D4.1

Bioeconomy related innovation ecosystem mapping

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Acronyms

AGROECOLOGY	EU Partnership on Accelerating Farming Systems Transitions through Agroecology Living Labs and Research Infrastructures
AI	Artificial Intelligence
AKIS	Agricultural Knowledge and Innovation System
APVV	Slovak Research and Development Agency
BAE	Business Angels Europe
BCSDH	Business Council for Sustainable Development in Hungary
BE	Blue Economy
BERD	Business Expenditure on Research and Development
BESCO	Bulgarian Entrepreneurial Association
BIC	Bio-based Industries Consortium
BIF 2	Baltic Innovation Fund 2
Biodiversa+	European Biodiversity Partnership
CAP	Common Agricultural Policy
CBE JU	Circular Bio-based Europe Joint Undertaking
BBI JU	Bio-based Industries Joint Undertaking
CCIS-CAFE	Chamber of Commerce and Industry of Slovenia - Chamber of Agricultural and Food Enterprises
CEE	Central and Eastern European Countries
CEF	Connecting Europe Facility
CEFoF	Central Europe Fund of Funds
CF	Cohesion Fund
Chips JU	Chips Joint Undertaking
CIRCBIO	'Circular economy and bioeconomy sectors' call (Horizon Europe)
CIRTT	Centre for Research, Development and Technology Transfer
CIS	Community Innovation Survey
CORDIS	Community Research and Development Information Service
COST	European Cooperation in Science & Technology
DG-GROW	Directorate-General for Internal Market, Industry, Entrepreneurship
EAFRD	European Agricultural Fund for Rural Development
EAGF	European Agricultural Guarantee Fund
EAGF	European Agricultural Guarantee Fund
EBAN	European Business Angels Network
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECBF	European Circular Bioeconomy Fund
EDCTP3	European and Developing Countries Clinical Trials Partnership

EFI	European Forest Institute
EFSI	European Fund for Strategic Investments
EIB	European Investment Bank
EIC	European Innovation Council
EIE	European Innovation Ecosystems
EIF	European Innovation Fund
EIP	European Innovation Partnerships
EIP-AGRI	European Innovation Partnership for Agricultural Productivity and Sustainability
EIS	European Innovation Scoreboard
EISMEA	European Innovation Council and SMEs Executive Agency
EIT	European Institute of Innovation and Technology
EMFAF	European Maritime, Fisheries, and Aquaculture Fund
ERA	European Research Area
ERC	European Research Council
ERDF	European Regional Development Fund
ESF+	European Social Fund Plus
ESG	Environmental, Social, and Governance
ESIF	European Structural and Investment Funds
ETCI	European Tech Champions Initiative
EU	European Union
EUPAHW	Animal Health and Welfare
EURADA	European Association of Development Agencies
EuroHPC	European Partnership for High Performance Computing
EUSBSR	EU Strategy for the Baltic Sea Region
FMFIB	Fund Manager of Financial Instruments in Bulgaria
FTE	Full-time Equivalent
FUIR	Romanian Research and Innovation Fund
FutureFoodS	European Partnership for a Sustainable Future of Food Systems
GERD	Gross Domestic Expenditure on Research and Development
GIS	Hungarian Green Investment Scheme
GNI	Gross National Income
GPP	Green Public Procurement
HAMAG-BICRO	Croatian Agency for SMEs, Innovations and Investments
HBOR	Croatian Bank for Reconstruction and Development
HC	Headcount
HE	Horizon Europe
HRST	Human resources in science and technology

I3	Interregional Innovation Investments
ICT	Information and Communication Technology
IEA	International Energy Agency
IF	Innovation Fund (EU Climate action)
IP	Intellectual Property
IPO	Initial Public Offering
IUNG	Institute of Soil Science and Plant Cultivation
JIC	South Moravian Innovation Centre
JRC	Joint Research Centre
JTF	Just Transition Fund
JUs	Joint Undertakings
K4P	Knowledge for Policy Programme
KICs	Knowledge and Innovation Communities
KRD	National Centre for Forest Development
LBTU	Latvia University of Life Sciences and Technologies
LIFE	Programme for the Environment and Climate Action
LLKC	Latvian Rural Advisory and Training Centre
MF	Modernisation Fund (EU Climate action)
NAFC	National Agricultural and Food Centre
NCBR	National Centre for Research and Development
NECPs	National Energy and Climate Plans
NEIA	New European Innovation Agenda
NOWR	National Centre for Agricultural Support
NRDI	National Research Development and Innovation Fund
OECD	Organization for Economic Co-operation and Development
OPVal	Operational Programme Research and Innovation
OTKA	Hungarian Scientific Research Fund
PCT	Patent Cooperation Treaty
PES	Payments for Ecosystem Services
PGFF	Polish Growth Fund of Funds
POSDRU	Sustainable Development Operational Program
PRIMA	Partnership on Research and Innovation in the Mediterranean Area
R&D	Research and Development
R&I	Research and Innovation
RAPIV	Regional Agency for Entrepreneurship and Innovations—Varna
ReactEU	Recovery Assistance for Cohesion and the Territories of Europe
RIS	Regional Innovation Scheme
RIV4BFS	Regional Innovation Valleys for Bioeconomy and Food Systems

RIVs	Regional Innovation Valleys
RRF	Recovery and Resilience Facility
S3	Smart Specialization Strategies
SBEP	Climate Neutral, Sustainable & Productive Blue Economy
SCAR	Standing Committee on Agricultural Research
SCSTI	Center for Scientific and Technical Information of the Slovak Republic
SDGs	Sustainable Development Goals
SIEA	Slovak Innovation and Energy Agency
SMEs	Small and Medium-sized Enterprises
SPS	Slovenian Enterprise Fund
SRIA	Strategic Research and Innovation Agenda
SRDF	Slovenian Regional Development Fund
STEM	Science, Technology, Engineering, and Mathematics
STEP	Strategic Technologies for Europe Platform
STI	Science-Technology-Innovation
STIP	Science, Technology, and Innovation Policies
SUA	Slovak University of Agriculture in Nitra
TFEU	Treaty on the Functioning of the European Union
TRL	Technology Readiness Levels
VIKO	Vilniaus Kolegija/Higher Education Institution
Water4All	European Partnership on Water Security for the Planet
WBEDIF	Western Balkans Enterprise Development and Innovation Facility

Introduction to the project

BOOST4BIOEAST *is a Coordination and Support Action funded by the European Commission developed to support the BIOEAST Initiative with the aim of empowering national stakeholders in the Central Eastern European and Baltic countries for the development of national bioeconomy action plans and to build long-lasting structures and spaces of dialogue for national and macro-regional cooperation. The project will enrich knowledge on the bioeconomy and stimulate related research and innovation across the macro-region.*

1 Introduction

Despite ambitious goals, Central and Eastern European (CEE) countries remained behind in developing the bioeconomy within the European Research Area (ERA) across economic, societal, and technological dimensions by the 2010s. In response, the Central-Eastern European Initiative for Knowledge-based Agriculture, Aquaculture, and Forestry in the Bioeconomy (BIOEAST) was established, bringing together eleven Member States: Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. This initiative set the vision for 2030 to foster knowledge-based and cooperative circular bioeconomies as well as focuses on strengthening bioeconomy development through education, research and innovation agendas, policy strategies, and targeted programs.

The BOOST4BIOEAST project supports the vision and the goals of the BIOEAST Initiative by strengthening national stakeholder networks and creating long-term structures for cooperation. It aims to develop national bioeconomy action plans through participatory approaches by 2026, but in order to achieve this, the project first conducts a multidimensional analysis to assess bioeconomy competencies, biomass availability, educational needs and innovation systems in the macro-region. As part of this ambitious analysis, the mapping of innovation ecosystems of the 11 Members States is essential to support the identification and assessment of possibilities for increasing national investments in research, innovation, and development and to foster cooperation within countries and across the macro-region.

This report aims to present the outcomes of this mapping exercise and its subsequent analysis. The report also contains recommendations for policymakers drawn from the insights of the analysis on structuring support policies and financial instruments to fully harness the innovation potential of the bioeconomy in these countries.

After an overview of the methodology (Chapter 2), concepts of innovation ecosystems (Chapter 3), funding and financing (Chapter 4), the following chapters of the report assess the different elements of the innovation ecosystem:

- Policy context: an inventory of EU, national, and regional strategies relevant for the circular bioeconomy in the BIOEAST region (Chapter 5).
- Introduction to the macro-environment for innovation in the BIOEAST Member States: analysis of structural and performance indicators for research, development, and innovation in comparison with the EU (Chapter 6).
- Overview of policy instruments supporting bioeconomy research and innovation (Chapter 7).
- Overview of public and private funding and financing opportunities for bioeconomy research and innovation (Chapter 8).

- A brief presentation of other macro-regional collaborative initiatives and good examples is provided in Chapter 9 which have been less covered in previous stocktaking exercises.
- Lastly, Chapter 10 summarizes the policy recommendations for the Member States drawn from the results of the mapping.

The findings to be presented will be of use to the BOOST4BIOEAST project partnership, to the BIOEAST member states and other international actors, through an overview of the respective policies and national strategic priorities, the funding and financing opportunities, the characterisation of the participation in the programmes, and an inventory of institutions and initiatives involved in bioeconomy research and innovation.

2 Methodology

The preparation of this mapping report involved several methodological steps designed to provide a comprehensive overview of the bioeconomy innovation ecosystem.

To define basic concepts, discover existing frameworks and utilize scientific evidence, literature review was conducted, with particular emphasis on publications from the European Commission (EC) and the Joint Research Centre (JRC). This review also drew on materials from previous projects, primarily coordination and support actions, that focused on bioeconomy and innovation.

Content analysis was carried out on relevant strategies, action plans, and foundational studies concerning circular bioeconomy innovation. This helped identify major themes and policy directions shaping the innovation landscape. The Bioeconomy Country Dashboard (EC JRC, n.d.), maintained by EC Knowledge Centre for Bioeconomy, helped us to get an initial overview of the national and regional strategic context for the bioeconomy. This was followed by a conscious search, machine translation and processing of national strategies.

To illustrate the broader innovation macro-environment, secondary data from Eurostat, the Community Innovation Survey (CIS), and the European Innovation Scoreboard (EIS) were analysed. These sources provided valuable insights into innovation performance and trends across EU Member States.

The Science, Technology, and Innovation Policies (STIP) Compass (EC & OECD, 2025) database was processed to map policy instruments supporting bioeconomy innovation, offering a clearer picture of national and international policy efforts. STIP Compass is a collaborative effort between the EC and the Organisation for Economic Co-operation and Development (OECD) designed to centralize both qualitative and quantitative information on national science, technology, and innovation policy trends. All data is openly available in line with the FAIR principles (Findable, Accessible, Interoperable, and Re-usable).

In addition, databases such as CORDIS and those maintained by individual institutions and programmes, including ERA Learn, the Common Agricultural Policy (CAP) Network, the European Investment Bank (EIB), the European Fund for Strategic Investments (EFSI), the European Innovation Council (EIC), and the European Institute of Innovation and Technology (EIT), were used to examine innovation funding activities in the sector.

A bioeconomy innovation funding and financing workshop held during the BIOEAST Conference on 5–6 March 2024 also provided a valuable opportunity for preliminary primary data collection, helping to inform the preparatory research phase of the report.

3 Bioeconomy innovation ecosystem

Bioeconomy transitions, as found by Carraresi (2024), require fundamental systemic changes, with systemic innovation acting as a main driver by fostering cross-sector collaboration. For effective transformation, it must operate at a multi-stakeholder level, enabling disruptive shifts that enhance the bioeconomy's efficiency and competitiveness against fossil-based alternatives.
Innovation ecosystems consist of companies across industries with complementary skills that collaborate to create value. These ecosystems facilitate the transition to a bioeconomy by enabling cross- sectorial and international value chains. The concept aligns with transition management and sustainability goals, extending beyond value chains by incorporating industrial symbiosis and circular economy principles. The literature on technological innovation systems identifies seven main drivers of emerging innovation ecosystems: entrepreneurial experimentation, knowledge development and exchange, search guidance, market formation, resource mobilization, and advocacy support. Achieving sustainable, closed-loop production requires sectoral integration, aligning with European circular economy policies (Philp & Winickoff, 2019).

Transitioning to a sustainable and circular bioeconomy requires policies that foster collaboration among businesses, researchers, policymakers, and other stakeholders. To support this, ten key policy messages have been identified by the EC (Dupont-Inglis *et al.,* 2021), each accompanied by implementation actions. One of the relevant messages is that aligning bioeconomy policy, funding, and strategic research and investment agendas across national and EU levels is crucial. Policymakers should integrate multiple policies and funding sources (e.g., CAP, Horizon Europe, Just Transition Fund (JTF)) to enable ecological and technological innovation. Multi-actor approaches must be financially supported through national, EU, and private funding mechanisms to drive sustainable bioeconomy growth. Another message is that the diffusion of bio-based knowledge and innovation is essential for rural and regional development. Strengthening National Agriculture and Rural Development— Knowledge and Innovation Systems (AKIS) through CAP, Horizon Europe, and other programs can enhance

knowledge exchange, farm advisory services, and industry collaboration. Ensuring the widespread adoption of agroecological practices and bio-based technologies is as important as fostering new innovations for achieving carbon-neutral economies.

The above thoughts were reinforced by Sakellaris *et al*. (2023/a): bioeconomy is an emerging industry requiring innovation in technologies, processes, products, and behaviours to enhance its value and sustainability. Bioeconomy innovations are interdisciplinary, often at low technological readiness, necessitating new research and development (R&D) efforts and learning approaches. They foster bio-based markets through sectoral linkages and circularity, where waste from one sector serves as input for another. Measuring bioeconomy innovation is complex due to its heterogeneity in type, sector, and impact. A sustainable bioeconomy transition demands advancements in R&D, social innovation, and policy support. Increased investment and incentives are crucial for competitiveness, with EU programs like Horizon Europe providing primary funding.

The bioeconomy's cross-sectoral and circular nature requires a systemic regional approach, linking diverse disciplines, technologies, and sectors while redefining value chains into regional value cycles. This approach aligns with established innovation theories, including innovative clusters, the triple and quadruple helix model, regional innovation systems, and AKIS. Regional bioeconomy ecosystems involve stakeholders such as governments, businesses, research institutions, and sectoral associations. Clusters play a crucial role in fostering collaboration, especially in industrial and rural areas, integrating biological resource producers like farmers and fishers. Effective policy coordination across research, innovation, agriculture, and the environment are essential for successful bioeconomy deployment (Haarich *et al*., 2017).

Intermediary organizations, or "bridges", are crucial in the bioeconomy, given the sector's technological immaturity and need for cross-sector collaboration. However, many regions lack dedicated bioeconomy bodies or networks, hindering organized development. Beyond traditional stakeholders, other emerging actors supporting bioeconomy promotion include business-bioeconomy strategy councils, thematic platforms and networks, specialized research and innovation centers, local coordination bodies, and cross-border cooperation projects (Haarich *et al*., 2017).

The bioeconomy is a growing priority across European regions, but its development is shaped by diverse drivers, capacities, and approaches, making regional analysis and support schemes complex. To address this, a typology of regional bioeconomy profiles has been developed by Haarich *et al*. (2017): Type 1: Regions with a natural resources and heritage driven bioeconomy profile; Type 2: Regions with a research driven bioeconomy profile; Type 3: Regions with a primary value chain bioeconomy profile (incipient); Type 4: Regions with a primary value chain bioeconomy profile (advanced); Type 5: Regions with an industrial biotech profile; Type 6: Regions with an integrated and advanced bioeconomy profile.

Haarich *et al.* (2017) also conclude, that, while European and national programs support bioeconomy development, much of its deployment happens at the regional level through projects led by local authorities, clusters, businesses, universities, and research centers. These initiatives leverage a mix of European, national, regional, and local funding. Case studies reveal bioeconomy projects spanning seven principal areas: knowledge generation; knowledge transfer, engagement, stakeholder networks; new generation and re-definition of value chains and value cycles/demonstration/technological readiness; public awareness, dissemination of information; bioeconomy coordination, governance and platforms; education; learning from other regions, alliances.

For the better deployment of the bioeconomy at all territorial levels, five main recommendations were formulated by Haarich *et al.* (2017 p. 12-13), based on the results of their study:

- More and better bioeconomy strategic planning and governance at national and regional level.
- Support value chain/cycle development and engage small and medium-size enterprises (SMEs).
- Develop research and innovation (R&I) on technologies, knowledge transfer, and new bioeconomy skills.
- Coordinate funding and synergies between instruments.
- Raise public awareness and acceptance.

To explore future bioeconomy pathways, the EC established a Network of Experts under the Knowledge Centre for Bioeconomy, focusing on foresight analysis (Fritsche *et al*., 2021) for the EU's bioeconomy. This process led to four 2050 scenarios:

- *Scenario 1:* Do it for us - proactive policy, Paris target nearly achieved (2 °C global temperature increase by 2100), no societal change (Business As Usual trend for consumption)
- *Scenario 2:* Do it together – integrative policy, Paris target fully achieved (1.5 °C global temp. increase by 2100), fundamental societal change (towards sustainable consumption)
- *Scenario 3:* Do it ourselves - societal action, Paris target missed (global temperature increase 2.5 °C by 2100), fundamental societal change (towards sustainable consumption)
- *Scenario 4:* Do what is unavoidable - reactive policy, Paris target clearly missed (3.5 °C global temperature increase by 2100), no societal change (Business As Usual trend for consumption)

Scenario 2 ("Do it together") offers the best outcome but is the most challenging, requiring integrative policies, societal engagement, cross-EU collaboration, and a post-2030 "New Green

Deal" with expanded funding. A bottom-up and top-down bioeconomy approach, including global partnerships, is essential.

The *BioWEconomy* concept, introduced by Fritsche *et al*. (2020), links social dimensions to the circular and sustainable bioeconomy, fostering resilience against global crises such as food and water shortages, climate change, and social instability. It expands beyond technological innovation to include new sociocultural actors, business models, and governance practices. A sustainable bioeconomy demands collaborative, multilevel governance, trust through transparent supply chains and participatory verification, and conditional sustainability requirements for financing. Participatory funding mechanisms, such as crowdsourcing, will empower bottom-up initiatives, aligning with the European Green Deal's Just Transition vision.

4 Funding and financing the bioeconomy innovation

Funding, in general, refers to money granted by an organization or government based on an agreement, typically without any repayment obligations. While the agreement may include specific contractual conditions, there is no requirement to return the funds. The primary sources of funding for organizations are often donations from governments or philanthropic entities. Financing, in contrast, involves providing capital with the expectation of repayment. Organizations are required to return the borrowed amount along with interest. This type of financial support is usually offered by banks, financial institutions, or investors such as venture capitalists, business angels, and shareholders (Vermont Bond Bank, n.d.; Changoo, 2021). The sources of funding/financing can be public or private, while its origin is divided between domestic and international (WEF, 2019). In summary, public funding offers more stability, larger financial support, and structured processes but involves significant bureaucracy and political dependence. Private funding, on the other hand, is more flexible, risk-tolerant, and market-driven but may come with uncertainty and limited funding amounts (ISU, 2006).

ShapingBio project's report 'Bioeconomy Financing in Europe Analysis' (Garthley & Wydra, 2024) differentiates the concepts of financing and investments regarding EU support for bioeconomy stakeholders. Financing refers to non-repayable grants from programs like Horizon Europe, supporting research and development. Investments, in contrast, involve return-seeking funding through financial instruments such as equity, loans, or blended financing, often facilitated by EIB and private investors. These instruments share risks and aim to scale up innovations by combining public and private funds. While grants and investments are distinct, they frequently overlap, especially in EU funding schemes.

According to NatureFinance's report 'Financing a Sustainable Global Bioeconomy' (2024), bioeconomy financing faces significant challenges due to limited private investment interest, unfavourable market conditions for nature-intensive enterprises, and restricted availability of risk capital for high-tech bioeconomy startups. However, financing the bioeconomy is feasible

through existing financial instruments, including sustainable finance tools such as nature credits (carbon and biodiversity credits) and sustainability-linked financing. Blended public-private funding, particularly from development finance institutions, is crucial for supporting bioeconomy growth in lower-income regions. Investor confidence increases where integrated bioeconomy strategies with executable plans exist, while isolated funds and strategies without market buy-in or trade policy links are less effective. A successful approach must incorporate enterprise development, public awareness, infrastructure, fiscal policies, education, and research. Additionally, international cooperation is vital to scaling the bioeconomy's benefits and managing its risks (NatureFinance, 2024).

Bioeconomy can typically be broken up into three interlocking themes:

- Research, development and innovation (Biotechnology)
- Sustainable use of biodiversity (Bioresources)
- Bioeconomy as an enabler of sustainable development (Bioecology)

Whilst drawing on this tradition, NatureFinance (2024) has found it useful to introduce the concept of a bioeconomy spectrum that has three interdependent basic segments:

- *Nature-Intensive Bioeconomy* – Focuses on traditional sectors like agriculture, forestry, and fisheries, with low-to-moderate technology risks and investment needs. Financing is primarily through established markets, public subsidies (e.g., EU's CAP), and concessionary lending. Payments for ecosystem services (PES) are emerging as an innovative financial tool to support nature conservation while providing economic benefits.
- *Advanced Bioeconomy* – Builds on traditional sectors by integrating modern technology for efficiency and sustainability. Focus areas include biofuels, biorefineries, and sustainable agriculture. Financing relies on venture capital, private equity, and targeted public subsidies, with governments playing a critical role in funding R&D and innovation.
- *High-Tech Bioeconomy* – Represents the frontier of biotechnology, using innovations like synthetic biology and genomics to develop high-value products. This sector is capital-intensive, with strong R&D investments and financing driven by venture capital, corporate funding, and strategic alliances. It is most prominent in technologically advanced regions with robust financial ecosystems.

On the basis of EIB report 'Access-to-Finance Conditions for Investments in Bio-Based Industries and the Blue Economy' (2017) presents an overview of the investment and access-to-finance conditions for Bio-based Industries (BBI) and the Blue Economy (BE). Main findings were that BBI and BE projects struggle to access private capital, with regulatory and market conditions being both fundamental drivers and challenges for investment. Funding gaps exist in scaling from pilot to demonstration and especially in BBI from demonstration to industrial-scale projects. While financial markets see growth potential, high perceived risks and information

asymmetries create two major funding gaps. Public financial instruments are used but could have a stronger catalytic impact. Policy actions and improved financial instruments are needed to de-risk investments and attract private capital.

Grants are widely available and play a key role in funding early-stage BBI and BE projects, particularly in R&D phases. However, project promoters face lengthy and complex application processes, causing financing bottlenecks and delays in decision-making and implementation. Innovative financial instruments are under-represented in the EU, whereas non-EU countries offer a broader mix. Risk-tolerant debt finance tailored to BBI and BE projects is crucial to bridging funding gaps. While some risk-sharing instruments exist for pilot and demonstration stages, they are insufficient for sustained funding beyond pre-commercial phases. EU funding remains grant-focused, with limited support for commercialisation, and existing risk-sharing programs may not adequately meet demand due to their risk absorption constraints. EU funding is more diverse at the national level than at the EU level, with significant country-specific differences. This variation characterizes the maturity of local BBI/BE projects, local raw resource availability, and national policies/strategies (EIB, 2017).

5 Policy background of circular bioeconomy innovation in the EU with particular focus on BIOEAST Member States

The aim of this chapter is to provide an overview of national and regional bioeconomy strategies, as well as EU and bioeconomy-relevant national strategies, action plans and other planning and legislative frameworks. The overview provides an outline of the policy environment and priority setting that sets the framework for the development of the bioeconomy and for research and innovation in this segment, both at present and in the longer term. The analysis includes an insight into the joint Strategic Research and Innovation Agenda (SRIA) defined by the BIOEAST Initiative and an outlook on the relevant national BIOEAST concepts.

The Council of the European Union (2023), highlights the importance of the bioeconomy for innovation in rural areas and emphasizes the need for coordinated funding from various EU instruments, including the CAP, Horizon Europe, and other funds. The Council also recognizes the role of SMEs, start-ups, and entrepreneurs in advancing the green, digital, and fair transition; stresses the need to align research, innovation, and industrial policies to accelerate market deployment of bio-based products, potentially through a bioeconomy industrial alliance and clustering; calls for better support for small actors in scaling up research and innovation; encourages the mobilization of private investment to enhance the sustainable and circular bioeconomy; supports knowledge-sharing and partnerships, including the AKIS and testing environments for bioeconomy solutions; recognizes the role of the EC in providing a knowledge base through initiatives like the Knowledge Centre for Bioeconomy and the Bioeconomy

Monitoring System; emphasises the role of research and innovation and Horizon Europe, including European research and innovation partnerships such as the Circular Bio-based Europe Joint Undertaking (CBE JU), European Innovation Partnerships (EIP) and Smart Specialisation Strategies (S3) in supporting it; endorses cooperation through initiatives like BIOEAST and urges greater support for less-developed regions via policy and knowledge transfer. The Council invites the EC to explore ways to promote innovation, technology adoption, and participation in research for rural and outermost regions.

5.1 EU Strategies dedicated to bioeconomy

5.1.1 EU Bioeconomy Strategy

The first Bioeconomy Strategy and Action Plan (EC, 2012), published in 2012, aimed to foster a more innovative, resource-efficient, and competitive society, balancing food security, sustainable resource use, and environmental protection. They were intended to shape bioeconomy research and innovation, promote policy coherence across national, EU, and global levels, and encourage public engagement. The Strategy sought synergies with policies like the CAP, maritime and fisheries policies, energy, industrial, and health policies, leveraging funding from research framework programmes available at the time.

The objectives were outlined by the Strategy as follows:

- Ensuring food security;
- Managing natural resources sustainably;
- Reducing dependence on non-renewable resources;
- Mitigating and adapting to climate change;
- Creating jobs and maintaining European competitiveness.

Main areas of action were defined as:

- Investments in research, innovation and skills;
- Reinforced policy interaction and stakeholder engagement;
- Enhancement of markets and competitiveness in bioeconomy.

The review of the Strategy (EC, 2018/a) came to the following conclusions: further investment mobilization requires a stable regulatory environment, especially for capital-intensive bio-refineries facing high risks. Scaling up technologies and demonstrators is essential. Policy coherence needs improvement, as the Strategy's objectives and Action Plan measures lack alignment and SMART[1] targets, hindering effectiveness. The evolving policy landscape – including the Circular Economy Action Plan, Energy Union Strategy, Paris Agreement, and Sustainable Development Goals (SDGs) – emphasizes the need for a sustainable, circular bioeconomy, requiring a reassessment of the 2012 Strategy and Action Plan. Stronger monitoring and assessment frameworks are needed to track progress, ensuring the

[1] Specific, Measurable, Achievable, Relevant, Time-bound

bioeconomy remains sustainable within biophysical limits while maximizing social and economic benefits. Indicators should align with the SDGs and other relevant metrics.

In 2018, an updated Bioeconomy Strategy (EC, 2018/b) was introduced. It presumed that unlocking the EU's bioeconomy potential requires investment, innovation, strategic development, and systemic changes across agriculture, forestry, fisheries, aquaculture, food, and biobased industries. Regulation and financing must support innovation to position Europe as a market leader, as highlighted in the Renewed European Agenda for Research and Innovation (EC, 2018/c). Horizon 2020 and the European Regional Development Fund (ERDF) will continue driving bioeconomy R&I, while the 2021-27 Multiannual Financial Framework allocates €10 billion under Horizon Europe's "Food and Natural Resources" cluster. S3 and regional partnerships further boost engagement. Global cooperation in bioeconomy research and innovation remains a priority. Beyond research and innovation, a strategic and systemic approach is needed to fully realize the economic, social, and environmental benefits of the bioeconomy. This requires collaboration across sectors, value chains, and regions to identify needs and actions while addressing systemic challenges and trade-offs to accelerate circular economy models. Maximizing synergies across EU and national funds, including the CAP, Common Fisheries Policy, cohesion policy, and InvestEU Financial Instruments, will be essential for effective deployment and scaling of innovations.

The updated Strategy reinforces the original objectives of the 2012 Strategy; however, to align with the evolving policy priorities, it outlines three central action areas:

- Strengthen and scale-up the bio-based sectors, unlock investments and markets;
- Deploy local bioeconomies rapidly across Europe;
- Understand the ecological boundaries of the bioeconomy.

Related to the first action area ("Strengthen and scale up the bio-based sectors, unlock investments and markets"), the following actions were defined, with the participation of the EC, the Member States, and various regional, institutional, and private stakeholders (EC, 2018/d):

- Mobilize public and private stakeholders, in research, demonstration, and deployment of sustainable, inclusive, and circular bio-based solutions.
- Launch of the EUR 100 million Circular Bioeconomy Thematic Investment Platform.
- Study and analyze enablers and bottlenecks and provide voluntary guidance to the deployment of bio-based innovations.
- Promote and/or develop standards and emerging market-based incentives and improve labels applicable to bio-based products on the basis of reliable and comparable data on environmental and climate performance.
- Facilitate the development of new sustainable biorefineries and confirm the type and estimated potential.

- Research and innovation investments for the development of substitutes to fossil-based materials that are bio-based, recyclable, and marine-biodegradable, and of bio-remediation methods by mobilising the cardinal actors in the relevant value chains, including the plastics value chain and to contribute to plastic-free, healthy, and productive European seas and oceans.

The EU Bioeconomy Strategy is foreseen to be updated again by the end of 2025, considering the current societal, demographic, economic, and environmental challenges, the bioeconomy's industrial dimension, and its links to biotechnology and biomanufacturing to contribute to a stronger EU economy. At the same time, it should also take into account the precautionary principle and, prioritize consumers' interests. (Council of the EU, 2024).

5.1.2 National bioeconomy strategies in the BIOEAST countries

The JRC, in collaboration with Bio-Based Industries Joint Undertaking (BBI JU) and International Energy Agency (IEA-Bioenergy), conducted a survey in 2017 to gather data on national bioeconomy policies. The findings were published in 2018 through its dashboard and a report (Lusser *et al*., 2018), with additional reports from IEA (Motola *et al.*, 2018) and BBI JU (BBI-JU, 2018). A follow-up survey in 2019 updated the dashboard, followed by further updates in 2021-2022 through desk research. In 2024, the data was reviewed with input from Member States' representatives of the European Bioeconomy Policy Forum (EC, 2024/a). As of the end of 2024, 11 EU Member States had a dedicated bioeconomy strategy at national level: besides Estonia and Latvia (Table 1. National strategies in the BIOEAST region, specifically dedicated to bioeconomy

), as the only BIOEAST countries, Austria, Belgium, Finland, France, Germany, Ireland, Italy, Portugal, and Spain.

Table 1. National strategies in the BIOEAST region, specifically dedicated to bioeconomy

	Title (English translation)	Publication year	Temporal scope
Croatia	Bioeconomy Strategy of the Republic of Croatia until 2035 (draft)	2020	2020-2035
Estonia	Circular Bioeconomy Roadmap	2023	2035
Latvia	Latvian Bioeconomy Strategy 2030 (LIBRA)	2018	2030

Source: own compilation based on the strategies and EU JRC's Knowledge4Policy Bioeconomy country dashboard (2025)

Estonia's Circular Bioeconomy Roadmap (Ministry of Regional Affairs and Agriculture, 2023) emphasizes research, development, innovation, and technology as a strategic field. A core focus is on fostering collaborative networks that bring together stakeholders from different sectors and value chains to develop cutting-edge technologies and create higher value-added products and services. The roadmap encourages active participation of R&D institutions in international research consortia, leveraging EU funding opportunities like Horizon Europe and Interreg. A

vital component of the strategy is supporting the development of piloting and technology-scaling infrastructure, including offshore facilities and bio-processing centers. Moreover, Estonia aims to adapt, test, and implement global circular bioeconomy research, best practices, and technologies to suit local conditions. The roadmap highlights the importance of IT solutions and artificial intelligence that enable efficient data utilization, the creation of digital collaboration platforms, process optimization, and the development of smart circular bioeconomy products and services.

Latvia's Bioeconomy Development Strategy (Ministry of Agriculture of the Republic of Latvia, 2018) envisages its sectors as innovation leaders in sustainably utilizing natural resources within the Baltic States. The focus is on developing and implementing innovative approaches to enhance economic growth, high-value production, exports, and employment while ensuring environmental quality, climate change mitigation and adaptation, and biodiversity preservation. According to the action direction of 'Knowledge and Innovation', a strong national research program focused on bioeconomy specialisation areas (as defined in RIS3) is essential, requiring long-term investments in research infrastructure and stable funding beyond five years. Effective collaboration between the public and private sectors should drive research, ensuring studies align with national economic demands while embracing interdisciplinary approaches for a knowledge-intensive bioeconomy. To bridge research and industry, predictable support mechanisms must facilitate knowledge transfer and commercialization, fostering partnerships between scientific institutions, entrepreneurs, farmers, and forest owners. Additionally, high-quality education tailored to bioeconomy sector needs is crucial, alongside leveraging new research opportunities to address social, environmental, climate, and economic challenges.

Croatia's draft Bioeconomy Strategy until 2035 (Croatian Ministry of Agriculture, 2020) envisions a rapidly growing, diverse sector that significantly contributes to economic sustainability, particularly in rural areas, while reducing reliance on non-renewable resources. A leading developmental priority is strengthening scientific research and innovation in the bioeconomy.

Although the Lithuanian National Bioeconomy Strategy is still to be developed, the Lithuanian Bioeconomy Development Feasibility Study (Ministry of Economy of the Republic of Lithuania & Aleksandras Stulginskis University, 2017) justifies the strategy by the need to transition from a fossil-based economy to a more sustainable, resource-efficient, and competitive bio-based economy.

The Czechia does not have a separate strategy on the bioeconomy, but the ideas and principles have been emphasized in a number of national strategies for some time. However, the document titled 'Concept of bioeconomy in the Czech Republic from the point of view of the Ministry of Agriculture for 2019-2024' (Ministry of Agriculture of the Czech Republic, 2019) aims to promote recycling and the transformation from traditional fossil-based economies to a

resource-efficient economy based on renewable materials produced through the sustainable use of ecosystem services, i.e., the bioeconomy.

5.1.3 National Bioeconomy Concept Papers in the BIOEAST Member States

As part of the BIOEASTsUP (n.d.) project, BIOEAST Member States developed Bioeconomy Concept Papers (Rozakis *et al*., 2023), which examined the status of bioeconomy sectors within each country, as of 2023. These papers explore both existing and alternative definitions of bioeconomy, as well as potential transformation pathways. They also include in-depth analysis of selected key bioeconomy sectors (both traditional and niche areas) that show strong potential. Each paper concludes with strategic directions and proposed actions to support the development and implementation of the bioeconomy. One system component to be addressed by the national stakeholders was bioeconomy related research and innovation. The proposed actions related to this component can be seen in

Table 2.

BIOEAST countries envision a resilient, knowledge-driven, and circular bioeconomy, through coordinated research and innovation efforts, underpinned by integrated innovation ecosystems, empowered human capital, and cohesive regional cooperation for bioeconomy development.

Table 2. Strategic actions related to research and innovation proposed in the national BIOEAST Concept Papers

Country	Strategic actions
Bulgaria	(1) Development of technologies and locally selected crop varieties to increase productivity and adapt to climate change in agriculture; (2) Creating new bio-based products and packaging, based on cascading use of by-products and waste in bio-refineries; (3) Strengthening the link between business and science through new types of partnerships (spin-offs, start-ups, living labs, open innovations); (4) Updating research, educational and training programs and creating centres and networks.
Croatia	(1) Establishment of scientific network with researchers and industry stakeholders to increase the capacity in fields related to bioeconomy; (2) Development of pilot scale plants as a biobased innovation and production of biobased products; (3) Empowerment of linkages between industrial needs and research activities.
Czechia	(1) Promoting innovation and reducing dependence on non-renewable resources; (2)Supporting the transition from cost-oriented competitiveness towards knowledge-based competitiveness; (3) Supporting cooperation between research organizations and the application sphere, further development of the national BIOEAST HUB CZ for the implementation of bioeconomy in the bottom-up approach; (4) Supporting environmentally friendly technologies and technologies and products that increase the overall efficiency of the use of primary resources and energy efficiency; (5) Development of bioeconomy education as it is of crucial importance to influence changes towards sustainable development, more specifically to provide sufficient competence for industry, services, and public administration; (6) Improvement of resource efficiency, develop industrial applications and biotechnology, comprehensive approaches to value chains, consumption, and ecosystem services.
Estonia	(1) Encouraging cooperation models and networks (enterprise cooperation, cooperation between enterprises and the state, international partners and research groups) within, above and between

	value chains for the development and introduction of technologies and the development of products and services with higher added value; (2) Supporting participation in international networks and consortia for using EU research and innovation funding opportunities (European Horizon, Interreg, etc.); (3) Supporting investments for the creation and development of innovative projects in cooperation of the state, public and private sectors for testing, piloting and technology scaling infrastructure (including offshore) and respective centres; (4) Development and introduction of small technological solutions suitable for community and regional levels; (5) Adaptation and application of the best practices and technologies of circular bioeconomy in Estonian conditions; (6) Application of IT solutions, including artificial intelligence, for the use of circular bioeconomy data and the development of products and services, the creation of digital cooperation platforms, optimization of processes and increased efficiency; (7) Improving the central access to state-ordered (applied) research and data in the Estonian Science Information System; communicating the possibilities of the system outside the academic circles.
Hungary	(1) Firmament of safe food system and supporting healthy diet by supporting new business models and innovative start-ups added value can be made from biological waste; (2) Preservation and strengthening of biomass production potential: a. with special attention to forests and added value creation: creating new and updating existing research infrastructures, increasing the human resources in number of researchers and skilled workers are essential for value added creation; b. with special attention to soil and biodiversity: increasing the amount of organic matter returned to the soils by at least 30% during the period of 2021-2030. There is a need to develop and maintain large experimental research infrastructures, as well.
Latvia	Allowing for closer collaboration between the system stakeholders, the communication between industry representatives, researchers and policymakers may be improved by implementing science-industry collaboration, research projects, piloting technologies and bioproducts that are developed in research institutions for industrial companies. Encourage private sector investment in research, which is not yet common practice in Latvia.
Lithuania	(1)Supporting (financial and nonfinancial) through consistent funding for the research, based on medium and long-term strategic planning; provide better support for business innovation by upgrading competences of science, technology and innovation public sector policy makers; (2) Enhancing integration with international innovation networks; promote the development of bioclusters; (3) Implementing the circular principles throughout the food supply chain; ensuring sustainable agriculture activity in a circular way by using locally available and produced resources; (4) Knowledge transfer, education: promoting the development of bioeconomic hubs, networks to ensure learning from best practices; enhance understanding of bioeconomy at the business, scientific, governmental and consumer levels, better use the education system at all levels.
Poland	(1) Increasing the agricultural productivity through sustainable intensification; (2) Cascading the use of agricultural and forest residues potential (increasing circularity) and the added value of biomass through innovative bio-products and technologies; (3) New and modern bio-refinery technologies and products. Significantly strengthen the relationship between business and science and educational activities in the field of sustainability and climate change.
Romania	Public technical assistance for organic farming business development, including dissemination of research results: although included in the National Strategic Plan, as part of AKIS, the need for technical assistance for farmers who practice ecological agriculture must be operationalized with priority in order to meet farmers' interest in this niche.

Slovakia	(1) Implementation of innovation policies focused on bioeconomy to achieve transformation goals identified during the preparation of Smart Specialisation Strategy SK 2021 – 2027; (2) Realisation of R&D projects, including demand-driven projects, living labs focused on: sustainable biomass production systems; innovative solutions for sustainable biosystems and biotechnologies; (3)Improving data, regional and macro regional research and innovation collaboration and enforce knowledge transfer to support evidence based policymaking and provide effective management and decision making tools for public and private stakeholders; (4) Providing effective necessary and tailored public financial support and incentives: in this regard, removing administrative barriers for funding research, innovations and cooperation of public and private stakeholders is of crucial importance; (5) Tailored education dedicated to bioeconomy and circular economy aimed at young people at the secondary and vocational schools and universities.
Slovenia	(1) Strengthening knowledge intensity (applied research, integration of RDI and industrial partners) is one of the prerequisites for the improvement of bioeconomy performance in terms of innovation adoption; (2) Boosting demand for biobased technological solutions and materials. These start with institutional buyers through the system of green public procurements. When designing and implementing public policies, plans, programs and measures to unlock the development potential of the bioeconomy in Slovenia, the following points should be considered: - The development of systematic and coordinated measures to support the development of more ambitious forms of cooperation between economic entities (industrial symbiosis) and development-innovation inter-industry cooperation within the framework of bioeconomy clusters; - Encouraging the development and use of cost-effective, innovative low-carbon technological and non-technological solutions.

Source: own compilation based on national BIOEAST Concept Papers

To enhance the ERA by fostering collaboration among stakeholders from various countries, anticipating research and innovation demands, and linking key organisations in the BIOEAST macro-region with EU bioeconomy networks, the BIOEAST Initiative has set up seven Thematic Working Groups (TWGs). These groups serve as a permanent macro-regional network of thematic experts representing ministries, academia, and research organisations:

- Agroecology and Sustainable Yields,
- Food Systems,
- Forestry Value Chains,
- Bioenergy and New Value-added Materials,
- Advanced Biochemicals and Biomaterials,
- Freshwater Based Bioeconomy,
- Bioeconomy Education.

The TWGs were instrumental in developing the BIOEAST SRIA (Nipers *et al.*, 2022) that addresses bioeconomy-related challenges, provides suggestions to overcome the weaknesses of the BIOEAST macro-region, and to reduce the effects of potential threats. It also aims to strengthen the knowledge base, stimulate research and innovation, and enhance cooperation and integration.

Each TWG developed its own thematic SRIA containing multiple Strategic Thematic Areas (Table 3). Within each of these areas, specific challenges, key research topics, and anticipated outcomes and impacts have been defined. Moreover, cross-cutting challenges and research topics that span multiple Core Themes have also been identified.

Table 3. BIOEAST Core Themes and Strategic Thematic Areas, as defined by the SRIA document

Core Theme	**Strategic Thematic Area**
Core Theme 1: Agroecology and sustainable yields	TA1: soil management TA2: transition to pesticide-free agriculture TA3: genetic resources and their diversification in agriculture TA4: innovation, smart agriculture, digitalisation and knowledge sharing TA5: sustainable animal husbandry and animal welfare TA6: rural development
Core Theme 2: Forestry value chains	TA1: forest resources in changing conditions TA2: sustainable wood production chains TA3: keeping and further strengthening of traditional and development of high-tech wood processing industries TA4: paper-pulp technologies TA5: recycling and cascading system of wood and wood products use TA6: forest ecosystem services and regional development TA7: education and communication
Core Theme 3: Food systems	TA1: sustainable food production TA2: power and information in the food system: strengthen the food environment and vulnerable actors in the food chains TA3: research, innovation, technology and investments for future sustainable food systems TA4: promoting sustainable food consumption and the shift to healthy, sustainable diets
Core theme 4: Bioenergy and new value-added materials	TA1: integrating bioenergy in circular and sustainable bioeconomy TA2: improving biomass quality for bio-based industry TA3: streaming bioenergy towards decarbonisation of national economies TA4: role of bioenergy in climate-neutral bioeconomy
Core Theme 5: Advanced biochemical and biomaterials	TA1: assessment of sustainable feedstocks for the chemical industry TA2: blue economy in the production of bio-based chemicals and materials TA3: chemical and enzymatic transformation of biomass TA4: production of bioactive and functional compounds TA5: production of bio-based materials and platform chemicals TA6: innovative high-value bio-based products for demanding applications
Core Theme 6: Freshwater based bioeconomy	-
Core Theme 7: Bioeconomy education	-

Source: BIOEAST SRIA, 2022

5.1.4 Regional bioeconomy strategies

A report of JRC (Haarich *et al.,* 2022) mapped and analysed the deployment of bioeconomy strategies at the regional level (NUTS 1 & 2) in the EU-27. Conducted from July 2021 to March 2022, it examines regulatory frameworks in place or under development as of November 2021. NUTS 3 was considered only when higher-level data was unavailable, focusing on the predominant sub-national level in each country. The study defines a "bioeconomy strategy" as a regulatory framework set by governmental authorities to achieve policy goals, including strategies, action plans, roadmaps, and resource management plans promoting a sustainable and circular bioeconomy. It mapped regional bioeconomy strategies using desk research and a web-based survey. The focus was on strategies from 2018-2021 or planned for 2022, with older ones included if still relevant. While a deep qualitative analysis was not conducted, strategies were categorized based on their bioeconomy focus and assessed for general characteristics across the EU.

The study finds that Interreg programs play an important role in developing regional and multi-regional bioeconomy strategies, often serving as the foundation for strategic frameworks in countries without systematic bioeconomy deployment. All identified multi-regional strategies stem from Interreg projects. Similarly, the BIOEAST Initiative supports bioeconomy development in 11 CEE countries where progress is less advanced. BIOEAST is backed by the EU's Horizon programme (Haarich *et al.*, 2022). Most of the relevant regional strategies, not regardless of the number of regions in the country, were identified in Poland, Czechia, and Hungary (Table 4).

Table 4. Number of regional strategies relevant to bioeconomy in the BIOEAST countries (published until or expected to be published after the year 2021)

	Fully dedicated bioeconomy strategies	Sectoral strategies	Embedded into other strategies
Bulgaria			
Czechia		4	13
Estonia			
Croatia			1
Hungary			10
Lithuania			1
Latvia	1		1
Poland	1	16	15
Romania	1		7
Slovenia			
Slovakia	1		4

Source: Haarich et al. (2022)

The Action Plan for the Development of a Knowledge-Driven Bioeconomy Innovation Ecosystem in Vidzeme Region in Latvia (Vidzeme Planning Region & Institute of Environmental Solutions, 2019) outlines clear actions to build a knowledge-driven bioeconomy innovation ecosystem, developed under the RDI2CluB project (Interreg Baltic Sea Region, n.d.) with broad stakeholder involvement. It focuses on regional and transnational actions to be implemented across short-, medium-, and long-term phases starting from 2019. The plan sets six strategic objectives: 1) to raise awareness of bioeconomy stakeholders on the bioeconomy and smart and sustainable exploitation of bio-resources; 2) to promote the development, availability and exchange of knowledge necessary for businesses to produce bio-resources based products and services; 3) to develop a bioeconomy cluster; 4) to ensure the availability of actual, evidence-based bioeconomy data and information and its dissemination to bioeconomy stakeholders; 5) to promote the improvement of policies and strategies, related to the bioeconomy, and their implementation tools; and 6) to increase attractiveness of the Vidzeme region as a desirable location for innovation in the bioeconomy and for investment in the bioeconomy.

The "Bioeconomy Development Strategy for the Mazowieckie Voivodeship" (Mazovian Energy Agency, 2021) is a comprehensive policy document aimed at fostering sustainable economic growth in the Mazovia region (Poland) by harnessing biological resources, knowledge, and innovation. The strategy, developed with input from regional stakeholders and coordinated by the Mazovian Energy Agency, aligns with EU priorities and national development goals. The overarching mission of the strategy is to establish Mazovia as a leader in the bioeconomy in Poland, a role it seeks to achieve by adapting to environmental shifts, harnessing developmental opportunities, and responding to residents' needs and expectations. The strategy sets out five strategic goals: efficient management of resources in accordance with the principles of sustainable development; increasing the use of renewable biological resources in sectors that create high added value; contribution to climate policy implementation; strengthening the research potential of scientific units and developing cooperation in business-science-environment relations; and shaping and promoting pro-environmental and pro-health consumer behaviour.

The BIOREGIO Action Plan for Romania's Sud Muntenia Region, developed by INCDCP ICECHIM Filiala Călărași, outlines a strategic framework to advance the bio-based circular economy. Rooted in the broader BIOREGIO project (2017–2021) (Interreg Europe, n.d.), the plan reflects lessons learned from European good practices and collaborative engagement with local stakeholders including public authorities, researchers, industry, and NGOs. The actions to be implemented were defined as follows: 1. Review of Regional Operational Programme funding instrument; 2. Economic and legal framework for bio-based circular economy; 3. Promoting technologies for valorisation of biowaste/biological streams; and 4. Inclusion of circular economy in the National Rural Development Programme.

The development strategy of the Bioeconomy Cluster in the Nitra Region of Slovakia, the Cluster's vision (Bioeconomy Cluster, 2020) is to be a supporting pillar of the bioeconomy ecosystem in Slovakia. Its mission is to ensure the economically and environmentally efficient use and conservation of natural resources by fostering innovation and cooperation between the various actors in the bioeconomy. The strategic objective is formulated as to promote the creation of an innovation ecosystem for knowledge and technology transfer between research and business in the bioeconomy through mutual collaboration, including contributing to relevant policy development. Specific objectives are the following: 1. Strengthening the innovation potential of actors in the bioeconomy through cooperation in knowledge and technology transfer, research, development, and innovation with high regional impact; 2. Engage the regional research and innovation ecosystem in international cooperation, including projects and expert participation in national policy making; and 3. Raising awareness and information on the bioeconomy at regional and national level.

5.2 The European Green Deal

The European Green Deal is a long-term growth strategy that aims to "transform the EU into a fair and prosperous society, with a modern, resource-efficient, and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use." (EC, 2019 p. 2) The ambitions have been financed by one third of the €1.8 trillion investment from the NextGenerationEU Recovery Plan, and the EU's seven-year budget (EC, n.d./a). The European Commission has introduced a series of proposals to align the EU's climate, energy, transport, and taxation policies with the goal of cutting net greenhouse gas emissions by at least 55% by 2030, relative to 1990 levels. The EU has established legally binding climate targets that apply to all major economic sectors. The comprehensive plan includes emission reduction goals spanning various industries, a target to enhance natural carbon sinks, a revised emissions trading system to limit emissions, impose a cost on pollution, and drive investments in the green transition, and social support measures for citizens and small businesses.

According to the EC, research and innovation play a central role in accelerating and navigating the necessary transitions, deploying, demonstrating and de-risking solutions, and engaging citizens in social innovation (EC, 2019). Horizon Europe, working in coordination with other EU programs, will be instrumental in mobilizing national public and private investments. At least 35% of Horizon Europe's budget will be allocated to funding climate-related solutions that support the implementation of the Green Deal. Four dedicated 'Green Deal Missions' will facilitate large-scale transformations in areas such as climate adaptation, oceans, cities, and soil. These missions will engage a diverse group of stakeholders, including regions and citizens. Additionally, partnerships with industry and Member States will advance research and innovation in transport, focusing on areas such as battery technology, clean hydrogen, low-carbon steel production, circular bio-based industries, and sustainable construction.

5.3 Strategies with bioeconomy-relevance

This sub-chapter provides a comprehensive stocktake and brief analysis of bioeconomy-relevant EU-level strategies, as well as the related national strategies adopted by BIOEAST countries (Table 5), with a focus on research and innovation. By mapping policy alignment, this sub-chapter aims to support better coordination and resource mobilisation for bioeconomy development across the macro-region.

Table 5. Presence and temporal scope of the bioeconomy-related strategies in the BIOEAST member states

	Bioeconomy	Circular economy	Biodiversity	Food	Forestry	Aquaculture and fisheries	Smart specialization	Climate adaptation	Energy and climate
BG	-	2027	2030 (2050)	2027	2030	2020	2027	2030	finalized
HR	2035	-	-	2030	-	2030	2029	2040	draft
CZ	-	2040	-	2030	2035	2024	2027	2030	finalized
EE	2035	2035	-	2027	2030	2030	2035	2030	draft
HU	-	2040	2030	2050	2030	2030	2027	2030	finalized
LV	2030	2027	-	-	undefined	2027	2027	2050	finalized
LT	-	2035	-	-	2050	2027	2030	2050	finalized
PL	-	2023 (2030)	-	2030	2030	2027	undefined	to be developed by 2026	draft
RO	-	2030	-	2030	2030	2030	2027	2030	finalized
SK	-	2040	-	2030	2025 (2050)	2030	2027	2025 (2030)	draft
SI	-	2030 (2035)	undefined	-	2026	2030	2030	2050	finalized

Source: own compilation based on EU and national strategies

5.3.1 EU Circular Economy Action Plan and national circular economy strategies

The Circular Economy Action Plan (EC, 2020a) aims to make Europe cleaner and more competitive by advancing circular economy practices in collaboration with businesses, consumers, and civil society. It supports the European Green Deal through a streamlined regulatory framework and initiatives promoting sustainable products, waste prevention, and a stronger market for secondary raw materials. Innovation is driven by EU funding (e.g., Horizon Europe, Programme for the Environment and Climate Action (LIFE), ERDF), digital tools (e.g. product passports) enhance transparency, and support for skills, research, and intellectual property policies align with green and digital transitions.

Across the various national strategies in the BIOEAST region with targets commonly set for 2027, 2030, or even 2035, there is a strong and consistent emphasis on enhancing innovation and R&D as central drivers of economic growth and competitiveness. Common thematic priorities include sectors such as health and life sciences, digital technologies, sustainable industry, and the bioeconomy, including aspects like the circular economy and biomass utilization, aligning with the shared commitment to sustainability and the green transition. There is a clear focus on building capacity through investment in scientific infrastructure, the development of human capital, and fostering collaboration among academia, business, and government.

5.3.2 EU's Biodiversity Strategy for 2030 and national biodiversity strategies

The EU Biodiversity Strategy for 2030 (EC, 2020b) aims to reverse biodiversity loss by 2030, supporting the SDGs and the Paris Agreement. It addresses key drivers of biodiversity decline, strengthens governance, and promotes full enforcement of EU laws. The strategy fosters collaboration among stakeholders to enable transformative change. Its vision is that by 2050, ecosystems worldwide are restored and protected. The core goal is to set Europe's biodiversity on a path to recovery by 2030 for the benefit of people, the planet, climate, and economy. Pillar three focuses on enabling transformative change through workforce reskilling, research funding via Horizon Europe, and new partnerships. It also supports policy development through the Knowledge Centre for Biodiversity, strengthens international collaboration, and promotes biodiversity education across Member States.

Based on the mapping of bioeconomy-related national strategies, at the time of the preparation of the report, only Bulgaria and Hungary had temporarily valid biodiversity strategy, published in 2022 and 2023, both with a scope until 2030. Slovenia's strategy originates from 2001, with no defined time frame. All strategies emphasize long-term visions for halting biodiversity loss and restoring ecosystems. However, references to bioeconomy or biomass are not uniformly present.

5.3.3 Farm to Fork Strategy and national food systems strategies

The Farm to Fork Strategy (EC, 2020c), part of the European Green Deal, aims to create sustainable, fair, and healthy food systems with positive environmental impacts. Key goals include climate change mitigation, biodiversity restoration, food security, fair trade, and economic viability for producers. Research and innovation are central, with Horizon 2020 and Horizon Europe investing €11 billion in areas like alternative proteins, soil health, agroecology, and digital solutions. Key initiatives include agroecology living labs, a soil health mission, and the "Safe and Sustainable Food Systems" partnership, promoting innovation, circularity, and resilience across the food value chain.

Most strategies in the BIOEAST Member States are designed with a long-term vision in mind, aiming to enhance food security, ensure sustainability in agriculture, and transition towards resilient food systems, often extending to 2030 or 2050. A central theme is the emphasis on food security and sustainability, with many initiatives aiming to bolster local food production, promote healthy eating habits, and safeguard supply chains. This is closely linked to environmental protection efforts, as countries increasingly prioritize the conservation of vital natural resources such as soil, water, and forests, while striving to minimize the ecological footprint of food systems. Innovation plays a crucial role in these strategies, with the adoption of new technologies, circular economy principles, and sustainable biomass use. At the same time, social equity remains a main concern, as several programs are dedicated to supporting vulnerable populations through targeted food aid and nutrition initiatives.

5.3.3 EU CAP and national strategic plans

The CAP supports a smart, sustainable, and resilient EU agriculture system to ensure long-term food security. Its priorities include farmer income, climate action, biodiversity, natural resource protection, and rural socio-economic development. From 2023–2027, national CAP Strategic Plans—approved by the EC—guide the strategic use of direct payments, market measures, and rural development funding (EU CAP Network, n.d./a).

A cross-cutting objective promotes modernization through innovation, knowledge sharing, and digitalization. Member States strengthen AKIS by supporting advisor training, peer learning, on-farm demos, and knowledge exchange. Operational Groups (OGs) under European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) and synergies with Horizon Europe foster bottom-up, practical innovation across agriculture and rural areas.

The strategies presented in the CAP Strategic Plans of BIOEAST Member States reveal a set of recurring themes aimed at transforming agriculture into a more sustainable, inclusive, and forward-looking sector. A strong focus is placed on supporting farmers and revitalizing rural areas by promoting fair income distribution, encouraging young people to take up farming, and diversifying rural economies to enhance quality of life. Sustainability lies at the heart of these plans, with widespread adoption of eco-schemes and practices that protect soil and water, preserve biodiversity, and address climate change. Innovation and knowledge transfer are also key priorities, with investments in digitalisation, smart farming technologies, advisory services, and training to boost productivity and resilience. Furthermore, the strategies emphasize fair and inclusive growth by reducing disparities between different farm sizes, supporting vulnerable sectors, and strengthening food security through a more market-oriented and competitive agricultural landscape.

5.3.4 EU Soil Strategy for 2030

The Soil Strategy (EC, 2021/b) provides a framework with concrete measures to protect, restore, and sustainably manage soils, ensuring societal engagement, financial support, knowledge sharing, and monitoring.

Horizon Europe will drive knowledge creation and collaboration to accelerate the transition to healthy soils. Key instruments include Cluster 6, Food2030 priorities, and Horizon Europe Partnerships (e.g., food system, biodiversity, agroecology, agriculture of data). The mission 'A Soil Deal for Europe' provides a structured research and innovation framework, supporting harmonized EU soil monitoring, research-policy integration, and practical implementation. It will fill knowledge gaps, test and deploy soil health solutions, and promote widespread adoption through living labs (on-the-ground experimentation) and lighthouses (best practice demonstration sites) (EC, 2022/a).

5.3.5 New EU Forest Strategy for 2030 and national forest(ry) strategies

The EU Forest Strategy (EC, 2021b) aims to boost forests' socio-economic role, support rural development, and promote a sustainable forest-based bioeconomy. It focuses on protecting and expanding forests to address climate change and biodiversity loss. A key priority is advancing forest research and innovation through Horizon Europe to support the Green Deal's goals. A forestry research and innovation partnership will be proposed to coordinate EU efforts and priorities. Horizon Europe will provide up to €1 billion, with private support through the Circular Bio-based Europe Partnership, to develop sustainable bio-based materials. Projects will also strengthen forestry's role in the EIP-AGRI.

BIOEAST national strategies emphasize sustainable forest management as a core principle, aiming to maintain the ecological, economic, and social functions of forests over the long term. A common vision is the recognition of forests as multifunctional systems that support biodiversity, regulate the climate, supply wood, and contribute to rural development. Many strategies prioritize the role of forest biomass in advancing the bioeconomy, often coupled with innovation in forestry practices and technologies. Forests are identified as key assets in both mitigating and adapting to climate change through enhanced carbon sequestration, afforestation, and efforts to increase ecosystem resilience.

5.3.6 EU's Blue Economy for a Sustainable Future

The Commission's sustainable blue economy approach (EC, 2021c) supports the European Green Deal by aligning marine activities across sectors like fisheries, aquaculture, shipping, and clean energy. It highlights the importance of research, innovation, and emerging technologies (e.g. AI, big data, autonomous systems) in achieving climate neutrality by 2050, restoring marine ecosystems, and transforming both traditional and emerging maritime industries. Coastal communities can boost local economies through innovation, supported by EU funding like the European Maritime, Aquaculture, and Fisheries Fund and Horizon Europe. These initiatives promote green and digital transitions, engaging SMEs, researchers, and public authorities. Smart specialization and interregional investment strengthen regional innovation and value chains, while the EU Climate Action Innovation Fund (IF) backs low-carbon marine technologies. The Commission also supports this through a mission to restore aquatic ecosystems and a 2023 partnership for a climate-neutral, sustainable blue economy.

Most national aquaculture and fisheries strategies in the BIOEAST countries prioritize the sustainable development of aquaculture, focusing on eco-friendly practices, biodiversity conservation, and efficient resource use. Countries aim to enhance the productivity, quality, and resilience of aquaculture systems to meet growing food demands and market competitiveness. Several strategies include goals related to fostering innovation, supporting marine biotechnology, and integrating aquaculture into the wider bioeconomy through R&D and technology adoption. Building resilience to climate change and strengthening ecological performance are also recurring themes, reflecting a growing awareness of environmental

challenges. Improved governance and active stakeholder (public institutions, research bodies, and private stakeholders) engagement, cooperation and participatory planning are recognized by several strategies.

5.3.7 A New Industrial Strategy for Europe

To boost competitiveness and advance a green, circular industry, this strategy (EC, 2020/d,e) emphasizes secure clean energy and raw material supply, increased investment in R&I and infrastructure, and strong collaboration across EU actors. Supportive regulation, public procurement, SME inclusion, and coordinated funding will drive clean tech markets, with early adopters gaining a key advantage.

The strategy urges industrial sectors to create roadmaps for climate neutrality and digital leadership, backed by research, skills, and EU support. Public-Private Partnerships and tools like the EIC will drive tech development and start-up growth. A stronger single market will foster innovation through regional experimentation and SME involvement. Horizon Europe and the IF will support the green and digital transition, with possible carbon contracts for difference boosting low-carbon tech deployment under the revised Emission Trading System (ETS).

5.3.8 Smart Specialisation Strategies (S3)

S3 have been crucial for integrating research and innovation into EU regional development since their introduction by the EC in 2010. Focused on participation, prioritization, and localization, S3 helps regions identify competitive advantages and drive sustainable economic transformation. Over a decade later, S3 is firmly embedded in EU policy, enhancing cooperation and shaping regional innovation strategies (EC, n.d./b).

According to the New European Innovation Agenda, over the new programming period 2021-2027, S3 will continue to "play a central role in strengthening regional innovation ecosystems so that they are better equipped to stimulate and sustain economic growth. They provide the framework for ERDF support for research and innovation to the tune of an estimated EUR 56 billion. Thematic Smart Specialisation Platforms and partnerships have also become key tools for connecting innovators with similar or complementary strengths and priorities in all Member States and regions, including in technology areas that are key for the twin green and digital transition." (EC, 2022/b p.10)

Across the various national strategies in the BIOEAST region with targets commonly set for 2027, 2030, or even 2035, there is a strong and consistent emphasis on enhancing innovation and R&D as central drivers of economic growth and competitiveness. Common thematic priorities include sectors such as health and life sciences, digital technologies, sustainable industry, and the bioeconomy, including aspects like the circular economy and biomass utilization, aligning with the shared commitment to sustainability and the green transition. There is a clear focus on building capacity through investment in scientific infrastructure, the

development of human capital, and fostering collaboration among academia, business, and government.

5.3.9 EU Strategy on Adaptation to Climate Change and national climate adaptation strategies

The EU's 2021 Climate Adaptation Strategy (EC, 2021d) aims for climate resilience by 2050 through four goals: smarter adaptation via better data and risk tools; faster implementation of solutions; more systemic integration across policies and governance; and stronger international action. It emphasizes science-based decisions, better understanding of climate-society links, and inclusive governance, while highlighting the need for more research on adaptation costs, benefits, and risks. The EU can drive climate adaptation through research programmes, the Space Programme, and the Civil Protection Mechanism, with key advances in damage modelling, health impacts, and climate tipping points. Strengthening platforms like Climate-ADAPT through further investment will enhance knowledge sharing, integrate project insights, and improve access to quality climate data and solutions (EEA, n.d.).

Most BIOEAST countries aim for climate resilience by 2030 or 2050, with emphasis on reducing vulnerability and increasing adaptive capacity. Strategies typically target multiple sectors, especially agriculture, forestry, and water, emphasizing mainstreaming of adaptation measures. Many countries stress a cross-sectoral approach. Several strategies highlight the role of bio-based industries, renewable biomass, and research and innovation in achieving climate goals.

5.3.10 Energy Union - National energy and climate plans

The National Energy and Climate Plans (NECPs), introduced under Regulation (EU) 2018/1999, guide how EU countries address the five energy union dimensions: decarbonization, energy efficiency, energy security, internal market, and research and innovation. They promote cross-government coordination, investment, and stakeholder consultation. Progress is reported biennially, with updated plans due by 30 June 2024. Member States also had to submit long-term 2050 strategies by 2020. A strong EU and national research and innovation strategy is key to leading in clean energy technologies, requiring better coordination, investment impact, and stronger research-industry links, building on Horizon programme.

NECPs in the BIOEAST area prioritize decarbonisation and the transition to cleaner energy systems, with a strong emphasis on reducing greenhouse gas emissions (decarbonization) and expanding the use of renewable energy sources. Alongside this, improving energy efficiency, particularly in buildings, transport, and industry, is a recurring objective, to reduce overall energy demand. Many strategies highlight the development and deployment of biomass-based solutions, bio-based products, and technologies that support a circular and sustainable economy. The plans also incorporate climate adaptation measures, often linking them to biodiversity conservation and integrated land-use planning.

5.3.11 EU directive on the promotion of the use of energy from renewable sources

Directive (EU) 2018/2001 of the European Parliament and of the Council establishes a common framework for promoting renewable energy in the EU, setting a binding 2030 target for its share in total energy consumption. It defines rules for financial support, self-consumption, renewable energy use in heating, cooling, and transport, regional cooperation, guarantees of origin, administrative procedures, and training. Additionally, it sets sustainability and emissions criteria for biofuels, bioliquids, and biomass fuels. Pursuant to the directive, Member States must ensure that biomass energy production minimizes market distortions and environmental harm, following the waste hierarchy and the cascading use principle. Support schemes for biofuels, bioliquids, and biomass fuels should prevent unsustainable practices and competition with material sectors. Woody biomass should be prioritized in the following order: wood-based products, extending product lifespan, re-use, recycling, bioenergy, and disposal.

6 The macro-environment of bioeconomy research and innovation in the BIOEAST member states

6.1 Structural characteristics

In recent years, significant attention has been given to the structural differences in R&D funding between Europe and its major global competitors. European policymakers have sought to increase business investment in R&D to align more closely with the levels observed in countries like South Korea, Japan, and the United States. Significant disparities within the EU can also be detected. The ERA was established to help overcome various barriers that have historically hindered research efforts in Europe, such as geographical, institutional, disciplinary, and sectoral divisions.

Eurostat compiles statistics on R&D expenditure following the guidelines outlined in the Frascati Manual 2015, published by the OECD. R&D expenditure is a fundamental metric that includes intramural spending, covering all R&D costs incurred within a specific statistical unit or economic sector in EU countries. The primary analysis of R&D statistics is categorized into four institutional sectors: the business enterprise sector, the government sector, the higher education sector, and the private non-profit sector. Gross domestic expenditure on Research and Development (GERD) consists of spending across these four sectors. This data accounts for research conducted within a country's territory, regardless of the funding source, and is often expressed as a percentage of Gross Domestic Product (GDP), a measure commonly referred to as R&D intensity (Eurostat, 2024/a).

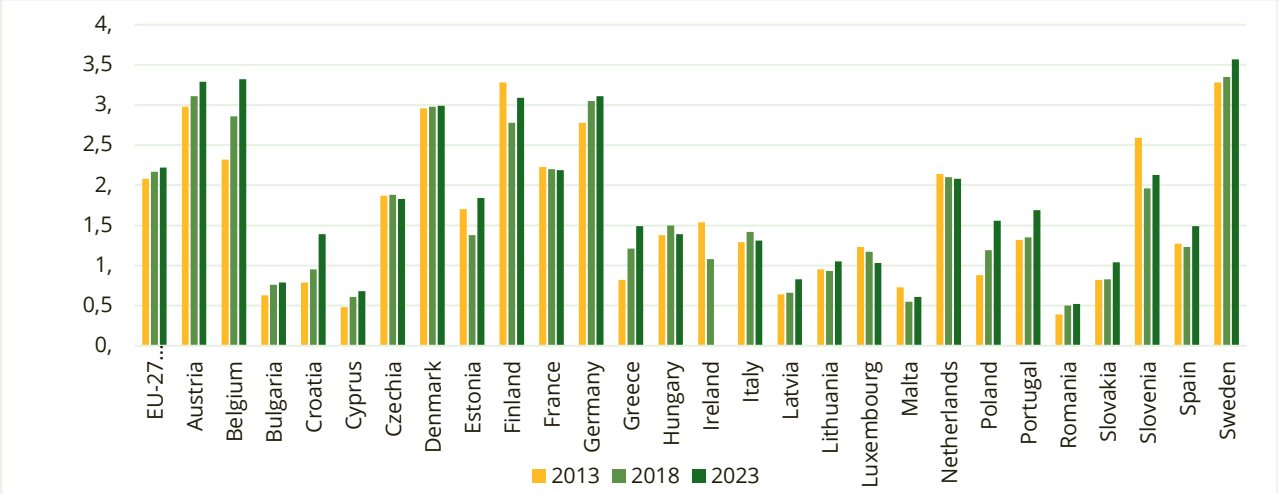
R&D personnel consist of persons engaged directly in R&D, which refers to the creative and systematic work undertaken to increase the stock of knowledge, including knowledge of humankind, culture and society, and to devise new applications of available knowledge. In addition, R&D personnel also include those providing direct services for the R&D activities, such

as R&D managers, administrators, technicians and clerical staff. For statistical analysis, data on R&D personnel are recorded using both headcounts (HC) and full-time equivalents (FTEs). Within this group, researchers form a specific subset of R&D personnel. They are professionals dedicated to generating new knowledge through research, as well as enhancing or developing concepts, theories, models, techniques, instruments, software, or operational methods (Eurostat, 2024/b).

The CIS provides insights into innovation within EU enterprises every two years. It serves as a primary information source for business analysts and policymakers, as it covers various aspects of the innovation process undertaken by European companies. The survey underwent significant restructuring following the adoption of the Oslo Manual in 2018. The CIS gathers data on basic concepts related to business innovation, including the presence or absence of innovation activities, innovation capabilities, implemented innovations, and critical non-monetary factors related to an enterprise's market environment and strategies. The information is categorized based on enterprise size, economic sector, and geographical location (Eurostat, 2021).

In the following overview, some key indicators in the BIOEAST countries are presented, based on Eurostat data, in an EU comparison. While a separate analysis of bioeconomy research and innovation was mostly not feasible due to the incompleteness of sectoral data, the figures for the whole economy provide a good indication of the characteristics and trends of the innovation macro-environment, taking into account industry interlinkages as well.

GERD activities is the total intramural expenditure on research and development performed on the national territory during a given period. This includes both current costs and capital expenditures. Figure 1 shows the GERD for each sector, which was on average 2.22% of the GDP in the EU-27 in 2023. While Sweden, Austria, Belgium, Germany and Finland spend more than 3% of their GDP on R&D, in the BIOEAST countries this proportion is below 2%. Among the BIOEAST countries, the Czechia, Estonia, Poland and Slovenia spend more on R&I, but, in the case of Bulgaria, Latvia and Romania this rate is less than 1%. Countries in the lower value range all showed an increasing trend in R&D expenditure throughout the years.



Note: no 2023 data available for Ireland

Figure 1. GERD in the EU member states, all sectors, 2013-2023 (percentage of GDP) (Source: own editing based on Eurostat)

As

Table 6 shows, the share of GERD provided by the business enterprise sector in most of the BIOEAST countries has been following an increasing trend over the years (2012-2022, often with values peaking in the mid-2010s), especially in Bulgaria, Latvia, and Lithuania. This is in line with the expectation that research and innovation should increasingly become a task and responsibility of the competitive sector and that marketable solutions are needed. In case of Czechia, Estonia, and Slovenia, a slightly declining trend can be observed, with fluctuations.

Table 6. Share of GERD by the business enterprise sector in the EU-27 and the BIOEAST countries (percentage of the total GERD)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
EU - 27 (from 2020)	56.47	56.66	56.81	56.86	58.01	59.03	59.20	58.98	57.75	57.65	n.a.
Bulgaria	20.77	19.51	22.25	35.58	43.61	43.21	43.13	37.64	35.43	32.93	34.74
Czechia	36.38	37.60	35.93	34.53	39.54	39.32	39.91	38.18	35.59	36.05	37.23
Estonia	51.29	42.05	37.06	41.01	48.24	43.57	40.83	49.11	50.13	50.95	49.47
Croatia	38.22	42.79	42.91	46.64	42.87	42.58	33.19	36.55	37.62	38.44	40.35
Latvia	23.73	21.79	27.83	20.04	21.56	24.15	22.34	24.28	31.24	33.47	37.32
Lithuania	26.47	27.47	32.71	28.53	38.97	35.42	38.04	34.00	37.32	36.06	39.93
Hungary	46.88	46.80	48.28	49.72	56.43	52.68	52.35	52.90	50.23	50.57	44.90
Poland	32.30	37.33	39.00	39.00	53.10	52.54	53.19	50.68	50.64	50.97	54.76
Romania	34.41	31.02	32.92	37.29	49.37	54.40	57.08	54.58	55.62	55.17	56.24
Slovenia	62.22	63.85	68.39	69.21	69.25	63.15	51.83	51.93	49.50	48.73	44.12
Slovakia	37.71	40.19	32.21	25.06	46.22	49.03	48.85	46.76	43.69	45.70	47.14

Source: own editing based on Eurostat

In Table 7, the business enterprises' R&D expenditure (BERD) is displayed**.** On average, 1.47% of GDP in the EU was spent on business R&D in 2023. A value above 1% can be observed in Slovenia, Czechia, Estonia, Hungary, and Poland, while the other BIOEAST member states lag with a share of around 0.3-0.8%. BERD as a percentage of GDP is slightly increasing in both Western Europe (the data of which is not shown here) and the BIOEAST region.

Table 7. BERD in the EU-27 and the BIOEAST countries (percentage of GDP)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
EU-27 (from 2020)	1.31	1.33	1.34	1.36	1.38	1.42	1.44	1.47	1.50	1.48	1.47	1.47
Bulgaria	0.36	0.39	0.52	0.70	0.56	0.52	0.54	0.56	0.57	0.51	0.51	0.51
Czechia	0.93	1.00	1.07	1.04	1.01	1.10	1.16	1.17	1.19	1.21	1.21	1.19
Estonia	1.21	0.81	0.61	0.66	0.63	0.59	0.59	0.85	0.95	0.98	0.99	1.06
Croatia	0.34	0.40	0.37	0.42	0.39	0.41	0.45	0.53	0.59	0.58	0.77	0.76
Latvia	0.16	0.18	0.25	0.16	0.11	0.14	0.16	0.17	0.26	0.29	0.29	0.30
Lithuania	0.24	0.24	0.32	0.29	0.30	0.33	0.39	0.43	0.53	0.54	0.53	0.44
Hungary	0.83	0.96	0.96	0.98	0.87	0.96	1.14	1.10	1.21	1.23	1.00	1.01
Poland	0.33	0.38	0.44	0.46	0.63	0.66	0.79	0.82	0.86	0.89	0.95	1.01
Romania	0.18	0.12	0.16	0.21	0.27	0.29	0.29	0.27	0.27	0.28	0.29	0.32
Slovenia	1.96	1.99	1.85	1.69	1.54	1.41	1.46	1.52	1.58	1.57	1.48	1.47
Slovakia	0.33	0.38	0.32	0.32	0.40	0.48	0.45	0.45	0.48	0.50	0.56	0.58

Source: own editing based on Eurostat

Table 8 shows R&D personnel and researchers in the total active population as the share of employment in all sectors (expressed in FTE). Most of the BIOEAST countries' ratios are well below the EU-27 average, with only Slovenia and the Czechia exceeding it, while Estonia and Hungary also having relatively higher rates within the region.

Table 8. Share of R&D personnel and researchers in total active population and employment all sector, percentage of total employment in FTE*

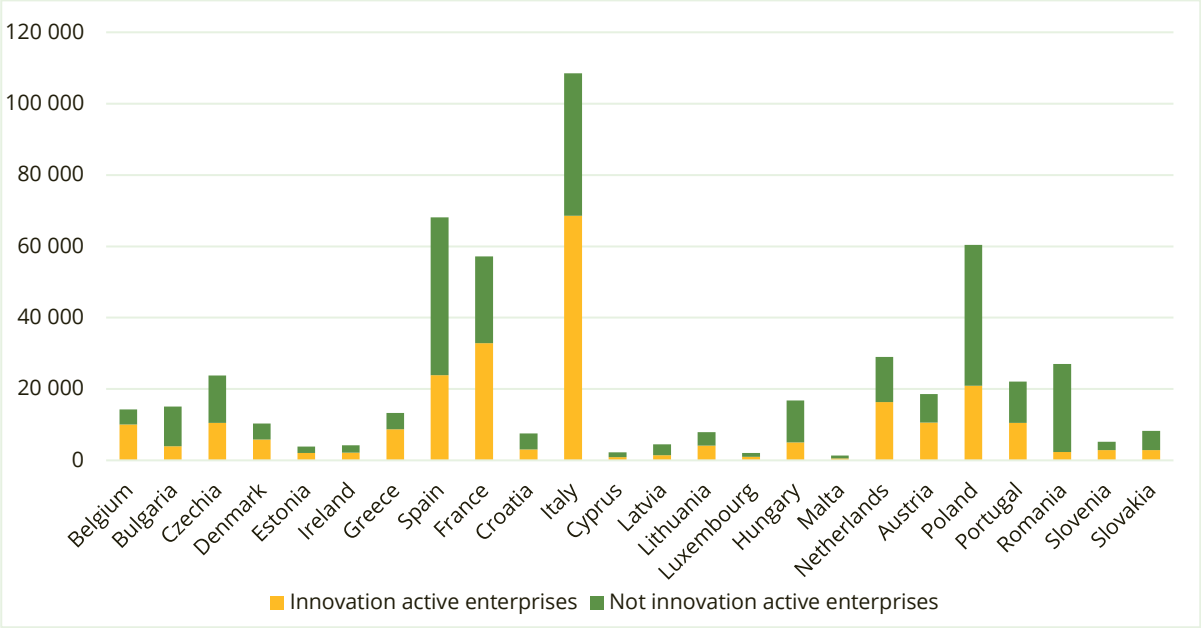
	2012	**2015**	**2020**	**2023**
EU - 27 (from 2020)	1.28	1.35	1.56	1.66
Bulgaria	0.59	0.77	0.93	0.9
Czechia	1.25	1.35	1.59	1.75
Estonia	0.98	0.92	1.04	1.33
Croatia	0.68	0.68	1.01	1.07
Latvia	0.66	0.64	0.77	0.78
Lithuania	0.84	0.82	1.1	1.05
Hungary	0.91	0.86	1.33	1.31
Poland	0.61	0.71	1.06	1.19
Romania	0.43	0.43	0.44	0.46
Slovenia	1.67	1.59	1.76	1.84

Slovakia	0.76	0.71	0.87	0.95

* in the years for which data were fully available

Source: own editing based on Eurostat

When looking at the innovation active enterprises (Figure 2) for all sectors in 2022, among the BIOEAST countries, the highest number of innovative enterprises can be found in Poland (20 912), followed by the Czechia (10 510), Hungary (5073) and Lithuania (4163). The proportion of innovative enterprises is the largest in Slovenia (55.4%), Estonia (53.2%), and Lithuania (52.6%), while the 8.8% value of Romania is extremely low, even compared with the relatively low level of Bulgaria (26.1%) and Hungary (30.2%).

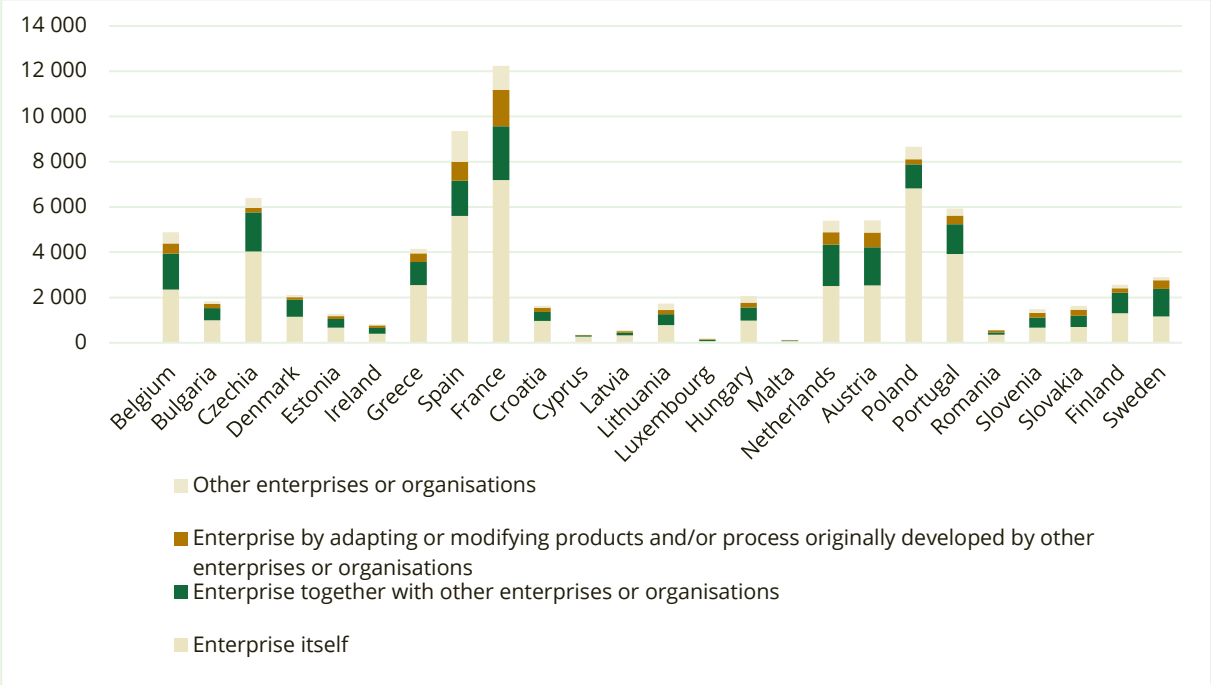


Note: Germany excluded because outlying values

Figure 2. Number of enterprises by innovation status, 2022

Source: own editing based on Eurostat (CIS 2022 data)

Figure 3 shows the number of enterprises that have developed or introduced some kind of innovation. It is presented according to whether this innovation was introduced by the enterprise itself, or with or by another enterprise or adopted and developed further. The exceptionally high values for Italy and Germany were excluded from the illustration. After the previous countries, France (7195) and Spain (5600) have the highest number of enterprises individually introducing innovations, but the number of enterprises introducing new innovations is high even in European comparison in Poland (6821) and the Czechia (4034) and especially compared to the BIOEAST region's other countries.



Note: Germany and Italy excluded because of outlying values

Figure 3. Number of enterprises that introduced an innovation by type of developer, 2022
Source: own editing based on Eurostat (CIS 2022 data)

Taking into account the bioeconomy's complexity and the need for reliable data for effective decision-making, the EU JRC is continuously developing methods to monitor research and innovation in bioeconomy sectors. The EU Bioeconomy Monitoring System is structured into indicators, key components, normative criteria, and objectives (Wydra *et al*., 2024). The proposed indicator system follows a common innovation study framework, viewing innovation as a sequence from investments (inputs) to interim results (throughputs), leading to outputs and socio-economic impacts (outcomes). However, real-world innovation processes are more complex, influenced by external factors, and not strictly cause-effect. Instead, the system helps identify where developments have occurred or are lacking (Wydra *et al*., 2024).

Figure 4 and Figure 5 display the sectoral composition of the bioeconomy by country. Among the countries with a higher share of bioeconomy knowledge-based services are BIOEAST countries such as Bulgaria, Estonia, Hungary, Slovenia, Czechia and non-BIOEAST countries such as Denmark, Austria, Finland, Sweden. Based on Ronzon *et al.* (2022), it is essential to recognize that knowledge-based services within the bioeconomy and those facilitating bio-based market development face significant uncertainties in estimating their bio-based output share, especially in areas such as scientific research, education, public administration, and bioeconomy-related organizations.

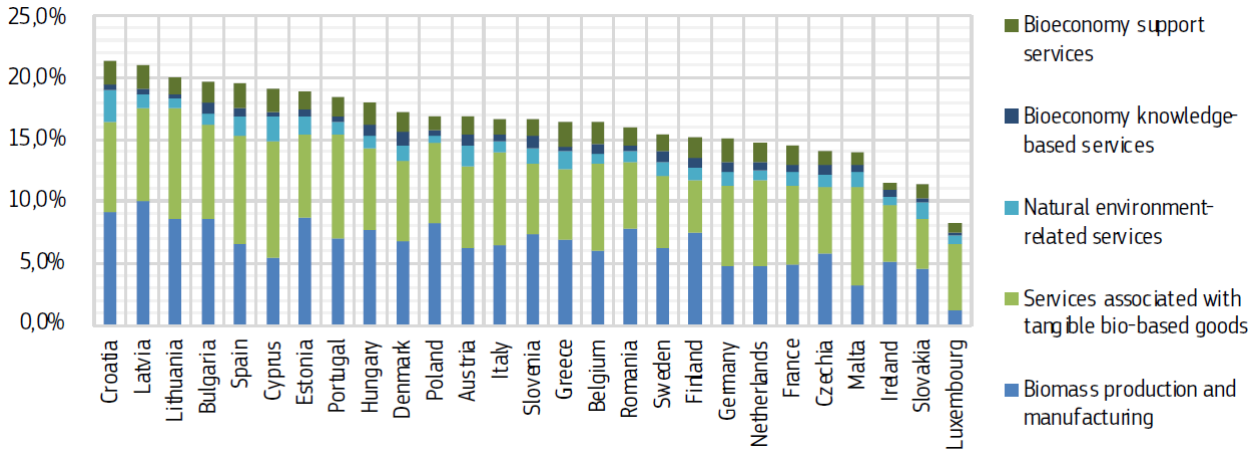


Figure 4. Value added (estimated maximum) by country (share over GDP, 2019)
Source: Mubareka et al. (2023), based on Ronzon et al. (2022)

Sweden, the Netherlands and Finland have the highest share of employment in bioeconomy knowledge-based services, followed by the Czechia, Slovenia, Hungary and Bulgaria.

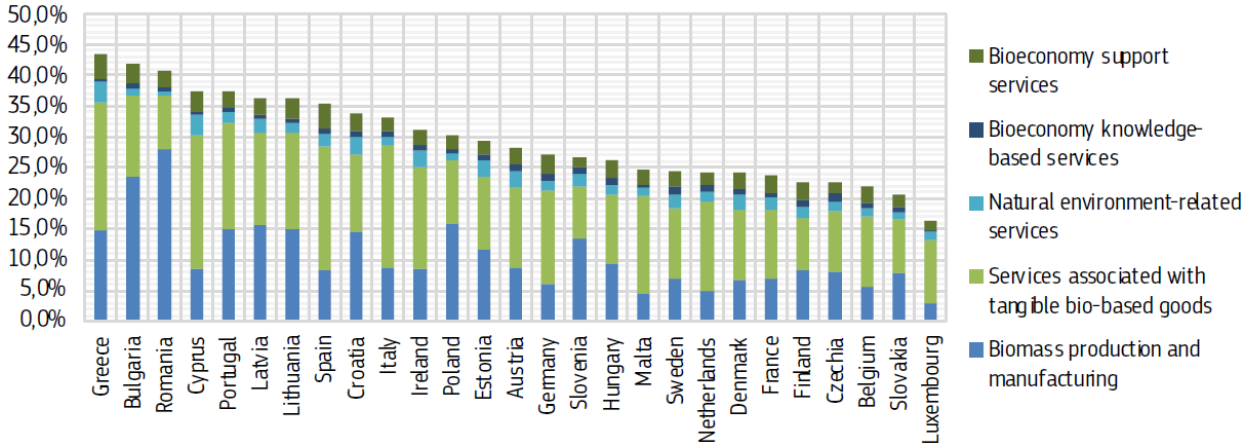
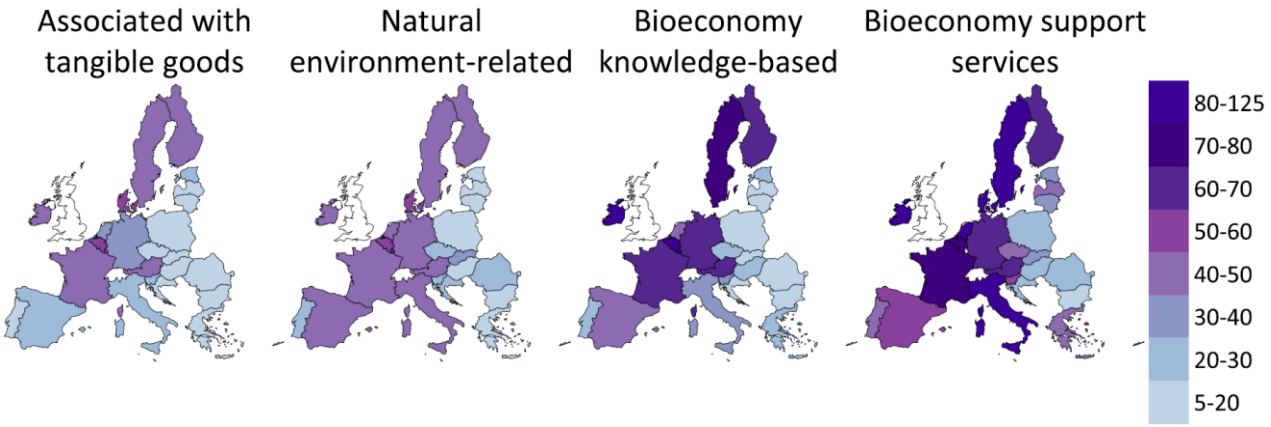


Figure 5. Employment (estimated maximum) by country (share over total employment, 2019)
Source: Source: Mubareka et al. (2023), based on Ronzon et al. (2022)

Figure 6 illustrates the value added per worker in four categories of bioeconomy services (maximum estimate, 2015–2017), revealing a gradient in labour productivity. Services related to bio-based products have the lowest productivity, while bioeconomy support services are the most productive. Although there are differences among EU Member States, a clear East-West divide in labour productivity remains. This persists despite the higher productivity growth rates in CEE countries, driven by their transition to a market economy and EU accession, which have facilitated catching-up and convergence (Eurostat, 2024c). In Bulgaria, Croatia, Hungary, Poland, and Romania, bioeconomy services generate less than €30,000 per worker across all categories. A similar pattern is observed in the Baltic countries and Czechia, except for bioeconomy support services (Ronzon *et al.,* 2022). Between 2010 and 2019, prior to COVID-19, labour productivity in the EU showed overall positive trends. The highest growth was observable in agriculture, +3.0% (Eurostat, 2024c).



Note: Minimum estimates are not shown as they convey messages similar to maximum estimates

Figure 6. Labour productivity of EU Member States' bioeconomy services in €1000 per persons employed (maximum estimates, 2015–2017)
Source: Ronzon et al. (2022)

6.2 Innovation performance

The EIS annually assesses the research and innovation performance of EU Member States, highlighting relative strengths and weaknesses to guide improvement efforts. First published in 2001, it has undergone multiple revisions, with the latest major update in 2021.

The EIS 2024 categorizes innovation into four main areas – Framework conditions, Investments, Innovation activities, and Impacts – across 12 dimensions and 32 indicators, all equally weighted in the Summary Innovation Index:

- *Framework conditions:* assesses the foundation for innovation, including tertiary education, Science, Technology, Engineering, and Mathematics (STEM) doctorates, international research collaboration, and digital skills.

- *Investments:* examines financial support for R&D and innovation from public and private sources, along with Information and Communication Technology (ICT) proficiency in the workforce.
- *Innovation activities:* focuses on SME-driven innovation, collaboration, commercialization of inventions, and intellectual property assets (patents, trademarks, designs).
- *Impacts:* measures the economic and environmental effects of innovation, including job creation, sales, high-tech exports, and sustainability contributions.

A brief overview is given of the characteristics completed and presented by the Regional Innovation Scoreboard (2024) by country as follows:

- Emerging innovator (Bulgaria, Croatia, Latvia, Poland, Romania, Slovakia),
- Moderate innovator (Czechia, Hungary, Lithuania, Slovenia),
- Strong innovator (Estonia).

Table 9. Summary Innovation Index scores in BIOEAST countries grouped by type of innovators (2024)

Innovator groups	Emerging						Moderate				Strong
Countries / Indicators	BG	HR	LV	PL	RO	SK	CZ	HU	LT	SI	EE
Summary Innovation Index	46.0	69.6	53.6	65.9	34.0	65.1	89.7	70.5	83.6	91.0	104.8

Source: own compilation by the authors based on EIS report (2024)

6.2.1 Progress in innovation performance between 2017 and 2024

Emerging innovators:

- Bulgaria: despite some fluctuations, the trend has remained positive since 2018.
- Croatia recorded the fastest innovation growth.
- Latvia saw minor fluctuations in innovation performance.
- Poland exhibited steady innovation growth with consistent yearly gains. This sustained progress highlights Poland's strong performance in innovation.
- Romania showed the lowest growth among EU Member States.
- Slovakia experienced significant fluctuations and modest growth compared to other countries.

Moderate innovators:

- Since 2017, Czechia has shown consistent and substantial growth, the overall trend reflects significant progress despite slight fluctuations.
- Hungary's innovation performance experienced some fluctuations. From 2019 onward, it showed steady progress with annual increases.
- Lithuania saw significant growth in innovation performance from 2017 to 2024.

- Slovenia's innovation performance declined notably between 2017 and 2019, but since 2020, it has shown a steady upward trend, and an overall positive growth trajectory.

Strong innovator:

- Estonia's innovation performance experienced significant growth from 2017 to 2024, despite some initial fluctuations.

According to the latest EIS summary report (EC, 2024/b), the EU remains a strong global player, excelling in 10 out of 19 indicators across the four main categories. While the EU demonstrates competitiveness in several principal areas, challenges persist, particularly in trademark applications and collaboration among innovative SMEs.

Considering 11 countries in the BIOEAST region, Annex 1 presents in detail the performance indices for three of the main - financial, innovation-related and environmental sustainability - EIS indicators and their subcategories based on these grouping criteria:

1) Finance and support
   - R&D expenditure in the public sector
   - Venture capital expenditures
   - Direct and indirect government support of business R&D
2) Innovators
   - SMEs introducing product innovations
   - SMEs introducing business process innovations
3) Environmental sustainability
   - Resource productivity
   - Air emissions by fine particulates
   - Environment-related technologies

Annex 1 also summarises the performances of each BIOEAST country along these criteria according to the following point of views:

- Performance relative to the EU in 2024
- Performance change 2017-2024
- Performance change 2023-2024

Consequently, the evolution of the innovation performance of the BIOEAST countries between 2017 and 2024 can be tracked both in relation to their starting position and in relation to the EU as a whole, along the above mentioned three main bioeconomy-related criteria (Annex 1).

6.2.2 Relative strengths and weaknesses

Table 10. List of relative strengths in BIOEAST countries grouping by type of innovators (2024)

	Emerging						Moderate				Strong
	BG	HR	LV	PL	RO	SK	CZ	HU	LT	SI	EE
Air emissions by fine particulates					✓	✓					
Broadband penetration					✓						
Design applications	✓			✓							
Direct and indirect government support of business R&D								✓			
Enterprises providing ICT training				✓							
Environment-related technologies	✓										
Exports of medium and high technology products					✓	✓					
Foreign doctorate students as a % of all doctorate students								✓			
Individuals with above basic overall digital skills							✓				
International scientific co-publications										✓	
Job-to-job mobility of human resources in science and technology (HRST)									✓		
Non-R&D innovation expenditures							✓		✓		
Population involved in lifelong learning										✓	✓
Population with tertiary education			✓	✓					✓		
Public-private co-publications		✓	✓				✓	✓		✓	✓
Sales of new-to-market and new-to-firm innovations						✓					
SMEs introducing product innovations		✓									
Venture capital expenditures		✓									
Trademark applications	✓		✓								✓

Source: own compilation by the authors based on data on EIS report (2024)

Based on Table 10 the most outstanding relative strengths of the BIOEAST countries is 'Public-private co-publication (in 6 countries), then 'Population with tertiary education (in 3 countries) and 'Trademark applications' (in 3 countries). These are so-called knowledge and corporate cooperation-oriented activities.

Table 11. List of relative weaknesses in BIOEAST countries grouping by type of innovators (2024)

	Emerging						Moderate				Strong
	BG	HR	LV	PL	RO	SK	CZ	HU	LT	SI	EE
Design applications						✓		✓			
Direct and indirect government support of business R&D	✓	✓	✓						✓		✓
Environment-related technologies		✓									✓
Foreign doctorate students as a % of all doctorate students				✓							
Innovation expenditures per person employed			✓								
Innovative SMEs collaborating with others					✓						
Job-to-job mobility of HRST						✓	✓				
Knowledge-intensive services exports		✓							✓	✓	
New doctorate graduates				✓							
Non-R&D innovation expenditures										✓	
Population involved in lifelong learning	✓										
Patent Cooperation Treaty (PCT) patent applications				✓			✓				
Population with tertiary education					✓		✓	✓			
R&D expenditure in the business sector			✓			✓			✓		
Resource productivity	✓										✓
SMEs introducing business process innovations					✓			✓			
Venture capital expenditures										✓	

Source: own compilation by the authors based on data collection from EIS report

The most outstanding relative weakness of the BIOEAST countries is 'Direct and indirect government support of business R&D' (in 5 countries), which is very relevant from the funding and financial point of view. Then 'Knowledge-intensive services exports', 'Population with tertiary education' and 'R&D expenditure in the business sector' (in 3-3 mainly different countries). In summary, a critical funding and financing gap, so-called lack-of-government-support-of-business-R&D can be identified in BIOEAST countries. An interesting fact worth highlighting is that the only strong innovator country in the BIOEAST region, Estonia, is not strengthened by direct and indirect government support, but by other, presumably private financing.

Council conclusions notes "that the trends of the EIS indicate that CEE Member States are mainly among the emerging and moderate innovators and their participation in framework programmes remains moderate". The Council conclusion also "emphasises the need to increase investments at national level and to take further action in order to broaden participation, to support the exchange and valorisation of excellent science and bio-based innovations across the ERA" (Council of the EU, 2024 p. 5).

7 Policy instruments for fostering bioeconomy research and innovation in the BIOEAST

This part of the mapping study analyses the STIP instruments registered and collected by the OECD's STIP Compass platform from different perspectives. These instruments have been filtered for BIOEAST countries and sorted by end years, focusing on the 2024-2037 interval. (In terms of the figures, 'end year' means that an instrument is available until this year.) In line with the main objectives of the mapping of bioeconomy ecosystem and funding opportunities in the BIOEAST region, the following aspects have been examined in detail:

- The number of generally related STIP instruments regarding the BIOEAST countries and different end-years of the selected initiatives;
- Yearly max total budget in million EUR regarding generally related STIP instruments considering the BIOEAST countries and different end-year of the selected initiatives;
- Grouping the number of generally related STIP instruments based on main instrument type categories;
- Grouping the number of generally related STIP instruments based on most relevant instrument type categories and detailed types inside these categories as well.

A total of 175 instruments (generally related to research and innovation, not specific but inclusive for bioeconomy R&I) were identified with regards to the temporal scope ('end year') of 2024-2037 interval.

7.1 The number of generally related STIP instruments regarding the BIOEAST countries and different end-years of the selected instruments

As

Table 12 shows, Poland has the largest number of instruments (58), due to the high number of initiatives with an end-year of 2027 (35). This is followed by Croatia and Hungary (with 22-22 arrangements), then Czechia (21) and Bulgaria (17). The other countries have less than 10 initiatives in terms of generally related STIPs[2]. The highest number of instruments will be in power until 2027, because of the duration of the current EU programming period, also with the outstanding number of Polish measures. This was followed by the number of initiatives up to 2030, which refers to the most common time horizon of European strategic ambitions. The distribution of measures among the countries can also be considered the most even for this end year.

Table 12. Number of STIP instruments per BIOEAST countries by end-year

End year / Country	2024	2025	2026	2027	2028	2029	2030	2031	2035	2037	*Total*
Bulgaria	4	6		2			4	1			*17*
Croatia	2	3	3	7	2		5				*22*
Czechia	1	2		13	1	1	3				*21*
Estonia							5		2		*7*
Hungary		8	4	5	1		4				*22*
Latvia	1			2			2				*5*
Lithuania	1		4	2			2				*9*
Poland	7	3	2	35	2	1	6			2	*58*
Romania		5		2							*7*
Slovakia					1						*1*
Slovenia		2	1	1			2				*6*
Total	*16*	*29*	*14*	*69*	*7*	*2*	*33*	*1*	*2*	*2*	*175*

Source: own compilation based on data collection from EC-OECD STIP Compass database (2025)

7.2 Estimated yearly max total budget in million EUR regarding generally related STIP instruments considering the BIOEAST countries and different end-year of the selected initiatives

Table 13 shows that Poland and instruments with a closing year of 2027 also stand out for the total annual budgets, for the same reason as in case of the number of instruments. After Poland (almost 6000 million EUR in total in the period), Bulgaria (almost 3200 million EUR in total), then the Czechia (approx. 1320 million EUR in total) and Hungary (approx. 1200 million EUR total) allocate a lot of resources to STIP measures.

[2] STIPs that are not specifically focused on the bioeconomy but have the potential in supporting bioeconomy innovation.

Table 13. Estimated yearly maximum summarized budget of STIP instruments' group by end-year (in million EUR)

End year / Country	2024	2025	2026	2027	2028	2029	2030	2031	2035	2037
Bulgaria	42	116		1000			2000	1		
Croatia	6	1	150	unkn.	unkn.		n.a.			
Czechia	20	70		1173	50	5	n.a.			
Estonia							46		unkn.	
Hungary		58	300	600	20		200			
Latvia	5			505			n.a.			
Lithuania	unkn.		30	10			500			
Poland	172	540	500	3716	550	20	500			unkn.
Romania		5		20						
Slovakia					unkn.					
Slovenia		2	n.a.	n.a.			20			

Note: 'unkn.' means unknown, 'n.a.' means not applicable

Source: own compilation based on data collection from EC-OECD STIP Compass database (2025)

The case of Latvia (510 million EUR) and Lithuania (540 million EUR) are also worth highlighting, where the number of instruments is small, but the summarized annual budgets are relatively high with the expiry date of 2027 (in Latvia) and 2030 (in Lithuania).

The highest annual values characterize the instruments available until 2027 (7024 million EUR), but the measures with an end-date of 2030 (3266 million EUR) are also noteworthy in the BIOEAST region.

7.3 Grouping the number of generally related STIP instruments based on main instrument type categories

Based on Table 14, two large groups of main instrument type categories are significant: 'Direct financial support' and 'Governance'.

Table 14. Number of STIP instruments by main instruments type categories (2024-2037)

Instrument type category / Country	Undefined	Collaborative infrastructures (soft and physical)	Direct financial support	Governance	Guidance, regulation and incentives	Indirect financial support	*Total*
Bulgaria			7	10			***17***
Croatia		4	9	6	3		***22***
Czechia		5	8	7	1		***21***
Estonia			3	3	1		***7***

Hungary		5	8	9			***22***
Latvia			1	4			***5***
Lithuania			2	6	1		***9***
Poland	1	6	36	10	4	1	***58***
Romania		3	3	1			***7***
Slovakia				1			***1***
Slovenia		1		5			***6***
Total	***1***	***24***	***77***	***62***	***10***	***1***	***175***

Source: own compilation based on data collection from EC-OECD STIP Compass database (2025)

These two groups can be examined in detail in terms of the instruments they include (Table 15).

7.4 Grouping the number of generally related STIP instruments based on most relevant instrument type categories and detailed types inside these categories as well

As shown in Table 15, two instruments (namely 'Grants for business R&D and innovation' and 'Project grants for public research') are dominant based on the numbers within the 'Direct financial support' category, while one instrument type (namely 'Strategies, agendas and plans') is outstanding based on the numbers within the 'Governance' category.

Table 15. Number of the types of STIP instruments per BIOEAST countries regarding 'Direct financial support' and 'Governance' (2024-2037)

Country / **Instrument types**	BG	HR	CZ	EE	HU	LV	LT	PL	RO	SK	SI	*Total*
Direct financial support	**7**	**9**	**8**	**3**	**8**	**1**	**2**	**36**	**3**			***77***
Centres of excellence grants		1	1		1							*3*
Equity financing								1				*1*
Fellowships and postgraduate loans and scholarships		1					1					*2*
Grants for business R&D and innovation		1	5	1	5			19	2			*33*
Innovation vouchers		2		2								*4*
Institutional funding for public research	4	1					1	3				*9*
Procurement programmes for R&D and innovation			1									*1*
Project grants for public research	3	3	1		2	1		13	1			*24*
Governance	**10**	**6**	**7**	**3**	**9**	**4**	**6**	**10**	**1**	**1**	**5**	***62***

Creation or reform of governance structure or public body		1		1				1				*3*
Formal consultation of stakeholders or experts		1			1							*2*
Horizontal Science-Technology-Innovation (STI) coordination bodies			1									*1*
Policy intelligence (e.g. evaluations, benchmarking and forecasts)		1	1									*2*
Public awareness campaigns and other outreach activities			2		3			2				*7*
Strategies, agendas and plans	10	3	3	2	5	4	6	7	1	1	5	*47*
Total	***17***	***15***	***15***	***6***	***17***	***5***	***8***	***46***	***4***	***1***	***5***	***139***

Source: own compilation based on data collection from EC-OECD STIP compass database (2025)

As the next step, the aggregated values of the financial resources for the specific types of instruments within the 'Direct financial support category' for the period 2024-2037 were investigated (Table 16).

Table 16. Estimated annual budget of STIP instrument types within 'Direct financial support' category per BIOEAST countries (in million EUR), 2024-2037

Country / **Instruments**	BG	HR	CZ	EE	HU	LV	LT	PL	RO	SK	SI
within 'Direct financial support' category											
Centres of excellence grants		unkn.	50		100						
Equity financing								500			
Fellowships and postgraduate loans and scholarships		unkn.					5				
Grants for business R&D and innovation		unkn.	175	20	690			2253	5		
Innovation vouchers		5		6							
Institutional funding for public research	71	50					1	90			
Procurement programmes for R&D and innovation			20								
Project grants for public research	56	unkn.	500		120	5		1491	20		

Note: 'unkn.' means unknown

Source: own compilation based on data collection from OECD STIP compass database (2025)

In contrast to Table 15, Table 16 shows that most of the financial resources (in million EUR) are not allocated where the highest the number of instruments are. That is, most of the financial resources in the BIOEAST countries will be spent on 'Grants for business R&D and innovation' instrument type (almost 3200 million EUR) and to 'Project grants for public research' (almost 2200 million EUR). Among the countries, Poland allocates the highest amount of funding to direct financial support (appr. 4400 million EUR) between 2024 and 2037. The total amount of funding derived from direct financial support category is slightly more than 6200 million EUR in the BIOEAST region.

8 Funding and financing of bioeconomy innovation in the BIOEAST member states

Based on the definitions and classifications introduced in the literature review (Chapter 4), this chapter provides an overview of the most relevant public and private funding and investment opportunities that can be leveraged by the entities interested in circular bioeconomy research and innovation in the BIOEAST member states.

The ShapingBio project promotes bioeconomy innovations and knowledge dissemination across the EU by providing evidence-based insights, guidelines, and policy recommendations. It aims to reduce sectoral fragmentation, enhance cross-sectoral collaboration, and harmonize policies (ShapingBio, n.d.). Its deliverable report 'Bioeconomy Financing in Europe Analysis' (Garthley & Wydra, 2024) analyzes bioeconomy financing in the EU, emphasizing the need for better-aligned and more accessible funding. Based on desk research, data analysis, and stakeholder input from investors and companies, it identifies major challenges and opportunities in public and private financing, focusing on support for R&D&I, scale-up, and commercialization:

- **Public funding mechanisms, such as Horizon Europe and Cluster 6**, play a crucial role in advancing bioeconomy innovation, particularly for early-stage ventures. Initiatives like BBI JU and CBE JU have helped align industry needs with research but have struggled to drive large-scale commercialization. The ECBF was established to address market entry challenges by leveraging public and private investments to scale up bio-based solutions. However, barriers remain, including investment risk aversion at the scaling stage and insufficient later-stage financial support. Greater alignment between funding mechanisms and commercialization needs is required to bridge the gap between research and market success.
- **Private investment** in the bioeconomy is growing, particularly in synthetic biology, biomaterials, and agri-tech, driven by regulatory incentives like CO_2 taxes and sustainability standards. However, challenges persist, including regulatory fragmentation, high capital requirements, and a lack of tailored de-risking mechanisms,

which hinder scaling and commercialization. Strengthening public-private synergies and developing targeted investment schemes could unlock more private capital, accelerating bio-based innovation and enhancing Europe's sustainability efforts.

- **Significant gaps remain in commercializing R&D and scaling bioeconomy technologies**, as many innovations struggle to secure funding despite early-stage support. High capital requirements, long timelines, and investment risks hinder market entry, while de-risking mechanisms, better financing access, and pilot facilities are needed. Funding disparities exist, favouring strong innovation ecosystems over emerging ones. Regulatory fragmentation across EU countries further complicates cross-border investments, highlighting the need for consistent frameworks like the EU taxonomy. Public funding plays a pivotal role but suffers from bureaucratic inefficiencies, and market information gaps make it harder for bio-based products to compete with fossil-based alternatives. Investors call for better data transparency and sector-specific insights in areas like synthetic biology, biomaterials, and agri-tech.
- Countries like Bulgaria, Croatia, Poland, and Romania struggle with limited private investment in bioeconomy, with only 3% of private investors involved in related deals. Estonia shows that strong policy interventions (education, innovation support, and digitalization) can attract investment and drive innovation growth, as seen in Estonia's transition to a strong innovation ecosystem by 2024. Significant challenges include misalignment between public and private financing, with short-term public grants failing to meet the long-term needs of bioeconomy projects. Emerging innovators in Eastern Europe often lack capital access, and early-stage ventures in Croatia and Poland struggle to secure R&D and commercialization funding. Hungary and Slovakia also face difficulties due to the high-risk profile of bioeconomy projects and complex public funding processes.
- An important factor also, affecting the investment possibilities and perspectives are the **local perceptions and attitudes** as they are reflected to the related stakeholders and the general public.

8.1 Public funding and financing opportunities

8.1.1 Horizon Europe

Horizon Europe (2021-2027) is a definitive EU Research and Innovation Framework driving recovery, resilience, and preparedness. It strengthens the knowledge base, fosters breakthrough innovation, and supports developing and demonstrating solutions. The program aims to restore industrial leadership, enhance strategic autonomy, and lead transparent and inclusive transformation for citizens and businesses (EC, 2021/e).

The programme's overarching goals are the following:

- to strengthen the EU's scientific and technological bases and the ERA,
- to boost Europe's innovation capacity, competitiveness and jobs,

- to deliver on citizen's priorities and sustain our socio-economic model and values,

with a particular focus on creating impact or the European Green Deal, the digital and sustainability transition and recovery from the coronavirus-crisis.

The program enhances collaboration and amplifies the impact of research and innovation by advancing, supporting, and implementing EU policies while addressing global challenges. It fosters the creation and dissemination of high-quality knowledge and technologies. Additionally, it drives job creation, harnesses the EU's talent pool, stimulates economic growth, enhances industrial competitiveness, and maximizes investment impact within a stronger ERA. Legal entities from the EU and associated countries are eligible to participate (EC, n.d./c).

Based on the Horizon Europe Strategic Plan for 2025-2027 (EC, 2024/c), the strategic priorities of the programme focus on:

- *Green transition:* Supporting Europe's goal of climate neutrality by 2050, tackling biodiversity loss and pollution, with at least 35% of funding for climate action and 10% for biodiversity.
- *Digital transition:* Investing at least €13 billion in core digital technologies to enhance Europe's competitiveness, strategic autonomy, and support the green transition.
- *Resilience, competitiveness, inclusiveness, and democracy:* Strengthening social rights, democratic values, civil security, sustainable economic models, health, and democratic participation.

Horizon Europe consists of three pillars and one horizontal activity (EC, 2024/c):

Pillar 1: *Excellent Science*
- European Research Council
- Marie Skłodowska-Curie Actions
- Research Infrastructures

Pillar 2: *Global Challenges and European Industrial Competitiveness*
- Cluster 1: Health
- Cluster 2: Culture, Creativity and Inclusive Society
- Cluster 3: Civil Security for Society
- Cluster 4: Digital, Industry and Space
- Cluster 5: Climate, Energy and Mobility
- Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment

Pillar 3: *Innovative Europe*
- European Innovation Council
- European Innovation Ecosystems
- European Institute of Innovation and Technology

All three pillars of the Horizon Europe contain application areas relevant to the bioeconomy. However, the most important areas relevant to the bioeconomy fall under Pillars II and III. Within Pillar II, Cluster 6 focuses specifically on the development of specific areas of the bioeconomy. Within Pillar III, the role of the European Innovation Ecosystems and the EIT is of particular relevance for the BIOEAST countries and the BOOST4BIOEAST project.

Horizon Europe Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment

Horizon Europe's Cluster 6 focuses on balancing environmental, social, and economic goals to drive the EU's transition to sustainability. It supports transformative change to reduce environmental degradation, restore biodiversity, and improve natural resource management, while ensuring climate goals, food, and water security. The cluster aligns with evolving geopolitical challenges and strengthens the EU's strategic autonomy in energy and food sectors. R&I will support the 8th Environment Action Programme, anchor policy in science-based knowledge, and accelerate the European Green Deal's ecological transition. It directly contributes to multiple SDGs, including zero hunger, clean water, climate action, and responsible consumption. Additionally, it supports biodiversity funding targets (EC, 2024c).

Cluster 6 supports in particular the following two Horizon Europe key strategic orientations (KSOs) and Impact Areas associated to them:

- KSO B: Restoring Europe's ecosystems and biodiversity, and managing sustainably natural resources
    - Enhancing ecosystems and biodiversity on land and in waters
    - Clean and healthy air, water and soil
    - Sustainable food systems from farm to fork on land and sea
- KSO C: Making Europe the first digitally enabled circular, climate-neutral and sustainable economy
    - Circular and clean economy

JRC (Korosuo *et al*., 2024) analysed EU bioeconomy trends, including research and innovation activity within the different framework programmes. Over the past two decades, EU investments in bioeconomy research and innovation have steadily increased through successive R&I Framework Programmes. As the bioeconomy concept evolved from a knowledge-based approach to a sustainable and circular model, funding priorities shifted accordingly. The 7th Framework Programme (2007) first introduced the bioeconomy under the theme of food, agriculture, fisheries, and biotechnology. Horizon 2020 (2014-2020) expanded its scope under Societal Challenge 2, integrating food security, sustainable agriculture, and marine research. In Horizon Europe (2021-2027), bioeconomy research plays a central role in Cluster 6, focusing on food systems, natural resources, and environmental sustainability (Korosuo *et al.,* 2024).

Between 2007 and 2024, the EU funded 1772 bioeconomy-related research and innovation projects, covering diverse topics such as bio-based innovation, bioeconomy governance, blue economy, biotechnology, food system transformation, and circular economy transition. The number of projects has grown significantly over the years. In terms of funding, the EU invested €1.17 billion through FP7, €2.54 billion via Horizon 2020, and €1.69 billion under Horizon Europe (up to 2024). The majority of grant recipients are from Spain, Germany, Italy, France, the Netherlands, the United Kingdom (while part of the EU), and Belgium, each involved in over 40 projects. In total, 5344 organizations from EU-27 (as of 2020) participated in bioeconomy projects, with an additional 1281 organizations from outside the EU. Over 17 years, half of the participating organizations were companies, while the rest were primarily universities and research centers, with other entities playing a minor role. This distribution has remained relatively stable. Among the countries most engaged in EU Horizon projects with the keyword 'bioeconomy' (2007-2024), Germany, Spain, France, Italy, and the Netherlands led, followed by Denmark, Finland, Belgium, and the United Kingdom. The most frequently used keywords in these projects include 'bioeconomy', 'bio-based', 'valorisation', 'biorefinery', 'industry partner', and 'multi-actor'. Notably, the term 'circular bioeconomy' emerged in 2016, whereas 'resource efficiency' was already in use by 2008, and 'waste stream' appeared in 2009 (Korosuo *et al*., 2024).

Based on the data from the EC's CORDIS database, the activity of organizations from the BIOEAST region, in comparison with the group of non-BIOEAST member states of the EU and countries outside the EU, can be seen in Table 17.

Table 17. Statistics on Horizon Cluster 6 participation of BIOEAST and other groups of countries*

	Number of projects being participated in	Number of project partners	Number of project coordinators	Number of individual organizations	Net EC contribution (million €)	Net EC contribution per partner (million €)
BIOEAST countries (11)	440	1349	23	690	306.45	0.23
non-BIOEAST country EU member states (16)	619	8265	558	3493	2966.06	0.36
non-EU countries (81)	486	1766	39	1003	312.25	0.18

*projects with 'signed' and 'closed' status

Source: own editing based on CORDIS (data accessed: September 2024)

Horizon Cluster 6 'Circular economy and bioeconomy sectors' (CIRCBIO) calls

Under Horizon Europe Cluster 6, the EC funds research and innovation to develop solutions for the sustainable and circular management and use of natural resources. Table 18 shows data on the activity of each BIOEAST member state, as well as the large groups of countries.

Table 18. Statistics on the participation of BIOEAST and other groups of countries in CIRCBIO calls (2021-2023)*

	Number of projects being participated in	Number of project partners	Number of project coordinator partners	Number of individual organizations	Net EC contribution (million €)	Net EC contribution per partner (million €)
Bulgaria	5	5	0	4	0.90	0.18
Czechia	9	12	0	10	2.79	0.23
Estonia	6	9	0	7	2.16	0.24
Croatia	11	12	0	12	2.27	0.19
Hungary	5	11	0	11	2.76	0.25
Lithuania	2	2	0	2	0.36	0.18
Latvia	5	6	1	5	2.52	0.42
Poland	12	13	0	12	2.82	0.22
Romania	8	13	0	12	2.96	0.23
Slovenia	5	10	0	9	2.33	0.23
Slovakia	6	6	0	3	1.45	0.24
BIOEAST countries	44	99	1	87	23.32	0.24
non-BIOEAST country EU member states	79	972	73	755	359.48	0.37
non-EU member states	56	166	5	138	30.46	0.18

*projects with 'signed' and 'closed' status

Source: own editing based on CORDIS (data accessed: September 2024)

A. Horizon Europe Partnerships

European Partnerships are strategic collaborations that create critical mass, leverage large investments, and reduce research fragmentation to tackle common challenges efficiently. By pooling resources, they enhance R&I impact, strengthen Europe's global research position, and address market failures by sharing risks and ensuring investment predictability. These partnerships provide a structured platform for coordinated research agendas, cross-sectoral collaboration, and knowledge exchange. They are guided by SRIAs, distinguishing them from other research initiatives. Their long-term vision fosters integration across disciplines, value chains, and stakeholders, ensuring systemic transformation aligned with EU priorities (EC, 2024/e).

European Partnerships operate under three implementation modes:

1. *Institutionalised Partnerships* – Long-term collaborations requiring high level integration:
    - Joint Undertakings (JUs) (Art. 187 TFEU) – Primarily industry-led, except for Global Health European and Developing Countries Clinical Trials Partnership, European Partnership for High Performance Computing and Chips JU.
    - Article 185 initiatives (Art. 185 TFEU) – Public-sector collaborations requiring specific legislation and dedicated structures.
    - EIT Knowledge and Innovation Communities (KICs) – EU-wide innovation ecosystems integrating education, research, and entrepreneurship.
2. *Co-programmed Partnerships* – Joint R&I programming with industry and stakeholders, based on a Memorandum of Understanding. The EU contributes through Horizon Europe, while partners provide matching contributions.
3. *Co-funded Partnerships* – Joint R&I programs co-funded between the EU (30-50% via Horizon Europe) and public R&I funders, implemented through transnational calls under a Horizon Europe Grant Agreement.

European Partnerships align closely with other ERA initiatives, including EU Missions and various components of Horizon Europe. They also complement funding sources such as the Cohesion Fund, European Structural and Investment Funds (ESIF), and the Recovery and Resilience Fund (RRF). Additionally, they create synergies with EU programs like the Digital Europe Programme, InvestEU Programme, and the Connecting Europe Facility.

Under the first (2021-2024) Horizon Europe Strategic Plan, 50 Partnerships have been established, of which 9 Partnerships belong to Cluster 6, including two Art. 185/187 institutionalised Partnerships and 7 co-funded Partnerships:

- CBE JU
- R&I in the Mediterranean Area (PRIMA) (Art. 185)
- The European Biodiversity Partnership (Biodiversa+)
- Climate Neutral, Sustainable & Productive Blue Economy (SBEP)
- Water Security for the Planet (Water4All)
- Animal Health and Welfare (EUPAHW)
- Accelerating Farming Systems Transitions (AGROECOLOGY)
- Agriculture of Data
- Safe and Sustainable Food System (FutureFoodS)

Table 19. Horizon Cluster 6 partnerships with the participation of BIOEAST countries

Name	Start Date	End Date	Partnership format	Number of participating countries	BIOEAST member states participating
AGROECOLOGY	01/01/2024	31/12/2030	Co-funded Partnership	26	CZ, EE, HU, LT, RO, SK, SI
Biodiversa+	01/10/2021	30/09/2028	Co-funded Partnership	36	All
EUPAHW	01/01/2024	31/12/2030	Co-funded Partnership	24	EE, LV, LT, PL, SK, SI
FUTURE4PRIMA	01/01/2024	31/12/2027	Other	16	BG, HR
FutureFoodS	19/06/2024	19/06/2034	Co-funded Partnership	28	BG, HR, EE, HU, LT, PL, RO, SK, SI
SBEP	01/09/2022	31/08/2029	Co-funded Partnership	26	BG, EE, LV, LT, PL, RO, SI
Water4All	01/06/2022	31/05/2029	Co-funded Partnership	31	CZ, EE, HU, LV, LT, PL, RO, SK

Source: own compilation based on ERA LEARN database (as of January 2025)

The Horizon Europe Strategic Plan 2025-2027 outlines a selection of new candidate partnerships, more precisely, 5 co-funded and 4 co-programmed European Partnerships set to launch in the second half of the program, one of these as part of Cluster 6, namely 'Forests and Forestry for a sustainable Future'.

The 2024 edition of the biennial monitoring report on the performance of European Partnerships (EC, 2024/f) evaluated the progress, contribution and impact of Partnerships, including country level fiches too. Data on the EU net contributions (Table) with the cut-off date of August 2023 were only available for co-programmed and institutionalised Partnerships by the closing date of the study, while data does not include projects from co-funded Partnerships nor projects supported under EIT KICs as the data were not yet in the eCORDA system (EC, 2024/f).

Table 20. EU net contribution to Partnerships in Horizon Cluster 6 in the BIOEAST member states, as of August 2023 (million €)

	Co-programmed	Institutionalised	Total
Bulgaria	0.00	0.00	0.00
Croatia	0.00	0.83	0.83
Czechia	0.00	0.79	0.79
Estonia	0.00	1.38	1.38
Hungary	0.00	0.00	0.00
Latvia	0.00	0.25	0.25
Lithuania	0.00	0.00	0.00
Poland	0.00	1.12	1.12
Romania	0.00	0.00	0.00
Slovakia	0.00	0.00	0.00
Slovenia	0.00	0.59	0.59

Source: own compilation based on EC (2024)

B. CBE JU

CBE JU is a €2 billion partnership between the EU and Bio-based Industries Consortium (BIC) funding circular bio-based industry projects in Europe. Operating under Horizon Europe (2021-2031), it builds on the earlier BBI JU while tackling current industry challenges. Transitioning from fossil resources to circular bio-based production is necessary to meet the EU's climate goals under the Green Deal. Bio-based industries drive this shift by transforming waste and biomass into sustainable products, supporting climate neutrality by 2050 while fostering green jobs and economic growth. CBE JU connects stakeholders to address industry challenges, with its public-private funding accelerating innovation and market adoption (CBE JU, n.d.).

CBE JU partnership focuses on (Circular Cities & Regions Initiative, n.d.):

- Supporting research and innovation for sustainable bio-based solutions;
- De-risking investments in innovative, circular bio-based production plants;
- Addressing the technological, regulatory & market challenges of the bioeconomy;
- Placing sustainability at the heart of its operations;
- Strengthening the collaboration of all bioeconomy actors;
- Engaging with more stakeholders along the value chains;
- Public-private collaboration for a greener future of Europe.

CBE JU implements its SRIA under Horizon Europe, organizing annual open calls to fund research, demonstration, and industrial projects. These projects foster collaboration across Europe's bio-based value chains, involving biomass producers, waste managers, researchers, and industries.

The main goals of CBE JU are (Circular Cities & Regions Initiative, n.d.)

- Accelerate the innovation process and development of bio-based innovative solutions.
- Accelerate market deployment of the existing mature and innovative bio-based solutions.
- Ensure a high level of environmental performance of bio-based industrial systems.

Data on the number and funding of projects within CBE JU partnership with the participation of BIOEAST member states (as of January 2025) can be seen in

Table 18 and Table 19.

Table 18. Number of projects funded by CBE JU with the participation of BIOEAST countries

	Bio-based chemicals	Bio-based polymers & plastics	Construction	Crop protection & fertilisation	Digital tool	Food, feed & cosmetics	Market, policies & awareness	Packaging	Textile
Coordination and Support Action							3		
Innovation Action - Demonstration	6	2		3		7		3	
Innovation Action – Flagship	1	1	1			2		1	
Research & Innovation Action	3	5			2	2		1	1

Source: own compilation based on CBE JU website (data accessed: January 2025)

Table 19. CBE JU contribution (million €) to projects with the participation of BIOEAST countries

	Bio-based chemicals	Bio-based polymers & plastics	Construction	Crop protection & fertilisation	Digital tool	Food, feed & cosmetics	Market, policies & awareness	Packaging	Textile
Coordination and Support Action							5.50		
Innovation Action - Demonstration	39.90	12.13		19.65		41.88		18.93	
Innovation Action – Flagship	16.98	16.64	15.90			33.54		16.83	
Research & Innovation Action	14.91	24.11			9.05	9.13		4.43	4.99

Source: own compilation CBE JU website (data accessed: January 2025)

C. Horizon Europe Missions

EU Missions serve as key initiatives within Horizon Europe, designed to coordinate efforts across various programs and stakeholders to address a select number of pressing global challenges. These Missions aim to drive impactful action while securing the engagement of policymakers, stakeholders, and the public. After a preparatory phase, five EU Missions were launched in 2021: Adaptation to Climate Change, Cancer, Restore Our Ocean and Waters, Climate-Neutral and Smart Cities, and A Soil Deal for Europe (EC, n.d./d). Data on the participation of the BIOEAST region compared with other groups of countries in Horizon Missions associated with Cluster 6 can be seen in **Hiba! A hivatkozási forrás nem található.**.

From 2025 to 2027, efforts will focus on transitioning EU Missions from their initial phase to deployment and impact. Actions include:

- *Strengthened governance:* improved coordination and administrative support to enhance mission effectiveness.
- *Diverse funding sources:* beyond Horizon Europe funding, new instruments like public-private partnerships and innovation procurement will be utilized.
- *Synergies:* governance mechanisms will foster collaboration between EU Missions, Horizon Europe, other EU instruments, and national/regional policies.

Council conclusions (Council of the EU, 2024 p. 4)"underlines the work done (...) in the ongoing European Partnerships, including but not limited to those in Cluster 6, of the Horizon Europe Programme, such as the Circular Bio-based Europe Joint Undertaking (CBE JU), which has put in place a widening strategy and action plan, with the aim of mobilising underrepresented stakeholders and beneficiaries, as well as the positive example of the Partnership for Research and Innovation in the Mediterranean Area (PRIMA) as an instrument for enhanced cooperation with neighbouring countries of the EU. Underlines the importance of synergies between and complementarities with missions, in particular the EU Missions 'Restore our Oceans and Waters' and 'A Soil Deal for Europe'."

The Soil Mission is often linked to Climate Change Adaptation, Water and Ocean Protection in Horizon Cluster 6. As shown by Table 20, in the two Missions most relevant to bioeconomy, 'SOIL' and 'OCEAN', the BIOEAST countries are represented in most of the projects, but the number of actual partner organisations is relatively low, and so is the share in funding.

Table 20. Statistics on the participation of BIOEAST and other groups of countries in Horizon Missions associated with Cluster 6 (including CLIMA-OCEAN-SOIL and OCEAN-SOIL)

	Number of projects		Number of partners		Net EC contribution (€)	
	SOIL	OCEAN	SOIL	OCEAN	SOIL	OCEAN
BIOEAST countries	37	25	92	158	24 140 569.94	35 584 012.75
non-BIOEAST country EU member states	43	40	681	548	236 342 870.5	182 008 944.1
non-EU member states	34	34	83	115	10 219 205.81	24 937 459.18

*projects with 'signed' and 'closed' status

Source: own compilation based on CORDIS (data accessed: September 2024)

Soil Mission

The issue of soil health concerns all countries and regions and is very important in terms of abundant and sustainable biomass production. The Soil Mission aims to accelerate sustainable soil management and restoration across Europe as part of a broader green transition. Its flagship initiative, A Soil Deal for Europe, establishes 100 living labs and lighthouses to drive soil health improvements by 2030 (EC, n.d./e).

The Mission has eight primary objectives:

- Reduce land degradation relating to desertification;
- Conserve and increase soil organic carbon stocks;
- No net soil sealing and increase reuse of urban soils;
- Reduce soil pollution and enhance restoration;
- Prevent erosion;
- Improve soil structure to enhance soil habitat quality for soil biota and crops;
- Reduce the EU global footprint on soils;
- Increase soil literacy in society across Member States.

To achieve these goals, the Mission follows four operational objectives:

1. Build capacities and the knowledge base for soil stewardship;
2. Co-create and upscale place-based innovations to improve soil health in all places;
3. Develop an integrated EU soil monitoring system and track progress towards soil health;
4. Engage with the soil user community and society at large (EC, n.d./e).

The Soil Mission is closely associated with the soil improvement objectives set in the BIOEAST countries. Preserving and improving soil quality is an important priority area of the BIOEAST Manifesto objectives. In addition, soil improvement is the most effective way of achieving agroecological objectives in general and within the BIOEAST Initiative, in particular the effective functioning of the Agroecology and sustainable yields TWG (BIOEAST Manifesto, 2024).

In line with the general Mission targets listed above, the BIOEAST Manifesto has set the following specific targets for soil management (BIOEAST Manifesto, 2024):

1. Instruments for closing yield gaps and improving ecosystem service performance in land endangered by soil erosion and especially desertification.

2. Development of scientific understanding of soil health improvement options of fertile land under cultivation, in particular black soils, and of soils that are not under cultivation, but can be reutilized for food production (e.g., marginal land, urban soils).

3. Improvement of institutional support and the quality of advisory services for efficient and sustainable soil management adapted to the macro-region.

4. Improvement of knowledge uptake saturation level by deployment of state-of-art research results into practice.

5. Facilitation of synergies and cooperation between public and private actors considering both land users and investments.

8.1.2 EIPs

Five EIPs were launched under the Innovation Union to accelerate research and innovation. EIPs unite public and private sectors across different levels, integrating supply and demand measures. They focus on societal benefits and modernization, fostering collaboration for faster, more effective outcomes (EC, n.d./f).

EIP-AGRI, launched in 2012, promotes innovation and knowledge exchange in agriculture, forestry, and rural areas. It follows an "interactive innovation" model, bringing together farmers, researchers, advisors, and businesses to co-create solutions for practical challenges. Innovation under EIP-AGRI can be technological, organizational, social, or based on traditional practices. Projects operate at both national (OGs under the CAP) and transnational levels (multi-actor projects under Horizon 2020 and Horizon Europe), accelerating the adoption of useful innovations (EC, n.d./g).

Types of EIP-AGRI projects (EC, n.d./g; EU CAP Network, n.d./b):

- *Research and Innovation projects:* Funded under Horizon Europe (previously Horizon 2020), these projects support sustainable agriculture, forestry, and rural areas by fostering multi-actor collaboration. They include thematic and advisory networks to accelerate knowledge exchange and innovation adoption.
- *OG projects:* These multi-actor innovation projects bring together farmers, researchers, advisors, and other stakeholders to develop practical solutions. Funded under the CAP (2023-2027) through national Strategic Plans, they were previously supported by Rural Development Programmes (2014-2022). For the summary of EIP OGs in the BIOEAST countries, see Table 21.

Table 21. Number and thematic focuses of EIP-AGRI OGs in the BIOEAST Member States

	Number of EIP-AGRI OGs	Proportion of OGs covering specific topics							
		Agricultural Productivity	Sustainability	Environmental Impacts	Socio-economic Impacts	Food Supply Chain	Climate and Climate Change	Research & Innovation	Forestry
Bulgaria	31	74.2%	51.6%	12.9%	6.5%	6.5%	3.2%	19.4%	0.0%
Croatia	18	55.6%	33.3%	16.7%	16.7%	50.0%	11.1%	5.6%	0.0%
Czechia	8	75.0%	37.5%	12.5%	0.0%	12.5%	0.0%	25.0%	0.0%
Estonia	0 or no data								
Hungary	58	84.5%	51.7%	32.8%	20.7%	0.0%	6.9%	10.3%	10.3%
Latvia	59	91.5%	47.5%	39.0%	67.8%	6.8%	13.6%	1.7%	25.4%
Lithuania	52	71.2%	32.7%	17.3%	7.7%	7.7%	11.5%	3.8%	1.9%
Poland	142	45.8%	26.8%	3.5%	1.4%	16.2%	0.0%	1.4%	0.0%
Romania	26	73.1%	42.3%	30.8%	11.5%	3.8%	0.0%	11.5%	0.0%
Slovakia	0 or no data								
Slovenia	69	68.1%	39.1%	60.9%	15.9%	11.6%	44.9%	7.2%	7.2%

Source: own compilation based on EU CAP Network (data accessed: January 2025)

8.1.3 European Circular Bioeconomy Fund (ECBF)

The ECBF is the first venture fund dedicated to supporting growth-stage companies in the European bioeconomy, including the circular bioeconomy. Its goal is to drive capital investment for scaling innovative, high-impact, and sustainable businesses (ECBF, 2025).

The fund plans to invest in approximately 22 late-stage bioeconomy companies, excluding energy and other sectors, across the EU's 27 member states and 16 Horizon 2020 associated countries (excluding the UK). It provides funding through equity, mezzanine, or debt instruments, targeting companies at different growth stages based on Technology Readiness Levels (TRL):

- TRL 6-7: Scaling from pilot to demonstration
- TRL 7-9: Advancing from demonstration to industrialization
- TRL 9: Expanding mature technologies globally

Investment focuses on novel or value-added technologies, products, processes, and business models that benefit the European economy and society. The BIOEAST initiative is part of ECBF's partner network. The ECBF's investment objectives also cover the BIOEAST region, with a particular focus on Estonia, Poland, Hungary and Slovenia (Martinez, 2021).

8.1.4 European Investment Bank Group (EIB)

The EIB provides financing for projects across the agricultural, fisheries, food, and forestry value chains, with a focus on food quality and security, sustainable rural development, climate-smart production, innovation, and resource efficiency. It supports the development of innovative and sustainable bio-resource pathways to contribute to a greener economy. The EIB Group was formed in 2000. It is composed of the EIB Institute, EFSI and EIF (EIB, n.d.).

Through its long-term financing and technical advice, EIB benefits farmers, private enterprises and society as a whole; promotes environmental sustainability; lowers agriculture's CO_2 emissions, and funds €5 bn annually to the agriculture and bioeconomy sector. EIB supports initiatives that address dominant challenges in modern agriculture, including feeding a growing population, ensuring farmers' livelihoods, and protecting the environment. It funds projects that support the development of innovative and sustainable agricultural practices and technologies, improve the sustainability and efficiency of food production, and enhance financial access for farmers, micro-enterprises, and small businesses (EIB, n.d.).

A. EFSI

EFSI, a partnership between the EC and the EIB Group, aims to address market failures by reducing investment risks and mobilizing private financing. It focuses on strategic investments in infrastructure, innovation, and SME financing. By absorbing some risk through an EU budget guarantee, EFSI encourages investment in projects that might otherwise struggle to secure funding, attracting private capital to bridge the EU's investment gap (EC, n.d./h).

With EFSI support, the EIB Group funds high-impact, economically viable projects, including those with higher risk profiles. It focuses on strategic infrastructure, renewable energy, resource efficiency, education, research, innovation, SME financing, and environmental, urban, and social projects. Financing instruments include loans, guarantees, credit enhancement, and equity-type products. Eligible applicants include companies of all sizes, utilities, public sector entities, national promotional banks, and investment platforms (EC, n.d./h).

Table 22 shows bioeconomy sector investments funded by EFSI in the BIOEAST region.

Table 22. Bioeconomy sector investments by EFSI in the BIOEAST countries (signed and approved)

Title	Countries	EFSI financing (million €)	Total investment related to EFSI (million €)	Approval date	Status
Boni Meat Production	Bulgaria	30.00	60.90	02/12/2020	signed
Agricover Loan For SMEs II	Romania	15.00	42.00	05/02/2020	signed
Dairy Production Modernisation And Logistics	Poland	50.00	108.30	18/12/2019	signed
Food Production Modernisation	Bulgaria Poland Romania	31.20	94.07	19/10/2018	signed
Plywood Production Investment Programme Latvia	Latvia	40.00	80.30	30/08/2019	approved
E-Piim Dairy Expansion	Estonia	28.00	99.68	05/02/2019	approved

Source: own compilation based on EIB

B. European Investment Fund (EIF)

EIF, part of the EIB Group, specializes in risk finance to support SMEs across Europe. Its shareholders include the EIB, the EC, and various public and private financial institutions. The EIF operates using its own resources or funds from the EIB, the EC, EU Member States, or other third parties. It improves SME access to finance by developing targeted financial products for intermediaries such as banks, guarantee and leasing companies, micro-credit providers, and private equity funds (EC, n.d./i).

The EIF aims to support EU priorities by fostering entrepreneurship, growth, innovation, research and development, employment, and regional development. It also seeks to generate returns for its shareholders through a balanced approach to commercial pricing, fees, and risk-based income.

EIF implements SME finance initiatives, including (EC, n.d./i):

- *InvestEU*, a major EU-driven program strengthening European competitiveness and strategic autonomy. It accounted for 45% of EIF activities in 2022, introducing sustainability-focused guarantees, support for female representation, climate and infrastructure investments, and funding mechanisms for scale-ups and initial public offerings (IPO).
- *European Tech Champions Initiative (ETCI)*, a growth-stage fund-of-funds supporting European tech companies in their pre-IPO phase. With an initial €3.75 billion, it addresses the scale-up funding gap by investing in large venture capital funds.

Additionally, the EIF collaborates with national and regional institutions through equity funds-of-funds and guarantee/debt funds, offering tailored financial solutions that align with EU policy objectives and complement national SME support schemes. Initiatives that are relevant in the BIOEAST region are listed in Table 23.

Table 23. Country and sector-specific initiatives (funds-of funds and guarantee debt funds)

Geographical scope	EIF-managed Joint Initiative / Fund-of Funds	Sector / Target Group	Business
(Austria), Czechia, Hungary, Slovakia, Slovenia	Central Europe Fund of Funds (CEFoF)	Growth phase SMEs and small mid-caps through a portfolio of investments into venture capital, private equity and mezzanine funds.	Equity
Latvia, Lithuania, Estonia	Baltic Innovation Fund	Co-investments alongside business angels, family offices and institutional investors into early to growth phase SMEs.	Equity
Poland	Polish Growth Fund of Funds (PGFF)	Growth-focused enterprises in Poland, CEE through portfolio of investments into venture capital, private equity and mezzanine funds.	Equity
Western Balkan countries, including Croatia	Western Balkans Enterprise Development & Innovation Facility (WB EDIF)	SMEs in the Western Balkans, helping to develop the local economy as well as the regional venture capital markets and at the same time promoting policy reforms to support access to finance through financial engineering instruments.	Equity Guarantees

Source: own compilation based on EIF

8.1.5 European Innovation Council and SMEs Executive Agency (EISMEA)

EISMEA supports European innovators, researchers, businesses, and consumers to strengthen the EU's global leadership in research and innovation. It promotes a competitive, digital, green, and inclusive economy while enhancing opportunities for SMEs and maintaining high protection standards for citizens. Established in 2021, EISMEA consolidates all EIC activities and SME-related programs under one agency (EC, n.d./j).

A. EIC

EIC established under Horizon Europe with a €10.1 billion budget, supports breakthrough technologies and companies essential for the EU's green and digital transition and strategic autonomy. It provides funding throughout the innovation lifecycle, from early-stage research to commercialization and scaling of start-ups and SMEs (EC, n.d./j).

In 2025, EIC funding is structured into four main schemes (EC, n.d./j):

- *EIC Pathfinder* – Supports advanced research for breakthrough technologies.
- *EIC Transition* – Validates technologies and develops business plans.
- *EIC Accelerator* – Helps SMEs, start-ups, and spin-offs bring innovations to market and scale up.
- *EIC Strategic Technologies for Europe Platform (STEP) Scale Up* – Provides additional support for promising companies to secure larger funding rounds for further growth.

*Table 24. EIC-funded projects with the participation and coordination of partners from BIOEAST countries, in bioeconomy-related sectors**

	Number of participants	Number of projects coordinated	Funds allocated
Bulgaria	6	6	€ 3 604 168.00
Croatia	1	1	€ 8 392 125.00
Czechia	4	3	€ 3 822 787.00
Estonia	13	15	€ 11 642 214.00
Hungary	14	14	€ 10 384 819.00
Latvia	4	3	€ 1 573 287.00
Lithuania	4	4	€ 285 716.00
Poland	18	17	€ 47 354 503.00
Romania	2	2	€ 142 858.00
Slovakia	11	10	€ 2 531 054.00
Slovenia	17	16	€ 17 185 761.00

* agriculture & fisheries, biotechnology, blue growth, eco-innovation and raw materials, food and beverages

Source: own compilation based on EIC datahub (data accessed: January 2025)

B. European Innovation Ecosystems (EIE)

EIE program, part of Horizon Europe, aims to build more connected, inclusive, and efficient innovation ecosystems to support company scaling, as outlined in the New European Innovation Agenda (NEIA) (EC, 2024/e).

Innovation ecosystems bring together individuals and organizations focused on innovation, linking resources, institutions, companies, investors, and policymakers. The EIE program complements initiatives by EIC, the EIT, and other Horizon Europe, national, regional, and private-sector efforts.

The NEIA seeks to develop new technologies, address societal challenges, and bring innovations to market, fostering deep tech advancements and attracting top talent and companies across Europe.

NEIA introduced five main initiatives, including Regional Innovation Valleys (RIVs) under the goal of strengthening EIE and reducing the innovation divide (EC, n.d./k).

a. RIVs for Bioeconomy and Food Systems

RIVs are specialized regional ecosystems focusing on critical deep-tech and industrial value chains that support the green and digital transitions and societal resilience. They aim to foster deep-tech innovation across EU territories in priority areas such as food security, renewable energy, circular economy, digital transition, and healthcare (EC, 2023).

At the beginning of 2025, 146 regions have been awarded the RIVs label for their commitment to strengthening regional research and innovation investments and policies (EC, 2025). The initiative has a total funding commitment of €170 million, with the first beneficiaries receiving approximately €116 million: €54 million from Horizon Europe's EIE Work Programme and €62 million from the Interregional Innovation Investments (I3) instrument under the ERDF.

Table 25. Selected RIVs in the BIOEAST countries (status in January 2025)

	Regions
Bulgaria	Severen tsentralen, Severoiztochen, Yugoiztochen, Yugozapaden, Yuzhen tsentralen
Croatia	Panonska Hrvatska, Jadranska Hrvatska, Grad Zagreb, Sjeverna Hrvatska
Czechia	Střední Čechy, Jihozápad, Severozápad, Severovýchod
Estonia	unknown
Hungary	Közép-Dunántúl, Dél-Dunántúl
Latvia	Latvija
Lithuania	Sostinės regionas, Vidurio ir vakarų Lietuvos regionas
Poland	Małopolskie, Śląskie, Wielkopolskie, Dolnośląskie, Opolskie, Warmińsko-mazurskie, Pomorskie, Lubelskie, Podkarpackie, Podlaskie, Warszawski stołeczny
Romania	Nord-Vest, Centru, Nord-Est, Sud-Muntenia, Bucureşti-Ilfov, Vest
Slovenia	Vzhodna Slovenija, Zahodna Slovenija
Slovakia	Bratislavský kraj, Západné Slovensko, Východné Slovensko

Source: own compilation based on EC (2025)

RIVs for Bioeconomy and Food Systems (RIV4BFS) are regional innovation ecosystems focused on bioeconomy and food systems, aligned with national and regional smart specialization strategies. They integrate deep-tech innovation to enhance EU value chains and facilitate the market scaling of innovations by connecting research, private sector, and other stakeholders. RIV4BFS takes a systemic approach, addressing not just technology but also infrastructure, regulation, and consumption patterns to drive sustainable change. They promote inclusive and interconnected innovation ecosystems, supporting the circular bioeconomy by linking food and

bio-based value chains, restoring ecosystems, and optimizing biomass use. Flexible in size and configuration, RIV4BFS adapt to regional priorities and sustainable biomass sources across EU Member States and Associated Countries. Their development is prerequisite to building a sustainable and circular EU bioeconomy by enhancing local ecosystem and soil health, connecting bioeconomy actors, and maximizing biomass side-stream utilization for food and bio-based materials (EC, 2023).

The initiative was introduced at an event in Plovdiv, Bulgaria, on October 13, 2023. The event gathered approximately 150 bioeconomy stakeholders and other participants in person, with over 500 attendees joining online. Participants included representatives from existing and emerging bioeconomy and food system valleys, European regions (particularly from BIOEAST countries), key bioeconomy stakeholders, university staff, students, and media.

"The RIV4BFS has the potential to bridge CEE regions with regions that are more advanced in bioeconomy, show good practice of functional bioeconomy value chains, enhance peer to peer mutual learning and hereby advance systemic thinking and new approach to biomass utilization." (BIOEAST Board, 2024 p.2)

Therefore, the BIOEAST Initiative together with BOOST4BIOEAST project strongly supports this initiative through awareness-raising and mobilizing Member States to ensure the engagement of the local regions.

8.1.6 EIT Hubs

The EIT Community is a collaborative network formed by the EIT and its long-term partnerships, known as KICs. By harnessing the combined expertise of these KICs, the EIT Community connects academia, research, and business to drive innovation, entrepreneurship, and creativity. Its goal is to contribute to a competitive, inclusive, and sustainable economy for future generations (EIT, n.d./a).

EIT Regional Innovation Scheme (RIS)

EIT RIS activities are designed to address the diverse innovation needs of eligible countries, particularly those with moderate or emerging innovation scores. To support implementation, EIT RIS Hubs have been established to strengthen local innovation ecosystems and connect them with the EIT's pan-European network. These Hubs facilitate collaboration among local innovation actors and help accommodate new partners into EIT Community activities (EIT, n.d./b).

EIT Food

EIT Food is a leading food innovation community that fosters collaboration across the entire food system to drive innovation and change. It connects startups, corporations, entrepreneurs,

investors, consumers, and industry stakeholders, bridging the gap between research and action, ideas and implementation, and present and future challenges. Supported by the EU, it invests in projects, organizations, and individuals committed to building a healthy and sustainable food system (EIT Food, n.d./c).

EIT Food collaborates with industry, education, and research partners to develop innovation projects that improve environmental and health outcomes. These projects align with three missions: promoting healthier lives through food, achieving a net-zero food system, and reducing risks to create a fair and resilient food system.

EIT Food drives transformation in the food system through four main activities (EIT Food, n.d./c):

- *Innovation* – Advancing research and innovation in food products and services by leveraging shared knowledge within its ecosystem.
- *Education* – Attracting and empowering talent to lead the shift toward a healthier, more sustainable, and trusted food sector.
- *Entrepreneurship* – Supporting agrifood startups and entrepreneurs to drive impactful food innovations and business growth across Europe.
- *Public Engagement* – Facilitating a two-way dialogue between experts and the public, recognizing the crucial role of consumers in shaping the food system.

The EIT RIS supports agrifood sector development in targeted regions through innovation, education, business creation, and communication activities. Open to students, researchers, entrepreneurs, and consumers, it helps enhance skills and creativity.

EIT Food Hubs, selected through open calls, serve as regional contact points, supporting local entrepreneurs and fostering innovation ecosystems. The Food Hubs were the first instances of EIT's sectoral approach, followed by other sectors. Currently, there are 21 Hubs across 15 EIT RIS countries, including Croatia, Bulgaria, Czechia, Estonia, Greece, Hungary, Italy, Latvia, Lithuania, Portugal, Romania, Serbia, Slovakia, Slovenia, and Turkey. Hubs of the BIOEAST countries are listed in Table .

Table 29. EIT Food Hubs in the BIOEAST countries

	Lead Entities	**Focus Areas**
Bulgaria	University of Economics – Varna, Regional Agency for Entrepreneurship and Innovations - Varna (RAPIV)	economic education, innovation, entrepreneurship, corporate social initiatives
Croatia	Smion, University of Zagreb, Faculty of Food Technology and Biotechnology	startup incubation, acceleration, food technology, biotechnology, nutrition science
Czechia	University of Chemistry and Technology, Prague	food science, food technologies, biochemical sciences, innovation ecosystem

Estonia	Tartu Biotechnology Park, South Moravian Innovation Centre (JIC)	biotechnology, business development, innovation support
Hungary	Campden BRI Hungary, PANNON Pro Innovations	food safety, risk assessment, transparency, food innovation, sustainability
Latvia	Latvia University of Life Sciences and Technologies (LBTU), Latvian Rural Advisory and Training Centre (LLKC)	agri-food industry, resource optimization, food chain innovation, rural advisory services
Lithuania	AgriFood Lithuania, Vilniaus kolegija/Higher Education Institution (VIKO)	digital innovation, agrifood tech, sustainability, higher education
Romania	Impact Hub Bucharest, Brasov Metropolitan Agency for Sustainable Development	entrepreneurship, innovation support, sustainable development, metropolitan cooperation
Slovakia	Slovak University of Agriculture in Nitra (SUA), The Center for Scientific and Technical Information of the Slovak Republic (SCSTI)	agricultural research, biotechnology, food incubation, university-based innovation
Slovenia	Chamber of Commerce and Industry of Slovenia, Chamber of Agricultural and Food Enterprises (CCIS-CAFE)	food innovation, policy development, sectoral support, networking

Source: own compilation based on EIT

8.1.7 Other possible sources of funding relevant for bioeconomy

ESIF: fostering lasting socio-economic convergence, territorial cohesion, social Europe and a smooth green and digital transition. As one of the largest investment instruments under the EU budget, the ESIF support the territorial, economic and social cohesion of Europe's regions, as well as their resilience and recovery from the crisis faced in the past years (EC, n.d./l). Comprise of:

- *ERDF:* aims to strengthen economic, social, and territorial cohesion in the EU, supporting innovation and SMEs, greener economies, and sustainable urban development (EC, n.d./m).
- *European Social Fund Plus (ESF+):* main instrument for investing in people and supporting the implementation of the European Pillar of Social Rights. Contributes to the EU's employment, social, education, and skills policies, including structural reforms in these areas (EC, n.d./n).
- *European Agricultural Fund for Rural Development (EAFRD):* finances the EU's contribution to rural development programs, improving the competitiveness of agriculture and encouraging sustainable management of natural resources (EC, n.d./o).
- *Cohesion Fund:* provides support to Member States with a gross national income (GNI) per capita below 90% EU-27 average to strengthen the economic, social, and territorial cohesion of the EU (EC, n.d./p).

European Maritime, Fisheries, and Aquaculture Fund (EMFAF): focuses on the sustainable use of aquatic and maritime resources, supporting R&I for sustainable blue bioeconomy and the transition to sustainable and low-carbon fishing (EC, n.d./q).

European Agricultural Guarantee Fund (EAGF): provides funds for income support schemes and supports agricultural markets (EC, n.d./r).

Connecting Europe Facility (CEF): key EU funding instrument to promote growth, jobs, and competitiveness through targeted infrastructure investment at the European level (EC, n.d./s).

IF: financed by EU Emissions Trading System revenues, provides substantial opportunities for bio-based solutions that contribute to decarbonizing sectors such as energy-intensive industries, renewable energy, and energy storage (EC, n.d./t).

Modernisation Fund (MF): supports the modernisation of energy systems and the improvement of energy efficiency in 13 lower-income EU Member States (EC, n.d./u).

European Research Council (ERC) grant schemes: ERC was set up by the EU in 2007 to fund individual scientists to carry out research at the frontiers of knowledge in Europe, to attract top talent. General features are funding schemes set up "for scientists, by scientists" and open to top researchers of any nationality, age and gender, from anywhere in the world, to perform research in Europe (ERC, n.d.).

Green Public Procurement (GPP): a voluntary instrument that stimulates demand for more sustainable goods and services, including bio-based products (EC, n.d./v).

JTF: aims to support the transition towards climate neutrality by alleviating its socio-economic impact in the regions most affected (EC, n.d./w).

Knowledge for Policy (K4P) Programme: supports policymaking in bioeconomy by providing scientific evidence and bridging the science-policy gap (EC, n.d./x).

LIFE: aims to achieve the shift towards a sustainable, circular and resilient economy, protect and restore the environment, halt and reverse biodiversity loss (EC, n.d./y).

Recovery Assistance for Cohesion and the Territories of Europe (React_EU): one of the largest programmes under Next Generation EU amounting to EUR 50.6 billion. It continues and extends the crisis response and crisis repair measures delivered through the Coronavirus Response Investment Initiative. These additional resources have been used for projects that foster crisis repair capacities in the context of the coronavirus crisis, as well as investments in operations contributing to preparing a green, digital, and resilient recovery of the economy (EC, n.d./z).

RRF: a temporary instrument at the heart of NextGenerationEU, the Facility enables the EC to raise funds by issuing bonds, which are then distributed to Member States to support reforms and investments that promote sustainability, resilience, and green and digital transitions, while addressing challenges from the European Semester's country-specific recommendations (EC, n.d./aa).

European Economic Area (EEA) and Norway grants: provided by Iceland, Liechtenstein, and Norway to reduce economic and social disparities in Europe and strengthen bilateral relations with beneficiary countries. They support a variety of areas, including research and innovation (Financial Mechanism Office, n.d.).

Swiss Contribution: Switzerland's financial support mechanism aimed at reducing economic and social disparities within the European Union, particularly targeting CEE countries that joined the EU after 2004. While not primarily a research and innovation funding tool, it can and has supported such activities as part of broader development and capacity-building objectives (Federal Department of Foreign Affairs, n.d.).

These funding resources provide a mix of grants, equity support, public procurement, and other financial instruments to support the development and scaling of bioeconomy innovations across the EU.

8.2 Private financing opportunities

Private financing, as found by Garthley & Wydra (2024), is crucial for advancing the bioeconomy in the EU, providing capital for startups and established companies as they scale from innovation to commercialization. Unlike public funding, which supports early-stage research, private investment focuses on market entry and growth, fostering competitiveness. Interest from venture capital, private equity, and corporate investors has increased in sectors like biotechnology, sustainable agriculture, and bio-based products. These investments bridge funding gaps, complement public initiatives, and accelerate innovation and commercialization across the bioeconomy.

Furthermore, Berto *et al.* (2021) argue that green finance is key to promoting sustainability, the bioeconomy and the circular economy through new pathways for economic development. Therefore, green financing initiatives are also given special attention in the analysis. The most important green finance initiatives, financing options, opportunities offered by national banks, good practices and case studies can be found on Green Finance Platform (n.d.), by country and also by sector.

According to Perunová and Zimmermannová (2021) financial support is a significant element for the future growth and development of the bioeconomy, which is expected to move society towards a more sustainable economy. The authors introduce and compare various financing opportunities promoted by the EU to support the development and growth of the European bioeconomy. Based on the results, it can be stated that the main types of financial instruments enabling bioeconomy development include taxes, tax relief, grants, subsidies, feed-in tariffs, loans, direct public funding, and tradable permit. At the same time, this study emphasizes the main role of mobilization of private investors as well to fill the gap in the European bioeconomy. One of the important results of the research is that the development of a new European risk-sharing financial instrument for the bioeconomy can potentially meet the needs of bioeconomy

projects and mobilize private capital. The authors conclude that there is no comprehensive system to support the development of the bioeconomy from initial research to the commercialization stage. Implementation of this system in practice will ensure that the right financing solutions and targeted advisory support in the bioeconomy will be available. The disadvantage is also the lack of private investment in the bioeconomy, so the EU still needs to attract more private investment to scale-up innovations in the bioeconomy.

All the referenced scientific scholars reinforce the need for a more detailed investigation on the availability of private funding and financing opportunities generally in the EU and in the BIOEAST region as well.

Most typical private financing resources are the following (Cumming, 2009):

1) Bank loans and credit lines
2) Investment funds
3) Private sector initiatives, including crowdfunding as well as donations and sponsorships from private actors
4) Venture capital and equity funding, including business incubators and start-up accelerators
5) Green financing, including green bonds

Regarding bioeconomy private funding and financing opportunities one of the main financial actors is the European Bank for Reconstruction and Development (EBRD). EBRD integrates environmental and social assessments into its investments, ensuring adherence to international standards. The bank prioritizes climate risk assessments and adaptation measures, helping clients enhance resilience and reduce long-term risks. The institution enforces strong safeguard policies, emphasizing economic inclusion, gender equality, and stakeholder engagement. Main financial products of EBRD are loans, equity investments and guarantees. EBRD tools and programs supports investments in products, technologies, and business models that have a positive impact on the green economy transition, focusing on energy, water, and materials efficiency (EBRD, n.d.). In addition to the EBRD, a number of commercial banks in all BIOEAST countries offer various loans and credit lines, including preferential financing for the development of SMEs specialised in the bioeconomy.

Several investment funds are active in the bioeconomy area. The ECBF already mentioned in previous chapters is the first investment (especially venture capital) fund in Europe exclusively dedicated to the bioeconomy, offering flexible financing tools from equity to mezzanine. ECFB aims to catalyse the transition towards a sustainable future by investing in bio-based, growth-stage companies with high potential for innovation, favourable returns, and positive impact. Similarly, EU-wide, comprehensive investment funds are the Innovation Fund and the Modernisation Fund. However, BIOEAST countries also have country-specific investment funds that support specifically bioeconomy-focused investments and programmes.

There are some private sector initiatives including crowdfunding as well as donations and sponsorships from private actors in BIOEAST countries. "Crowdfunding is an innovative form of financing. The protagonists are the members of the crowd, the fundraiser, and the online funding platform that manages flows between the two. The main feature of crowdfunding is that it renders traditional financial intermediaries unnecessary. Individuals invest directly in projects to meet the funding needs of entrepreneurs or ventures. In return for making this pledge, backers receive a reward, which may be economic or social. The pledge is made by a relatively small number of backers over the Internet" (Martínez-Climent *et al*., 2019 p. 2). These actors contribute in different ways: providing either money or a business idea. It is commonly used by startups and growing businesses as an alternative funding source and helps build a community around a product or idea. Additionally, it provides market insights and access to potential customers. According to Martínez-Climent *et al.* (2019), the potential forms of crowdfunding can be described as follows:

- *Peer-to-peer lending* is a form of financing that enables loans between individuals without intervention from financial intermediaries. The risk is greater than with other transactions. Accordingly, the return on investment is also higher.
- In *equity-based crowdfunding*, investors, in exchange for their investment, receive shares in the business project they have pledged to. When investors receive a token, product, service, or gift in exchange for their pledge to the project, this is known as reward-based crowdfunding.
- *Donation-based crowdfunding* aims to raise funds to contribute to social causes, such as non-governmental organizations. Investors invest in these projects without expecting any economic return. Instead, they seek a social reward by contributing to sustainable development.
- *Other forms* of donations and sponsorships from private actors, e.g., the World Bioeconomy Association serves as a global hub for stakeholders promoting the growth of the bioeconomy across multiple sectors. Its vision is to position the bioeconomy as a transformative force, addressing challenges like climate change, biodiversity loss, food security, and health by optimizing the industrial use of underutilized biomass.

Private venture capital investment funds play an important role in helping small businesses lacking access to capital expand and grow rapidly, though it applies to a smaller subset of businesses. Venture capital funds primarily source funding from institutional investors and focus on high-growth potential firms, but many investors hesitate due to high risks and transaction costs. The development of the bioeconomy relies on investments along the entire value chains for bioeconomy products, including research, product development and marketing. The availability of capital, especially venture capital for risky investments, is therefore an essential condition for the development of the bioeconomy (Birner, 2018).

BioeconomyVentures is an outstanding example which is dedicated to enhancing investments within the European bioeconomy by connecting startups and spin-offs with investors to facilitate deal-making (BioeconomyVentures, n.d.). Their strategy includes:

- *Ambassador Programme and "Explore and Expand" Workshops:* They have selected 20 organizations across 25 European regions to serve as ambassadors, organizing 46 pitching and networking events throughout Europe.
- *Online Platform:* A smart tool designed to match startups with investors, streamlining connections to suitable investment opportunities.
- *Investment Readiness Programme:* A training program tailored for European bioeconomy startups, aimed at preparing entrepreneurs to effectively engage with investors and secure necessary funding.
- *Open Calls for Innovators and Challenges:* Providing additional opportunities for startups and SMEs to showcase their innovative solutions to corporates and investors, thereby increasing their chances of obtaining funding or forming new partnerships.

One of the most important forms of start-up accelerators are business angels. According to the definition of EC's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG-GROW), business angel is a high-net-worth individual with business experience who invests in new and growing private businesses, either independently or within a syndicate (EC, n.d./ab). Beyond capital, they provide expertise, skills, and valuable networks, offering 'smart and patient' capital with a long-term perspective. Business angels play a crucial economic role as a major source of risk capital, second only to family and friends in funding startups. They contribute to economic growth and technological progress. EU countries are responsible for promoting business angel investments through incentives and co-investment with public funds. The EC supports cross-border investments, collaboration with venture capital, and investment readiness training to enhance business angel engagement (EC, n.d./ab).

Two relevant examples are:

- **European Business Angels Network (EBAN)** serves as the leading representative of the early-stage investor community across Europe, bringing together over 100 member organizations from more than 50 countries. Founded in 1999 by pioneering angel networks in collaboration with the EC and European Association of Development Agencies (EURADA), EBAN represents a sector that invests approximately €11.4 billion annually, playing a crucial role in supporting SMEs (EBAN, n.d.).
- **Business Angels Europe (BAE)** is the European Confederation of Angel Investing, representing business angel federations and trade associations across Europe. It unites key players from the most active angel investment markets. BAE's main objectives include: establishing a connected ecosystem for angel investing across Europe;

advocating for a favourable fiscal and regulatory environment for angel investors.; promoting the growth of the angel investment market by increasing awareness and encouraging individuals to invest in small businesses with both capital and expertise (BAE, n.d.).

Green financing as defined by the Green Finance Platform (2021), sustainable financial system fosters long-term economic, social, and environmental well-being by shaping financial assets to support an inclusive and environmentally sustainable economy. *Sustainable finance* is the broadest term, integrating environmental, social, and governance (ESG) considerations, while *green finance* focuses on financial instruments that fund environmentally sustainable projects. The objectives of green finance are internalizing environmental costs and reducing investment risks, ensuring green projects are prioritized over unsustainable alternatives. Green finance includes various financial instruments such as green bonds, carbon market instruments, and sustainable banking and insurance products. Renewable energy and sustainable infrastructure are major areas of interest. As ESG reporting becomes mainstream, investors, banks, and insurers increasingly integrate ESG factors into risk management and decision-making. ESG risks include physical, transition, and liability risks, affecting financial stability and influencing investment strategies.

An indicative list of typical domestic funding and financing tools in BIOEAST countries can be found in Table 30. Furthermore, the list of most relevant institutions and financing tools are collected regarding BIOEAST region country by country based on the above described most typical private financing resources in Annex 2.

Table 30 26. Other domestic funding and financing tools in BIOEAST countries

Countries	Most relevant types of domestic public and private finance funds and programs
Bulgaria	**Fund Manager of Financial Instruments in Bulgaria (FMFIB)** operates as a Fund of Funds; it allocates targeted public funds from EU programmes and national co-financing, using special financing schemes (financial instruments), including for bioeconomy sectors. **The Bulgarian Entrepreneurial Association (BESCO)** acts as a bridge between startups, private and institutional investors, the government, and other stakeholders in the innovation industry. Its role is to upgrade the current Bulgarian legislation and propose contemporary market-driven policies based on innovation and progressive thinking, access to talent, access to capital.
Croatia	**Croatian Agency for SMEs, Innovations and Investments (HAMAG-BICRO)** issues guarantees for bank credits approved by credit institutions and other legal entities approving loans to SMEs and makes direct financial contributions to SMEs in the form of grants. **Centre for Research, Development and Technology Transfer (CIRTT)** at the University of Zagreb BIOCentre: One of the first research infrastructures in Croatia. It provides business assistance and advisory services for biotech companies, laboratory space, conference rooms, and fully equipped offices are available for rent; technology transfer via central laboratory, a range of process development services; courses in business development and product development. It builds a network between individuals, companies and institutions in biotech and financial sectors. Assists research groups at the university in securing financial support for research and development. Connects research groups with partners from the business sector

	and helps establish collaboration in the development of technology and commercialization of intellectual property created at the university. **Croatian Bank for Reconstruction and Development (HBOR)** through its specialized programmes HBOR provides support to start-ups, exporting companies, new production and companies from different sectors of economy such as industry, tourism, environmental protection and energy efficiency, agriculture.
Czechia	**The Country for the Future** research, development and innovation programme is aimed at supporting innovative business and is one of the first essential tools for the implementation of the Innovation Strategy of the Czechia 2019–2030.
Estonia	**ResTA** program supports business-oriented R&D in the valorisation of wood, food, and subsoil resources. The total budget of ResTA is 10 821 810 €. **Baltic Innovation Fund 2 (BIF 2)** BIF2 is a EUR 156m Fund-of-Funds initiative launched by the EIF in co-operation with the Baltic national promotional institutions – KredEx (Estonia), Altum (Latvia) and Invega (Lithuania). **RITA** funds socio-economical applied research based on the needs of the state. It supports strategic R&D activities - implementation of socio-economical interdisciplinary applied research as well as knowledge-based policy formulation. **NUTIKAS** funding supports companies in commissioning necessary applied research or product development projects from universities or research institutions. The maximum funding per project is 2 million euros, whereas the minimum amount is 20 000 euros. **Estonian Research Council** funds research and innovation in Estonia, coordinates funds for bioeconomy (NUTIKAS, RITA, ResTa), and supports international research cooperation.
Hungary	**Hungarian Green Investment Scheme (GIS)** funds measures to reduce greenhouse gases, with revenue created from trading surplus greenhouse gas emission allowances, following the Kyoto Protocol. These funds are usually allocated to promote energy efficiency investments in the domestic sector. **National Research, Development and Innovation Fund (NRDI)** NRDI offers grants and funding programs for research and development projects in various areas, including bioeconomy. This can include projects related to bio-based products, agricultural and forestry biotechnology, sustainable resource management. **Hungarian Scientific Research Fund (OTKA)** plays a crucial role in supporting and fostering scientific research in Hungary, thus contributing to the country's development, technological advancement, and competitiveness in the global scientific community. **Innowwide** Innovative SMEs receive a grant of 60,000 euro to assess the viability of research or commercial ambitions in international target markets. Innowwide is funded by the European Union as part of the European Partnership on Innovative SMEs.
Latvia	**BIF 2** **Fundamental and Applied Research Program** The program financed from the state budget aims to create new knowledge and technological knowhow in all fields of science. Program is organized as annual open calls.
Lithuania	**BIF 2** **Tax incentives for investment and innovations** offers a one-year corporate income tax holiday for small business start-ups and tax incentives targeting companies developing new technologies and afterwards using them in their activities to generate income. **Large-Scale Projects** offers significant tax incentives, including 0% corporate tax for 20 years, and streamlines key processes in land acquisition, planning and migration for large scale projects.
Poland	**Operational Program Smart Growth:** This European Union-funded program supports research and innovation activities in various sectors, including the bioeconomy. It provides grants for projects focused on developing new biomaterials, bioenergy sources, and sustainable agriculture practices.

	National Centre for Forest Development (KRD) provides financial support for projects related to forestry and the sustainable management of forest resources. They offer grants for initiatives focused on bio-based products, forest biomass utilization, and innovative forest management practices. **National Centre for Research and Development (NCBR)** provides funding for research and development projects in various sectors, including the bioeconomy. They offer grants for research and innovation activities in biotechnology, agriculture and forestry. **National Centre for Agricultural Support (KOWR)** is a Polish governmental agency, supervised by the Minister of Agriculture and Rural Development. KOWR provides financial support for projects related to agriculture and rural development. They offer grants for activities such as the development of bioenergy, bio-based products, and sustainable farming practices.
Romania	**National Programme for Research and Development:** The Romanian government provides funding through this program to support research and development projects in various sectors, including the bioeconomy. **Sustainable Development Operational Program (POSDRU)** is a Romanian funding program that aims to foster social and economic development. While not specific to the bioeconomy, it includes support for projects related to sustainable practices, including those within the bioeconomy sector. **Romanian Research and Innovation Fund (FUIR)** focuses on supporting research and innovation projects in Romania across various sectors, including the bioeconomy. It provides grants and financial assistance to projects that demonstrate scientific and technological excellence.
Slovakia	**National Agricultural and Food Centre (NAFC)** provides grants and funding for research and development projects related to agriculture, food, and bioeconomy. **Operational Programme Research and Innovation (OPVaI)** provides funding for research and innovation projects, including those related to the development of bioeconomy solutions. **Slovak Innovation and Energy Agency (SIEA)** offers various funding programs and grants to support projects focused on renewable energy sources, energy efficiency, and sustainable solutions in different sectors, including bioeconomy. **Slovak Research and Development Agency (APVV)** provides financial support for research projects, including those in the field of bioeconomy, to enhance innovation and competitiveness.
Slovenia	**Slovenian Enterprise Fund (SPS)** focuses on providing financial support, guarantees, and programs to foster the growth and development of SMEs, start-ups, and scaleups, both domestically and internationally, while promoting sustainable development. **Slovenian Regional Development Fund (SRDF)** acts as one of the key institutions of regional development policy that aims for a more sustainable achievement of long-term public goals in the development of regions, rural areas and protected areas. Beneficiaries are SME's, farmers, holdings, co-operatives, municipalities and nonprofit organisations. As a primary form of incentive, the Fund grants loans with a favourable interest rate and a long maturity. Other forms are guarantees, subsidies, soft loans, capital investments and prefinancing. As of end-2021, SRDF had an outstanding guarantee volume of around EUR 1.6M and supported around 150 SMEs. **Ekosklad** is a Slovenian Eco Fund that supports activities related to nature protection. It builds on the experience and examples of good practice to date with new findings and measures that improve the state of the environment. The transition to renewable energy sources, efficient use of energy, handling of waste and wastewater, permanent mobility and public awareness are challenges that it addresses

Source: own compilation based on the collection of published national bioeconomy strategies of BIOEAST countries regarding timeframe including 2024 and Sakellaris et al. (2023/b)

Stronger public-private synergies in the bioeconomy can be achieved through aligned policies and targeted funding for high-risk, high-reward investments. Investors and companies advocate for specialized funds or co-investment opportunities with public capital to reduce risks and attract private investment. Enhancing access to technical expertise, fostering investor-startup networks, and ensuring clear, flexible regulations would further support informed investment decisions. Additionally, comprehensive business support programs are crucial for helping bioeconomy ventures overcome financing and scaling challenges (Garthley & Wydra, 2024).

Table 31 27. Schematic overview of funding and financing sources for bioeconomy innovation

<table>
<tr><th></th><th colspan="2">Funding</th><th colspan="2">Financing/Investment</th></tr>
<tr><td rowspan="2">Public</td><td>Domestic</td><td>International</td><td>Domestic</td><td>International</td></tr>
<tr><td>grants and subsidies from national and sub-national budgets</td><td>grants and subsidies from EU budget (e.g., ESI funds, Horizon Europe, EIT, EIC, EIP),

bilateral donors</td><td>loans, guarantees and equity</td><td>loans, guarantees and equity (e.g., EIB, ECBF)</td></tr>
<tr><td rowspan="2">Private</td><td>Domestic</td><td>International</td><td>Domestic</td><td>International</td></tr>
<tr><td colspan="2">corporate sector funding,

philantropist funding</td><td colspan="2">bank loans and credit lines,
corporate investors,
private investment funds,
crowdfunding, donations, sponsorships,
venture capital and equity funding,
business incubators and startup accelerators,
green financing (incl. green bonds)</td></tr>
<tr><td colspan="5">Public-private partnerships</td></tr>
</table>

Source: own compilation

8.2.1 Gaps and challenges in the BIOEAST macro-region

There are several major challenges in applied research and technology transfer in the bioeconomy in the CEE macro-region, as concluded by the BIOEASTsUP report 'Report on the state of-the-art innovation gaps and needs of the bioeconomy related research and innovation in the BIOEAST macro-region' (Vitunskienė *et al*., 2021). These challenges include:

1. *Limited funding:* One of the main challenges is the limited funding available for applied research and technology transfer in the CEE macro-region. This hampers the establishment of research infrastructure, recruitment of skilled researchers, and execution of innovative research projects.
2. *Lack of collaboration:* There is often a lack of collaboration between academia, industry, and government sectors in the CEE macro-region. This hinders the effective transfer of technologies from academia to industry and slows down the adoption of bio-based solutions by companies.
3. *Knowledge and skill gaps:* The CEE macro-region faces knowledge and skill gaps in the bioeconomy sector. This includes a shortage of trained professionals in fields such as

biotechnology, biochemistry, and process engineering, which limits the region's capacity to develop and transfer advanced technologies.

4. *Regulatory barriers:* The bioeconomy operates under regulatory frameworks that can differ across countries in the CEE macro-region. These differences create barriers to technology transfer and hinder the scaling up of bio-based solutions. Harmonization and alignment of regulations is needed to facilitate the transfer and adoption of technologies.
5. *Limited commercialization support:* The CEE macro-region often lacks the necessary infrastructure and support systems to facilitate the commercialization of bio-based technologies. This includes access to pilot and demonstration facilities, business incubators, and technology transfer offices. These facilities and support systems are crucial for bridging the gap between research and market implementation.
6. *Weak intellectual property (IP) protection:* IP protection is a critical aspect of technology transfer and commercialization. However, there can be weak IP protection mechanisms in some countries in the CEE macro-region, which can discourage investment in research and development, as well as hinder technology transfer and commercialization efforts.
7. *Limited awareness and education:* There is a need for increased awareness and education about the potential of the bioeconomy and the benefits of bio-based technologies in the CEE macro-region. This includes raising awareness among policymakers, industry stakeholders, and the public, as well as providing education and training programmes to foster a skilled workforce in the bioeconomy sector.

The current report, which explores the years 2024-2025, continues to confirm some of the challenges experienced in the past in BIOEAST region as shown in the identification of disparities in relative strengths and weaknesses (Table 10-11).

Special areas still in need of improvement in and after 2024, based on the Innovation Scoreboard performances of the BIOEAST countries:

- Limited funding (i.e. the lack of 'Direct and indirect government support of business R&D' in some BIOEAST countries),
- Knowledge and skill gaps (i.e. the disparities of 'Population with tertiary education' and 'Knowledge-intensive services exports'),
- Limited commercialization support (i.e. the relatively low 'Direct and indirect government support of business R&D' and 'R&D expenditure in the business sector'),
- Limited awareness and education (i.e. the inequalities in 'Population with tertiary education').

9 Collaborative bioeconomy initiatives related to and other than BIOEAST, with the participation of CEE countries

This chapter explores important collaborative bioeconomy initiatives (projects, hubs, and organisations) involving CEE countries, beyond the framework of the BIOEAST initiative, based on the highlights in JRC's science for policy report 'Trends in the EU bioeconomy' (Mubareka *et al.*, 2023). These collaborative initiatives at macro-regional and interregional levels, often supported by EU strategies and funding mechanisms, bring together diverse stakeholders to promote sustainable bio-based value chains, circular bioeconomy models, and cross-border innovation.

Working in collaboration with the BIOEAST initiative, Circular BioEconomy Market Uptake and Policy Support in Central Europe (BIOECO-UP) project aims to introduce and promote the circular bioeconomy concept across Central Europe. It focuses on developing new circular value chains, encouraging shifts in consumer behavior, and supporting policymakers in integrating circular bioeconomy policies. Countries involved: Austria, Croatia, Czechia, Hungary, Italy, Poland, Slovakia, Slovenia (Interreg Central Europe, n.d.).

Bioeconomy is also one of the 13 policy areas within the EU Strategy for the Baltic Sea Region (EUSBSR). The Nordic Council of Ministers, in collaboration with partners from Finland, Sweden, and Lithuania, leads efforts in this field. Serving as a main access point and support hub, the Nordic Council of Ministers facilitates cooperation among stakeholders interested in advancing bioeconomy initiatives aligned with the broader objectives of the EUSBSR (Nordic Co-operation, n.d.).

The European Territorial Cooperation Programmes, known as Interreg, play a crucial role in shaping regional and multi-regional bioeconomy strategies. They drive additional macro-regional initiatives, with two currently active and four completed:

- *Danube Region* (DanubeBioValNet, 2017-2019): launched in 2017, this project fostered cross-regional collaboration among 16 partners from 10 Danube regions. It focused on developing three bio-based value chains—phytopharmaceuticals, eco-construction, and bio-based packaging (bioplastics)—alongside initiatives in the hemp industry. Countries involved: Austria, Bulgaria, Croatia, Czechia, Germany, Romania, Serbia, Slovakia, Slovenia (ENRD, n.d.).
- *BIO-ECOnomy Research-Driven Innovation for the Adriatic-Ionian Region* (Bioeco-RDIADRION, 2018-2020): this initiative aimed to establish a regional innovation system for the Adriatic-Ionian area, fostering bioeconomy development in the region. Countries involved: Albania, Croatia, Greece, Italy, Serbia, Slovenia (Interreg Adrion, n.d.).

The *European Forest Institute (EFI)* is an international organization established by European states. Thirty European states have ratified the EFI Convention, and the institute has around 125 Associate and Affiliate Member organizations across 39 countries (including all BIOEAST member states). Its headquarters are in Joensuu, Finland, with additional offices in Barcelona, Bonn, Brussels, and Rome, with project offices in Malaysia and China. EFI conducts research and provides policy support on forest-related issues. It promotes networking, disseminates impartial and policy-relevant information on forestry, and advocates for science-based policymaking. EFI also enhances support for decision-makers and hosts the International Partnerships Facility, a global knowledge hub that facilitates policy and governance reforms. The facility fosters international cooperation to promote legal, deforestation-free, and sustainable timber and agricultural commodity production and trade (EFI, n.d.).

10 Policy recommendations

The mapping of the strategic policy background for bioeconomy innovation, the funding and financing opportunities, as well as the various stakeholders and initiatives, was mainly quantitative and content-oriented, and did not include a qualitative assessment of the functioning and effectiveness of existing instruments and initiatives. Our recommendations are therefore formulated in the light of the gaps and opportunities identified through this approach:

1. In the EU, there is a **need for greater clarity on how the development of a circular bioeconomy, while strengthening ecological sustainability and social equity, will serve the continent's competitiveness in comparison with global competitors.** Public resources for research should be channelled in this direction and the competitive environment to stimulate innovation should be developed in this spirit.
2. BIOEAST member countries that do not yet have a dedicated national bioeconomy strategy should make efforts to involve wide range of stakeholders, to assess the situation and to create a vision, and to set priorities and goals, in order to allow the development of the circular bioeconomy in a more predictable policy environment, along well-focused programmes. **Frameworks for tracking the implementation of the strategies that have been or are being developed, need to be developed, with defined tasks, responsibilities, targets and deadlines.**
3. **BIOEAST sub-national regions with significant bioeconomy potential should strive to develop their own bioeconomy strategy** or to prepare sectoral sub-strategies relevant to the bioeconomy and better harmonise them with EU (and, where applicable, national) bioeconomy objectives.
4. In the area of bioeconomy research and innovation, **research organisations and enterprises should be made more aware of the possibilities for support, funding, and investment financing, how to combine them and, where possible, be steered**

towards market sources, to move away from a situation of heavy dependence on public subsidies. Instead of just "learning to apply", entities that are supposed to be the custodians of innovation should mobilise their external and internal resources, capitalise on their competitive advantages and develop their product and service offerings in response to real market demands.

5. It is necessary to increase the participation (and eventually the leadership roles) of **BIOEAST countries** in Horizon and other collaborations for research on the circular bioeconomy and its sub-areas, **endowing actors with the capabilities and helping to foster an institutional culture that promotes excellence, proactiveness, efficiency and better advocacy.**
6. **National governments, business and social organisations should also pool their own financial and intellectual resources to ensure that collaborative, multi-stakeholder initiatives promoting circular bioeconomy innovation**, such as BIOEAST national HUBs, are sustained and operate in an open and flexible way, according to the needs of the actors.

11 Conclusion

The mapping and analysis of the bioeconomy innovation ecosystem in the BIOEAST macro-region reveal a complex but increasingly coherent landscape, shaped by a growing recognition of the sector's transformative potential for sustainable development, economic resilience, and environmental stewardship. The findings presented in this report highlight both the progress made and the persistent challenges facing the region's bioeconomy innovation system.

The region's transition toward a circular and sustainable bioeconomy is underpinned by a diverse set of policy instruments, national and regional strategies, and funding frameworks, many of which have been aligned with EU-level objectives and initiatives. However, a main observation is the heterogeneity in the maturity of national bioeconomy strategies and innovation capacities across BIOEAST countries. While some Member States, have developed dedicated bioeconomy strategies, others remain in earlier stages of policy development, often relying on narrower frameworks.

The macro-environment for bioeconomy innovation in the BIOEAST region is characterized by below-EU-average levels of R&D expenditure and innovation output, although there is an upward trend in business enterprise investment in R&D in several countries. The presence of structural gaps in public-private collaboration, institutional capacity, and funding access—particularly for scaling technologies from pilot to demonstration and commercialization—remains a critical barrier to innovation-driven growth.

Notably, the concept papers and strategic actions developed under the BIOEASTsUP project provide a roadmap for coordinated efforts in research and innovation, highlighting the need

for stronger linkages between science, industry, and policymaking. Emerging clusters, hubs, and intermediary organizations are beginning to act as bridges across sectors and regions, enabling cross-cutting collaboration, knowledge transfer, and the development of integrated value chains.

The financial landscape for bioeconomy innovation is evolving, with increasing emphasis on blending public and private investment, de-risking mechanisms, and sustainability-linked instruments. However, access to risk-tolerant finance and tailored support for SMEs, start-ups, and niche innovators remains limited. Enhanced financial mechanisms, aligned strategies, and regional cooperation are needed to bridge funding gaps and accelerate the market uptake of bio-based solutions.

In conclusion, the BIOEAST countries have taken important steps toward building a collaborative and innovation-driven bioeconomy. To fully realize the region's potential, efforts must focus on improving strategic planning and governance, supporting cross-sectoral and cross-border collaboration, strengthening education and skills development, and enhancing funding access. These actions will be essential to align with EU climate and sustainability goals, support rural development, and position the BIOEAST macro-region as a proactive contributor to the European Green Deal and the evolving global bioeconomy.

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Appendices

Annex 1. A brief overview of BIOEAST countries in line with the Innovation Scoreboard (2024) – selected indicators

Emerging innovators

Bulgaria:

Summary innovation index (relative to EU in 2017): 50.6 Rank: 33.

Bulgaria is an Emerging Innovator with performance at 46% of the EU average in 2024. Performance is below the average of the Emerging Innovators (48%). Performance is increasing less than the EU (+10%).

Relative strengths: Design applications, Trademark applications, Environment-related technologies.

Relative weaknesses: Direct and indirect government support of business R&D, Population involved in lifelong learning, Resource productivity.

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
Finance and support	**26.9**	**0.9**	**2.1**
R&D expenditure in the public sector	19.7	-1.6	-3.3
Venture capital expenditures	53.7	8.3	11.7
Direct and indirect government support of business R&D	2.2	-3.9	-1.3
Innovators	**29.4**	**4.0**	**-37.9**
SMEs introducing product innovations	44.4	13.6	-41.7
SMEs introducing business process innovations	17.0	-5.2	-34.3
Environmental sustainability	**46.6**	**-10.1**	**-8.2**
Resource productivity	14.0	10.9	0.4
Air emissions by fine particulates	37.7	9.8	-17.1
Environment-related technologies	88.5	-55.7	-2.2

Croatia:

Summary innovation index (relative to EU in 2017): 76.6 Rank: 26.

Croatia is an Emerging Innovator with performance at 69.6% of the EU average in 2024. Performance is above the average of the Emerging Innovators (48%). Performance is increasing more than the EU (+10%).

Relative strengths: Public-private co-publications, SMEs introducing product innovations, Venture capital expenditures.

Relative weaknesses: Direct and indirect government support of business R&D, Knowledge-intensive services exports, Environment-related technologies.

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
Finance and support	**81.4**	**42.5**	**-9.4**
R&D expenditure in the public sector	86.9	41.0	1.6
Venture capital expenditures	135.5	94.9	-19.9
Direct and indirect government support of business R&D	7.7	-16.2	-8.5
Innovators	**131.3**	**54.5**	**0.0**
SMEs introducing product innovations	145.4	82.0	0.0
SMEs introducing business process innovations	119.8	28.5	0.0
Environmental sustainability	**60.3**	**-20.2**	**-6.6**
Resource productivity	83.2	17.7	16.5
Air emissions by fine particulates	75.9	13.9	4.1
Environment-related technologies	17.6	-100.0	-40.9

Latvia:

Summary innovation index (relative to EU in 2017): 59 Rank: 30.

Latvia is an Emerging Innovator with performance at 53.6% of the EU average in 2024. Performance is above the average of the Emerging Innovators (48%). Performance is increasing less than the EU (+10%).

Relative strengths: Population with tertiary education, Trademark applications, Public-private co-publications.

Relative weaknesses: Direct and indirect government support of business R&D, Innovation expenditures per person employed, R&D expenditure in the business sector.

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
Finance and support	**40.7**	**-13.6**	**-0.8**
R&D expenditure in the public sector	59.0	1.6	1.6
Venture capital expenditures	53.6	-45.8	-0.8
Direct and indirect government support of business R&D	3.3	1.3	-4.4
Innovators	**47.0**	**11.9**	**4.2**
SMEs introducing product innovations	42.1	8.7	1.6
SMEs introducing business process innovations	50.9	14.8	6.6
Environmental sustainability	**44.4**	**-9.6**	**6.3**
Resource productivity	50.9	1.4	-1.3
Air emissions by fine particulates	42.2	17.2	17.2
Environment-related technologies	41.5	-56.9	15.6

Poland:

Summary innovation index (relative to EU in 2017): 72.5 Rank: 27.

Poland is an Emerging Innovator with performance at 65.9% of the EU average in 2024. Performance is above the average of the Emerging Innovators (48%). Performance is increasing more than the EU (+10%).
Relative strengths: Design applications, Population with tertiary education, Enterprises providing ICT training.
Relative weaknesses: Foreign doctorate students as a % of all doctorate students, New doctorate graduates, PCT patent applications.

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
Finance and support	**61.7**	**15.7**	**-4.6**
R&D expenditure in the public sector	62.3	-4.9	-4.9
Venture capital expenditures	46.4	-1.2	-9.3
Direct and indirect government support of business R&D	80.2	64.5	0.9
Innovators	**45.5**	**34.9**	**0.0**
SMEs introducing product innovations	43.1	29.7	0.0
SMEs introducing business process innovations	47.5	40.1	0.0
Environmental sustainability	**60.3**	**-9.8**	**-7.3**
Resource productivity	49.6	23.9	6.5
Air emissions by fine particulates	77.2	12.0	-2.5
Environment-related technologies	46.8	-68.3	-25.4

Romania:
Emerging Innovator Summary innovation index (relative to EU in 2017): 37.4 Rank: 36.
Romania is an Emerging Innovator with performance at 34% of the EU average in 2024. Performance is below the average of the Emerging Innovators (48%). Performance is increasing less than the EU (+10%).
Relative strengths: Broadband penetration, Exports of medium and high technology products, Air emissions by fine particulates.
Relative weaknesses: Population with tertiary education, SMEs introducing business process innovations, Innovative SMEs collaborating with others.

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
Finance and support	**20.4**	**-6.5**	**-1.7**
R&D expenditure in the public sector	8.2	-18.0	-1.6
Venture capital expenditures	38.5	10.0	-3.2
Direct and indirect government support of business R&D	12.2	-8.9	0.0
Innovators	**2.7**	**3.1**	**0.4**
SMEs introducing product innovations	5.9	6.3	0.8
SMEs introducing business process innovations	0.0	0.0	0.0
Environmental sustainability	**47.8**	**-18.5**	**-13.1**
Resource productivity	13.5	1.3	4.2
Air emissions by fine particulates	68.7	7.2	-0.9
Environment-related technologies	50.5	-71.4	-44.9

Slovakia:

Emerging Innovator Summary innovation index (relative to EU in 2017): 71.6 Rank: 28

Slovakia is an Emerging Innovator with performance at 65.1% of the EU average in 2024. Performance is above the average of the Emerging Innovators (48%). Performance is increasing less than the EU (+10%).

Relative strengths: Exports of medium and high technology products, Sales of new-to-market and new-to-firm innovations, Air emissions by fine particulates.

Relative weaknesses: Job-to-job mobility of HRST, R&D expenditure in the business sector, Design applications.

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
Finance and support	**46.8**	**-9.2**	**6.5**
R&D expenditure in the public sector	49.2	-67.2	3.3
Venture capital expenditures	44.7	13.5	1.2
Direct and indirect government support of business R&D	46.7	48.8	17.3
Innovators	**45.5**	**15.2**	**-1.2**
SMEs introducing product innovations	48.4	15.2	6.4
SMEs introducing business process innovations	43.3	15.5	-7.8
Environmental sustainability	**90.9**	**-7.1**	**-6.2**
Resource productivity	78.3	17.9	6.2
Air emissions by fine particulates	101.8	9.9	-1.6
Environment-related technologies	87.1	-52.3	-23.4

Moderate innovators

Czechia:

Moderate Innovator Summary innovation index (relative to EU in 2017): 98.7 Rank: 19.

Czechia is a Moderate Innovator with performance at 89.7% of the EU average in 2024. Performance is above the average of the Moderate Innovators (84.8%). Performance is increasing more than the EU (+10%).

Relative strengths: Non-R&D innovation expenditures, Individuals with above basic overall digital skills, Public-private co-publications.

Relative weaknesses: Job-to-job mobility of HRST, Population with tertiary education, PCT patent applications.

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
Finance and support	**84.2**	**9.2**	**-4.2**
R&D expenditure in the public sector	93.4	-29.6	-8.2
Venture capital expenditures	93.7	87.2	0.1
Direct and indirect government support of business R&D	61.8	-24.9	-3.3
Innovators	**95.4**	**11.4**	**-54.3**
SMEs introducing product innovations	99.7	7.6	-52.2
SMEs introducing business process innovations	91.9	15.1	-56.2
Environmental sustainability	**93.5**	**14.6**	**-0.6**
Resource productivity	78.6	28.0	1.4
Air emissions by fine particulates	110.7	12.8	0.3
Environment-related technologies	83.6	6.9	-3.2

Hungary:

Moderate Innovator Summary innovation index (relative to EU in 2017): 77.6 Rank: 25.

Hungary is a Moderate Innovator with performance at 70.5% of the EU average in 2024. Performance is below the average of the Moderate Innovators (84.8%). Performance is increasing less than the EU (+10%).

Relative strengths: Direct and indirect government support of business R&D, Foreign doctorate students as a % of all doctorate students, Public-private co-publications.

Relative weaknesses: Design applications, Population with tertiary education, SMEs introducing business process innovations.

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
Finance and support	**81.2**	**-9.4**	**-1.2**
R&D expenditure in the public sector	42.6	4.9	-3.3
Venture capital expenditures	73.6	1.4	-12.9
Direct and indirect government support of business R&D	136.4	136.4-43.2 14.9	136.4-43.2 14.9
Innovators	**45.3**	**18.8**	**-11.0**
SMEs introducing product innovations	60.0	22.4	-12.6
SMEs introducing business process innovations	33.4	15.5	-9.5
Environmental sustainability	**69.8**	**-9.1**	**-3.9**
Resource productivity	67.5	22.5	10.9
Air emissions by fine particulates	91.7	-2.9	-1.1
Environment-related technologies	41.8	-43.4	-19.8

Lithuania:

Moderate Innovator Summary innovation index (relative to EU in 2017): 92 Rank: 22.

Lithuania is a Moderate Innovator with performance at 83.6% of the EU average in 2024. Performance is below the average of the Moderate Innovators (84.8%). Performance is increasing more than the EU (+10%).

Relative strengths: Job-to-job mobility of HRST, Population with tertiary education, Non-R&D innovation expenditures.

Relative weaknesses: R&D expenditure in the business sector, Direct and indirect government support of business R&D, Knowledge-intensive services exports.

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
Finance and support	**82.1**	**21.1**	**6.1**
R&D expenditure in the public sector	65.6	-39.3	-6.5
Venture capital expenditures	137.6	92.7	17.3
Direct and indirect government support of business R&D	32.7	25.9	11.7
Innovators	**96.7**	**-5.4**	**-24.4**
SMEs introducing product innovations	85.6	-15.8	-42.0
SMEs introducing business process innovations	105.7	4.3	-7.9
Environmental sustainability	**75.3**	**-0.4**	**-2.5**
Resource productivity	48.5	2.8	6.4
Air emissions by fine particulates	102.8	16.6	2.0
Environment-related technologies	61.9	-27.5	-16.3

Slovenia:

Moderate Innovator Summary innovation index (relative to EU in 2017): 100.1 Rank: 17.

Slovenia is a Moderate Innovator with performance at 91% of the EU average in 2024. Performance is above the average of the Moderate Innovators (84.8%). Performance is increasing less than the EU (+10%).

Relative strengths: Public-private co-publications, Population involved in lifelong learning, International scientific co-publications.

Relative weaknesses: Non-R&D innovation expenditures, Knowledge-intensive services exports, Venture capital expenditures.

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
Finance and support	**74.2**	**4.6**	**2.7**
R&D expenditure in the public sector	78.7	13.1	8.2
Venture capital expenditures	45.6	27.2	-1.6
Direct and indirect government support of business R&D	104.7	-33.8	-0.4
Innovators	**120.2**	**52.7**	**-1.5**
SMEs introducing product innovations	151.7	92.1	5.7
SMEs introducing business process innovations	94.6	15.3	-8.2
Environmental sustainability	**79.9**	**13.6**	**2.3**
Resource productivity	88.1	28.3	1.5
Air emissions by fine particulates	93.3	14.6	3.6
Environment-related technologies	54.1	0.6	1.3

Strong innovator

Estonia:

Strong Innovator Summary innovation index (relative to EU in 2017): 115.3 Rank: 14.

Estonia is a Strong Innovator with performance at 104.8% of the EU average in 2024. Performance is below the average of the Strong Innovators (111.3%). Performance is increasing more than the EU (+10%).

Relative strengths: Trademark applications, Public-private co-publications, Population involved in lifelong learning.

Relative weaknesses: Resource productivity, Direct and indirect government support of business R&D, Environment-related technologies.

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
Finance and support	**101.8**	**23.0**	**3.3**
R&D expenditure in the public sector	106.6	0.0	3.3
Venture capital expenditures	150.6	70.5	0.0
Direct and indirect government support of business R&D	35.8	1.2	7.3
Innovators	**109.1**	**35.7**	**-18.1**
SMEs introducing product innovations	117.5	49.9	11.6
SMEs introducing business process innovations	102.0	21.9	-46.5
Environmental sustainability	**56.7**	**-9.9**	**-8.0**
Resource productivity	26.4	19.1	5.4
Air emissions by fine particulates	87.2	65.3	19.0
Environment-related technologies	42.3	-142.2	-57.8

Annex 2. Overview of BIOEAST countries in line with the most relevant private funding and financing opportunities of bioeconomy

In Annex 2, private funding and financing opportunities of the bioeconomy are summarized country by country in the BIOEAST region. All the countries offer several private funding and financing opportunities for sustainable, green and bioeconomy innovation activities.

Bulgaria

1) **Bank loans and credit lines**
   - **Allianz Bank Bulgaria** is providing €291 million in new financing for Bulgarian businesses through a securitization deal with the EIB Group, which could support sustainable investments.
   - **United Bulgarian Bank** is offering €150 million in fresh lending to companies, including for sustainable development projects.
   - **Bulgarian Development Bank** offers specialized credit lines for renovation programs supporting energy efficiency measures in buildings.
   - **ProCredit Bank**, with support from the EBRD, offers green financing solutions in Bulgaria. A €60 million loan agreement was established to fund projects focused on energy efficiency, renewable energy, and climate resilience measures.
   - **Allianz Bank Bulgaria** in collaboration with the EIB Group, has entered into a synthetic securitisation transaction to enhance financing for small and medium-sized enterprises. This agreement, valued at €291 million, is designed to support Bulgarian companies in their sustainable development efforts, including investments in green and digital solutions.
2) **Investment funds**
   - **ECBF,** partly funded by the European Commission, invests in late-stage bioeconomy start-ups.
   - **EIF** has launched the Green Private Credit, a fund of funds designed to accelerate climate and environmental solutions.
   - Bulgaria plans to transform the **Bulgarian Energy Efficiency and Renewable Energy Fund** into a National **Decarbonisation Fund** with a target size of €3.5 billion.
3) **Private sector initiatives**
   - Large industrial companies like **Aurubis Bulgaria** are investing in solar power plants to satisfy their energy needs and reduce carbon footprints.
4) **Venture capital and equity funding, including business incubators and start-up accelerators**

Venture capitalists:

- **LAUNCHub Ventures** is investing between $250,000 to $2.5 million in startups at the prototype and early revenue stages. They focus on ambitious Central and Southeastern European founders.
- **Eleven Ventures** supports early-stage startups in various sectors, providing funding and mentorship.
- **BrightCap Ventures** invests in technology startups across multiple sectors, focusing on enterprise applications and high-tech industries.
- **New Europe Venture Equity** is investing in sectors like fintech, adtech, and media. They typically invest between €300,000 to €3 million per company.
- **Empower Capital** focuses on sectors such as data analytics, healthcare, and logistics, with investments ranging from €250,000 to €3 million.
- **VoiVoda Ventures** is investing in early-stage tech companies, particularly in mobile technology, SaaS, security, and cloud computing. Their investment range is between $25,000 to $100,000.

Business Incubators and Startup Accelerators:

- **AE Ventures** is an investment company that provides initial funding, mentorship, and support to blockchain projects.
- **Innovation Capital** is a venture capital fund focusing on pre-seed (up to €50,000) and seed funding rounds (up to €1,000,000). They invest across various industries, including software, e-commerce, and healthcare.
- **Start It Smart** is an entrepreneurship organization dedicated to helping young individuals establish profitable businesses through mentorship and resources.
- **Founder Institute Eastern Europe Virtual Program** is a four-month virtual accelerator offers feedback sessions with mentors, access to course tools, and virtual networking opportunities.

5) **Green financing**

- **Bulgarian Energy Holding** is offering opportunities for refinancing bonds issued by the Holding for green projects.
- The most important green financing opportunities and relevant green growth opportunities of Bulgaria are available in this platform: https://www.greenpolicyplatform.org/country/bulgaria

Croatia

1) **Bank loans and credit lines**

- **Privredna Banka Zagreb** offers €100 million credit line from the EIB from which at least 20% dedicated to climate action and environmental sustainability projects. The bank focus on energy efficiency and renewable energy production and allocates 10% of support for women-owned and women-run businesses.

- **Croatian Bank for Reconstruction and Development** offers €200 million loan from EIB as part of a €500 million agreement. It expands financing for green projects and environmental sustainability.

2) **Investment funds**
   - **Three Seas Initiative Innovation Fund** supports growth-stage companies in the CEE and aims to mobilize €1 billion in new financing for the region.
   - **Vesna Deep Tech Venture Fund** is Croatia's first technology transfer fund which is a cross-border initiative with Slovakia and covers €40 million pledged by EIF.
3) **Private sector initiatives**
   - It is not mentioned in the sources.
4) **Venture capital and equity funding, including business incubators and start-up accelerators**

Venture capitalists:

- **Fil Rouge Capital** is dedicated to investing in Croatian startups across all sectors, offering incubation, acceleration programs, and traditional venture capital funding. Investment tickets range from €10,000 to €2 million.
- **South Central Ventures** is operating across Southern Europe with offices in Zagreb, Belgrade, and Skopje. This firm invests in exceptional regional teams targeting global markets. Seed funding can reach up to €500,000, with early to growth-stage investments up to €5 million.
- **Feelsgood Capital** focuses on impact startups addressing the general SDGs, investing between €100,000 and €1 million in early-stage companies that aim for positive social or environmental impact.

Business Incubators and Startup Accelerators:

- **Croatian Business Angels Network** is a network of private investors providing capital, mentorship, and networking opportunities to startups in Croatia.
- **Zagreb Innovation Centre** focuses on innovation across sectors including green tech and sustainability. It supports cleantech and eco-innovation startups through access to labs, R&D support, and funding opportunities.
- **University of Zagreb - FER** concentrated on university spin-offs and tech startups, including green tech and sustainability-focused research commercialization. It has strong ties to the Faculty of Electrical Engineering and Computing, often working on energy, environment, and smart systems.

5) **Green financing**
   - The most important green financing opportunities and relevant green growth opportunities of Croatia are available in this platform: https://www.greenpolicyplatform.org/country/croatia

Czechia

1) **Bank loans and credit lines**
   - **EIB and Ceska Sporitelna Partnership:** EIB has pledged CZK 1.4 billion (€55 million) to Ceska Sporitelna, enabling it to expand lending to SMEs and Mid-Caps in the Czech Republic by around CZK 5.7 billion (€228 million).
   - **EIB Group Financing**: The EIB Group provided €2.47 billion in new financing to the Czech Republic in 2024, with a significant portion dedicated to supporting SMEs and Mid-Caps. This includes €866 million for Czech SMEs and Mid-Caps through intermediaries such as Moneta Money Bank, Ceskoslovenska Obchodni Banka, CSOB Leasing, Komerční banka, and SG Equipment Finance Czech Republic.
2) **Investment funds**
   - **Czech Science Foundation Grants:** Starting January 2025, GACR is funding 474 new scientific projects, including 410 standard projects worth CZK 3.4 billion (approximately €136 million). These grants support basic research and are open to all researchers and their teams, regardless of age and experience.
   - **Technology Agency of the Czech Republic Calls** has published a schedule of national and international calls for applied research projects in 2025. Relevant calls include: 1) Transport (DOPRAVA 2030) program, opening on March 5, 2025; 2) Environment for Life program (Sub-programme 3), scheduled for December 2025, supporting environmental technologies.
   - **US Embassy Small Grants Program:** While currently suspended, this program typically supports projects strengthening ties between the United States and Czechia, including scientific and technological cooperation, innovation, green technologies, and environmental issues.
   - **Decarbonization Fund:** The EC has approved a €960 million subsidy program to support Czechia's strategic investments in hydrogen electrolysers and other decarbonization technologies.
3) **Private sector initiatives**
   - **Private Investment in Green Economy**: The Czech government's programme to support investments in strategic sectors, approved by the EC, is expected to attract around 3 billion euros of private investment in areas such as renewable energy, battery technologies, and hydrogen infrastructure.
4) **Venture capital and equity funding, including business incubators and start-up accelerators**

Venture capitalists:

- **Soulmates Ventures** is a Prague-based venture capital firm dedicated to accelerating sustainable startups. They have launched a €50 million fund aimed at supporting ventures in areas such as air, water, energy, mobility, education,

healthcare, food and agriculture, and the circular economy. The firm invests up to €3 million per company, with the possibility of an additional €2 million in follow-on funding. Beyond financial support, Soulmates Ventures provides strategic expertise and assists with market expansion.

- **Tilia Impact Ventures** focuses on backing Czech and CEE founders who are developing scalable solutions with systemic environmental and social impact. They invest between €300,000 and €1.5 million per company through equity or convertible debt. Tilia emphasizes mission-aligned capital, impact measurement, and hands-on operational support. While sector-agnostic, they prioritize startups with impact embedded in their business models, ensuring both financial returns and measurable social change.
- **Lighthouse Ventures** is a tech-focused venture capital firm in the Czech Republic that supports innovative ideas in their early stages with financial and professional assistance. Their international team has expertise in entrepreneurship, startup mentoring, mergers and acquisitions, and media/marketing. They collaborate with top Czech startup incubators, tech partners, and government institutions, providing a wide network of investors.
- **Czech Founders VC** is an early-stage venture capital firm that supports startups at their initial, pre-seed stage. The firm is also associated with the largest community of over 500 founders from the Czech Republic with global ambitions, known as Czech Founders.
- **DEPO Ventures** is a venture capital firm based in the Czech Republic that focuses on early-stage investments. They provide funding and support to startups, leveraging their network of investors and industry experts to help companies grow and succeed.
- **Credo Ventures** is a venture capital firm focused on early-stage investments in Central and Eastern Europe, particularly in information technology and related areas. They aim to identify and support the most interesting early-stage companies in the region**.**

Business Incubators and Startup Accelerators:

- **EcoTech Hub** is the part of the Technologická Inkubace project, it specifically supports eco-innovation startups and focuses on sustainability, material reuse, and energy savings.
- **ITACA Business Incubator** is not exclusively focused on green businesses, but it includes CleanTech among its areas of interest.
- **Akcelerátor VŠEM** aims to contribute to a sustainable future and supports projects that solve problems the Czech Republic is struggling with, which may include environmental issues.
- **ESA Business Incubation Center** is although primarily focused on space technologies, it supports innovators who can transform space technologies into products for practical use on Earth, which may include sustainable solutions.

- **BIC Plzeň** is sector-agnostic, but it promotes innovation and commercialization of R&D, which could include green and sustainable technologies.

5) **Green financing**
   - The most important green financing opportunities and relevant green growth opportunities of the Czech Republic are available in this platform: https://www.greenpolicyplatform.org/country/czech-republic

Estonia

1) **Bank loans and credit lines**
   - **EIB Financing:** The EIB has been actively involved in supporting Estonia's green initiatives: **1) UP Catalyst:** In 2024, the EIB provided an €18 million loan to UP Catalyst, an Estonian company that converts industrial carbon dioxide emissions into carbon-neutral graphite and nanotubes. These materials are essential in batteries, electronics, paints, coatings, polymers, and concrete. **2) Icosagen AS:** In 2023, the EIB, backed by the InvestEU program, agreed to an €18 million loan with Icosagen AS, an Estonian biopharmaceutical innovator. This financing supports the company's production facility and strengthens its innovative research and development technology platforms.
2) **Investment funds**
   - **SmartCap Green Fund:** Established by the state-owned fund management company SmartCap, the Green Fund utilizes €100 million from the NextGenerationEU recovery fund to bolster venture capital for green technology startups and scale-ups. Initially providing direct investments to early-stage companies, the fund has expanded to offer anchor investments in specialist green tech venture capital funds and supports companies ready to scale up.
   - **EfTEN Baltics Sustainable Property Fund**: This private equity real-estate fund focuses on sustainability investments in the Baltic region.
   - **IF** focuses on renewable energy, carbon capture and storage, energy-intensive industry, and energy storage solutions. Grants range from €2.5 million to over €100 million depending on company size.
3) **Private sector initiatives**
   - **Crowdfunding Platforms:** Estonia has a vibrant crowdfunding scene, offering alternative financing options for innovative projects: 1) Hooandja caters to creative projects and has been instrumental in funding various initiatives. 2) Real Estate Crowdfunding Platforms like Reinvest24 have enabled companies and individuals to raise funds for real estate projects, reflecting the sector's dominance in Estonia's crowdfunding landscape.
   - **Private Sector Contributions to Hydrogen Technology**: Estonia has allocated €49 million from RRF funds to support hydrogen technology deployment by 2026. Private

sector contributions include companies developing hydrogen production, fuel cells, and electrolysers, with pilot projects supported by public-private partnerships.

4) **Venture capital and equity funding, including business incubators and start-up accelerators**

Venture capitalists:

- **SmartCap:** A venture capital fund focusing on early-stage companies in sectors such as energy, climate tech, manufacturing, agritech, and real estate technology.
- **Karma Ventures:** Invests in early-stage tech startups from seed to series B.
- **Superangel** focuses on AI, robotics, mobility, logistics, fintech, and SaaS sectors.
- **Change Ventures i**nvests in pre-seed and seed-stage startups across various sectors.
- **Tera Ventures i**nvests in early-stage digital startups.
- **Spring Capital** supports early-stage technology-driven startups in the Nordics and CEE region.
- **Trind VC** invests in early-stage startups.
- **Lemonade Stand** focuses on early-stage investments.
- **United Angels VC** invests in early-stage startups.
- **NordicNinja VC** invests in tech startups from seed to series D stages.
- **Metaplanet Holdings** invests in companies from seed stage to series B, focusing on sectors such as AI, biotech, and fintech.

Business Incubators and Startup Accelerators:

- **Beamline Accelerator:** This program focuses on cleantech startups, offering €60,000 investment and €100,000 direct follow-up investment to the best teams. It aims to support impactful innovation, policies, and systematic sustainability.
- **Circular Economy Services by Tartu Science Park:** This program offers financial support up to €50,000 for companies implementing circular economy solutions. It includes feasibility studies and piloting projects.
- **Cleantech ForEst:** This non-profit organization supports and funds early-stage green technology startups. It runs hackathons, mentoring programs, and an accelerator for green startups in areas such as solar, green building materials, energy efficiency, electric mobility, and circular economy innovation.
- **ESA BIC Estonia:** While primarily focused on space technology, this incubator also supports startups developing products for terrestrial use, which may include sustainable solutions.
- **Pärnu County Development Center:** This organization is developing a regional bio-economy competence center and has initiated mapping of local bioresources for developing West-Estonia's bioeconomy strategy.
- **Prototron:** This accelerator focuses on turning innovative ideas into prototypes, with a main focus on the green and cleantech sector, especially in energy, agriculture, transportation, and forestry.

- **Baltic Impact Accelerator:** This project implements an accelerator program that develops new business models with a focus on the triple bottom line (3BL), which includes environmental sustainability.

5) **Green financing**
   - **Green Audit and Implementation Grant**: Industrial companies can receive up to €10,000 for green audits and €200,000 for implementing sustainable development roadmaps, with at least 30% self-financing required.
   - **EBRD Green Financing** aims to increase green financing to more than 50% of its annual business volume by 2025.
   - The most important green financing opportunities and relevant green growth opportunities of Estonia are available in this platform: https://www.greenpolicyplatform.org/country/estonia

Hungary

1) **Bank loans and credit lines**
   - **EIB Financing:** The EIB offers various financial products and services, including loans, equity investments, and guarantees, to projects aligned with EU policy objectives. It supports initiatives in climate action, environment, innovation, and infrastructure. Hungarian businesses can access EIB financing through partnerships with local commercial banks and institutions.
   - **Hungarian Development Bank** is a state-owned development bank that raises funds in domestic and international markets to finance development loans and projects. It has issued green and social bonds to support sustainable initiatives. Businesses can access its financial products through its Pont Plus network, which includes designated branches of commercial banks across Hungary.

2) **Investment funds**
   - **EIT:** Headquartered in Budapest, the EIT is an independent EU body aimed at strengthening Europe's innovation capabilities. It operates through KICs that focus on various sectors, including climate, energy, and raw materials. These KICs provide funding and support to innovative projects and startups in Hungary.
   - **EU Funding Opportunities:** Various EU programs offer funding for innovation in agriculture, food, and forestry. The EIP-AGRI platform provides information on funding sources and open calls that Hungarian entities can apply for to support their green and sustainable projects.
   - **Hungarian Research, Development and Innovation Office:** The Office manages national and international funding programs to support research, development, and innovation in Hungary. They offer various grants and financing options for projects focusing on sustainability and bioeconomy. The Office plans to offer a new venture

capital program investing HUF 10 billion in early seed-stage financing for SMEs with high growth potential, alongside market investors as co-investors.

- **UniCredit Group Guarantee Facility**: Part of a €370 million umbrella guarantee agreement with the EIF, this facility allows UniCredit to support more innovative and green businesses in Hungary with competitive pricing and less collateral requirements.

3) **Private sector initiatives**
   - It is not mentioned in the sources.
4) **Venture capital and equity funding, including business incubators and start-up accelerators**

Venture capitalists:

- **Hiventures** supports a wide range of businesses, including startups and SMEs, with investment funds totalling over 155 billion Hungarian forints. It invests in companies with innovative solutions and significant growth potential across various stages.
- **PortfoLion:** The venture capital and private equity arm of OTP Bank Plc, PortfoLion focuses on the CEE region, investing in small and medium enterprises across various industries, including Fintech, Cybersecurity, and Agriculture.
- **Solus Capital** manages assets of around EUR 40 million, primarily investing in early-stage companies offering innovative products or services.
- **Flashpoint VC** is investing in early-stage tech companies, particularly in the Enterprise Applications and HighTech sectors.
- **Conor Fund** is a venture capital firm focusing on early-stage investments in the High Tech and Enterprise Applications sectors.
- **Lead Ventures** is investing in early-stage startups in CEE, focusing on software and SaaS sectors.
- **Vespucci Partners** is investing in early-stage tech startups, particularly in the High Tech and Enterprise Applications sectors.
- **Impact Ventures** is a Budapest-based venture capital firm supporting companies that aim to create a high social or environmental impact. Impact Ventures invests in startups focused on social inclusion, education, employment, and environmental sustainability, providing funding ranging from €100,000 to €2 million.
- **Bonitás** invests in local startups across various stages, with a preference for sectors such as agrotech, healthcare and biotech, clean and renewable energy, and sustainable environment. Investment tickets range from €560,000 up to €4.2 million.
- **Széchenyi Funds:** As one of Hungary's largest venture capital investors, Széchenyi Funds is particularly interested in cleantech and Industry 4.0 companies that have demonstrated promising growth dynamics. The firm focuses on sectors including the green economy and energy, supporting companies that contribute to environmental sustainability.

Business Incubators and Startup Accelerators:

- **Design Terminal** is an innovation agency that runs mentoring programs for creative entrepreneurs, facilitating valuable corporate partnerships and emphasizing talent development.
- **CEU InnovationsLab:** Affiliated with the Central European University, it is a leading university incubator in CEE. It offers startups mentorship, entrepreneurship sessions, and access to coworking spaces in Budapest and Vienna.
- **BnL Start Partners** is Hungary's first startup incubator focused on B2B and Fintech sectors. It provides strategic and business planning, financial modeling, and networking opportunities.
- **OTP Startup Partner Program:** Backed by OTP Bank, this accelerator seeks later-stage startups offering solutions relevant to financial institutions. The program includes a 3-month pilot, and a 6-month rollout phase aimed at validating startups within the banking group.
- **MKB Fintechlab:** An innovation and design lab supported by MKB Bank, focusing on Fintech startups that provide solutions in digital transformation and banking system innovation. It offers a 12-week acceleration program with mentorship and potential investment.
- **NAK TechLab** is an incubation program seeking innovative solutions in the agricultural and food sectors. Over three months, it assists startups in identifying market problems and offers business training, workshops, and mentorship from industry professionals.
- **OXO Labs** specializes in accelerating Hungarian startups to global markets. It provides incubation and acceleration programs, mentoring early-stage technology projects, and supporting market entry and growth strategies.
- **Intellitext** is based in Budapest and seeks projects with strong teams and significant growth potential, offering incubation services to support their development.
- **Econic accelerator:** Operated by Green Brother, the Econic accelerator is a leading European program designed to support startups in energy, mobility, clean technology, and the circular economy. This 7-9 month-long program offers expert guidance, funding opportunities up to €1.2 million, and access to a pan-European network of investors and industry leaders. It is tailored for high-potential startups from CEE, including Hungary.

5) Green financing

- There are many forms of green financing available in Hungary, including green bonds, green loans, sustainability-linked loans and other preferential loans for agribusiness actors. Both the Hungarian National Bank, commercial banks and agencies (e.g. OTP, Erste, EXIM) and advisory organisations help farmers with specific green financing schemes.
- The most important green financing opportunities and relevant green growth opportunities of Hungary are available in this platform: https://www.greenpolicyplatform.org/country/hungary

Latvia

1) **Bank loans and credit lines**
   - **Rietumu Banka**: As one of Latvia's largest private commercial banks, Rietumu Banka focuses on serving large and medium-sized businesses, including those in green energy, food production, and manufacturing sectors. The bank offers financing for new projects, refinancing existing liabilities, credit lines, and business investments. Over the past five years, it has provided financing worth more than €1 billion, with a significant portion allocated to "green" loans.
   - **HeavyFinance:** This Lithuanian environmental technology investment company operates in Latvia, providing a marketplace for the agricultural industry. HeavyFinance facilitates investments in debt capital for small and medium-sized agricultural enterprises to adopt and expand regenerative agriculture practices, such as no-till farming and mixed crop rotation. The company offers green loans aimed at generating carbon credits through sustainable farming practices.
   - **ECBF:** While not exclusively Latvian, the ECBF invests in early-stage companies across Europe, including Latvia, that have developed innovations in the circular bioeconomy sector. The fund focuses on technologies and business models that promote sustainability, such as bio-based chemicals and materials, and biomass technologies leading to higher-value green products.
   - **EIB:** The EIB has provided significant financing to Latvian companies for sustainable projects. For example, it granted €39 million to AS Latvijas Finieris, a leading Latvian manufacturer of birch plywood, to support investments in research and development, as well as to modernize and expand production facilities. This financing aligns with the EIB's commitment to supporting sustainable investment, innovation, and job creation in Europe.
   - **EBRD:** Through its Green Innovation Programme (GIP), funded by Horizon 2020, this institution assists firms in Latvia in conducting research, development, and deployment activities. The program supports investments in products, technologies, and business models that have a positive impact on the green economy transition, focusing on energy, water, and materials efficiency.
   - **Altum Support Program:** Loans with capital discounts worth €30 million for entrepreneurs planning to make investments of at least €10 million in business growth in Latvia.
   - **Productivity Loans for Business Innovations:** A new support program with over €98 million available funding, offering loans with a 30% capital discount (up to €1.5 million) for micro, small, and medium enterprises and small to medium-capitalization companies in Latvia.

2) **Investment funds**
   - **Innovation Fund for Decarbonization and Energy Projects:** The EU's Innovation Fund is one of the largest funding sources for innovative climate technology projects, supporting low-emission technologies and advancing Europe's transition to climate neutrality in Latvia as well. This fund supports green energy technologies, industrial decarbonization, renewable energy, carbon capture, and energy efficiency projects. It offers co-financing and technical assistance with a total budget of €38 billion (2020–2030).
   - **Green Industry Innovation Programme:** Supported by the EEA Grants, this programme provides support to Latvian companies implementing projects in green industry areas, contributing to a structural shift towards a greener economy.
   - **LIFE Programme:** The LIFE programme is the EU's funding instrument for the environment and climate action, co-financing projects that contribute to the implementation, updating, and development of EU environmental and climate policy and legislation regarding also Latvia's improvement of bioeconomy.
   - **IF:** A €39 million loan from the EIB to AS Latvijas Finieris, a leading Latvian mid-cap manufacturer of birch plywood, for investments in research and development and modernization of production facilities.
   - **Green Economy Transition Investments:** EBRD supports private sector financing for renewable energy generation and energy efficiency improvements.
   - **Innovation Investment Fund:** A new fund under Altum with €2 million allocated to support companies implementing innovative ideas in various areas of smart specialization.
   - **Sweden-Latvia Cooperation Fund** provides project grants to foster bilateral collaborations between Sweden and Latvia in innovation, cultural exchange, and sustainability. Applications for the 2025 funding cycle are open until April 20, 2025.
3) **Private sector initiatives**
   - It is not mentioned in the sources.
4) **Venture capital and equity funding, including business incubators and start-up accelerators**

Venture capitalists:
- **Change Ventures** invests up to €2 million in startups across various industries in Latvia.
- **BADIdeas.Fund** focuses on B2B SaaS and marketplaces, with investments up to €150,000.
- **Draugiem Capital** invests starting from €100,000, primarily in e-commerce ventures.
- **FlyCap** offers mezzanine investments of up to €3 million, focusing on healthcare, B2B, IT & Tech, and export-oriented manufacturing in Latvia.

- **Imprimatur Capital** invests up to €2 million, targeting B2B software & data, digital health, learning & training, and robotics/automation sectors.
- **ZGI Capital** provides investments up to €5 million across various industries.
- **BaltCap** is the largest private equity fund manager in the Baltics.
- **Imprimatur Capital** focuses on early-stage technology businesses in Latvia.
- **Merito Partners** manages multiple funds, including growth capital and sustainable energy.
- **Altum** is a state-owned development finance organization investing in venture capital funds.

Business Incubators and Startup Accelerators:

- **EIT RIS** supports innovation hubs in Latvia to foster entrepreneurship and connect innovators with industry leaders, particularly in sustainable sectors.
- **FICIL Energy and Green Economy Work Group** advocates for policy improvements to promote investments in renewable energy, circular economy practices, and decarbonization of industries beyond the EU's ETS.
- **Commercialization Reactor:** This platform specializes in transforming scientific discoveries into profitable businesses. Their 6-month acceleration program offers workshops, mentoring, and up to €50,000 in investment for B2B early-stage startups in the science or deeptech sectors.
- **Buildit Accelerator** focused on IoT and hardware startups and provides a structured program that includes legal setup, networking, idea validation, and workshops on product development, marketing, and sales. The goal is to prepare startups for successful fundraising.
- **EIT Urban Mobility Incubator** is aiming to transform urban mobility and reduce CO_2 emissions, this 10-week program in Riga offers workshops, mentoring, business coaching, and industry networking. Participants also have access to R&D infrastructure and can receive up to €6,000 in pilot financing.
- **UL Student Business Incubator** is operated by the University of Latvia; this incubator offers a 24-week program for students to develop their business ideas. It includes workshops, mentoring, and grants of €1,800 per team for prototype development.
- **Startup Wise Guys** is one of Europe's most experienced B2B startup accelerators, offering programs in various sectors, including SaaS, fintech, and sustainability.
- **LIAA Business Incubators:** 11 regional incubators throughout Latvia, including locations in Daugavpils, Jūrmala, Jelgava, Kuldīga, Liepāja, Madona, Ogre, Rēzekne, Sigulda, Valmiera, and Ventspils.
- **Creative Industries Incubator** is located in Riga, offering free co-working spaces.
- **UL Student Business Incubator** is run by the University of Latvia, providing a 24-week program for students.
- **Overkill Ventures** invests in startups across the Baltics, Nordics, CEE, and CIS.

5) **Green financing**

- The most important green financing opportunities and relevant green growth opportunities of Latvia are available in this platform: https://www.greenpolicyplatform.org/country/latvia

Lithuania

1) **Bank loans and credit lines**

- **EBRD:** The EBRD is committed to helping Lithuania build a green economy through investment, reform, and policy dialogue. It provides financing to firms aiming to achieve environmental sustainability and supports projects that contribute to climate change mitigation and adaptation.
- **EIB Group Financing**: The EIB Group provided €449 million in financing to Lithuania in 2024, with a significant portion dedicated to supporting green investments and business development.

2) **Investment funds**

- **HeavyFinance** is a Lithuanian climate technology company that operates a marketplace facilitating investments in the agricultural sector. The platform enables investors to fund small and medium-sized agricultural enterprises aiming to adopt regenerative agriculture practices, such as no-till farming and sustainable crop rotation. This approach not only supports sustainable agriculture but also offers investors opportunities to participate in environmentally beneficial projects.
- **Coinvest Capital**, a subsidiary of INVEGA, plays a pivotal role in Lithuania's startup ecosystem, particularly in the green technology sector. The firm co-invests with private investors in startups developing sustainable and innovative solutions. For example, Coinvest Capital collaborated with private investors to fund Cambridge Phenotyping, a startup founded by Lithuanian neuroscientists, showcasing its commitment to supporting green innovations.
- **ECBF:** While not exclusive to Lithuania, the ECBF invests in innovative companies across Europe that are advancing the circular bioeconomy. Lithuanian companies focusing on bio-based chemicals, materials, and sustainable biomass production may be eligible for investment from this fund, which aims to support the transition to a sustainable and circular bioeconomy.
- **EIT Climate-KIC:** As part of EIT, EIT Climate-KIC operates in Lithuania to support climate innovation initiatives. It provides funding, mentorship, and networking opportunities to startups and projects focused on climate change mitigation and adaptation, fostering the development of sustainable technologies and business models
- **Innovation Agency's GreenTech Hub:** The Innovation Agency in Lithuania has launched the GreenTech Hub, aimed at stimulating the growth of green businesses

that create high added value. Beyond distributing funding, the hub offers consultations on business financing, exports, and other ongoing programs, thereby supporting the expansion of green innovations into partner countries and strengthening development cooperation activities.

- **Eco-innovation Program:** €1 million investment for industrial SMEs in Central and Western Lithuania to conduct technological audits, eco-design, eco-labelling, and certification of sustainable products.
- **Innovation Agency Funding:** The Innovation Agency distributes funding to stimulate the growth of green businesses creating high added value for Lithuania.

3) Private sector initiatives

- It is not mentioned in the sources.

4) Venture capital and equity funding, including business incubators and start-up accelerators

Venture capitalists:

- **Contrarian Ventures:** Focused on early-stage investments in energy transition and smart mobility sectors across Europe and Israel, with investments around €500,000.
- **Coinvest Capital:** A co-investment fund partnering with angel investors, investing between €450,000 and €1.6 million in early-stage Lithuanian startups.
- **NGL:** Specializes in early and growth-stage investments, supporting high-potential startups with global ambitions.
- **ScaleWolf:** Backs early-stage tech startups with a focus on scalable business models and cross-border growth.
- **Firstpick**: Invests in startups promoting sustainability, such as Tingit, which focuses on extending product lifespans through repair networks.

Business Incubators and Startup Accelerators:

- **70Ventures:** A Vilnius-based accelerator focusing on B2B startups, providing funding from €20,000 to €400,000 based on revenue milestones, along with mentorship and access to a Nordic network.
- **Startup Wise Guys:** An Estonian accelerator active in Lithuania, offering a 3-month mentorship-driven program for B2B SaaS, fintech, cybersecurity, and sustainability startups, including up to €30,000 in investment and co-working space access.
- **Baltic Sandbox:** Based in Vilnius, this accelerator partners with startups aiming to expand into Western markets, focusing on sustainable development, digital economy, and responsible consumption, providing mentorship, legal support, and fundraising assistance.
- **Katalista Ventures:** A hybrid accelerator and private fund in Vilnius supporting high-impact startups with a focus on resilience, global scalability, sustainability, and a triple top line approach.

- **Futurepreneurs:** A pre-acceleration program aimed at impact-driven entrepreneurs addressing SDGs, offering mentorship, workshops, and investor pitching opportunities.
- **StartupHighway:** An early seed-stage fund and accelerator based in Vilnius, providing mentorship and funding to startups across various industries.
- **Sunrise Valley Science and Technology Park:** Located in Vilnius, it fosters entrepreneurship by promoting collaboration between business and science, offering infrastructure and services to innovative companies.
- **Vilnius University Biotechnology Business Incubator**: Focused on life sciences, offering lab access, business consultations, and commercialization support.
- **Cleantech Catalyst (Sunrise Tech Park)** focuses on climate technology startups in energy, resources, mobility, and circular economy areas.
- **Tech-Park Kaunas** promotes circular economy principles by supporting startups with sustainable practices like resource reuse and extending product lifecycles.
- **Circuloop:** A pre-accelerator project dedicated to developing products and services based on circular economy principles. It offers prototyping spaces and expert mentoring for circular innovation.

5) Green financing

- **European Green Capital 2025:** Vilnius has been named the European Green Capital for 2025, which may lead to increased funding opportunities for green initiatives in the city.
- The most important green financing opportunities and relevant green growth opportunities of Lithuania are available in this platform: https://www.greenpolicyplatform.org/country/lithuania

Poland

1) Bank loans and credit lines

- **EIB and SG Equipment Leasing Polska:** In September 2024, the EIB provided a €100 million loan to SGEF Poland to support SMEs. SG will offer new loans totaling €200 million, with at least 20% allocated to climate action initiatives, including investments in low-emission vehicles, machinery for industry and agriculture, and renewable energy projects.
- **Santander Bank Polska and Santander Leasing**: These institutions have partnered with the EIB and EIF to provide up to €1.19 billion in funding for Polish SMEs, with a focus on businesses promoting gender equality

2) Investment funds

- **Polish Development Fund:** A state-owned financial group that offers instruments supporting the development of companies, local governments, and individuals. It

invests in sustainable social development and national economic growth, aligning with Poland's green transformation goals.

- **Green Fund for Warsaw:** This initiative allows private companies to directly contribute to climate change adaptation activities within Warsaw. The fund supports various projects, from tree planting to biodiversity inventories, promoting green urban development.
- **Green Industry Innovation Programme:** Supported by the Norway Grants, this programme allocated over €17 million to projects focusing on green industry innovation in Poland. It aims to support the development and implementation of new technologies, solutions, processes, products, or services that contribute to environmental sustainability.
- **Polish Green Fund (Polski Fundusz Zieleni):** Established by the Industrial Development Agency S.A., this fund aims to mobilize institutional capital, both Polish and foreign, to support Poland's energy transition and decarbonization efforts. It focuses on investments in renewable energy sources, green industrial transformation, infrastructure, and municipal services.
- **Modernisation Fund**: Poland has secured a record-breaking 10 billion Polish zloty (approximately €2.3 billion) from the EU's Modernisation Fund to boost its green energy transformation.

3) **Private sector initiatives**
   - **Bioeconomy Investment Opportunities**: Poland's strong industries in the primary and chemical sectors, combined with its well-organized innovation support infrastructure, present opportunities for both domestic and foreign investment in bio-based industrial activities.
4) **Venture capital and equity funding, including business incubators and start-up accelerators**

Venture capitalists:

- **EEC Ventures:** An independent venture capital firm managing funds specialized in energy, Industry 4.0, and cleantech sectors. EEC Magenta invests in seed-stage, early-stage, and growth-phase companies, with ticket sizes ranging from PLN 4 million up to PLN 27 million.
- **SpeedUp Venture Capital Group:** A leading group of venture capital funds investing in early-stage enterprises in CEE. Their areas of interest include consumer internet, electromobility, energy, fintech, and medtech, focusing on technologies like machine learning and artificial intelligence.
- **EIT InnoEnergy:** Supported by the EIT, this fund invests in sustainable energy innovations across Europe, including Poland. It collaborates with over 400 industrial companies, research centers, and academic institutions in 40 countries, investing annually in innovative projects.

- **MCI Capital**: A private equity fund listed on the Warsaw Stock Exchange, MCI Capital focuses on investments in the digital economy and climate tech, including sectors like energy and retail digital transformation.
- **Market One Capital**: An early-stage seed fund based in Warsaw and Barcelona, focused on European SaaS-based marketplaces and B2B software.

Business Incubators and Startup Accelerators:

- **Youth Business Poland:** This accelerator supports positive impact startups that combine social and sustainability-focused missions with technological innovation. Their preferred industries include green tech, sustainable production, manufacturing and farming, ecological food production, and carbon footprint reduction.
- **GreenEvo – Accelerator of Green Technologies:** An initiative by Poland's Ministry of Environment aimed at the international transfer of environmentally friendly technologies developed in Poland. It supports companies in areas such as wastewater and hazardous waste treatment, renewable energy sources, and ecological production methods.
- **ReaktorX:** A pre-acceleration program based in Warsaw, designed for first-time founders to help validate business ideas and connect with experienced mentors.
- **Startup HUB Poland:** A non-profit organization that supports both Polish and international startups in establishing and developing their businesses in Poland through various acceleration programs.

5) **Green financing**
   - The most important green financing opportunities and relevant green growth opportunities of Poland are available in this platform: https://www.greenpolicyplatform.org/country/poland

Romania

1) **Bank loans and credit lines**
   - **Raiffeisen Bank – Green Financing Products:** loans and tailored financial products for businesses in sustainable agriculture, green technologies, and environmental projects.
   - **Banca Comercială Română - Green Financing:** offers dedicated loan products for renewable energy systems installation, provides specialized financing programs for larger-scale renewable energy initiatives, supports green financing in the real estate sector, with sustainable finance mortgages representing over 20% of the mortgage retail portfolio.
   - **EIB Group Financing for Small Businesses:** provided over €623 million in financing for small businesses in Romania in 2024, offers potential co-financing opportunities for private investors in sustainable projects.

2) **Investment funds**
   - **Romanian - American Foundation** supports entrepreneurship and rural innovation including bioeconomy and agri-innovation projects.
   - **Fondation Botnar** supports digital and social innovations, including sustainable urban development and climate resilience.
3) **Private sector initiatives**
   - It is not mentioned in the sources.
4) **Venture capital and equity funding, including business incubators and start-up accelerators**

Venture capitalists:

- **ROCA X** is an early-stage tech startups with scalable solutions. Open to green/bioeconomy innovations with strong growth potential.
- **Morphosis Capital** is a growth capital for Romanian SMEs, including sectors like agribusiness and circular economy.

Business Incubators and Startup Accelerators:

- **TechAngels Romania** is a network of angel investors supporting Romanian startups in tech, health, agri-food, and sustainability.
- **Growceanu Angel Investment:** Smart money for early-stage startups in Romania and Central Europe, including climate, agri-tech, and bioeconomy.
- **Rubik Hub** is an incubation and acceleration for startups including cleantech, circular economy, and sustainable agriculture.
- **Commons Accel** supports mission-driven startups in Romania. Includes sustainability and agri-food innovation.
- **SEE CleanTech Accelerator** is launched in collaboration with the energy ministries of Romania and the Republic of Moldova, the SEE CleanTech Accelerator supports startups and innovators from South-Eastern Europe developing technological solutions in green energy.
- **Black Sea ClimAccelerator:** A regional initiative by EIT Climate-KIC in partnership with Impact Hub Bucharest and Innovation Accelerator, the Black Sea ClimAccelerator targets startups in Romania and Bulgaria developing climate-positive solutions. The program offers mentorship, grant financing, and access to a network of professionals, focusing on sectors like cleantech, waste management, circular economy, carbon emissions reduction, and green mobility.
- **Impact Hub Bucharest** runs various programs supporting startups in climate and sustainability sectors, such as ClimAccelerator and WE.Circular. These initiatives provide resources, mentorship, and networking opportunities for entrepreneurs focused on environmental impact and circular economy practices.

5) **Green financing**
   - **Raiffeisen Bank – Green Financing Products** loans and tailored financial products for businesses in sustainable agriculture, green technologies, and environmental projects.
   - **Banca Comercială Română - Green Financing** offers dedicated loan products for renewable energy systems installation, provides specialized financing programs for larger-scale renewable energy initiatives, supports green financing in the real estate sector, with sustainable finance mortgages representing over 20% of the mortgage retail portfolio.
   - The most important green financing opportunities and relevant green growth opportunities of Romania are available in this platform: https://www.greenpolicyplatform.org/country/romania

Slovakia

1) **Bank loans and credit lines**
   - **EIB Loan:** The EIB has provided a €240 million loan to Slovakia for co-financing green and digital projects1. This is part of a larger €800 million facility aimed at strengthening environmental sustainability and economic competitiveness in Slovakia.
   - **Ceska Sporitelna Financing:** Although this is for the Czech Republic, it's worth noting that similar opportunities might exist in Slovakia. The EIB provided a €55 million guarantee to Ceska, enabling €228 million in new financing for SMEs and Mid-Caps, with 80% of the new lending targeted at less-developed areas.
2) **Investment funds**
   - **ECBF** is a specialized investment fund that focuses on innovative companies in the circular bioeconomy sector across Europe, including Slovakia. It provides equity and mezzanine financing to early-stage companies developing sustainable solutions, thereby supporting the growth of the bioeconomy.
   - **International Visegrad Fund** promotes regional cooperation among the Visegrad Group countries—Czech Republic, Hungary, Poland, and Slovakia. It offers grants for projects in various areas, including innovation, research and development, and entrepreneurship, which can encompass green and sustainable initiatives. Eligible applicants include NGOs, civil society organizations, municipalities, and private companies focusing on regional collaboration.
   - **Slovak Innovation and Energy Agency** provides various funding programs and grants to support projects focused on renewable energy sources, energy efficiency, and sustainable solutions in different sectors, including the bioeconomy.
   - **CB Investment Management** based in Bratislava, manages a fund focused on early-stage Slovakian startups with international potential. It offers investments up to €1.6

million, with the possibility of follow-on rounds, supporting innovative companies in various sectors, including green and sustainable technologies.

- **Bioeconomy Cluster Funding** in Slovakia received a grant of €170,540.40 for a project focused on supporting networking and innovation in the bioeconomy. This funding aims to strengthen links between research and business practice, support cross-sectoral cooperation, and increase awareness about the bioeconomy.
- **Innovation Fund Net Zero Call:** A €2.4 billion fund to support decarbonization projects of various scales, including renewable energy production, energy storage, heat pumps, and hydrogen production.
- **Slovak Challenge Fund** supports Slovak companies' innovative ideas in areas such as natural resources, nature-based solutions, energy transition, agricultural innovations, e-governance, and societal resilience. Funding of up to $40,000 is available per project.
- **EUROSTARS Program** offers funding for SMEs collaborating on R&D projects creating innovative products, processes, or services. In Slovakia, the maximum grant is €450,000 per project.
- **Innovation Fund for Climate Action** supports projects like carbon capture and storage, innovative low-carbon technologies, renewable energy generation, and energy storage. It has two categories: 'Large scale' (capital expenditure above €7.5 million) and 'Small scale' (total capital costs below €7.5 million).

3) **Private sector initiatives**
   - **Innovate Slovakia** is a platform that supports sustainable innovation by connecting businesses with potential investors. For example, in February 2022, the Slovak e-mobility company GreenWay received an €85 million investment from international infrastructure funds Helios Energy Investments and Generation Capital. This funding aimed to expand GreenWay's network of electric vehicle charging stations and enhance its technical capabilities.
4) **Venture capital and equity funding, including business incubators and start-up accelerators**

Venture capitalists:

- **Vision Ventures** located in Bratislava manages €11 million and focuses on seed investments up to €800,000. The fund is open to various industries and seeks exceptional Slovak companies aiming to scale internationally, including those developing sustainable and green technologies.
- **Zero Gravity Capital** is a Slovakian venture capital firm focused on seed startups with the potential to create new markets or revolutionize existing ones. The fund seeks companies with innovative, scalable business models, including those in the sustainability sector, to provide necessary capital and hands-on support.

- **Eterus Capital** invests €500k-€5M in growth-stage companies.
- **Venture to Future Fund** invests €0.5M-€4.8M in innovative SMEs.

Business Incubators and Startup Accelerators:

- **G-Force** is a pre-seed investment and acceleration program in Slovakia, part of the global Founders Factory network. It focuses on supporting early-stage startups, including those in sustainability sectors, by providing funding, mentorship, and access to a vast network of industry experts.
- **Raw Materials Accelerator** is a program which specifically targets startups in the raw materials sector, which likely includes sustainable and circular economy initiatives.
- **CircleHub Košice:** This hub was established to support the circular transition in the Košice region. It provides services such as assistance in implementing best practices, finding partners for technical solutions, and developing circular solutions within research and innovation projects.
- **VP UK Incubator:** Part of the Comenius University of Science Park in Bratislava, this incubator focuses on biomedical, biotechnology, environmental medicine, bioinformatics, and other related ecological innovations.

5) **Green financing**

- The most important green financing opportunities and relevant green growth opportunities of Romania are available in this platform: https://www.greenpolicyplatform.org/country/slovakia

Slovenia

1) **Bank loans and credit lines**

- **EIB Group Financing:** In 2024, the EIB Group provided €284 million in new financing in Slovenia, targeting the energy transition and business innovation. This includes different financial sources, e.g. loans, credit lines, funding for upgrading electricity grids to integrate renewable energy sources and expand capacity for electric vehicle charging. Additionally, the EIF's investments support venture capital and private equity initiatives that promote entrepreneurship and innovation in sustainable sectors.
- **SID Banka Initiatives**: SID Banka, Slovenia's national development bank, collaborates with various partners to support sustainable development projects. For instance, it has partnered with the EIF and private investors to finance technology transfer and commercialization of research projects in Slovenia and Croatia. Engaging with SID Banka can provide access to funding tailored for green and sustainable innovations.

- **NetZero Cities Expert Support**: This initiative invites proposals for expert support in collaboration within the Republic of Slovenia, with a focus on climate-related projects. The deadline for submissions was February 24, 2025.

2) **Investment funds**

- **Vesna Deep Tech Venture Fund:** Established in 2024, this fund focuses on technology transfer, intellectual property protection, and the commercialization of research projects in Slovenia and Croatia. With a total commitment of €49 million—€40 million from the EIF and €9 million from other investors—the fund aims to invest in up to 80 projects, particularly at the proof-of-concept stage, to foster innovation and sustainability in the region.
- **ECBF**: While not exclusive to Slovenia, the ECBF invests in early-stage companies with developed innovations seeking to expand into new markets. The fund focuses on circular and bioeconomy technologies, biomass production, bio-based chemicals and materials, and biological alternatives in various industries. Slovenian companies engaged in bioeconomy innovation may explore opportunities with the ECBF.
- **Regional Development Funds**: Various regional development agencies in Slovenia manage funds aimed at promoting sustainable development and innovation within specific regions. These funds often provide grants or favorable loans to projects that contribute to green growth and bioeconomy advancements.
- **Slovene Early Stage Innovation Fund 2024-2029** provides equity financing for innovative companies with global growth potential, focusing on start-up and growth phase companies, existing portfolio companies with global potential, companies contributing to green and digital transition, businesses solving environmental problems. The fund offers investments ranging from €0.2 million to €3 million per company, with the possibility of add-on investments.
- **Circular Bioeconomy Thematic Investment Platform**: This €100 million financial instrument aims to de-risk private investments in sustainable solutions, building on and reinforcing synergies with ongoing and future EU initiatives.
- **Slovenian Enterprise Fund** offers financing for various business stages.

3) **Private sector initiatives**

- **Strategic Research and Innovation Partnership for Circular Economy** is a cluster initiative in Slovenia that brings together businesses, research institutions, and other stakeholders to promote circular economy practices. While not a direct funding source, it facilitates networking and collaboration, potentially leading to private funding opportunities for innovative projects in sustainability and bioeconomy.
- **Private sector collaborations**: Events like the National Bioeconomy HUB meeting on September 26, 2024, aim to connect stakeholders in the bioeconomy with private investors and banks, presenting specific business practices in the circular bioeconomy that are ripe for investment.

- **Hungarian-Austrian and Hungarian-Slovenian Research Projects**: This call aims to fund experienced, talented, and internationally acclaimed researchers and research group leaders for collaborative projects between Hungary, Austria, and Slovenia
- **Business Angels of Slovenia:** The largest angel investor club in the country.

4) **Venture capital and equity funding, including business incubators and start-up accelerators**

Venture capitalists:

- **Business Angels of Slovenia:** A network of angel investors providing capital, mentorship, and networking opportunities to Slovenian startups.
- **Silicon Gardens:** An angel investment club supporting early-stage startups in Slovenia and the broader region.
- **RSG Capital:** A venture capital firm focusing on investments in innovative companies with high growth potential in Slovenia and neighbouring countries**.**
- **Alita Capital:** A private investment firm involved in venture capital and private equity, supporting startups and growth-stage companies.
- **COINVEST:** An investment platform connecting startups with potential investors, facilitating funding and growth opportunities.
- **Suricate Ventures i**nvests in entrepreneurs contributing to society and the environment.
- **Fil Rouge Capital** invests in early-stage businesses from pre-seed to Series A rounds.
- **RSG Capital** supports local businesses and fosters economic growth.
- **ALFI Private Equity Fund** focuses on innovative and fast-growing SMEs.

Business Incubators and Startup Accelerators:

- **ABC Accelerator:** Based in Ljubljana, ABC Accelerator has supported over 200 startups through its 3-month acceleration program, offering mentorship and business connections.
- **Hekovnik Startup School:** Located in Ljubljana, Hekovnik provides tailored acceleration programs focusing on bridging the gap between education and market realities, emphasizing product development and market needs.
- **Ljubljana University Incubator:** Dedicated to early-stage startups, it offers a 6-month pre-incubation program for entrepreneurs at the beginning of their business journey.
- **Kovačnica - Business Incubator Kranj:** Recognized for its supportive environment, Kovačnica offers motivational events, business advice, thematic workshops, and mentoring programs to assist startups in overcoming initial challenges.

- **Reveris:** A niche accelerator focusing on early-stage software, tech, and gaming startups, providing customized support in design thinking, customer development, and data-driven decision-making.
- **Incubator Sežana:** As the oldest and largest business incubator in Slovenia, it offers consulting and mentoring across various business aspects, including product development, marketing, and internationalization.
- **SAŠA Incubator:** Located in the Šalek Valley, fostering early-stage enterprises.

5) Green financing

- **Slovenian Sovereign Sustainability Bonds**: The Republic of Slovenia has issued sustainability bonds to finance projects aligned with environmental and social objectives. These bonds support initiatives in areas such as low-carbon transport, energy efficiency, and sustainable environmental management. While primarily government-driven, they indicate a national commitment to funding sustainability projects, potentially opening avenues for private sector participation.
- The most important green financing opportunities and relevant green growth opportunities of Romania are available in this platform: https://www.greenpolicyplatform.org/country/slovenia

Annex 3. Collection of bioeconomy research and innovation stakeholders in the BIOEAST countries

Country	Name (with link)	Description
Bulgaria	Agrarian University – Plovdiv	Faculty of Agronomy Faculty of Horticulture with Viticulture Faculty of Plant Protection and Agroecology
Bulgaria	Agricultural Academy	Scientific, applied, educational, service and support activities in the field of agriculture, animal husbandry and food industry.
Bulgaria	AgroHub	Development of the agri-food sector, potential for access to technological solutions and services supporting digitalisation, support to farmers and companies for process automation, resource efficiency, smart production.
Bulgaria	Association of Bulgarian Energy Agencies	Development of strategic documents and local and regional level, Implementation of project.
Bulgaria	BESCO – The Bulgarian Entrepreneurial Association	Upgrades the current Bulgarian legislation and propose contemporary market-driven policies based on innovation and progressive thinking, access to talent, access to capital.
Bulgaria	Black Sea Energy Cluster	Creating organization supporting decrease in the energy consumption, organization which supports the development of the renewable energy resources and effectively managing the energy flow in the Black Sea Local Region.
Bulgaria	Bulgarian Academy of Sciences	Research divisions: - Biodiversity, Bioresources and Ecology (incl. Forest Research Institute) - Biomedicine and Quality of Life (incl. Institute of Biophysics and Biomedical Engineering) - Nanosciences, New Materials and Technologies (incl. Institute of Polymers) - Energy Resources and Energy Efficiency (incl. Institute of Chemical Engineering) - Climate Change, Hazards and Natural Resources (incl. Climate, Atmosphere and Water Research Institute)
Bulgaria	Bulgarian Furniture Cluster	Provides an infrastructure of collaboration, co-innovation, knowledge exchange, and overall togetherness of companies, organizations, and research and educational facilities in the furniture sector.
Bulgaria	Bulgarian Pulp and Paper Institute	Serves companies in the pulp and paper industry (Modern technologies for the production of fibrous semimanufacture, paper, board, corrugated board and packaging thereof, the protection of the environment during the production activities in the pulp and paper industry.)
Bulgaria	Center of excellence "Mechatronics and Clean technologies"	Clean energy and green technologies; mechanical engineering, mainly focused on clean technology and mechatronics and clean technology.
Bulgaria	Competency Center "Clean technologies for a sustainable environment - water, waste, energy for a circular economy"	Research activities combine different eco, bio and energy benefits and enrichment of bioresources (microorganisms and microbial agents).
Bulgaria	Competency Center for the Sustainable Use of Bio-Resources and Waste from Medicinal and Aromatic Plants for Innovative Bioactive Products	R&D and innovation for the efficient use of national medicinal and aromatic plant resources and utilization of agrobio-waste.
Bulgaria	Competency Center Technologies' and systems for generation, storage and consumption of clean energy: Institute of	Scientific program, including bioenergy, that represent the main approaches to the production, storage and conversion of renewable energy.

	Electrochemistry and Energy Systems Acad. E. Budevski-BAS	
Bulgaria	Competency Center" Personalized Innovative Medicine (PERIMED)"	Biochemical R&D; biocatalysis and bioactive substances for the preparation of experimental batches of bioactive components that can be registered as food additives.
Bulgaria	Energy Agency of Plovdiv	R&D&I in the field of utilisation of biomass for biofuels, biowastes for energy and new materials, testing of biofuels, compost and biowastes.
Bulgaria	Export Hub Bulgaria	Market entry support, events, knowledge transfer & market information, access to programmes for export potential development for Bulgarian SMEs, knowledge transfer, supporting SMEs to access international markets.
Bulgaria	Fund of Funds ("Fund Manager of Financial Instruments in Bulgaria")	Distributes public funds from European programmes and national co-financing through specialised support mechanisms (financial instruments).
Bulgaria	Green Synergy Cluster	Implementing sustainable solutions in the following fields: Sustainable Energy Planning; Renewable Energy; Energy Efficiency; Renewable Energy Communities; Smart Cities and Positive Energy Districts; Biomass to energy; Bio-based industries.
Bulgaria	Health & Life Science Cluster Bulgaria	Unites experts, researchers, institutions, and businesses to advance biotechnology and life sciences in Bulgaria, aiming to position the country as a global hub, support sector growth, and foster collaboration across academia, media, entrepreneurs, investors, and public institutions.
Bulgaria	Holding Textile Cluster Silk	Silkworm, mulberry, natural silk producer companies
Bulgaria	Institute for Circular Economy	NGO active at the intersection of circular economy, biomimicry and regenerative development (provides consulting service, design excellence and innovation to create products and business models).
Bulgaria	Institute of organic chemistry with Center of phytochemistry	Aims is to clarify the relationship between the synthesis, the structure and the reactivity of organic compounds; isolation, determination of the structure and practical application of natural compounds; determination of the structure and the function of proteins, enzymes and peptides; study of the thermal and catalytic transformations of hydrocarbons.
Bulgaria	Medical University – Plovdiv	Faculty of Pharmacy (with biophysics and biochemistry departments)
Bulgaria	Mission Green Bulgaria	Joins leading experts in the fields of innovation economy, energy transition, bioeconomy and biomass, smart cities, nature-based solutions and sustainable finance, motivated by the desire to turn Bulgaria into one of the green and innovative leaders in Europe.
Bulgaria	Sofia Municipal Privatization & Investment Agency	Support international companies with business services, industry specific information and contacts, as well as with finding appropriate sites/locations and/or expertise/employees.
Bulgaria	Sofia Tech Park	Bulgaria's first science and technology park focusing on information technology, life sciences and green energy.
Bulgaria	Sofia University "St. Kliment Ohridski"	Faculty of Chemistry and Pharmacy Faculty of Biology
Bulgaria	Tech Tour	Connects tech entrepreneurs with investors, experts, coaches, and regions to realize their bold ambition and build successful partnerships, event management, market information, community building, stakeholder involvement.
Bulgaria	Technical University of Gabrovo	Department "Material science and Mechanics of materials": Environmental protection engineering, Waste treatment technology and equipment. Department of Mathematics, Informatics and Natural Sciences: Bio-plasticizers, Green Chemistry, Sustain able water management, Waste treatment technologies, Renewable energy sources, Waste recovery.
Bulgaria	Trakia University	Faculty of Agriculture, Faculty of Veterinary Medicine with University Veterinary Hospital, Faculty of Engineering and Technology - Yambol,

		Institute for Sustainable Transition and Development, Institute of Food Security.
Bulgaria	University of Chemical Technology and Metallurgy - Sofia	Educate qualified experts in all areas of chemical technologies and metallurgy, biotechnology, ecology, IT and management. Development of fundamental and applied scientific researches in the traditional areas of natural science and chemical technologies.
Bulgaria	University of Economics – Varna	Department of Agricultural Economics: academic research with practical implications, competitive solutions with sustainable economic and social repercussions.
Bulgaria	University of Food Technologies - Plovdiv	Faculty of Technology (food and biotechnology)
Bulgaria	University of Forestry – Sofia	Faculty of Forestry Faculty of Forest Industry Faculty of Ecology and Landscape Architecture Faculty of Veterinary Medicine Faculty of Agronomy
Bulgaria	University of National and World Economy – Sofia	Research Center for Agrarian Business and Nature Use, University Center for Sustainable Development
Croatia	BioBRIDGES	Addressing key challenges in improving the marketability of bio-based products (BBPs) by fostering close cooperation and partnerships among bio-based industries, brand owners and consumers' representatives.
Croatia	BIOCentre	Offers business support and advisory services for biotech companies, including laboratory space, conference rooms, and fully equipped offices for rent. It also provides technology transfer, process development services, and courses in business and product development, while fostering a network between biotech, business, and financial sectors.
Croatia	Centar za tehnološki razvoj – Razvojna agencija Brodsko-posavske županije	Research and development, innovation, start-ups, technology transfer arising from its mission, taking into account the level of development, specific needs and requirements of the local environment.
Croatia	CIRTT – Centre for Research, Development and Technology Transfer at the University of Zagreb	Connects research groups with partners from the business sector and helps establish collaboration in the development of technology and commercialization of intellectual property created at the university.
Croatia	Croatian Bank for Reconstruction and Development (HBOR)	Support to start-ups, exporting companies, new production and companies from different sectors of economy such as industry, tourism, environmental protection and energy efficiency, agriculture.
Croatia	Croatian Chamber of Commerce	Provides services and contributes to enhancing entrepreneurship and competitiveness with a focus on sustainable, socially responsible growth.
Croatia	Croatian Competitiveness Cluster of food-processing sector	Networking of the public and private sectors, and scientific research institutes within the food processing sector.
Croatia	Croatian Forest Research Institute	Preservation and protection of stability, productivity, biodiversity and genetic resources of forest ecosystems of the Republic of Croatia using natural regeneration and the achieved level of sustainable management.
Croatia	Croatian Science Foundation	Regular open calls for project financing, that include research projects on the national level.
Croatia	Croatian Veterinary Institute	Monitoring and studying the epizootiological state of infectious and other animal diseases and improving methods for their control.
Croatia	Croatian Wood Cluster	Strengthening competitiveness of wood processing sector by encouraging the activities in the field of research, development of technology, applying and commercialisation of innovation and encouraging of investments.
Croatia	CROBIOHUB	Facilitates networking, information exchange on research and innovation, promotes biomass circularity and efficiency, and aids biomass market development.

Croatia	CROMARIS d.d.	Production and processing of high quality Mediterranean fish and the sixth biggest company in the world in farming of sea bass and seabream.
Croatia	EIT Climate KIC Hub in Croatia	A consortium of organisations that aims to promote and establish a sustainable and responsible economy, working on innovative solutions, operating and building systemic changes including all sectors and levels of society.
Croatia	Energy Institute Hrvoje Požar	Institution owned by the Republic of Croatia whose activity includes the implementation of scientific research in the field of energy, the provision of professional support to public authorities, and advisory services in the domestic and international markets.
Croatia	Institute for Adriatic Crops and Karst Reclamation	Innovative research projects in the field of biotechnological sciences (agriculture and forestry), to transfer the knowledge to target users and also to participate in academic education.
Croatia	Institute for Development and International Relations	Interdisciplinary scientific research and analysis in the field of sustainable development, environmental and nature protection, regional and local development and policy as well as good governance.
Croatia	Institute of Agriculture and Tourism	Public non-profit scientific institute
Croatia	Institute of Oceanography and Fisheries	Biological, chemical, and physical oceanography as well as sedimentology, fishery, and mariculture.
Croatia	Institute Ruđer Bošković	Scientific research in the natural, biomedical and engineering sciences, with contributions to higher education and cooperation with the business sector.
Croatia	Josip Juraj Strossmayer University of Osijek	Faculty of Agrobiotechnical Sciences Faculty of Food Technology
Croatia	OIKON Ltd. – Institute of Applied Ecology	Independently operated and privately owned and officially licensed for activities in the fields of environmental and nature protection, geodesy, protection and conservation of cultural heritage, and development of forest management plans.
Croatia	Podravka d.d.(Inc)	Research and Development department: product development, sensory analysis, taste research, raw material quality control, semi-finished products, ready-made products, packaging, production plant and environment all have the aim of continuously ensuring the highest quality of Podravka products.
Croatia	Technological innovation centre Rijeka (TIC)	Retrofitting, innovating & developing solutions to make existing tertiary buildings "greener".
Croatia	Tehnološki centar Split	Centre for business development, Entrepreneurial-supporting infrastructure owned by the City of Split established with the aim of providing support for the development of entrepreneurship, with a special focus on activities in the field of high technologies.
Croatia	Tehnološki park Varaždin	Incubation centre for innovative start-up companies, establishment of a mechanism for improvement of existing technologically innovative companies, improvement of transfer of knowledge from universities and development centres into the economy, networking of companies, educational institutions, development agencies and innovative individuals, and change of perception towards innovation as a foundation of a new economy.
Croatia	University of Zagreb	Faculty of Food Technology and Biotechnology, Faculty of Mechanical Engineering and Naval Architecture, Faculty of Pharmacy and Biochemistry, Faculty of Agriculture, Faculty of Chemical Engineering and Technology, Faculty of Forestry and Wood Technology

Croatia	Wood cluster SLAVONIAN OAK	Sustainable development, environmental protection, and increasing competitiveness in forestry and wood industry by efficient use of valuable raw material Slavonian oak and other wood species.
Croatia	ZICER – Zagreb Innovation Centre	Supporting and advancing entrepreneurial climate as well as society at large. They promote the creation of stimulating entrepreneurial environment and strengthening of entrepreneurial competencies, clarify the best ways to finance entrepreneurial endeavours, and help innovative high-tech companies and teams turn their ideas into actual products.
Czechia	Agricultural Research, Ltd. Troubsko	Research in agriculture, food and biotechnology. International applied research and innovation transfer projects in bioeconomics.
Czechia	Agriresearch Rapotin, Ltd	Solving current issues related to nutrition, breeding, reproduction and welfare of animals, likewise the environment and quality of animal and plant production.
Czechia	Agritec Plant Research Ltd.	Applied and fundamental research in agriculture, the environment and the food industry.
Czechia	Agrotest fyto s.r.o.	Applied research in the field of agriculture, focused primarily on solving specialized research projects, breeding, testing, providing advice and providing specialized services.
Czechia	Agrovýzkum	Consultancy in agriculture
Czechia	APPE Acociace progresivních podnikových ekologů	A voluntary non-political union of citizens interested in business ecology and the circular economy.
Czechia	Association of research organizations	Supports the engagement and involvement of SMEs and large entrepreneurs, provides methodology for SMEs on how to use the potential of bioeconomy innovation.
Czechia	Bio – měsíčník pro trvale udržitelný život	Environmental information portal
Czechia	BIOEAST HUB CZ	Gather stakeholders and support their engagement in bioeconomy.
Czechia	Bioeconomy platform of the Czech Republic	Knowledge hubs transfering and fostering the national bioeconomy and its competitiveness.
Czechia	Bioinstitut, o.p.s.	It ransfers of science and research findings into practice; education, training and publication activities; promotion of sector towards professionals and the public.
Czechia	Centrum Algatech	It associates more than 40 biogas industry members and leading R&D institutions as well as engineers, biogas plant operators, project specialists and other experts not only from the Czech Republic.
Czechia	Česká technologická platforma rostlinných biotechnologií	Technology foresight on plant biotechnology.
Czechia	Charles University	Faculty of Science, Environment Centre
Czechia	Crop Research Institute	Basic and applied research, ranging from traditional studies of genetics, plant breeding, plant nutrition, agroecology, plant health, and the safe storage of crops and agricultural produce.
Czechia	Czech Academy of Agricultural Sciences	Contributing to the design and development of the bioeconomy strategy, advisory body.
Czechia	Czech Biofuels Technology Platform	Similar structure of working groups as the European Biofuel Platform, involvement of a wide range of specialists in the areas of agriculture, chemical technology and sustainability.
Czechia	Czech Technology Platform Plants for the Future	Platform for the exchange of views and experiences in the field of plant biotechnology.
Czechia	Czech University of Life Sciences Prague	Faculty of Agrobiology, Food and Natural Resources Faculty of Forestry and Wood Sciences Faculty of Tropical AgriSciences

		Research Centre for Bioeconomics and Low-Carbon Economics at the Faculty of Economics and Management
Czechia	CzechGlobe – Global Change Research Institute of the Czech Academy of Sciences	State-of-the-art instrumentation and techniques to investigate current and future manifestations of global change in the atmosphere, ecosystems and human society.
Czechia	Dairy Research Institute, Ltd.	Research and development in the field of milk and dairy products, namely from basic dairy production, the collection of milk and its t echnological processing, to the quality and safety of final dairy products.
Czechia	Department of Forest and Wood Products Economics and Policy (FFWT), Faculty of Forestry and Wood Technology, Mendel University	Research and academic activities in the areas of arboristics, furniture design and furniture technology, forestry, landscaping, timber structures and wood building construction, wood technology and timber management and furniture design.
Czechia	Designfoods	Offers professional services in the area of food development. Specializes in development of formulas from a culinary model, in development of laboratory samples, in assistance with pilot and operational tests, and in technological counselling.
Czechia	Environment Centre, Charles University	Conducts environmental research and provides environmental expertise and information for students, university staff and for the general public.
Czechia	Food Research Institute	Activities on improving the level of our population and food for healthier foods offered in market. It is aimed at improving the procedures for processing food from the beginning of production to their final preparation.
Czechia	Forestry and Game Management Research Institute	Research focused on forest management as well as expertise and consulting services for state administration and forest owners.
Czechia	Hop Research Institute Co., Ltd.	Complex scientific and research activities in the area of cultivation, harvest and post-harvest treatment of hops.
Czechia	Institute of Agricultural Economics and Information	Basic and applied research and development, and disseminating its results through education, publishing, or technology transfer in the fields of agricultural economics and policy, including the development of the multifunctional nature of agriculture and rural areas.
Czechia	Institute of Animal Physiology and Genetics of the Czech Academy of Sciences	Basic research in physiology, genetics, ecology and evolution. From biomedical to biodiversity-oriented, unique features of domestic, wild and laboratory animals.
Czechia	Institute of Animal Science	Research in the fields of animal genetics and breeding, bio-technology and reproduction, nutrition, quality of products, animal ethology and welfare, breeding technology, herd management and production economy.
Czechia	Institute of Chemical Process Fundamentals of the CAS, v. v. i.	Graduate school for PhD studies in the fields of chemical engineering, physical chemistry, industrial chemistry, and biotechnology.
Czechia	Institute of Experimental Botany of the Czech Academy of Sciences	Research in plant biology, namely in plant genetics, physiology, phytopathology and biotechnology.
Czechia	Institute of Vertebrate Biology CAS	Basic research of vertebrates in the fields of biodiversity, evolutionary ecology, general ecology.
Czechia	MILKOM	Offers services in the fields of dairy processing and packing technology, and food research, and laboratory products.
Czechia	National Cluster Association	Brings together entities and individuals with the goal of coordinated and sustainable development of cluster initiatives and cluster policy development in the Czech Republic based on concentration of knowledge, experience and expertise to strengthen the Czech competitiveness.
Czechia	OSEVA Development and Research Ltd.	Agricultural, environmental and renewable energy resource research and consultancy.
Czechia	Palacký University Olomouc	Faculty of Science Czech Advanced Technology Research Institute

Czechia	Potato Research Institute Havlíčkův Brod, Ltd	Research, consultancy, verification of plant protection product features.
Czechia	Research and Breeding Institute of Pomology Holovousy, Ltd.	Research of practically all fruit crop that is grown as a market culture in the Czech Republic.
Czechia	Research Institute for Soil and Water Conservation	Basic and applied research in the field of soil science, water and landscape management, soil and water protection, development and maintenance of irrigation and drainage constructions, principles, conservation methods and policies.
Czechia	Research Institute of Agricultural Engineering	Research, knowledge transfer, advisory, extension and consultancy services, education, policy support.
Czechia	Research Institute of Brewing and Malting, Plc	Development of new technologies aimed at increasing production efficiency and quality while preserving all attributes of the Czech way of beer production and its specific properties.
Czechia	SELTON Research Centre, Ltd.	Technical consultants in the field of chemistry, food, agriculture and forestry; providing professional courses, training and other educational events and lecturing activities.
Czechia	Technology Centre Prague	Supports the participation of the Czech Republic in the European Research Area, prepares analytical and conceptual studies for research and development, performs international technology transfers and supports the creation and development of innovation businesses.
Czechia	The Institute of Botany of the Czech Academy of Sciences	Research in a wide range of evolutionary and ecologically focused botanical disciplines.
Czechia	University of Chemistry and Technology Prague	Faculty of Chemical Technology Faculty of Environmental Technology Faculty of Food and Biochemical Technology Faculty of Chemical Engineering
Czechia	University of South Bohemia in České Budějovice	Faculty of Science Faculty of Agriculture and Technology Faculty of Fisheries and Protection of Waters Bioeconomy Initiative - University of South Bohemia
Czechia	Veterinary Research Institute	Research and dissemination of research results to both the academic community and practical users in the agricultural and food industry.
Estonia	Association of Estonian Food Industry	Represents the interests of Estonian food industry in the development of national economic policy and interacts with authorities, producers, trade, and other interested parties by co-operating in all the links of the food chain.
Estonia	Center of competence for wood processing and furniture manufacturing	Achieve the competitiveness and higher added value of products of companies operating in the Estonian wood processing sector by supporting the creation of their products and brands, and as a result, moving the Estonian wood sector into more profitable parts of the value chain.
Estonia	Competence Centre for Knowledge-Based Health Goods and Natural Products	Consolidate and mobilise sectorial know-how as well as other resources and raise the sectorial competitiveness via international networking, research, and development based on both academic excellence and business innovation. Supporting the cooperation of research institutes, the public sector, and enterprises.
Estonia	Entrepreneurship Education Program Edu ja Tegu	Encouraging the enterprising spirit in Estonian students and teachers and to ensure that creating the sense of initiative and developing entrepreneurial and career competencies would become a natural part of education.
Estonia	Estonian Chamber of Agriculture and Commerce	Promoting balanced development in agriculture, processing, and rural services, supporting cooperation between local producers and processors, and facilitating trade in domestic and international markets, with representation in national and international structures.

Estonia	Estonian Research Council	Coordinates funds for bioeconomy (NUTIKAS, RITA, ResTa), and supports international research cooperation.
Estonia	Estonian University of Life Sciences	Centre of Bioeconomy, Polli Horticultural Research Centre, Centre of Renewable Energy
Estonia	Fisheries Information Centre	Contributes to enhancing the level of knowledge of entrepreneurs active in fisheries and aquaculture and the valorisation of aquatic biological resources to improve their economic and environmental sustainability.
Estonia	SWEETWOODS flagship biorefinery in Imavere, Estonia	Uses Sunburst pre-processing technology to efficiently convert over 90% of woody biomass into high-quality lignin and wood sugars at an industrial scale.
Hungary	Bay Zoltán Nonprofit Ltd. for Applied Research	Largest state-owned institution of applied research, its Department for Biotechnology Bay-Bio provides analytical services and undertakes research and development in applied microbiology (biorefinery and biocatalysis) and in biology-based energy production (algal biotechnology, renewable energy development).
Hungary	Beta Research Institute Nonprofit Ltd.	Biotechnological research of sugar and waste.
Hungary	Biocompack Ltd	A collaborative company that focuses on the research and development of biodegradable packaging materials made from renewable resources, reducing the environmental impact of packaging waste.
Hungary	Centre for Ecological Research	Institute of Ecology and Botany, Institute of Aquatic Ecology
Hungary	Circular Economy Platform	Promotes the transition to a circular economy. Fosters knowledge sharing, joint projects, and collaborations to drive sustainable economic models.
Hungary	Corvinus University of Budapest	Regional Centre for Energy Policy Research
Hungary	Eötvös Loránd University	Faculty of Science, University Centre for Innovation
Hungary	Eszterházy Károly University	Faculty of Natural Sciences, Institute of Viticulture and Enology
Hungary	Herman Ottó Institute	Nature conservation, agricultural vocational education, National CAP Network - Support Unit for Rural and Regional Development
Hungary	Hungarian Bioeconomy Cluster	Supportling the emergence of the bioeconomy (economy based on biomass) in Hungary and to support its long-term survival and continuous development.
Hungary	Hungarian Biotechnology Association	Alliance that unites the voices and interests of companies, researchers, academic institutions and related organizations to provide them with shared services, advocacy, and help in finding success and opportunities in the field of life sciences. .
Hungary	Hungarian University of Agriculture and Life Sciences	Institute of Agricultural and Food Economics Institute of Aquaculture and Environmental Safety Institute of Genetics and Biotechnology Institute of Agronomy Institute of Rural Development and Sustainable Economy Institute of Food Science and Technology Institute of Horticultural Sciences Institute for Viticulture and Oenology Institute of Animal Sciences Institute of Animal Physiology and Nutrition Research Institute of Karcag Research Center for Fisheries and Aquaculture (HAKI)

Hungary	National Biomethane-Biogas Bioenergy Industry Association	Represents the interests of the industry based on its own professional activities. Members include agricultural biogas plants and many other companies or organizations involved in the biogas industry.
Hungary	Pannon Pro Innovations	Private consultancy providing a wide range of innovation management and entrepreneurship support activities. Its key topics are sustainability, energy, climate change and bioeconomy.
Hungary	HUNATIP - Hungarian Aquaculture Technology and Innovation Platform	Assist the implementation of R&D programs and the knowledge and technology transfer.
Hungary	Magyar Bioeconomy Fórum	Exploit the country's biomass potential by supporting companies and organisations in the sector.
Hungary	Research Institute of Organic Agriculture (ÖMKI)	Research institute in Hungary that specializes in organic agriculture with the aim of promoting the improvement and more widespread use of organic agriculture.
Hungary	Szeged Biotechnology Incubator	Advancing the bioeconomy by supporting startups in the development of bio-based products and technologies.
Hungary	University Debrecen	Faculty of Agricultural and Food Sciences and Environmental Management
Hungary	University of Miskolc	Faculty of Earth and Environmental Sciences and Engineering, Faculty of Materials and Chemical Engineering
Hungary	University of Pannonia	Faculty of Engineering
Hungary	University of Pécs	Faculty of Sciences
Hungary	University of Sopron	Faculty of Forestry, Faculty of Wood Engineering and Creative Industries, Forest Research Institute
Hungary	University Of Szeged	Faculty of Agriculture, Faculty of Engineering, Faculty of Pharmacy
Hungary	University of Technology and Economics Budapest	Faculty of Chemical Technology and Biotechnology
Latvia	AS Ziedi JP - circular economy in a Latvian farm	This farm embodies circular economy principles, where interconnected activities ensure full resource utilization, with digestate returning as fertilizer and byproducts feeding new production processes, eliminating waste. (part of the Global Network of Lighthouse farms).
Latvia	Association of Biotechnology of Latvia	Promotes biotechnology sphere in Latvia.
Latvia	Association of the Latvian Chemical and Pharmaceutical Industry (LAKIFA)	Develop innovations and products with high added value, promoting cooperation of the companies within the sector.
Latvia	Cleantech Latvia	Cluster that provides support to our partners in developing new products, acquiring export markets and promoting cooperation.
Latvia	Daugavpils University	Faculty of Natural Sciences and Healthcare, Institute of Life Sciences and Technology
Latvia	Food Products Quality Cluster	Fosters cooperation between its members and external partners, to promote knowledge and technology transfer, develop new products, technologies, and innovative solutions.
Latvia	Forest and Wood Products Research and Development Institute	To solve competently and responsibly the issues of wood and timber product development, and improvement of informal professional education put forward by the sector.
Latvia	Forest Research Station	Forestry research, environmental and forest monitoring facilities, training and further training support in the field of forestry education.

Latvia	Forest Sector Competence Centre	Implements industrial research projects, in the development of new products and technologies, thereby promoting the development of forest and related industries.
Latvia	Green Tech Cluster	Brings together companies, educational and research institutions, as well as other organizations that operate in the industries of green and smart technologies.
Latvia	Latvian Food Bioeconomy Cluster (LFBC)	One of the most developed and internationally active bioeconomy clusters in the Baltic.
Latvia	Latvian Forest Industry Federations	Associations of the industry, unifying active and socially responsible forestry, primary processing, further processing enterprises, wooden houses, and furniture manufacturers.
Latvia	Latvian High Added Value and Healthy Food Cluster	Network of innovative and export oriented food and drinks industry SMEs.
Latvia	Latvian Investment and Development Agency (LIDA)	Aims to increase export and competitiveness of Latvian companies, facilitate foreign investment and implement tourism development and innovation policies.
Latvia	Latvian Rural Advisory and Training Centre	Promotes rural prosperity by offering businesses, organizations, and farmers access to knowledge, advice, and industry services, while engaging farmers in local pilot activities and encouraging student project participation.
Latvia	Latvian State Forest Research Institute "Silava"	Support institution for the Latvian forest industry, which creates new knowledge on the basis of new or existing research objects and tools, ensures the transfer of global knowledge and critical evaluation, as well as the institutional environment for the growth of young scientists.
Latvia	"Biomasa" Association	Leading wood and other biomass research centres in the Baltic region.
Latvia	Latvian University of Life Sciences and Technologies	Faculty of Agriculture and Food technology, Faculty of Forest and Environmental Sciences Faculty of Economics and Faculty of Veterinary Medicine
Latvia	Latvian Wood Construction Cluster	Brings together manufacturers of wooden buildings/structures and providers of wood construction solutions operating in Latvia.
Latvia	LBTU Forest and Water Resources Research Laboratory	Research programmes and projects, fundamental and applied research in forest sciences, hydro-engineering sciences, environmental sciences and material sciences.
Latvia	Riga Technical University	Faculty of Natural Sciences and Technology
Latvia	The Association of the Latvian Chemical and Pharmaceutical Industry (LAKIFA)	Brings together companies involved from the pharmaceuticals and chemicals industry. It works also to develop and support dialogue between companies and policy makers in the industry.
Latvia	University of Latvia	Faculty of Medicine and Life Sciences, Faculty of Science and Technology
Lithuania	Association of Wood and Furniture Industry	Enterprises and organizations of various size and form of ownership related, in one way or another, to the processing of wood, production of wood products, trading in raw wood, wood materials and wood products.
Lithuania	Biopower plant development cluster (Adecco)	It seeks to develop biogas production and related technologies that create the conditions necessary for organic farming.
Lithuania	Centre for Innovative Medicine	Department of Biopharmacy
Lithuania	Institute of Economics and Rural Development of the Lithuanian Centre for Social Sciences	Holistic solutions to the issues of the Lithuanian rural economy and policy development, oriented towards national state interests and needs of business and non-governmental organisations.
Lithuania	Kaunas University of Technology	Environmental Engineering Institute, Biomedical Engineering Institute, Food Institute, Research Institute of Materials Science,

Lithuania	Klaipeda University	Faculty of Marine Technologies and Natural Sciences, Marine Research Institute
Lithuania	Life Sciences Digital Innovation Hub Cluster	Platform for business-research partnership, dedicated to fostering digital innovation in the life sciences, bringing together research, business and public sector institutions and organizations.
Lithuania	LithuaniaBIO	Promotes the application of life sciences and biotechnology in Lithuania's economy, focusing on bioeconomy, medical technologies, and life sciences to address global environmental and quality of life challenges.
Lithuania	Lithuanian Biomass Energy Association LITBIOMA	Companies belonging to the association are actively operating in the field of biomass production and supply: they are cultivating energetic plant plantations, producing various types of biofuel and all tools and equipment necessary for this activity.
Lithuania	Lithuanian Energy Institute	State research center focused on energy-related studies, including power system modeling, control optimization, renewable energy, energy security, fuel cells, hydrogen, thermal physics, nuclear safety, and structural integrity assessment.
Lithuania	Lithuanian Research Centre for Agriculture and Forestry	Institute of Agriculture, Institute of Horticulture, Institute of Forestry, Institute of Animal Science and Food Institute
Lithuania	Lithuanian University of Health Sciences	Faculty of Veterinary Medicine, Faculty of Animal Sciences
Lithuania	Marine Valley	Promotion of fundamental and applied studies competitive on the global market and at training highly qualified specialists for the needs of Lithuania's maritime sector.
Lithuania	National Food Cluster (NAMŪK)	Creates exclusive and innovative higher valueadded products from local raw materials.
Lithuania	Nature Research Centre	Higher education and research institution conducting fundamental and applied research on living and non-living nature, which helps ensuring the quality and continuity of the life of society in conditions of diverse changes in ecosystems and emerging social challenges.
Lithuania	Nemunas Valley	Central hub for developing R&D in the fields of agro biotechnologies, bioenergy and forestry, food technologies, safety and wellness food.
Lithuania	Open R&D Lithuania network	Agro-innovation and food technologies; Health technologies and biotechnologies; and Energy and sustainable environment (including fourth-generation biofuels and biomass).
Lithuania	Santaka Valley	Connects and integrates the open-access infrastructures for developing R&D in the fields of sustainable chemistry and pharmacy (including biochemistry and biopharmacy), mechatronics, future energy (including bioenergy) and ICT.
Lithuania	Santara Valley	Central hub for developing R&D in the fields of biotechnologies, innovative medicine, molecular medicine and biopharmacy, ecosystems and ICT.
Lithuania	SMART food cluster	Food industry companies representing individual industry sectors in domestic and foreign markets, not acting like direct competitors to one another, and creating possibilities for mutual trust and cooperation.
Lithuania	Teva Baltics	Development and application of recombinant protein production technologies for the needs of the biopharmaceutical industry.
Lithuania	Thermo Fisher Scientific Baltics	Develops, produces and distributes products for life science research and diagnostics in global markets.
Lithuania	Vilnius Gediminas Technical University (VILNIUS TECH)	Faculty of Fundamental Sciences, Faculty of Environmental Engineering, Institute of Building Materials,

		Institute of Sustainable Construction, Leader in the field of technological sciences with modern and labour market-oriented approach to studies.
Lithuania	Vilnius University	Life Sciences Center has research areas including Biotechnologies, Ecosystems, Biodiversity, Preservation of Environment and Use of Natural Resources, among others.
Lithuania	Vytautas Magnus University	Agriculture Academy (Faculty of Agronomy, Faculty of Bioeconomy Development, Faculty of Forest Sciences and Ecology, Faculty of Engineering), Faculty of Natural Sciences
Poland	AgroBioCluster	Brings together companies, local government administration, research and scientific institutes from Central Poland, stimulating their holistic development and international cooperation.
Poland	Bioeconomy Cluster Association	Common platform for dialogue and cooperation for the scientific community and entrepreneurship in the field of the broadly understood bioeconomy.
Poland	Centre for Advisory Service in Brwinów (CDR)	Cooperates with agricultural advisory centres, government and local government administration institutions, industry organisations, research and development centres and other organisations and institutions working for the development of rural areas and agriculture.
Poland	Inland Fisheries Institute (IRS)	Research and publishing activities which aim to disseminate information about and popularize fisheries.
Poland	Institute of Agricultural and Food Economics	Research on the economic, production and social situation of the Polish countryside, agriculture and the broadly understood food economy.
Poland	Institute of Agriculture and Food Biotechnology of the Polish Academy of Sciences (PAN)	Basic and applied research in the field of agri-food biotechnology, safe production and storage of food, food and feed safety and quality to support the agri-food industry, including food distributors.
Poland	Institute of Agrophysics	Research for the sustainable production of agricultural plant raw materials in order to ensure food security and mitigate adverse environmental and climate changes.
Poland	Institute of Animal Production (IZ)	Research (basic, applied, industrial), development work in animal production and management of agricultural landscape.
Poland	Institute of Natural Fibres and Medicinal Plants (IWNiRZ-PIB)	National and international research projects; conducts multi-directional cooperation with numerous scientific units around the world; operates for the needs of agriculture, environmental protection, construction, transport, the food industry, pharmacy and medicine.
Poland	Institute of Plant Protection (IOR)	Scientific, implementation, dissemination and service activities, which cover all issues related to the protection of cultivated plants in Poland.
Poland	Institute of Rural and Agricultural Development of the Polish Academy of Sciences	Advanced interdisciplinary social research on the transformation of rural areas and to provide expert services in this field.
Poland	Institute of Soil Science and Plant Cultivation (IUNG)	Crop production, soil science and fertilisation, as well as recognition and protection of agricultural areas against various forms of degradation.
Poland	Institute of Technology and Life Science	Research and development in the life sciences and technology.
Poland	LifeScience Kraków Cluster	Offers access to an organized cooperation network operating in the scientific and business environment.
Poland	Lodz University of Technology	Faculty of Chemistry, Faculty of Material Technologies and Textile Design, Faculty of Biotechnology and Food Sciences, Faculty of Process and Environmental Engineering
Poland	Lublin Eco-Energy Cluster	Involves entities in the field of renewable energy (solar, wind, hydro and geothermal) as well as production and use of biomass for energy purposes.

Poland	Łukasiewicz Research Network	Operating under the "Science is Business" model, they collaborate with entrepreneurs to enhance business operations and develop transformative technologies.
Poland	Marine Fisheries Research Institute (MIR)	Scientific and research and development work supporting economically sustainable and environmentally safe development of marine fisheries.
Poland	Military University of Technology in Warsaw	Source of knowledge in the field of technology and its application. It provides expert support for the Ministry of National Defense. It is a leader in the area of creating links between industry and business and scientific and research centers.
Poland	National Centre for Research and Development (NCBiR)	Innovative technological and social solutions, creating an ecosystem of knowledge and information about them.
Poland	National Veterinary Institute (PIWET)	Scientific research and development work in the field of animal health protection, prevention and diagnostics of infectious animal diseases, including zoonoses, hygiene and toxicology of food of animal origin, feed hygiene and environmental protection.
Poland	Plant Breeding and Acclimatization Institute (IHAR)	Development of research theory and methodology, as well as the preparation of analyses and assessments of the state of development in the fields of science covered by its statutory activities.
Poland	Polish Agency for Enterprise Development (PARP)	Involved in the implementation of national and international programmes financed from the EU structural funds, state budget and multiannual programmes of the EC.
Poland	Polish Association of Centers for Technology Transfer (PACTT.pl)	Voluntary association of representatives from entities responsible for the management and commercialization of intellectual property of Polish universities, research institutes and the Polish Academy of Sciences.
Poland	Polish Association of University Knowledge Transfer Companies (PSC)	Commercializes research results by establishing spin-off companies and to initiate and implement R&D projects for businesses & public administration.
Poland	Polish Bioeconomy Technological Platform	Brings together business partners, research institutions and universities.
Poland	Polish Biomass Association, POLBIOM	Brings together specialists involved in the production and processing of biomass for non-food purposes, in particular energy.
Poland	South Poland Cleantech Cluster (SPCleantech)	Supports sustainable and green growth of the region by participating in the creation and implementation of an inclusive green growth policy that can improve the social situation of residents, promote responsible management of natural resources and respect the delicate balance on our planet.
Poland	The Waste Management and Recycling Cluster	Creates raw material facilities for industry, integrating the industry and strengthening the competitiveness of member companies in accordance with the Circular Economy model.
Poland	University of Agriculture in Krakow	Faculty of Agriculture and Economics, Faculty of Forestry, Faculty of Animal Science, Faculty of Biotechnology And Horticulture, Faculty of Food Technology, Faculty Of Veterinary Medicine
Poland	University of Warmia and Mazury in Olsztyn	Faculty of Animal Bioengineering,, Faculty of Biology and Biotechnology Centre for Bioeconomy and Renewable Energies, Faculty of Agriculture and Forestry, Faculty of Veterinary Medicine
Poland	Warsaw University of Life Sciences (SGGW)	Faculty of Animal Breeding, Bioengineering and Conservation, Faculty of Forestry, Faculty of Veterinary Medicine, Faculty of Biology and Biotechnology,

		Faculty of Horticulture, Faculty of Agriculture and Ecology, Faculty of Wood Technology, Faculty of Food Technology
Poland	Warsaw University of Technology	Faculty of Chemical and Process Engineering, Faculty of Chemistry, Faculty of Materials Science and Engineering
Poland	West-Pomeranian Chemical Cluster "Green Chemistry"	Leading R&D cluster uniting enterprises and institutions in Poland to drive innovation in green chemistry through value chains and demonstration projects.
Poland	Wrocław University of Environmental and Life Science – Poznań	Institute of Agricultural Engineering,, Institute of Agroecology and Plant Production, Institute of Animal Husbandry and Breeding Institute of Environmental Biology, Institute of Environmental Engineering, Institute of Soil Science, Plant Nutrition and Environmental Protection
Romania	Agri-Bio-Tech	Combines cultivation and selection activities with the control of analysis, storage and transport, seeking the greatest reduction of emissions at every step of the supply chain.
Romania	AGROPRO Oltenia Cluster	Framework for dialogue between entities from diverse backgrounds (academic, private, public, civil society) with concerns in the agricultural sector, as well as the creation of a common brand in this field with the result of the development of the whole South-West Oltenia regions from the economic point of view and the social infrastructure.
Romania	AICAR	Government-supported, nationwide network of incubators, associations, NGOs from Alba Iulia, Brasov, Mangalia, Sfantu Gheroghe, Targu Mures, Cluj Napoca, Bacau, Satua Mare, Dorotoi, Campia Tutzii, Timisoara.
Romania	ASIMCOV	Strengthens Covasna County's smart bioeconomy ecosystem through local community, business, and public sector engagement.
Romania	bioROne Cluster	Network and common platform to help maximise the innovation potential of Nort-East Romania, and strengthen the innovation process from an original idea to a product.
Romania	CLUSTERO	Gathers the most active Romanian clusters in fields such as: textiles, renewable energy, electronics and software.
Romania	Green Building and Development Cluster	Develops technologies, processes, and services as well as new business models resulting from the collaboration of stakeholders interested in the circular economy.
Romania	Green Energy Romanian Innovative Biomass Cluster	Promotes biomass as Romania's valuable renewable energy source, focusing on ecological and social innovations. It connects businesses, research institutions, universities, and public authorities to enhance cooperation, stimulate innovation, and improve the biomass value chain.
Romania	INCDO-INOE 2000, Research Institute for Analytical Instrumentation ICIA	Fundamental and applied research, analytical methodologies elaboration for a wide range of samples, design and construction of laboratory analytical instruments, performing of chemical analyses and provide services of information, advice and representation for business.
Romania	IND-AGRO-POL competitiveness pole	Unites members, including SMEs, to drive innovation and collaboration in agro-industry, bioeconomy, renewable energy, and eco-technologies while promoting social inclusion.
Romania	Institute of Agricultural Economics from the Romanian Academy	Fundamental and applied research in the field of agri-food, rural economy and rural development, policy impact analysis with national and international funding and actively take part in the research results dissemination, both to the academics and the policy makers' level.
Romania	Inter-Bio	Supports its members to interact with the governing bodies, to internationalise their production, to gain business skills, increase RDI

		development, links to consumers and other sectors in bioeconomy, networking.
Romania	National Institute for Research & Development in Chemistry and Petrochemistry	Scientific research and technology development in the chemical and petrochemical industries.
Romania	National Institute of Research and Development for Biological Sciences	Life sciences research in four essential directions including agriculture, environmentl, biomedicine, and circular bioeconomy.
Romania	National Research and Development Institute for Food Bioresources – IBA	Public research entity coordinated by the Ministry of Research and Innovation with research activity in 4 strategical areas: food safety, nutrition, consumer behaviour and food (Bio)technologies.
Romania	Romanian Institute of Bioeconomy	Promotes bioeconomy, raise public awareness, support innovation, enhance market competitiveness, and foster collaboration among policymakers, NGOs, academia, and civil society for sustainable development.
Romania	Transylvanian Furniture Cluster	Promotes and endorses the furniture industry, with the stated aim of supporting an increase of competitiveness for SMEs, both nationally and internationally.
Slovakia	"Biomasa" Association	Participation in the process related to the use of renewable energy sources through the dissemination of information and the implementation of new biomass technologies suitable for the environment.
Slovakia	Argrobiotech at the Slovak University of Agriculture	Equipped with advanced research infrastructure, enabling high-level, practical research in agrobiology, agricultural product processing, biotechnology, genetic technologies, agroecology, bioenergetics, and bioeconomy.
Slovakia	Association for the Biofuel Production and Utilization / Slovak Biogas Association	Its vision is the most comprehensive Slovak environment for an efficient and energy system with the best possible bio-waste processing and bio-energy production.
Slovakia	Association of Producers of Organic Fertilizers	Brings together Slovak producers not only of fertilizers but also of protective means for plants as well as farmers interested in organic agriculture.
Slovakia	Bioeconomy Cluster	Fosters cooperation, networking, innovation, and information exchange among members and stakeholders in the agri-food and bio-based sectors, focusing on collaborative bioeconomy projects.
Slovakia	Centre for Sustainable Alternatives - CEPTA	Association of people with a need to develop activities to protect the environment, nature, promote civic participation, a healthy lifestyle and sustainable alternatives to the current consumer lifestyle.
Slovakia	Comenius University Bratislava	Faculty of Natural Sciences
Slovakia	Energy Communities of Slovakia Cluster (KEKS)	Help, create, strengthen, support, and connect energy communities and communities across Slovakia.
Slovakia	Envirocentrum Banská Štiavnica	Seeks to enhance individuals' climate and environmental literacy by promoting and communicating the latest scientific insights on climate change, innovative solutions, and best practices for the country's adaptation and mitigation efforts.
Slovakia	Hemp Cluster	Research and development of sustainable hemp production, which brings value to people in a cooperative, circular, and regional manner.
Slovakia	Inovato Cluster	Works with a variety of stakeholders to develop an innovation ecosystem based on shared values.
Slovakia	National Agricultural and Food Centre	Comprehensive research and knowledge gathering regarding sustainable use and protection of natural resources, especially soil and water resources, for crop production and animal husbandry, quality and safety, innovation and competitiveness of food and non-food products of agricultural origin.

Slovakia	National Forest Centre	Development and promotion of sustainable forest management and its implementation in practice.
Slovakia	Pulp and Paper Research Institute	Technological research and development and industrial application, technical assistance to pulp and paper mills and converting plants, enhancing the skill of the papermakers and on retrieval and dissemination of professional and economical information.
Slovakia	REPRIK – Regional Industry Innovation Cluster Rimavská Kotlina	Continuous development of modern and systemic energy policy and the development of the business environment with an emphasis on production, distribution, investment development, research, development, education, social development, ecology.
Slovakia	Slovak Academy of Sciences	Section II: agricultural and veterinary sciences, biological and chemical sciences
Slovakia	Slovak Investment and Trade Development Agency (SARIO)	Offers assistance and support to investors and businesses interested in developing projects related to the bioeconomy sector in Slovakia.
Slovakia	Slovak Plastics Cluster	The cluster was created on the initiative of non-governmental entities operating in the plastics industry.
Slovakia	Slovak University of Agriculture in Nitra	Faculty of Agrobiology and Food Resources, Faculty of Biotechnology and Food Sciences, Faculty of Horticulture and Landscape Engineering
Slovakia	Slovak University of Technology	Faculty of Chemical and Food Technology, Institute of Materials Science
Slovakia	Technical University in Zvolen	Faculty of Forestry, Faculty of Wood Sciences and Technology, Faculty of Environmental and Manufacturing Technology
Slovakia	The Danube Transfer Center Network	Dynamic transnational structure dedicated to fostering innovation and knowledge transfer between academia and the economic environment.
Slovakia	The National Platform AgroBioFood Nitra	Connects education, research, and business, promoting innovation, transferring and implementing R&D results, and fostering international cooperation, transnational consortia, and the practical application of research and innovation.
Slovakia	The Union of Slovak Clusters	To create a suitable and competitive business environment through the close cooperation of regional government, academia and research with business in the area of innovation.
Slovakia	Union of ecological agriculture Ecotrend	Non-governmental, non-profit organization with nationwide operations, which brings together growers, processors, producers, experts and those interested in organic agriculture and sustainable living.
Slovakia	Union of Wood Processors of the Slovak Republic	A voluntary employers' organization that brings together owners and managers of companies in the wood processing industry.
Slovakia	University of Veterinary Medicine and Pharmacy in Košice	Department of Chemistry, Biochemistry and Biophysics, Department of Breeding and Diseases of Game, Fish and Bees, Ecology and Cynology, Department of Animal Nutrition and Husbandry, Department of Public Veterinary Medicine and Animal Welfare
Slovenia	Bogatin, part of EIT Climate-KIC Accelerator	Company that provides research and consulting connected to innovation and entrepreneurship stakeholders, both in the public and private sectors.
Slovenia	CircAgro	Develops circular solutions for scalable business models, adding value to agricultural side-streams and by-products. Its outputs, including product prototypes, technological concepts, business models, and policy frameworks, aim to benefit farmers, value chain actors, and society.
Slovenia	Deep Demonstration of a Circular, Regenerative and Low-Carbon Economy	Collaborating on the Deep Demonstration Initiative to accelerate Slovenia's transition to a circular, regenerative, and low-carbon economy. Aims to drive rapid decarbonization, climate resilience, and societal prosperity through circular economy strategies.

Slovenia	Faculty of Chemistry and Chemical Technology of University of Maribor	R&I in bio-based sector, in the fields of chemistry, chemical and biochemical engineering, and in related fields.
Slovenia	InnoRenew CoE	Research about renewable materials and sustainable buildings, and transfer of scientific knowledge into industrial practice.
Slovenia	National Institute of Chemistry	Relates to the production of various biobased chemicals/materials. Researching is oriented towards the development of new technologies and products, Industry is an important partner to the Institute.
Slovenia	Pulp and Paper Institute	Research and development center, supports companies with a comprehensive portfolio of services and strategic networks at national and international level.
Slovenia	SRIP	Promotes transition to a circular economy, aiming to establish the country as a hub for circular economy expertise, attracting top professionals and foreign investors through its knowledge, R&D infrastructure, technologies, services, and regulatory support. It functions as a cluster-like national stakeholder.
Slovenia	Technology Park Ljubljana	Supports collaborative innovation ecosystems by co-creation and implementation of strategies, programs and services to increase regional innovation capacity.
Slovenia	The Jožef Stefan Institute	Research work oriented into applications in field of bio-based products. Basic and applied research in the fields of natural sciences and technology.
Slovenia	University of Ljubljana	Faculty of Chemistry and Chemical Technology,, Biotechnical Faculty Faculty of Mechanical Engineering in Ljubljana

BIO east

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