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PRIORITY DEVELOPMENT OF THE GREEN ECONOMY IN AZERBAIJAN

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Formulation of the problem. The transition to a green economy is one of the key directions of global development; however, the decarbonization process is accompanied by significant risks that can weaken the economic security of a state. This study applies comparative analysis of international experiences and statistical data to evaluate the economic and social impacts of green policies. *The purpose of the study.* Additionally, the paper emphasizes the importance of adapting global decarbonization frameworks to the specific economic structure of resource-dependent states such as Azerbaijan, highlighting the need for flexible policy tools. *The object of the study* is the organizational, methodological and technological aspects of strengthening internal control systems through the implementation of modern digital technologies and innovative monitoring tools. *Research methods*. Using a descriptive-analytical methodology based on secondary data, regulatory documents, corporate reports, and international assessments, the paper evaluates the extent to which digitalization, automation, data analytics, and continuous control mechanisms have strengthened internal control effectiveness. *The main hypothesis.* The findings provide practical guidance for policymakers, businesses, and energy planners in implementing sustainable strategies. *Present of the main material*. This paper analyzes the main threats that arise during ecological transformation: financial, technological, energy-related, institutional, and social. The shift toward green technologies requires large-scale investments, which increase fiscal pressure, create risks of growing external dependence, and widen the technological gap. Additional threats emerge in traditional economic sectors, including declining competitiveness of the hydrocarbon industry and the need to restructure industrial infrastructure. Special attention is given to Azerbaijan, which, following COP29, intensified its policies aimed at developing renewable energy sources (solar and wind capacity in Jabrayil, Fuzuli, the Caspian basin), establishing green zones, and modernizing the energy system. *Originality and practical significance*. Despite progress, the country faces shortages of domestic investment, technological dependence on imported high-tech equipment, the need to modernize digital networks, and challenges related to social adaptation of workers in traditional sectors. *Conclusions and prospects for further research.* The results show that successful risk management requires systematic state policy, development of national technological potential, strengthening of energy infrastructure, improvement of legislation, and implementation of “just transition” programs. The material may be used in developing a long-term sustainable development strategy for Azerbaijan.

Keywords:
economic security, green economy, risks, sustainable development, investments.

ПРІОРИТЕТНИЙ РОЗВИТОК ЗЕЛЕНОЇ ЕКОНОМІКИ В АЗЕРБАЙДЖАНІ

Постановка проблеми. Перехід до зеленої економіки є одним із ключових напрямків глобального розвитку; проте процес декарбонізації супроводжується значними ризиками, які можуть послабити економічну безпеку держави. У цьому дослідженні застосовується порівняльний аналіз міжнародного досвіду та статистичних даних для оцінки економічного та соціального впливу зеленої політики. *Мета дослідження*. У статті наголошується на важливості адаптації глобальних рамок декарбонізації до специфічної економічної структури ресурсозалежних держав, таких як Азербайджан, підкреслюючи необхідність гнучких інструментів політики. *Об'єктом дослідження* є організаційні, методологічні та технологічні аспекти зміцнення систем внутрішнього контролю шля-

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хом впровадження сучасних цифрових технологій та інноваційних інструментів моніторингу. *Методи дослідження*. Використовуючи описово-аналітичну методологію, засновану на вторинних даних, нормативних документах, корпоративних звітах та міжнародних оцінках, у статті оцінюється ступінь, до якої цифровізація, автоматизація, аналітика даних та механізми безперервного контролю посилили ефективність внутрішнього контролю. *Основна гіпотеза*. Результати дослідження надають практичні рекомендації для політиків, бізнесу та планувальників енергетики щодо впровадження стратегій сталого розвитку. *Виклад основного матеріалу*. У цій статті аналізуються основні загрози, що виникають під час екологічної трансформації: фінансові, технологічні, енергетичні, інституційні та соціальні. Перехід до зелених технологій вимагає масштабних інвестицій, що збільшує фіскальний тиск, створює ризики зростання зовнішньої залежності та розширює технологічний розрив. Додаткові загрози виникають у традиційних секторах економіки, включаючи зниження конкурентоспроможності вуглеводневої промисловості та необхідність реструктуризації промислової інфраструктури. Особлива увага приділяється Азербайджану, який після COP29 активізував свою політику, спрямовану на розвиток відновлюваних джерел енергії (сонячні та вітрові потужності в Джебраїлі, Фізулі, Каспійському басейні), створення зелених зон та модернізацію енергетичної системи. *Оригінальність та практична значущість*. Незважаючи на прогрес, країна стикається з дефіцитом внутрішніх інвестицій, технологічною залежністю від імпортного високотехнологічного обладнання, необхідністю модернізації цифрових мереж та викликами, пов'язаними із соціальною адаптацією працівників у традиційних секторах. *Висновки та перспективи подальших досліджень*. Результати показують, що успішне управління ризиками вимагає системної державної політики, розвитку національного технологічного потенціалу, зміцнення енергетичної інфраструктури, вдосконалення законодавства та впровадження програм «справедливого переходу». Матеріал може бути використаний при розробці довгострокової стратегії сталого розвитку Азербайджану.

Ключові слова:
економічна безпека, зелена економіка, ризики, сталий розвиток, інвестиції.

Formulation of the problem. Modern global trends demonstrate the necessity of transitioning to environmentally sustainable development models. Intensified climate change, global decarbonization targets under the Paris Agreement, and the expansion of renewable energy technologies create urgent challenges for resource-dependent economies. Historically, Azerbaijan has relied heavily on oil and gas revenues, which makes the transition to green economy both a strategic opportunity and a potential source of financial and social risks. Mismanagement of this process could increase dependence on imported technologies and reduce competitiveness in international markets. Intensified climate change, rising international decarbonization requirements, changes in global energy demand, and the expansion of green technologies create new conditions for the functioning of national economies. For Azerbaijan, a country with significant resource potential, the transition to a green economy is both a strategic opportunity for diversification and a source of internal and external risks. Even minor delays in this transition can increase long-term economic vulnerability.

At the same time, the dynamics of global energy markets demonstrate that countries delaying ecological reforms face higher long-term adaptation costs, which further increases the urgency of timely policy implementation for Azerbaijan.

The relevance of the topic is driven by the fact that the green transition affects all key sectors: energy, industry, finance, labor markets, investment policy, and the state's international obligations. Mismanagement of this process can lead to increased dependence on imported technologies, growing social tension, and reduced competitiveness.

The scientific significance of the work lies in systematizing the risks of the green transition in the context of economic security and identifying threats specifically relevant to resource-based economies such as Azerbaijan.

This also expands the academic understanding of how environmental reforms interact with macroeconomic stability in emerging economies, enriching the comparative literature on green transformation.

Research objectives:

define the theoretical and methodological foundations of the green economy

identify key groups of risks affecting economic security

analyze threats relevant to Azerbaijan

propose measures to minimize risks and strengthen economic resilience

Analysis of recent research and publications. The practical significance of the results

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lies in their potential use when forming state policies on green development, developing energy security strategies, and forecasting economic impacts. The study also contributes to understanding how structural reforms can support long-term sustainable growth.

The purpose of the study is to identify and classify the risks to economic security during the transition to a green economy and to analyze their impact on Azerbaijan's economic stability.

Presentation of the main research material. A green economy is a development model focused on efficient resource use, emissions reduction, ecological modernization of industries, and improved quality of life. UNEP defines it as an economy that ensures low-carbon development and social inclusiveness.

According to UNEP, it also emphasizes social inclusiveness and low-carbon growth, while OECD highlights the importance of innovation and technological advancement. For Azerbaijan, this implies adapting global best practices to local resource availability, workforce skills, and economic structure.

A green economy implies reduced emissions, rational resource use, and social inclusion.

Economic security is the ability of a state to maintain the stability of its economic system while preventing internal and external threats.

In the context of the green transition, economic security depends on: stable financial resources; resilience of the energy system; the economy's adaptability to new technological structures; reduced dependence on imported strategic goods (Table 1).

Table 1 – Key risk groups

Risk group	Main content
Financial	Investment deficit, rising costs
Technological	Import dependence, technological gap
Energy	Unstable generation, insufficient infrastructure
Social	Unemployment in traditional sectors
Institutional	Weak regulation, corruption risks
Sectoral	Decline in resource-based industries

Source: developed by the author

For example, Azerbaijan requires an estimated $2-3 billion annually to achieve its renewable energy targets, while domestic green finance infrastructure is limited. These financial constraints slow down implementation and make long-term planning more difficult. Similar challenges are observed in other developing countries, highlighting the importance of international partnerships and green bonds to mitigate fiscal risks.

Furthermore, volatility in global capital markets increases uncertainty for long-term renewable projects, making stable regulatory frameworks especially important (Figure 1).

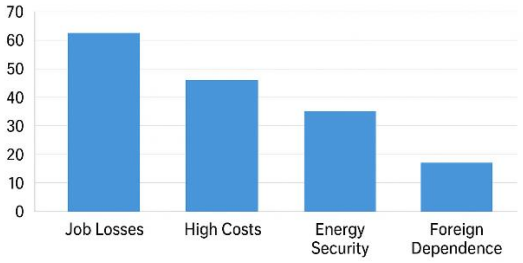

Figure 1 – Risks and Threats to Economic Security during the Green Transition
Source: developed by the author based on [1-8]

This chart illustrates the prevalence of different risk types according to international studies. Financial and social risks are particularly prominent in resource-based economies like Azerbaijan, where job losses in traditional sectors and investment deficits pose serious threats.

The chart visualizes the most common threats mentioned in international studies. The greatest risk is potential job loss (63%),

especially in traditional sectors such as oil and gas. High costs (47%) reflect the need for large investments in infrastructure and technology. Energy threats (35%) relate to the instability of renewable energy generation and insufficient storage. The smallest but still significant risk is external dependence (17%), caused by technology imports.

Achieving decarbonization goals requires annual investments of billions of dollars (IEA, 2024). Azerbaijan faces high capital costs for renewables and grid modernization, alongside a limited domestic green finance market. This increases long-term project risks and reduces investor confidence.

The state faces increased budgetary pressure due to subsidies and tax incentives for green projects. Without careful planning, this may create additional burdens on public finances.

The green bonds market depends on global trends, interest rates, and regulatory changes, making it difficult to rely on such instruments as a stable long-term financing source (Table 2, Figure 2).

Table 2 – Main challenges on the path toward a green economy

Country/region	Annual investments (bn $)	Financing gap	Source
EU	~620	Low	IEA, 2024
China	~900	Medium	IEA, 2024
Azerbaijan	2-3	High	Ministry of Energy, 2023
Developing Countries	1200+	Very high	World Bank, 2023

Source: developed by the author based on [11-13]

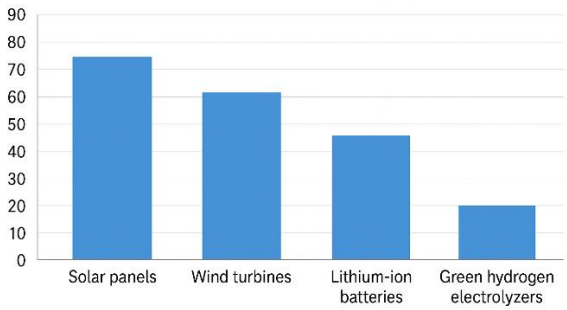

Figure 2 – Share of Imported Key Renewable Technologies in World Trade (%)
Source: developed by the author based on [9; 10]

The chart shows global import shares of strategic green technologies. Solar panels lead (~75%), followed by wind turbines (62%). Lithium-ion battery imports account for ~45%, highlighting dependence on external suppliers. Electrolyzers have the smallest share (20%) but are rapidly growing due to hydrogen energy development.

This technological dependence represents a significant economic security risk for developing economies, including Azerbaijan.

Technological risks: Tech dependence: most renewable components are imported from China; Technological gap: local industry may fall behind global standards; Cyber threats: automated smart grids and digital stations are vulnerable; Limited domestic R&D capacity, which slows the assimilation of advanced low-carbon technologies and increases dependency on foreign expertise

Structural risks: Declining revenues from oil and gas; Rising production costs due to environmental standards; Social changes: job losses in traditional sectors.

Azerbaijan example: solar and wind projects reduce reliance on thermal power plants, requiring workforce retraining.

Institutional risks: Insufficient regulatory framework; Corruption risks in large investment allocation; Poor coordination among state bodies in ecological reforms (Table 3).

The results show that successful risk management requires systematic state policy, development of national technological potential, strengthening of energy infrastructure, improvement of legislation, and implementation of

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"just transition" programs. The material may be used in developing a long-term sustainable development strategy for Azerbaijan.

Table 3 – Main Risks to Energy Security in Renewable Energy Systems

Risk	Manifestation	Consequence
Generation instability	Wind/solar fluctuations	Energy deficit
Storage shortage	Difficulty covering peaks	Grid failures
Cyber risks	Attacks on digital systems	Infrastructure disruption

Source: developed by the author based on [12-13]

Rising social inequality due to higher energy tariffs. In Azerbaijan, this may disproportionately affect rural communities and workers in the oil and petrochemical industries. Green projects in the Caspian region and Karabakh create new jobs but require retraining programs to ensure workforce adaptation. Lessons from other countries show that early social programs reduce public resistance to energy transitions.

In addition, insufficient public awareness of ecological reforms may create communication gaps, reinforcing resistance and slowing the adoption of new technologies.

Unemployment risks in coal and petrochemical industries. Regional imbalances investments concentrate in developed areas.

Azerbaijan example: green projects in Karabakh and the Caspian region create new jobs but require state-supported balancing measures and targeted training programs for workers.

Risk Mitigation Measures and Strengthening Economic Security. Azerbaijan can also establish a state green investment fund and attract international partners through public-private partnerships. Such financial instruments have successfully supported renewable projects in countries like China and the EU, providing both funding and risk-sharing mechanisms: development of green bonds; establishing a state green investment fund; attracting international partners through public-private partnerships; Technological measures; incentivizing local production of renewable energy components; creating innovation technoparks; supporting digitalization of the energy sector.

Energy resilience: construction of energy storage systems; modernization of distribution grids; development of hybrid energy systems; strengthening cross-border energy cooperation to stabilize supply and integrate renewable capacities.

Social programs: workforce retraining programs; protection of vulnerable groups during tariff changes; development of green education.

Institutional reforms: updating legislation; anti-corruption control mechanisms; improved coordination among ministries.

Conclusion and the prospect of further research. The transition to a green economy is a strategic direction for Azerbaijan after COP29; however, it is accompanied by serious risks that may reduce economic stability. Effective management of these risks requires coordinated state policy, investment in national technological capacity, modernization of energy infrastructure, and social programs for workforce adaptation. In addition, international collaboration, cybersecurity development, and continuous monitoring of economic impacts are essential to ensure a just and sustainable green transition. The most significant threats relate to finance, technology, energy stability, and institutional limitations.

Equally important is the development of human capital capable of supporting innovation, as the success of the green transition depends not only on infrastructure but also on professional competencies.

To minimize these threats, the following are necessary: state support for investments; stimulation of national technology production; modernization of the energy system; workforce training and social programs; development of cybersecurity; improvement of environmental regulations.

The study shows that the green transition is not only strategically important but also a complex process requiring thorough analysis of risks and their impacts on national economic security. For resource-based economies like Azerbaijan, these challenges are intensified by the need for structural transformation. Despite this, the green transition presents opportunities: development of innovation, increased energy independence, new markets and jobs,

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international cooperation, and long-term investments.

The transition to a green economy is one of the key directions of global development; however, the decarbonization process is accompanied by significant risks that can weaken the economic security of a state. This study applies comparative analysis of international experiences and statistical data to evaluate the economic and social impacts of green policies. Additionally, the paper emphasizes the importance of adapting global decarbonization frameworks to the specific economic structure of resource-dependent states such as Azerbaijan, highlighting the need for flexible policy tools. The findings provide practical guidance for policymakers, businesses, and energy planners in implementing sustainable strategies. This paper analyzes the main threats that arise during ecological transformation: financial, technological, energy-related, institutional, and social. The shift toward green technologies requires large-scale investments, which increase fiscal pressure, create risks of growing external dependence, and widen the technological gap. Additional threats emerge in traditional economic sectors, including declining competitiveness of the hydrocarbon industry and the need to restructure industrial infrastructure.

With proper risk management, the green transition can become a driver of sustainable growth, innovation, and competitiveness for Azerbaijan.

References

1. Asian Development Bank. (2023). Green Energy Transition in Asia. Manila: ADB.
2. European Commission. (2023). Fit for 55: Policy Package Overview. Brussels: European Commission.
3. International Energy Agency. (2024). Energy Technology Perspectives. Paris: IEA.
4. International Energy Agency. (2023). World Energy Investment Report. Paris: IEA.
5. IPCC. (2022). Mitigation of Climate Change. Geneva: Intergovernmental Panel on Climate Change.
6. Ministry of Energy of Azerbaijan. (2023). Renewable Energy Development Report. Baku: Ministry of Energy of Azerbaijan.
7. OECD. (2023). Financing Climate Action. Paris: OECD Publishing.
8. OECD. (2022). Green Growth Indicators. Paris: OECD Publishing.
9. UNECE. (2023). Green Economy Transition Guidelines. Geneva: United Nations.
10. UNEP. (2022). Green Economy Initiative Report. Nairobi: UNEP.
11. UNEP. (2023). Global Environment Outlook. Nairobi: UNEP.
12. UNFCCC. (2023). Global Stocktake Technical Report. Bonn: UNFCCC Secretariat.
13. World Bank. (2023). Green Growth Opportunities for Developing Countries. Washington, DC: World Bank.
14. World Bank. (2024). Renewable Energy Market Overview. Washington, DC: World Bank.
15. World Economic Forum. (2023). Energy Transition Index. Geneva: WEF.

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