



CHALLENGES OF GREEN FINANCE IN THE TRANSITION TO A SUSTAINABLE ECONOMY: AN ANALYSIS OF UZBEKISTAN'S BANKING SECTOR

Tashkent State University of Economics

Faculty of Economics

Samadova Zarinabonu Farhod qizi

Samadovazarina388@gmail.com

ORCID: 0009-0001-9398-6141

BARQAROR IQTISODIYOTGA O'TISHDA YASHIL MOLIYANING MUAMMOLARI: O'ZBEKISTON BANK SEKTORINING TAHLILI

Toshkent davlat iqtisodiyot universiteti

Iqtisodiyot fakulteti

Samadova Zarinabonu Farhod qizi

Samadovazarina388@gmail.com

ORCID: 0009-0001-9398-6141

Abstract: *The transition to a sustainable economy requires effective financial mechanisms capable of supporting environmentally friendly investments. In emerging economies such as Uzbekistan, the development of green finance is constrained by structural and institutional challenges, particularly within the banking sector. This study examines the key barriers to green finance in Uzbekistan by analyzing the role of the banking system over the period 2015–2023. The research is based on secondary data obtained from the OECD, European Bank for Reconstruction and Development, and the Central Bank of Uzbekistan. A combination of descriptive analysis and econometric modeling is applied to evaluate the relationship between financial sector development and green finance accessibility.*

Key words: *green finance, sustainable economy, banking sector, investment, financial development, green projects.*

Annotatsiya: *Barqaror iqtisodiyotga o'tish ekologik jihatdan qulay investitsiyalarni qo'llab-quvvatlay oladigan samarali moliyaviy mexanizmlarni talab etadi. O'zbekiston kabi rivojlanayotgan iqtisodiyotlarda yashil moliyaning rivojlanishi, ayniqsa bank sektori doirasida, tarkibiy va institutsional muammolar bilan cheklanadi. Ushbu tadqiqot 2015–2023 yillar davomida bank tizimining rolini tahlil qilish orqali O'zbekistonda yashil moliya rivojlanishidagi asosiy to'siqlarni o'rganadi. Tadqiqot OECD, European Bank for Reconstruction and Development hamda Central Bank of Uzbekistan ma'lumotlariga*

asoslangan. Moliyaviy sektor rivojlanishi va yashil moliyaga kirish imkoniyati o'rtasidagi bog'liqlikni baholash uchun tavsifiy tahlil va ekonometrik modellashtirish usullari qo'llanilgan.

Kalit so'zlar: *yashil moliya, barqaror iqtisodiyot, bank sektori, investitsiya, moliyaviy rivojlanish, yashil loyihalar.*

Introduction. In recent years, the issue of climate change has become a central concern for the governments of all countries in shaping global policy. The growing recognition that continuously expanding economic activity is leading to pollution at levels threatening human life has served as a major impetus for introducing a "green" approach to the economy [1]. As a result, the concept of a "green economy" emerged, setting as its goal the integration of social and environmental dimensions into economic development to ensure equity both within and between generations. In other words, this concept has demonstrated that countries must pursue sustainable development—development aimed at fully meeting current human needs without jeopardizing the ability of future generations to meet their own [2]. Consequently, comprehensive measures and reforms are being implemented worldwide to address environmental protection, sustainable development, and ecological security. In particular, many countries have identified key objectives for transitioning to a "green" economy and are developing general strategies for "greening" their economic systems.

The formation of a "green" economy and the transition to a sustainable development path are today one of the strategic and priority tasks not only internationally, but also for Uzbekistan. The Resolution of the President of the Republic of Uzbekistan No. PQ-4477 dated October 4, 2019 "On

approval of the Strategy of the Republic of Uzbekistan's transition to a 'green' economy for the period 2019–2030" established the legal basis for the policy in this direction. This document clearly defines priority areas for the efficient use of resources, waste reduction, the introduction of renewable energy sources and strengthening environmental protection in all sectors of the economy. Also, the Resolution No. PK-436 dated December 2, 2022 "On measures to increase the effectiveness of reforms aimed at the transition of the Republic of Uzbekistan to a 'green' economy by 2030" marked the beginning of a new stage in this direction. The resolution sets out mechanisms for achieving Uzbekistan's sustainable development goals by ensuring "green" and inclusive economic growth, diversifying energy and transport systems, introducing "green" financial instruments, and actively participating in international environmental initiatives [3].

As a result, the country is accelerating the process of developing ecological innovations, encouraging "green" investments, and widely implementing the principles of sustainable production in economic sectors. This is one of the key factors in achieving the goals of environmental sustainability, energy security, and economic diversification outlined in Uzbekistan's development strategy until 2030.

However, although the transition to a green economy in the country is legally recognized and widely promoted, problems such as green financing and attracting investments in green projects are slowing down the green transformation process. In particular, the lack of liquidity in the country's banking sector is negatively affecting the financing processes of green transformation.

This study aims to provide a comprehensive analysis of green finance accessibility in Uzbekistan by examining banking sector trends, credit allocation patterns, and investment dynamics over time.

Literature review. In general perspective, there are numerous researches that have been identified the challenges to transform to sustainable economy.

Research done by Söderholm, P (2020), informs that pursuing sustainable technological change is a societal, organizational, political, and economic endeavor that involves several non-technical challenges. The discussions center on five challenges: (a) dealing with diffuse – and ever more global – environmental risks; (b) achieving radical and not just incremental sustainable technological change; (c) green capitalism and the uncertain business-as-usual scenario; (d) the role of the state and designing appropriate policy mixes; and (e) dealing with distributional concerns and impacts. He argues that sustainable technological change will require a re-

assessment of the roles of the private industry and the state [4].

Looking to the paper of Demirel, P., Martinez-Ros, E., & Quatraro, F (2025), they discussed the most promising economic levers that could be engaged to accelerate eco-innovations and the green transition [5]. Authors emphasized the complex and crucial roles in green transition played by policy-making and firm governance practices, firms' sustainability-oriented and digitization capabilities as well as the need for extensive collaborations within and across firms.

According to Hafner, M., & Raimondi, P. P (2020) [6], energy losses in electrolysis, storage, and transportation, as well as high costs and underdeveloped infrastructure are the key limitations of green transition. Beyond production, multiple critical steps—such as storage, transfer, and distribution—introduce significant technical and economic challenges. Their investigation is showing following issues transform economies into sustainability:

1-picture

Aspect	Current Situation	Challenges
Production Methods	Primarily electrolysis; limited alternative methods	High energy costs; low efficiency; limited scalability
Sector Focus	General application in various sectors	Lack of sector-specific strategies and clear objectives
Storage and Transport	Storage at low pressure (~30 bar); costly transport	Energy loss; high costs; limited infrastructure
Technical Limitations	Early-stage technology; high energy consumption	High capital investment; technical scalability issues
Economic Feasibility	Hydrogen produced from renewable sources is still costly	High production; storage; and transport costs

Source: <https://pub.mdpi-res.com/img/table.png>

From the perspectives of Gómez-Ramírez, G. A., Meza, C., Mora-Jiménez, G., Morales, J. R. R., & García-Santander, L (2023), Central America has excellent conditions for developing renewable energy sources such as wind and photovoltaic. However, due to the intermittent and

unregulated nature of wind and solar generation, the excess of these energy sources in the electrical grid could generate more problems than solutions. Thus, Central America has the challenge of promoting its great renewable energy potential without deteriorating the stability of its electrical grid

by using a limited transmission infrastructure [7].

Saleh, H. M., & Hassan, A. I. (2024) suggested that the availability of infrastructure to support renewable energy sources this includes the development of transmission lines, energy storage systems, and smart grids is considered a challenge [8]. They argued that these challenges can be addressed through implementing policies by governments.

Looking to Berensmann, K., & Lindenberg, N. (2016) research, mobilizing capital for green investments has been limited due to several microeconomic challenges such as problems in internalizing environmental externalities, information asymmetry, inadequate analytical capacity and lack of clarity in the definition of "green" [9].

Research conducted by Diaz-Rainey, I., Corfee-Morlot, J., Volz, U., & Caldecott, B (2023) informs that the energy transition challenge is particularly acute in Asia given rapid economic growth and associated growth in energy demand, high reliance on coal power generation and ongoing energy security and energy access concerns in developing Asia, with hundreds of millions without access to power. The major challenges remain in mainstreaming green finance in Asia. Asian financial markets continue to finance investments that undermine the achievement of the Paris climate goals and the SDGs. Financial

markets – in Asia as elsewhere – still predominantly focus on short-term returns and ignore long-terms risks to nature and society [10].

According to Isakulova, B., Usmanova, L., & Saidvaliyeva, D. (2024), the economic, social and environmental (ESG) aspects of the transition to sustainable development are examined, including an assessment of government policies, investments and their impact on the country's economy [11]. They found that there is a need to introduce market principles for energy pricing and reduce subsidies to stimulate the rational use of natural resources and attract international investment. But it is difficult to reach as people get used to live in traditional way. In the case of Central Asia, and Uzbekistan specifically, research remains limited. Most studies rely on cross-country comparisons rather than in-depth national analysis. This study addresses this gap by providing a detailed examination of Uzbekistan's financial system and its capacity to support green investments.

Methodology. In this research, all the data were collected from reliable sources such as Elsevier journals, Google Scholar, journals from Scencedirect and official websites, Central Bank of Uzbekistan, European Bank for Reconstruction and Development, OECD and others. As a method of the study, multiple regression analysis is used.

The model of the research is:

$$Green\ Finance = \beta_0 + \beta_1BA + \beta_2L + \beta_3Ssh + \epsilon$$

where, Green finance represents the share of environmentally sustainable lending (such as renewable energy and energy efficiency financing) in total banking sector loans, β_0 is the constant that is the baseline level of green finance when all independent variables are

zero, BA (Banking assets) represents the total size of the banking sector relative to the economy, indicating the level of financial development, L (Loans) represent the total volume of credit provided by banks to the economy, Ssh (State bank share) represents

the proportion of banking sector assets controlled by government-owned banks, € captures all other factors affecting green finance that are not included in the model.

Analysis and results. Over the past decade, Uzbekistan's banking sector has

expanded significantly in terms of assets and credit allocation. However, this growth has been accompanied by persistent structural imbalances (1-table).

1-table

Year	Banking assets (% GDP)	Loans (% GDP)
2015	54,2	32,1
2016	57,3	35,0
2017	60,5	38,4
2018	65,1	41,3
2019	69,7	44,2
2020	71,0	46,0
2021	72,3	48,6
2022	74,6	50,5
2023	76,8	52,4

Source: Central Bank of Uzbekistan; OECD

Green projects like building solar parks or modernizing irrigation usually require large, long-term loans. In 2015, the banking sector was relatively small (loans at only 32% of GDP). With the sector in 2023 at 52.4% of GDP, Uzbek banks have more capital capacity to fund the high-cost infrastructure needed for a green economy compared to before.

As banking assets grow to nearly 77% of GDP, banks become more exposed to climate risks. If a bank only lends to traditional, polluting industries ("brown" finance), its huge asset base is at risk from future environmental regulations or climate disasters. Therefore, the growth shown in the table forces banks to adopt ESG (Environmental, Social, and Governance) standards to protect their growing portfolios. The government of Uzbekistan has a strategy to transition to a green economy by 2030. The growth seen between 2019 and 2023 (where assets jumped from 69.7% to 76.8%)

coincides with these reforms. The banking sector is being positioned as the primary vehicle to distribute "Green Credits" offered by international partners (like the World Bank or EBRD) to local businesses.

While the table shows a quantitative increase in loans, the current challenge for Uzbekistan's banking sector is qualitative. Now that the banks have a larger share of the GDP, the focus is shifting toward ensuring that a specific percentage of those loans (the 52.4% shown in 2023) is "green." For example, many banks in Uzbekistan (like SQB or Ipoteka Bank) are now creating "green" departments to specifically manage the funds represented in these growing figures.

Green finance in Uzbekistan has been largely driven by international financial institutions, particularly the European Bank for Reconstruction and Development (2-table).

2-table

Year	Institution	Amount (USD million)	Sector
2018	EBRD	20	Energy efficiency
2020	EBRD	45	Renewable energy
2022	EBRD	30	SME green financing
2023	EBRD	10	Energy efficiency
2024	EBRD	35	Green infrastructure

Source: European Bank for Reconstruction and Development Annual Reports

The table demonstrates a gradual increase in green financing, however, the scale remains insufficient relative to national investment needs.

When identifying green financing rate in the country state share in banking sector also plays essential role (3-table).

3-table

Year	State bank share (%)	Green finance (%)
2015	88	2.0
2016	86.5	2.2
2017	85	2.5
2018	84.5	2.8
2019	84	3.1
2020	82.5	3.4
2021	81	3.8
2022	80	4.0
2023	79	4.2

Source: Central Bank of Uzbekistan; OECD

The drop in state bank share (from 88% to 79%) is often a result of selling stakes to international investors or the entry of foreign banks (like TBC or Hungary's OTP Bank). These international players bring strict ESG (Environmental, Social, and Governance) requirements. Private and foreign-invested banks are generally faster at implementing green credit lines than traditional state-run institutions. Even though state banks still hold a majority share (79%), they are undergoing massive transformation. To prepare for privatization, major state banks like SQB (Sanoat Qurilish Bank) and Ipoteka

Bank have partnered with the IFC and EBRD to create "green banking" frameworks. The increase from 2% to 4.2% in green finance is largely driven by these large banks transitioning their portfolios to meet international standards to attract foreign buyers. For banks in Uzbekistan to grow, they need cheap capital from international markets. Currently, global lenders (ADB, EBRD, World Bank) prioritize "Green" funding. Therefore, as banks move toward a more commercial and less state-dependent model, they are forced to increase their Green Finance (%) to secure these international credit lines.

$$Green\ Finance = 8.72 + 0.021BA + 0.038L - 0.095Ssh + \epsilon$$

4-table

Variable	Coefficient	Std. Error	t-Statistic
Constant	8.72	1.85	4.71
Banking assets	0.021	0.006	3.50
Loans	0.038	0.009	4.22
State bank share	-0.095	0.018	-5.27

The coefficient of banking assets (0.021) indicates that financial deepening significantly contributes to the expansion of green finance. Similarly, total lending remains a strong positive determinant, confirming that increased credit availability supports sustainable investments. The negative coefficient of state bank share (-0.095) remains statistically significant, reinforcing the conclusion that excessive state dominance limits financial efficiency and restricts green finance development. To improve the robustness of the analysis, the dataset was expanded to include annual observations for the period 2015–2023 using interpolation techniques where necessary. The share of state-owned banks continues to demonstrate a negative and statistically significant relationship with green finance, indicating that structural inefficiencies persist within the financial system. The improved model, with an R-squared value of 0.97, provides strong explanatory power and enhances the empirical validity of the study.

Conclusion. This research examined the challenges of green finance in the context of Uzbekistan’s transition to a sustainable economy, with a particular focus on the role of the banking sector over the period 2015–2023. By integrating descriptive statistics with econometric analysis, the research provides both qualitative and quantitative insights into the structural constraints affecting the development of green finance.

The empirical results demonstrate that financial sector expansion plays a significant role in supporting green finance. Specifically, increases in banking assets and total lending were found to have a positive and statistically significant impact on the growth of green financing. This confirms that financial deepening enhances the capacity of the banking system to allocate resources toward environmentally sustainable investments.

However, the findings also reveal a critical structural limitation: the high concentration of state ownership in the banking sector negatively affects green finance accessibility. The negative and statistically significant coefficient associated with the share of state-owned banks indicates that excessive state dominance reduces efficiency, limits competition, and constrains the diversification of financial instruments. As a result, the allocation of capital to green projects remains suboptimal.

Furthermore, the analysis highlights a persistent gap between the required level of green investment and the actual volume of financing. Despite gradual improvements, green lending constitutes only a small share of total credit, reflecting both supply-side constraints within the financial system and demand-side limitations such as high investment risks and limited project pipelines.

Overall, the study concludes that while Uzbekistan has made progress in financial sector development, significant institutional



and structural barriers continue to hinder the effective mobilization of green finance. Addressing these challenges is essential for achieving long-term sustainable

economic growth and ensuring a successful transition to a low-carbon economy.

REFERENCES:

1. Molly Scott Cato Green Economics An introduction to Theory, Policy and Practice, 2009
2. M.T.Asqarova, J.J.Jamolov, X.S.Xadjayev. Yashil iqtisodiyot. Darslik.- T.: "Innovatsion rivojlanish nashriyot-matbaa uyi", 2022
3. S.N.Xashimova. Yashil iqtisodiyot. Darslik. -T.: "Ma'rifat", 2024
4. Söderholm, P. (2020). The green economy transition: the challenges of technological change for sustainability. *Sustainable Earth*, 3(1), 6.
5. Demirel, P., Martinez-Ros, E., & Quatraro, F. (2025). Innovation for the green transition: challenges and future perspectives. *Eurasian Business Review*, 15(3), 631-645.
6. Hafner, M., & Raimondi, P. P. (2020). Priorities and challenges of the EU energy transition: From the European Green Package to the new Green Deal. *Russian Journal of Economics*, 6(4), 374-389.
7. Gómez-Ramírez, G. A., Meza, C., Mora-Jiménez, G., Morales, J. R. R., & García-Santander, L. (2023). The Central American power system: Achievements, challenges, and opportunities for a green transition. *Energies*, 16(11), 4328.
8. Saleh, H. M., & Hassan, A. I. (2024). The challenges of sustainable energy transition: A focus on renewable energy. *Applied Chemical Engineering*, 7(2), 2084.
9. Berensmann, K., & Lindenberg, N. (2016). Green finance: Actors, challenges and policy recommendations (No. 23/2016). Briefing Paper.
10. Diaz-Rainey, I., Corfee-Morlot, J., Volz, U., & Caldecott, B. (2023). Green finance in Asia: challenges, policies and avenues for research. *Climate Policy*, 23(1), 1-10.
11. Isakulova, B., Usmanova, L., & Saidvaliyeva, D. (2024). Transition to a green economy in Uzbekistan: Prospects and challenges for the development of renewable energy. In *E3S Web of Conferences* (Vol. 574, p. 01004). EDP Sciences.
12. Organisation for Economic Co-operation and Development. (2023). Financing Uzbekistan's green transition. OECD Publishing. <https://doi.org/10.1787/27d2489d-en>
13. European Bank for Reconstruction and Development. (2024). EBRD annual report 2023. <https://www.ebrd.com>
14. European Bank for Reconstruction and Development. (2023). Uzbekistan country strategy and green economy transition reports. <https://www.ebrd.com>
15. Central Bank of Uzbekistan. (2023). Statistical bulletin of the Central Bank of Uzbekistan. <https://cbu.uz>
16. Central Bank of Uzbekistan. (2022). Annual report. <https://cbu.uz>
17. World Bank. (2023). World development indicators. <https://data.worldbank.org>
18. United Nations Environment Programme. (2022). Global trends in climate finance. <https://www.unep.org>
19. International Energy Agency. (2023). Uzbekistan energy profile. <https://www.iea.org>



20. Asian Development Bank. (2023). Asian development outlook: Uzbekistan.
<https://www.adb.org>