

Bioeconomy, BIOEAST, and the Opportunities of Hungary and Romania: A Blueprint for a Sustainable Future

Bioökonómia és a BIOEAST, a fenntartható átmenet aspektusai Magyarország és Románia vonatkozásában

A bioökonómia a fenntartható átmenet sarokkövévé vált, mely rendszerszerűen magába foglalja az agráriumot, az erdőgazdálkodást, az akvakultúrát, a biológiai alapú iparágakat és az energiaágazatot. Mivel az Európai Unió nagy hangsúlyt fektet erre a kritikus szektorpolitikára, Magyarország és Románia kulcsfontosságú helyetbe kerülhet. Mindkét ország jelentős biológiai alapú erőforrásokkal rendelkezik, és a BIOEAST kezdeményezés részeként, amely Közép- és Kelet-Európában segíti a biomaszra alapú gazdaságok kialakítását, előnyökre tehetnek szert az európai fenntarthatósági átmenet globális kontextusában. Ez a véleménycikk arra törekszik, hogy kiemelve a bioökonómia definícióit, bemutassa a BIOEAST kezdeményezést, és rávilágítson Magyarországra és Romániára egyéni sajátosságaira, kihívásaira és lehetőségeire.

Kulcsszavak: bioökonómia, fenntarthatóság, biomasz

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Bioeconomy has emerged as the cornerstone for sustainable transition, encompassing different sectors: agriculture, forestry, aquaculture, bio-based industries, and energy sectors in a systemic way. As the European Union focuses on this crucial policy area, Hungary and Romania stand at a pivotal juncture. Both countries do have significant bio-based resources and by being part of the BIOEAST initiative, which seeks to develop sustainable bio-based economies in Central and Eastern Europe, could benefit the European sustainability transition in the global context. This opinion article aims to highlight the definitions of bioeconomy, to present the BIOEAST initiative, and delve into the individual roles, challenges, and opportunities for Hungary and Romania.

Keywords: bioeconomy, sustainability, biomass

Critical transition

The European Union (EU), United States of America (USA) and China have their individual definitions and approaches for bioeconomy. Despite being driven by research and innovation and still lagging marketable fully fledged technological solutions bioeconomy offers a sustainable pathway out of fossil-based economy. The big countries are heavily investing in these sectors and promote innovation for enabling the transition towards a sustainable future. In this context the BIOEAST initiative provides a unique opportunity for 11 Central and Eastern European countries to set their own strategic research and innovation agenda and to develop sustainable bioeconomies that aligns with EU principles. Given the differences in the Western and Eastern European bioeconomies' landscapes, initiatives like BIOEAST are essential for deploying and ensuring that countries like Hungary and Romania are not left behind in the critical transition.

The transition to a sustainable bioeconomy is critical because it directly impacts the countries environmental, economic, and social future. Delays or failures in making this transition have long-lasting implications, thus needs a critical focus for policymakers. The term “critical transformative transition” in the context of bioeconomy refers to the urgent and transformative changes needed to address several intertwined challenges:

- Environment: Traditional economies are based on unsustainable exploitation of natural resources leading to biodiversity loss, soil degradation, water resources depletion. Transitioning to a bioeconomy can mitigate these impacts by supporting sustainable and renewable biological resources.

- Resilience: Relying on finite and scarce resources such as fossil fuels and minerals expose countries to economic vulnerabilities, including price volatility and geopolitical tensions. A shift to bioeconomy can help diversify sources and adding value at local level, thus increasing resilience.

- Research and technological innovation: The bioeconomy is intrinsically tied to advances in research and innovation, focusing on new the modern biorefinery concept and biotechnology, data sciences, and other fields. The transition is critical because falling behind in these areas could lead to reduced competitiveness.

- Social: A successful transition to a bioeconomy can potentially create new jobs and promote social equality by revitalizing rural areas and facilitating a more equitable distribution of benefits.

- Regulatory Alignment: With numerous countries and regions (EU, USA, China, etc.) adopting different approaches to bioeconomy, there's a risk of creating different standards and regulations that could hinder global efforts. The transition is critical to align these varying strategies into a cohesive and interoperable framework, bio-based materials and products standardization is critical for Europe. Who writes the standards could lead the markets.

- Global challenges: In the context of climate change with a growing global population and increasing demand for food-feed, water and energy the transition to a more sustainable and efficient bioeconomy becomes not just beneficial but necessary for planetary boundaries.
- Shocks and crises: Since 2008 the number of economic shocks and crises are exponentially growing. The extraordinary governmental measures are tending to become part of the everyday decision making. The unorthodox responses become the normalcy. Apparently the most important consequences of recent shocks and crises are on reshaping the global supply chains. There is a global tendency on reshaping and rethinking the global supply chains and trade relations including the supply on biomass and natural resources. Thus, very soon even the less developed countries and macro-regions should rethink their role in this context.

EU Bioeconomy and the BIOEAST Initiative

In the context of critical transition, the BIOEAST initiative is especially crucial for countries in Central and Eastern Europe. These countries often lack the infrastructure, policies, and R&D investments to fully participate in the bioeconomy. The initiative can provide the needed platform for these nations to catch up with Western European countries, making the region more competitive and sustainable. Most of the Western European EU member states does have a bioeconomy strategy and action plan. Recently the three Baltic countries, Poland and Croatia are developing their own bioeconomy roadmaps. The national level bioeconomy definition is crucial to be able to have an interconnected horizontal approach across different sectors and policies.

The EU defines bioeconomy as the sustainable production and processing of biological resources including waste for food-feed, material use, and energy (EU Bioeconomy Strategy, 2018). Moreover, considers the service sector as vital part of the bioeconomy. The emphasis is on sustainability and circularity, aiming to develop a more resource-efficient economy that is in line with environmental objectives. The finances of the EU bioeconomy strategy and action plan are driven by research and innovation priorities. Since 2012 the EU spent more than 5 billion Euro from Horizon 2020 and Bio-Based Industries Joint Undertaking, and currently is assigned a budget of 9 billion euro from Horizon Europe Cluster 6 and 2 billion from industry and Commission combined budget for a public private partnership Circular Biobased Europe Joint Undertaking. Both sources are focusing on research and innovation. Recently (September 2023) Ursula Von Der Leyen head of Commission announced the launch of the EU Biotech and Biomanufacturing Initiative. Most probably (not yet visible

when the article is published) will focus on the markets and on the valorization of research and innovation advancements from the past 10 years.

In the USA, bioeconomy is primarily seen through the lens of biotechnology and its applications across sectors such as agriculture, health, and energy (National Bioeconomy Blueprint, 2012). Early 2023 Biden-Harris administration announces new goals and priorities to advance American biotechnology and biomanufacturing. The focus is on innovation and commercialization, aiming to boost economic growth and ensure national security.

China's interpretation of bioeconomy is closely tied to its "Ecological Civilization" vision. The focus is on sustainable development and the utilization of bio-resources for industrial and societal advancement (Zhou et al., 2019, "China's bioeconomy: Current status, challenges and strategies"). A cornerstone of China's bioeconomy is the investment in bio-based materials and renewable energy.

If we compare, the USA's approach is highly focused on technology and innovation while China apparently combines ecological principles with industrial advancement. The EU aims for a balanced approach, merging economic growth with sustainability. Visibly an important competition started globally for the processing of available biomass. In this context the role of the Central and Eastern European countries' biomass and natural resources can be greatly appreciated, thus the macro region could gain a new role in the context of European discussions about strategic autonomy.

BIOEAST is a macro-regional governmental level initiative that aims to build sustainable bioeconomies in Central and Eastern Europe (BIOEAST Initiative, 2016). This initiative is significant as it allows countries in the region to share knowledge and adapt best practices, tailored to their unique challenges and opportunities. While the EU has a broad bioeconomy strategy, Central and Eastern European countries often lack the specific policies or the R&I infrastructure to fully capitalize on biomass potential. BIOEAST fills this gap by providing a collaborative platform for these countries, thereby enhancing regional coherence in line with the broader EU strategy. Three major pillars help the countries to deploy their bioeconomies: 1. strategic research and innovation agenda building, 2. science-policy dialogs in the macro-region and EU levels, 3. foresight exercises to help the decision makers. The initiative is dedicated to shaping policy that promotes research and innovation, facilitates knowledge transfer, and optimizes the allocation of available resources. It is a collaborative platform where member countries like Hungary and Romania can share knowledge, experience, and best practices, thereby contributing to the wealth of their societies and to the EU's bioeconomy. The idea is to utilize renewable biological resources sustainably and convert them locally into value-added products. It not only addresses ecological concerns but also holds the promise of economic growth, job creation, and social inclusion.

Conceptualizing the Hungarian and Romanian bioeconomies

The BIOEAST Initiative aims to build knowledge-based agriculture, forestry, and aquaculture in the bioeconomy. For this reason, the BIOEASTsUP Horizon 2020 EU project was launched under the auspice of the macro-regional governmental initiative to support eleven countries in building up their own bioeconomy strategies. While a project cannot develop national level strategies, instead there were developed 11 national concept papers which could serve the basis for the policy level discussion in each country for developing their own bioeconomy strategies. The concept papers have a triple goal. Firstly, to serve the ministries to generate deeper discussions at national level on the necessity of paradigm shift in economic thinking regarding renewable natural resources like biomass and the carrying capacity of an environment without which the circular economy and sustainable development cannot be achieved. Secondly, wishes to bring the current agricultural challenges into public consciousness, to raise awareness and to direct attention to the systemic approaches and the need to think in the context of circular bioeconomy as a promising tool to respond to global and regional challenges caused by the fossil-based economy based on excessive resource use. Thirdly, to demonstrate the wide range of options to create added value and the conditions for doing so.

Hungary's concept paper is in line with Hungary's long-term vision for sustainable agriculture and rural development but less on the industrial policies. However, show critical parts which need to be considered at industrial level. It aims to integrate bioeconomy as a cross-sectoral element by 2030. Notably, Hungary has been proactive in leveraging BIOEAST to collaborate at inter-ministerial level and with other member states, share expertise, and mobilize investments. However, despite a well-defined vision, Hungary faces challenges in developing a comprehensive strategy and action plan thus lagging in implementing sustainable practices in primary sectors such as agriculture and forestry in the context of sustainable approach of biomass processing.

Romania has enormous untapped potential in bioeconomy, especially in its agri-food and forestry sectors. While it doesn't have a separate bioeconomy strategy, it leverages multiple national programs and funding schemes to encourage bio-based industries. Romania's involvement in BIOEAST is promising but needs to transition from paper to practice. The key challenges for Romania include science-business collaborations and establishing a focused bioeconomy policy.

Comparing the two countries' concept papers both do miss a comprehensive governmental level bioeconomy strategy and action plan. Hungary is a way ahead in strategic alignment across ministries, whereas Romania operates through various national programs. On funding principles Hungary shows a better blend of public and private investments, while Romania predominantly relies on public funds.

Hungary is a moderate innovator country (2023 EU Innovation Scoreboard) while Romania is low-innovation country. The experts shows that both countries' bioeconomies are mainly driven by primary sectors: agriculture and forestry less on aquaculture. The fresh water based blue bioeconomy is untapped potential in both countries. The bulk of the biomass is exported as raw material without processing into value added materials. Beside the food and feed production the best examples are the processing into fuel and energy, despite that these are the lowest value-added processes. The industrial valorization of biomass and biowaste is lagging, despite the high potential of value-added possibility into advanced biochemicals and materials. On the latter the global market data shows a potential of 7% growth which is enormous potential to focuses the national industrial policies and investments.

In a way forward both Hungary and Romania need to fully engage with BIOEAST to harness the collective wisdom of the macro-region and the EU. In policy refinement Romania could benefit by formulating a focused bioeconomy strategy, drawing inspiration from Poland and Baltic states especially Estonia, which just recently (September 2023) promoted the national bioeconomy roadmap. Both countries should prioritize sustainability in their respective bioeconomy agendas.

The BIOEAST Policy Support Facility developed with the help of the European Commission (2020), and the BIOEAST foresight exercise (2021) emphasize the need to focus national priorities on bioeconomy. Experts indicates the need for specific programs to enable long term goals in the critical transformative transition. Three specific programs could benefit the countries' economies:

1. National bioeconomy education, research, and innovation program
2. National bioeconomy strategy and action plan
3. National bioeconomy development operational program for the industry.

Stakeholder interviews shows that bioeconomy priority should be taken up by the political leadership. Regardless of political sides (left or right) the political priority setting could provide guidance for sectoral policy makers and stakeholders on the most important pathways. Countries need to discuss the trade-offs and to invest in strategic sectors by having a holistic and systemic view of the sustainable transition.

Hungary and Romania, both key members of BIOEAST, have unique opportunities and challenges in the realm of European bioeconomy. As the EU intensifies its focus on this crucial sector, it is imperative for these countries to refine their strategies, embrace regional collaborations, and ensure sustainability. The future of bioeconomy in Central and Eastern Europe hinges on how well Hungary and Romania, among others, can navigate these opportunities for the benefit of critical transformative transition.

BIOEAST Initiative related documents: <https://bioeast.eu/documents/>