From Strategy to Action for a Regional, Participatory, and Sustainable EU Bioeconomy

Evidence and recommendations from RuralBioUp, SCALE-UP, BioRural, and MainstreamBIO

JOINT POLICY PAPER

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Abstract

This Joint Policy Paper, developed by four Horizon Europe projects, RuralBioUp, SCALE-UP, BioRural, and MainstreamBIO, offers targeted insights and recommendations to support the review and update of the EU Bioeconomy Strategy. It emphasizes the critical role of rural communities and primary producers in driving a sustainable, circular bioeconomy, while addressing persistent barriers such as knowledge gaps, limited financing, and policy disconnects. The paper focuses on four priority areas: education and capacity building, biomass mobilization, policy coherence, and financial instruments—aiming to align EU ambitions with on-the-ground realities and empower rural actors as key agents of change.

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Introduction

The transition to a sustainable, circular bioeconomy is a cornerstone of the European Union's vision for resilient rural areas, economic growth, and climate neutrality (European Commission, 2018; 2022; 2024). This Joint Policy Paper, developed by the RuralBioUp, SCALE-UP, BioRural, **and** MainstreamBIO projects, presents evidence, targeted insights, and recommendations aimed at supporting the review and update of the EU Bioeconomy Strategy taking place in 2025. It highlights ways to empower rural communities, farmers, and local authorities, as key drivers of innovation and sustainability in the bioeconomy.

Rural areas are uniquely positioned to drive the bioeconomy, yet they face persistent challenges: fragmented knowledge exchange, underutilized biomass resources, and limited access to tailored financing and policy support. Importantly, recent studies and stakeholder consultations reveal a growing sense of dissatisfaction among farmers and primary producers, who often feel excluded from decision-making and distant from the policy frameworks shaping their future (European Commission, 2023; Borzacchiello et al, 2024). This disconnect can undermine the effectiveness and legitimacy of bioeconomy policies, as highlighted by the Joint Research Centre, which call for greater involvement of primary producers in strategy development and implementation (European Commission, 2024).

This policy paper addresses four critical topics for policymakers, with a particular focus on bridging the gap between policy and practice within rural areas and with rural actors:

- **Fostering Education, Capacity Building, and Knowledge Sharing in the Rural Bioeconomy:** Building skills and fostering knowledge exchange are essential to unlock rural bioeconomy potential. Investments in education and digital platforms can bridge gaps in technical expertise, enhance stakeholder engagement, and empower youth and underrepresented groups, as highlighted by the European Commission (2023) and recent JRC analyses (Borzacchiello et al., 2024).
- **Primary Producers and Biomass Mobilization in Regional Bio-based Value Chains:** Farmers and foresters are central to sustainable bio-based value chains. However, there is a need to address producers' concerns about exclusion from policy processes and economic development. Ensuring their active participation requires targeted training, improved market access, and support for innovative business models, in line with EU priorities for inclusive rural development (European Commission, 2024).
- **Strengthen Coherence Between the EU Bioeconomy Strategy and Key Sustainability Agendas:** Aligning the EU Bioeconomy Strategy with the Green Deal, the Farm to Fork Strategy, and climate objectives is vital. Policy coherence will help manage trade-offs and maximize synergies for environmental and economic sustainability. A consistent connection between EU bioeconomy policy aspirations and national/regional-level implementation for inclusive and sustainable bioeconomy transition needs to be ensured (Faulkner et al., 2024).
- **Economic incentives and financial instruments for scaling up bio-based projects:** Effective policy instruments and funding pathways are needed to scale up rural bioeconomy initiatives. Mapping existing policies and designing fit-for-purpose financing will accelerate the adoption of bio-based solutions and support long-term rural resilience. Financial support complements other policy provisions to improve collaborations in the value chain to harmonising different sectors under a common bioeconomy framework (Singh et al., 2021).

By advancing these priorities and directly addressing the concerns of farmers and primary producers, the new EU Bioeconomy Strategy can catalyze innovation, boost rural employment, and position Europe as a global leader in sustainable, circular value chains.

Methodology

This policy paper builds on the collective knowledge generated by the four Horizon Europe projects, all of which are actively engaged in supporting rural bioeconomy development across Europe. Each project applied context-specific methodologies to identify challenges, gather evidence, and formulate policy recommendations.

Methods included stakeholder surveys and semi-structured interviews, as well as the analysis of data and information collected through participatory observation during project activities or through desk review of outputs generated after their implementation. These approaches enabled the integration of multiple stakeholder perspectives, ensuring a grounded and representative evidence base.

The collected challenges were subsequently classified into thematic clusters aligned with the key focus areas of the policy paper: education and knowledge sharing, primary producers mobilization, policy coherence, and economic incentives. Within each cluster, evidence from different projects was synthesized and compared to identify recurring issues, innovative practices, and enabling conditions. This clustering process enabled a comparative analysis across regions and enhanced the robustness of the recommendations.

The policy paper was co-drafted through a collaborative and iterative process by all four sister projects. It also includes feedback gathered during a joint event in Brussels with other EU-funded bioeconomy projects. As part of the event, a dedicated policy session was held, culminating in a final roundtable discussion featuring key commentators from CEI-ES, DG AGRI, DG RTD, and the BIOEAST Initiative. This process ensured that the resulting document reflects both the diversity of rural contexts and the common challenges faced across regions and bioeconomy initiatives in Europe

Sources of Evidence

The evidence underpinning each thematic section of this policy paper stems from a wide array of project activities and stakeholder engagements implemented in the period 2022-2025 and collected across multiple regions and countries. While certain findings recur across themes due to their cross-cutting nature, each section draws on specific and complementary sources.

MainstreamBIO

- 7 Multi-actor Innovation Platforms with over 130 stakeholders within 7 countries
- 7 Workshops to scale-up innovations, **161** total participants
- 7 Mutual Learning workshops, **130** total participants
- 7 capacity building workshops, **160** total participants
- 7 co-creation workshops, **92** total participants
- 2 rounds of 7 Networking events and 7 Regional Awareness raising events (28 events in total)
- 10 webinars over **600** participants, 2 with specific focus on youth and woman participation
- Toolkit for a circular bioeconomy

RuralBioUp

- 9 Regional Hubs' action plans across 6 countries
- Survey to all 9 Regional Hubs
- 2 Mobilization and Mutual Learning activities, in Italy and in Belgium, with almost 400 participants
- 1 focus group with almost 30 participants

SCALE-UP

- 6 regional stakeholder platforms and numerous platform meetings held across the pilot regions
- A comprehensive needs analysis among stakeholders in the pilot regions with 104 individual inputs received
- 21 cross-regional stakeholder trainings with more than 1,200 participants
- 12 regional task forces for market assessment and business model design
- 6 student competitions with 452 students and teachers participating across the pilot regions

BIORURAL

- Stakeholder survey reaching over **400 bioeconomy actors** across Europe and **40 expert interviews** conducted in different EU regions to identify barriers and opportunities
- 43 national innovation workshops that captured grassroots stakeholders ideas on circular value chains
- Identification of systemic knowledge and capacity gaps **among primary producers, SMEs, and local policymakers**
- Development of a **pan-European knowledge base** to inform policy and support rural bioeconomy uptake
- Mapping and analysis of **success stories and innovation cases across rural and semi-rural areas**

Fostering Education, Capacity Building, and Knowledge Sharing in the Rural Bioeconomy

The European Commission recognizes that education and capacity building are pivotal in advancing bioeconomy policy, particularly through stakeholder engagement. As outlined in the "Enhancing Stakeholder Involvement in the EU Bioeconomy Policy" report and the European Research Executive Agency's note on bioeconomy's role in achieving a circular, low-carbon economy, these efforts are essential for fostering public understanding and engagement, thereby enabling an effective multi-actor approach.

Challenge description

The bioeconomy faces several critical challenges, especially in rural areas, where traditional agricultural practices and bio-based industries intersect. These challenges are multi-dimensional and cross-cutting, requiring concerted efforts across sectors and governance levels. Key issues identified include:

- **Fragmented Stakeholder Engagement:** There is a lack of inclusion of underrepresented groups—such as youth and women—and uneven participation of primary producers across regions. In addition, repeated consultation efforts without visible follow-up or tangible outcomes have contributed to stakeholder fatigue, particularly among rural actors.
- **Low Awareness of Bioeconomy Benefits:** Many rural communities have limited knowledge of the bioeconomy's potential contributions to sustainability, innovation, and local development, hindering the grassroots uptake of bio-based practices.
- **Gaps in Technical Skills:** Primary producers, SMEs, and local authorities often lack the technical knowledge and practical skills necessary to participate effectively in bio-based value chains.
  Lack of Sustained Networking and Knowledge Sharing: The absence of structured networks and knowledge-sharing platforms prevents the exchange of experiences, best practices, and successful models, limiting innovation across regions.
- **Communication Barriers:** Inefficient communication channels between researchers, businesses, policymakers, and local communities impede collaborative problem-solving and decision-making.

Addressing these barriers is not only crucial for the sustainable and inclusive growth of the bioeconomy but also for strengthening interconnected areas, such as local capacity-building and cross-sector collaboration, ensuring that rural communities can fully engage in and benefit from bio-based solutions.

Evidence and Analysis

The education and skills dimension of the bioeconomy remains a critical area for intervention, particularly in enabling rural actors to engage meaningfully in and benefit from bio-based value chains. Drawing on the outcomes of four Horizon Europe projects—RuralBioUp, SCALE-UP, MainstreamBIO, and BioRural—a set of cross-cutting themes emerges that highlights both structural gaps and opportunities for policy action.

These findings draw on diverse evidence collected across territorial contexts. RuralBioUp analyzed regional Action Plans and surveyed stakeholders from its Regional Hubs. SCALE-UP focused on stakeholder engagement, highlighting youth involvement in bioeconomy innovation ecosystems. MainstreamBIO explored inclusive strategies targeting youth and women in rural areas. BioRural contributed with a broad survey of over 400 bioeconomy actors and 40 expert interviews across

Europe, revealing systemic knowledge gaps, particularly among primary producers, SMEs, and local policymakers. The findings below synthesize key insights and inform policy recommendations.

- **Insufficient Systemic Understanding and Tools among Key Stakeholders:** Policymakers and local authorities often lack the systemic understanding and practical tools required to develop or support circular bioeconomy strategies suited to rural areas. This limits their ability to engage rural actors and mobilize local biomass resources. Survey results from RuralBioUp also highlight confusion around key concepts such as bioeconomy, circularity, and sustainability, further compounding the challenge.
- **Training Gaps for Primary Producers and Rural SMEs:** Farmers, forest owners, and rural SMEs—especially in remote areas—face limited access to practical, targeted training opportunities, reducing their capacity to engage in bio-based markets. Evidence from the RuralBioUp project highlights that this lack of capacity building also limits their ability to access existing support mechanisms, such as financial tools, and to participate in the co-creation of locally tailored bioeconomy strategies. Additional evidence from the BioRural workshops and surveys BioRural further supports this finding.
- **Fragmented and Outdated Educational Offers:** Current educational and training programs are fragmented, discipline-focused, and poorly aligned with the evolving skills needed for a sustainable, circular bioeconomy. Evidence from the SCALE-UP project shows that targeting high school students through educational events and student competitions can highlight the potential of the bioeconomy to create high-skilled jobs in rural areas, bridging the gap between outdated curricula and the skills demanded by the sector.
- **Weak Knowledge-Sharing Networks and Disconnected Local Clusters:** The lack of structured and continuous knowledge-sharing networks limits the dissemination of best practices and weakens cooperation among rural actors. Local clusters—when effectively supported—can enhance learning, collaboration, and trust, but rural stakeholders often face barriers in accessing innovation hubs typically concentrated near urban, industrial, or academic centers. Evidence from the RuralBioUp project—particularly, though not exclusively, from the Puglia, Marche, and Centru Regional Hubs—underscores these challenges.
- **Limited Digital Literacy for Effective Tool Adoption:** While digital platforms can enhance value chain transparency and connectivity, their adoption is often limited by low levels of digital literacy among key stakeholder groups—particularly in rural areas. Evidence from the RuralBioUp project, including experiences from the BIOEAST Hub and the Lombardy Hub highlight the importance of improving digital competencies to fully leverage the potential of these tools.
- **Low Youth Engagement in the Rural Bioeconomy:** Young people in rural areas are rarely exposed to bioeconomy career opportunities or innovation pathways, contributing to demographic decline and limiting long-term renewal of the sector. Evidence from the MainstreamBIO and SCALE-UP projects highlights the importance of engaging youth to ensure future participation and innovation in rural bioeconomy systems.

These findings are closely linked to broader goals like mobilizing local biomass, adopting circular models, and integrating producers into bio-based chains. Addressing these challenges requires strategic investment in skills development, cross-sector collaboration, and place-based knowledge to enable an inclusive and sustainable bioeconomy.

Policy Implications and Recommendations

To successfully advance the rural bioeconomy, it is essential to address persistent gaps in education, capacity building, and knowledge exchange. A multi-actor approach—engaging farmers, SMEs, policymakers, educators, and other stakeholders—is needed to build the skills and awareness required to activate rural bio-based value chains. The following recommendations aim to foster local ownership, improve access to opportunities, and align efforts with broader EU objectives such as the European Green Deal, the Farm to Fork Strategy, and the updated EU Bioeconomy Strategy.

- **Broaden the co-creation of the bioeconomy strategy to include diverse rural actors/communities**—beyond primary producers—through inclusive, participatory approaches. Involve youth, women, and low-income groups from the start, treating all actors as co-creators—not end-users—in defining needs and shaping training and innovation processes.
- **Develop Continuous Multidisciplinary Training for Policymakers and Local Authorities**: Establish long-term training programmes for policymakers and local authorities focused on bioeconomy value chains, circular economy principles, financial tools, and governance mechanisms. These programmes should enhance institutional capacity to design, implement, and support local bioeconomy strategies.
- **Promote Flexible and Targeted Skills Development through Micro-Credentials:** Encourage the uptake of micro-credentials, remote learning tools (e.g. MOOCs), and modular training to offer flexible, accessible learning paths. These should target farmers, SMEs, and other rural actors and address context-specific needs and emerging bioeconomy competencies.
- **Embed Practical Learning into Education and Training Pathways**: Integrate hands-on formats—such as hackathons, internships, and study visits—into vocational and higher education programmes. Collaborations between schools, universities, and rural businesses can help learners build transversal and entrepreneurial skills while addressing real-world bioeconomy challenges.
- **Valorization of Knowledge Sharing through Digital Platforms:** Invest in digital platforms that host training materials, best practices, and decision-support tools. These platforms should foster peer learning, knowledge exchange, and access to innovation among rural stakeholders, including policymakers, producers, and entrepreneurs.
- **Boost Youth Engagement in Rural Bioeconomy Pathways:** Organize educational events, awareness campaigns, and student competitions to promote the bioeconomy as a source of meaningful, high-skilled jobs in rural areas. Support initiatives that place youth at the center, building a sense of responsibility, ownership, and innovation (e.g., Youth Council, Youth Role Playing activities).
- **Support Multi-Stakeholder Hubs and Networks:** Establish and strengthen structured stakeholder hubs at regional, national, and EU levels to reduce fragmentation and mitigate stakeholder fatigue. Clustering actors—such as farmers, SMEs, academia, and local authorities—into coordinated networks fosters more efficient engagement, knowledge exchange, and co-creation. These hubs should be integrated into bioeconomy strategies and supported with dedicated funding, infrastructure, and facilitation services to ensure continuity and long-term impact.

By implementing these recommendations, rural areas can become active players in the sustainable and circular bioeconomy. Strengthening skills, knowledge flows, and collaboration mechanisms will empower communities to unlock local biomass potential, stimulate innovation, and contribute to a resilient green transition.

Good practice examples

Good practice on “Enhance Knowledge Sharing through Digital Platforms”

- RuralSpot **Establishing a Digital Knowledge Hub.** RuralSpot’s platform exemplifies the importance of creating accessible, interactive, and resource-rich digital platforms that foster knowledge sharing. The platform enables rural communities to exchange best practices, innovative farming techniques, and solutions to common challenges. A best practice here is to integrate features like online forums, webinars, and real-time updates, which support continuous learning and collaboration among users, especially for communities in remote areas.
- MainstreamBIO **Creates and implements a digital toolkit** to better match as well as to improve understanding of the bioeconomy through a suite of educational resources based on existing research findings and tools. MaistreamBIO co-creates and develops meaningful information, tools and resources to facilitate the development of the bioeconomy. The catalogue of technologies, business models and social innovations for small-scale bio-based solutions, identifies and inventories best practices for improved nutrient recycling practices in rural areas and finally develops, upgrades and integrates digital tools and support services in the MainstreamBIO digital toolkit
- BioRural toolkit contains over 90 scientific lectures/knowledge exchange recordings given by experts on key bioeconomy topics (Agriculture and Food, Forestry and Habitats, Aquatic biomass, Biochemicals and Biomaterials, Bioenergy) cross-cutting topics (eg. certification, EIA), and showcases of good practices. Each lecture contains a written summary and references for further study on the presented topic. In addition the BioRural toolkit is designed as a one stop shop facilitating knowledge exchange and contains materials including: bioeconomy factsheets, bioeconomy inventory, success stories, knowledge exchange material and practice abstracts.

Good practice on “Boost Youth Engagement in Rural Bioeconomy Pathways"

- SCALE-UP: **Organizing Student Competitions to Inspire Youth.** The SCALE-UP project effectively engages youth by organizing exciting student competitions that focus on bioeconomy innovation. A best practice is to create challenges that are educational, fun, and tied to real-world problems in rural areas. These competitions can be complemented by mentorship opportunities, ensuring young people gain insights into practical bioeconomy applications and are encouraged to pursue careers in agriculture and sustainability.

Good practice on “Support Multi-Stakeholder Hubs and Networks”

- **CUMA-Coopérative d'Utilisation du Matériel Agricole**. CUMA cooperatives demonstrate how farmers can collaborate to jointly invest in equipment that may be too expensive for individual farmers. A best practice is the development of transparent financial models and decision-making structures, ensuring that all members have equal access to the equipment and the benefits of shared investments. Establishing maintenance protocols and scheduling systems also enhances the cooperative’s effectiveness and reduces downtime.
- **GDA-Groupements de Développement Agricole.** GDA farmer associations effectively support innovation by creating networks where farmers can share new ideas, technologies, and best practices. A best practice is to facilitate regular meetings and workshops, where farmers can discuss innovations, challenges, and opportunities. Integrating support from technical experts and offering access to funding or grants for innovation projects helps foster a culture of continuous improvement and knowledge exchange among farmers.

- **MIPs-Multiactor Innovation Platforms** created in the MainstreamBIO project are regional networks comprising stakeholders from the entire value chain of the agri-food and bio-based sector, along with researchers, policy makers, farmers and civil society representatives. These networks have been established in seven EU countries, with varying profiles of bioeconomy-related contexts such as feedstocks, value chains, policy frameworks, stakeholder attributes, needs, perceptions, and socio-economic contexts. The MIPs aim to support collaboration, explore opportunities, co-create solutions, and drive innovation to mainstream small-scale bio-based solutions.

Primary Producers and Biomass Mobilization in Regional Bio-based Value Chains

The European Commission has actively supported the integration of primary producers into regional bio-based value chains, recognizing their pivotal role in biomass mobilization. The Joint Research Centre's 2023 report on “Biomass production, supply, uses and flows in the European Union” provides comprehensive data on biomass flows, highlighting the importance of sustainable biomass sourcing for food, energy, and materials. Additionally, the European Commission's Bioeconomy Strategy (2018) emphasises the need to strengthen and scale up bio-based sectors, with a focus on mobilizing stakeholders, promoting investments, and facilitating the deployment of sustainable biorefineries.

Challenge description

Primary producers – farmers, foresters, and fishers – form the cornerstone of the bioeconomy by supplying renewable biological resources. Yet, despite their central role, they are frequently underrepresented in bio-based value chains, limiting the equitable distribution of benefits and weakening the resilience of rural economies.

Several recurring barriers hinder their full participation:

- **Weak Communication Channels & Information Gaps:** Producers are often disconnected from downstream actors, resulting in a fragmented value chain and restricted economic opportunities. Ineffective communication between primary producers and downstream partners contributes to a lack of transparency and misalignment of incentives. Many producers lack access to timely and relevant information about bioeconomy markets, technologies, and best practices.
- **Ineffective Biomass Mobilization:** Many producers lack tools and knowledge to align biomass availability with processing demands (in terms of quantity and quality). Uncertainties about where, when, how, and in what volumes biomass becomes available, combined with insufficient awareness of market dynamics, contribute to low participation in regional bio-based value chains.
- **Insufficient Infrastructure for Biomass Handling and Storage**: Many primary producers lack access to local facilities for collecting, storing, or preparing biomass, which limits their ability to supply regional value chains in a consistent and cost-effective manner. This contributes to the underutilization of available resources and weakens the viability of decentralized bio-based systems.
- **Limited Integration in Emerging Bio-Based Energy Models:** New opportunities in community-led bioenergy and circular bioeconomy initiatives often remain out of reach for producers due to institutional, financial, or regulatory barriers. Without supportive frameworks, primary producers are unable to fully participate in or benefit from these locally rooted value creation models.

These challenges are particularly pronounced in rural areas, where producers face additional constraints related to geographic isolation, small operational scales, disconnection from innovation hubs, and limited infrastructure.

Evidence and Analysis

The findings presented here draw on evidence and experiences generated by four Horizon Europe projects that have engaged primary producers across diverse European contexts.

In particular, the SCALE-UP project, through its training programme and thematic seminars, involved over 1,300 participants from 32 countries, shedding light on how farmers and foresters experience

and navigate the bioeconomy. Complementing this, RuralBioUP explored new models of stakeholder engagement, piloting itinerant events that foster informal dialogue and stimulate collaboration among local actors. Meanwhile, MainstreamBIO focused on raising awareness and promoting innovation in small-scale bio-based solutions, with a strong emphasis on capacity building through webinars and in-person activities carried out across seven EU regions. Finally, BioRural provided a targeted suite of tools and learning platforms—including the BioRural Toolkit and a collection of success stories—to support biomass mobilization and knowledge transfer in rural areas. Together, these projects offer a comprehensive and grounded perspective on the opportunities, challenges, and enabling conditions for primary producers to actively participate in and shape Europe's bioeconomy.

Together, these projects provide a rich evidence base on how farmers, foresters, and other rural actors experience, understand, and shape the bioeconomy. The following key themes emerged:

- **Low Innovation Potential in Rural Areas:** As shown by the results of the BioRural survey to 400 rural actors, including primary sector adopters and non-adopters of innovations, the more rural, more remote, and smaller (individuals), the lower interest or readiness for investing and entering new businesses. Farmers and foresters working alone are less prone to entering into new bioeconomy value chains.
- **Integration Challenges across Rural Value Chains:** Persistent issues in communication, transparency, and coordination undermine trust and collaboration among stakeholders, limiting the integration and functioning of rural bioeconomy value chains. Evidence from the SCALE-UP and BioRural projects highlights the need for stronger facilitation mechanisms and shared governance models to foster cooperation.
- **Supporting Frameworks:** Effective participation of primary producers hinges on a supportive ecosystem – including regulatory clarity, financial incentives, and active institutional backing (SCALE-UP, BioRural). MainstreamBIO also emphasized the importance of awareness-raising as part of this support system.
- **The Importance of Cooperatives:** Cooperatives and producer organisations play a central role in facilitating bioeconomy development, e.g. in regions like Andalusia and North Macedonia. These structures support disseminating good practices, managing heterogeneous biomass, and fostering cooperation across the value chain. Cooperatives, differently to individual farmers, enable economies of scale, and benefit from personnel specialised in businesses and markets.
- **Successful Biomass Utilization:** A robust understanding of the entire production chain, conversion processes, and the interdependencies between sectoral dynamics and environmental constraints is of key importance to ensure effective mobilization of regional biomass resources.

Moreover, other cross-cutting findings from the projects are the following:

- **Education and Capacity Building:** Engaging producers requires targeted education on sustainable practices, diversification strategies, and bio-based value creation. For example, MainstreamBIO offered webinars and in-person events to highlight bio-based income opportunities for farmers and foresters; BioRural developed expert-led tutorials and capacity-building workshops to equip rural stakeholders with technical and practical knowledge; SCALE-UP facilitated field visits to showcase innovative practices on the ground.
- **Innovative Formats for Engagement:** Informal, flexible engagement spaces – such as itinerant events (RuralBioUP) or regional platform meetings (SCALE-UP) – have proven effective in enabling dialogue, fostering new connections, and broadening participation across stakeholder groups.
- **Empowerment through Co-Creation:** All four projects stress the need to move beyond passive involvement. Primary producers should be empowered to co-create strategies and solutions that reflect their local realities, building on good practices and peer learning (SCALE-UP, BioRural, MainstreamBIO).

- **Showcasing Tangible Innovation:** BioRural's success stories demonstrate how rural actors are already leading in bio-based innovation – from decentralized heating systems and logistics hubs for residues to community-driven energy initiatives.

Policy Implications and Recommendations

To enhance the integration of primary producers into bio-based value chains and ensure inclusive rural development, the following recommendations are proposed, reflecting the collective insights:

- **Promote the Role of Cooperatives and Producer Networks:** Encourage the formation and strengthening of cooperatives as key facilitators of the bioeconomy. Cooperatives can coordinate supply chains, promote collective branding, and serve as platforms for peer-to-peer learning and shared innovation.
- **Address Integration Challenges with Transparent Communication Tools:** Develop communication frameworks and tools that facilitate timely information exchange between producers and downstream actors. Transparency in contracts, pricing, and product specifications is vital for trust-building and sustained cooperation.
- **Enhance Regulatory and Institutional Support:** Strengthen policies that simplify procedures and reduce administrative burdens for primary producers. Provide clear guidance and support for navigating bioeconomy regulations, certification schemes, and funding opportunities.
- **Establish Support Structures for Value Chain Participation:** Ensure that producers have access to advisory services, market intelligence, and technical assistance tailored to bioeconomy contexts. Public institutions, rural development agencies and regional chambers of agriculture should play an active role in supporting producers' engagement.
- **Provide Support Services for Effective Biomass Utilization:** Facilitate biomass capacity building on flow mapping, demand forecasting, and environmental impact assessments. Equip producer networks and cooperatives with tools to make informed decisions about when and how to mobilize local biomass resources in a sustainable and profitable way.
- **Organize Localized, Participatory Engagement Events:** Implement itinerant stakeholder engagement events and regional dialogues to bring bioeconomy actors together. These forums promote mutual understanding, identify local bioeconomy assets, and co-create solutions adapted to territorial realities.
- **Support the Development of Local Biomass Infrastructure:** To improve the reliability and sustainability of regional biomass supply chains, invest in local and micro-regional infrastructure such as biomass storage, pre-processing, and logistics centres. These facilities can reduce transport inefficiencies, enable year-round biomass mobilization, and support the economic viability of decentralized bio-based systems.
- **Facilitate the Inclusion of Primary Producers in Community-Based Bioeconomy and Energy Initiatives:** Strengthen the role of farmers, foresters, and other primary producers in regional bio-based value chains by supporting their active participation in community-led initiatives such as bioenergy communities. These systems enable producers to supply locally sourced biomass and engage in collective ownership or governance structures.

By implementing these recommendations, rural regions can unlock the potential of primary producers, ensuring that they are not just raw material suppliers but full partners in the sustainable development of the bioeconomy. Empowering producers with knowledge, voice, and economic opportunity will strengthen rural resilience and foster more equitable value chains across Europe.

Good-practice examples

Terres de Sources in Brittany, France

The Brittany region of France is highly farm-intensive, particularly in terms of livestock production. As a result, the region's water resources face significant pressures, especially from nitrate pollution.

In the area surrounding the city of Rennes, the local water management agency has launched a programme to collaborate with farmers on protecting these water resources.

As part of the **"Terres de Sources"** programme, the water management agency works together with numerous local stakeholders – **60 partners in total**, including the regional and city councils, the chamber of agriculture, and farmer cooperatives. The shared goal is to protect water resources while supporting the agricultural transition toward more sustainable practices.

For example, the programme supports the development of a **regional hemp value chain**. A pilot project has been launched, covering 20 hectares of cultivated land, with activities including crop monitoring, identifying markets for hemp, and evaluating farming practices.

This good practice illustrates how to develop a **fair and sustainable bioeconomy value chain** by:

- ensuring fair remuneration for farmers and integrating them into the bioeconomy;
- applying a multi-actor approach to ensure the success of the business model; and
- placing ecosystem services at the core of the initiative.

Large-Scale Composting in North Macedonia

In the Southeastern region of North Macedonia, around 22,000 tons of biodegradable waste are landfilled every year. Seeing an opportunity in this unused resource, a local entrepreneur in Strumica started a family-run composting business. For the past four years, the facility has operated on a four-hectare site, using organic materials like herb, flower, and fruit leftovers, as well as reeds from nearby meadows. It produces around 5,000 m^3 of certified organic compost annually, with each cycle taking six months. The team includes two agronomists and six machine operators. This initiative not only helps reduce environmental impact but also creates green jobs and promotes sustainable farming. With plans to add packaging, calibration, and new compost types, it offers a practical model for a small-scale bio-based business model and a good **example of how biomass can be effectively used through low-tech, local solutions.**

Strengthen Coherence Between the EU Bioeconomy Strategy and Key Sustainability Agendas

This section highlights the need for greater coherence between the European Union's Bioeconomy Strategy and its broader environmental and climate frameworks, such as the European Green Deal, the Circular Economy Action Plan, the Common Agricultural Policy, and the Waste Framework Directive. As the bioeconomy continues to expand across sectors, aligning its development with ecological and climate priorities is critical to ensuring policy effectiveness and long-term resilience. With discussions currently underway on an updated Bioeconomy Strategy, this is a timely opportunity to enhance coherence and foster a more integrated approach to achieving the EU's goals on climate neutrality, resource efficiency, and nature restoration.

Challenge Description

Despite shared visions between the EU Bioeconomy Strategy and major EU policy frameworks, coherence across these agendas remains uneven. In several key sectors, diverging goals, implementation gaps, and inconsistent signals to stakeholders can hinder synergies and reduce the overall effectiveness of the EU's sustainability transition:

- **Diverging or unaligned Objectives between key strategies**: Some sustainability and bioeconomy goals point in different directions in certain aspects (The Bioeconomy strategy and the Green Deal, Circular Action Plan, Common Agricultural Policy)
- **Lack of harmonized EU standards for bio-based products** as a major obstacle to innovation and market scaling in the bioeconomy
- **Fragmented & Rigid Waste Classification for by-products, residues, and secondary raw materials** create significant uncertainties in the development and implementation of bioeconomy value chains
- **Regional Policy Misalignment:** National and regional policies, such as industrial and innovation policies, may not fully support the bioeconomy goals, leading to inconsistent implementation across regions
- **Innovation Outpaces Regulation:** The accelerated pace of innovation in bioeconomy sectors—such as life sciences and biotechnology—is not matched by timely regulatory adaptation; while regulatory sandboxes are discussed, the lack of concrete mechanisms creates legal uncertainty and slows down deployment of new solutions across the EU.
- **Complexity of existing 'Sustainability' regulations - Discontent in the Primary Sector:** In recent years, farmers and other primary producers across Europe have staged protests expressing dissatisfaction with the Green Deal and related environmental regulations. They report increased complexity and additional burdens from new obligations to justify eligibility for the same amount received in the previous period. This was introduced without adequate consultation or compensation, all while facing pressures to remain price-competitive.

Evidence and Analysis

The specific challenges are supported by findings and evidence generated by four Horizon Europe projects that worked with a wide range of stakeholders on mainstreaming bioeconomy initiatives across the EU:

The BioRural project gathered insights from key bioeconomy stakeholders through expert interviews and 43 grassroots workshops across 14 countries. These revealed unclear and conflicting objectives

within existing EU regulations. Common barriers to circular transitions included fragmented and rigid waste classification systems, and the lack of harmonized EU standards for bio-based products.

Evidence from RuralBioUp hubs also highlighted challenges in aligning the EU Bioeconomy Strategy with broader sustainability agendas. In Puglia (Italy), a regional panel was established to coordinate bioeconomy policies, but faced difficulties due to conflicting sectoral regulations. In the Czech BIOEAST hub, limited interregional collaboration hindered innovation. In Romania's CENTRU hub, fragmented regulations and difficulties accessing EU funding blocked small-scale bioeconomy initiatives.

Similarly, MainstreamBIO stakeholder engagement showed that nutrient recycling is regulated across multiple sectors, often with overlapping or conflicting rules. The lack of EU-wide standards for biomass residues and bioproducts remains a major obstacle. These findings stress the need for greater policy coherence and regulatory harmonization across the EU.

Together, these projects provide a significant amount of evidence from bioeconomy stakeholders supporting the following themes and issues:

- **Diverging or unaligned objectives:** Stakeholders consistently reported misalignment between major EU strategies. Interviews conducted by *BioRural* revealed tensions between the **EU Bioeconomy Strategy**, which promotes the scaling of biological resources and valorisation of biomass side-streams, and the **Circular Economy Action Plan**, which emphasises material loops such as reuse and recycling—objectives that are not always complementary. Additionally, the **European Green Deal's** push to reduce chemical use in agriculture may conflict with the Bioeconomy Strategy's support for biotechnological innovation. The **Common Agricultural Policy (CAP) 2023-2027** introduces eco-schemes for sustainability, yet its area-based payments still favour intensive farming models, limiting alignment with bioeconomy goals focused on sustainable biomass sourcing.
- **Fragmented & Rigid Waste Classification for by-products, residues, and secondary raw materials**:
    - In 43 national workshops, *BioRural* participants frequently identified unclear and inconsistent waste classification laws as a major barrier to circularity. The **EU Waste Framework Directive** lacks clear definitions for when bio-based residues can be treated as by-products or secondary raw materials rather than waste, making it difficult to reuse these streams in practice.
    - The **End-of-Waste Criteria** are often vague and inconsistently applied, causing regulatory bottlenecks. Stakeholders also noted that regional variation in waste management rules and permitting practices creates uncertainty, delays, and barriers to scaling cross-border bio-based solutions
- **Lack of harmonized EU standards for bio-based products**:
    - Stakeholders repeatedly cited the absence of harmonised EU-wide standards for bio-based products as a key limitation to innovation and market entry. Definitions and classification criteria vary across countries and sectors, particularly for packaging and construction materials. This lack of uniformity creates confusion, hampers product development, and makes it harder for bio-based alternatives to compete with conventional options. Participants advocated for clear, EU-wide standards to validate the environmental and performance characteristics of bio-based products and enable regulatory certainty.
- **Regional Policy Misalignment**
    - A significant challenge raised during BioRural's workshops and RuralBioUp's hubs was inconsistent bioeconomy related regulations across regions and sectors. This lack of uniformity creates confusion for stakeholders, particularly in areas such as waste management, bio based product certification, and environmental standards. The EU REACH Regulation (Registration, Evaluation, Authorisation, and Restriction of

Chemicals) was frequently mentioned in this regard. While REACH sets strict requirements for chemicals used in products, it does not adequately differentiate between bio-based and petrochemical-based products. As a result, bio-based innovations often face the same regulatory hurdles as conventional fossil-based products, which can stifle their development and competitiveness.

- National and regional policies, such as industrial and innovation policies, may not fully support the bioeconomy goals, leading to inconsistent implementation across regions. Example: Some regions may focus on industrial growth, neglecting bioeconomy initiatives.

Policy Implications and Recommendations

- **Enhance Strategic Alignment:** Establish a cross-sectoral task force to ensure coherent objectives and actions in aligning (value chain, regional, national) Bioeconomy Strategies with other strategic priorities. This will help harmonize goals and reduce conflicting priorities, ensuring a unified approach to sustainability.
- **Leveraging strategic synergies:** Develop joint action plans that align the Bioeconomy Strategy with other related strategies, focusing on common goals such as sustainability and competitiveness. This will minimize conflicts and leverage synergies between the strategies, promoting a cohesive policy framework.
- **Promote Sectoral Synergies**: Facilitate regular stakeholder consultations across sectors to identify and exploit synergies between sector-specific plans (e.g. circular economy, smart specialization). This will reduce fragmentation and enhance collaborative efforts, leading to more efficient resource use.
- **Harmonize Regional Policies:** Encourage alignment of national and regional policies, such as industrial and innovation policies through incentives and guidelines. This will promote consistent implementation and support bioeconomy initiatives across different regions.
- **Develop and adopt a unified definition for bio-based products across the EU:** This will reduce confusion, ensure uniformity, and facilitate effective policy implementation, enhancing market transparency and consumer trust.
- **Establish standardized criteria for classifying bio-based products**, involving stakeholders from various sectors. Harmonized criteria will improve market transparency, support regulatory compliance, and boost consumer confidence in bio-based products.
- **Streamline End-of-Waste Criteria,** develop sector-specific and material-specific End-of-Waste criteria to simplify and speed up approval processes for commonly reused bio-based materials.
- **Clarify and Harmonize Definitions,** revise and harmonize the EU Waste Framework Directive and related legislation to provide clear, consistent classifications for bio-based residues, by-products, and secondary raw materials across all Member States.

Good practice examples

Finland's National Bioeconomy Strategy: Finland's approach embeds circularity, climate neutrality, and sustainability as core principles. It promotes the cascading use of biomass, circular product design, and sectoral integration—particularly in high-impact areas. The Bioeconomy Strategy stands out as a leading example of alignment with the European Green Deal and the Circular Economy Action Plan. Provides a policy blueprint for coherent implementation of EU-level strategies at the national level, integrating sectoral, environmental, and regional goals

Ireland - Bioeconomy Action Plan 2023-2025: Ireland's Bioeconomy Action Plan 2023–2025, published in September 2023, is a comprehensive national initiative designed to integrate bioeconomy development with broader sustainability goals. The plan outlines 33 targeted actions across seven pillars, including governance, research and innovation, climate and circular economy, and regional development. Notably, it emphasizes policy coherence by aligning bioeconomy objectives with

existing national strategies such as the Climate Action Plan 2021, Food Vision 2030, and Our Rural Future 2021–2025. The plan also promotes stakeholder engagement through public consultations and the establishment of interdepartmental groups to ensure coordinated implementation across sectors.

Integrated Multi-Fund Investment for Bioeconomy Innovation in Italy

Italy's "BIT II" strategy offers a strong example of how coherence between the EU Bioeconomy Strategy and broader sustainability agendas can be strengthened through targeted, multi-sectoral investment. The strategy leverages a combination of public funding sources—including EU structural funds, national programs, and regional initiatives—to promote the conversion of agricultural residues into high-value bio-based products. Notable projects under this framework include:

- **PRIME (Green Chemistry from Agricultural Residues):** This initiative focuses on the development of innovative green chemistry processes to transform agricultural waste into new bio-based products, fostering both environmental sustainability and rural economic development.
- **VegeaTextile (Innovative Bio-based Products from Wine Residues):** VegeaTextile demonstrates how wine industry residues can be upcycled into innovative textile materials, linking agricultural sectors with the bio-based manufacturing industry and advancing circular economy goals.

Economic incentives and financial instruments for scaling up bio-based projects

Depending on the scope and objectives, policies comprise a variable mix of instruments that can be identified as “regulatory”, “financing mechanisms” (such as investment support, feedstock premiums, capital grants, technology subsidies, tax incentives, user charges, and research funding) and “soft measures”. In this context, we focus below on financing mechanisms as a large part of bio-based technologies face difficulties in securing financing, especially at the pilot stage or on a small scale. These challenges are mainly due to high investment risks, difficulties in assessing the added value, inadequate financial instruments, limited access to advice and expert competences, as well as low investor awareness.

Challenges description

- **Capital intensive requirements -** many of the ideas use new, not yet commercialized technologies (e.g. biorefineries, waste-to-bioenergy conversion) with lack of proven business models, creating uncertainty among investors about the return on investment (ROI). Such projects also require high CAPEX (capital costs) due to the need for significant investment, in addition to a long payback period - as bio-solutions typically take a considerable amount of time to become financially viable. The market for organic products is not yet fully developed – there is no guarantee of sales.
- **High Operating Expenditures (OPEX) cost -** Biomass is a low energy and low density material, widely dispersed across rural areas, requiring long-distance transportation and collection from multiple small suppliers, which makes it expensive to deliver sufficient quantities cost-effectively. It requires intensive labour for collection and processing.
- **Difficulties with determining added value -** Environmental, social and governance (ESG) effects are not included in traditional financial analyses. The value of such projects is often underestimated because their full impact is not visible (e.g. CO_2 sequestration, improved soil health).
- **Unsuitable financial instruments -** Public and bank funds are often complex to apply for, involving bureaucratic instruments and designed for large industrial projects. There is a lack of microfunds, low-interest loans and "success financing" models (e.g. pay-per-output). Additionally, most institutions do not understand the specifics of the bioeconomy, e.g. seasonality of production or the impact of local raw materials.
- **Lack of advice and expertise -** Applicants (farmers, startups) are not familiar with available funds or have no experience writing applications. There is a lack of support networks that would help connect innovators with investors. There is also a lack of funds for start-ups to continue their work after the first period of establishment phase.
- **Low investor awareness -** Private investors often do not know the potential of bio-based solutions. There is a lack of so-called "green" VC and PE funds that specialize in bioeconomy. The bio-based product market is not yet fully developed - there is no guarantee of sales.
- **Value chain volatility -** Bio-based product value chains involve several steps. One or more can be new or insufficiently tested in real-world conditions, making the entire value chain as robust as its weakest link.
- **Challenges related to the scale of bio-based solutions -** The supply of bio-based solutions relies on an underdeveloped market that faces a well-established, highly experienced petrochemical industry, with a vast economy of scale.

Evidence and Analysis

The sisters' projects have successfully carried out their work and identified financial problems as one of the most important factors limiting the development of bioeconomy. Our baseline analysis to identify and analyze the needs for improving and increasing support for small biotechnology enterprises identified lack of financial capital as the most frequently cited barrier to adopting biobased solutions, with respondents highlighting this issue. Stakeholders consistently emphasized the high upfront costs of transitioning from linear to circular biobased value chains and the urgent need for targeted funding support to enable this shift. Stakeholders identified a high perception of financial risk as a major barrier for private capital investment in the critical scaling phase from demonstration projects to industrial deployment. This hinders innovation and slows the broader adoption of bio-based solutions. Furthermore, it was reported that lengthy bureaucratic procedures discourage bio-based project promoters from applying to public funding schemes, thus limiting access to available financial support. In the Latvia Regional Hub, participants highlighted difficulties in securing private investment for small-scale bio-based infrastructures, due to uncertainty about long-term economic returns. This financial gap restricts the development of local, rural bioeconomy initiatives.

- **High investment risk -** The analysis shows that bio-based technologies often carry high investment risks, especially in early stages. Most activities aiming to improve nutrient recycling observe high CAPEX (capital costs) due to the need of significant investment as observed in Algae cultivation, Ammonia stripping/scrubbing, precision farming, anaerobic digestion. There are limited and insufficient risk mitigation mechanisms in place. Financing for replication remains a challenge despite technology having been proven through “first-of-their-kind” biorefineries. For expensive equipment the Joint ownership concept or purchase by a group of farmers or agricultural associations should be promoted and simplified.
- **Technological Uncertainty & Limited Maturity -** Many of bio-based solutions are still at TRL (Technology Readiness Level) 6–8 (pilot/demo stage), and are dependent on non-standardized feedstocks, which was observed at the service provision. There is one area where investment is sorely needed: demo plants. In Europe, there is a lack of incentives to invest in pilot facilities where startups can demonstrate the economic feasibility of their ideas. This is both the highest-risk segment of the biobased value chain but also the most important. It is extremely capital-intensive to bring new, untested products out of the laboratory yet most biobased products in Europe fall under this category. According to various sources, this lack of pilot facilities is a major reason why the region is seeing a pile-up of biobased products at the lab stage, preventing promising products from reaching the consumer. The European Commission explicitly recognises the problem (DG R&I) describing the lack of support for the lab-to-demo transition as a ‘valley of Death’ for bio-economy innovations.
- **Market Volatility & Underdeveloped Demand -** Unstable biomass prices, limited off-take agreements, and lack of mature markets for bio-based products. Products often compete with cheaper fossil-based alternatives, unlevel playing field with fossil-based counterparts; consumer expectations that all externalities (i.e., environmental, sustainable, local, etc.) are included in the product price. In addition, the low TRL of this type of investment extends the payback period. There is a need to support the Innovation Valley of Death by extending the duration of the Interregional Innovation Investments (I3) Instrument after 2027.
- **Policy and Regulatory Uncertainty -** Subsidy structures and support schemes are inconsistent or short-term involving in addition lengthy permitting processes (e.g. for bioenergy and wastewater-based cultivation). It seems that subsidy schemes are useful to stimulate early adopters who are already motivated to take action, rather than to mobilize individuals who are not yet willing to undertake concrete climate action like integrated pest management (IPM), introduction of catch crops, etc. Evidence from the RuralBioUp Hubs also reveals challenges in securing private investment for small-scale bio-based infrastructures, primarily due to uncertainties about long-term economic returns. This regulatory uncertainty deters

bio-based project promoters from applying for public funding, thereby limiting access to available financial support.

- **Lack of advice and expertise -** Broader ecosystem benefits that may provide based on the virtual explosion in literature on biochar benefits should be taken into consideration. Moreover, the avoided costs associated with larger positive externalities of its use in water and air quality improvement and GHG emissions reduction should not be overlooked. Conservative agriculture may warrant greater support as part of a long-term soil and food security strategy, as well as capture general environmental benefits provided through, for example, its nitrogen remediation capabilities and its implications for local air quality and nearby and downstream water quality.

Policy Implications and Recommendations

Challenges faced by technologies promoting bio-based solutions and gaps in current policies assist to conclude recommendations consistent with bioeconomy objectives and improve the perspectives of bio-based activities deployment.

- **Create dedicated financial instruments (micro-grants, blended finance)** Subsidies such as carbon credit schemes that increase the profitability (ROI) of capital investment projects, creation of B2B partnerships with established industries downstream to the value chain namely food, cosmetics and pharma industry with availability of funds searching investment opportunities. Offer low-interest loans, introduce leasing models, support the implementation of policies which regulate standards of soil improvers and emission limits.
- **Financial instruments for competitiveness of factors of production (land, labour, biomass**). Tax incentives/credits for skilled labour. Encourage cooperation between farmers, promoting smallholder associations, and providing them with mechanisms for access to machinery and economic support. Promote direct payments to farmers who store carbon and reduce their carbon footprint by reducing direct and indirect fossil energy consumption.
- **Support for Public-Private Partnerships (PPP)** Encouraging cooperation of municipalities, universities, industry and farmers in local projects (e.g. biogas plants, local agricultural waste processing centres) can strengthen the regional bioeconomy; Creation of local bioeconomy clusters will foster innovation and more efficient use of local resources; supporting the impact of public-private partnership funding model as a seal of excellence, alongside targeted grants can enhance cost-competitiveness.
- **Training and advisory networks** (e.g. BioHUBs, bioeconomy clusters, incubators MIPs). Advisory and mentoring support, matchmaking platforms – connecting startups with investors, innovation and academia-business interlinkages as Technology Transfer Centers – helping to prepare business models and applications. Develop a common strategy for investors to understand the sector's diversity and potential. Horizontal measures to promote tech transfer to small businesses including incubation programs, mentorship, and access to funds may be combined to the CAP second pillar support for young and new entrants concerning land, capital, and training. Invest in capacity building and the right expertise (i.e., legal, marketing, engineering, etc.) to turn ideas into bankable projects.
- **Simplification of procedures for local projects (e.g. biogas, composting plants)** support cost-sharing programs among farmers for shared treatment facilities (case of slurry). Ensure a predictable regulatory framework that directs investment to the sector; streamline and accelerate authorisation processes.
- **Mitigation of market volatility impacts**. By introducing loan guarantees or revenue insurance schemes for rural bio-based SMEs, governments can aid in de-risking these sectors. Policy makers can integrate the results highlighted by REA programs such as success stories or small-scale pilot projects, to benchmark bio-based enterprises' economic viability and eligibility for government support.

- **Public procurement quotas**, directing private and public enterprises towards sourcing fractions of their utilized commodities from rural bio-based producers by a predetermined time-frame. The visibility of early adopters can stimulate wider uptake and support public perception of sustainable alternatives.

Good practice examples

Adequate funding/support at different ownership levels

Invest-NL Bioeconomy Loans – Netherlands National development finance, financing projects and businesses, as well as by providing advice and/or carrying out research on how to enable financing for business cases. Provides instruments like Venture debt, subordinated loans, and co-investments. Focus on Circular bioeconomy technologies and scale-up of biobased startups. Helping to bridge the "valley of death" for biotech and agri-circular solutions.

Swedish Energy Agency Green Innovation Loans support to the research development and demonstration within the area of energy. Provides Instruments like soft loans for commercializing green technologies. Focus on Renewable bioenergy, biomass gasification, and waste-to-energy projects. Supports advancing second-generation biofuels in Sweden.

Finnish Climate Fund – Bioeconomy Support Mission-oriented investment strategy aligned with carbon neutrality goals. Provides instruments like equity and loans, focusing on carbon sequestration, forest-based bioproducts, and biorefineries. Significantly support scaling wood-based packaging and textile fibers.

AWS Green Finance – Austria Wirtschaftsservice (AWS) Government agency instrument for guarantees and subsidized loans. Focusing on green startups and sustainable bioproducts (e.g., algae-based materials, agri-waste valorization). Helps to lower entry barriers for SMEs in the bioeconomy.

Technology parks across Poland focusing on the bioeconomy: Kutno Agro-industrial Park, and the Łódzki Regionalny Park Naukowo-Technologiczny (coordinator of BioNanoPark) in the Lodzkie region, Wrocław Technology Park (coordinator of cluster Nutribiomed) in the Dolnoslaskie region.

Conclusions

A joint contribution to the public consultation on the upcoming EU Bioeconomy Strategy 2025

The four EU projects funded under the HORIZON-CL6-2021-CIRCBIO-01-08 topic, RuralBioUp, SCALE-UP, BioRural, and MainstreamBIO, have joined forces to share their feedback on the update of the EU Bioeconomy Strategy. Together, the projects have developed a joint policy paper outlining key recommendations for the future of the European bioeconomy, with a particular focus on strengthening its regional dimension.

The European bioeconomy holds transformative potential to deliver on climate, biodiversity, and rural development goals. However, rural communities and primary producers—who are essential actors in delivering a sustainable bioeconomy—continue to face systemic barriers to participation, knowledge access, and financing. Drawing from multi-stakeholder engagement, workshops, surveys, and innovation platforms implemented across 20+ countries during the period 2022-2025, the four projects outline the following priorities for the new EU Bioeconomy Strategy.

First and foremost, there is a pressing need to bridge the knowledge and skills gap in rural areas. Farmers, SMEs, and public authorities often lack the technical know-how, digital literacy, and systemic understanding of bioeconomy principles. Moreover, while many participatory activities take place, they can lead to "stakeholder fatigue" and fragmented dialogue. The EU Bioeconomy Strategy should promote the creation of interconnected stakeholder clusters - a "network of networks" - at regional, national, and EU levels enabling structured, inclusive, and continuous engagement. This approach would help reduce stakeholder fatigue and ensure long-term impact through an effective governance framework. It should include modular, micro-credential training programmes and promote digital platforms and knowledge-sharing that actively engage youth, women, and underrepresented groups as co-creators.

Second, it is critical to empower primary producers as active agents in bio-based innovation, given that many of them remain disconnected from downstream actors and excluded from value creation. The EU Bioeconomy Strategy should foster producer cooperatives and promote investment in local infrastructure such as biomass storage, logistics, and pre-processing units. It should also encourage strengthened cooperatives to aggregate biomass, share knowledge, and de-risk investment. Moreover, it should improve transparency and communication along the value chain to support participation and incentivize integration of producers in bioenergy and circular value models.

Third, the EU Bioeconomy Strategy must enhance policy coherence with other major sustainability frameworks such as the Green Deal, the Common Agricultural Policy, and the Circular Economy Action Plan. Harmonised EU-wide definitions for bio-based products, clearer end-of-waste criteria, and simplified classification of by-products and secondary raw materials are crucial. National and regional policy alignment should be supported through joint planning tools and cross-sectoral task forces that promote integrated, place-based strategies.

Finally, overcoming financial barriers is essential to scaling up bio-based solutions. Many rural innovators struggle with high investment risks, lack of tailored instruments, and complex procedures. The future EU Bioeconomy Strategy should respond to these challenges by introducing micro-grants, blended finance models, and public-private partnership schemes. It should also simplify access to funding, integrate advisory services into financial programmes, and support the development of regional investment hubs that help de-risk innovation and enable SMEs to move from pilot phase to market deployment.

A regionally responsive and inclusive EU Bioeconomy Strategy is crucial to empower rural actors as co-creators of sustainable value. Strengthening capacity, infrastructure, cross-sector cooperation, and investment support mechanisms will be key to unlocking Europe's full bioeconomy potential.

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