ons in the table.
- If you have any general comments or sugges ons, feel free to include them in a separate sec on below the table.
- There is no need to use track changes or directly edit the document; your feedback in the table is sufficient.

General Informa on

Country:	Hungary
Ins tu on:	Óbuda University
Name:	Prof. Dr. TAKÁCS-GYÖRGY Katalin

Feedback Table

Sec on	Key Points in the Sec on	Ques ons for Feedback	Feedback
Introduc on	Overview of bioeconomy, importance of intersectoral coopera on	1. Does the introduc on clearly define the scope and importance of intersectoral coopera on in the bioeconomy? 2. Is there any informa on or perspec ve missing that you believe should be included?	1. Both the scope and the importance of intersec onal coopera on – somehow co-ope on – is clearly defined in introduc on. It is highlighted that the integra on of different sectors is essen al for maximizing the poten al of the bioeconomy, enabling the efficient use of resources, the development of new products and services, and the crea on of sustainable value chains. 2. While discussing the importance of intersectoral coopera on, the poten al risk that arises from the - o en - compe ve status of the value chain actors is overlooked.
Iden fied Barriers and Challenges	Common barriers across sectors, challenges specific to stakeholder groups	1. Are the iden fied barriers and challenges comprehensive? 2. Do you see any specific addi onal barriers? Do 3. the challenges align with your experience in intersectoral coopera on?	1. The iden fied barriers and challenges are well defined, though the way of reducing the risk coming from the undefined finance, is not highlighted. 2. Barrier of the lack of trust among the par cipants of the value chain. 3. Yes, including the formerly men oned one.
Quadruple Helix Approach	Lessons from round tables, importance of engagement and flexibility	1. Are the lessons learned accurately reflected? 2. Do you agree with the emphasis on early engagement and flexibility?	1. Yes, they are clear. It is important to develope a common language and understanding among stakeholders from different sectors, clarifying technical terms, opera onal procedures and strategic objec ves. This will ensure that all par es are on the same page. 2. Yes, to get informed the par cipants as early as it is possible can shorten the me takes to convince the par es involved.

Developing Intersectoral Coopera on Procedures	Step-by-step guide to designing and implemen ng coopera on	1. Are the procedures clear? 2. Are there any steps that seem unrealis c? What 3. improvements would you suggest to enhance the prac cality of these steps?	1. Part, speaking of "Developing Intersectoral Coopera on Procedures" is clearly wri en, the chain of steps that builds on each other can be implemented if the resources are available. 2. I have not found any unrealis c step. 3. I do not have any other improvement.
Conclusions and Recommenda ons	Summary of findings and suggested ac ons	1. Do the conclusions reflect the main points that you consider important? 2. Are the recommenda ons ac onable and relevant? 3. Are there any addi onal recommenda ons you would propose?	1. Yes. 2. The recommenda ons for future ac ons, including part "Promote public awareness and engagement" can be carried out, they are relevant and promote the success of the project. 3. More focus should go on recommenda on on deepening the involvement of par cipa ng par es and communica ng the individual par cipa on benefits of the project and the actors (suppor ng the benefits with appropriate u lity calcula ons).

Annex: Toolbox – Prac cal Solu ons to Enhance Intersectoral Coopera on	Overview of tools for se ng SMART objec ves, stakeholder mapping, engagement planning and MoUs to support intersectoral coopera on	1. Are the tools provided prac cal and easy to implement? 2. Which tools do you think will be the most useful for enhancing intersectoral coopera on, and why? 3. Are there any addi onal tools or resources you would recommend including in the toolbox?	1. The listed tools are commonly used in strategic planning, rela vely easy to implement the concept of SMART (Specific, Measurable, Achievable, Relevant, and Time-Bound) objec ves. Higher focus should go on the way to transfer the aims into „figures“, so in some cases the usage of GANTT diagram, design methods also can make easier the implementa on. The Stakeholder Mapping is one of the first step to design the network and connec ons between the par es of the value chain. The method can be applied appropriately according to the connec on diagram and table provided. If the communica on between the par es is itera ve, in me, the Stakeholder Engagement Plan will work. The Memorandum of Understanding on intersectoral coopera on in the field of bioeconomy is a necessary statement, but cannot be considered as a „real tool“. 2. 1., 2., 3. ones. 3. Cohen model (inlcuding risk management).

Dear Madam/Sir,

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We have created a brief table with targeted questions related to specific sections of the document. Your insights on these questions will help us refine the procedures and make them more applicable to real-world scenarios. Please take a moment to review the table and provide your feedback. There's no need to edit the document directly—your responses in the table will be sufficient.

Thank you for your time and contributions!

BIOECO-UP team

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- There is no need to use track changes or directly edit the document; your feedback in the table is sufficient.

General Information

Country:	**Hungary**
Institution:	**Óbuda University, Department of Business Sciences and Digital Skills**
Name:	**János Varga PhD**

Feedback Table

Section	Key Points in the Section	Questions for Feedback	Feedback
Introduction	Overview of bioeconomy, importance of intersectoral cooperation	1. Does the introduction clearly define the scope and importance of intersectoral cooperation in the bioeconomy? 2. Is there any information or perspective missing that you believe should be included?	The document addresses a highly important and timely issue. The field of bioeconomy is not widely known, particularly in the countries where the round tables have taken place. The introduction effectively emphasizes the importance of intersectoral cooperation. It discusses the concept of the bioeconomy and its overarching paradigm. While highlighting specific sectors is valuable, as the introduction rightly does, it is crucial to stress that all sectors can influence their functioning. These highlighted sectors should be considered flagship sectors within the bioeconomy theme, but all other sectors are also connected to them, either directly or indirectly, at some level. Today, sustainability is no longer the responsibility of just one or a few sectors—all sectors can contribute. There is no doubt that cooperation must be strengthened. The introduction makes this clear and underscores the benefits of collaboration, particularly in areas such as sustainability, resource efficiency, innovation, and economic growth. It is essential to emphasize that innovation plays a key role in shaping the bioeconomy and should be more closely aligned with it. Additionally, the state of social capital in each country should be considered, as its level significantly influences the potential for cooperation in a given region.
Identified Barriers and Challenges	Common barriers across sectors, challenges specific to stakeholder groups	1. Are the identified barriers and challenges comprehensive? 2. Do you see any specific additional barriers? 3. Do the challenges align with your experience in intersectoral cooperation?	This chapter effectively summarises the main challenges. The problems and obstacles identified are relevant to most countries. Indeed, differences in regulations, institutional frameworks, and resource constraints pose significant challenges. In addition to these issues, it is important to highlight that the bioeconomy remains a relatively unfamiliar

			concept among economic operators. While many have heard of it, they often lack a clear understanding of how it functions or what it truly entails. This underscores the crucial role of education in raising awareness and fostering expertise in the field. The text rightly suggests that research institutes and research centres play a key role and should collaborate more closely with industry. While the need for increased focus on bioeconomy-related research is acknowledged, a critical question remains: What about the training of professionals? Where are the talents who truly understand this field, and how is the next generation being educated? Training programmes must be designed to equip individuals with the necessary skills, while younger generations should be encouraged and motivated to pursue careers in this sector. While this chapter effectively outlines the key challenges, it is worth considering whether these challenges are interrelated. Do they stem from a common root cause? Exploring the underlying factors that have led to these problems could add further depth to the analysis. Additionally, while the chapter highlights the difficulties faced by various stakeholders, it does not delve deeply into the reasons behind these struggles. Important questions remain: What has led to the crisis of confidence among economic operators, and how can it be mitigated? How do regulatory inconsistencies contribute to market uncertainties? Furthermore, the discussion should extend to the role of innovation, examining the risks and uncertainties associated with it in the context of the bioeconomy. The text could also address the cultural differences and varying objectives across sectors that make cooperation challenging.

			The key question is how these obstacles can be overcome. To what extent does a lack of trust contribute to these difficulties, and could it be a barrier to effective collaboration? Another important consideration is the role of digitalisation in facilitating cooperation. Effective communication, information sharing, data storage, and overall technological integration all require strong digital capabilities. What kind of IT infrastructure or information systems are available to stakeholders in the bioeconomy? What digital tools are commonly used in organic farming? Additionally, greater attention should be given to workforce skills, education systems, and the supply of trained professionals in the bioeconomy sector. Financial constraints are another recurring issue. However, the problem is not necessarily the availability of resources but rather the lack of targeted funding for specific cooperative initiatives. This aspect needs to be explored in greater detail. More opportunities should be created to promote intersectoral cooperation and win-win financial strategies. The problems and challenges outlined in this chapter are real and significant. Cultural, regulatory, and institutional differences can act as barriers to cooperation. The science and education sectors should take on a more active role in addressing these challenges, while economic policy should focus on strengthening social capital. The bioeconomy needs greater visibility and promotion to ensure wider societal engagement. Presenting best practices and successful case studies of cooperation could be beneficial. Furthermore, the chapter should explore motivational factors and market incentives in greater depth. These aspects deserve thorough analysis to identify effective solutions.

Quadruple Helix Approach	Lessons from round tables, importance of engagement and flexibility	1. Are the lessons learned accurately reflected? 2. Do you agree with the emphasis on early engagement and flexibility?	This chapter explores ways to promote intersectoral cooperation, emphasizing the early and inclusive involvement of stakeholders—an area where the education system can already play a significant role. It highlights the importance of communication, flexibility, and adaptability, all of which are indeed crucial competencies. Additionally, it acknowledges that existing initiatives could be expanded upon. While this is certainly true, such efforts should be undertaken on a much larger scale. The chapter rightly identifies flexibility as an essential factor. However, a key question arises: From whom, specifically, is flexibility expected, and in what form? The concept of flexibility differs depending on whether it applies to institutions or businesses. It is crucial to clarify who should be expected to demonstrate flexibility and adaptability. Furthermore, it is important to consider the potential limitations of flexibility and adaptability and explore strategies for overcoming them. The emphasis on early stakeholder involvement and adaptability is well-founded. Engaging stakeholders at an early stage allows for the identification and resolution of conflicting interests before they become obstacles to cooperation. An inclusive approach not only strengthens stakeholder engagement but also enhances the long-term sustainability of intersectoral initiatives. Finally, fostering an innovative approach is essential for the development of the bioeconomy. The key question is: How can this be facilitated? Innovation inherently requires creativity, critical thinking, diverse perspectives, flexibility, and adaptability. If the goal is to truly advance bioeconomy development, it is essential to cultivate an innovative mindset among stakeholders. Achieving this will require targeted

			instruments, appropriate incentives, strong support structures, and long-term strategic planning.
Developing Intersectoral Cooperation Procedures	Step-by-step guide to designing and implementing cooperation	1. Are the procedures clear? 2. Are there any steps that seem unrealistic? 3. What improvements would you suggest to enhance the practicality of these steps?	This chapter aims to provide an overview of the steps needed to facilitate cooperation. It offers valuable insights into identifying opportunities for collaboration, developing synergies, and testing new approaches. These are all useful recommendations, and in some cases, practical advice is provided to enhance understanding. However, certain aspects could be further elaborated. One key issue that remains unaddressed is how businesses of different sizes can bridge gaps in funding and resources. A crucial question is how these businesses should begin the process: What should be their first step, and who will guide them in taking those initial steps? Additionally, who will support them in implementing pilot projects? While the overall process is clear, some details still require further clarification. Another critical aspect that should be explored is the extent of regulatory and bureaucratic barriers in different countries and how they can be minimized. The chapter does not sufficiently address the variations in legal frameworks across sectors or the degree of bureaucratic obstacles involved. Furthermore, a more in-depth discussion of the differing interests of stakeholders within each sector would be beneficial. The priorities of a university, for instance, differ significantly from those of a local government or a private business. Where interests diverge, there is a high potential for tensions, conflicts, and disagreements. A key question is how these conflicts can be managed effectively. What conflict resolution strategies could be implemented, and can a structured framework for conflict management be developed?

			Based on these considerations, the following practical steps could be recommended: presenting a more detailed financial model to address funding challenges, identifying and addressing regulatory barriers, introducing conflict management mechanisms or mediation strategies to facilitate cooperation between stakeholders with differing interests, developing strategic steps to reduce bureaucratic hurdles, establishing measurable key performance indicators (KPIs) to track progress, implementing continuous evaluation and feedback monitoring mechanisms. Ultimately, fostering trust, openness, and reliability among stakeholders remains a fundamental element in building successful cooperation.
Conclusions and Recommendations	Summary of findings and suggested actions	1. Do the conclusions reflect the main points that you consider important? 2. Are the recommendations actionable and relevant? 3. Are there any additional recommendations you would propose?	Conclusions and proposals are always a crucial part of a document, as they help define the direction for future development. The recommendations and suggestions presented here are all significant, with points on innovation and education being particularly valuable. Additionally, there is a clear need for improvement in areas such as funding, regulatory frameworks, knowledge sharing, and sustainability. The proposals are well-structured and highly relevant to bioeconomy cooperation. Most of the recommendations are feasible, but their successful implementation depends on the right institutional and economic policy framework. It is important to note that some elements may require a longer timeframe to materialize—such as international harmonization of regulations or the promotion of global cooperation. These aspects must be supported by long-term strategic plans with clearly defined milestones, ensuring a gradual and structured approach to progress. Similarly, addressing regulatory challenges, reducing bureaucratic barriers at the international

			level, and fostering trust among stakeholders will require sustained coordination over time. To achieve this, it is essential to establish the necessary institutional and technological infrastructure to support effective long-term implementation. Moreover, key tools such as feedback mechanisms, digital and technological solutions, pilot projects, and social studies—as previously mentioned—can play a vital role in facilitating cooperation. The conclusions and recommendations section, while valuable, is relatively brief. Given the importance of this topic, there is significant potential to expand on possible solutions in greater depth. It is assumed that further research and analysis will be conducted to refine and elaborate on these proposals.
Annex: Toolbox – Practical Solutions to Enhance Intersectoral Cooperation	Overview of tools for setting SMART objectives, stakeholder mapping, engagement planning and MoUs to support intersectoral cooperation	1. Are the tools provided practical and easy to implement? 2. Which tools do you think will be the most useful for enhancing intersectoral cooperation, and why? 3. Are there any additional tools or resources you would recommend including in the toolbox?	The tools presented here appear to be applicable, but their effectiveness ultimately depends on the expertise of those who use them. It is crucial that these tools are operated by professionals with the necessary knowledge and that the results generated by the models are interpreted by qualified experts. The importance of expertise must continue to be emphasized. There is no doubt that the tools and processes discussed in the text can contribute to fostering cross-sectoral cooperation. However, a key question remains: how can these stakeholders be brought together, encouraged to engage in dialogue, and motivated to recognize the potential benefits of collaboration? Tools such as SMART goal setting, stakeholder mapping, and stakeholder engagement plans are all straightforward and valuable for project management and stakeholder interaction. Nonetheless, further exploration is needed to determine how software and technical support can be provided to stakeholders, what additional digital solutions

			can facilitate collaboration, how experience-sharing should be structured, and which IT applications, platforms, or systems can best support cooperation. The role of education and innovation has already been highlighted in previous sections, but their promotion requires additional tools and proposals, as does the development of social capital and trust among economic operators. One of the most effective tools for this purpose is stakeholder mapping, which not only identifies key stakeholders but also clarifies their roles in collaboration. Beyond simple identification, models should be employed that analyze stakeholders' contributions and the value created for them. It is essential to determine what level of collaboration is necessary to generate mutual benefits. If required, new models should be developed, research conducted, and networks analyzed. A stakeholder map can help actors from different sectors understand who the key partners are and what roles they play in achieving successful cooperation. A stakeholderinterest analysis matrix can also be beneficial, but the primary question is: how much value does collaboration bring to each stakeholder? If the potential benefits can be clearly demonstrated, stakeholders will be more willing to engage in cooperation. While a structured framework could be useful, it may not be as practical for smaller businesses or less experienced organizations that lack the capacity for long-term planning. Given the volatility of today's business environment, long-term planning is often challenging, as numerous unpredictable factors can influence the path to a given goal. Therefore, a rigid framework may not be widely adopted by all stakeholders. Additional substantive proposals could enhance the effectiveness of cross-sectoral cooperation. First, greater

			emphasis should be placed on risk management, as such collaborations inherently involve risks. Identifying, assessing, and mitigating these risks should be a priority. Similarly, project management should receive more attention, as it plays a crucial role in guiding the establishment and execution of cooperation initiatives throughout their entire life cycle. It is recommended that stakeholders acquire more advanced project management knowledge and skills. Moreover, the development of digital competencies is essential. Enhancing stakeholders' proficiency in digital tools, online platforms, applications, and database management will facilitate closer and more efficient collaboration. Strengthening these digital capabilities will enable stakeholders to establish and maintain effective communication, streamline data sharing, and improve overall cooperation within and across sectors.

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A1.3 Transnational testing of intersectoral cooperation procedures

D 1.3.2 Transnational peer review of draft procedures for bioeconomy intersectoral cooperation

National peer review report: ITALY

UNIBO

Content

Executive Summary

Provide an overview on the national peer review process and its objectives. Summarize key findings from the review and outline the most significant conclusions:

- Country: ITALY
- Institutions involved:

COOP ITALIA: is the National Consortium of Consumer Cooperatives. On behalf of the Associated Cooperatives, it develops marketing and communication policies and strategies, manages negotiations and purchases with suppliers and develops Coop brand products, guaranteeing innovation and controlling quality and safety. Dr Chiara Faenza is the chief person of the Sustainability area.

UNIVERSITY of BOLOGNA: Prof. Luca Lambertini is an expert in enviro-economics, economy of natural resources and green technologies.

ART-ER S.Cons.P.A: is the Emilia-Romagna consortium company for innovation and technology transfer, providing services to businesses, universities and the community at large. Dott. Arianna Cecchi is in charge of coordinating the activities of Climate-KIC Italian partners within innovation projects and the national Start up accelerator programme and is an expert in sustainable development policies and practices, climate change, renewable energy, energy and resource efficiency, innovation policy with competences in project management and international networking.

- Number of stakeholders involved: 3
- Summary of key findings from the peer review: In general, external reviewers gave a very positive opinion on the documents provided. Only a few minor comments (see below) were addressed.

1. Findings from Peer Review Process

This section will summarize the feedback received in each section from the reviewers. Refer to the corresponding sections in the peer review table template.

1.1. Introduction

Summary of participant's feedback on the introduction of the procedures, including:

- Clarity of scope and importance of intersectoral cooperation. The feedback received is that the introduction clearly defines the scope and significance of intersectoral cooperation,

highlighting its role in sustainability, innovation, and resource efficiency. It provides specific examples and mentions the challenges of sector integration. However, the second and third paragraphs of the intro could be profitably condensed into a single one.

- Suggestions for additional perspectives and missing elements, if any. The introduction could include specific examples of successful intersectoral collaborations to strengthen its relevance. The functions of biodiversity protection and Natural capital valorization that can be played by sustainable bioeconomy could be stressed

1.2. Identified Barriers and Challenges

Comprehensiveness of barriers:

- Were the barriers and challenges identified sufficient? The feedback received is that the barriers are comprehensive, covering cultural silos, regulatory misalignments, resource constraints, and knowledge gaps.

- Did the feedback suggest any additional challenges? Additional barriers could be limited stakeholder engagement in underrepresented regions and uncertainty of bureaucracy and diverse metrics used by different sectors.

- Did the findings align with national experience in intersectoral cooperation? The reviewers stated that the challenges align closely with common experiences in collaborative initiatives across sectors. The alignment is concerning regulatory environments and institutional silos. The need for a solid science-based non-technical communication to avoid misconception and perceptions based on wrong beliefs could be included.

1.3. Quadruple Helix Approach

Lessons learned:

- How well were the lessons from round tables and stakeholder engagement reflected? Yes, the lessons emphasize early engagement, communication, and adaptability, which are critical for collaboration.

- Was there consensus on the importance of early engagement? In general, the essential aspects of successful intersectoral cooperation were properly considered. However, one suggestion was to mention (in subsection 3.1) that the stakeholders' engagement procedure should also serve the purpose of ascertaining stakeholders' awareness of their potential role, with a view to facilitate the development of the following phases. Also one reviewer suggests to mention the "SH fatigue", referred to the difficulty to keep the SH engaged on a continuous basis. On the flexibility side examples of what is intended with "flexible" design and implementation would be useful.

1.4. Developing Intersectoral Cooperation Procedures

Feedback on the draft procedures:

- Were the steps clear and realistic? The reviewers found that the procedures are clear and provide a logical framework for implementation, with a cautionary note about

understanding market demands (subsection 4.1): available data could be heterogeneous across sectors and countries. A minor remark is that the resource-intensive nature of initial stakeholder engagement might be challenging for smaller organizations. Also, give timing and real world examples was suggested.

- Were any steps suggested for improvement? The reviewers suggested to simplify the stakeholder engagement process by providing templates or digital tools for mapping and engagement. Another comment concerned what already mentioned at point 1, whether the extant empirical evidence is detailed and homogeneous; this is also important when it comes to monitoring actions and assessing outcomes. Another suggestion is to expand step 4 from pilots to commercialization to include intermediary steps such as authorizations, certifications, IP agreement.

1.5. Conclusions and Recommendations

Participants insights on the conclusions and recommendations:

- Did the conclusions align with the feedback received? The conclusions summarize the critical insights effectively, emphasizing challenges and solutions. They are actionable and align with the goals of fostering intersectoral cooperation.

- Additional actionable recommendations proposed, if any. An additional suggestion was to Include recommendations for capacity-building programs specifically tailored to small and medium enterprises (SMEs). Another review suggests to consider not only policy impact to collaboration but also viceversa: collaborations might try to offer policy the knowledge for informed decisions, for instance through position papers.

1.6. Toolbox for Enhancing Cooperation

Feedback on the tools provided:

- Practicality and ease of implementation. The tools like SMART objectives and stakeholder mapping are practical and user-friendly.

- Most useful tools identified. Reviewers stated that the most useful tool is the stakeholder mapping: self-identifying as a stakeholder may reflect too many elements which may not deliver. The same holds for the stakeholder engagement plan; both ensure inclusivity and strategic alignment.

- Suggestions for additional tools or resources. It was suggested to consider including a digital collaboration platform for real-time project management and communication and possible tools from the market side, for instance, Product development roadmaps, Business model canvas, framework agreements (to ensure the input bio-material, etc.)

2. General Comments and Observations

The Introduction clearly defines scope and signficance of interesectiorial cooperation. Indetified barriers and challenges are comprehensive, covering the different relevanmt aspects. Concerning

the quadruple Helix Approach, lessons from round tables were reflected, and the the essential aspects of successful intersectoral cooperation were properly considered. Procedures for the development of interesectorial cooperatin are clear; some recommendations were provided.

3. The project refers to the collaboration and the critical roadmap by bioeconomy intersectoral cooperation, which is the base for the successful development of the project. It could be interesting to point out (art 5 and 6) also information regarding the NDA (NonDisclosure Agreement) which is aimed at defining the data property and the use of results, in particular when patent or general protection could be an option.

4. Next Steps and Recommendations

Identify key actions that should be taken based on the national peer review results. These may include revisions to the procedures, additional stakeholder engagement, or further research.

The key action might be an optimisation of procedures adopted for the development of the intersectorial cooperation.

5. Conclusions

Indicate the primary takeaways from the peer review. Summarize the overall value and outcomes of the peer review process in advancing intersectoral cooperation for the bioeconomy.

The review by external judges who have different and, ideally, complementary skills can be very useful for the review of documents that deal with bioeconomy issues and the procedures necessary for the development of its principles.

Annex 1: Peer review at national level

Reviews were uploaded in GD.

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A1.3 Transnational testing of intersectoral cooperation procedures

D 1.3.2 Transnational peer review of draft procedures for bioeconomy intersectoral cooperation

National peer review report: Poland

Institute of Soil Science and Plant Cultivation – State Research Institute

Content

Executive Summary

Provide an overview on the national peer review process and its objectives. Summarize key findings from the review and outline the most significant conclusions:

- Country: Poland
- Institutions involved:
    - Jerzy Haber Institute of Catalysis and Surface Chemistry Polish Academy of Sciences
    - Mikrobiotech Ltd.
    - The reviewer didn't want to publicly disclose information about the government agency (in climate and environment policy area) she is employed in
    - European Carbon Farmers Ltd.
    - Polish Academy of Sciences – Institute of Rural and Agricultural Development / European Rural Development Network
    - AGROINTELLI /INNOV-AGRI / independent expert of agro-business
- Number of stakeholders involved: 6
- Summary of key findings from the peer review:

The peer review process provided valuable insights into the strengths and areas for improvement in fostering intersectoral cooperation within the bioeconomy. The key findings are summarized by section:

1. Introduction

The document was well-structured and provided a clear introduction to the importance of intersectoral cooperation. Reviewers appreciated the explanation of the concept but suggested adding more success stories and case studies to illustrate successful collaborations.

2. Identified Barriers and Challenges

The document correctly identified major barriers, such as regulatory challenges, financial constraints, and communication gaps between sectors. However, the reviewers identified several additional challenges.

3. Quadruple Helix Approach

The methodology was well-received, but reviewers suggested including more practical applications. The document assumes that all stakeholders are willing to cooperate, whereas, in reality, conflicting priorities often hinder collaboration.

4. Developing of Intersectoral Cooperation Procedures

The proposed steps were considered realistic and clear. However, several other key areas for improvement were identified.

5. Conclusions and Recommendations

The conclusions were well-structured but sometimes too general. Experts suggested refining them by specifying the direct benefits of intersectoral cooperation for different stakeholders.

6. Toolbox for Enhancing Cooperation

The reviewers positively evaluated the tools, highlighting two of them. They also recommended some additional tools that could improve the quality of the documents, which will be acceptable to most recipients.

7. General conclusion

The document effectively outlines the importance of intersectoral cooperation in the bioeconomy, but it requires further refinement to enhance its practical application. By incorporating more concrete examples, addressing financing and regulatory challenges, and structuring cooperation mechanisms, it can better serve as a practical guide for stakeholders involved in the bioeconomy sector.

1. Findings from Peer Review Process

This section will summarize the feedback received in each section from the reviewers. Refer to the corresponding sections in the peer review table template.

1.1. Introduction

Summary of participant's feedback on the introduction of the procedures, including:

- **Clarity of scope and importance of intersectoral cooperation.**

All opinion from Polish reviewers regarding *the introduction* to the topic of intersectoral cooperation are positive. The *Introduction* has a proper structure, explains the meaning and scope of intersectoral cooperation. This part of the document is clear, providing the most important information about this process. Several areas have also been suggested for expansion to further enhance the substantive value of this section.

- **Suggestions for additional perspectives and missing elements, if any.**

Despite the positive reception of *the Introduction*, reviewers pointed out several elements that could be added to it. One opinion suggests that it would be valuable to include specific examples of success stories.

- Although *the Introduction* focuses on more theoretical concepts, adding examples of good practices at the beginning of the document could clearly encourage the reader to delve deeper into the text. An example of such a practice could be innovations in the field of biopolymers integrating the agricultural and chemical sectors.
- Another element that could enrich *the Introduction* is placing greater emphasis on connections with specific bioeconomy policies. It is suggested to highlight the links between EU strategies and the goals of the European Green Deal to strengthen their significance.
- One reviewer felt that the document did not specify the target audience, i.e., which stakeholder group it is addressed to. They suggest that, in its current form, it should primarily be aimed at public administration, which plays a key role in building intersectoral cooperation in the bioeconomy.
- It is also worth focusing on 'strengthening' the document by adding a more prominent introduction that emphasizes the importance of the bioeconomy and its historical roots in nature. Cross-sectoral actions are also essential for addressing environmental crises, which could also be mentioned.
- The perspective of intersectoral cooperation should also be approached from different perspectives. Primarily, it should be viewed from the perspective of the recipient, who may not want to engage in such activities directly but instead focus on how to guide them towards successful collaboration. ○ The scope of the meaning of intersectoral cooperation, its effects, and the benefits that result from it should also be expanded.

- The regulatory barriers to intersectoral cooperation should also be more strongly highlighted, particularly the regulatory elements that limit it.

- Gaps were also noted in terms of various areas of intersectoral cooperation in the bioeconomy, such as biopolymers or biodegradable materials, which can connect sectors like agriculture, the chemical industry and medicine. Such cooperation could be presented as another good practice and success story.
- One reviewer thought that the principles of circular bioeconomy were not sufficiently presented, such as waste valorization or the possibilities of industrial symbiosis to enhance sustainability in biopolymer production.
- The topic of 'green' chemistry, which supports sustainable development and the bioeconomy while connecting many sectors, also needs to be further explored.
- The importance of collaboration between academia and industry, which is essential for bringing innovative solutions to the market, was also pointed out but was not fully addressed in the document.
- It was also suggested to highlight other barriers, such as financial ones, scalability of biobased materials, and, in the case of developing innovative solutions, to define the TRL level.

1.2. Identified Barriers and Challenges

Comprehensiveness of barriers:

- **Were the barriers and challenges identified sufficient?**

According to the experts, the barriers and challenges have been correctly identified. Reviewers did not have major objections regarding this issue. It was only suggested to improve the visual presentation of the content by adding boxes, using bold font to emphasize key points. It was also proposed to include specific case studies that would effectively enrich the content.

- **Did the feedback suggest any additional challenges?**

Reviewers have identified several key challenges and barriers that were not addressed in the documents.

- Legislative barriers related to regulations were not sufficiently highlighted in the document, especially regarding their significant impact on the possibilities of building cross-sectoral collaborations. This issue is particularly relevant when considering the different definitions of 'waste' across European countries. The meaning of the same product can vary significantly; in some countries, certain substances classified as 'waste' become legally unusable despite their high potential for use as raw materials in bioproduct manufacturing. While there are ways to ease these restrictions, they often involve complex environmental assessment procedures, which ultimately become unprofitable for potential producers. Another problem noted by the reviewers, also closely related to legislation, is the high frequency of regulatory changes in the EU. These constant modifications

significantly hinder the expansion of the bioeconomy by introducing increasingly complex procedures.

- Reviewers also pointed out the lack of identification of key pain points—critical connecting factors that not only facilitate but, in some cases, even force different entities to collaborate.

- There is a noticeable lack of space for sectoral collaboration incubation. The document correctly highlights that different entities have their own priorities and objectives, which prevents them from focusing on other sectors with which they could potentially collaborate more effectively. Organizing meetings to foster these relationships would require time and commitment but could yield tangible benefits and significantly expand intesectoral cooperation.
- A lack of experience in intersectoral collaboration remains a major challenge. Additionally, there is a shortage of examples of best practices that could positively influence the development of such cooperation.
- The diversity of stakeholders, each with different approaches and methods of operation, presents another barrier. Enterprises, business support institutions, universities, and research & development organizations operate within different environments, possess different experiences, have varying expectations, personnel, financial capabilities, and access to funding sources such as EU funds. While each of these entities could engage in some form of collaboration, a common problem is the difficulty in finding 'a common ground' to establish and maintain relationships.
- Introducing a new product to the market comes with high costs, mainly due to the need for extensive market research. For some entities, identifying actual demand for a given product or service and assessing whether the costs of implementing a new technology are justified remains a challenge.
- Many industries exhibit resistance to change and avoid taking risks, which prevents them from attempting to modify their technologies or solutions to incorporate bioproducts. Their concerns often revolve around uncertainties regarding quality assurance, efficiency, or long-term costs, which may ultimately turn into wasted investment. For example, chemical companies producing petroleum-based plastics may resist switching to bio-based materials like PHA/P3(HN) if there is no strong market demand or financial incentives. A potential solution to this issue could be the introduction of 'transition funds' that provide subsidies to industries shifting to bio-based processes.
- Limited infrastructure for scaling bio-based solutions is another common challenge. For instance, innovative bio-based materials such as PHA, DES, or bio-derived solvents are not fully utilized due to the lack of suitable industrial infrastructure for further processing, testing, and mass production. The document should emphasize infrastructure development as a critical bottleneck and suggest investments in pilot plants, demonstration-scale production facilities, and biorefinery networks.

- **Did the findings align with national experience in intersectoral cooperation?**

The general opinion of experts aligns with the findings presented in the document. Their experience in intersectoral collaboration is relatively similar, and for the most part, they agree with the identified challenges and barriers to connecting entities from different sectors.

However, experts highlighted several key challenges they have encountered in cross-sector collaboration:

- The document was assessed as being too 'general', as it does not specify challenges in the context of concrete technological and economic barriers. For example, previously mentioned gaps in technology transfer and commercialization highlight the difficulties in bridging the gap between the scientific community and the business sector.
- Commonly encountered problems also include the high costs of introducing new technologies to the market. Entities often struggle with accurately assessing market demand and the need for a given product or service.
- Assessing the real benefits of cross-sector collaboration remains challenging.

1.3. Quadruple Helix Approach

Lessons learned:

- **How well were the lessons from round tables and stakeholder engagement reflected?**

The reviewers unanimously gave a positive assessment of the conclusions presented in the document. They believe that the structure and content are of good quality, clear, and relevant. The application of this methodology (Quadruple Helix Approach) was also evaluated positively. Additionally, several important conclusions were proposed to enhance the quality of the document.

- It is recommended to include examples of successful outcomes resulting from the process itself.
- It is also worth mentioning that not every established collaboration must end with success. Acknowledging this fact may help many entities and bring benefits in attitude, in the form of accepting failure. Such an approach may be particularly effective in the early stages of collaboration development.
- To enrich the substantive value of the document, the following aspects could be further detailed:
    - Collaboration between industry and academia. The document focuses more on the scientific community and policymakers, but industry is equally important in this relationship. It would be valuable to add details on the effective involvement of chemical manufacturers, agri-food entrepreneurs, etc., in these activities.

- There are also gaps regarding the challenge of transitioning from a project or research phase to the commercialization of a given solution. Presenting a bestpractice example in this regard would also be a valuable element.
- The document assumes that everyone is willing to collaborate; however, this is not always the case, and conflicts often arise between the priorities and goals of individual stakeholders. This is an important conclusion that has not been clearly presented.

• **Was there consensus on the importance of early engagement?**

All reviewers agree on the importance of early access and flexibility for the success of collaboration. However, they also highlight other equally important aspects, such as:

- Clear and transparent communication along with well-defined common goals—these are fundamental elements influencing effective collaboration between entities from different sectors. It is important to forward that stakeholders may have different individual goals, which is not a problem, as long as they do not contradict or negatively impact each other.
- While the document acknowledges the importance of flexibility, it does not address methods for managing it. For example, it lacks guidance on how stakeholders should adapt to unforeseen challenges or define governance models that enable adaptive decisionmaking. Additionally, it was suggested to structure the process by conducting regular reviews, adjusting strategies based on real data, and jointly developing contingency plans.

1.4. Developing Intersectoral Cooperation Procedures

Feedback on the draft procedures:

• **Were the steps clear and realistic?**

The experts evaluated the proposed steps positively. In their opinion, they are realistic and transparent. However, they also pointed out several key aspects that should be added to enhance the substantive value or with which they do not fully agree. They noted a lack of practical details and the omission of key challenges related to intersectoral collaboration in biotechnology.

In Step 2, ‘Designing Business Combinations’, there is no clearly defined mechanism for technology transfer and scaling. The document incorrectly assumes that once synergies are identified, companies will easily establish cooperation. In reality, this assumption is difficult to implement, as connecting business activities with the scientific world is usually fraught with challenges. Technology transfer is a complex process that requires significant financial resources and is burdened with numerous other issues, including intellectual property concerns. Scaling production is also a complex process that requires substantial investment, specialized equipment, and compliance with various legal regulations.

Additionally, the document does not take into account the 'Valleys of Death' at TRL 4-6, where most innovative solutions fail due to a lack of funding for product development, investments in pilot and demonstration projects, and the high risk associated with introducing new products to the market.

One of the experts suggests adding a new 'sub-step' describing technology transfer, including references to publicly and privately co-financed pilot programs, joint IP agreements facilitating commercialization, and accelerated regulatory pathways for bio-based products.

Concerns were also raised regarding Step 4, 'Implementation and Testing of Procedures.' It was suggested that the description of scaling is overly simplified, as the document implies that after a successful pilot, scaling and commercialization will proceed without significant complications. However, reality suggests otherwise. Three key issues can be identified: the absence of clearly defined market entry strategies, no mention of Venture Capital funds or financing models for transitioning from pilot to commercial scale, and a lack of risk assessment for scaling failure.

A potential solution to this issue is the introduction of Scaling Readiness Levels (SRL), which would function similarly to TRL but focus on scalability aspects. Another necessary addition would be a sub-step on financing and investment, including information about Venture Capital Funds, EU Green Funds, and Circular Economy Investment Schemes. Another proposed solution is implementing risk mitigation strategies through joint ventures between academia and industry, as well as flexible pricing models combined with subsidies for market entry of bio-based products.

- **Were any steps suggested for improvement?**

The experts presented their comments and suggestions to enrich the steps outlined in the document. These include:

- Introducing more detailed descriptions and guidelines for monitoring the effectiveness of collaboration and methods of adaptation in crisis situations.
- Ensuring that the steps reflect a more practical approach based on experience in innovation within the bioeconomy.
    - Adding Technology Readiness and Business Readiness Frameworks by incorporating TRL and SRL indicators to guide stakeholders in scaling innovation. For example, transitioning from TRL 5 to TRL 8 may require developing industrial partnerships, investing in pilot plants, and undergoing regulatory procedures. Furthermore, properly informing stakeholders about the significance of TRL and SRL indicators could positively impact investment scheduling and expectations management.
    - Implementing risk mitigation strategies and adaptive business models. Collaborations within the bioeconomy often fail due to market volatility and uncertainty regarding return on investment. Presenting adaptive business models in the document could help mitigate these issues. Possible models to consider adding include:

        - Subscription-based pricing models
        - Public-private cost-sharing initiatives aimed at reducing risk for companies implementing new solutions
        - Green public procurement to create stable demand for bioproducts, as demand stability is a fundamental factor in successfully introducing a new product to the market.
    - Improving the quality of financing and investment strategies by developing dedicated financial roadmaps, including information on programs such as EU Horizon Europe, BBI JU (now CBE JU), and national grants for innovative solutions. Additionally, these roadmaps could include details on Venture Capital funds dedicated to start-ups and cooperative financing models that connect business with science.
    - Considering adjustments to stakeholder collaboration mechanisms. The document lacks structured cooperation frameworks and only briefly mentions stakeholder engagement. A possible solution would be introducing regular meetings, such as roundtable discussions.
- In the case of financial evaluation, it was noted that there is insufficient emphasis on assessing the financial viability of collaborations. The success of a partnership often depends on the profits that potential partners can generate rather than solely on the potential benefits of the collaboration itself. Any project will eventually fail if it does not have a clear vision translated into concrete actions that convert potential into actual profits.

- One reviewer suggested renaming Step 2 from 'Identification of Potential for Cross-Sector Collaboration' to 'Mapping the potential of intersectoral collaboration participants', modifying the formatting (e.g., using boxes), and demonstrating more best practices. ○ For the 'Development of Intersectoral Collaboration Procedures', greater emphasis should be placed on the importance of key performance indicators (KPIs) in organizing joint efforts towards a commonly agreed (and properly understood) project goal.
- The final recommendation from the experts concerns Step 1: 'Is There a Need for the Product or Service?'—market research and competitive analysis. The expert proposes adding the following aspects:
    - Understanding market needs and how different sectors can jointly address them.
    - A market-driven approach where the development of new products or services is guided by existing or emerging needs.
    - Stakeholder consultations and market research at this stage are crucial for accurately assessing demand and identifying opportunities that are both economically viable and socially desirable. Additionally, considering global trends and policy directions can help align collaborative efforts with broader sustainable development goals and regulatory frameworks.

1.5. Conclusions and Recommendations

Participants insights on the conclusions and recommendations:

- **Did the conclusions align with the feedback received?**

The conclusions were presented clearly and understandably. Not all experts agreed with them, but their format in relation to the document was conveyed correctly and effectively summarized the key issues. However, certain shortcomings were noted.

The main problem identified by the reviewers was that the conclusions were sometimes too general, lacking precision regarding the challenges associated with bioproducts. There was no clear indication of the real benefits that intersectoral collaboration brings to specific sectors of the bioeconomy. Additionally, issues related to scalability and the proper commercialization of innovative bioproducts were not sufficiently addressed, despite being among the key conclusions.

It was also recommended to outline the requirements for transitioning from collaboration to actual implementation. One of the issue was the lack of distinction between the capabilities of 'individual entities', public institutions, and policymakers. The conclusions should be separated and even expanded to better target the specific groups they are intended for.

- **Additional actionable recommendations proposed, if any.**

A number of potential recommendations were also suggested for inclusion. Among the key ones are the following:

- It may be worth considering adding recommendations on regulatory and legal issues tailored to international conditions.
- One reviewer noted the absence of an introductory framework for the recommendations, such as those based on the SMART approach or the quadruple helix model.
- The introduction does not specify the intended audience of the document. However, the way the recommendations are presented suggests that it is primarily directed at policymakers. Issues such as raising public awareness, developing educational programs, providing financial support, and offering tax incentives clearly indicate the target audience. Therefore, it would be beneficial either to explicitly state in the introduction that the document is aimed at policymakers or to expand the recommendations to also support academia and industry.
- Another identified issue was the overly general nature of the theses within the recommendations.
- The recommendations lack key aspects such as the need to create an appropriate space for co-creation and effective collaboration, preparing recipients for the possibility of failure—which should not be seen as a disaster but rather as a learning opportunity. There is also no mention of real best practices, which could significantly enrich the document. Additionally, it should be emphasized that the process of intersectoral collaboration should begin with an assessment of problems rather than focusing solely on potential. ○ The section on commercialization and its importance should be expanded. A comprehensive review of existing financial support instruments is also crucial.

- One reviewer suggested developing a platform for intersectoral collaboration. Such a platform would serve as a centralized hub for stakeholders, facilitating connections between entities and improving access to their services. It would also simplify the search for potential funding sources and provide opportunities to participate in training and courses related to intersectoral cooperation.
- Given the significant challenges and gaps in interactions between academia and industry, it is important to highlight possible ways to facilitate these connections and demonstrate the benefits of such collaboration. One potential solution could be the implementation of technology transfer hubs to improve cooperation between these sectors.

1.6. Toolbox for Enhancing Cooperation

Feedback on the tools provided:

- **Practicality and ease of implementation.**

The overall impression of the experts regarding the presented tools is positive. Most of them consider the tools to be practical, helpful, relatively easy to use, and well-adapted to the real needs of stakeholders. The tools are intuitive and can significantly facilitate intersectoral collaboration. The SMART tool for goal setting and stakeholder mapping received particularly positive feedback. Its flexible structure allows for various applications in the field of the bioeconomy.

However, one respondent was relatively critical of the presented tool, disagreeing with several assumptions. He found it unclear where the predefined percentage targets originated from, such as 'Increasing the use of bio-based materials in local production by 20%.' He pointed out that this should be treated as a performance indicator rather than a predetermined primary goal, which should instead stem from a financial objective. The next step should involve issuing recommendations to achieve the goal. He provided several exemplary options:

- What portion of the profit can be allocated to sourcing alternative materials (e.g., increasing the use of bio-based materials)?
- What external societal costs do we aim to reduce by changing raw material sources?
- What internal cost savings can be generated by shifting to different raw materials?
- What additional revenue can be generated by adopting alternative raw materials?

- **Most useful tools identified.**

The experts identified two tools as the most useful: the Stakeholder Mapping Tool and the Memorandum of Understanding (MoU). The first is crucial for identifying and engaging the right stakeholders, which can significantly impact the success of a given initiative. The second supports the formalization of collaboration and ensures long-term commitment from the involved parties,

which can greatly enhance the stability of intersectoral cooperation. These tools help build trust, provide a clear framework for collaboration, and minimize conflicts of interest at every stage of implementation. In particular, these two tools are extremely valuable for strengthening intersectoral partnerships. The issues they address are key elements for effective collaboration.

Additionally, the SMART Framework for goal alignment was highlighted, as it can facilitate project management and monitoring by precisely defining cooperation objectives. Another useful tool mentioned was the Stakeholder Engagement Plan Template, specifically Figure 5: Example of a Stakeholder Engagement Plan.

All of the listed tools are well-developed and supported by literature examples, which enhances their credibility and effectiveness. They can significantly assist stakeholders by structuring activities and reducing potential complications.

- **Suggestions for additional tools or resources.**

The reviewers proposed four additional tools that they consider essential, as the issues they address would support the activities of many stakeholders.

- The first tool would be designed for developing technology transfer and commercialization strategies. This is a significant challenge frequently mentioned by most experts. The tool could facilitate the transition of low-TRL solutions developed in academic settings into industry-ready applications. It would support the progression from laboratory-scale research to full-scale product manufacturing. The tool should include a TRL tracker to help stakeholders assess product readiness, a bioproduct scaling checklist covering legal regulations, infrastructure, and investment requirements, as well as guidelines for industry partnerships.
- The second tool should provide a roadmap for financing and investment in the bioeconomy. One of the most common reasons for project abandonment is the lack of appropriate funding. This process could be highly beneficial for implementing many innovative projects. The tool could include a list of EU and national funding programs that serve as financial sources for projects at different TRL levels.
- The third tool could support the integration of the circular bioeconomy value chain. Many projects do not initially consider circular economy principles in their early development phases. This tool could help evaluate waste valorization, identify waste streams, and suggest ways to repurpose raw materials.
- Lastly, it is worth considering the introduction of a process-oriented tool rather than a purely static one—such as a tool designed for conducting workshops, training sessions, and providing guidelines for moderators.

2. General Comments and Observations

Summarize additional feedback/comments that reviewers may have shared outside the structured table format. This may include observations on the overall process, methodology, or unforeseen challenges.

None of the experts provided additional feedback outside the structured table format. However, after conducting a thorough analysis of the responses from the reviewers presented in the table, it can be concluded that their overall impressions of the documents are positive. The substantive value of these documents is high, and their structure is correct. Of course, the experts had their comments and doubts regarding some aspects, but these often resulted from the different areas of expertise that the reviewers focus on in their daily activities.

The structured review process effectively captured key issues; however, several broadly outlined topics emerged that require more attention and precision, as they seem to be crucial for intersectoral cooperation. In most cases, the reviewers did not point out flaws or evident errors in the document. Their comments and recommendations were driven more by the lack of comprehensive coverage of certain topics rather than by any fundamental mistakes made by the authors. It is definitely worth focusing on adding practical guidelines and examples of successful intersectoral collaborations. Additionally, some reviewers noted that the document does not sufficiently specify its target audience. While the recommendations seem primarily directed at policymakers, it would be beneficial to clarify whether other stakeholders, such as industry representatives or research institutions, are also key recipients of the information.

3. Next Steps and Recommendations

Identify key actions that should be taken based on the national peer review results. These may include revisions to the procedures, additional stakeholder engagement, or further research.

As part of the analysis of six independent expert opinions, several key actions have been identified to improve the quality of intersectoral cooperation in the bioeconomy. The proposed solutions focused on streamlining this process, increasing stakeholder engagement, identifying gaps in this area through further research, and adjusting national policies.

- First and foremost, it is recommended to expand *the Introduction* by adding information on the target audience of the documents. The current form suggests that they are primarily intended for policymakers. However, it is advisable to broaden certain sections to include aspects relevant to the scientific community, industry, and the wider business sector. Incorporating the recommendations provided by experts will undoubtedly enhance the substantive value of these documents and help identify a broader target audience. Implementing these changes will also positively impact the understanding of each group's role and contribution to the process.
- An important element that experts repeatedly pointed out as missing and recommended to be included was good practices (success stories) in intersectoral cooperation. This presentation format better illustrates the raw data and makes the actual operation of this process more tangible for recipients.
- It is also suggested to expand the information on legal regulations and general EU policies, with a particular focus on the European Green Deal and circular economy strategies. ○ One of the key issues not addressed is the challenge of technology transfer and connecting the scientific community with industry. A proposed solution is the introduction of a cooperation platform aimed at highlighting the benefits of such collaborations and encouraging their formation. Technology transfer hubs could also play a crucial role in supporting these initiatives. Currently, establishing these relationships is highly problematic, primarily due to the differing objectives of these two sectors. Scientific research and academic projects often remain at the research or prototype stage within laboratories and are not further developed. Meanwhile, industry is continuously searching for new solutions to optimize processes or introduce innovative products to the market. Effectively bridging these two environments would greatly benefit both sides. This process would accelerate the commercialization of research, increase awareness of intellectual property rights, and facilitate agreements such as licensing contracts.
- Experts also noted the lack of sufficient information on financial opportunities. Many projects are abandoned due to a lack of appropriate funding. Existing European and national programs could significantly address this issue, particularly since intersectoral cooperation is often a requirement for funding eligibility.

In summary, the national expert review has highlighted key areas requiring improvement in intersectoral cooperation within the bioeconomy. By revising procedures, strengthening stakeholder engagement, and conducting further research, significant progress can be made in fostering innovation and sustainable development. Implementing these recommendations will

enhance the effectiveness of collaborative efforts and ensure long-term success in building a strong bioeconomy ecosystem.

4. Conclusions

Indicate the primary takeaways from the peer review. Summarize the overall value and outcomes of the peer review process in advancing intersectoral cooperation for the bioeconomy.

The verification of conclusions by multiple independent experts from a given country appears to be a highly effective method. It allows for analyzing documents from various perspectives. The experts' areas of expertise were quite diverse, which led to differing recommendations, as each of them faces unique challenges and complications. However, many of the issues they identified were relatively similar, further proving that such verification is necessary and effective.

Among the reviewers, there is a high level of interest in the topic of intersectoral collaboration. They highlight numerous challenges they encounter in this area but also recognize the great potential in developing such documents.

The peer review process has provided valuable insights into the challenges, opportunities, and necessary improvements in fostering intersectoral cooperation for the bioeconomy. The diverse expertise of the reviewers has enabled a multi-faceted analysis, allowing for a more refined and actionable set of recommendations.

- One of the primary takeaways from the review is the confirmation that intersectoral cooperation is essential for accelerating innovation in the bioeconomy. However, the process is hindered by several significant barriers, including regulatory challenges, financial constraints, and gaps in communication between sectors. The review highlighted the necessity of targeted strategies to address these issues, particularly in areas such as technology transfer, infrastructure development, and stakeholder engagement.
- A major observation was the need to clarify the intended audience of the procedures and ensure that recommendations cater to different stakeholder groups, including policymakers, industry representatives, and the academic community. Many experts suggested expanding the introductory sections to better reflect the specific needs and roles of each group. Additionally, they recommended incorporating success stories as concrete examples of effective intersectoral cooperation to provide practical guidance and inspiration.
- Regulatory barriers were another key concern, particularly discrepancies in waste classification across different EU countries. The lack of uniformity in legal frameworks creates obstacles for industries attempting to utilize bio-based materials. Experts suggested enhancing policy alignment and developing clearer guidelines to facilitate smoother cooperation.
- Financial challenges also emerged as a critical issue. Many bioeconomy projects fail to progress due to inadequate funding, especially in the transition from research to commercialization. The introduction of new financing mechanisms, including venture

capital support, green funds, and subsidy programs for bio-based industries, was strongly recommended.

- Another crucial takeaway was the importance of structured cooperation frameworks. The review emphasized the need for platforms that facilitate communication and collaboration between academia and industry. Technology transfer hubs and structured funding pathways were identified as potential solutions to bridge the gap between scientific research and commercial application.

- The review also underscored the necessity of practical tools to enhance cooperation. Stakeholder mapping, memorandums of understanding (MoUs), and structured engagement plans were identified as particularly effective. However, additional tools—such as financial roadmaps and commercialization strategies—were suggested to further improve the feasibility of intersectoral initiatives.

In conclusion, the peer review process has provided a comprehensive assessment of the factors influencing intersectoral cooperation in the bioeconomy. While significant challenges remain, the findings suggest clear pathways for improvement. By addressing regulatory inconsistencies, enhancing financial support mechanisms, and strengthening cooperation frameworks, the bioeconomy can achieve greater integration and innovation across sectors. The implementation of these recommendations will be crucial in ensuring sustainable and effective collaboration in the long term.

Annex 1: Peer review at national level

Please provide the individual results of peer review at national level.

1. Introduction – Overview of bioeconomy, importance of intersectoral cooperation

1) Does the introduction clearly define the scope and importance of intersectoral cooperation in the bioeconomy?

Expert No. 1

Brilliant; potential points to elaborate more: More emphasis on specific success stories or examples – while the introduction covers theoretical importance, an early reference to a concrete case of successful intersectoral cooperation (e.g., biopolymer innovation integrating agriculture and chemical sectors) could make it more compelling.; Explicit link to bioeconomy policies – while it mentions global sustainability efforts, it could better tied in with specific EU Bioeconomy Strategies or Green Deal objectives to reinforce relevance.

Expert No. 2

It does seem so.

Expert No. 3

The introduction explains what intersectoral cooperation is and what it consists of, what its features are.

Expert No. 4

Yes, in principle the section defines the scope and importance of intersectoral cooperation in bioeconomy in an efficient manner.

Expert No. 5

The introduction clearly defines the scope and importance of intersectoral cooperation in the bioeconomy providing very good overview of the process, stressing that it is about pooling of resources, knowledge and expertise from various fields, enhancing resilience by diversifying economic activities and reducing dependencies on single industries—thus leading to more innovative and comprehensive solutions.

Expert No. 6

The introduction clearly defines the importance of cross-sectoral cooperation, emphasizing its role in innovation and sustainable development.

2) Is there any information or perspective missing that you believe should be included?

Expert No. 1

Points from my perspective (know-how) that you guys can implement in:

1. Deeper Integration of Biopolymers and Circular Economy Strategies

Missing:

- The document acknowledges intersectoral cooperation in bioeconomy broadly, but it does not explicitly discuss biopolymers or biodegradable materials as a key area where multiple sectors (e.g., agriculture, chemical industry, packaging, and medical applications) can collaborate.
- There's no mention of circular bioeconomy principles—how material loops can be closed, waste valorization strategies, or how industrial symbiosis can foster sustainability in biopolymer production.

Recommendation:

- Explicitly mention biopolymers as a prime example of intersectoral cooperation between agriculture (biomass feedstock), the chemical industry (polymerization, modification), and waste management (biodegradation, recycling).
- Introduce circular economy models where bio-based plastics and solvents create closedloop systems, reducing dependency on fossil-based materials.

2. Role of Deep Eutectic Solvents (DES) and Green Chemistry

Missing:

- The document does not explore the role of sustainable solvents in enabling bioeconomy innovations, even though green chemistry is critical for biomass processing, biopolymer extraction, and functionalization.

- No mention of how intersectoral cooperation can help scale green solvent applications (e.g., integrating DES in biomass refining or enzymatic processes to improve bio-based material production).

Recommendation:

- Introduce green solvents and DES as a cross-sectoral enabler in sustainable bioeconomy practices, linking the chemical industry with material sciences and bio-based industries.
- Highlight how collaborative research between academia and industry can scale-up solventbased innovations to improve biopolymer properties and processing.

3. More Industry-Academia-Policy Integration for Innovation Commercialization

Missing:

- The transition from research to industry application is underdeveloped. It discusses academia and industry but does not elaborate on scaling lab-based bioeconomy innovations into market-ready solutions.
- Funding and regulatory bottlenecks specific to biopolymers and sustainable materials (e.g., EU regulations on bio-based content, REACH compliance) are not discussed.

Recommendation:

- Propose a roadmap for commercializing bio-based materials—from lab-scale research to pilot plant validation, regulatory approvals, and industrial adoption.
- Highlight the need for policy harmonization in bio-based product certification, investment in bio-refineries, and EU Green Deal incentives for sustainable materials. 4. Stronger Emphasis on Industrial Symbiosis and Resource Efficiency

Missing:

- The document does not explicitly explore how intersectoral cooperation can facilitate industrial symbiosis—where waste from one sector serves as input for another.
- No direct mention of valorization of agricultural/food waste into bio-based materials (PHA production, biochar, bioplastics).

Recommendation:

- Discuss how industrial symbiosis can reduce waste and create high-value bio-based products, referencing examples like PHA production from agri-waste or bioplastic additives from lignin/hemicellulose.

- Introduce a framework for assessing waste-to-value potential in different sectors and integrating it into intersectoral cooperation models.

5. Addressing the Challenges of Scaling Biopolymers and Green Solvents

Missing:

- While barriers such as regulatory misalignment and market uncertainty are mentioned, specific challenges for bio-based materials, solvents, and coatings are not addressed.

- There's no mention of technological readiness levels (TRLs) for bioeconomy innovations, which are crucial for securing funding and industry partnerships.

Recommendation:

- Include a discussion on technology readiness levels (TRLs) and what's needed to move biopolymers and green solvents from TRL 4-6 (lab/pilot scale) to TRL 8-9 (full commercial deployment).

- Highlight investment barriers for bio-based industries—such as high initial costs for biorefineries and the need for policy-driven demand creation (e.g., procurement mandates, bioplastics incentives).

Expert No. 2

I believe that the barriers associated with regulations (especially regulations on waste and international waste shipment incl. within EU borders) are the key limiting factor for intersectoral cooperation, and I don't believe it is sufficiently highlighted.

Expert No. 3

I propose to add more about the importance of this cooperation, its effects in the bioeconomy—why it is worth doing? What are the specific benefits? Why is it worth cooperating intersectorally?

Expert No. 4

To make it stronger, I would suggest including a stronger introduction emphasizing economy as such as rooted in nature (bioeconomy) and therefore, making the connection with environmental crisis which needs urgent and cross sectional responses.

Furthermore, I would not assume the recipients of the document will want to cooperate in intersectional way, but instead guide them in the process of arriving at such intersectional approach.

Including specific examples, or case studies in boxes, as well as key summary points from each section (for reinforcing valid messages included in this part) would really help in making this part of the document stronger.

Expert No. 5

It is worth precisely indicating to whom the document is addressed or reflecting on this - see my comment below, on the Conclusions and Recommendations section. I understand that it is useful for each of a broad group of stakeholders, but focusing on those with a leading role in building bioeconomy intersectoral cooperation and this is primarily the responsibility of the public administration (with the power of institutional and financial frameworks)—this is suggested be recommendations.

Expert No. 6

It may be worth adding examples of successful initiatives to illustrate such cases.

2. Identified Barriers and Challenges - *Common barriers across sectors, challenges specific to stakeholder groups*

1) Are the identified barriers and challenges comprehensive?

Expert No. 1

Yes

Expert No. 2

They seem comprehensive.

Expert No. 3

It is worth considering the following issues in the context of barriers:

- Demand for products, services—are they really needed and will the costs of their implementation be justified?
- Need to conduct market research—high costs of entering the market for this type of product/service
- Lack of experience in cooperation, lack of good practices in the field of intersectoral cooperation
- Different stakeholders participating in intersectoral cooperation: entrepreneurs, business environment institutions, universities, research and development organizations – different environments, experiences, expectations, staffing, financial possibilities, access to aid funds, e.g. EU funds, different methods of operation of these entities.

In the context of Challenges:

- Demand for products, services—are they really needed and will the costs of their implementation be justified?
- What are the real needs of the cooperation participants? ○ What is the main goal of the cooperation?
- What are the expected indicators of the achievement of the cooperation goal? What are the individual stages, schedule, duration of individual stages? When are individual goals to be achieved?
- These are innovative products that are the result of intersectoral cooperation—it is necessary to study the activities of competitors (high costs, difficult access to information)
- There is a need to clearly define the roles of individual stakeholders participating in international cooperation: entrepreneurs, business environment institutions, universities, research and development units. What are their tasks? What effects are they to achieve? What benefits will they gain? What material/financial contribution will they make?

Expert No. 4

Yes, the list of barriers and challenges is really comprehensive. Consider using boxes and bold font to emphasize your points. Also, adding specific case studies to illustrate the points mentioned would be really helpful.

Expert No. 5

This part is well organized, authors based of individual interviews and desk study emphasize cultural and institutional silos as the main barrier, a need for deep understanding of the complexities and dynamics of each sector involved but also point the economic barriers that can deter stakeholders from engaging in long-term cooperative efforts.

Expert No. 6

The document does a good job of identifying barriers, such as regulatory differences and knowledge gaps between sectors.

2) Do you see any specific additional barriers?

Expert No. 1

Additional Barriers to Consider:

(A) Limited Infrastructure for Scaling Bio-Based Solutions

- Problem: Even if innovative bio-based materials (like PHA, DES, or bio-based solvents) are developed, there is often no industrial-scale infrastructure for processing, testing, and mass production.
- Example: Small-scale PHA production requires specialized bioreactors, downstream processing units, and composting/recycling systems, which many countries lack.
- Solution: The document should highlight infrastructure development as a key bottleneck and suggest investment in pilot plants, demo-scale production, and biorefinery networks.

(B) High Initial Costs & Slow Return on Investment (ROI) in Bio-Based Industries

- Problem: Developing bio-based materials is capital-intensive, and investors often see long payback periods compared to fossil-based alternatives.

- Example: DES-based polymer extraction methods may reduce environmental impact, but they can be more expensive than conventional solvent-based extraction.

- Solution: The document could propose financial de-risking mechanisms, such as bioeconomy-focused grants, green bonds, or tax incentives for companies investing in sustainable materials.

(C) Lack of Standardization & Certification for Bio-Based Products

- Problem: Many bio-based materials (PHA, bio-based solvents, coatings) lack clear regulatory standards, making it hard to enter markets.

- Example: Some biodegradable plastics cannot legally claim 'compostability' unless they meet strict EN 13432 or ASTM D6400 certification standards.

- Solution: The document should address the need for harmonized certification frameworks across Europe to ensure market access for sustainable products.

(D) Limited Industrial Collaboration in Circular Bioeconomy Models

- Problem: Industrial symbiosis is often not incentivized, meaning companies do not naturally share by-products or collaborate across sectors.

- Example: A PHA-producing fermentation company could utilize agricultural residues, but there's no structured system to connect these industries efficiently.

- Solution: The document could propose policy-driven waste valorization programs, tax credits for circular supply chains, and databases for industrial by-product exchange.

(E) Resistance to Change & Risk Aversion in Traditional Industries

- Problem: Large industries (chemicals, plastics, pharmaceuticals) are often risk-averse and hesitate to adopt bio-based alternatives due to uncertainty in performance and long-term costs.

- Example: Chemical companies producing petroleum-based plastics may resist switching to bio-based PHA/P3(HN) materials without strong market demand or financial incentives.

- Solution: The document could recommend 'transition funding', where industries receive subsidies for shifting toward bio-based processes.

Expert No. 2

Barriers associated with regulations, as mentioned above, are of sufficient magnitude to override any cooperation attempts or procedures. This has several aspects:

- Although EU law clearly states when substances achieve end-of-waste (see DIRECTIVE 2008/98/EC - Article 5 for 'by-products' or Article 6 for 'end-of-waste'), it is less clear as to when substances achieve waste status. Thus, multiple substances that could, technically speaking, be used productively are likely to be considered 'waste' per regulators in individual states.

- Unfortunately, once a substance is classified as 'waste' its use is restricted (rather heavily, although the level of restrictions can vary from state to state) and its uptake by bioeconomy can be restricted or inhibited entirely.

- To alleviate those restrictions, producers or buyers must usually undergo complex environmental assessment procedures—often costly and lengthy ones. Also, as EU introduces new laws rather rapidly, these procedures tend to expand in complexity. Thus bioeconomy (as it related to secondary materials that may be classified as waste) is factually discouraged due to procedural complexity.

Expert No. 3

The answer is contained in question 1.

Expert No. 4

Yes, for me there are two key barriers missing. The first one is lack of specific pain points being identified that unite, or in other words force, various actors to work together. From my experience, cooperation is only possible if the actors have to work together. The second barrier is lack of spaces for those collaborations to be incubated. As you say in the document, different groups focus on different priorities and do not know about the potential of the others to provide in solving their own challenges. Once bridges between actors are built, co-operations emerge naturally. However, this needs time and incubation. From my experience, lack of those spaces is the greatest barrier to more intersectoral cooperation.

Expert No. 5

No answer

Expert No. 6

It can also include difficulties in accessing finance for bioeconomy start-ups.

3) Do the challenges align with your experience in intersectoral cooperation?

Expert No. 1

Partially. The document captures many general bioeconomy challenges, but it lacks depth in specific technical and economic barriers that impact:

- Biopolymers & Green Solvents—the unique scaling, regulatory, and infrastructure challenges you face in your research are not well addressed.
- Technology Transfer & Commercialization—the gap between academic research and industrial application (which you've likely experienced in PHA development) is not fully explored.
- Industrial Symbiosis & Waste Valorization—the document discusses cooperation but doesn't propose concrete mechanisms for integrating waste streams into high-value applications.

Expert No. 2

They do, somewhat. However, in my experience less than substantial part is captured (as explained above with relation to regulations).

Expert No. 3

No answer

Expert No. 4

Yes, they do. Plus I do share two further experiences above also rotted in my own experience in intersectoral cooperation.

Expert No. 5

Both the barriers and the challenges are consistent, in line with my knowledge from bringing together actors from different sectors in practice. These are useful information.

Expert No. 6

More or less the challenges align with the experience of mine.

3. Quadruple Helix Approach - *Lessons from round tables, importance of engagement and flexibility*

1) Are the lessons learned accurately reflected?

Expert No. 1

Mostly, yes. The document does a good job summarizing key lessons from the Quadruple Helix Approach based on discussions in seven European countries. It highlights:

- Early and Inclusive Engagement—bringing in stakeholders from the start to ensure alignment.
- Clear Communication & Common Objectives—avoiding misunderstandings by defining shared goals.
- Flexibility & Adaptability—adjusting cooperation models based on real-world challenges.
- Building on Existing Initiatives—leveraging current collaborations rather than starting from scratch.

What's Missing?

While these insights are valid, they lack depth in industry-academia collaboration and practical mechanisms for making cooperation successful in bio-based sectors. Given my expertise, the document could better emphasize:

(A) More Detailed Role of Industry in Driving Bioeconomy Innovation

- The lessons learned focus a lot on academia and policy, but industry involvement is not well explained.
- Industries often resist change due to market risks—what incentives and mechanisms (e.g., tax benefits, regulatory support, venture capital funding) can encourage their deeper engagement?
- The document should address how biopolymer producers, chemical companies, and agribusinesses can be integrated more effectively.

(B) Overcoming Research-Industry Gaps in the Quadruple Helix

- The document does not fully explore the challenge of commercializing bio-based innovations.
- Many academic bioeconomy projects (like PHA research) struggle to reach industrial scale due to funding, IP issues, or lack of business knowledge.
- Proposed Fix: Introduce Technology Transfer Offices (TTOs), public-private pilot programs, and industrial co-creation labs as mechanisms for bridging research and market deployment.

(C) Addressing Conflicts Between Stakeholder Priorities

- The document assumes that all sectors in the Quadruple Helix naturally align, but in reality, conflicts between economic, environmental, and social goals often arise.
- Example: A PHA biopolymer company wants to scale up production, but local farmers may be hesitant to supply non-food biomass, fearing economic risks.
- Proposed Fix: Discuss conflict resolution mechanisms, such as multi-stakeholder negotiation platforms or incentive-aligned contracts.

Expert No. 2

I don’t have sufficient knowledge of the subject to answer.

Expert No. 3

The conclusions are reflected.

Expert No. 4

Yes, the lessons learned presented in the document are accurately reflected. I would add to the list "giving yourself permission to 'fail' in cooperation" – not all cooperations need to succeed and from my experience giving the process explicit permission to 'fail' really helps. Especially, in the early stages of co-operation development.

Expert No. 5

The text is clear, a quadruple helix model is commonly used in stakeholder engagement, here the concept is translated to the specificity of the intersectoral cooperation in more technologicaloriented objectives of collaboration.

Expert No. 6

An emphasis on early engagement and flexibility among collaborating groups and sectors may be crucial.

2) Do you agree with the emphasis on early engagement and flexibility?

Expert No. 1

Yes, I strongly agree, but it needs more structure.

- Early Engagement is Critical—bioeconomy projects (like biopolymers, green solvents) require early collaboration between scientists, policymakers, and industry to align regulations and funding.
- Flexibility is Necessary—because bioeconomy sectors face uncertain markets and evolving regulations, cooperation models must allow for adaptation and iteration.

What's Missing?

While flexibility is emphasized, the document does not offer concrete methods for managing flexibility in cooperation frameworks.

- How do stakeholders adjust to unforeseen challenges? ○ What governance models enable adaptive decision-making?

- Proposed Fix: Introduce an Adaptive Management Framework—a structured process where bioeconomy stakeholders conduct regular reviews, pivot strategies based on real-world data, and co-develop contingency plans.

Expert No. 2

I can't see anything clearly wrong with that!

Expert No. 3

I agree that early involvement and flexibility are very important for the success of cooperation.

Expert No. 4

Yes, totally. However, I would emphasize the "giving yourself permission to 'fail'" as a more important success factor than the one presented above.

Expert No. 5

I do agree with the emphasis on early engagement and flexibility, I would see the equally important issue of clear communication and well defined common objectives as one of the fundamental elements influencing the good collaboration of actors representing different sectors (those objectives can be different to each stakeholder (particular needs) bur common understanding of the end-point of collaboration is crucial for the success.

Expert No. 6

A specific example of success resulting from this approach can be added—mainly to support the abovementioned thesis.

4. Developing Intersectoral Cooperation Procedures – Step-by-step guide to designing and implementing cooperation

1) Are the procedures clear? *Expert*

No. 1

YES!

Expert No. 2

They seem clear!

Expert No. 3

No answer

Expert No. 4

Yes, the steps presented are clear.

Expert No. 5

In the section Developing Intersectoral Cooperation Procedures, four steps are indicated, the most important of which is the first, as it builds the basis for cooperation, but is also based on a very carefully defined common understanding of the purpose of the action, and this should be particularly emphasised. This will enable both the correct analysis of the sectors involved, as well as the mapping of resources, but above all it will identify the correct synergies and complementarities and finally indicate the possible creation of new business models.

Expert No. 6

The procedures are logical and well-structured.

2) Are there any steps that seem unrealistic?

Expert No. 1

Yes, some steps lack practical details or understate key challenges in intersectoral cooperation, particularly in bio-based industries like biopolymers and green solvents.

(A) Step 2: Designing Business Combinations – Lacks a Clear Mechanism for Technology Transfer & Scaling

- The document assumes that once synergies are identified, businesses will easily collaborate, but in reality:
- Technology transfer from academia to industry is slow due to IP issues and funding gaps.
- Scaling bio-based materials requires regulatory approval, specialized equipment, and high capital investment.
- Why This is Unrealistic?
- It doesn't account for the 'Valley of Death' (TRL 4-6), where many bio-based innovations fail due to a lack of investment for pilot and demonstration-scale projects.
- It doesn't address risk-sharing models to encourage large industries to adopt biobased solutions.

Proposed Fix:

- Introduce a dedicated sub-step for Technology Transfer with:
- Public-private co-financed pilot programs. ○ IP-sharing agreements for easier commercialization.
- Regulatory fast-track pathways for bio-based products.

(B) Step 4: Implementing and Testing Procedures – Scaling is Described Too Simplistically

- The document suggests that after a successful pilot, scaling and commercialization will follow naturally, but in reality there is:
- No clear market-entry strategy outlined.
- No mention of venture capital or financing models to move from pilot scale to market production.

- No risk assessment for scaling failures.

Proposed Fix:

- Add Scaling Readiness Levels (SRLs) similar to Technology Readiness Levels (TRLs) to guide scale-up strategies.
- Introduce a Funding & Investment Section detailing:
  - EU Green Funds, Bioeconomy Venture Capital, Circular Economy Investment Schemes.
- Propose risk-mitigation strategies, including:
  - Joint ventures between academia and industry.
  - Flexible pricing and market-entry subsidies for bio-based materials.

Expert No. 2

I don't think that any of them seem unrealistic.

Expert No. 3

No answer

Expert No. 4

As raised before in the document, experiences of successful cooperations I have are not rotted in 'positive' cooperation aimed at pulling resources to tap into big opportunities together. Rather they are rooted in 'negative' realities of 'we cannot achieve XYZ alone, so we need to co-operate'. I think this pathway should be emphasized or at least presented as an alternative pathway to the one already presented in the document.

Expert No. 5

No answer

Expert No. 6

The procedures are logical and well-structured.

3) What improvements would you suggest to enhance the practicality of these steps?

Expert No. 1

To make these steps more actionable and aligned with your experience in bioeconomy innovation, I recommend to:

(A) Add a Technology & Business Readiness Framework

- Define Technology Readiness Levels (TRLs) and Scaling Readiness Levels (SRLs) to guide stakeholders on when and how to scale innovations.
- For instance, a PHA biopolymer project moving from TRL 5 (lab scale) to TRL 8 (precommercial scale) needs:
    - Industrial partnerships.
    - Pilot plant investment.
    - Regulatory approvals.
- Adding clear TRL/SRL indicators will help stakeholders align their expectations and investment timelines.

(B) Introduce Risk Mitigation & Adaptive Business Models

- Many bioeconomy collaborations fail due to market volatility and uncertain ROI.
- The document should include adaptive business models, such as:
    - Subscription-based pricing models for bio-based materials to secure demand.
    - Public-private cost-sharing initiatives to lower risk for industries adopting new materials.
    - Green procurement policies to create stable demand for bio-based solutions.

(C) Strengthen Funding & Investment Strategies ○ Provide a dedicated funding roadmap listing:

- EU Horizon Europe, Bio-Based Industries Joint Undertaking (BBI JU)(now CBE JU), and national green investment grants as sources of financial support.
- Venture capital funds focused on bioeconomy start-ups.
- Cooperative financing models (e.g., industry-academia funding pools).

(D) Improve Stakeholder Alignment Mechanisms

- The document mentions stakeholder engagement, but it doesn't provide a structured collaboration framework.
- Add regular multi-sectoral roundtables and structured coordination mechanisms (e.g., a bioeconomy cluster governance model).

Expert No. 2

Financial assessment – I don't think I am seeing sufficient emphasis on the assessment of financial profitability of a cooperation. Per my experience, success in cooperation is dictated by profits, not potential. Without a clear vision (and of course execution) of how to precipitate potential into monetary gain any project must inevitably fail.

Expert No. 3

I propose that you consider adding:

Step 1: Is there a need for a product or service – market research, competition and include the following:

- Understanding market demands and how different sectors can collaboratively meet these needs.
- A market-driven approach where the development of new products or services is guided by existing or emerging demands.
- Engaging in stakeholder consultations and market research at this stage is crucial for accurately assessing demand and identifying opportunities that are economically viable and

socially desirable. Additionally, considering global trends and policy directions can help align cooperation efforts with broader sustainability goals and regulatory frameworks.

Step 2: Considerations instead of Identifying Potential for Intersectoral Cooperation, I propose: Mapping the potential of intersectoral cooperation participants

Expert No. 4

As above in question 2., plus formatting (use of boxes) and providing specific example(s) to illustrate high-level points made.

Expert No. 5

This section should come back and point out the importance of the KPIs in organising collective work on the way to a collectively agreed (and correctly understood) goal for the whole project.

Expert No. 6

It may be worth considering adding more details/instructions on how to monitor the effectiveness of the collaboration and adapt if there are problems.

5. Conclusions and Recommendations – *Summary of findings and suggested actions*

1) Do the conclusions reflect the main points that you consider important?

Expert No. 1

This comes out after the comments above from my area of expertise (biopolymers/DES, scaling up etc):

1. While the conclusions align with the general findings of the document, they lack specificity in terms of bio-based industry challenges, particularly:

- How intersectoral cooperation benefits specific bioeconomy sectors like biopolymers, green solvents, or industrial symbiosis.

- What's required to move from cooperation frameworks to real-world implementation?
- Scalability and commercialization of bio-based innovations are not emphasized enough.

Proposed Fix: The conclusion should include a stronger link between research, industry, and commercialization, particularly:

- Need for dedicated funding mechanisms for scaling bio-based innovations.
- Integration of technology transfer models to reduce commercialization gaps.
- Industrial symbiosis strategies to make bio-based value chains more circular and efficient.

Expert No. 2

I believe conclusions do capture the material provided, whether it agrees with my assessment or not.

Expert No. 3

No answer

Expert No. 4

Yes, important points are raised in the conclusions.

Expert No. 5

Conclusions are highlighting the relevant information.

Expert No. 6

The conclusions summarize the main issues well.

2) Are the recommendations actionable and relevant?

Expert No. 1

No answer

Expert No. 2

They are relevant per material provided.

Expert No. 3

No answer

Expert No. 4

Unfortunately not. For me while the points reflect the main points that I consider important, the points are very high-level.

I already made a series of comments in this evaluation—focus on creating spaces for co-creation to be explored, letting yourself the ability to 'fail', start from the pain point rather than big potential, including case studies—are all examples of how to make this document and its conclusions significantly stronger.

Finally, some stakeholders—like Government Agencies—have significant resources available to engage in the co-creation processes and co-operations discussed in the document. Some others—like farmers and other civil society actors—have much smaller means to participate in the intersectoral co-operation. Hence continuous engagement from some stakeholders can be a real challenge unless 'positive discrimination' approach is used. This should be part of the documents' narrative and recommendations.

Expert No. 5

No answer

Expert No. 6

The message is quite clear.

3) Are there any additional recommendations you would propose?

Expert No. 1

A) Strengthening the Commercialization Pathway for Bio-Based Innovations

- Problem: Many bio-based materials and green chemistry solutions struggle to reach full market adoption.
- Solution: Introduce a dedicated funding pipeline to support TRL (Technology Readiness Level) advancements:
    - TRL 4-6 (Lab to Pilot Scale): Co-financed pilot projects between academia and industry.
    - TRL 7-9 (Commercialization): Venture capital-backed funds for bio-based start-ups.
- Proposed Mechanism:
    - Create dedicated bioeconomy accelerators for market-driven bio-based innovation.
    - Use EU Innovation Fund & Horizon Europe grants to finance pilot-scale bioeconomy projects.

(B) Creating Risk-Mitigation Strategies for Intersectoral Partnerships

- Problem: Industries are hesitant to invest in untested bio-based solutions due to long ROI cycles and uncertain demand.
- Solution:
    - Introduce risk-sharing models where government and private investors co-fund biobased industry projects.
    - Implement green public procurement policies to guarantee stable demand for biobased materials (PHA, bio-solvents, etc.).

(C) Encouraging Industrial Symbiosis & Circular Bioeconomy Models

- Problem: The document mentions intersectoral cooperation but does not propose tangible frameworks for industrial symbiosis.

- Solution:
    - Establish bio-based material exchange platforms where industries can trade waste products (e.g., agricultural waste used for PHA production).
    - Promote cross-sectoral bio-refinery models that integrate agriculture, forestry, and chemical industries.

(D) Implementing Technology Transfer Hubs & Open Innovation Models

- Problem: The gap between research and industry adoption is significant.
- Solution:
    - Create technology transfer hubs where universities and industries collaborate on scaling bio-based innovations.
    - Promote open innovation models where multiple stakeholders co-develop solutions, reducing time-to-market for sustainable materials.

Expert No. 2

I believe they are relevant, I can't consider them actionable, however. It seems they are still too broad at this point.

Expert No. 3

I propose to include in the Conclusions and Recommendations the need for:

- Evaluation of activities conducted so far and identification of good practices
- Mapping the potential of institutions to get involved in the work of committees and teams, so that their activity is as effective as possible
- Development and launch of a dedicated internet platform developing interdisciplinary cooperation, serving to match partners, use of services in developing activities, e.g. accredited research units, advisory institutions, sources of financing, including EU funds, training, courses, studies in the field of intersectoral cooperation
- Review of existing support instruments and selection of the most effective methods of financial support

In addition, I propose to give priority to the economic justification of projects implemented sustainably.

Expert No. 4

Please see my answer in point 2. above to see the additional recommendations proposed.

Expert No. 5

What is missing, however, is an introductory paragraph synthetically introducing the following points - recommendations given the SMART and quadruple helix approach presented earlier. The introduction to the whole document points out that "The scope of the document is broad, encompassing various sectors within the bioeconomy and providing general procedures that can be adapted to different national and sectoral contexts. The focus of the document is on delivering a framework that is transferable and applicable across a wide range of settings".

In contrast, the recommendations appear to be aimed at one group - policy makers (because: promoting public awareness and engagement, creating educational programmes, providing targeted financial support through grants, subsidies and tax incentives, points rather to a public actor with the power (financial) to create new 'policy'-tools), although there is no indication in this introduction who the document is aimed at.

Expert No. 6

Of course, it is worth considering adding recommendations for international regulatory alignment and harmonization.

6. Annex: Toolbox – Practical Solutions to Enhance Intersectoral Cooperation - *Overview of tools for setting SMART objectives, stakeholder mapping, engagement planning and MoUs to support intersectoral cooperation*

1) Are the tools provided practical and easy to implement?

Expert No. 1

Yes

Expert No. 2

General impression: I got lost. This might be because I tend to assess based on financial metrics, while the material presented appears to accept pre-determined ideological or politically-derived metrics as fundamental. For instance, it is not immediately clear to me why 'Increase the use of bio-based materials in local manufacturing by 20%' would be considered a valid goal. I think it should be a derived, not a set metric, and it should be derived from an underlying financial goal. Then, solutions should be proposed to construct the financial goal. For instance:

- How much profit can we sacrifice to source different materials than currently (e.g. expand the use of bio-based materials);
- How much external cost to society do we want to avoid by sourcing different materials;
- How much in savings can we generate internally by sourcing different materials;
- How much added revenue can we generate by sourcing different materials.

The decision on % of biobased materials used should be educated by the following line of reasoning, not the other way round—per my experience in the field.

Expert No. 3

The introduction effectively explains what intersectoral cooperation is, its key components, and its defining features. This provides a solid foundation for understanding the context of the toolbox.

Regarding the tools presented, they appear to be practical and easy to implement. The structured approach, including SMART objectives, stakeholder mapping, engagement planning, and MoUs, ensures clarity and applicability in diverse intersectoral settings. These tools provide actionable steps that can facilitate cooperation between different sectors.

Expert No. 4

No answer

Expert No. 5

A very good annex presents 4 tools that can be used by collaborative groups to organise their work, or inspire such arrangements.

Expert No. 6

Yes, the tools included in the annex are practical and tailored to the real needs of stakeholders. They are intuitive and enable a systematic approach to cross-sectoral cooperation. The use of the SMART framework for defining goals and the tools for mapping and engaging stakeholders is particularly helpful. Their structure allows for flexible adaptation to different bioeconomy projects.

2) Which tools do you think will be the most useful for enhancing intersectoral cooperation, and why?

Expert No. 1

Stakeholder mapping tool and MoU

Expert No. 2

No answer

Expert No. 3

Among the tools, stakeholder mapping and engagement planning seem particularly valuable for enhancing intersectoral cooperation. Understanding key actors, their interests, and the best ways to engage them is crucial for successful collaboration. Additionally, the use of MoUs helps formalize commitments, ensuring long-term sustainability of partnerships.

Expert No. 4

No answer

Expert No. 5

I highlight the SMART Objectives Alignment Framework approach and the Stakeholder Mapping Tools as the most useful for enhancing intersectoral cooperation because they are 1/ reworked and well documented in the literature, so with a guarantee of effectiveness if well understood and applied, 2/ structuring approach facilitating grouping of stakeholders to be activated.

I find very useful the tools: Stakeholder Engagement Plan Template/ especially Figure 5: Example of the Stakeholder Engagement Plan/ and a very practical version (sample) of Memorandum of Understanding (MoU) on Intersectoral Cooperation within Bioeconomy. Both are applicable as an inspirational, model approach to the process of network building.

Expert No. 6

- SMART Objectives Alignment Framework—allows for precise definition of cooperation goals, which facilitates its management and monitoring.
- Stakeholder Mapping Tools—is crucial for identifying and engaging the right stakeholders, which increases the chances of project success.

  Memorandum of Understanding (MoU)—formalizes cooperation and ensures long-term commitment of the parties, which is important for the stability of cross-sector projects.

These tools help build trust, a clear structure of cooperation and avoid conflicts at different stages of project implementation.

3) Are there any additional tools or resources you would recommend including in the toolbox?

Expert No. 1

(A) Technology Transfer & Commercialization Strategy Tool

Why Needed?

- The annex lacks a tool to help research-based innovations reach industry adoption.
- Many bio-based projects fail to transition from lab-scale to market-ready products.

What This Tool Should Include:

- A Technology Readiness Level (TRL) Tracker, helping stakeholders assess the maturity of their innovations.
- Checklist for scaling bio-based products, covering regulatory approval, infrastructure needs, and investment requirements.
- Guidance on industry partnerships, focusing on how to pitch bio-based innovations to investors and manufacturers.

(B) Bioeconomy Funding & Investment Roadmap

Why Needed?

- Intersectoral cooperation in the bioeconomy often fails due to lack of investment at critical scaling stages.
- Current tools do not address funding strategies, making implementation difficult.

What This Tool Should Include:

- List of EU and national funding sources for bio-based projects (Horizon Europe, Bio-Based Industries Joint Undertaking, Circular Bioeconomy Investment Funds).
- Step-by-step guide for securing funding at different TRL stages.
- Financial risk-sharing models (e.g., government-backed co-financing, industry-academia investment pools).

(C) Circular Bioeconomy Value Chain Integration Tool

Why Needed?

- The annex lacks a tool for integrating industrial symbiosis strategies into bioeconomy projects.
- Many bio-based projects do not plan for circularity from the start, leading to inefficiencies.

What This Tool Should Include:

- Waste valorization assessment—identifying how by-products from one sector can be raw materials for another (e.g., agricultural waste as a substrate for PHA production).
- Circular bioeconomy business models, mapping how resources circulate within bio-based industries.

- Checklist for industrial symbiosis partnerships, ensuring cross-sector waste integration is part of cooperation agreements.

Expert No. 2

No answer

Expert No. 3

At this stage, no additional tools or resources seem necessary, as the toolbox already provides a comprehensive and well-structured set of solutions. However, further emphasis on the benefits of intersectoral cooperation—particularly its impact on the bioeconomy, its advantages, and the added value of such collaborations—could further strengthen the introduction. That said, the current explanation is clear and well-developed.

Expert No. 4

Consider adding not only static tools (which are great), but also include process tools—like workshop formats, guidelines for facilitators, etc.—to actually run the processes mentioned in the other parts of this document.

Expert No. 5

No answer

Expert No. 6

Case studies of successful cross-sector projects—will allow stakeholders to better understand how the tools can be used in practice.

Digital platforms for managing collaboration, e.g. collaborative project management tools (Trello, Asana) that can help with ongoing communication and coordination of activities.

Methods for monitoring and evaluating collaboration, e.g. success indicators for cross-sector collaboration that will allow for progress assessment and improvements.

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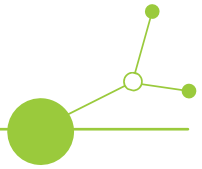
A1.3 Transnational testing of intersectoral cooperation procedures

D 1.3.2 Transnational peer review of draft procedures for bioeconomy intersectoral cooperation



National peer review report: Slovakia

Bioeconomy Cluster

Content

Executive Summary

Country: Slovakia

Institutions involved: Slovak University of Agriculture in Nitra, Union of Slovak Clusters

Number of stakeholders involved: 2

Summary of key findings from the peer review: The document effectively defines intersectoral cooperation, providing a clear understanding of its relevance across various sectors. The benefits of collaboration are highlighted and the key aspects that contribute to sustainable bioeconomy are outlined. While the identified barriers are comprehensive, the differentiation between financial, human and technological resource constraints should be emphasized. The proposed procedures are well-structured and logically presented, making them accessible to stakeholders. However, the implementation phase would benefit from stronger policy support to ensure effectiveness. Finally, the tools outlined in the document are practical and designed to be userfriendly – they provide structured general methodologies that stakeholders can easily adopt according to their needs. However, incorporating additional tools could further enhance the document by offering practical examples of successful intersectoral cooperation.

1. Findings from Peer Review Process

1.1. Introduction

The introduction provides comprehensive definition of intersectoral cooperation in the bioeconomy and highlights its relevance across multiple sectors. Also, it emphasizes how intersectoral cooperation fosters innovation, resource efficiency and sustainable value chains. The role of research and knowledge-sharing in driving sustainable solutions is outlined too. The introduction focuses mainly on the benefits, but does not include potential difficulties that are later discussed in the document. Moreover, also other industries can be mentioned in addition to sectors named in the document.

1.2. Identified Barriers and Challenges

The document categorizes barriers and challenges in a structured way, ensuring the main obstacles are covered. The barriers align with real-world experiences, but it was suggested to better acknowledge that resource constraints affect especially small businesses or farmers. In addition, it was recommended to list the challenges at the beginning for better clarity as well as to differentiate the financial, human and technological resource limitations. Furthermore, the absence of structured stakeholder engagement methodologies at the policy level was highlighted as a critical barrier.

1.3. Quadruple Helix Approach

During the peer review, the emphasis on early engagement and flexibility was supported. Also, the importance of adaptive management and leveraging previous collaborations was highlighted. Furthermore, it was emphasised that the cross-sectoral cooperation is needed also during the

implementation phase, especially at the policy level. Regarding the engagement of relevant actors, it was stressed that the role of clusters should be emphasized too.

1.4. Developing Intersectoral Cooperation Procedures

The step-by-step procedures were considered clear and logically structured – each step is well explained, making it accessible for various stakeholders. It was pointed out that cooperation between different sectors is often time-consuming, whereby the partnership-building is more politically and economically sensitive than outlined. Moreover, incorporating risk assessment strategies was suggested too – together with policy support, financial incentives and various mechanisms for resolving conflicts – these were recommended to mitigate potential obstacles. It was also mentioned that the information within section is sufficient, but the need for better policy implementation strategies was reiterated.

1.5. Conclusions and Recommendations

The conclusions were seen as accurate and relevant, as they effectively summarize the key aspects of intersectoral cooperation in the bioeconomy. Generally, the recommendations are well structured and relevant to intersectoral cooperation and only one additional recommendation was suggested – to distinguish between policy preparation and implementation. Identifying and engaging key decision-makers was emphasized as a crucial factor for success. Furthermore, leveraging existing knowledge-sharing platforms like AKIS, EIP Operational Groups, Living Labs and thematic networks was stressed too, as they are very relevant in knowledge sharing.

1.6. Toolbox for Enhancing Cooperation

The tools outlined in the annex are seen as practical and designed to be user-friendly, as they provide structured general methodologies that stakeholders can easily adopt to their specific needs. It was highlighted that effective management strategies are essential for long-term collaboration. Particularly the Stakeholder Engagement Plan Template was highlighted as helpful for ensuring the continuous communication, commitment and alignment of interest among different sectors. Moreover, adding some case studies and even the best practice database was recommended, as including real-world examples of successful intersectoral cooperation in bioeconomy projects could provide inspiration and practical insights.

2. General Comments and Observations

The review process highlighted the need for a stronger connection between policy drafting and its implementation. The stakeholders participating in the peer review process emphasized that crosssectoral cooperation should not end with planning, but should extend into execution and monitoring. Existing initiatives should not only be leveraged but also linked together to avoid redundancy and maximize the effectiveness.

3. Next Steps and Recommendations

To enhance the document further, several key steps and recommendations were suggested. The introduction could be revised to briefly acknowledge potential difficulties, such as regulatory

barriers, funding limitations and sector-specific challenges. Additionally, it was suggested that more industries could be explicitly referenced to ensure inclusivity.

The section on barriers and challenges could be refined by listing them upfront and distinguishing between different types of resource constraints, including financial, human and technological limitations.

The role of clusters in fostering the collaboration could be emphasized within the Quadruple Helix Approach, and cooperation should be extended beyond planning into the policy implementation phase. Strengthening this connection highlights that the strategies need to be translated into actionable results.

Risk assessment strategies could be incorporated into the procedural steps to mitigate potential political and economic obstacles. This includes introducing policy support mechanisms or financial incentives.

The toolbox could be expanded by including real-world case studies and the best practice database, offering practical examples of successful intersectoral cooperation. These additions can provide valuable insights and guidance for stakeholders navigating similar initiatives.

4. Conclusions

The peer review process provided valuable insights into refining the draft procedures for bioeconomy intersectoral cooperation. The feedback highlights the importance of comprehensive stakeholder engagement, clear policy implementation strategies and practical tools that enhance collaboration. Addressing the suggested improvements will enhance the document's effectiveness in fostering sustainable bioeconomy partnerships.

A key takeaway from the review process is the necessity of balancing theoretical frameworks with practical implementation. While the proposed procedures are well-structured, their success depends on adequate policy support, clear risk mitigations strategies and the inclusion on actionable recommendations. Strengthening the connection between policy drafting and implementation will ensure that strategies translate into tangible outcomes. Ensuring active involvement from decision-makers, enhancing stakeholder engagement and leveraging real-world examples will contribute to a more effective and sustainable approach to intersectoral collaboration.

Annex 1: Peer review at national level

The individual results of peer review at national level.

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BIOECO-UP

A1.3 Transnational testing of intersectoral cooperation procedures

D 1.3.2 Transnational peer review of draft procedures for bioeconomy intersectoral cooperation

National peer review report: Slovenia

UL BF & ISD

Content

Executive Summary

Provide an overview on the national peer review process and its objectives. Summarize key findings from the review and outline the most significant conclusions:

- Country: Slovenia
- Institutions involved: Anteja ECG, CircularChange
- Number of stakeholders involved: 2
- Summary of key findings from the peer review:

The peer reviews provided valuable feedback into the challenges and opportunities associated with fostering collaboration across different bioeconomy sectors and industries.

While the draft procedures effectively highlight intersectoral collaboration in research, they do not adequately address the critical phase of market deployment at Technology Readiness Levels (TRL) 8–9. Overcoming barriers at this stage, including commercialization and scaling up technologies, is crucial for effective bioeconomy development.

Institutional silos, especially in traditional industries (100+ years old), hinder innovation and collaboration. Companies often face difficulties in identifying strategic partners and navigating complex value chains. Additionally, fragmented governance and a lack of coordination between ministries create challenges in policy alignment and resource allocation.

Early and flexible engagement among stakeholders is essential for successful cooperation. However, financial incentives tend to dominate decision-making processes, necessitating the framing of sustainability initiatives in terms of economic value. Furthermore, market demand should drive business decisions to ensure long-term success.

There is a pressing need for national policy frameworks to provide clear strategic directions for businesses in the bioeconomy. Without such guidance, investment risks increase, and private sector engagement remains limited. Additionally, improved monitoring mechanisms are necessary to track progress and measure the effectiveness of bioeconomy initiatives.

The stakeholder mapping tool is particularly useful for strengthening cooperation. Further integration of data-driven decision-making tools, such as VCG.AI for analytics and Material Flow Mapping for resource tracking, could support more efficient and informed collaboration.

1. Findings from Peer Review Process

This section will summarize the feedback received in each section from the reviewers. Refer to the corresponding sections in the peer review table template.

1.1. Introduction

Summary of participant's feedback on the introduction of the procedures, including:

- Clarity of scope and importance of intersectoral cooperation.

The feedback highlights that the introduction effectively defines the scope and significance of intersectoral cooperation within the bioeconomy. It acknowledges the importance of collaboration across sectors to foster innovation and sustainability. While the introduction provides a strong foundation, participants suggested expanding its scope to address the challenges of commercializing mature technologies, more systematic approach and thinking, fostering industryresearch collaboration beyond the early research phase, and improving access to market intelligence for businesses seeking to engage in intersectoral cooperation.

- Suggestions for additional perspectives and missing elements, if any.

1.2. Identified Barriers and Challenges

Comprehensiveness of barriers:

- Were the barriers and challenges identified sufficient?

The identified barriers and challenges in intersectoral cooperation within the bioeconomy are largely comprehensive. However, some critical aspects require further emphasis, particularly the persistence of institutional silos in traditional industries, the complexity of fragmented value chains, and the limited openness to innovation among established enterprises. Additionally, challenges related to technical knowledge gaps and financial constraints significantly hinder the adoption of bioeconomic innovations.

- Did the feedback suggest any additional challenges?

The feedback highlighted additional challenges, notably the lack of coordination among government ministries and the absence of clear pathways for commercialization at advanced Technology Readiness Levels (TRL 8–9). The need for structured prioritisation in business

decisionmaking and better integration of technology providers with industry stakeholders was also emphasized.

- Did the findings align with national experience in intersectoral cooperation?

The findings align with national experiences in intersectoral cooperation, confirming that institutional rigidity, governance fragmentation, and insufficient market intelligence are common obstacles. The necessity of fostering collaborative platforms, enhancing policy coherence, and implementing structured monitoring mechanisms is crucial to support the successful transition towards a circular bioeconomy.

1.3.Quadruple Helix Approach

Lessons learned:

- How well were the lessons from round tables and stakeholder engagement reflected?

The lessons from round tables and stakeholder engagement were well integrated, particularly in emphasizing the importance of early stakeholder engagement and clear communication. The documents highlight the need for alignment between stakeholders from the outset to ensure effective collaboration in bioeconomy initiatives. However, challenges remain in maintaining shared goals and ensuring consistent understanding, as financial and strategic motivations often differ among participants. The documents also acknowledge the necessity of reinforcing key bioeconomy concepts to ensure all stakeholders have a common knowledge base.

- Was there consensus on the importance of early engagement?

There was strong agreement on the value of early engagement and flexibility within intersectoral cooperation. Early-stage discussions help to align expectations, define roles, and minimize conflicts, particularly in investment-heavy projects. The analysis underscores the necessity for adaptive strategies, as market shifts and technological uncertainties require consortia to be resilient. Examples such as biochar and insect bioconversion highlight the risks of rigid approaches. The documents stress that engagement must be not only technical but also strategic, ensuring that financial viability remains a core consideration alongside sustainability and other goals.

1.4. Developing Intersectoral Cooperation Procedures

Feedback on the draft procedures:

- Were the steps clear and realistic?

The steps outlined in the draft procedures are clear and logically structured. The framework provides a solid foundation for fostering intersectoral cooperation, with a well-defined step-bystep approach. The first step, in particular, aligns with established business practices and ensures clarity in decision-making. However, while the procedures themselves are well-articulated, the practical application might be challenging, especially for businesses struggling to translate strategic plans into concrete investments. A stronger emphasis on market demand and sectorspecific case studies could enhance their applicability.

No steps appear to be unrealistic; the structure reflects common industry methodologies, making it both practical and actionable. The logical sequencing of steps ensures that businesses and stakeholders can implement the guidelines effectively without facing major obstacles. The alignment with existing frameworks and strategies in the bioeconomy sector further strengthens the credibility and feasibility of the proposed procedures.

- Were any steps suggested for improvement?

To enhance the practicality of the steps, an additional component under business cooperation design could address decision-making bottlenecks. A prioritization framework for investment opportunities—based on criteria such as: market viability, risk assessment, and strategic fit—would help companies navigate complex choices with greater confidence. This would be particularly beneficial for businesses with limited resources, enabling them to allocate investments efficiently while maximizing impact.

1.5.Conclusions and Recommendations

Participants insights on the conclusions and recommendations:

- Did the conclusions align with the feedback received?

The conclusions largely align with the feedback received, particularly regarding the need for clearer national strategic direction to support bioeconomy investments. The main challenges identified—such as fragmented governance, institutional silos, and limited technical capacity—were reflected in the final conclusions. However, the experts emphasized that a stronger focus should be placed on the role of intersectoral cooperation in overcoming investment risks and scaling up mature technologies. Additionally, concerns were raised about the effectiveness of current monitoring frameworks, highlighting the need for more structured evaluation mechanisms to track progress and outcomes.

- Additional actionable recommendations proposed, if any.

The recommendations were generally considered actionable and relevant, especially regarding knowledge sharing, interdisciplinary studies, and education programs. However, the experts suggested further steps to ensure effective implementation. Strengthening monitoring frameworks with clear indicators was seen as essential to assess the impact of policy measures and industry initiatives. Moreover, there was strong support for establishing a specialized Slovenian Business Club dedicated to the circular bioeconomy. This would provide a tailored platform for industry stakeholders to collaborate, exchange best practices, and engage directly with policymakers.

1.6.Toolbox for Enhancing Cooperation

Feedback on the tools provided:

- Practicality and ease of implementation.

The tools provided in the annex are practical and relatively easy to implement. Their structured approach allows stakeholders to systematically define objectives, map key actors, and plan engagement strategies. The step-by-step methodology ensures clarity and usability, making it accessible for various organizations, regardless of their experience with intersectoral cooperation. However, while the tools are straightforward, their effectiveness depends on the availability of relevant data and stakeholder willingness to participate in collaborative initiatives.

- Most useful tools identified.

Among the most useful tools, the **Stakeholder Plan** stands out as a critical instrument for enhancing cooperation. By clearly identifying key actors and their roles, this tool helps to bridge communication gaps and align interests across sectors. Additionally, the **SMART objectives framework** ensures that cooperation efforts are measurable and results-oriented, facilitating a structured approach to project development. The inclusion of **Memoranda of Understanding (MoUs)** further strengthens partnerships by formalizing commitments and setting clear expectations.

- Suggestions for additional tools or resources.

To improve the toolbox, additional tools such as **VCG.AI** and **Material Flow Mapping** could be integrated. **VCG.AI** supports data-driven decision-making by providing insights into trends, optimizing resource allocation, and enhancing strategic planning. **Material Flow Mapping** helps visualize resource flows between sectors, identifying inefficiencies and promoting circular

economy principles. These tools would enhance transparency, foster informed decision-making, and support long-term collaboration.

2. General Comments and Observations

Summarize additional feedback/comments that reviewers may have shared outside the structured table format. This may include observations on the overall process, methodology, or unforeseen challenges.

One of the experts expressed his personal view from the field and pointed out concrete problems while working alongside the industry.

3. Next Steps and Recommendations

Identify key actions that should be taken based on the national peer review results. These may include revisions to the procedures, additional stakeholder engagement, or further research.

The experts pointed out that procedures should place greater emphasis on overcoming institutional silos and rigid business models that hinder cooperation and clear pathways for intersectoral collaboration should be outlined, particularly in later stages of technology development (scale-up). There was a suggestion of a specialized Slovenian Business Club that could be established to support industry stakeholders in the circular bioeconomy. But in reality this could be combined with already existing platforms or HUBs, because Slovenia is a small market and all the players already know each other.

A comprehensive national strategic framework for the bioeconomy sector should be developed to provide businesses with clear investment guidelines.

4. Conclusions

Indicate the primary takeaways from the peer review. Summarize the overall value and outcomes of the peer review process in advancing intersectoral cooperation for the bioeconomy.

The peer review confirmed the need to strengthen intersectoral cooperation in the bioeconomy, particularly in bridging the gap between research and commercialization. Effective collaboration between technology providers and industry remains a challenge, with companies struggling to find strategic partners and market opportunities. Key barriers include institutional silos, rigid business

models, and fragmented value chains. The lack of coordination between government ministries was identified as a major obstacle, highlighting the need for interministerial cooperation.

The Quadruple Helix approach was recognized as effective when engagement starts early and remains flexible. The review emphasized the importance of clear national policies, stronger monitoring mechanisms, and industry-focused networks to enhance collaboration. Practical tools like stakeholder mapping and data-driven decision-making were recommended.

Annex 1: Peer review at national level

Please provide the individual results of peer review at national level.