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ESG FINANCING AND BIOECONOMY IN UKRAINIAN POSTWAR DEVELOPMENT: SYNERGIZING EUROPEAN AND GLOBAL PERSPECTIVES

Abstract

This article formulates a theoretical approach to ESG financing and bio-economy in Ukrainian postwar development based on a review of European and global literature. The research applies bibliographic analysis following the PRIS-

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MA standard. The study examined and confirmed the synergy of the following three hypotheses: the irreversibility of the bioeconomic transformation is due to shifts in risks associated with resource use (H1); the ESG financing is an inherent part of the overall financing system for postwar economic development (H2); the Ukrainian economy's prosperity will be based on the ESG financing and bioeconomy development (H3). The article emphasises the relationship between structural reforms of the economy, the formation of an ESG financing system, and bioeconomy development in line with European principles as strategic directions for enhancing the economic security of Ukraine. It is substantiated that the integration of the European principles of bioeconomy and ESG financing into the strategic planning for national development increases the level of economic security, reduces the risks of dependence on raw material markets, and creates prerequisites for innovative growth. A limitation of the study and a prospect for further research is the absence of multidisciplinary frameworks that identify the elements of economic, social, and environmental systems critical to bio-based transformation processes and their outcomes.

Key Words:
bioeconomy, economic security, economy, ESG financing, governance, structural reforms.

JEL: O12, Q01, Q28.

2 tables, 3 figures, 42 references.

Problem Statement

As a prerequisite for a fair transition to sustainable development, the synergy of ESG financing and the bioeconomy provides a complementary foundation for ensuring the equitable and sustainable use of nature, especially biodiversity. The estimated value of the global bioeconomy today is between $4 trillion and $5 trillion, and it could reach $30 trillion by 2050. The importance of transitioning to sustainable development through ESG financing and the bioeconomy is indicated in national and regional strategic initiatives across nations like Namibia and South Africa to Mexico and Brazil, and from India and China to Japan, the EU, and the United States (Baskar et al., 2024).

In Ukraine's path toward European integration and post-war economic recovery based on European values, the adoption of best practices in ESG financ-

ing and bioeconomy is of crucial importance. In particular, the "Strategy for a Competitive and Sustainable EU Bioeconomy" aims to capitalise on the biotechnology revolution and builds on the 2012 and 2018 strategies, which achieved significant progress in research and innovation. This strategy for economic growth aligns with the Competitiveness Compass, the Clean Industrial Deal, and the Vision for Agriculture and Food (European Commission, n.d.). A key component of the shift to a more just, low-carbon, climate-resilient, and nature-positive economy is the global bioeconomy.

In the European Union, the main focus is on promoting innovation in the development of green sectors of the economy based on the circular use of resources, particularly biomass. The urgent financial instrument for regulating this process is the implementation and monitoring of ESG principles in financial systems of enterprises.

The bioeconomy and ESG financing are closely linked, with ESG standards being a major driver of funding for sustainable bioeconomy initiatives. Financial institutions have numerous opportunities not only to fulfil but also to exceed their Environmental, Social, and Governance (ESG) obligations in the bioeconomy, which harnesses renewable biological resources to produce goods and energy.

Although capital is available, even for fragile and conflict-affected situations (FCS), it seldom reaches so-called "frontier markets" because of perceived or actual dangers, such as reputational, political, and financial concerns. Conflict sensitivity is rarely, if ever, considered as a necessary condition for success in the vast majority of investment products available on the market today, which are primarily focused on green or development outcomes. More progressive actions garner even less attention than the relative passivity of adopting a conflict-sensitive perspective, which guarantees that an investment does not worsen the situation. In addition to offering the potential for reduced risk and higher financial rewards, well-designed investments have the ability to create more stable society in which they are made.

This is highly relevant for contemporary Ukraine. The modern economy of Ukraine is undergoing deep transformation driven by the simultaneous influence of multiple exogenous and endogenous factors: military actions, infrastructure degradation, energy challenges, global climate change, integration processes within the framework of rapprochement with the EU, and the transition to a sustainable development model. Under these conditions, the need for a systematic rethinking of approaches to managing structural change in the economy – with an orientation toward the Sustainable Development Goals (SDGs), which serve as a conceptual framework for economic, social, and environmental transformation – becomes paramount. In turn, within ESG efforts, competent ESG management and the intensive development of the bioeconomy are among the key pillars. Structural reforms, ESG financing, and bioeconomy development should be guided by a conflict-specific vision, especially within regional perspectives. The western regions of Ukraine differ markedly from the eastern and southern regions in terms of safety, infrastructure availability, investment attractiveness, social capital, ecological situation, and so forth. Thus, an approach to the bioeconomy should be highly specific and "customized", based on a deep understanding of potential, risks, challenges, and prospects.

ESG principles must be integrated into Ukraine's structural reforms in order to attract reconstruction funding and establish a sustainable bioeconomy. Key changes include strengthening institutions, improving the business climate to attract private investment, upgrading to the latest available technologies, and adhering to EU sustainability criteria, particularly in renewable energy and resource management. This entails establishing a consistent ESG risk-assessment framework for financial institutions, encouraging corporate sustainability reporting, and formulating a bioeconomy strategy that capitalizes on Ukraine's potential for long-term growth in sectors such as the blue economy.

Literature Review

Today, it is highlighted that the model for peacebuilding bioeconomy financing based on ESG principles requires new actors and new solutions to meet the core criteria of predictability, long-term investment, and diversification beyond reliance on a small number of government donors (Kantowitz et al., 2021; Ratnawati et al., 2024). When approached carefully, this new model can be a "win-win" for both the peacebuilding and financial sectors. Table 1 illustrates how ESG integration helps direct funds toward sustainable bio-innovation.

Table 1

The role of ESG in financing the bioeconomy

Direction	Essence
Establishing an Investment Framework	Environmental stewardship, social responsibility, and sound governance, or ESG criteria, provide investors with a uniform framework for assessing the benefits and dangers related to bioeconomy companies and initiatives.
Improving Capital Access	Strong ESG performance is typically associated with lower capital costs and easier access to funding. The bioeconomy is a perfect fit for this kind of investment because of its potential to have a good social and environmental impact.
Driving Innovation	ESG-linked funding promotes the creation of novel technologies that decarbonize conventional value chains using biotechnology and green chemistry.
Maintaining Equity and Sustainability	The "socio-bioeconomy" strategy ensures that economic activities respect the needs and expertise of Indigenous Peoples and Local Communities (IPLCs), preventing historical injustices and guaranteeing an equal distribution of benefits by integrating social and governance factors.

Source: made by the authors based on Kumar et al. (2025).

In order to address the underlying causes of conflict and advance stability, the convergence of the bioeconomy, peacebuilding, and funding for the Sustainable Development Goals (SDGs) entails utilizing investments in sustainable biological resource management and related innovation. As a vital route for sustainable development, the global bioeconomy is estimated to be worth $4 trillion to $5 trillion, yet it lacks funding – especially in vulnerable and conflict-affected areas (Dietz et al., 2024).

Academics stress that the bioeconomy must be envisioned, created, managed, and funded jointly. The bioeconomy encompasses a range of bio-based businesses and markets, from local and regional socio-bioeconomies to companies, industries, and economies that combine technologies with biodiversity, from biochemicals and bioplastics to various uses of biogenetics. This spectrum must be viewed as a whole (Lanzerath et al., 2022; Zagorsky et al., 2023).

Beladi et al. (2025) examine how green finance for ESG projects affects salaries and company dynamism in the economy. They demonstrate that while green financing can reduce the wage gap in the short term, this effect may diminish over time. Additionally, green financing for ESG projects has the potential to strengthen market competition and reduce wage disparity. In order to finance ESG investments that meet environmental and social norms and foster a sustainable and just economy, policy measures are proposed, including the development of green financing through favourable loan terms.

The economic impact of ESG reforms is becoming a major topic of study in both academic and policy circles. In particular, based on the operationalization of Amartya Sen's work on collective decision-making and multi-criteria decision assistance techniques, Siekmann (2025) incorporates stakeholder perceptions and regional transformation paths into a decision support system. Because the Rhenish lignite mining region in Germany is particularly impacted by the phase-out of coal and is intended to serve as a model region for a sustainable bioeconomy, the created decision support system is deployed there.

Alharbi (2024) investigates the effects of ESG reforms on economic growth in Gulf Cooperation Council (GCC) nations and examines how financial development contributes to these effects, using a fixed effect method on yearly data from 2000 to 2022. The findings show that financial development strengthens the association between ESG elements and economic growth. The results highlight the importance of strong governance and economic diversification, indicating that integrating ESG standards with financial development can promote a robust and sustainable growth model for the GCC countries. This study opens the door for further research on ESG adaptation in comparable contexts by providing novel insights toward customizing ESG policies for resource-dependent economies.

By offering sustainable substitutes for carbon-intensive goods, encouraging regenerative farming methods, fostering scientific advancements, and boosting industries like tourism and gastronomy, the bioeconomy presents enormous

promise for climate mitigation, adaptation, and resilience, according to McCarthy et al. (2025). It promises significant ecological, social, and economic benefits as it grows sustainably.

Sharma et al. (2022) examined the connection between corporate performance and ESG factors in 91 companies across Gulf Cooperation Council (GCC) countries. Their results demonstrated that market value was significantly and positively affected by governance transparency, indicating that companies with more robust governance disclosures earn greater investor trust and better financial outcomes. Similarly, Di Simone et al. (2022) investigated the connection between innovation, ESG practices, and economic sustainability at the corporate level. They discovered that social factors like community involvement and labour standards, in particular, are important components of ESG pillars that contribute to long-term financial success. Ahmad et al. (2024) likewise concludes that comprehensive disclosure of social, economic, and environmental sustainability initiatives improves corporate performance, highlighting the connection between sustainability goals and business expansion.

The European Union's Strategy for Financing the Transition to a Sustainable Economy, the International Finance Corporation's performance standards, and the World Bank's suggestions for national taxonomies of sustainable economic activities are just a few of the major international approaches and policy frameworks examined by the Ukrainian scholar Vartsaba (2025). The author investigates the applicability of these frameworks in the context of Ukraine's postwar reconstruction and its transition to a low-carbon and inclusive economy. The results support the conclusion that sustainable finance presents a strategic opportunity to construct a robust and competitive economy in addition to rebuilding vital infrastructure. In order to optimize the advantages of sustainable financial practices in Ukraine's recovery efforts, the paper emphasizes the necessity of institutional support, regulatory adaptation, and active collaboration between the public and private sectors.

The importance of green finance in guaranteeing Ukraine's sustainable economic development is examined by Ukrainian scientists Piskunov et al. (2025). The report examines the current situation of green finance in Ukraine and identifies the main obstacles and difficulties impeding its growth, including a weak legal system, restricted access to funding, and poor awareness among businesses. Promising development paths have also been highlighted, such as incorporating ESG criteria into financial management procedures, expanding public-private partnerships, and adopting European methods.

Numerous studies highlight the close connection between economic growth and environmental performance at the macroeconomic level. Khan et al. (2020), for instance, emphasize the use of renewable energy in logistics as a way to lower emissions and improve both economic and environmental performance. However, while the link between environmental factors and economic growth has been widely studied, a theoretical reinterpretation of the relationship between ESG financing and the bioeconomy is needed for post-war sustainable development.

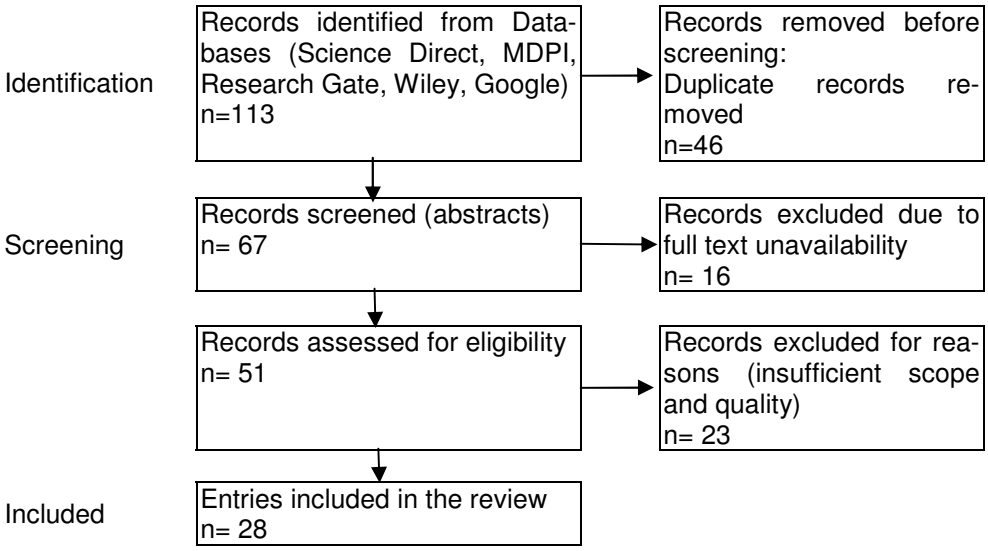
The purpose of this article is to formulate a theoretical approach to ESG financing and the bioeconomy in Ukraine's postwar development through a review of European and global literature.

Methodology

The study is based on bibliographic research to verify the hypotheses put forward. A combination of narrative and integrative literature review methods was employed. Due to the multifaceted nature of the topic, as well as the scarcity of good-quality research within the Ukrainian context, the Consensus app was employed in the initial stage of searching for publications to be included in the analysis sample. Overall, the standard PRISMA protocol was applied (see Figure 1).

Figure 1

PRISMA protocol for sampling



Source: developed by the authors.

The justification for choosing the PRISMA protocol lies in its clear algorithmic nature, the accuracy with which the results are verified, the standardised

methodology of its application, and the visualisation of the results. Consensus was used to identify relevant publications using search queries conducted in ScienceDirect, MDPI, Wiley, and Google (in English and/or Ukrainian), yielding 113 records. These records were then screened manually on the basis of their abstracts and findings.

The research methodology is based on the formulation and verification of the following hypotheses:

H1.The irreversibility of the bioeconomic transformation is due to shifts in risks associated with resource use;

H2. ESG financing is an inherent part of the overall financing system for postwar economic development;

H3. The Ukrainian economy's prosperity will be based on the ESG financing and bioeconomy development.

Research Results

H1. The irreversibility of the bioeconomic transformation is due to shifts in risks associated with resource use

Eversberg & Fritz (2022) contend that expanding the perspective beyond policy discussions and stakeholder views is necessary to gain a thorough grasp of the types of social transformation envisioned and contested in the bioeconomy debate. The authors investigate social tensions and alliances for and against bio-based, post-fossil transitions within the general population using representative German survey data from 2018. Using a relational analysis to map various socio-ecological mentalities, the authors discover that the current "socio-ecological space of possibilities" for changes in Germany is shaped by conflicts between growth- and sufficiency-oriented, high-tech-focused and techno-sceptical, and fossilist and post-fossil visions. Furthermore, the growth and fossilism dimensions show sharply different patterns of environmentally relevant practices. According to Eversberg & Fritz (2022), there is a considerable risk of social conflict since concerns pertaining to bio-based, post-fossil transformations are more contentious among the populace than in policy discussions. Establishing democratic and participatory transformation pathways that are both ecologically sustainable and socially just will be the main task.

Based on the FAO's approach, the Warchold & Pradhan (2025) developed a European bioeconomy database with 1,382 indicators. The findings indicate that there are bi-directional interactions involving both trade-offs and synergies in the BE-SDG nexus. SDG 13 is most strongly impacted by bioeconomy practices,

both favourably and unfavourably. The bioeconomy is most positively impacted by SDG 15 and negatively by SDG 12 (Warchold & Pradhan, 2025).

Saviotti (2017) correctly points out that the bioeconomy will depend on contemporary biotechnology and be extremely knowledge-intensive. The bioeconomy, like other significant discoveries, will create wealth and displace current economic activity through creative destruction. Fossil fuel suppliers are likely to lose while biological input suppliers are likely to gain. However, nations and areas that are hubs for the production of knowledge will typically benefit from the balance of power more than those that supply natural resources. As a result, nations with only declaratory bioeconomic development run the risk of being included in the "list" of outsiders.

A more detailed and methodical understanding of instrument combinations is crucial given the significance of policy instruments in organizing the execution and governance of bioeconomy transformations. A comprehensive analysis is especially important for evaluating the potential efficacy and legitimacy of bioeconomy policies, establishing best practices in instrument design, and determining where strategic changes could be required. According to Goritz et al. (2026), sectoral approaches in biotechnology and bioenergy typically offer more precise and tangible tools than holistic bioeconomy approaches, which are still more expansive and goal-oriented. Furthermore, compared to high-income nations, where tactics are less calibrated and more abstract, emerging economies frequently focus more on instrument specification. This implies that tactics may take on a more operational orientation in environments where the bioeconomy is presented as part of a developmental agenda, but political contestation surrounding bioeconomy goals appears to favour more symbolic and less detailed formulations in high-income settings.

H2. ESG financing is an inherent part of the overall financing system for postwar economic development

Environmental, Social, and Governance (ESG) is a framework designed to allocate funds to businesses that practice ethical and sustainable management. A number of organizations, including Sustainalytics, Refinitiv, S&P, and MSCI, provide ESG ratings for funds. These organizations use different approaches to assess businesses based on factors including labour practices and carbon emissions.

Scientists cover broader scope, considering green public finance concept. Green public finance includes allocating public funding to sustainable initiatives, integrating environmental concerns into budgeting and fiscal policies, and modifying government financial management to promote climate and environmental goals (Almenhali & Nobanee, 2021). This strategy seeks to improve fiscal transparency in climate-related investments, encourage sustainable development, and match government spending with initiatives for mitigating and adapting to climate change. Green bonds, environmental taxes, green budgeting, and incorporating

climate risk into public financial management (PFM) are important instruments. Core components of green public finance are summarized in Table 2 below.

Table 2

Core components of green public finance

Element	Description
Climate-sensitive public finance management	Adapting current public finance management systems to address climate change. This involves internal controls, budget processes, and administration of public investment projects that support climate-sensitive policies
Green budgeting	Climate objectives can be included into the national budget by identifying expenditures that support or impede environmental goals, tracking spending on climate programs, and ensuring fiscal policies support green transitions
Environmental taxes	Using resource and pollution taxes (such as energy and carbon taxes) to fund green initiatives and encourage eco-friendly behaviour
Green bonds	Issuing government-backed bonds expressly to fund environmentally beneficial initiatives like clean water, renewable energy infrastructure, or sustainable transportation
Fiscal incentives	Providing subsidies, tax breaks, and other financial assistance to encourage firms and families to embrace green practices and invest in sustainable technologies
Transparency and oversight	Improving parliamentary supervision, external audit functions (such as those of governmental audit organizations), and fiscal transparency to guarantee accountability for climate-related spending and goals

Source: based on Schioppi (2023), Gupta et al. (2024).

The findings of Zheng et al. (2025) demonstrate that green finance promotes improved national ESG performance. According to the heterogeneity test, countries with faster ICT development, better institutional quality, and higher levels of financial development see greater rise in national ESG performance from green financing. In particular, green finance advances green technology, which improves ESG performance; nevertheless, the method of upgrading industrial structure is not supported by the facts.

Rich empirical data on the connection between green financing and ESG performance from many nations and locations has been presented by various

academics, however the findings varied. In South Africa, Udeagha & Breitenbach (2023) examined data from the Southern African Development Community (SADC) between 1960 and 2020 using the Nonlinear Autoregressive Distributed Lag (NARDL) framework. They discovered notable variations in the connections between green finance, environmental quality, and economic growth across various nations. While the remaining nations exhibit symmetric behavior and linear long-term relationships, some have long-term asymmetric ties, while others have both short- and long-term asymmetric relationships. This suggests that a nation's economic structure and regulatory environment may have an impact on how green finance is implemented in different nations.

Meanwhile, as D'Amato & Korhonen (2021) correctly point out, dissonances exist between theoretical objectives and practical implementation in the field of integrating the green economy, circular economy, and bioeconomy into a strategic sustainability framework. The authors correctly emphasize that, while the complementary understanding of the circular economy, bioeconomy, and green economy provides important guidelines for post-Covid-19 sustainability transformations, there is a need for more holistic, systems-wide, and integrative research on potentially competing or supplementary sustainability stories.

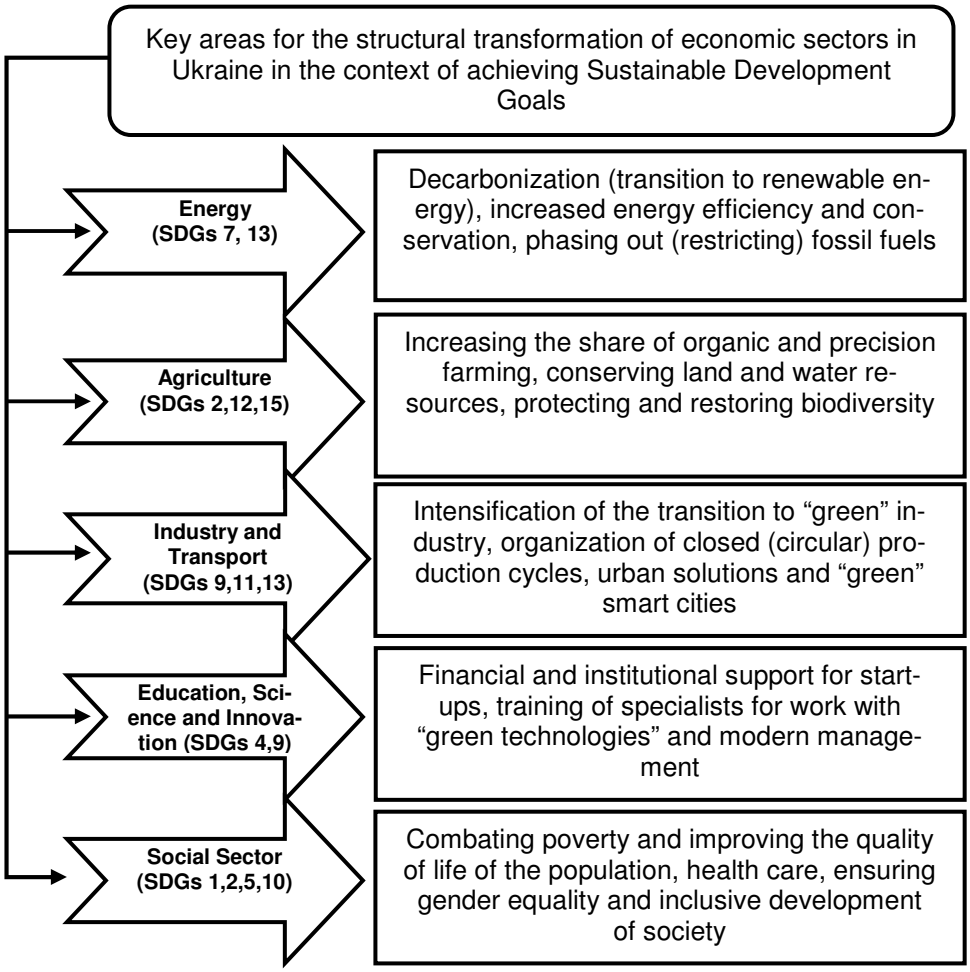
H3. The Ukrainian economy's prosperity will be based on the ESG financing and bioeconomy development

The goal of the bioeconomy is to establish a sustainable economic system that can boost GDP and employment while reducing dependency on fossil fuels. It looks at how important economic sectors like GDP, employment, supply, and demand are impacted by the transition to renewable biological resources. It entails simulating the transition's potential for expansion and employment creation, as well as its effects on the trade balance and related expenses like implementation and compliance. However, prudent policy and investment are necessary for the bioeconomy to be effective.

In their study, Pashakolaie et al. (2025) make an effort to incorporate contemporary bioeconomy into macroeconomics. Bioenergy, biochemicals, and biomaterials are examples of contemporary bioeconomy technologies that were incorporated into the macroeconomic framework in this study. Based on a thorough literature analysis, the study investigated the function of the bioeconomy across five basic macroeconomic domains: supply, demand, GDP, markets, and socioeconomic aspects (employment and social cost). The results show that the bioeconomy has an average direct and overall employment impact of 1.4 and 2.5 FTE/MW, respectively. Supply-side effects rely on the availability of resources, whereas demand-side effects are mostly influenced by customer behavior and views. Both engineers and economists can benefit from the findings, which promote resilient bio-based macroeconomics, sustainable policy development, and strategic decision making by bridging the technological and macroeconomic systems.

Figure 2

Promising directions for the sectoral transformation of Ukraine's national economy to achieve Sustainable Development Goals



Source: Ivanchenkov (2025).

Creating policies that include the bioeconomy with current economic development, encouraging a transition from a linear to a circular economy, and utilizing new technology are all structural reforms for the bioeconomy. To promote sustainable practices and establish new value chains, from the waste generated in

conventional sectors to sustainable bioproducts and services, this calls for changes to regulations, market-based policies, investments in education, and public awareness. At first glance, the Ukrainian academic community's vision of policies for industrial structural transformation looks quite comprehensive and competent. Figure 2 shows the priority areas for structural transformation of Ukraine's main economic sectors proposed by the Ukrainian researcher Ivanchenkov (2025) in the context of achieving the SDGs, demonstrating the integration of sectoral goals with the global UN agenda. It was found that the successful implementation of the SDGs requires the adaptation of strategic documents and a comprehensive change in the sectoral structure, which involves environmental modernization, social inclusion, increasing institutional capacity, and strengthening the role of innovation.

Moreover, current research shows that combining the bioeconomy with Environmental, Social, and Governance (ESG) principles provides a strategic framework for post-war nations to rebuild by promoting social support, economic growth, and environmental recovery (Kumar et al., 2025). While ESG offers a framework to guarantee this development is resilient, sustainable, and inclusive, the bioeconomy focuses on employing biological resources to replace fossil-based products, which can boost innovation, create jobs, and revive economic activity. This strategy can assist nations in avoiding the drawbacks of conventional, linear economies and constructing a more competitive and sustainable future (Hafner et al., 2020; Cummins, 2025).

Discussion

Meanwhile, neither in scholarly literature nor in state-level programmatic documents in Ukraine concrete proposed steps and their strong science-based justification and implication forecasting under various scenarios are observed.

The idea of "green recovery" is currently dispersed across numerous programs and industries in Ukraine due to the country's lack of a cohesive national reconstruction strategy, despite political commitment to "building back better" and sustainability. Even among international partners, a holistic, coordinated approach is still lacking, and stakeholders frequently concentrate on discrete green projects without fully integrating green recovery into their strategic vision. In this context, Ukraine can learn a lot from the EU's experience incorporating sustainability into post-crisis recovery.

By directing sustainable investments and linking funds to climate targets, the EU's sustainable finance and recovery framework – which combines the EU Taxonomy for Sustainable Activities with the Recovery and Resilience Facility – aims to accelerate the green transition. Implementation difficulties, the necessity of strategic planning, and strict oversight are highlighted by lessons learned from

EU member states. Despite these differences, the Recovery and Resilience Facility's structure and guiding principles are significantly incorporated into the Ukraine Facility and the Ukraine Plan, which use its framework to guarantee steady, predictable funding for reconstruction. By integrating sustainability goals like climate neutrality, they seek to bring national recovery initiatives into compliance with EU environmental criteria.

As it is known, the mandatory use of bioethanol in gasoline has long been followed by European countries, the USA and Brazil. Many farmers in Western countries invest funds in the construction of enterprises for the production of ethyl alcohol, raise grain prices, participate in the distribution of profits.

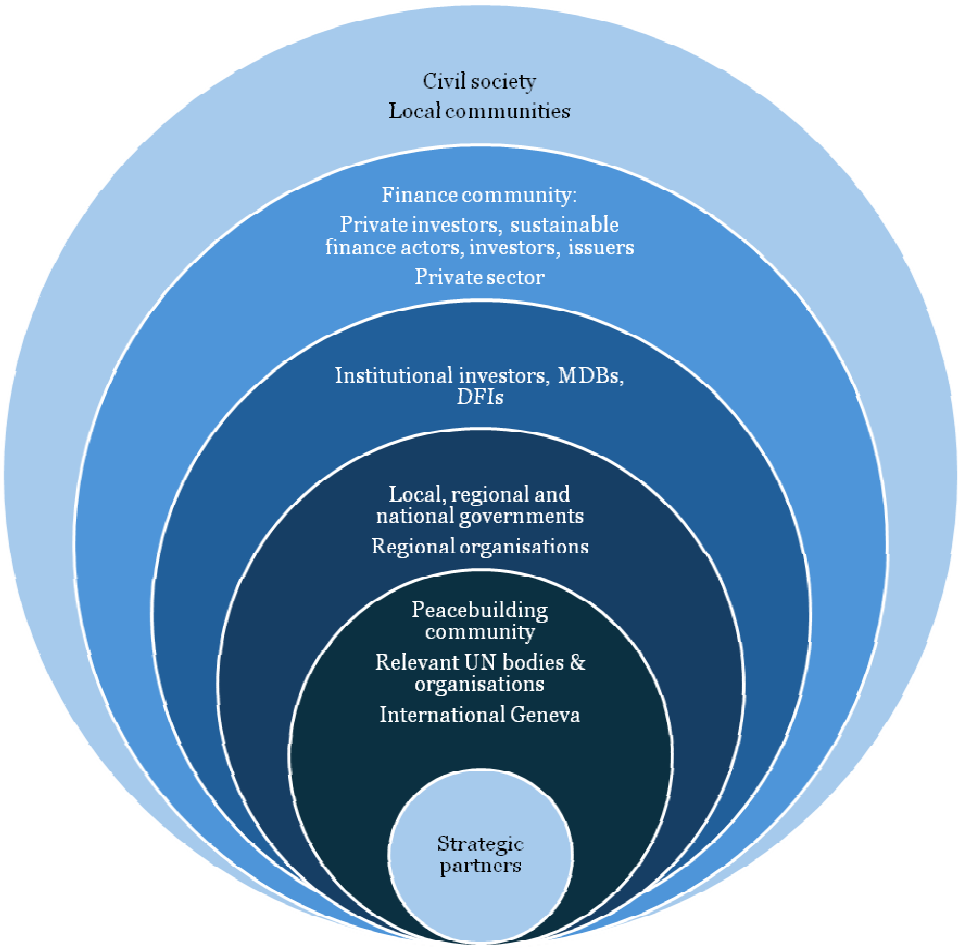
For many years, the creation and execution of innovation policy funding programs have been the focus of political and scientific discussion. One topic that is frequently highlighted is the growing popularity of mission-oriented innovation policies. Prochaska & Schiller (2021) claim that there is still a lack of clarity and precision of how missions originate, what rhetoric goes along with them, and how they are ultimately carried out. This study raises the question of whether mission-oriented innovation strategy truly adheres to a rigid top-down logic or if the policymaking process more closely reflects a particular evolutionary scheme. Many policy strategy articles demonstrate that the shift from biotechnology to a much broader bioeconomy does not occur in a linear sequence. This investigation cannot confirm disproportionate priority or neglect of a specific industry. However, there is a noticeable shift in the bioeconomy. As a result of the leitmotif change, biotechnology funding was significantly cut, while R&D in the agriculture sector increased. Furthermore, it is obvious that the issue of missing markets, as predicted in theoretical research, may be empirically validated. In terms of public involvement, little effort has been put into the practical implementation of bioeconomical knowledge, which is why the projected shift to bio-based economic activity is falling behind schedule.

Regional bioeconomy imbalances within a country stem from unequal access to resources, technology, capital, and knowledge, resulting in divergent development paths (Rasshyvalov et al., 2024). And this should not only be considered, but also serve as the foundation for the design and operation of management processes for implementing structural reforms that contribute to the alignment of economic, environmental, and social goals.

In this vein, Ukraine should pay close attention to the newly emerging notion of "peace finance". The so-called "Peace Finance" is a key new way to harness peacebuilding organizations' huge core expertise to guide and make better, peace-aligned investment decisions that reduce risks for investors while also strengthening community resilience and contributing to economic stability. Peace Finance has the ability to boost human development and provide decent lives for those living in fragile and conflict-affected areas (Bhatia et al., 2024). Systemic change necessitates the establishment of a Peace Finance ecosystem (see Figure 3).

Figure 3

The global Peace Finance ecosystem: uniting resources and expertise for coordinated action, increased efficiency, scalability, and effect



Source: Bhatia et al. (2024).

Indeed, the state of war necessitates the development of the defence sector in Ukraine, but it should be clearly distinguished from the ESG agenda. Integrating the bioeconomy to this agenda may become an optimal way of achieving this distinction.

Despite its transformational potential, the contemporary bioeconomy already makes a substantial contribution to national economies all around the world. For instance, the food business accounts for 25% of the estimated €2.2 trillion in turnover generated by the bioeconomy in the European Union. The agricultural sector employs about 17.5 million people in bio-based economic activities (Stark et al., 2022). In 2017, Argentina's bioeconomy made up 16.1% of the nation's GDP. About 12% of Malaysia's GDP came from bio-based value-added in 2016 (Stark et al., 2022). It is evident that nations vary in their socioeconomic and technological growth paths, as well as their endowments of natural resources. In addition to influencing the stages and future prospects of bioeconomic transformation, these contextual factors also lead to varying perspectives on the relative importance of sustainability objectives and technological change alternatives (Laibach et al., 2019).

Understanding this is crucial for Ukraine today. "Copying" EU strategies without regard for national and, even more importantly, in-country regional specifics, particularly during wartime, leads to the declarativeness of developed strategies (Bondarenko et al., 2022; Bashtannyk et al., 2025). At the same time, local initiatives, lacking "orientations", become scattered and lose a significant part of their potential.

In order to fully realize the potential of ESG financing and bioeconomy growth for post-war recovery and EU integration, structural reforms in Ukraine's economy – particularly in the legal, financial, and product market systems – are essential (Mironova et al., 2022; Karolyi et al., 2025). Strengthening institutions, conforming to EU environmental and social norms, and drawing in foreign ESG investments to finance resilient, sustainable infrastructure and industrial clusters are, in fact, important improvements (Sytnyk et al., 2022). However, this requires not unified but rather a strategic approach to recovery that prioritizes green and sustainable development alongside institutional, managerial and financial stability.

Conclusions

The study confirmed that the hypotheses (H1, H2 and H3) put forward were naturally integrated into Ukraine's post-war economic recovery. Ukraine's experience is unique among countries facing political and socio-economic crises. Indeed, the irreversibility of the bioeconomic transformation is due to shifts in risks associated with resource use (H1).The Ukrainian economy's prosperity will be based on the ESG financing and bioeconomy development (H3). The ESG offers a framework to guarantee this development is resilient, sustainable, and inclusive. The bioeconomy focuses on employing biological resources to replace fossil-based products, which can boost innovation, create jobs, and revive economic activity. Consequently, the ESG financing is an inherent part of the overall financing system for postwar economic development (H2). This strategy can assist in avoid-

ing the drawbacks of conventional, linear economies and constructing a more competitive, sustainable future.

One significant study gap is the absence of multidisciplinary frameworks that pinpoint the elements of economic, social, and environmental systems that are important for bio-based transformation processes and their outcomes. To support sustainable bioeconomic innovation processes under various contextual conditions, it is especially important to better understand what propels the development of important enabling technologies and what mix of policy incentives is required.

For structural reforms in Ukraine to be successful, bioeconomy concerns should be organically integrated into the ESG agenda, which would prevent the erosion of the national ESG landscape and open broad and unique perspectives for development even in the state of war. In turn, this implies a clear differentiation of regional specificities based on an analysis of not only the current state of affairs but also prospective parameters, including those related to the peacebuilding domain.

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